Stormwater Management Report and Servicing Brief

Site 2 National Capital Business Park
1100 Last Mile Drive
Ottawa, ON

Prepared for:

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TABLE OF CONTENTS

1 INTRODUCTION AND SITE DESCRIPTION 1
2 EXISTING SITE AND DRAINAGE DESCRIPTION 2
3 SCOPE OF WORK 2
4 REGULATORY APPROVALS 3
5 SUPPORTING REPORTS AND STUDIES 3
6 WATER SUPPLY AND FIRE PROTECTION 4
6.1 Existing Water Supply Services and Fire Hydrant Coverage 4
6.2 Water Supply Servicing Design 4
7 SANITARY SERVICE 7
7.1 Existing Sanitary Sewer Services 7
7.2 Sanitary Sewer Servicing Design 7
8 STORMWATER MANAGEMENT 7
8.1 Existing Stormwater Infrastructure 7
8.2 Design Criteria 8
8.2.1 Water Quality 8
8.2.2 Water Quantity 9
8.2.3 Water Balance Mitigation and Downstream Erosion Control 9
8.3 Stormwater Release Rate Method of Analysis 9
8.4 Proposed Stormwater Management Design 9
8.4.1 Outlet 1 – Site 1, Huntclub Road Culvert, McEwan Creek 9
8.4.2 Outlet 2 – McEwan SWM Pond Facility 10
8.4.3 Water Budget and Infiltration 14
9 EROSION AND SEDIMENT CONTROL 15
10 CONCLUSION 15
11 REPORT CONDITIONS AND LIMITATIONS 17

APPENDICES

Appendix A **Pre-consultation / Correspondence**

Appendix B **Servicing Development Application Checklist**

Appendix C **Water Supply Calculations**

Appendix D **City of Ottawa Boundary Conditions**

Appendix E **FUS Fire Flow Calculations**

Appendix F **Wastewater Collection Calculation**

Appendix G **Stormwater Management Design Criteria Summary**

Appendix H **Pre and Post Development Watersheds**

Appendix I **Storm Sewer Sizing Calculations**

Appendix J **Stormwater Management Calculations (Outlet 1)**

Appendix K **Stormwater Management Calculations (Outlet 2)**

Appendix L **Site 1 Approved Stormwater Management Plan**

Appendix M **Watts Roof Drain Specification**

Appendix N **Outlet 1 Stormceptor OGS**

Appendix O **Low Impact Development Planning and Design Fact Sheets**

Appendix P **Civil Engineering Drawings**

Appendix Q **Proposed Site Plan**

Appendix R **Legal Survey**

LIST OF TABLES

Table 1: City of Ottawa Design Guidelines Design Parameters 4
Table 2: Summary of Anticipated Demands 5
Table 3: Summary of Anticipated Demands and Boundary Conditions at Road Connection 6
Table 4: Fire Protection Summary Table 6
Table 5: Outlet 1 Pre-development flows, Allowable Post Development Release 9
Table 6:Outlet 2 Pre-development flows 10
Table 7:Stormwater Release Rate & Storage Volume Summary 12

LIST OF FIGURES

Figure 1 – Arial View of Proposed Development 1
Figure 2 – Pre Development Runoff Delineation 8

1 INTRODUCTION AND SITE DESCRIPTION

LRL Associates Ltd. was retained by Avenue 31 Capital Inc. to complete a Stormwater Management Analysis and Servicing Brief for the development of one (1) Industrial building surface parking areas, landscaping and gravel outdoor storage within Site 2 of the National Capital Business Park, located at 1100 Last Mile Drive in Ottawa ON.

The subject property is legally described as Part 14 and 15, Part of Lot 5, Concession C (Rideau Front) in the geographic township of Gloucester in the City of Ottawa. The subject lot is zoned IH (Heavy Industrial Zone). The total site area is approximately **6.11 Ha**.

Figure 1: Arial View of Proposed Development

The proposed development includes a single industrial building with surface parking, vehicular maneuverability, loading docks and associated site features. The building is located central on the parcel, with car parking in front of the main entrances to fronting the North property line along Last Mile drive. To the rear of the building, there is outdoor surface space allocated to loading docks and trailer parking to provide optimum functionality to the end user of the proposed

industrial building. The building has a proposed floor area of approximately 18,763m^2. Refer to the Site Plan included in ***Appendix Q*** for more details***.***

This report has been prepared in consideration of the terms and conditions noted above and with the civil drawings prepared for the new development. Should there be any changes in the design features, which may relate to the stormwater and servicing considerations, LRL Associates Ltd. should be advised to review the report recommendations.

2 EXISTING SITE AND DRAINAGE DESCRIPTION

The subject site measures ***6.11 ha*** and currently consists of two separate parts in Lot 5, Concession 6 each. The site is currently vacant and landscaped. The site is generally flat with elevations ranging from 79.9m at the west corner of the site to 77.7m at the east corner of the site. The majority of the site drains to the southeast property line towards a storm pond located to the southeast of the site. The remainder of the site drains northeast towards an easement located along the northeast property line of the site, which ultimately conveys flows towards the southeast property line.

Sewer and watermain mapping, along with as-built information collected from the City of Ottawa indicate the following existing infrastructure located within the adjacent right-of-ways:

Last Mile Drive:

- 250mm PVC watermain
- 250mm PVC sanitary sewer located northwest of the site

There are no storm sewers located within Last Mile Drive as the cross section is a 20.m rural right-of-way cross section with roadside ditches. Additionally, there's a storm pond located to the southeast of the site. This is referenced to as the McEwan Creek Stormwater Management Facility.

3 SCOPE OF WORK

As per applicable guidelines, and consultation with the City of Ottawa and RVCA staff, the following items will be completed and conclusions will be considered during the detailed design of the site:

Water Supply

- Calculate the expected water supply demand at average and peak conditions.
- Calculate the required fire flow as per the Fire Underwriters Survey (FUS) method.
- Confirm the adequacy of water supply and pressure during peak flow and fire flow.
- Describe the proposed water distribution network and connection to the existing system.

Stormwater Management

- Calculate the allowable stormwater release rate.

- Calculate the anticipated post-development stormwater release rates.
- Demonstrate how the target quantity and quality objectives will be achieved.
- Incorporate low impact development measures and additional infiltration on site to reduce the impact the flow from the development could have on erosion in the downstream McEwen Creek. This will also mitigate the impacts of the development on the water balance/infiltration in post development conditions.

Sanitary Discharge

- Describe the existing sanitary sewers available to receive wastewater from the building.
- Calculate peak flow rates from the development.
- Describe the proposed sanitary sewer system.
- Review impact of increased sanitary flow on downstream sanitary sewer.

4 REGULATORY APPROVALS

The proposed development is subject to the Site Plan Control approval process within the City of Ottawa. Additionally, flow from the site ultimately drains to downstream watercourses regulated by the Rideau Valley conservation Authority.

An MECP Environmental Compliance Approval is expected to be required for installation of the proposed storm and sanitary sewers within the site. A Permit to Take Water is not anticipated to be required for pumping requirements for sewer installation. No other approval requirements from other regulatory agencies are anticipated.

5 SUPPORTING REPORTS AND STUDIES

The following reports were referenced during the design of the subject site:

- Functional Servicing Report for National Capital Business Park – 4120 & 4055 Russell Road, prepared by DSEL, dated March 2020.
- Servicing Design Brief for National Capital Business Park – Last Mile Drive, prepared by DSEL, dated March 2021.
- Green's Creek Watershed Integrated Fluvial Geomorphological and Hydrological Study, prepared by JTB Environmental Systems Inc. and J.F. Sabourin & Associates Inc., dated March 2009.
- Preliminary Geotechnical Investigation, Proposed Commercial/Industrial Complex, 4055 and 4120 Russell Road, prepared by Patterson Group, Dated January 2020.
- McEwen Creek Stormwater Management Facility Design Brief, Prepared by IBI Group, Dated November 2009.
- Hydrogeological Study, Proposed National Capital Business Park, Site 2, Prepared by Patterson Group, dated December 2022.

6 WATER SUPPLY AND FIRE PROTECTION

6.1 Existing Water Supply Services and Fire Hydrant Coverage

The subject property lies within the City of Ottawa 2W2C water distribution network pressure zone. There is an existing 250 mm watermain within Last Mile Drive. Two stubs have been extended from the existing watermain into the subject site for connection. There are currently seven (7) existing fire hydrants within close proximity to the subject property. Refer to ***Appendix C*** for the location of fire hydrants.

6.2 Water Supply Servicing Design

It is proposed that one (1) industrial building will be constructed on this site. Two (2) water services will be provided to the building via the 250mm watermain stubs extended from the existing watermain located within Last Mile Drive. The two services (required as per City as per Technical bulletin ISTB-20-03) will enter central into the front of the building. Refer to *Site Servicing Plan* C.401 in ***Appendix P*** for servicing layout and connection points.

Table 1 below summarizes the City of Ottawa Design Guidelines design parameters employed in the preparation of the water demand estimate.

Table 1: City of Ottawa Design Guidelines Design Parameters

Parameter	Value
Minimum Depth of Cover	2.4m
Desired operating pressure during maximum daily flow	345 kPa (50 psi) and 552 kPa (80 psi)
Minimum allowable pressure during peak hour flow	275 kPa (40 psi)
Minimum allowable pressure during maximum daily + fire flow	275 kPa (20 psi)
Average Day Demand	
Residential	280 L/c/d
Industrial - Light	35,000 L/gross ha/d
Industrial - Heavy	55,000 L/gross ha/d
Maximum Daily Demand	
Residential	2.5 x avg. day
Industrial	1.5 x avg. day
Commercial	1.5 x avg. day
Institutional	1.5 x avg. day
Maximum Hour Demand	
Residential	2.2 x max. day
Industrial	1.8 x max. day
Commercial	1.8 x max. day
Institutional	1.8 x max. day

The proposed gross area of each industrial building is approximately 18 763 m^2 with approximately 1 280m^2 of office space. Based on the *City of Ottawa Design Guidelines for Consumption Rates*, to the buildings' use were considered industrial-light with a consumption rate

of 35,000 L/gross ha/ day and have assumed the consumption rate for the office spaces to be 75L/9.3m^2/d.

The required water supply for the industrial buildings has been calculated using the following formula:

$$\boldsymbol{Q} = (\boldsymbol{q} \times \boldsymbol{A} \times \boldsymbol{M})$$

Where,

q = average water consumption (L/gross ha/day for industrial space and 75L/9.3m^2/d for office space)

A = area (ha for industrial space and m^2 for office space)

M = Peak factor

The following factors were used in calculations as per Table 4.2 in the City of Ottawa Design Guidelines;

- Maximum Daily Demand Industrial Factor = **1.5** x Avg Day
- Peak Hour Demand Industrial Factor = **1.8 x Max Day**

Using the above-mentioned factors and design parameters listed in Table 1, total anticipated demands were calculated as follows:

- Average daily domestic water demand is **0.84** L/s,
- Maximum daily demand is **1.27** L/s, and
- Maximum hourly is **1.52** L/s.

Table 2 below summarizes anticipated demands. Refer to ***Appendix C*** for water demand calculations.

Table 2: Summary of Anticipated Demands

Design Parameter	Anticipated Demands (L/s)
Average Daily Demand	0.84
Max Day + Fire Flow (per FUS)	1.27 + 233.3
Peak Hour	1.52
*Water demand calculation per City of Ottawa Water Design guidelines. **See Appendix C** for details.*	

The City of Ottawa was contacted to obtain boundary conditions associated with the estimated water demand. Correspondence has been included in ***Appendix D*** with the provided boundary conditions summarized in Table 3 on the following page.

Table 3: Summary of Anticipated Demands and Boundary Conditions at Road Connection

Scenario	Anticipated Demand (L/s)	Boundary Conditions @ Last Mile Drive (North Connection) * (m H2O/psi)	Boundary Conditions @ Last Mile Drive (West Connection)* (m H2O/psi)
Average Daily Demand	0.84	130.7/76.76	130.7/76.69
Peak Hour Demand	1.52	123.8/66.94	123.8/66.87
Max Day +Fire Flow	232.85	108.4/45.03	107.7/43.97
**Assumed ground elevation at connection points are 79.15 (North Connection) and 79.2 (West Connection)*			

Based on the information provided, it was concluded that the pressure in all design scenarios meet the required pressure ranges outlined in table 1 at the two connections.

The estimated fire flow for the proposed buildings was calculated in accordance with *ISTB-2018-02*. The following parameters were provided by the Architect, see ***Appendix E*** for collaborating correspondence and Fire Flow Calculations:

- Type of construction – Non-Combustible;
- Occupancy type –Combustible; and
- Sprinkler Protection – Automatic Sprinkler System.

The estimated fire flow demand was estimated to be **14,000 L/min**. There are seven (7) existing fire hydrants located in close proximity to the proposed buildings that are available to provide the required fire flow demands. Refer to ***Appendix C*** for fire flow calculations and fire hydrant locations. Table 4 below summarizes the aggregate fire flow of the contributing hydrants in close proximity to the proposed building based on Table 18.5.4.3 of *ISTB-2018-02*.

Table 4: Fire Protection Summary Table

Fire Flow Demand (L/min)	Fire Hydrants(s) within 75m	Fire Hydrant(s) within 150m	Fire Hydrant(s) within 300m	Available Combined Fire Flow (L/min)
14,000	1	4	2	(1 x 5678) + (4x 3785) + (2 x 2839) = 26 496

The total available fire flow from the contributing hydrants is equal to **26,496 L/min**. This is sufficient to provide adequate fire flow for the proposed development. A certified fire protection system specialist will need to be employed to design the building's fire suppression system and confirm the actual fire flow demand.

The proposed water supply design conforms to all relevant City Guidelines and Policies.

7 SANITARY SERVICE

7.1 Existing Sanitary Sewer Services

The subject property is tributary to the Green Creek Collector south trunk sewer. There is an existing 250 mm diameter sanitary sewer within Last Mile Drive.

7.2 Sanitary Sewer Servicing Design

The sanitary flows from the industrial building is proposed to connect to the existing manhole SAN MH201A which extends into the subject site along the north property line from the existing 250mm diameter sanitary sewer within Last Mile Drive. Refer to LRL drawing C.401, included in **Appendix P,** for the proposed sanitary servicing.

The total post-development wet flow for the site was calculated to be **5.64 L/s**. The parameters used to calculate the anticipated flows for the industrial portions of the building were an Average Light Industrial Flow of 35,000 L/ha/day as per the City of Ottawa Design Guidelines, an infiltration allowance of 0.33 L/s/ha and an industrial peak factor of 7.0. The parameters used to calculate the anticipated flows for the office spaces within the buildings were as assumed flow rate for the office spaces of 75L/9.3m^2/d, an infiltration allowance of 0.33 L/s/ha and a peak factor of 1.5.

Refer to ***Appendix F*** for further information on the calculated sanitary flows.

8 STORMWATER MANAGEMENT

8.1 Existing Stormwater Infrastructure

The subject property is undeveloped currently with no existing infrastructure on site. Recently the roadway surrounding the site to the north and the west, Last Mile Drive, was constructed with a rural cross-section including gravel shoulders and roadside ditches. There is currently no storm sewers located within Last Mile Drive surrounding the site.

The site is a is tributary to the McEwan Creek Watershed with all flow on site ultimately making it's way to McEwan Creek.

In pre-development conditions, drainage from the subject site is depicted by existing watersheds EWS-01 (2.095 ha) and EWS-02 (4.400 ha). The existing topography creates the divide as shown in the figure on the following page, defining two separate outlets; Outlet 1, conveying through NCBP Site 1 to the east, and Outlet 2, conveying into the McEwan Creek SWM Facility.

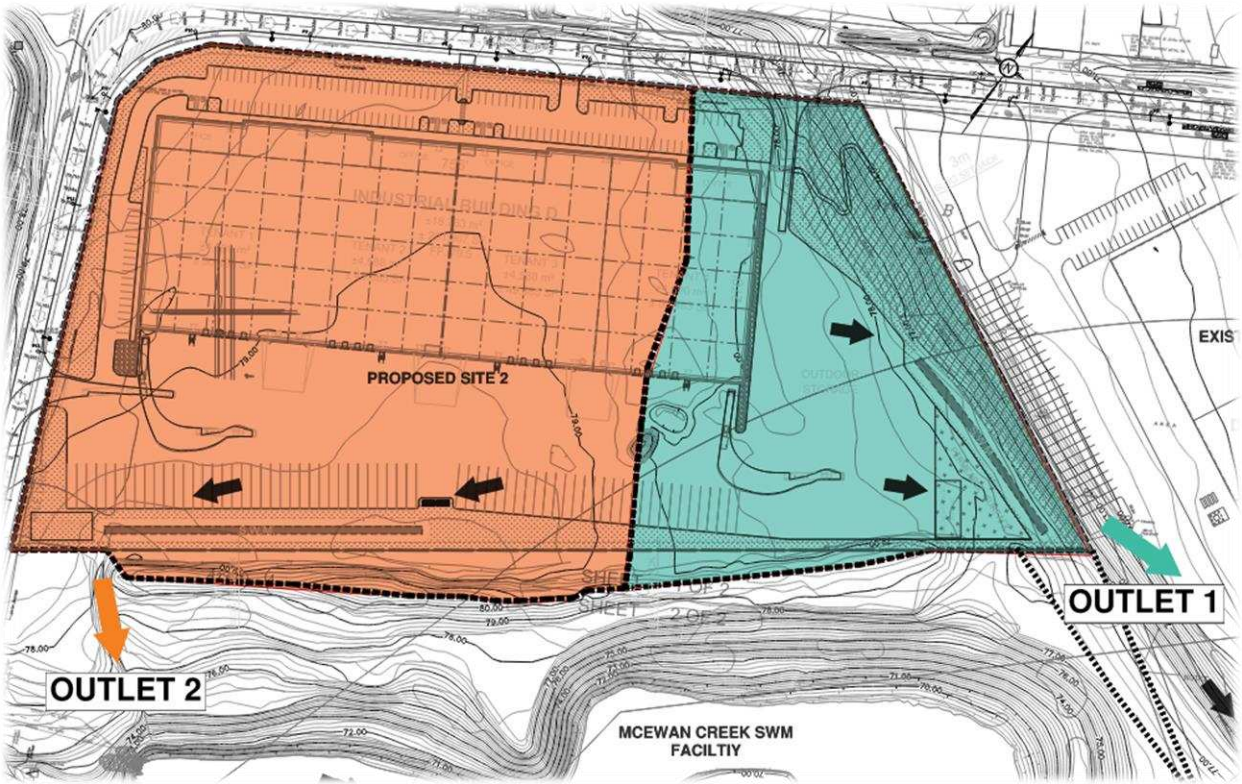

Figure 2: Pre Development Runoff Delineation

EWS-01 drains uncontrolled overland east towards neighboring parcel, Site 1 NCBP, and is conveyed via swales and a culvert under Hunt Club Road, ultimately reaching McEwan Creek. EWS-02 drains uncontrolled overland south towards McEwan Creek SWM Pond Facility with much of the drainage route being directed through an existing swale within the pond property. Refer to plan C701 included in ***Appendix P*** for pre-development drainage characteristics.

8.2 Design Criteria

The stormwater management criteria for this development is based on the pre-consultation with City of Ottawa officials, RVCA, the City of Ottawa Sewer Design Guidelines including City of Ottawa Stormwater Management Design Guidelines, 2012 (City Standards), as well as the Ministry of the Environment's Stormwater Management Planning and Design Manual, 2003 (SWMP Manual). ***Appendix G*** includes a figure summarizing the Stormwater Management Criteria for each outlet of the site.

8.2.1 Water Quality

The subject property lies within the Ottawa River East sub-watershed and is therefore subject to review by the Rideau Valley Conservation Authority (RVCA). It was determined that 'enhanced' treatment (80% TSS Removal) is required for stormwater runoff from the proposed development. Correspondence with RVCA is included in ***Appendix A***.

For the portion of the subject site draining to McEwens Creek Stormwater Facility, a combined removal of 80% TSS is required, 70% achieved through the pond.

8.2.2 Water Quantity

Based on pre-consultation with the City, correspondence included in ***Appendix A***, the following stormwater management requirements were identified for the subject site:

- Control post-development flows to pre-development flows.
- Attenuate all storms up to and including the City of Ottawa 100-year storm event on site.

8.2.3 Water Balance Mitigation and Downstream Erosion Control

Based on correspondence with the NCC and the RVCA, it was recommended that on site SWM controls be implemented to infiltrate 10mm of runoff by introducing a combination of best management practices and low impact design measures. This will result in an overall runoff volume reduction.

8.3 Stormwater Release Rate Method of Analysis

The Modified Rational Method has been used to calculate the runoff rate from the site to quantify the detention storage required for quantity control of the development. Refer to ***Appendix J*** *and* ***Appendix K*** for storage calculations.

8.4 Proposed Stormwater Management Design

The site has been analyzed and post-development watersheds have been allocated. To adhere to existing drainage characteristics, two outlets are proposed. The following sections detail the design for each outlet; Outlet 1 directed to NCBP Site 1 and Huntclub Road culvert, and Outlet 2, directed to McEwen SWM Pond Facility.

8.4.1 Outlet 1 – Site 1, Huntclub Road Culvert, McEwan Creek

The eastern part of the site has been analyzed and two (2) post-development watersheds which will drain to Outlet 1 have been allocated. It is proposed that these watersheds will adhere to the drainage characteristics and pre-development flow rate of existing watershed EWS-01.

During the detailed design of Site 1 of the NCBP issued in 2021 by DSEL, considerations were given to the runoff coming from this site by ensuring a swale along the border was designed to intercept the runoff prior to it entering into the developed site. The Stormwater management plan outlining this existing watershed has been included in ***Appendix L*** for reference. Table 5 below summarizes the 2-yr & 100-yr pre-development flows for EWS01 which would set the allowable release rates for outlet 1.

Table 5: Outlet 1 Pre-development flows, Allowable Post Development Release

Drainage Area Name	2-yr Flow (L/s)	100-yr Flow (L/s)
EWS-01	64.02	147.75

As shown in Table 5, the allowable release rates for Outlet 1 were identified as **64.02 L/s** and **147.75 L/s** for the 2-yr and 100-yr flows respectively.

The post-development watersheds were allocated as follow;

Watershed WS-100 (0.551ha) consisting mainly of grass and a large sloped area of the site will flow uncontrolled east as per existing conditions. Runoff will surface drain towards the eastern property line into an existing swale located within Site 1. The swale will convey flows to Hunt Club road-side ditch and ultimately to the McEwan Creek.

Watershed WS-101 (0.803ha) consists of travel way and outdoor storage area with a small portion of landscaping on the south border of the site. This will drain overland, enter the retention area, with some characteristics of an enhanced grass swale before being controlled at the outlet and conveyed offsite to the swale along the border of Site 1.

The post development flows exceeding the allowable release rate for this outlet will be retained on site with storage provided in a grass depression area with 3:1 side slopes, and a flat bottom. This retention area will also provide the opportunity for infiltration to the underlying sols while providing the storage required during rainfall events. The depressed area has been sized to provide adequate detention for events greater than the 1:100year storm.

Refer to ***Appendix H*** for watershed area's and a summary of the weighted runoff coefficients.

To attenuate flows to **the** allowable release rates, it is calculated that a total of **93.59 m^3** and **209.05 m^3** of storage will be required in the 2-yr and 100-yr storm respectively. Captured flows will be restricted via a proposed orifice plate **230mm** diameter ICD located in DICB02 in the stormwater retention area. Refer to ***Appendix J*** for detailed stormwater calculations.

The required storage is proposed within the eastern retention area on site which is demonstrated on drawing "C601 – Stormwater Management Plan" of ***Appendix P***.

8.4.1.1 Quality Control

To meet stormwater quality control identified by RVCA, a **Stormceptor EF06** Oil/Grit Separator is proposed to provide enhanced (80% TSS removal) treatment. Refer to C401 for location of OGS an ***Appendix N*** for sizing report and specs.

8.4.2 Outlet 2 – McEwan SWM Pond Facility

The western portion of the site has been analyzed and seven (7) post-development watersheds which will drain to Outlet 2 have been allocated. It is proposed that these watersheds will adhere to the drainage characteristics and pre-development flow rate of existing watershed EWS-02 also draining in the same direction in pre-development conditions. Table 6 below shows the 2-yr & 100-yr pre-development flows for EWS01 which would set the allowable release rates for Outlet 2.

Table 6:Outlet 2 Pre-development flows

Drainage Area Name	2-yr Flow (L/s)	100-yr Flow (L/s)
EWS-02	68.81	156.96

As shown in Table 6, the allowable release rates for Outlet 2 were identified as **68.81 L/s** and **156.96L/s** for the 2-yr and 100-yr flows respectively.

The post-development watersheds were allocated as follows;

Watershed WS-200 (A + B) (0.036ha) consisting of grass will flow uncontrolled. Runoff will surface drain to Last Mile Drive.

Watershed WS-201 (0.0.296ha) consists of car parking, entrance into the site from Last Mile Drive as well and landscaped area. This is graded to drain into catch basin manholes and enter into the storm sewer network at the most upstream run.

Watershed 202 (0.287ha) consists mainly of paved parking area and a landscape buffer between the site and the Last Mile Drive Right-of-way. This also drains into catch basin manholes entering into a 300mm storm pipe.

Watershed 203 (0.178ha) consists mainly of paved parking lot and landscaped areas west of the building. Runoff in this watershed will be captured via catch basins and directed to the stormwater retention area conveyed in a 375mm storm pipe.

Watershed 204 (0.770ha) consists mainly of paved trailer parking area, and paved loading docks and landscaping around the west entrance to the site. Runoff in this watershed will drain into a catch basin, conveyed via a 375mm sewer into the retention area.

Watershed 205 (0.564ha) consists mainly of paved trailer parking area, and paved loading docks draining into a separate storm network with an inlet to the retention area on the east end.

Watershed 206 (0.460ha) consists mainly of paved trailer parking area, and paved loading docks draining into a catchbasin at the most upstream section of the network with an outlet into the retention area on the east end.

Watershed 207 (0.675ha) is landscaped area, the retention area and captures a portion of offsite land, draining directly overland into the retention.

Watershed 208 (1.875 ha) is the building envelope. Runoff will be captured via twenty-four (24) roof drains with controls. Captured flow will then be directed directly to a manhole located downstream of the on site retention.

In order to achieve the allowable post-development stormwater release rate, the proposed watersheds will utilize surface storage in the stormwater retention area combined with rooftop storage for Watershed 208. The retention area will also provide the opportunity for groundwater infiltration in addition to the storage required during significant rainfall events.

Table 7 on the following page summarizes the release rates and storage volumes required to meet the allowable release rates identified in Table 6.

Table 7:Stormwater Release Rate & Storage Volume Summary

Catchment Area	Drainage Area (ha)	2-year Release Rate (L/s)	2-Year Required Storage (m^3)	100-year Release Rate (L/s)	100-Year Required Storage (m^3)	Total Available Storage (m^3)
WS-200 (UNCONTROLLED)	0.032	1.73	0.0	4.02	0.0	0.0
WS-201, 202, 203, 204, 205, 206, 207 (CONTROLLED)	3.231	21.59	642.92	43.02	1499.63	2321.70
WS-208 (ROOF CONTROLLED)	1.876	45.36	303.40	45.36	914.08	950.45
TOTAL	**5.139**	**68.68**	**946.33**	**92.40**	**2413.71**	**3272.15**

To attenuate flows to the allowable release rates, it is calculated that a total of **946.33 m^3** and **2413.71 m^3** of storage will be required in the 2-yr and 100-yr storm respectively prior to releasing flow to the McEwen SWM Facility. The required storage is proposed to be met via a combination of building rooftop ponding and surface ponding in stormwater retention area. The maximum required storage and allowable release rates were divided as per the following;

- ***914.08*** **m^3** is required rooftop storage in WS-208 corresponding to a maximum restricted flow of ***45.36 L/s*** via roof drain controls;
- ***1499.63*** **m^3** is required surface storage in the remainder of the watersheds draining to this outlet, corresponding to maximum restricted flow of ***43.02 L/s*** *accomplished* via proposed orifice plate **124mm** diameter ICD located in DICB01 at the outlet of the storm retention area.

8.4.2.1 Rooftop Storage Analysis

The proposed building's rooftop was analysed and divided into individual ponding areas, each with a central roof drain. A total of twenty-four (24) roof drains, each of which is restricting the discharge rate to a maximum of 1.89 L/s, resulting in a total release rate from the roof of 45.36 L/s is proposed. Each of the roof drain flow control devices has been selected to provide a flow rate of 1.89 L/s at a maximum flow depth of 0.15 m. Proposed roof drains are to be WATTS RD-100-A roof drains with a fully exposed wier opening. See ***Appendix M*** for more information about the selected roof drain and flow restrictor.

The total available roof storage volume (m^3) has been calculated using the following formula:

$$V = (\frac{D_{Sl} * A_{Eff}}{3})$$

Where:

V = available (provided) rooftop storage (m^3)
D_{Sl} = slope ponding depth (m)
A_{Eff} = effective roof area (m^2)

Based on the equation above, it was calculated that **950.45 m³** of rooftop storage is available in the 100-year event. For additional details on the calculations for available area of rooftop storage, refer to ***Appendix K***.

The 2-yr and 100-yr ponding extents can be found on drawing "C601 – Stormwater Management Plan" of ***Appendix P***.

8.4.2.2 Quality Control

The site has been designed to provide additional TSS removal as a supplement to what the McEwen SWM Pond Facility achieves. A combination of best management practices and low impact development strategies will be implemented to treat the catchments which are mainly comprised of parking lot and vehicular circulating areas (WS-201, WS-202, WS-203, WS-204, WS-205, WS-206). These catchments correspond to an area of 2.56 ha, representing 50% of the total contributing flow to this outlet. The remainder of the contributing flow to outlet 2 comes from rooftop or greenspace surrounding the SWM retention area and the neighboring SWM city owned block; therefore, not requiring treatment as it would be considered clean runoff. Of the 2.56 ha of contributing sub catchments, approximately 2.20ha is comprised of impervious surface.

The LID Guidelines provide several recommendations for enhanced grass swales and brio-retention area that were taken into consideration when designing the stormwater retention area for this site, such as:

1) Pre-treatment is provided through sumps present in the catch basins capturing the flow before conveying through sewers into the retention swale.
2) Swale side slopes are maintained as flat as possible with maximum sloping of 3:1 to provide pre-treatment and maximize swale filtering surface.
3) Geometry of the retention swale provides a bottom width of 3.0m which prevents flows from concentrating once entering.
4) Flat longitudinal slopes are proposed along the grass swale to promote shallow flows, adequate water treatment and infiltration.
5) As per design guidelines, ratio of impervious drainage area to bio-retention treatment area was calculated to be 9.56:1. This is slightly higher than the recommended ratio based on the soil type, however is within range.
6) Landscaped with Sod to provide a vegetated base.

7) The Geotechnical Report as well as the Hydrogeological Study states that groundwater was not observed in the test pits, which were excavated to a maximum depth of 3.2 m bgs. Therefore, it is anticipated that sufficient clearance, exceeding 1.0m, will be achieved between bottom of LID measures and expected groundwater level as recommended per design guidelines.

8) Runoff conveyed through the retention area will be truncated as a result of outlet control which will increase infiltration into the ground prior to leaving the site.

These fundamental components integrated into the stormwater retention area which are similar to an enhanced grass swale will benefit the treatment of the flow leaving. As per the Credit Valley Conservation Authority LID design manual, the median pollutant mass removal rates of swales from available performance studies are 76% for total suspended solids. However, this number is not representative for the design conditions given that not all items outlined in the design guidance were integrated. Assuming that 40% would be removed from the design principles integrated, the on site BMP's with the McEwen Creek SWM Facility would provide a combined removal rate of 82%. The combined removal rate of the systems described above and the McEwen SWM pond in series was determined as follows;

R ***=A+B-[(AxB)/100]***
=40+70–[(40x70)/100]
=82% TSS Removal

Where;

R = Total TSS Removal Rate

A =TSS Removal Rate of the First Upstream BMP (Assumed 40% From BMP/LID's)

B =TSS Removal Rate of Second or Downstream BMP (70% from McEwen Creek SWMF)

By combining these various Low-Impact development (LID) approaches with the achievable 70% TSS removal from the McEwen SWM Pond Facility, it is believed that the targeted 80% TSS removal will be achieved. Refer to **Appendix O** for more details on LID measures.

8.4.3 Water Budget and Infiltration

To reduce impacts on erosion within the downstream McEwen Creek, this site design is intended to capture and retain (infiltrate or abstract) the first 10 mm of rainfall. This 10 mm target can be partially achieved by the default initial abstraction as a result of depression storage, with the additional retention being obtained through on site topsoil and planting, the two stormwater retention areas as well as a permeable surface on the east portion of the site, accepting overland sheet flow from watershed WS-101.

A summary of the calculations to determine the volume of storage required to retain the first 10mm of rainfall the site in it's entirety is summarized on the following page. The Sewer Design Guideline outlines depression storage values of 4.67 mm on all soft landscaped surfaces and a 1.57 mm on all hardscaped surfaces which have also been considered.

Landscaped Area Runoff Volume	= 1.73x (10mm-4.67) x 10 m^3/ha x mm =92.21 m^3
Impervious Runoff Volume (Asphalt, Gravel, concrete)	=2.89x (10mm-1.57) x 10 m^3/ha x mm =243.63 m^3
Building Runoff/Rooftop	=1.876x (10mm-1.57) x 10 m^3/ha x mm= =158.15 m^3
Total	=493.99 m^3

Additional retention is obtained in the stormwater depressed areas at an elevation below the outlet control device. Availability for supplementary infiltration exists in landscaped areas for small retention depressions within the grading or amended topsoil.

In addition, the east portion of the site has been designed utilizing sheet flow, direction a large catchment directly over a permeable surface prior to out letting into the storm retention area at outlet 1 as can be seen on the sketch below.

By implementing a combination of LID principles within the stormwater design, it can be concluded that infiltrated will be promoted and there will be a reduction on potential volume of runoff.

9 EROSION AND SEDIMENT CONTROL

During construction, erosion and sediment controls will be provided primarily via a sediment control fence to be erected along the perimeter of the site where runoff has the potential of leaving the site. Inlet sediment control devices are also to be provided in any catch basin and/or manholes in and around the site that may be impacted by the site construction once it progresses.4

Mud mat's are proposed at the entrance/exit to the subject property to mitigate tracking of additional sediments and soil form construction vehicles off site and onto Last Mile drive and surrounding roadways.

Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification OPSS 577. Refer to LRL Associates drawing C.101 for erosion and sediment control details.

10 CONCLUSION

This Stormwater Management and Servicing Report for the development proposed at Site 2 of the National Capital Business Park presents the rationale and details for the servicing requirements for the subject property.

In accordance with the report objectives, the servicing requirements for the development are summarized below:

Water Service

- The required fire flow was calculated to be **14,000 L/min** using the FUS method for the proposed building.
- There are seven (7) existing fire hydrants available to service `the building. They will provide a combined fire flow of **26 496 L/min.**
- Two (2) water services will be provided to the building via the 250mm watermain stubs extended from the existing watermain located within Last Mile Drive.

Sanitary Service

- The total calculated wet wastewater flow from the proposed development is **5.64 L/s.**
- The proposed development will be serviced via a network of 200mm diameter SAN sewers which will connect to EX SAN MH201 and will discharge **5.64 L/s** to the existing downstream 250 mm dia. sanitary sewer within Last Mile Drive.

Stormwater Management

- The site has been analyzed and post-development watersheds have been allocated. To adhere to existing drainage characteristics, two outlets are proposed.
- **Outlet 1 to McEwan Creek;**
    - Flows are restricted to allowable release rates of **64.02 L/s** and **147.75 L/s** in the 2-yr and 100-yr storm events respectively.
    - Much of the watershed draining in this direction will be conveyed overland via sheet flow, prior to entering into a retention area and outetting to the neighbouring developed Site, ultimately reaching McEwan's Creek.
    - Required Quality controls to be met via a proposed **OGS**.
- **Outlet 2 to McEwan SWM Pond Facility**;
    - Flows are restricted to allowable release rates of **68.81 L/s** and **156.96 L/s** in the 2-yr and 100-yr storm events respectively.
    - On-site storage is provided via surface ponding in the dedicated stormwater retention area and rooftop storage.
    - Required Quality controls are assumed to be provided through a combination of on-site LID and Best management practices before being treated to 70% TSS removal within the McEwan Creek SWM Pond Facility.

11 REPORT CONDITIONS AND LIMITATIONS

The report conclusions are applicable only to this specific project described in the preceding pages. Any changes, modifications or additions will require a subsequent review by LRL Associates Ltd. to ensure the compatibility with the recommendations contained in this document. If you have any questions or comments, please contact the undersigned.

Prepared by:
LRL Associates Ltd.

Virginia Johnson, P. Eng.
Civil Engineer

APPENDIX A

Pre-consultation / Correspondance

Amr Salem

From: Jennifer Murray <jmurray@ave31.com>
Sent: August 22, 2022 5:12 PM
To: Amr Salem; Harrison Werner; John Holland; Paul Hicks; Anthony Francis; James Lennox
Cc: Maxime Longtin; Virginia Johnson; Gavin MacDonald
Subject: FW: 4120 Russell Rd - site 2 - informal pre-consult recap
Attachments: russell, 4120_design brief.pdf; Pre-con Applicant's Study and Plan Identification List.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Please see attached the City pre-consultation notes for Site 2.
The focus is mainly on Stormwater, however there are also a few comments related to urban design, Planning Rationale & Design Brief and landscape design.

Talk to you all on Wednesday. We look forward to having this submission in ASAP., I know there was some delay with some tweaks to the Site Plan. I have the application ready to go in and will make an appointment for Friday this week to make the submission.

Jennifer

Jennifer Murray, P. Eng, MBA
Vice President, Land Development
Vice-présidente, Développment de terrains

Avenue 31 Capital Inc.
801-250 City Centre
Ottawa, ON
K1R 6K7

E jmurray@ave31.com
C 613-799-2422

From: Gervais, Melanie <Melanie.Gervais@ottawa.ca>
Sent: August 17, 2022 6:12 PM
To: Jennifer Murray <jmurray@ave31.com>
Subject: 4120 Russell Rd - site 2 - informal pre-consult recap

Hello Jennifer,

Please refer to the below and attached notes regarding the informal Pre-Application Consultation (pre-con) Meeting held on June 16th 2022 for the property at 4120 Russell Rd for a Site Plan Control application in order to allow the development of two warehouse buildings by Avenue 31. I have also attached the required Plans & Study List for application submission.

Below are staff's preliminary comments based on the information available at the time of pre-con meeting:

Planning

The Planning Rationale must review both the current Official Plan and the new Official Plan. If the new Official Plan has been approved by the Minister by the time you apply, you will only need to review the new Official Plan.

This site is outside of the MTO control area.

Site Plan Control – Complex Approval: **$49,964.88** (plus engineering design review fee, plus $1,065 Conservation Authority Fee)
https://app06.ottawa.ca/online_services/forms/ds/site_plan_control_en.pdf

Engineering (Jeff Shillington)
Water and Sanitary: no concerns as the infrastructure was installed as part of Last Mile Drive

Stormwater:
- The eastern pond should have water quality treatment, for example an OGS upstream of the pond before discharging into the McEwan Creek.
- The western outlet water quality will most likely be accommodated in the McEwen SWM Facility.
- Please indicate outlets ditch/swale route into the recipients.
- The proposed ponds have to have a vehicular access to the inlet and the outlet.
- It appears, that there is enough space between a building and the pond for a maintenance access since the parking lots could be occupied by cars. There is no space for the service road close to the eastern building only the parking lot.
- Safety of public should be addressed, which will depend on the pond depth and max ponding. We may consider a fence installation with a gate for city vehicles. Our practice is not to fence SWM facilities and therefore we would require more information to confirm this requirement.
- There maybe be a stagnant water in the pond and possible mosquito nuisance might be a problematic too. Complaints from nearby residents can be expected.

RVCA (Jamie Batchelor)

Please coordinate with the RVCA to obtain their comments. They've indicated that they want a meeting to discuss their requirement. It is to your benefit to incorporate their comments in your initial design in order to prevent significant delays/multiple resubmissions during the Site Plan review process.

Parkland (Phil Castro)

- We require parkland dedication.

- Parks and Facilities Planning is currently undertaking a legislated replacement of the Parkland Dedication By-law, with the new by-law to be considered by City Council on August 31, 2022. The by-law recommended for approval by Council increases the required parkland conveyance for mid-rise and high-rise residential development, and includes one-year transition policies for in-stream development and building permit applications or those that will be submitted and meet the requirements for completeness by September 1, 2022.
    - To ensure you are aware of parkland dedication requirements for your proposed development, we encourage you to familiarize yourself with the staff report and recommended by-law that were recommended for Council approval by Planning

Committee on July 7, 2022. For any questions or information, please contact the project lead at Kersten.Nitsche@ottawa.ca.

Transportation (Wally Dubyk)

A Screening Form is to be submitted to determine if a transportation study is required. Consultants should fill in the form in Appendix 'B'. Click on the website: www.ottawa.ca/TIA

The consultant should review the sight distance to the access and any obstructions that may hinder the view of the driver.

The Owner acknowledges and agrees that all private accesses to Roads shall comply with the City's Private Approach By-Law being By-Law No. 2003-447 as amended https://ottawa.ca/en/living-ottawa/laws-licences-and-permits/laws/law-z/private-approach-law-no-2003-447 or as approved through the Site Plan control process.

Signs related to the development site are to be placed in accordance with the applicable sign by-law https://ottawa.ca/en/search?searchfield=sign+by+law. (Permanent Signs on Private Property By-law No. 2016-326). (Temporary Signs on Private Property By-law No. 2004-239). (Signs on City Roads By-law No. 2003-520). An Encroachment Agreement will be required for any signage on the road allowance.

The Owner shall be required to enter into maintenance and liability agreement for all pavers, plant and landscaping material placed in the City right-of-way and the Owner shall assume all maintenance and replacement responsibilities in perpetuity.

Bicycle parking spaces are required as per Section 111 of the Ottawa Comprehensive Zoning By-law. Bicycle parking spaces should be located in safe, secure places near main entrances and preferably protected from the weather.

Urban Design (Christopher Moise)

- This proposal does not run along or does not meet the threshold in one of the City's Design Priority Areas and need not attend the City's UDRP. Staff will be responsible for evaluating the proposal and providing design direction;
- We appreciate the material presented and have the following comments/questions about the proposal:
    - Parking: Minimize quantity of vehicular parking between buildings and public right-of-way, provide in discreet locations and screened from view of the public right-of-way with landscaping. We recommend using minimum parking requirements for the office use to mitigate heat island effects;
    - Landscaping: Improve the landscaping treatment around the site and adjacent to the public right-of-way with enhanced plantings and trees;
    - Pedestrian connectivity: Consider safe and convenient access to buildings from parking locations;
- A scoped Design Brief is a required submittal for all Site Plan/Re-zoning applications and can be combined with the Planning Rationale. Please see the Design Brief Terms of Reference provided.
    - Note. The Design Brief submittal should have a section which addresses these pre-consultation comments;

Environmental (Matthew Hayley)

- Provide the 2020 EIS and 2021 up-date memo with the application as well as any supporting material from NCC process.
- Consider urban heat island effect, bird-safe design and tree canopy.
- Element like 35% mature canopy cover over parking lot, light grey roof, should be added to the Planning Rationale.

As we discussed, NCC approval process has likely addressed most of the City's environmental concerns.

City Surveyor

- The determination of property boundaries, minimum setbacks and other regulatory constraints are a critical component of development. An Ontario Land Surveyor (O.L.S.) needs to be consulted at the outset of a project to ensure properties are properly defined and can be used as the geospatial framework for the development.
- Topographic details may also be required for a project and should be either carried out by the O.L.S. that has provided the Legal Survey or done in consultation with the O.L.S. to ensure that the project is integrated to the appropriate control network.

Questions regarding the above requirements can be directed to the City's Surveyor, Bill Harper, at Bill.Harper@ottawa.ca

Other

- Plans are to be standard A1 size (594 mm x 841 mm) or Arch D size (609.6 mm x 914.4 mm) sheets, dimensioned in metric and utilizing an appropriate Metric scale (1:200, 1:250, 1:300, 1:400 or 1:500).
- All PDF submitted documents are to be unlocked and flattened.
- You are encouraged to contact the Ward Councillor, Councillor Diane Deans, at Diane.Deans@ottawa.ca about the proposal.

Please refer to the links to Guide to preparing studies and plans and fees for further information. Additional information is available related to building permits, development charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting geoinformation@ottawa.ca.

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

Please do not hesitate to contact me if you have any questions.

Regards,

Mélanie Gervais *MCIP, RPP*
Planner III (A) / Urbaniste III (i)
Development Review - South /

Examen des demandes d'aménagement - sud
Planning, Real Estate and Economic Development Department /
Direction générale de la planification, des biens immobiliers et du développement économique
City of / Ville d'Ottawa
110, avenue Laurier Avenue West / Ouest,
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Ottawa, ON K1P 1J1
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Mail Code: 01-14

****Please note that I'm working from home during the COVID-19 pandemic.***

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Amr Salem

From: Jamie Batchelor <jamie.batchelor@rvca.ca>
Sent: August 26, 2022 11:27 AM
To: Jennifer Murray; Claire Milloy; Amr Salem
Cc: Virginia Johnson; Maxime Longtin; Evelyn Liu; Shillington, Jeffrey; Gervais, Melanie; Evelyn Liu
Subject: RE: NCBP Site 2

Good Morning Jennifer,

Here are the RVCA comments compiled by RVCA technical staff Claire Milloy, and Evelyn Liu for the pre-con and based on the meeting with LRL.

The RVCA met virtually with LRL on August 17, 2022, to discuss the stormwater management plan for Site 2 (3rd Site Plan) at the NCBP. Based on that discussion and a simple review of the previously accepted stormwater management plan for Site 1, the RVCA provides the following preliminary comments and requests.

- The east side of Site 2 naturally drains to the adjacent property, Site 1. Following development, stormwater from the east side of Site 2 will be directed to Site 1 and an outlet that was already assessed and accepted as part of the Site 1 plan.
    - Based on information from page 148 (OGS sizing) of the Site 1 stormwater management report, the RVCA requests clarification about how the east part of Site 2 is accounted for in the Site 1 quality control.
    - Details and confirmation that the total drainage area for Sites 1 and 2 are accounted for in the OGS sizing is needed.

- The rest of the site will drain to the south, to two stormwater retention areas / dry ponds and on to an existing stormwater facility, the McEwen Pond.
    - The RVCA requests confirmation that the McEwen Pond was sized to accommodate the development on Site 2, such that post development peak flows will match pre-development peak flows. (control of post to pre)

- LRL indicated that the following LIDs were being incorporated into the Site 2 development design and that a treatment train approach was being considered
    - roof-top storage on both buildings
    - 2 SWM retention areas at the south part of the lot
    - gravel shoulders
    - filter strips

- The RVCA indicated that we support the use of green infrastructure, including LID, and that it is understood that this is a provincial standard to be met for all new parts of a municipal stormwater management system, unless specific constraints are identified. The RVCA also indicated that if there are no new outlets for which the RVCA would have to provide regulatory permission, the RVCA would only be providing advice to the City of Ottawa about their own stormwater management plan approvals, as per a MOA / MOU. The RVCA and LRL discussed the requirement to have discussion with the City of Ottawa to adopting green infrastructure standards at any given site.

When the RVCA reviews stormwater management reports in accordance with our MOA, we review it in the context of all related provincial and local stormwater standards, including (Section 10.0) of the 2021 hydrogeological and terrain analysis guidelines which includes a requirement for a water budget assessment to be undertaken.

- a water budget assessment to be undertaken as per (Section 10.0) of the 2021 hydrogeological and terrain analysis guidelines.
    - The RVCA noted that this should usually be done in advance of all stormwater management design, but that adoption of this practice in the region is on-going; that targets (storage, ET, infiltration, runoff reduction etc.) are set during the pre-development water budget analysis; and that the benefits of the chosen treatment train approach should be evaluated during the post-development water budget analysis.
- specific data to be collected and analysis to be completed as part of the 2021 Low Impact Development Technical Guidance Report – See sections 3.3, 3.4, 3.5, etc.

*links to these documents were sent to the development team in a separate email

It is noted here that the constraints to be identified are listed in the appendices of the provinces CLI ECA template.

Jamie Batchelor, MCIP, RPP
Planner, ext. 1191
Jamie.batchelor@rvca.ca

Rideau Valley Conservation Authority

3889 Rideau Valley Drive
PO Box 599, Manotick ON K4M 1A5
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From: Jennifer Murray <jmurray@ave31.com>
Sent: Monday, August 22, 2022 7:10 PM
To: Claire Milloy <claire.milloy@rvca.ca>; Amr Salem <asalem@lrl.ca>
Cc: Virginia Johnson <vjohnson@lrl.ca>; Maxime Longtin <mlongtin@lrl.ca>; Jamie Batchelor <jamie.batchelor@rvca.ca>; Evelyn Liu <evelyn.liu@rvca.ca>; Shillington, Jeffrey <jeff.shillington@ottawa.ca>; Gervais, Melanie <Melanie.Gervais@ottawa.ca>
Subject: RE: NCBP Site 2

We would appreciate receiving the pre-consultation comments from the RVCA for NCBP Site 2 if there are any specific comments.
We have received the notes from the City, but they did not include any input from RVCA.
I believe that the meeting took place with our Engineering Consultant to discuss the project.
I would appreciate any formal notes on the Stormwater requirements from the City with RVCA input. Or from the RVCA directly, assuming that the City agrees with the comments?

Jennifer Murray, P. Eng, MBA
Vice President, Land Development
Vice-présidente, Développment de terrains

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From: Claire Milloy <claire.milloy@rvca.ca>
Sent: August 17, 2022 1:56 PM
To: Amr Salem <asalem@lrl.ca>
Cc: Virginia Johnson <vjohnson@lrl.ca>; Maxime Longtin <mlongtin@lrl.ca>; Jennifer Murray <jmurray@ave31.com>; Jamie Batchelor <jamie.batchelor@rvca.ca>; Gavin MacDonald <gmacdonald@ave31.com>; Evelyn Liu <evelyn.liu@rvca.ca>
Subject: RE: NCBP Site 2

Hello All,
Thanks for the discussion today.

As mentioned, here is the link to the City's guidance about LID in areas with hydrogeological constraints: Low Impact Development Technical Guidance Report (ottawa.ca)

I can also point to discussions about water budgets in several sections of the CITY OF OTTAWA HYDROGEOLOGICAL AND TERRAIN ANALYSIS GUIDELINES, such as in Section 10.0.

Kind regards,
Claire Milloy, M.Sc., P.Geo.
Department of Engineering and Regulation
Rideau Valley Conservation Authority

-----Original Appointment-----
From: Jamie Batchelor <jamie.batchelor@rvca.ca>
Sent: Friday, August 12, 2022 5:11 PM
To: Jamie Batchelor; Amr Salem; Evelyn Liu; Claire Milloy
Cc: Virginia Johnson; Maxime Longtin; Jennifer Murray; Gavin MacDonald
Subject: NCBP Site 2
When: Wednesday, August 17, 2022 1:00 PM-2:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Microsoft Teams Meeting

Microsoft Teams meeting

Join on your computer or mobile app
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Meeting ID: 232 932 239 483
Passcode: nZPH4T
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APPENDIX B

Servicing Development Application Checklist

Servicing study guidelines for development applications

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

- ☐ Executive Summary (for larger reports only).
- ☒ Date and revision number of the report.
- ☒ Location map and plan showing municipal address, boundary, and layout of proposed development.
- ☒ Plan showing the site and location of all existing services.
- ☒ 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.
- ☒ Summary of Pre-consultation Meetings with City and other approval agencies.
- ☒ 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.
- ☒ Statement of objectives and servicing criteria.
- ☒ Identification of existing and proposed infrastructure available in the immediate area.
- ☒ 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).
- ☒ 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 neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.
- ☐ 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.
- ☐ Proposed phasing of the development, if applicable.

☒ Reference to geotechnical studies and recommendations concerning servicing.

☐ All preliminary and formal site plan submissions should have the following information:
- Metric scale
- North arrow (including construction North)
- Key plan
- Name and contact information of applicant and property owner
- Property limits including bearings and dimensions
- Existing and proposed structures and parking areas
- Easements, road widening and rights-of-way
- Adjacent street names

4.2 Development Servicing Report: Water

☐ Confirm consistency with Master Servicing Study, if available
☒ Availability of public infrastructure to service proposed development
☒ Identification of system constraints
☒ Identify boundary conditions
☒ Confirmation of adequate domestic supply and pressure
☒ 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.
☒ 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.
☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design
☒ Address reliability requirements such as appropriate location of shut-off valves
☒ Check on the necessity of a pressure zone boundary modification.
☐ 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

- ☒ 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.
- ☒ 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.
- ☒ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.
- ☐ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

4.3 Development Servicing Report: Wastewater

- ☒ 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).
- ☐ Confirm consistency with Master Servicing Study and/or justifications for deviations.
- ☒ 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.
- ☐ Description of existing sanitary sewer available for discharge of wastewater from proposed development.
- ☐ 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)
- ☒ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix ‘C’) format.
- ☒ Description of proposed sewer network including sewers, pumping stations, and forcemains.
- ☐ 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).
- ☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.
- ☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.
- ☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.
- ☐ Special considerations such as contamination, corrosive environment etc.

4.4 Development Servicing Report: Stormwater Checklist

- ☒ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)
- ☐ Analysis of available capacity in existing public infrastructure.
- ☒ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.
- ☒ 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.
- ☒ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.
- ☒ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.
- ☐ Set-back from private sewage disposal systems.
- ☐ Watercourse and hazard lands setbacks.
- ☐ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.
- ☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.
- ☒ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
- ☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
- ☐ 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.
- ☐ Any proposed diversion of drainage catchment areas from one outlet to another.
- ☐ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
- ☐ 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.
- ☒ Identification of potential impacts to receiving watercourses
- ☐ Identification of municipal drains and related approval requirements.
- ☒ Descriptions of how the conveyance and storage capacity will be achieved for the development.
- ☒ 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.

- ☐ Inclusion of hydraulic analysis including hydraulic grade line elevations.
- ☐ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
- ☐ 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.
- ☐ Identification of fill constraints related to floodplain and geotechnical investigation.

4.5 Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

- ☒ 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.
- ☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.
- ☐ Changes to Municipal Drains.
- ☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

4.6 Conclusion Checklist

- ☒ Clearly stated conclusions and recommendations
- ☒ 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.
- ☒ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario

APPENDIX C

Water Supply Calculations

Water Supply Calculations

LRL File No.	220345
Date	November 11, 2022
Prepared by	Tamara Harb

Industrial Demand based on the City of Ottawa Design Guidelines-Water Distribution, 2010

	Gross Area (m2)	Gross Area (ha)
Industrial Space	17158.5	1.72
Office Space	1604.5	0.16
Total	**18763**	**1.88**

Average Water Consumption Rates

Industrial Light	35,000	L/ha/d		
Office Use*	75/9.3	L/m2/d	**Assumption as per Appdx 4A of Sewer Guidelines*	
Average Day Demand	**72,994**	**L/d**	**0.84**	**L/s**
Maximum Day Factor	1.5			
Maximum Daily Demand	**109,491**	**L/d**	**1.27**	**L/s**
Peak Hour Factor	1.8			
Maximum Hour Demand	**131,390**	**L/d**	**1.52**	**L/s**

Water Service Pipe Sizing

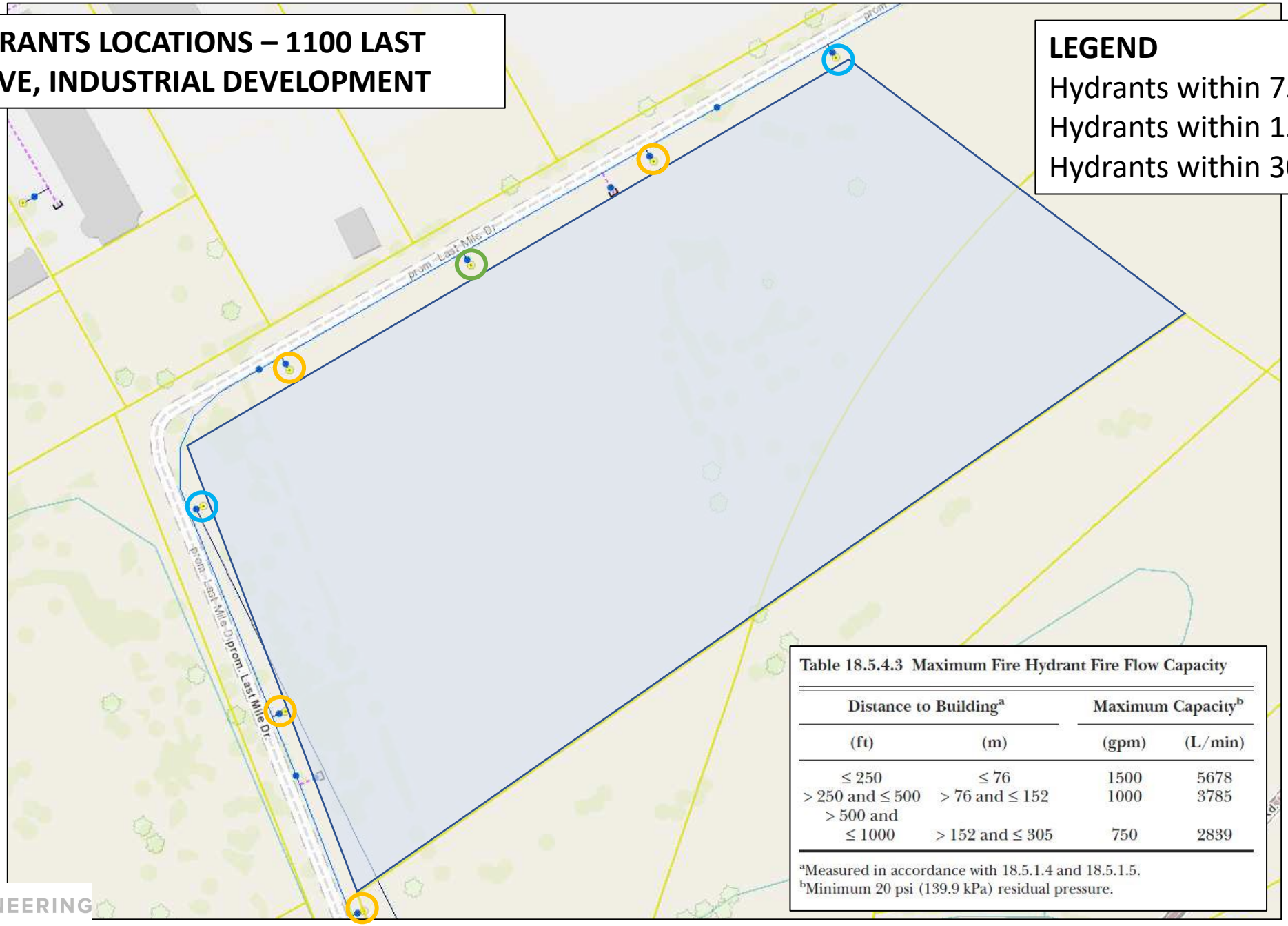
Q = VA

Where: V = velocity
A = area of pipe
Q = flow rate

Assuming a maximum velocity of 1.8m/s, the diameter of pipe is calculated as:

Minimum pipe diameter (d) =	$(4Q/\pi V)^{1/2}$	
=	0.033	m
=	33	mm
Proposed pipe diameter (d) =	**50**	mm
=	**2**	Inches

FIRE HYDRANTS LOCATIONS – 1100 LAST MILE DRIVE, INDUSTRIAL DEVELOPMENT



LEGEND

- Hydrants within 75m
- Hydrants within 150m
- Hydrants within 300m

Table 18.5.4.3 Maximum Fire Hydrant Fire Flow Capacity

Distance to Building[a]		Maximum Capacity[b]	
(ft)	(m)	(gpm)	(L/min)
≤ 250	≤ 76	1500	5678
> 250 and ≤ 500	> 76 and ≤ 152	1000	3785
> 500 and ≤ 1000	> 152 and ≤ 305	750	2839

[a]Measured in accordance with 18.5.1.4 and 18.5.1.5.
[b]Minimum 20 psi (139.9 kPa) residual pressure.

LRL ENGINEERING

APPENDIX D

City of Ottawa Boundary Conditions

Virginia Johnson

From: Shillington, Jeffrey <jeff.shillington@ottawa.ca>
Sent: December 19, 2022 2:25 PM
To: Tamara Harb
Cc: Fawzi, Mohammed; Virginia Johnson
Subject: RE: LRL220345 - Site 2 National Capital Business Park - Boundary Conditions Request
Attachments: Site 2 National Capital Business Park December 2022.pdf

Hi Tamara,

Sorry for the delay. Please see below/attached.

The following are boundary conditions, HGL, for hydraulic analysis at Site 2 National Capital Business Park (zone 1E) assumed to be connected to the 254 mm watermain on Last Mile Road (see attached PDF for location).

Both Connections:

Min HGL: 123.8 m

Max HGL: 130.7 m

Max Day + Fire Flow (233.3 L/s): 108.4 m (Connection 1), 107.7 m (Connection 2)

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.

Please let me know If you require anything further.

Jeff Shillington, P.Eng.
Senior Project Manager, Development Review, South Branch
Planning, Infrastructure and Economic Development
City of Ottawa
tel: 580-2424 x 16960
email: jeff.shillington@ottawa.ca

From: Tamara Harb <tharb@lrl.ca>
Sent: December 19, 2022 11:57 AM

To: Shillington, Jeffrey <jeff.shillington@ottawa.ca>
Cc: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>; Virginia Johnson <vjohnson@lrl.ca>
Subject: RE: LRL220345 - Site 2 National Capital Business Park - Boundary Conditions Request

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Good morning Jeffrey,

I wanted to follow up on the email below requesting boundary conditions for our site. We submitted the request three weeks ago and we require this information to submit our project for this week.

Thank you,

TAMARA HARB, EIT, CPESC-IT
Civil Engineer in Training

LRL Engineering
5430 Canotek Road
Ottawa, Ontario K1J 9G2

T (613) 842 - 3434 or (877) 632-5664 ext.222
C (613) 915 - 0350
F (613) 842 - 4338
E tharb@lrl.ca
W www.lrl.ca

We care deeply, so let us know how we did by completing our Customer Satisfaction Survey.
Nous nous soucions profondément de votre opinion, nous vous invitons donc à nous faire savoir si nous avons satisfait vos attentes en remplissant notre sondage sur la satisfaction de la clientèle

---

From: Tamara Harb
Sent: November 28, 2022 12:48 PM
To: jeff.shillington@ottawa.ca
Subject: LRL220345 - Site 2 National Capital Business Park - Boundary Conditions Request

Good afternoon Jeff,

I would like to request boundary conditions for the proposed development for Site 2 in the National Capital Business Park located at Russel Rd/ Hunt Club Rd. It is proposed that 1 building (industrial building with some office space) will be developed on this site. We are proposing a dual service connection to the municipal watermain in Last Mile Drive for the building (see image for connection points below). Please provide the boundary conditions for the two connections, using the following proposed development demands:

	Demand (L/s)

Avg. Daily	0.84
Max Day + FUS	1.27 + 233
Peak Hour	1.52

Also please find attached the site plan, water demand calculations and fire flow calculations.

Thank you,

TAMARA HARB, EIT, CPESC-IT
Civil Engineer in Training

LRL Engineering
5430 Canotek Road
Ottawa, Ontario K1J 9G2

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*We care deeply, so let us know how we did by completing our **Customer Satisfaction Survey**.*

Nous nous soucions profondément de votre opinion, nous vous invitons donc à nous faire savoir si nous avons satisfait vos attentes en remplissant notre ***sondage sur la satisfaction de la clientèle***

Given the current COVID-19 situation, please be aware that LRL has implemented alternative working conditions for our team.
Many of us have now transitioned to working from home; however, communication and workability remains one of our top priorities.
We will continue to be reachable by cell phone or by calling LRL at 613-842-3434 which will prompt you to enter the extension of the person you are trying to reach.
In addition, we will continue to have access to all e-mail correspondence and do our best to return all inquiries in a timely manner.

'

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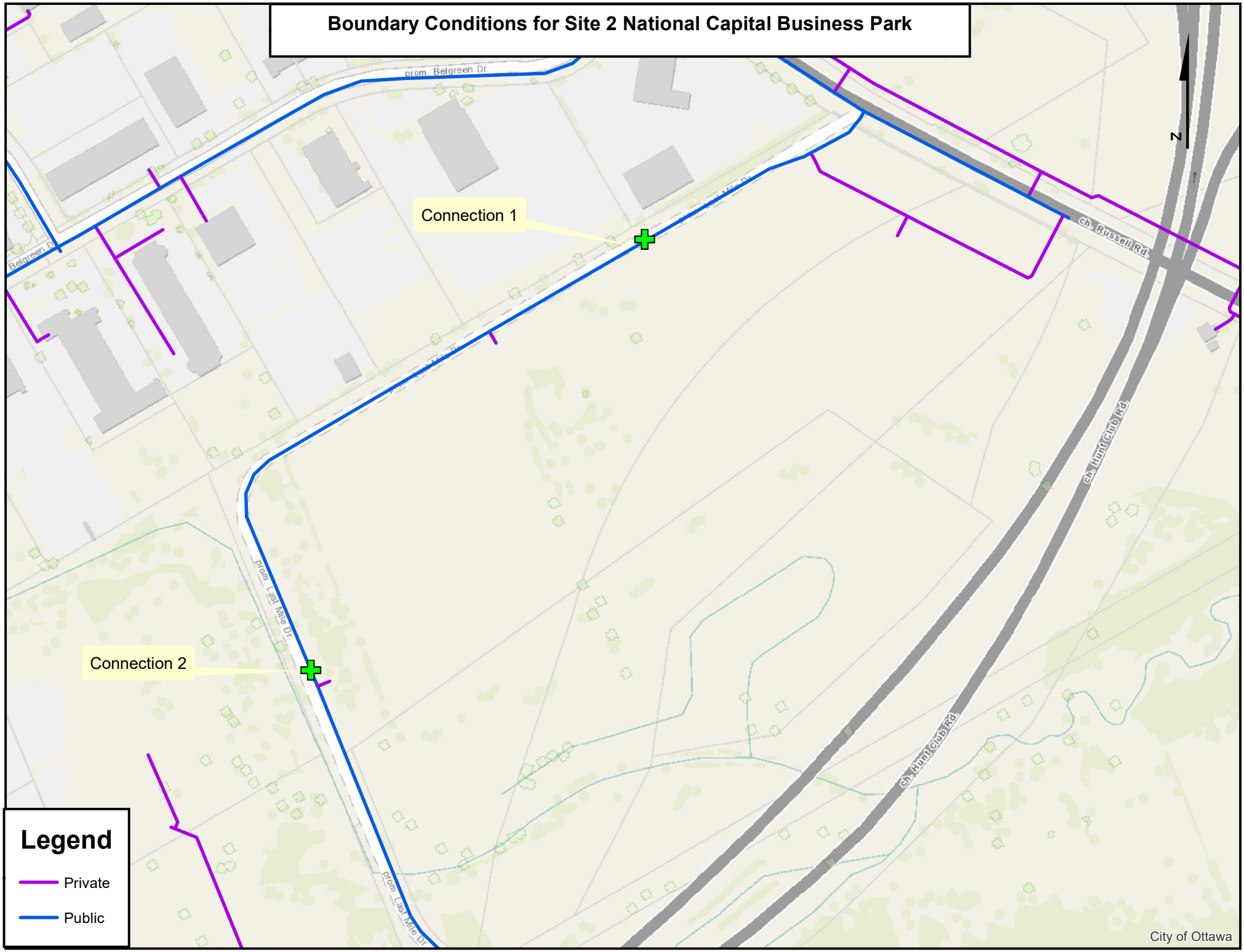
'

Boundary Conditions for Site 2 National Capital Business Park



APPENDIX E

FUS Fire Flow Calculations

Fire Flow Calculations - Industrial Building D1

LRL File No. 220388
Date November 11, 2022
Method Fire Underwriters Survey (FUS)
Prepared by Tamara Harb

Step	Task	Term	Options	Multiplier	Choose:	Value	Unit	Fire Flow
Structural Framing Material								
1	Choose frame used for building	Coefficient C related to the type of construction	Wood Frame	1.5	Non-combustible construction	**0.8**		
			Ordinary Construction	1.0				
			Non-combustible construction	0.8				
			Fire resistive construction <2 hrs	0.7				
			Fire resistive construction >2 hrs	0.6				
Floor Space Area (A)								
2	Total area					**18,763**	m^2	
3	Obtain fire flow before reductions	Required fire flow	Fire Flow = 220 x C x $A^{0.5}$				L/min	**24,108**
Reductions or surcharge due to factors affecting burning								
4	Choose combustibility of contents	Occupancy hazard reduction or surcharge	Non-combustible	-25%	Combustible	**0%**	L/min	**24,108**
			Limited combustible	-15%				
			Combustible	0%				
			Free burning	15%				
			Rapid burning	25%				
5	Choose reduction for sprinklers	Sprinkler reduction	Full automatic sprinklers	-30%	True	**-30%**	L/min	**14,465**
			Water supply is standard for both the system and fire department hose lines	-10%	True	**-10%**		
			Fully supervised system	-10%	False	**0%**		
6	Choose separation	Exposure distance between units	Northwest side	>30m	0%		L/min	**14,465**
			Southwest side	>30m	0%			
			Northeast side	>30m	0%			
			Southeast side	>30m	0%	**0%**		
Net required fire flow								
7	Obtain fire flow, duration, and volume	Minimum required fire flow rate (rounded to nearest 1000)					L/min	**14,000**
		Minimum required fire flow rate					L/s	**233.3**
		Required duration of fire flow					hr	**3**

Virginia Johnson

From: Harrison Werner <hwerner@waremalcomb.com>
Sent: December 20, 2022 2:57 PM
To: Virginia Johnson
Cc: John Holland
Subject: RE: 220345- NCBP Building D FUS Calculations

Hi Virginia,

I can confirm the building will be non-combustible construction, and it will be sprinklered. I can't comment on the contents of the building as this is just a shell and that would be up to the future tenants (though assuming it will be combustible is probably the better conservative option).

Best,

Harrison Werner, NCARB, LEED AP BD+C
Senior Job Captain
hwerner@waremalcomb.com
P 905.760.1221 x2145

WARE MALCOMB

From: Virginia Johnson <vjohnson@lrl.ca>
Sent: December 20, 2022 2:50 PM
To: Harrison Werner <hwerner@waremalcomb.com>
Subject: 220345- NCBP Building D FUS Calculations

CAUTION: External Email Alert!

Hello Harrison,
Can you please confirm the following:

- Non combustible structural framing material
- Combustible contents
- Confirm building will be sprinklered

Thanks,

Virginia Johnson, P. Eng.
Partner
Civil Engineering Department Lead
LRL Engineering
5430 Canotek Road
Ottawa, Ontario K1J 9G2
C (613) 915-9503
T (613) 842-3434 or (877) 632-5664 ext 223
F (613) 842-4338
E vjohnson@lrl.ca
W www.lrl.ca

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APPENDIX F

Wastewater Collection Calculations

LRL File No. 220345
Project: Site 2 National Capital Business Park
Location: Russel Rd/ Hunt Club Rd, Ottawa ON
Date: December 22, 2022

Sanitary Design Parameters

Average Daily Flow = 280 L/p/day
Commercial & Institutional Flow = 50000 L/ha/day
Light Industrial Flow = 35000 L/ha/day
Heavy Industrial Flow = 55000 L/ha/day
Maximum Residential Peak Factor = 4.0
Commercial & Institutional Peak Factor = 1.5
Correction Factor=0.8
Industrial Peak Factor = as per Appendix 4-B = 7
Extraneous Flow = 0.33L/s/gross ha

Pipe Design Parameters

Minimum Velocity = 0.60 m/s
Manning's n = 0.013

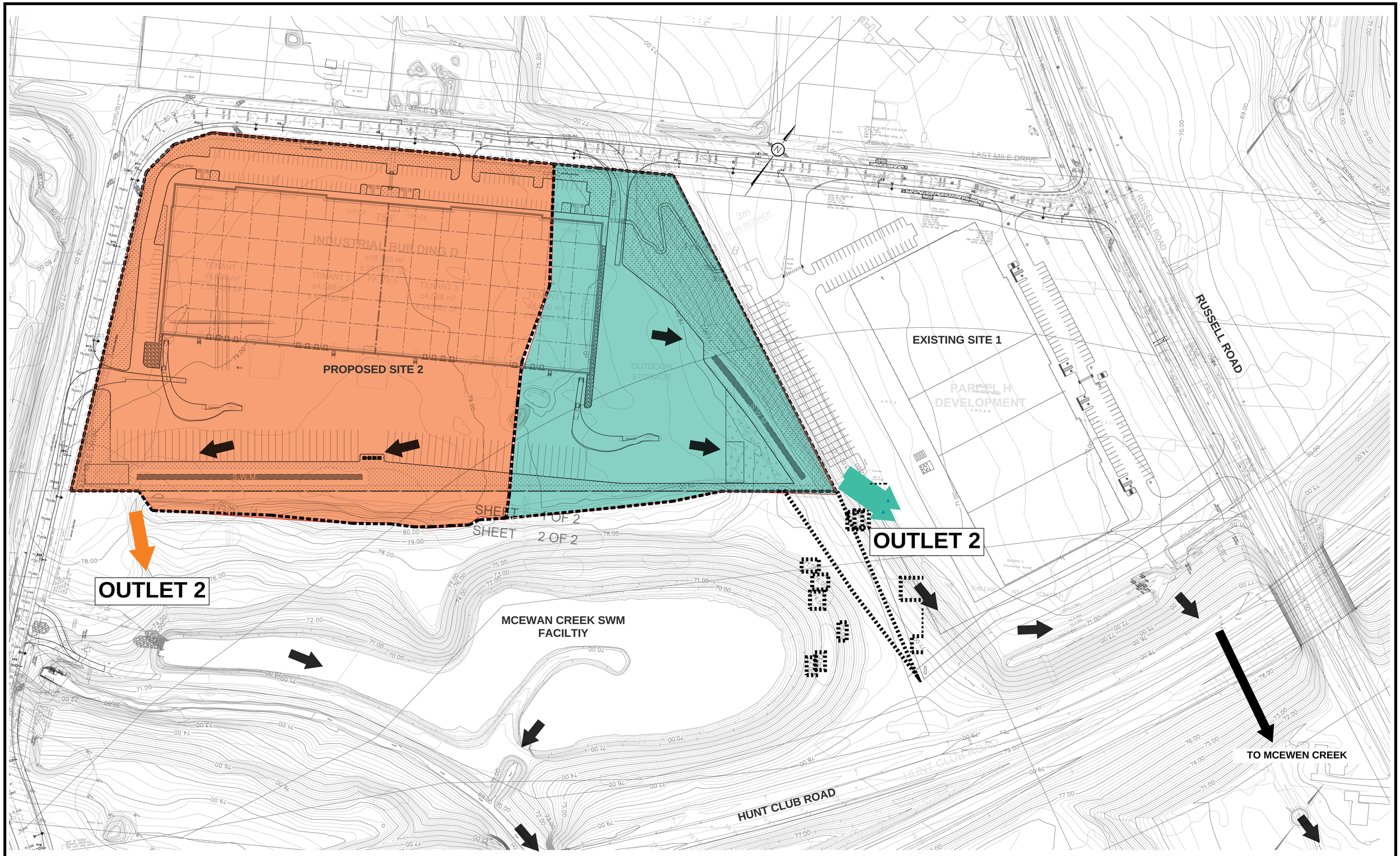
LOCATION		RESIDENTIAL AREA AND POPULATION						COMMERCIAL		INDUSTRIAL			INSTITUTIONAL		C+I+I	INFILTRATION			TOTAL FLOW (l/s)	PIPE					
				CUMMULATIVE																					
FROM	TO	POP.	AREA (Ha)	AREA (Ha)	POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (Ha)	ACCU. AREA (Ha)	AREA (Ha)	PEAK FACT.	ACCU. AREA (Ha)	AREA (Ha)	ACCU. AREA (Ha)	PEAK FLOW (l/s)	TOTAL AREA (Ha)	ACCU. AREA (Ha)	INFILT. FLOW (l/s)		LENGTH (m)	DIA. (mm)	SLOPE (%)	MATERIAL	**CAP. (FULL) (l/s)**	**VEL. (FULL) (m/s)**
Building D	SAN MH02							0.16	0.16	1.72	7.0	1.72			5.02	1.880	1.880	0.62	**5.64**	15.1	200	2.00%	PVC	**46.38**	**1.48**
SAN MH02	SAN MH01							0.00	0.16	0.00	7.0	1.72			5.02	1.880	1.880	0.62	**5.64**	67.4	200	0.40%	PVC	**20.74**	**0.66**
SAN MH01	EX SAN MH 201A							0.00	0.16	0.00	7.0	1.72			5.02	1.880	1.880	0.62	**5.64**	13.2	200	1.10%	PVC	**34.40**	**1.09**

NOTES: Existing inverts and slopes are estimated. They are to be confirmed on-site.

Designed: T.H.	PROJECT: Site 2 - National Capital Business Park		
Checked: V.J.	LOCATION: Russel Rd/ Hunt Club Rd		
Dwg. Reference: C.401	File Ref.: 220345	Date: 2022-12-22	Sheet No. 1 of 1

APPENDIX G

Stormwater Management Design Criteria Summary



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Stormwater Management Criteria

National Capital Business Park- Site 2

Site Address: 4120 Russell Rd, Ottawa ON

Date:
December 2022
LRL File No.:
220345

SK-01

APPENDIX H

Pre and Post Development Watersheds

LRL Associates Ltd.

Storm Watershed Summary

LRL File No.	220345
Project:	Site 2
Location:	NCBP Site 2
Date:	December 20, 2022
Designed:	Tamara Harb
Drawing Reference:	C701/C702

Pre-Development Catchments

WATERSHED	C = 0.2	C = 0.80	C = 0.90	Total Area (m^2)	Total Area (ha)	Combined C
EWS-01	20952.4	0.0	0.0	20952.4	2.095	0.20
EWS-02	43996.4	0.0	0.0	43996.4	4.400	0.20
TOTAL	**64948.7**	**0.0**	**0.0**	**64948.7**	**6.495**	**0.20**

Post-Development Catchments

WATERSHED	C = 0.20	C = 0.80	C = 0.90	Total Area (m^2)	Total Area (ha)	Combined C	
WS-100 (UN-CONTROLLED)	5171.7	0.0	342.8	5514.5	0.551	0.24	OUTLET 1 MCEWAN CREEK
WS-101 (CONTROLLED)	1497.5	0.0	6533.4	8030.8	0.803	0.77	
Total Outlet 1 McEwan Creek	**6669.2**	**0.0**	**6876.1**	**13545.3**	**1.355**	**0.56**	
WS-201 (CONTROLLED)	791.5	0.0	2168.67	2960.2	0.296	0.71	OUTLET 2 McEwan SWM Pond
WS-202 (CONTROLLED)	840.1	0.0	2025.88	2866.0	0.287	0.69	
WS-203 (CONTROLLED)	741.0	0.0	1037.3	1778.3	0.178	0.61	
WS-204 (CONTROLLED)	1146.7	0.0	6554.1	7700.8	0.770	0.80	
WS-205 (CONTROLLED)	51.3	0.0	5592.8	5644.1	0.564	0.89	
WS-206 (CONTROLLED)	0.0	0.0	4604.6	4604.6	0.460	0.90	
WS-207 (CONTROLLED)	6754.7	0.0	0.0	6754.7	0.675	0.20	
WS-208 (ROOF - CONTROLLED)	0.0	0.0	18763.0	18763.0	1.876	0.90	
WS-200 A,B,C (UNCONTROLLED)	331.7	0.0	0.0	331.7	0.033	0.20	
Total Outlet 2 McEwan SWM Pond	**10657.0**	**0.0**	**40746.4**	**51403.4**	**5.140**	**0.75**	
TOTAL	**17326.2**	**0.0**	**47622.5**	**64948.7**	**6.495**	**0.71**	

APPENDIX I

Storm Sewer Sizing

LRL Associates Ltd.
Storm Design Sheet

LRL File No.	220345
Project:	Site 2
Location:	NCBP Site 2
Date:	Deember 22, 2022
Designed:	Tamara Harb
Drawing Reference:	C.401

Storm Design Parameters

Rational Method Q = 2.78CIA

Q = Peak flow in litres per second (L/s)
A = Drainage area in hectares (ha)
C = Runoff coefficient
I = Rainfall intensity (mm/hr)

Runoff Coefficient (C)

Grass	0.20
Gravel	0.80
Asphalt / rooftop	0.90

Ottawa Macdonald-Cartier International Airport IDF curve equation (5 year event, intensity in mm/hr)

$$I_5 = 998.071 / (Td + 6.053)^{0.814}$$

Min. velocity = 0.80 m/s
Manning's "n" = 0.013

LOCATION			AREA (ha)			FLOW						STORM SEWER							
CONTIBUTING AREA(S) / WATERSHED(S)	From	To	C = 0.20	C = 0.80	C = 0.90	Indiv. 2.78AC	Accum. 2.78AC	Time of Conc. (min.)	Rainfall Intensity (mm/hr)	Peak Flow Q (L/s)	Controlled Flow Q (L/s)	Pipe Diameter (mm)	Type	Slope (%)	Length (m)	Capacity Full (L/s)	Velocity Full (m/s)	Time of Flow (min.)	Ratio (Q/Q_{FULL})
OUTLET 1 - McEwan Creek																			
WS101	DICB02 (RA1)	OGS	0.150	0.000	0.653	1.718	1.72	18.29	74.2	127.54	83.63	375	PVC	0.30%	10.0	96.0	0.87	0.19	0.87
WS101	OGS	OUTLET TO MCEWAN CREEK	0.150	0.000	0.653	1.718	1.72	18.48	73.8	126.73	83.63	375	PVC	0.30%	9.6	96.0	0.87	0.18	0.87
OUTLET 2 - McEwan Storm Pond Facility																			
WS201	STM CB01	STM CBMH01	0.079	0.000	0.217	0.587	0.59	49.78	37.8	22.16		250	PVC	0.43%	84.7	39.1	0.80	1.77	0.57
WS201 & WS202	STM CBMH01	STM MH01	0.163	0.000	0.419	1.140	1.14	51.55	36.8	41.99		300	PVC	0.34%	68.9	56.4	0.80	1.44	0.74
WS201 & WS202	STM MH01	STM MH02	0.163	0.000	0.419	1.140	1.14	52.99	36.1	41.15		300	PVC	0.34%	14.8	56.4	0.80	0.31	0.73
WS201 & WS202	STM MH02	STM CBMH02	0.163	0.000	0.419	1.140	1.14	53.30	35.9	40.98		300	PVC	0.34%	32.3	56.4	0.80	0.67	0.73
WS201, WS202 & WS203	STM CBMH02	STM MH03	0.237	0.000	0.523	1.441	1.44	53.98	35.6	51.31		375	PVC	0.25%	76.6	87.7	0.79	1.61	0.59
WS201, WS202, WS203	STM MH03	STM MH04	0.237	0.000	0.523	1.441	1.44	55.58	34.9	50.22		375	PVC	0.25%	41.0	87.7	0.79	0.86	0.57
WS204	STM CBMH02	STM MH04	0.115	0.000	0.655	1.704	1.70	49.78	37.8	64.35		375	PVC	0.25%	32.4	87.7	0.79	0.68	0.73
WS201, WS202, WS203, WS204	STM MH04	RETENTION AREA 2	0.35	0.00	1.53	4.025	4.03	56.44	34.5	138.71		525	PVC	0.16%	25.9	172.0	0.79	0.54	0.81
WS206	STM CB03	STM CBMH03	0.00	0.00	0.46	1.152	1.15	49.78	37.8	43.52		300.00	PVC	0.34%	76.36	56.4	0.80	1.60	0.77
WS205 & WS206	STM CBMH03	RETENTION AREA 2	0.01	0.00	1.02	2.554	2.55	51.38	36.9	94.30		375.00	PVC	0.36%	23.36	105.2	0.95	0.41	0.90

LRL Associates Ltd.
Storm Design Sheet

LRL File No. 220345
Project: Site 2
Location: NCBP Site 2
Date: Deember 22, 2022
Designed: Tamara Harb
Drawing Reference: C.401

WS-208 (ROOF - CONTROLLED)	ROOF	ST MH05	0.00	0.00	1.88	4.695	4.69	49.78	37.8	177.33	45.36	300.00	PVC	3.70%	77.90	186.0	2.63	0.49	0.24
WS201, WS202, WS203, WS204, WS205, WS206, WS207	DICB 02 (RA2)	STM MH05	1.03	0.00	2.20	6.074	6.07	49.78	37.8	229.45	43.02	300.00	PVC	0.34%	7.26	56.4	0.80	0.15	0.76
WS201, WS202, WS203, WS204, WS205, WS206, WS207, WS208	STM MH05	STM MH06	1.03	0.00	4.07	10.769	10.77	50.27	37.5	403.88	88.38	375.00	PVC	0.35%	8.59	103.7	0.94	0.15	0.85
WS201, WS202, WS203, WS204, WS205, WS206, WS207, WS208	STM MH06	OUTLET UPSTREAM OF MCEWAN STORM POND FACILITY	1.03	0.00	4.07	10.769	10.77	50.43	37.4	402.99	88.38	450.00	PVC	0.20%	55.00	127.5	0.80	1.14	0.69

APPENDIX J

Stormwater Management Calculations (Outlet 1)

LRL File No.	220345	**Stormwater Management Design Sheet**
Project:	Site 2	
Location:	NCBP Site 2	
Date:	December 22, 2022	
Designed:	Tamara Harb	
Drawing Ref.:	C601	

OUTLET 1 - McEwan Creek
2 YEAR PRE TO 2 YEAR POST STORM CALCULATIONS

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) = A / (Td + C)^{B}
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Stormwater Management

I_2 = 732.95 / (Td + 6.199)$^{0.81}$ **a = 732.951** **b = 0.81** **C = 6.199**

C =	0.20	max of 0.5 as per City of Ottawa
I =	55.0	mm/hr
Tc =	18	min (Time of concentration was determined through analysis of existing site topography and by using the airport method)
Total Area =	2.095	ha

Allowable Release Rate= 64.02 L/s

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**0.1964**	ha	**∑R=**	**3.83**	**1.00**
Controlled	WS-101 (CONTROLLED)	0.803	ha	R=	0.77	**0.96**
	Total Controlled =	**0.803**	**ha**	**∑R=**	**0.77**	**0.96**
Un-controlled	WS-100 (UN-CONTROLLED)	0.551	ha	R=	0.24	**0.30**
	Total Un-Controlled =	**0.551**	**ha**	**∑R=**	**0.24**	**0.30**

Post-development Stormwater Management (Uncontrolled Catchment WS-100)

2 Year Storm Event:

I_2 = 732.95 / (Td + 6.199)$^{0.81}$ **a = 732.951** **b = 0.81** **C = 6.199**

Time (min)	Intensity (mm/hr)	Uncontrolled Runoff (L/s)	Controlled Release Rate Constant (L/s)	Total Release Rate (L/s)
18	55.0	25.64	0.00	**25.64**

Post-development Stormwater Management (WS-102)

2 Year Storm Event: **Allowable Release Rate (L/s)= 38.38**

I_2 = 732.95 / (Td + 6.199)$^{0.81}$ **a = 732.951** **b = 0.81** **C = 6.199**

		Storage Required				
Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	76.8	164.93	78.20	34.60	0.00	34.60
15	61.8	132.64	88.23	34.60	0.00	34.60
20	52.0	111.73	92.56	34.60	0.00	34.60
25	45.2	96.99	93.59	34.60	0.00	34.60
30	40.0	85.99	92.50	34.60	0.00	34.60
35	36.1	77.43	89.95	34.60	0.00	34.60
40	32.9	70.57	86.33	34.60	0.00	34.60
45	30.2	64.94	81.91	34.60	0.00	34.60
50	28.0	60.21	76.84	34.60	0.00	34.60
60	24.6	52.73	65.28	34.60	0.00	34.60
70	21.9	47.06	52.31	34.60	0.00	34.60
90	18.1	38.96	23.54	34.60	0.00	34.60
110	15.6	33.43	0.00	34.60	0.00	34.60
130	13.7	29.40	0.00	34.60	0.00	34.60
150	12.3	26.31	0.00	34.60	0.00	34.60
170	11.1	23.86	0.00	34.60	0.00	34.60

Total Storage Required =	**93.59**	**m^3**	refer to LRL Plan C.601
Available Storage* =	**106.44**	**m^3**	*at a pond elevation of 76.89m
2-Yr HWL=	**76.89**	**m**	actual available pond volume = 338.90 cu.m

Summary of 2-Year Pre to 2-Year Post Release Rates and Storage Volumes to Outlet 1 - McEwan Creek				
Catchment Area	**Drainage Area (ha)**	**2-year Release Rate (L/s)**	**2-Year Required Storage (m3)**	**2 Available Storage (m3)**
WS-100 (Uncontrolled)	0.551	25.64	0	0
WS-101 (CONTROLLED)	0.803	34.60	93.59	106.44
TOTAL	**1.355**	**60.24**	**93.59**	**106.44**
Allowable Release Rate at Outlet 1 =64.02L/s				

LRL File No.	220345	**Stormwater Management Design Sheet**
Project:	Site 2	
Location:	NCBP Site 2	
Date:	December 22, 2022	
Designed:	Tamara Harb	
Drawing Ref.:	C601	

OUTLET 1 - McEwan Creek

100 YEAR PRE TO 100 YEAR POST STORM CALCULATIONS

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) = $A / (Td + C)^B$
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Stormwater Management

I_{100} = 1735.688 / (Td + 6.014)0.820 **a = 1735.688** **b = 0.82** **C = 6.014**

C =	0.20	max of 0.5 as per City of Ottawa
I =	126.8	mm/hr
Tc =	18	min (Time of concentration was determined through analysis of existing site topography and by using the airport method)
Total Area =	2.095	ha

Allowable Release Rate= 147.75 L/s

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**0.1964**	ha	**∑R=**	**3.83**	**1.00**
Controlled	WS-101 (CONTROLLED)	0.803	ha	R=	0.77	**0.96**
	Total Controlled =	**0.803**	**ha**	**∑R=**	**0.77**	**0.96**
Un-controlled	WS-100 (UN-CONTROLLED)	0.551	ha	R=	0.24	**0.30**
	Total Un-Controlled =	**0.551**	**ha**	**∑R=**	**0.24**	**0.30**

Post-development Stormwater Management (Uncontrolled Catchment WS-100)

2 Year Storm Event:

I_{100} = 1735.688 / (Td + 6.014)0.820 **a = 1735.688** **b = 0.82** **C = 6.014**

Time (min)	Intensity (mm/hr)	Uncontrolled Runoff (L/s)	Controlled Release Rate Constant (L/s)	Total Release Rate (L/s)
18	126.8	59.18	0.00	**59.18**

Post-development Stormwater Management (WS-102)

2 Year Storm Event: **Allowable Release Rate (L/s)= 88.57**

I_{100} = 1735.688 / (Td + 6.014)0.820 **a = 1735.688** **b = 0.82** **C = 6.014**

		Storage Required				
Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	178.6	383.43	179.88	83.63	0.00	83.63
15	142.9	306.85	200.90	83.63	0.00	83.63
20	120.0	257.58	208.74	83.63	0.00	83.63
25	103.8	223.00	209.05	83.63	0.00	83.63
30	91.9	197.28	204.56	83.63	0.00	83.63
35	82.6	177.33	196.77	83.63	0.00	83.63
40	75.1	161.37	186.57	83.63	0.00	83.63
45	69.1	148.28	174.55	83.63	0.00	83.63
50	64.0	137.33	161.11	83.63	0.00	83.63
60	55.9	120.03	131.03	83.63	0.00	83.63
70	49.8	106.92	97.81	83.63	0.00	83.63
90	41.1	88.28	25.12	83.63	0.00	83.63
110	35.2	75.59	0.00	83.63	0.00	83.63
130	30.9	66.35	0.00	83.63	0.00	83.63
150	27.6	59.29	0.00	83.63	0.00	83.63
170	25.0	53.71	0.00	83.63	0.00	83.63

Total Storage Required =	**209.05**	**m^3**	refer to LRL Plan C.601
Available Storage =	**338.90**	**m^3**	
100-Yr HWL=	**77.35**	**m**	

Summary of 100-Year Pre to 100-Year Post Release Rates and Storage Volumes to Outlet 1 - McEwan Creek				
Catchment Area	**Drainage Area (ha)**	**2-year Release Rate (L/s)**	**2-Year Required Storage (m3)**	**2 Available Storage (m3)**
WS-100 (Uncontrolled)	0.551	59.18	0	0
WS-101 (CONTROLLED)	0.803	83.63	209.05	338.90
TOTAL	**1.355**	**142.81**	**209.05**	**338.90**
Allowable Release Rate at Outlet 1 = 147.75L/s				

ORIFICE CALCULATIONS for Outlet 1 - McEwan Creek

2-YEAR

Product Orifice Plate

Invert Level =	76.68	masl.	
HWL =	0.10	m	head acting on centerline
HWL =	76.89	masl.	
Orifice Dia. =	**230**	mm	
Orifice Invert =	76.68	masl.	
Orifice Area =	0.0415	m^2	
C =	0.61		
Controlled Release =	34.60	L/s	

100-YEAR

ORIFICE CALCULATIONS for Outlet 1 - McEwan Creek

Product Orifice Plate

Invert Level =	76.68	masl.	
HWL =	0.56	m	head acting on centerline
HWL =	76.89	masl.	
Orifice Dia. =	**230**	mm	
Orifice Invert =	76.68	masl.	
Orifice Area =	0.0415	m^2	
C =	0.61		
Controlled Release =	83.63	L/s	

APPENDIX K

Stormwater Management Calculations (Outlet 2)

LRL File No.	220345	**Stormwater Management Design Sheet**
Project:	Site 2	
Location:	NCBP Site 2	
Date:	December 22, 2022	
Designed:	Tamara Harb	
Drawing Ref.:	C601	

OUTLET 2 - MCEWAN STORM POND FACILITY
2 YEAR PRE TO 2 YEAR POST STORM CALCULATIONS

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) = A / (Td + C)^{B}
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Stormwater Management

I_2 = 732.95 / (Td + 6.199)$^{0.81}$ **a = 732.951** **b = 0.810** **C = 6.199**

C =	0.20	max of 0.5 as per City of Ottawa
I =	28.1	mm/hr
Tc =	50	min (Time of concentration was determined through analysis of existing site topography and by using the airport method)
Total Area =	4.400	ha

Allowable Release Rate= 68.81 L/s

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**5.1396**	ha	**∑R=**	**0.43**	**0.53**
Controlled	WS-201 (CONTROLLED)	0.2960	ha	R=	0.71	0.89
	WS-202 (CONTROLLED)	0.2866	ha	R=	0.69	0.87
	WS-203 (CONTROLLED)	0.178	ha	R=	0.61	0.76
	WS-204 (CONTROLLED)	0.770	ha	R=	0.80	0.99
	WS-205 (CONTROLLED)	0.564	ha	R=	0.89	1.00
	WS-206 (CONTROLLED)	0.460	ha	R=	0.90	1.00
	WS-207 (CONTROLLED)	0.675	ha	R=	0.20	0.25
	WS-208 (ROOF - CONTROLLED)	1.876	ha	R=	0.90	1.00
	Total Controlled Minus Roof =	**3.231**	**ha**	**∑R=**	**0.68**	**0.85**
Un-controlled	WS-200 A,B,C (UNCONTROLLED)	0.032	ha	R=	0.20	0.25
	Total Un-Controlled =	**0.032**	**ha**	**∑R=**	**0.20**	**0.25**

Post-development Stormwater Management (Uncontrolled Catchment WS-200)

2 Year Storm Event:

I_2 = 732.95 / (Td + 6.199)$^{0.81}$ **a = 732.951** **b = 0.810** **C = 6.199**

Time (min)	Intensity (mm/hr)	Uncontrolled Runoff (L/s)	Controlled Release Rate Constant (L/s)	Total Release Rate (L/s)
10	76.8	1.73	0.00	1.73

Post-development Stormwater Management (WS-201 -207)

2 Year Storm Event: **Allowable Release Rate (L/s)= 21.72**

I_2 = 732.95 / (Td + 6.199)$^{0.81}$ **a = 732.951** **b = 0.810** **C = 6.199**

		Storage Required				
Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	76.8	583.17	336.95	21.59	0.00	21.59
15	61.8	468.99	402.66	21.59	0.00	21.59
20	52.0	395.07	448.17	21.59	0.00	21.59
25	45.2	342.95	482.04	21.59	0.00	21.59
30	40.0	304.05	508.42	21.59	0.00	21.59
35	36.1	273.79	529.63	21.59	0.00	21.59
40	32.9	249.53	547.07	21.59	0.00	21.59
45	30.2	229.60	561.64	21.59	0.00	21.59
50	28.0	212.91	573.97	21.59	0.00	21.59
60	24.6	186.46	593.54	21.59	0.00	21.59
70	21.9	166.38	608.12	21.59	0.00	21.59
90	18.1	137.76	627.30	21.59	0.00	21.59
110	15.6	118.21	637.72	21.59	0.00	21.59
120	14.6	110.57	640.64	21.59	0.00	21.59
150	12.3	93.03	642.92	21.59	0.00	21.59
170	11.1	84.38	640.42	21.59	0.00	21.59

Total Storage Required =	**642.92**	**m^3**	refer to LRL Plan C.601
Available Storage* =	**644.92**	**m^3**	*at a pond elevation of 77.05m
2-Yr HWL=	**77.05**	**m**	actual available pond volume = 2321.7 cu.m

Post-development Stormwater Management (WS-208 (Building))

2 Year Storm Event:

I_2 = 732.95 / (Td + 6.199)$^{0.81}$ **a = 732.951** **b = 0.810** **C = 6.199**

		Storage Required				
Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)

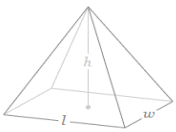
LRL File No.	220345
Project:	Site 2
Location:	NCBP Site 2
Date:	December 22, 2022
Designed:	Tamara Harb
Drawing Ref.:	C601

Stormwater Management Design Sheet

OUTLET 2 - MCEWAN STORM POND FACILITY

2 YEAR PRE TO 2 YEAR POST STORM CALCULATIONS

10	76.8	400.62	213.16	45.36	0.00	45.36
15	61.8	322.19	249.14	45.36	0.00	45.36
20	52.0	271.40	271.25	45.36	0.00	45.36
25	45.2	235.60	285.35	45.36	0.00	45.36
30	40.0	208.87	294.32	45.36	0.00	45.36
35	36.1	188.09	299.73	45.36	0.00	45.36
40	32.9	171.42	302.55	45.36	0.00	45.36
45	30.2	157.73	303.40	45.36	0.00	45.36
50	28.0	146.27	302.72	45.36	0.00	45.36
60	24.6	128.10	297.85	45.36	0.00	45.36
70	21.9	114.30	289.54	45.36	0.00	45.36
80	19.8	103.43	278.76	45.36	0.00	45.36
90	18.1	94.64	266.09	45.36	0.00	45.36
100	16.7	87.35	251.94	45.36	0.00	45.36
110	15.6	81.21	236.61	45.36	0.00	45.36
120	14.6	75.96	220.30	45.36	0.00	45.36



V = (l*w)*h/3 = Ah/3

Summary of Roof Storage

Maximum Required Roof Storage (100 Year) =	303.40	m^3	
Watts Roof Drain Discharge =	0.0126	L/s/mm	
Proposed Head =	150	mm	*An Emergency overflow scupper is provided above this height.
Control Flow/Drain =	1.89	L/s	
Number of Roof Drains =	24		
Total Flow from Roof Drain =	45.36	L/s	
Total Roof Surface =	19009	m^2	
Effective Roof Surface =	19009	m^2	100 (% of total roof surface)
Available Roof Storage =	**950.45**	m^3	

Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (**Watts RD-100 Weir Opening =Fully Exposed**)

Total Storage Required = 303.40 m^3 refer to LRL Plan C.601

Available Storage = 950.45 m^3

Summary of 2-Year Pre to 2-Year Post Release Rates and Storage Volumes to Outlet 2 - McEwan SW Pond Facility

Catchment Area	Drainage Area (ha)	2-year Release Rate (L/s)	2-Year Required Storage (m3)	Total Available Storage (m3)
WS-200 A,B,C (UNCONTROLLED)	0.032	1.73	0	0
WS-201 TO WS-207 (CONTROLLED)	3.231	21.59	642.92	644.92
WS-208 (ROOF - CONTROLLED)	1.876	45.36	303.40	950.45
TOTAL	**5.140**	**68.68**	**946.33**	**1595.37**

Allowable Release Rate at Outlet 1 = 68.81L/s

LRL File No.	220345	Stormwater Management Design Sheet
Project:	Site 2	
Location:	NCBP Site 2	
Date:	December 22, 2022	
Designed:	Tamara Harb	
Drawing Ref.:	C601	

OUTLET 2 - MCEWAN STORM POND FACILITY
100 YEAR PRE TO 100 YEAR POST STORM CALCULATIONS

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) $= A / (Td + C)^B$
A = Area (ha)
T_c = Time of concentration (min)

Pre-development Stormwater Management

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ a = 1735.688 b = 0.820 C = 6.014

C =	0.20	max of 0.5 as per City of Ottawa
I =	64.2	mm/hr
Tc =	50	min (Time of concentration was determined through analysis of existing site topography and by using the airport method)
Total Area =	4.400	ha

Allowable Release Rate= 156.95 L/s

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**5.1396**	ha	**∑R=**	**0.43**	**0.53**
Controlled	WS-201 (CONTROLLED)	0.2960	ha	R=	0.71	0.89
	WS-202 (CONTROLLED)	0.2866	ha	R=	0.69	0.87
	WS-203 (CONTROLLED)	0.178	ha	R=	0.61	0.76
	WS-204 (CONTROLLED)	0.770	ha	R=	0.80	0.99
	WS-205 (CONTROLLED)	0.564	ha	R=	0.89	1.00
	WS-206 (CONTROLLED)	0.460	ha	R=	0.90	1.00
	WS-207 (CONTROLLED)	0.675	ha	R=	0.20	0.25
	WS-208 (ROOF - CONTROLLED)	1.876	ha	R=	0.90	1.00
	Total Controlled Minus Roof =	**3.231**	**ha**	**∑R=**	**0.68**	**0.85**
Un-controlled	WS-200 A,B,C (UNCONTROLLED)	0.032	ha	R=	0.20	0.25
	Total Un-Controlled =	**0.032**	**ha**	**∑R=**	**0.20**	**0.25**

Post-development Stormwater Management (Uncontrolled Catchment WS-200)

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ a = 1735.688 b = 0.820 C = 6.014

Time (min)	Intensity (mm/hr)	Uncontrolled Runoff (L/s)	Controlled Release Rate Constant (L/s)	Total Release Rate (L/s)
10	178.6	4.02	0.00	4.02

Post-development Stormwater Management (WS-201-207)

100 Year Storm Event: **Allowable Release Rate (L/s)= 107.57**

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ a = 1735.688 b = 0.820 C = 6.014

		Storage Required				
Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	178.6	1355.78	787.66	43.02	0.00	43.02
15	142.9	1084.98	937.77	43.02	0.00	43.02
20	120.0	910.77	1041.30	43.02	0.00	43.02
25	103.8	788.50	1118.22	43.02	0.00	43.02
30	91.9	697.55	1178.15	43.02	0.00	43.02
35	82.6	627.01	1226.38	43.02	0.00	43.02
40	75.1	570.57	1266.12	43.02	0.00	43.02
45	69.1	524.29	1299.44	43.02	0.00	43.02
50	64.0	485.60	1327.73	43.02	0.00	43.02
60	55.9	424.40	1372.98	43.02	0.00	43.02
70	49.8	378.05	1407.12	43.02	0.00	43.02
90	41.1	312.15	1453.31	43.02	0.00	43.02
110	35.2	267.29	1480.18	43.02	0.00	43.02
120	32.9	249.77	1488.58	43.02	0.00	43.02
150	27.6	209.65	1499.63	43.02	0.00	43.02
170	25.0	189.90	1498.20	43.02	0.00	43.02

Total Storage Required =	**1499.63**	**m^3**	refer to LRL Plan C.601
Available Storage =	**2321.70**	**m^3**	
100-Yr HWL=	**78.35**	**m**	

Post-development Stormwater Management (WS-208 (Building))

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ a = 1735.688 b = 0.820 C = 6.014

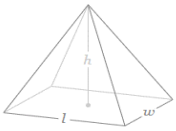
Storage Required

LRL File No.	220345
Project:	Site 2
Location:	NCBP Site 2
Date:	December 22, 2022
Designed:	Tamara Harb
Drawing Ref.:	C601

Stormwater Management Design Sheet

OUTLET 2 - MCEWAN STORM POND FACILITY
100 YEAR PRE TO 100 YEAR POST STORM CALCULATIONS

Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate Constant (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	178.6	931.38	531.61	45.36	0.00	45.36
15	142.9	745.35	629.99	45.36	0.00	45.36
20	120.0	625.68	696.38	45.36	0.00	45.36
25	103.8	541.68	744.48	45.36	0.00	45.36
30	91.9	479.19	780.90	45.36	0.00	45.36
35	82.6	430.74	809.30	45.36	0.00	45.36
40	75.1	391.97	831.86	45.36	0.00	45.36
45	69.1	360.17	850.00	45.36	0.00	45.36
50	64.0	333.59	864.70	45.36	0.00	45.36
60	55.9	291.55	886.29	45.36	0.00	45.36
70	49.8	259.71	900.26	45.36	0.00	45.36
80	45.0	234.68	908.73	45.36	0.00	45.36
90	41.1	214.44	913.03	45.36	0.00	45.36
100	37.9	197.71	914.08	45.36	0.00	45.36
110	35.2	183.62	912.52	45.36	0.00	45.36
120	32.9	171.58	908.81	45.36	0.00	45.36



V = (l*w)*h/3 = Ah/3

Summary of Roof Storage

Maximum Required Roof Storage (100 Year) =	914.08	m^3	
Watts Roof Drain Discharge =	0.0126	L/s/mm	
Proposed Head =	150	mm	*An Emergency overflow scupper is provided above this height.
Control Flow/Drain =	1.89	L/s	
Number of Roof Drains =	24		
Total Flow from Roof Drain =	45.36	L/s	
Total Roof Surface =	19009	m^2	
Effective Roof Surface =	19009	m^2	100 (% of total roof surface)
Available Roof Storage =	**950.45**	m^3	

Roof Drain Model = Watts Roof Drain with Adjustable Flow Setting (**Watts RD-100 Weir Opening = Fully exposed**)

Total Storage Required =	**914.08**	**m^3**	refer to LRL Plan C.601
Available Storage =	**950.45**	**m^3**	

Summary of 100-Year Pre to 100-Year Post Release Rates and Storage Volumes to Outlet 2 - McEwan SW Pond Facility

Catchment Area	Drainage Area (ha)	100-year Release Rate (L/s)	100-Year Required Storage (m3)	Total Available Storage (m3)
WS-200 A,B,C (UNCONTROLLED)	0.032	4.02	0	0
WS-201 TO WS-207 (CONTROLLED)	3.231	43.02	1499.63	2321.70
WS-208 (ROOF - CONTROLLED)	1.876	45.36	914.08	950.45
TOTAL	**5.140**	**92.40**	**2413.71**	**3272.15**
Allowable Release Rate at Outlet 1 = 156.95L/s				

LRL Associates Ltd.
Stormwater Management Design Sheet

ORIFICE CALCULATIONS for Outlet 2 to McEwan Storm Pond Facility

2-YEAR

Product Orifice Plate

Invert Level =	76.55	masl.	
h =	0.44	m	head acting on centerline
HWL =	77.05	masl.	
Orifice Dia. =	**124**	mm	
Orifice Invert =	76.55	masl.	
Orifice Area =	0.0121	m^2	
C =	0.61		
Controlled Release =	21.59	L/s	

ORIFICE CALCULATIONS for Outlet 2 to McEwan Storm Pond Facility

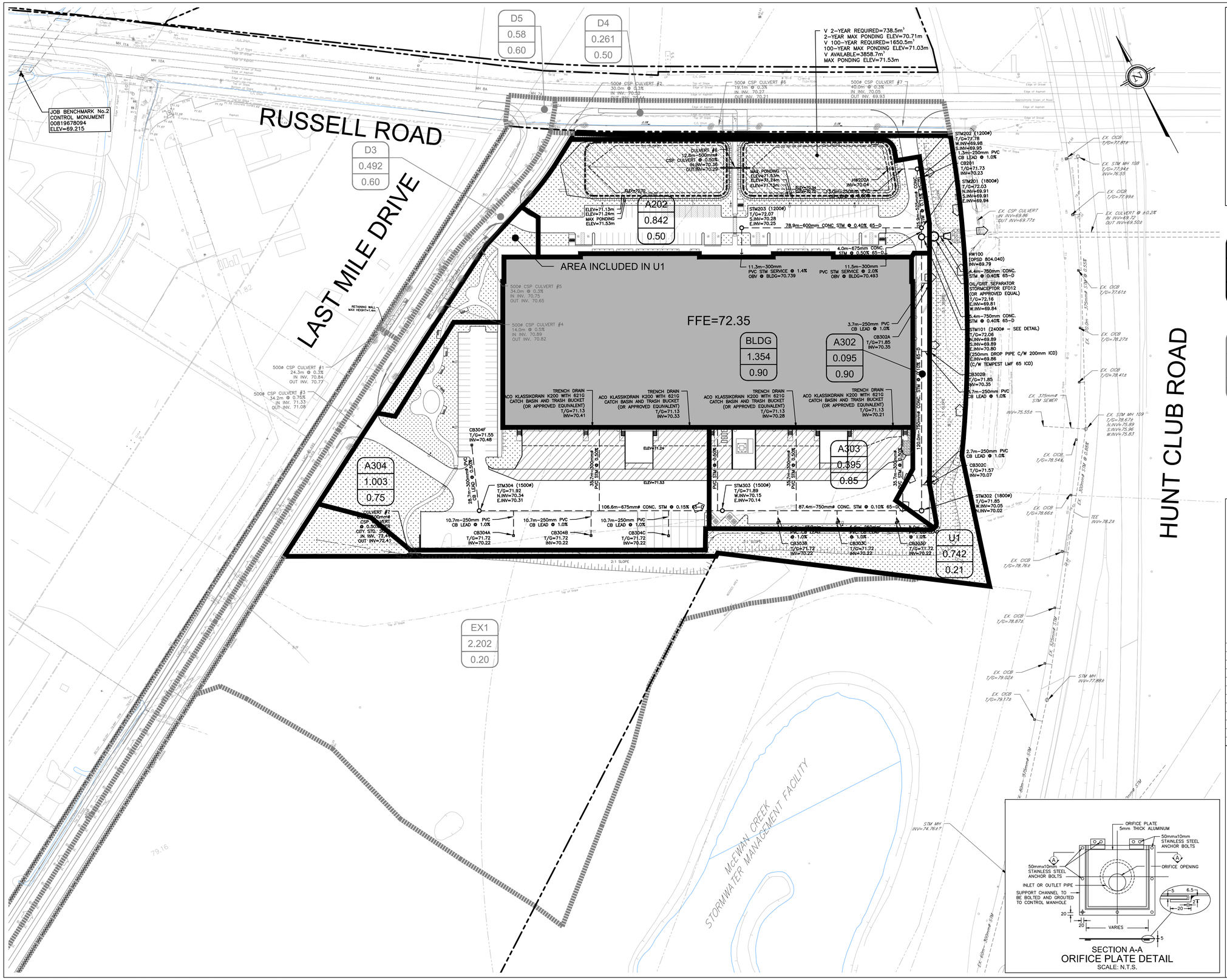
100-YEAR

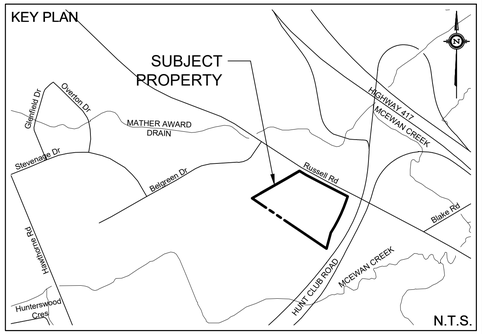
Product Orifice Plate

Invert Level =	76.55	masl.	
h =	1.74	m	head acting on centerline
HWL =	78.35	masl.	*maximum before overflow, therefore anything lower would have less head, and release a smaller rate of flow.
Orifice Dia. =	**124**	mm	
Orifice Invert =	76.55	masl.	
Orifice Area =	0.0121	m^2	
C =	0.61		
Controlled Release =	43.02	L/s	

APPENDIX L

Site 1 Approved Stormwater Management Plan





LEGEND

A101 / 4.010 / 0.19	DRAINAGE AREA ID; AREA IN Ha; RATIONAL METHOD RUNOFF COEFFICIENT
D3 / 4.010 / 0.19	OFF-SITE DRAINAGE AREA ID; AREA IN Ha; RATIONAL METHOD RUNOFF COEFFICIENT

PROPERTY LINE
PROPOSED STORM SEWER
DRAINAGE DIVIDE
OFF-SITE DRAINAGE DIVIDE
PROPOSED SWALE
PROPOSED PERFORATED SUBDRAIN
PROPOSED STORM MANHOLE
PROPOSED CATCH BASIN
PROPOSED CB 'T'
EMERGENCY FLOW ROUTE
SURFACE PONDING AREA
MAX PONDING
100-YR PONDING
INTERMEDIATE PONDING
2-YR PONDING

TOPOGRAPHIC INFORMATION
TOPOGRAPHIC INFORMATION PROVIDED BY ANNIS, O'SULLIVAN, VOLLBEKK LTD.
PROJ. NO. 17730-19
DATED JUNE 18, 2020

SITE PLAN INFORMATION
SITE PLAN PROVIDED BY WARE MALCOMB
PROJ. NO. TOR20-0019-00
RECEIVED AUGUST 27, 2021.

GEOTECHNICAL STUDY
GEOTECHNICAL RECOMMENDATIONS PROVIDED BY PATERSON GROUP
PROJ. NO. PG4854-1
DATED AUGUST 13, 2020.

SITE SERVICING AND STORMWATER MANAGEMENT STUDY
SERVICING AND STORMWATER MANAGEMENT RECOMMENDATIONS PROVIDED BY DSEL
PROJ. NO. 19-1155
DATED MARCH 2021

BENCH MARK
JOB BENCHMARK No.1 CONTROL MONUMENT 0011962U3456
ELEV=73.746
JOB BENCHMARK No.2 CONTROL MONUMENT 00819678094
ELEV=69.215

No.	BY	YY.MM.DD	DESCRIPTION
5	B.N.C.	21.09.03	REVISED PER SITE PLAN
4	B.N.C.	21.05.07	ISSUED FOR TENDER
3	B.N.C.	21.03.10	ISSUED FOR MUNICIPAL REVIEW
2	B.N.C.	20.12.10	ISSUED FOR MUNICIPAL REVIEW
1	B.N.C.	20.08.13	ISSUED FOR MUNICIPAL REVIEW

PROJECT No.19-1155

LICENSED PROFESSIONAL ENGINEER R. M. WINGATE 100088090 PROVINCE OF ONTARIO

REVIEWED BY

STORMWATER MANAGEMENT PLAN
4120 RUSSELL RD - SITE 1

© DSEL

NATIONAL CAPITAL BUSINESS PARK

222 Somerset W, Unit 401
Ottawa, Ontario, K2P 2G3

DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™
120 Iber Road Unit 103
Stittsville, Ontario, K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

DRAWN BY:	G.G.G.	CHECKED BY:	A.D.F.	DRAWING NO.	SHEET NO.
DESIGNED BY:	B.N.C.	CHECKED BY:	A.D.F.	SWM-1	1 of 1
SCALE:	1:750	DATE:	JULY 2020		

CITY PLAN No.: 18438

CITY FILE No.: D07-12-20-0028

z:\projects\19-1155_4120-russell-road\b_design\b2_drawings\b2-2_main (dsel)\site-1_spa_sub2\2021-11-11_1155_site-1_spa.dwg

APPENDIX M

Watts Roof Drain Specifications

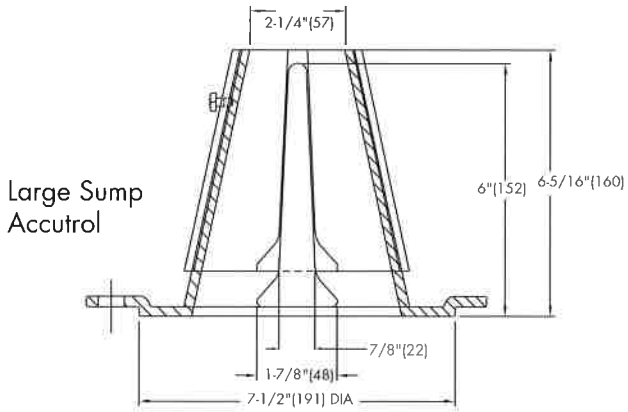
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

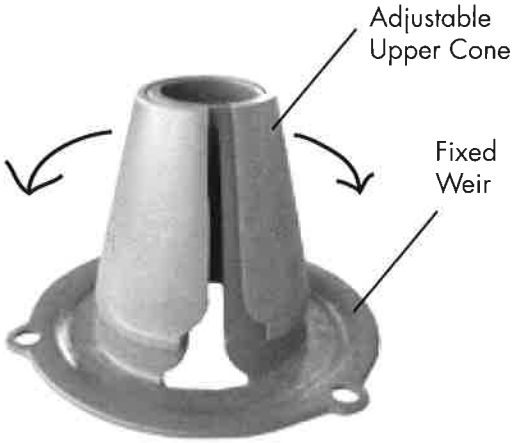
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2" of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3" of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm(per inch of head) x 2 inches of head] + 2-1/2 gpm(for the third inch of head) = 12-1/2 gpm.





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	Head of Water					
	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	10	10	10	10	10

Job Name _____ **Model No.** _____

Job Location _____ Contractor _____

Engineer _____ Representative _____

WATTS®

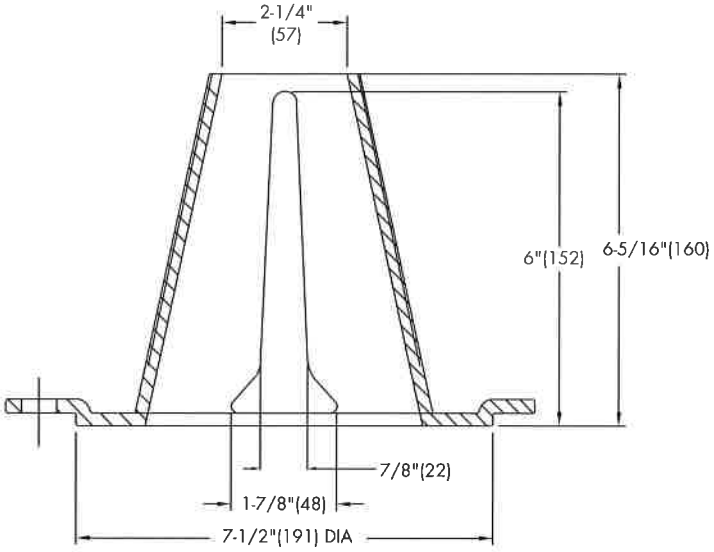
WATTS Drainage reserves the right to modify or change product design or construction without prior notice and without incurring any obligation to make similar changes and modifications to products previously or subsequently sold. See your WATTS Drainage representative for any clarification. Dimensions are subject to manufacturing tolerances.

CANADA

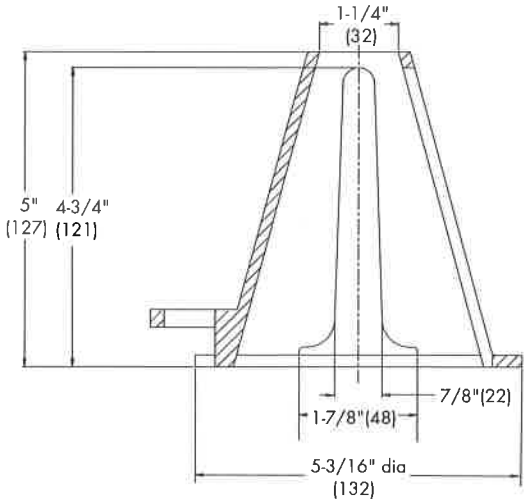
ACCUTROL WEIR FLOW CONTROL

SPECIFICATION: Watts Drainage Products epoxy coated cast iron Accutrol Weir is designed with parabolic openings which limit the flow of rain water off a roof. Each weir slot controls flow to 5 gpm per inch of head to a maximum of 30 gpm at 6" head(for large sump), 25 gpm at 5" head(for small sump) . The Accutrol Weir is secured to the flashing clamp of the roof drain. The Accutrol Weir is available with 1 to 4 slots for the large sump drain and up to 3 slots for the small sump drain.

For Large Sump Roof Drains Specify the "-A" option and number of slots required. (ie. "RD-100-A2" for two slot weir)
For Small Sump Roof Drains Specify the "-A" option and number of slots required. (ie. "RD-200-A1" for one slot weir)



LARGE SUMP ACCUTROL WEIR



SMALL SUMP ACCUTROL WEIR

Job Name _____ **Model No.** _____

Job Location _____ Contractor _____

Engineer _____ Representative _____

WATTS®

WATTS Drainage reserves the right to modify or change product design or construction without prior notice and without incurring any obligation to make similar changes and modifications to products previously or subsequently sold. See your WATTS Drainage representative for any clarification. Dimensions are subject to manufacturing tolerances.

CANADA

APPENDIX N

Outlet 1 Stormceptor OGS

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

08/17/2022

Province:	Ontario
City:	Ottawa
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20
Site Name:	OGS 1
Drainage Area (ha):	1.05
Runoff Coefficient 'c':	0.80
Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0
Required Water Quality Runoff Volume Capture (%):	90.0
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	

Project Name:	4120 Russell Rd.
Project Number:	220345
Designer Name:	Brandon O'Leary
Designer Company:	Forterra
Designer Email:	brandon.oleary@forterrabp.com
Designer Phone:	905-630-0359
EOR Name:	Amr Salem
EOR Company:	LRL Associates Ltd.
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	75
EFO6	86
EFO8	92
EFO10	96
EFO12	97

Recommended Stormceptor EFO Model:	**EFO6**
Estimated Net Annual Sediment (TSS) Load Reduction (%):	**86**
Water Quality Runoff Volume Capture (%):	**> 90**

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

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

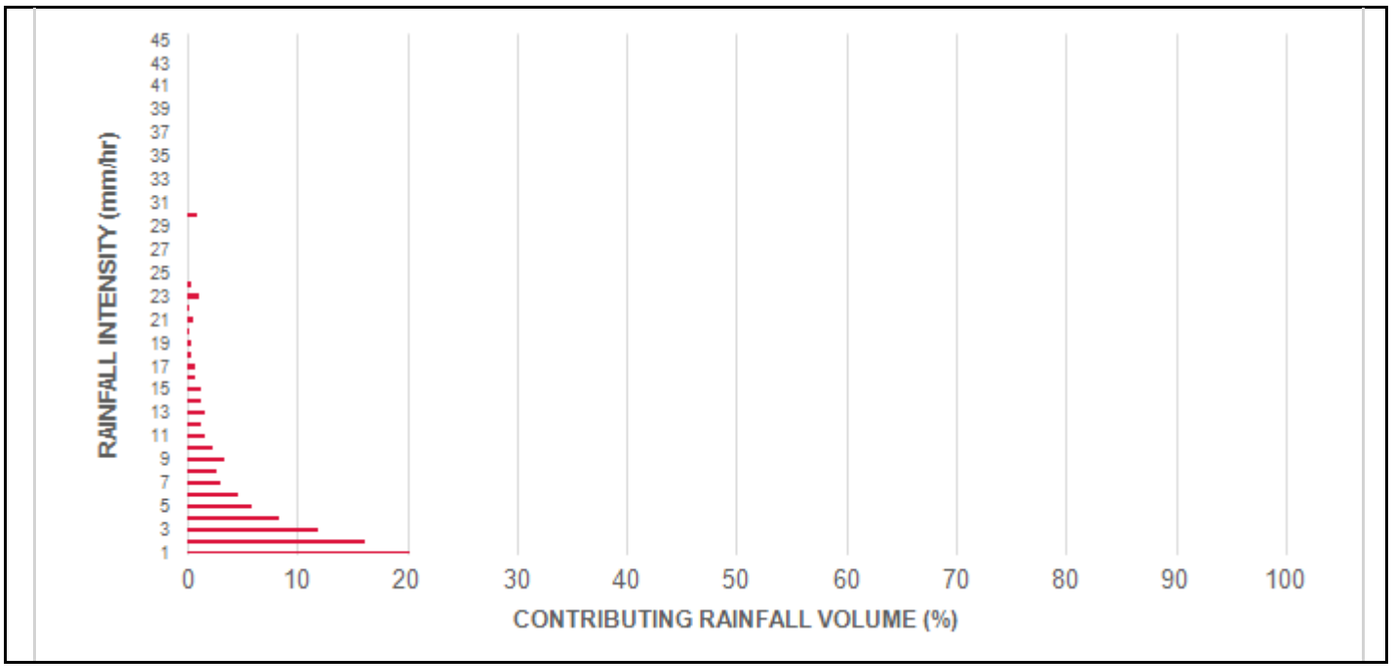
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

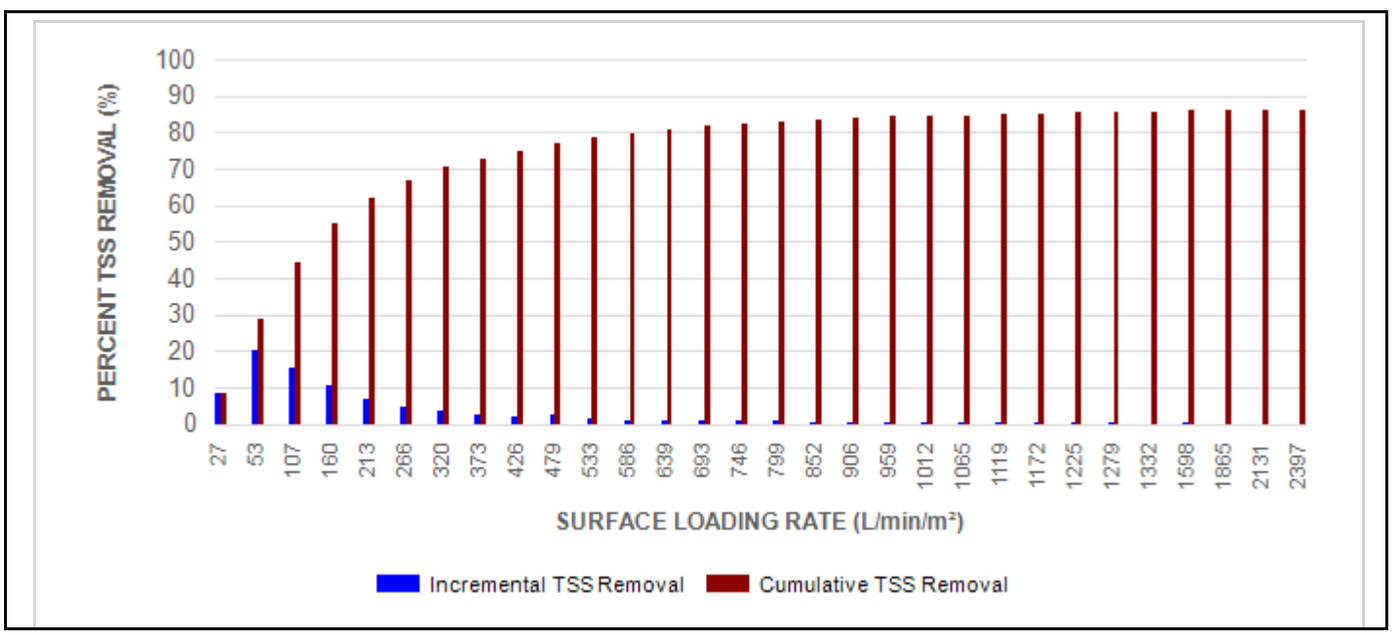
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.5	8.6	8.6	1.17	70.0	27.0	100	8.6	8.6
1	20.3	29.0	2.34	140.0	53.0	100	20.3	29.0
2	16.2	45.2	4.67	280.0	107.0	96	15.6	44.5
3	12.0	57.2	7.01	420.0	160.0	88	10.6	55.1
4	8.4	65.6	9.34	560.0	213.0	83	7.0	62.1
5	5.9	71.6	11.68	701.0	266.0	80	4.8	66.8
6	4.6	76.2	14.01	841.0	320.0	78	3.6	70.4
7	3.1	79.3	16.35	981.0	373.0	75	2.3	72.7
8	2.7	82.0	18.68	1121.0	426.0	73	2.0	74.7
9	3.3	85.3	21.02	1261.0	479.0	70	2.3	77.1
10	2.3	87.6	23.35	1401.0	533.0	68	1.6	78.6
11	1.6	89.2	25.69	1541.0	586.0	66	1.0	79.7
12	1.3	90.5	28.02	1681.0	639.0	64	0.8	80.5
13	1.7	92.2	30.36	1821.0	693.0	64	1.1	81.6
14	1.2	93.5	32.69	1962.0	746.0	64	0.8	82.4
15	1.2	94.6	35.03	2102.0	799.0	63	0.7	83.1
16	0.7	95.3	37.36	2242.0	852.0	63	0.4	83.6
17	0.7	96.1	39.70	2382.0	906.0	62	0.5	84.0
18	0.4	96.5	42.03	2522.0	959.0	62	0.2	84.3
19	0.4	96.9	44.37	2662.0	1012.0	61	0.3	84.5
20	0.2	97.1	46.70	2802.0	1065.0	60	0.1	84.6
21	0.5	97.5	49.04	2942.0	1119.0	59	0.3	84.9
22	0.2	97.8	51.37	3082.0	1172.0	58	0.1	85.1
23	1.0	98.8	53.71	3223.0	1225.0	56	0.6	85.6
24	0.3	99.1	56.04	3363.0	1279.0	55	0.1	85.8
25	0.0	99.1	58.38	3503.0	1332.0	54	0.0	85.8
30	0.9	100.0	70.06	4203.0	1598.0	46	0.4	86.2
35	0.0	100.0	81.73	4904.0	1865.0	39	0.0	86.2
40	0.0	100.0	93.41	5604.0	2131.0	34	0.0	86.2
45	0.0	100.0	105.08	6305.0	2397.0	31	0.0	86.2
Estimated Net Annual Sediment (TSS) Load Reduction =								**86 %**

Climate Station ID: 6105978 *Years of Rainfall Data*: 20

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL
FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

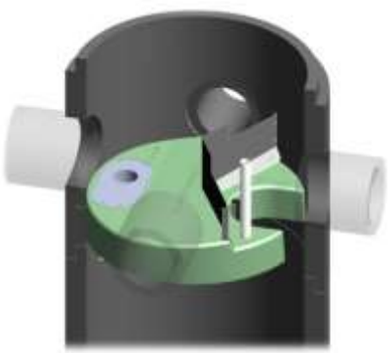
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

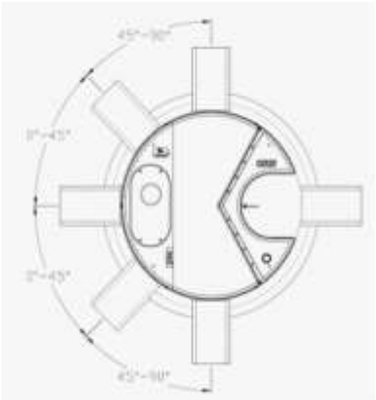
DESIGN FLEXIBILITY

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

OIL CAPTURE AND RETENTION

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





INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

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

Pollutant Capacity

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

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

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

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

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

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

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

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

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

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

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in

accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

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

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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

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

APPENDIX O

Low Impact Development Planning and Design Fact Sheets

ENHANCED GRASS SWALES

CVC/TRCA LOW IMPACT DEVELOPMENT
PLANNING AND DESIGN GUIDE - FACT SHEET

GENERAL DESCRIPTION

Enhanced grass swales are vegetated open channels designed to convey, treat and attenuate stormwater runoff (also referred to as enhanced vegetated swales). Check dams and vegetation in the swale slows the water to allow sedimentation, filtration through the root zone and soil matrix, evapotranspiration, and infiltration into the underlying native soil. Simple grass channels or ditches have long been used for stormwater conveyance, particularly for roadway drainage. Enhanced grass swales incorporate design features such as modified geometry and check dams that improve the contaminant removal and runoff reduction functions of simple grass channel and roadside ditch designs.

Where development density, topography and depth to water table permit, enhanced grass swales are a preferred alternative to both curb and gutter and storm drains as a stormwater conveyance system. When incorporated into a site design, they can reduce impervious cover, accent the natural landscape, and provide aesthetic benefits.

DESIGN GUIDANCE

GEOMETRY AND SITE LAYOUT

- Shape: Should be designed with a trapezoidal or parabolic cross section. Trapezoidal swales will generally evolve into parabolic swales over time, so the initial trapezoidal cross-section design should be checked for capacity and conveyance assuming it is a parabolic cross-section. Swale length between culverts should be 5 metres or greater.
- Bottom Width: Should be designed with a bottom width between 0.75 and 3.0 metres. Should allow for shallow flows and adequate water quality treatment, while preventing flows from concentrating and creating gullies.
- Longitudinal Slope: Slopes should be between 0.5% and 4%. Check dams should be incorporated on slopes greater than 3%.
- Length: When used to convey and treat road runoff, the length simply parallels the road, and therefore should be equal to, or greater than the contributing roadway length.
- Flow Depth: A maximum flow depth of 100 mm is recommended during a 4 hour, 25 mm Chicago storm event.
- Side Slopes: Should be as flat as possible to aid in providing pretreatment for lateral incoming flows and to maximize the swale filtering surface. Steeper side slopes are likely to have erosion gullying from incoming lateral flows. A maximum slope of 2.5:1 (H:V) is recommended and a 4:1 slope is preferred where space permits.

PRE-TREATMENT

A pea gravel diaphragm located along the top of each bank can be used to provide pretreatment of any runoff entering the swale laterally along its length. Vegetated filter strips or mild side slopes (3:1) also provide pretreatment for any lateral sheet flow entering the swale. Sedimentation forebays at inlets to the swale are also a pretreatment option.

CONVEYANCE AND OVERFLOW

Grass swales must be designed for a maximum velocity of 0.5 m/s or less for the 4 hour 25 mm Chicago storm event. The swale should also convey the locally required design storm (usually the 10 year storm) at non-erosive velocities.

SOIL AMENDMENTS

If soils along the location of the swale are highly compacted, or of such low fertility that vegetation cannot become established, they should be tilled to a depth of 300 mm and amended with compost to achieve an organic content of 8 to 15% by weight or 30 to 40% by volume.

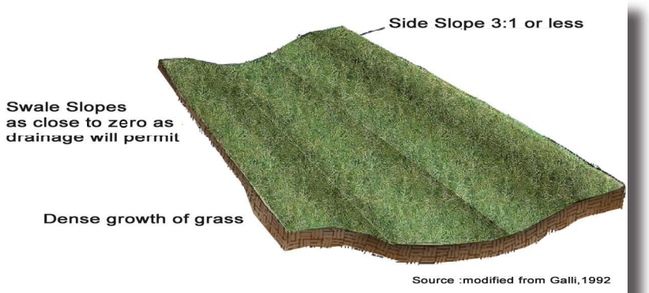
Source: Delaware Department of Transportation

Source: Seattle Public Utilities

Source: Thomas Engineering

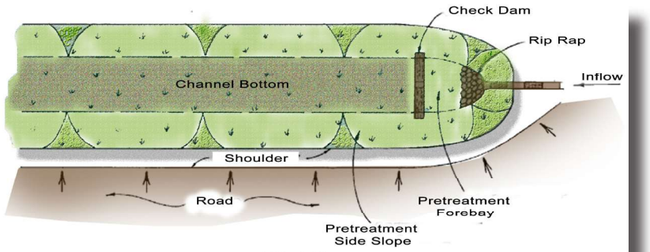
Source: Sue Donaldson

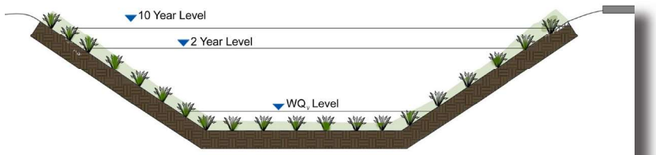
Source: CVC



Source :modified from Galli,1992

PLAN VIEW OF A GRASS SWALE





PLAN AND PROFILE VIEWS

ABILITY TO MEET SWM OBJECTIVES

BMP	Water Balance Benefit	Water Quality Improvement	Stream Channel Erosion Control Benefit
Enhanced Grass Swale	Partial - depends on soil infiltration rate	Yes, if design velocity is 0.5 m/s or less for a 4 hour, 25 mm Chicago storm	Partial - depends on soil infiltration rate

GENERAL SPECIFICATIONS

Component	Specification	Quantity
Check Dams	Constructed of a non-erosive material such as suitably sized aggregate, wood, gabions, riprap, or concrete. All check dams should be underlain with geotextile filter fabric. Wood used for check dams should consist of pressure treated logs or timbers, or water-resistant tree species such as cedar, hemlock, swamp oak or locust.	Spacing should be based on the longitudinal slope and desired ponding volume.
Gravel Diaphragm	Washed stone between 3 and 10 mm in diameter.	Minimum of 300 mm wide and 600 mm deep.

CONSTRUCTION CONSIDERATIONS

Grass swales should be clearly marked before site work begins to avoid disturbance during construction. No vehicular traffic, except that specifically used to construct the facility, should be allowed within the swale site. Any accumulation of sediment that does occur within the swale must be removed during the final stages of grading to achieve the design cross-section. Final grading and planting should not occur until the adjoining areas draining into the swale are stabilized. Flow should not be diverted into the swale until the banks are stabilized.

Preferably, the swale should be planted in the spring so that the vegetation can become established with minimal irrigation. Installation of erosion control matting or blanketing to stabilize soil during establishment of vegetation is highly recommended. If sod is used, it should be placed with staggered ends and secured by rolling the sod. This helps to prevent gullies.

SITE CONSIDERATIONS

Available Space
Grass swales usually consume about 5 to 15% of their contributing drainage area. A width of at least 2 metres is needed.

Site Topography
Site topography constrains the application of grass swales. Longitudinal slopes between 0.5 and 6% are allowable. This prevents ponding while providing residence time and preventing erosion. On slopes steeper than 3%, check dams should be used.

Drainage Area & Runoff Volume
The conveyance capacity should match the drainage area. Sheet flow to the grass swale is preferable. If drainage areas are greater than 2 hectares, high discharge through the swale may not allow for filtering and infiltration, and may create erosive conditions. Typical ratios of impervious drainage area to treatment facility area range from 5:1 to 10:1.

Soil
Grass swales can be applied on sites with any type of soils.

Pollution Hot Spot Runoff
To protect groundwater from possible contamination, source areas where land uses or human activities have the potential to generate highly contaminated runoff (e.g., vehicle fueling, servicing and demolition areas, outdoor storage and handling areas for hazardous materials and some heavy industry sites) should not be treated by grass swales.

Proximity to Underground Utilities
Utilities running parallel to the grass swale should be offset from the centerline of the swale. Underground utilities below the bottom of the swale are not a problem.

Water Table
The bottom of the swale should be separated from the seasonally high water table or top of bedrock elevation by at least one (1) metre.

Setback from Buildings
Should be located a minimum of four (4) metres from building foundations to prevent water damage.

OPERATION AND MAINTENANCE

Generally, routine maintenance will be the same as for any other landscaped area; weeding, pruning, and litter removal. Grassed swales should be mown at least twice yearly to maintain grass height between 75 and 150 mm. The lightest possible mowing equipment should be used to prevent soil compaction. Routine roadside ditch maintenance practices such as scraping and re-grading should be avoided. Regular watering may be required during the first two years until vegetation is established. Routine inspection is very important to ensure that dense vegetation cover is maintained and inlets and pretreatment devices are free of debris.

For the first two years following construction the swale should be inspected at least quarterly and after every major storm event (> 25 mm). Subsequently, inspections should be conducted in the spring and fall of each year and after major storm events. Inspect for vegetation density (at least 80% coverage), damage by foot or vehicular traffic, accumulation of debris, trash and sediment, and structural damage to pretreatment devices.

Trash and debris should be removed from pretreatment devices and the surface of the swale at least twice annually. Other maintenance activities include weeding, replacing dead vegetation, repairing eroded areas, dethatching and aerating as needed. Remove accumulated sediment on the swale surface when dry and exceeding 25 mm depth.

TORONTO AND REGION Conservation for The Living City

CVC CREDIT VALLEY CONSERVATION

FOR FURTHER DETAILS SEE SECTION 4.8 OF THE CVC/TRCA LID SWM GUIDE

Sustainable Technologies
EVALUATION PROGRAM

LOW IMPACT DEVELOPMENT PLANNING AND DESIGN FACT SHEET

Enhanced Grass Swales

Enhanced Grass Swales are vegetated open channels designed to convey, treat and attenuate stormwater runoff. Simple grass channels or ditches have long been used for stormwater conveyance, particularly for road drainage. Enhanced grass swales incorporate design features such as modified geometry and check dams that improve the contaminant removal and runoff reduction functions of simple grass channel and roadside ditch designs. Bioretention swales (i.e. bioswales, dry swales) incorporate filter media and possibly a perforated pipe underdrain to ensure they drain within the required drawdown time. Where development density, topography and depth to water table permit, swales are a preferable alternative to curb and gutter and storm drains as a stormwater conveyance system.

DESIGN

GEOMETRY AND SITE LAYOUT

Swales typically treat drainage areas of two hectares or less. Minimum planting soil or filter media bed footprint area is based on the design storm runoff volume and effective surface ponding depth behind check dams. Recommended impervious drainage area to pervious facility footprint area ratios (I:P ratios) range from 5:1 on low permeability soils, such as hydrologic soil group (HSG) C and D, to 20:1 on high permeability soils (HSG A & B). Cross-section shape may be parabolic or trapezoidal, but parabolic is preferable for aesthetics, maintenance and hydraulics.

INLETS

Distribute concentrated inflows between multiple inlets or facilities to reduce risk of failure. Configurations include overland sheet flow, concentrated overland flow and concentrated underground (i.e. pipe) flow.

PRE-TREATMENT

Pre-treatment captures sediment before it reaches the filter bed. It is typically necessary unless runoff sediment load is very low (e.g. roof drainage). Pre-treatment options include: level spreaders, stone filter inlets with geotextile fabric and catch basins with sump. See Specifications section for more information.

PLANTING SOIL / FILTER MEDIA

Planting soil or filter media should come pre-mixed from an approved vendor. See Specifications section for more details.

UNDERDRAIN

Underdrains are recommended for bioswales where native soil infiltration rate < 15 mm/h (hydraulic conductivity < 1×10^{-6} cm/s), and needed for non-infiltrating designs. They are comprised of a length of perforated pipe embedded near the top of the storage reservoir, with an overlying choker layer of medium-sized aggregate, and structures to provide inspection and maintenance access. Alternatively, the perforated pipe could be installed on the reservoir bottom and connected to an upturned pipe assembly or riser. Another option is to include a flow restrictor (e.g. orifice cap or valve) on the underdrain outlet pipe, to optimize infiltration while meeting the required drainage time.

PERFORATED PIPE

Continuously perforated, smooth interior HDPE or PVC pipe with diameter ≥ 200 mm to reduce freezing risk and facilitate access by camera and cleaning equipment. Perforated pipe extends length of facility and solid pipe is used to connect to storm drain system.

ACCESS STRUCTURES

Used for inspection and flushing. May be a maintenance hole or vertical standpipe connected to the perforated pipe. Couplings used for standpipe connections should be 45° to facilitate pipe access by camera or cleaning equipment.

CONVEYANCE AND OVERFLOW

Swales can be designed to be inline or offline from the drainage system. Inline swales accepts all flow from the drainage area and conveys large event flows through an overflow outlet. Overflow structures must be sized to safely convey large event flows out of the facility. Options include flat, dome or ditch inlet catch basins connected to a storm sewer.

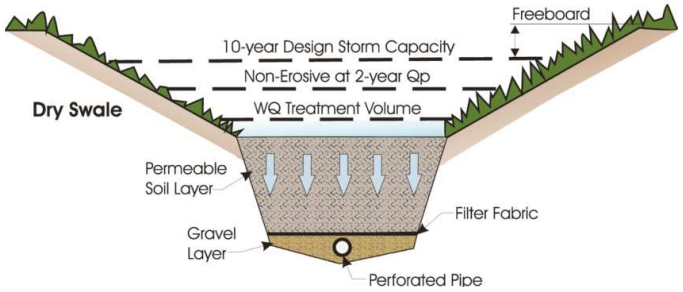
MONITORING WELLS

A vertical standpipe consisting of an anchored 100 to 150 mm diameter pipe with perforations along the length within the reservoir, installed to the bottom of the facility, with a lockable cap. The well allows monitoring of inter-event drainage times.

PLANTS

Planting should be dense to help maintain surface infiltration and improve sediment settling and retention of dissolved contaminants. See Specifications section for more information.

Swale Design	Ability to meet stormwater criteria		
	Water balance	Water quality	Stream erosion control
Swale with no underdrain or full infiltration	Partial – based on storage volume and soil infiltration rate	Yes – size for water quality storage requirement and max. flow rate of 0.5 m/s	Partial – based on storage volume and soil infiltration rate
Swale with underdrain or partial infiltration	Partial – based on storage volume beneath the underdrain and soil infiltration rate	Yes – size for water quality storage requirement	Partial – based on storage volume, soil infiltration rate, and if flow restrictor is used
Swale with underdrain and impermeable liner or no infiltration	Partial – some volume reduction through evapo-transpiration	Yes – size for water quality storage requirement	Partial – based on available storage volume and if flow restrictor is used



PLANNING CONSIDERATIONS

Native Soil | Swales can be located over any soil type, but HSG A and B soils are best for achieving water balance objectives. Facilities should be located in portions of the site with the highest native soil infiltration rates. Where infiltration rates are less than 15 mm/hr (hydraulic conductivity less than $1x10^{-6}$ cm/s) an underdrain is recommended. Native soil infiltration rate at the proposed facility location and depth should be confirmed through in-situ measurements of hydraulic conductivity under field saturated conditions.

Wellhead Protection | Facilities receiving road or parking lot runoff should not be located within year 2 year time-of-travel wellhead protection areas (see local drinking water source protection plan).

Available Space | Reserve open space of about 5 to 20% of the size of the contributing drainage area.

Site Topography | Contributing slopes should be between 1 to 5%. Swale longitudinal slopes may range from 0.5 to 6%. On slopes steeper than 3%, check dams should be used.

Water Table | Maintaining a separation of 1 m between the elevations of the base of the practice and the seasonally high water table, or top of bedrock is recommended. Lesser or greater values may be considered based on groundwater mounding analysis. See STEP LID Planning and Design Guide wiki page, Groundwater, for further guidance and spreadsheet tool.

Pollution Hot Spot Runoff | To protect groundwater from possible contamination, runoff from pollution hot spots should not be treated by swales designed for infiltration. Facilities designed with an impermeable liner (filtration only) can be used to treat runoff from hot spots.

Proximity to Underground Utilities | Designers should consult local utility design guidance for the horizontal and vertical clearance between storm drains, ditches and surface water bodies.

Karst | Swales designed for infiltration are not suitable in areas of known or implied karst topography.

Setback from Buildings | Should be set back 4 m from building foundations.

OPERATION AND MAINTENANCE

Routine Maintenance | Routine maintenance consists of mowing, weeding, pruning and mulching vegetation, and checking and cleaning trash, debris and sediment from pre-treatment devices, inlets, check dams and outlets twice a year in the spring and/or late fall, or when pre-treatment device sump is half full. Use a hydro-vac truck to remove sediment from catchbasin and oil and grit separator sumps and check dams. Grassed swales should be mown at least twice yearly to maintain grass height between 75 and 150 mm. Watering may be required during the first two years until vegetation is established. Other maintenance activities include replacing dead vegetation and repairing eroded areas as needed. Remove accumulated sediment when it is dry and has reached a depth > 25 mm.

Inspection | Routine inspections should be done twice annually in the spring and late fall and after major storm events. Inspect for vegetation density (at least 80% coverage), damage by foot or vehicular traffic, channelization, accumulation of debris, trash and sediment and damage to pre-treatment devices.

Monitoring | Monitoring of storage reservoir water level during and after natural or simulated storm events using the monitoring well should be performed periodically to verify the facility drains within the required drainage time (typically 72 hours). Monitoring should be performed as part of inspections following construction or major rehabilitation prior to assumption, and every 15 years at a minimum, to track drainage performance over time and determine when replacement is needed.

CONSTRUCTION

Soil Disturbance and Compaction | Before site work begins, locations of swales should be clearly marked. Ideally, swale locations should remain outside the limit of disturbance until construction of the facility begins to prevent soil compaction by heavy equipment.

Erosion and Sediment Control | Swale locations should not be used as sediment basins during construction. To prevent sediment from clogging, erosion and sediment controls should remain in place and runoff should be diverted from the swale until the contributing drainage area is fully stabilized and vegetation cover is established.

The water component of the Sustainable Technologies Evaluation Program is a collaboration of:

Toronto and Region Conservation Authority,

Credit Valley Conservation, and

Lake Simcoe Region Conservation Authority

For more information:

Visit the online Low Impact Development Stormwater Management Planning and Design Guide for more information including links to all sources cited: wiki.sustainabletechnologies.ca.

LID Stormwater Inspection and Maintenance Guide (TRCA, 2016): sustainabletechnologies.ca.

LID Construction Guide (CVC, 2012): sustainabletechnologies.ca.

GENERAL SPECIFICATIONS

Material	Specification
Site Layout	• Enhanced swales typically treat drainage areas of two hectares or less. • Swale total width should be 2 metres or greater and bottom width between 0.75 and 3.0 metres. Swale length between check dams should be ≥ 5 m. • Side slopes should be no steeper than 1:3 (33%) for mowing maintenance. Gentler slopes (e.g. 1:4 or 25%) are encouraged where runoff enters the swale as sheet flow. • A maximum flow depth of 0.1 m is recommended during the design storm event.
Inlets	• For concentrated overland flow: (i) Catch basins or other inlet structures should be located at all sag points in the gutter grade and immediately upgrade of median breaks, crosswalks and street intersections. (ii) Inlet types include curb openings (modified curbs, spillways), side inlet catch basins, trench drains or other pre-fabricated inlet structures. (iii) Spillways aid in turning flow 30, 45 or 90 degrees into the practice. (iv) Incorporate concrete aprons at curb opening or spillway locations to increase inflow effectiveness. (v) If the inlet structure itself does not provide sedimentation or filtration pre-treatment, incorporate a pre-treatment feature at curb opening or spillway location to isolate sediment, trash and debris for ease of removal. (vi) Provide a 75 to 150 mm drop in elevation between the inlet invert and grass or mulch surface, pre-treatment feature or concrete apron.
Pre-Treatment	• Level spreader: A shallow trench structure (with concrete, metal or wood lip), graded to be level and installed parallel to the pavement edge or flush curb. Recommended sizing: (i) 1.4 m of length for every 0.01 m^3/s of inflow during the design storm event, (ii) width of 300 mm or 3 times inflow pipe diameter, (iii) depth of 200 mm or half the inflow pipe diameter. Used with overland sheet flow inlets. • Geotextile and stone filter inlets: Square or rectangular curb openings located directly over the practice, filled with clean aggregate, covered with a layer of geotextile filter fabric and stone, graded level or gently sloped and installed at concentrated overland flow inlets (e.g. curb cuts). Elevation change of 75 to 100 mm from pavement to top of the stone cover. Stone cover may be 50 to 150 mm diameter crushed angular stone, river rock/beach stone or rip rap. • Catch basin, manhole, or other inlet structure sumps in combination with a shield, baffle, trap, or filter insert device, or goss trap are used to pre-treat concentrated overland flow. They can be designed to retain both coarse and fine particulate sediments in the sump, and floatables (hydrocarbons, trash and debris). A variety of proprietary pre-treatment devices are available. • Forebay: Constructed with 2:1 length to width ratio and sized to accommodate ponding volume of 25% of the surface ponding storage requirement. Used with concentrated overland flow inlets.
Planting Soil/ Filter Media	• Planting soil: (i) use for enhanced grass swales (ii) hydraulic conductivity, saturated (ASTM D2434) at 85% maximum dry density (ASTM D698) should be of 15 - 300 mm/h. • Filter Media Blend A – Drainage rate priority: (i) Use when I:P ratio ≥15:1, (ii) 3 parts sand to 1 part organic material or additives, (iii) Porosity of 0.4, (iv) hydraulic conductivity, saturated (ASTM D2434) at 85% maximum dry density (ASTM D698) should be of 75 - 300 mm/h. • Filter Media Blend B – Water quality treatment priority: (i) Use when improved metals and phosphorus retention and/or more diverse planting options are desired, (ii) 3 parts sand to 2 parts topsoil to 1 part organic material or additives, (iii) porosity of 0.35, (iv) hydraulic conductivity, saturated (ASTM D2434) at 85% maximum dry density (ASTM D698) should be 25 to 300 mm/h. • Sand: Should be coarse and have a fineness modulus index between 2.8 and 3.1 according to ASTM C33/C33M. • Topsoil: Must contain at least 9%, and not greater than 36% clay-sized particles and have a sodium absorption ratio less than 15. • Organic material: Should be material low in available phosphorus such as leaf and yard waste compost, untreated wood chips, shredded paper or coir. Organic matter (ASTM F1647) should make up 3 to 10% of the filter media by dry weight. • Additives: Typically 5 to 10% by volume of the filter media blend (follow product manufacturer instructions where applicable). • Particle-size distribution (ASTM D7928): <25% silt-and clay-sized particles combined (smaller than 0.05 mm); 3 to 12% clay-sized particles (0.002 mm or smaller). • Other parameters: Phosphorus (Plant Available or Extractable) should be between 10 and 40 ppm, and cation exchange capacity (ASTM D7503) >10 meq/100 g.
Check Dams	• Low head dams to slow concentrated flow and promote settling and infiltration. Dam height depends on depth of ponded water that will infiltrate in the required drainage time. May be constructed of any resilient and waterproof material including concrete, metal and stone (typically <150mm rip rap) and may have spillways incorporated into their profile to direct water to the centre of the swale. Should include stone cover on the down-gradient side for erosion control. • Check dam spacing should be based on the slope and desired ponding volume. They should be spaced far enough apart to allow access for maintenance equipment (e.g., mowers).
Plants	• Enhanced grass swales may be planted with sod or seed. • If using seed, stabilize swale with erosion control blanket. • Bioswale planting plans should feature a mixture of deeply rooting perennials adapted to both wet and dry conditions and local climate. • If using a native seed mix, include a cover crop of oats, winter wheat, or rye to stabilize the swale in the short term. • Road salt tolerance should be considered if facility will receive pavement runoff.

APPENDIX P

Civil Engineering Drawings

NATIONAL CAPITAL BUSINESS PARK
SITE 2 - BUILDING D
1100 LAST MILE DRIVE
OTTAWA, ON

REVISION 02

KEY PLAN (N.T.S.)

DRAWING INDEX	
TITLE PAGE	
GENERAL NOTES PLAN	C001
SEDIMENT AND EROSION CONTROL PLAN	C101
GRADING AND DRAINAGE PLAN	C301
SERVICING PLAN	C401
SERVICING PLAN - MCEWAN CREEK SWF DETAILS	C402
STORMWATER MANAGEMENT PLAN	C601
PRE-DEVELOPMENT WATERSHED PLAN	C701
POST-DEVELOPMENT WATERSHED PLAN	C702
CONSTRUCTION DETAIL PLAN	C901

LRL
ENGINEERING | INGÉNIERIE
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NCBP - SITE 2 BUILDING D
1100 LAST MILE DRIVE, OTTAWA ON
REV.02 - REISSUED FOR MUNICIPAL APPROVAL - 23 DECEMBER 2022
LRL PROJECT no: 220345

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
Dec 23, 2022
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

D07-12-22-0125

PLAN NO. 18839

GENERAL NOTES

1. ALL WORKS MATERIALS SHALL CONFIRM TO THE LAST REVISION OF THE STANDARDS AND SPECIFICATIONS FOR THE CITY OF OTTAWA, ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS), WHERE APPLICABLE. LOCAL UTILITY STANDARDS AND MINISTRY OF TRANSPORTATION STANDARDS WILL APPLY WHERE REQUIRED.
2. THE CONTRACTORS SHALL CONFIRM THE LOCATION OF ALL EXISTING UTILITIES WITHIN THE SITE AND ADJACENT WORK AREAS. THE CONTRACTORS SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITIES TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OR REPLACEMENT OF ANY SERVICES OR UTILITIES DISTURBED DURING CONSTRUCTION , TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION.
3. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION, ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER. LOST TIME DUE TO FAILURE OF THE CONTRACTORS TO CONFIRM UTILITY LOCATIONS AND NOTIFY ENGINEER OF POSSIBLE CONFLICTS PRIOR TO CONSTRUCTION WILL BE AT CONTRACTORS EXPENSE.
4. ANY AREA BEYOND THE LIMIT OF THE SITE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION AT THE CONTRACTOR'S EXPENSE. RELOCATING OF EXISTING SERVICES AND/OR UTILITIES SHALL BE AS SHOWN ON THE DRAWINGS OR DETECTED BY THE ENGINEER AT THE EXPENSE OF DEVELOPERS.
5. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE 'OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS'. THE GENERAL CONTRACTORS SHALL BE DEEMED TO BE THE 'CONTRACTOR' AS DEFINED IN THE ACT.
6. ALL THE CONSTRUCTION SIGNAGE MUST CONFIRM TO THE MINISTRY OF TRANSPORTATION OF ONTARIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES PER LATEST AMENDMENT.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING DURING THE PERIOD OF THE CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES TO PREVENT CONFLICTS.
8. ALL DIMENSIONS ARE IN METRES UNLESS SPECIFIED OTHERWISE.
9. THERE WILL BE NO SUBSTITUTION OF MATERIALS UNLESS PRIOR WRITTEN APPROVAL IS RECEIVED FROM THE ENGINEER.
10. ALL CONSTRUCTION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE RECOMMENDATIONS MADE IN THE GEOTECHNICAL REPORT.
11. FOR DETAILS RELATING TO STORMWATER MANAGEMENT AND ROOF DRAINAGE REFER TO THE SITE SERVICING AND STORMWATER MANAGEMENT REPORT.
12. ALL SEWERS CONSTRUCTED WITH GRADES LESS THAN 1.0% SHALL BE INSTALLED USING LASER ALIGNMENT AND CHECKED WITH LEVEL INSTRUMENT PRIOR TO BACKFILLING.
13. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AND TO BEAR THE COST OF THE SAME.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADDITIONAL BEDDING, OR ADDITIONAL STRENGTH PIPE IF THE MAXIMUM TRENCH WIDTH AS SPECIFIED BY OPSD IS EXCEEDED.
15. ALL PIPE/CULVERT SECTION SIZES REFER TO INSIDE DIMENSIONS.
16. SHOULD DEEPLY BURIED ARCHAEOLOGICAL REMAINS BE FOUND ON THE PROPERTY DURING CONSTRUCTION ACTIVITIES, THE HERITAGE OPERATIONS UNIT OF THE ONTARIO MINISTRY OF CULTURE MUST BE NOTIFIED IMMEDIATELY.
17. ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR. REVIEW WITH CONTRACT ADMINISTRATOR AND THE CITY OF OTTAWA PRIOR TO ANY TREE CUTTING/REMOVAL.
18. DRAWINGS SHALL BE READ ON CONJUNCTION WITH ARCHITECTURAL SITE PLAN.
19. THE CONTRACTOR SHALL PROVIDE THE PROJECT ENGINEER ONE SET OF AS CONSTRUCTED SITE SERVICING AND GRADING DRAWINGS.
20. BENCHMARKS: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THAT THE SITE BENCHMARK(S) HAS NOT BEEN ALTERED OR DISTURBED AND THAT ITS RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION DEPICTED ON THIS PLAN.

EROSION AND SEDIMENT CONTROL NOTES

GENERAL

THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

THE CONTRACTOR ACKNOWLEDGES THAT SURFACE EROSION AND SEDIMENT RUNOFF RESULTING FROM THEIR CONSTRUCTION OPERATIONS HAS POTENTIAL TO CAUSE A DETRIMENTAL IMPACT TO ANY DOWNSTREAM WATERCOURSE OR SEWER, AND THAT ALL CONSTRUCTION OPERATIONS THAT MAY IMPACT UPON WATER QUALITY SHALL BE CARRIED OUT IN MANNER THAT STRICTLY MEETS THE REQUIREMENT OF ALL APPLICABLE LEGISLATION AND REGULATIONS.

AS SUCH, THE CONTRACTOR SHALL BE RESPONSIBLE FOR CARRYING OUT THEIR OPERATIONS, AND SUPPLYING AND INSTALLING ANY APPROPRIATE CONTROL MEASURES, SO AS TO PREVENT SEDIMENT LADEN RUNOFF ENTERING ANY SEWER OR WATERCOURSE WITHIN OR DOWNSTREAM OF THE WORKING AREA.

THE CONTRACTOR ACKNOWLEDGES THAT NO ONE MEASURE IS LIKELY TO BE 100% EFFECTIVELY FOR EROSION PROTECTION AND CONTROLLING SEDIMENT RUNOFF AND DISCHARGES FROM THE SITE. THEREFORE, WHERE NECESSARY THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL MEASURES ARRANGED IN SUCH MANNER AS TO MITIGATE SEDIMENT RELEASE FROM THE CONSTRUCTION OPERATIONS AND ACHIEVE SPECIFIC MAXIMUM PERMITTED CRITERIA WHERE APPLICABLE. SUGGESTED ON-SITE MEASURES MAY INCLUDE, BUT SHALL NOT BE LIMITED TO, THE FOLLOWING METHODS: SEDIMENT PONDS, FILTER BAGS, PUMP FILTERS, SETTLING TANKS, SILT FENCE, STRAW BALES, FILTER CLOTHS, CATCH BASIN FILTERS, CHECK DAMS AND/OR OTHER RECOGNIZED TECHNOLOGIES AND METHOD AVAILABLE AT THE TIME OF CONSTRUCTION. SPECIFIC MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH REQUIREMENTS OF OPSS 577 WHERE APPROPRIATE, OR IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

WHERE, IN THE OPINION OF THE CONTRACT ADMINISTRATOR OR REGULATORY AGENCY, THE INSTALLED CONTROL MEASURES FAIL TO PERFORM ADEQUATELY, THE CONTRACTOR SHALL SUPPLY AND INSTALL ADDITIONAL OR ALTERNATIVE MEASURES AS DIRECTED BY THE CONTRACT ADMINISTRATOR OR REGULATORY AGENCY, AS SUCH, THE CONTRACTOR SHALL HAVE ADDITIONAL CONTROL MATERIALS ON SITE AT ALL TIME WHICH ARE EASILY ACCESSIBLE AND MAY BE IMPLEMENTED BY HIM AT THE MOMENT'S NOTICE.

PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL SUBMIT TO THE CONTRACT ADMINISTRATOR SIX COPIES OF A DETAILED EROSION AND SEDIMENT CONTROL PLAN (ESCP). THE ESCP WILL CONSIST OF WRITTEN DESCRIPTION AND DETAILED DRAWINGS INDICATING THE ON-SITE ACTIVITIES AND MEASURES TO BE USED TO CONTROL EROSION AND SEDIMENT MOVEMENT FOR EACH STEP OF THE WORK.

CONTRACTOR'S RESPONSIBILITIES

THE CONTRACTOR SHALL ENSURE THAT ALL WORKERS, INCLUDING SUB-CONTRACTOR, IN THE WORKING ARE ARE AWARE OF THE IMPORTANCE OF THE EROSION AND SEDIMENT CONTROL MEASURES AND INFORMED OF THE CONSEQUENCES OF THE FAILURE TO COMPLY WITH THE REQUIREMENTS OF ALL REGULATORY AGENCIES.

THE CONTRACTOR SHALL PERIODICALLY, AND WHEN REQUESTED BY THE CONTRACT ADMINISTRATOR, CLEAN OUT ACCUMULATED SEDIMENT DEPOSITS AS REQUIRED AT THE SEDIMENT CONTROL DEVICES, INCLUDING THOSE DEPOSITS THAT MAY ORIGINATE FROM OUTSIDE THE CONSTRUCTION AREA. ACCUMULATED SEDIMENT SHALL BE REMOVED IN SUCH A MANNER THAT PREVENTS THE DEPOSITION OF THIS MATERIAL INTO THE SEWER WATERCOURSE AND AVOIDS DAMAGE TO CONTROL MEASURES. THE SEDIMENT SHALL BE REMOVED FROM THE SITE AT THE CONTRACTOR'S EXPENSE AND MANAGED IN COMPLIANCE WITH REQUIREMENTS FRO EXCESS EARTH MATERIAL, AS SPECIFIED ELSEWHERE IN THE CONTRACT.

THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE CONTRACT ADMINISTRATOR ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO EITHER THE WATERCOURSE OR THE STORM SEWER SYSTEM. FAILURE TO REPORT WILL BE CONSTITUTE A BRACH OF THIS SPECIFICATION AND THE CONTRACTOR MAY ALSO BE SUBJECT TO THE PENALTIES IMPOSED BY THE APPLICABLE REGULATORY AGENCY. 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.

THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE CONTRACT ADMINISTRATOR, THE MEASURE OR MEASURES, IS NO LONGER REQUIRED. NO CONTROL MEASURE MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE CONTRACT ADMINISTRATOR. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED IN A MANNER THAT AVOIDS THE ENTRY OF ANY EQUIPMENT, OTHER THAN HAND-HELD EQUIPMENT, INTO ANY WATERCOURSE, AND PREVENTS THE RELEASE OF ANY SEDIMENT OR DEBRIS INTO ANY SEWER OR WATERCOURSE WITHIN OR DOWNSTREAM OF THE WORKING AREA. ALL ACCUMULATED SEDIMENT SHALL BE REMOVED FROM THE WORKING AREA AT THE CONTRACTOR'S EXPENSE AND MANAGED IN COMPLIANCE WITH THE REQUIREMENTS FOR EXCESS EARTH MATERIAL

WHERE, IN THE OPINION OF EITHER THE CONTRACT ADMINISTRATOR OR A REGULATORY AGENCY, ANY OF THE TERMS SPECIFIED HEREIN HAVE NOT BEEN COMPLIED WITH OR PERFORMED IN A SUITABLE MANNER, OR TAT ALL, THE CONTRACTOR ADMINISTRATOR OR A REGULATORY AGENCY HAS THE RIGHT TO IMMEDIATELY WITHDRAW ITS PERMISSION TO CONTINUE THE WORK BUT MAY RENEW ITS PERMISSION UPON BEING SATISFIED THAT THE DEFAULTS OR DEFICIENCIES IN THE PERFORMANCE OF THIS SPECIFICATION BY THE CONTRACTOR HAVE BEEN REMEDIED.

SPILL CONTROL NOTES

1. ALL CONSTRUCTION EQUIPMENT SHALL BE RE-FUELED, MAINTAINED, AND STORED NO LESS THAN 30 METRES FROM WATERCOURSE, STEAMS, CREEKS, WOODLOTS, AND ANY ENVIRONMENTALLY SENSITIVE AREAS, OR AS OTHERWISE SPECIFIED.
2. THE CONTRACTOR MUST IMPLEMENT ALL NECESSARY MEASURES IN ORDER TO PREVENT LEAKS, DISCHARGES OR SPILLS OF POLLUTANTS, DELETERIOUS MATERIALS, OR OTHER SUCH MATERIALS OR SUBSTANCES WHICH WOULD OR COULD CAUSE AN ADVERSE IMPACT TO THE NATURAL ENVIRONMENT.
3. IN THE EVENT OF A LEAK, DISCHARGE OR SPILL OF POLLUTANT, DELETERIOUS MATERIAL OR OTHER SUCH MATERIAL OR SUBSTANCE WHICH WOULD OR COULD CAUSE AN ADVERSE IMPACT TO THE NATURAL ENVIRONMENT, THE CONTRACTOR SHALL:
   - 3.1. IMMEDIATELY NOTIFY APPROPRIATE FEDERAL, PROVINCIAL, AND LOCAL GOVERNMENT MINISTRIES, DEPARTMENTS, AGENCIES, AND AUTHORITIES OF THE INCIDENT IN ACCORDANCE WITH ALL CURRENT LAWS, LEGISLATION, ACTS, BY-LAWS, PERMITS, APPROVALS, ETC.
   - 3.2. TAKE IMMEDIATE MEASURES TO CONTAIN THE MATERIAL OR SUBSTANCE, AND TO TAKE SUCH MEASURES TO MITIGATE AGAINST ADVERSE IMPACTS TO THE NATURAL ENVIRONMENT.
   - 3.3. RESTORE THE AFFECTED AREA TO THE ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITIES HAVING JURISDICTION.

MUD MAT NOTES

1. THE GRANULAR MATERIAL WILL REQUIRE PERIODIC REPLACEMENT AS IT BECOMES CONTAMINATED BY VEHICLE TRAFFIC.
2. SEDIMENT SHALL BE CLEANED FROM PUBLIC ROADS AT THE END OF EACH DAY.
3. SEDIMENT SHALL BE REMOVED FROM PUBLIC ROADS BY SHOVELING OR SWEEPING AND DISPOSED OR PROPERLY IN A CONTROLLED SEDIMENT DISPOSAL AREA.

SITE GRADING NOTES

1. PRIOR TO THE COMMENCEMENT OF THE SITE GRADING WORKS, ALL SILTATION CONTROL DEVICES SHALL BE INSTALLED AND OPERATIONAL PER EROSION CONTROL PLAN.
2. ALL GRANULAR AND PAVEMENT FOR ROADS/PARKING AREAS SHALL BE CONSTRUCTED IN ACCORDANCE WITH GEOTECHNICAL ENGINEER'S RECOMMENDATIONS.
3. ALL TOPSOIL AND ORGANIC MATERIAL SHALL BE STRIPPED WITHIN THE ROAD AND PARKING AREAS ALLOWANCE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
4. CONCRETE CURB SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. SC1.1 PROVISION SHALL BE MADE OR CURB DEPRESSIONS AS INDICATED ON ARCHITECTURAL SITE PLAN. CONCRETE SIDEWALK SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD SC1.4. ALL CURBS, CONCRETE ISLANDS, AND SIDEWALKS SHOWN O THIS DRAWING ARE TO BR PRICED IN SITE WORKS PORTION OF THE CONTRACT.
5. PAVEMENT REINSTATEMENT FOR SERVICE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. R10 AND OPSD 509.010 AND OPSS 310.
6. GRANULAR 'A' SHALL BE PLACED TO A MINIMUM THICKNESS OF 30MM AROUND ALL STRUCTURES WITHIN THE PAVEMENT AREA.
7. SUB-EXCAVATE SOFT AREAS AND FILL WITH GRANULAR 'B' COMPACTED IN MAXIMUM 30MM LIFTS.
8. ALL WORK ON THE MUNICIPAL RIGHT OF WAY AND EASEMENTS TO BE INSPECTED BY THE MUNICIPALITY PRIOR BACKFILLING.
9. CONTRACTOR TO OBTAIN A ROAD OCCUPANCY PERMIT 48 HOURS PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL ROAD ALLOWANCE, IF REQUIRED BY THE MUNICIPALITY.
10. ALL PAVEMENT MARKING FEATURES AND SITE SIGNAGE SHALL BE PLACED PER ARCHITECTURAL SITE PLAN. LINE PAINTING AND DIRECTIONAL SYMBOLS SHALL BE APPLIED WITH A MINIMUM OF TWO COATS OF ORGANIC SOLVENT PAINT.
11. REFER TO ARCHITECTURAL SITE PLAN FOR DIMENSIONS AND SITE DETAILS.
12. STEP JOINTS ARE TO BE USED WHERE PROPOSED ASPHALT MEETS EXISTING ASPHALT. ALL JOINTS MUST BE SEALED.
13. SIDEWALKS TO BE 13MM & BEVELED AT 2:1 OR 6MM WITH NO BEVEL REQUIRED BELOW THE FINISHED FLOOR SLAB ELEVATION AT ENTRANCES REQUIRED TO BE BARRIER-FREE, UNLESS OTHERWISE NOTED. ALL IN ACCORDANCE WITH OBC 3.8.1.3 & OTTAWA ACCESSIBILITY DESIGN STANDARDS.
14. WHERE APPLICABLE THE CONTRACTOR IS TO SUBMIT SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION. SHOP DRAWINGS MUST BE SITE SPECIFIC, SIGNED AND SEALED BY A LICENSED STRUCTURAL ENGINEER. THE CONTRACTOR WILL ALSO BE REQUIRED TO SUPPLY AND GEOTECHNICAL CERTIFICATION OF THE AS-CONSTRUCTED RETAINING WALL TO THE ENGINEER PRIOR TO FINAL ACCEPTANCE.

ROADWORK SPECIFICATIONS

15. ROADWORK TO BE COMPLETED IN ACCORDANCE WITH GEOTECHNICAL INVESTIGATION PREPARED BY PATERSON GROUP, PG4854-1, DATED REV2 JANUARY 13, 2020.
16. ALL TOPSOIL AND ORGANIC MATERIAL SHALL BE STRIPPED WITHIN THE ROAD ALLOWANCE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND STOCK PILLED ON SITE AS DIRECTED BY NATIONAL MUNICIPALITY.
17. THE SUBGRADE SHALL BE CROWNED AND SLOPED AT LEAST 2% AND PROOF ROLLED WITH HEAVY ROLLERS.
18. SUB-EXCAVATE SOFT AREAS AND FILL WITH GRANULAR 'A', TYPE II COMPACTED IN MAXIMUM 300MM LIFTS.
19. ALL GRANULAR FOR ROADS SHALL BE COMPACTED TO MINIMUM OF 100% STANDARD PROCTOR DENSITY MAXIMUM DRY DENSITY (SPMDD).

SANITARY, FOUNDATION DRAIN, STORM SEWER AND WATERMAIN NOTES

GENERAL

1. LASER ALIGNMENT CONTROL TO BE UTILIZED ON ALL SEWER INSTALLATIONS.
2. CLAY SEALS TO BE INSTALLED AS PER CITY STANDARD DRAWING S8. THE SEALS SHOULD BE AT LEAST 1.5M LONG (IN THE TRENCH DIRECTION) AND SHOULD EXTEND FROM TRENCH WALL TO TRENCH WALL. THE SEALS SHOULD EXTEND FROM THE FROST LINE AND FULLY PENETRATE THE BEDDING, SUB-BEDDING, AND COVER MATERIAL. THE BARRIERS SHOULD CONSIST OF RELATIVELY DRY AND COMPATIBLE BROWN SILTY CLAY PLACED IN MAXIMUM 225MM LIFTS AND COMPACTED TO A MINIMUM OF 95% SPMDD. THE CLAY SEALS SHOULD BE PLACED AT THE SITE BOUNDARIES AND AT 60M INTERVALS IN THE SERVICE TRENCHES.
3. SERVICES TO BUILDING TO BE TERMINATED 1.0M FROM THE OUTSIDE FACE OF BUILDING UNLESS OTHERWISE NOTED.
4. ALL MAINTENANCE STRUCTURE AND CATCH BASIN EXCAVATIONS TO BE BACKFILLED WITH GRANULAR MATERIAL COMPACTED TO 98% STANDARD PROCTOR DENSITY. A MINIMUM OF 300MM AROUND STRUCTURES.
5. "MODULOC" OR APPROVED PRE-CAST MAINTENANCE STRUCTURE AND CATCH BASIN ADJUSTERS TO BE USED IN LIEU OF BRICKING. PARGE ADJUSTING UNITS ON THE OUTSIDE ONLY.
6. SAFETY PLATFORMS SHALL BE PER OPSD 404.02.
7. DROP STRUCTURES SHALL BE IN ACCORDANCE WITH OPSD 1003.01, IF APPLICABLE.
8. THE CONTRACTOR IS TO PROVIDE CCTV CAMERA INSPECTIONS OF ALL SEWERS, INCLUDING PICTORIAL REPORT, ONE (1) CD COPY AND TWO (2) VIDEO RECORDING IN A FORMAT ACCEPTABLE TO ENGINEER. ALL SEWER ARE TO BE FLUSHED PRIOR TO CAMERA INSPECTION. ASPHALT WEAR COURSE SHALL NOT BE PLACED UNTIL THE VIDEO INSPECTION OF SEWERS AND NECESSARY REPAIRS HAVE BEEN COMPLETED TO THE SATISFACTION OF THE ENGINEER.
9. CONTRACTOR SHALL PERFORM LEAKAGE TESTING, IN THE PRESENCE OF THE CONSULTANT, FOR SANITARY SEWERS IN ACCORDANCE WITH OPSS 407. CONTRACTOR SHALL PERFORM VIDEO INSPECTION OF ALL SEWERS. A COPY OF THE VIDEO AND INSPECTION REPORT SHALL BE SUBMITTED TO THE CONSULTANT FOR REVIEW AND APPROVAL PRIOR TO PLACEMENT OF WEAR COURSE ASPHALT.

SANITARY

10. ALL SANITARY SEWER INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE CITY OF OTTAWA AND THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD). AND SPECIFICATIONS (OPSS).
11. ALL SANITARY GRAVITY SEWER SHALL BE PVC SDR 35, IPEX 'RING-TITE' (OR APPROVED EQUIVALENT) PER CSA STANDARD B182.2 OR LATEST AMENDMENT, UNLESS SPECIFIED OTHERWISE.
12. EXISTING MAINTENANCE STRUCTURES TO BE RE-BENCHED WHERE A NEW CONNECTION IS MADE.
13. SANITARY GRAVITY SEWER TRENCH AND BEDDING SHALL BE PER CITY OF OTTAWA STD. S6 AND S7 CLASS 'B' BEDDING, UNLESS SPECIFIED OTHERWISE.
14. SANITARY MAINTENANCE STRUCTURE FRAME AND COVERS SHALL BE PER CITY OF OTTAWA STD. S24 AND S25.
15. SANITARY MAINTENANCE STRUCTURES SHALL BE BENCHED PER OPSD 701.021.
16. 100MM THICK HIGH-DENSITY GRADE 'A' POLYSTYRENE INSULATION TO BE INSTALLED IN ACCORDANCE WITH CITY STD W22 WHERE INDICATED ON DRAWING C.401.

STORM

17. ALL REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.2, OR LATEST AMENDMENT. ALL NON-REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.1, OR LATEST AMENDMENT. PIPE SHALL BE JOINED WITH STD. RUBBER GASKETS AS PER CSA A257.3, OR LATEST AMENDMENT.
18. ALL STORM SEWER TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. S6 AND S7 CLASS 'B' UNLESS OTHERWISE SPECIFIED. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY PROJECT GEOTECHNICAL ENGINEER.
19. ALL PVC STORM SEWERS ARE TO BE SDR 35 APPROVED PER C.S.A. B182.2 OR LATEST AMENDMENT, UNLESS OTHERWISE SPECIFIED.
20. CATCH BASIN SHALL BE IN ACCORDANCE WITH OPSD 705.010.
21. CATCH BASIN LEADS SHALL BE IN 200MM DIA. AT 1% SLOPE (MIN) UNLESS SPECIFIED OTHERWISE.
22. ALL CATCH BASINS SHALL HAVE 600MM SUMPS, UNLESS SPECIFIED OTHERWISE.
23. ALL CATCH BASIN LEAD INVERTS TO BE 1.5M BELOW FINISHED GRADE UNLESS SPECIFIED OTHERWISE.
24. THE STORM SEWER CLASSES HAVE BEEN DESIGNED BASED ON BEDDING CONDITIONS SPECIFIED ABOVE. WHERE THE SPECIFIED TRENCH WIDTH IS EXCEEDED , THE CONTRACTOR IS REQUIRED TO PROVIDE AND SHALL BE RESPONSIBLE FOR EXTRA TEMPORARY AND/OR PERMANENT REPAIRS MADE NECESSARY BY THE WIDENED TRENCH.
25. ALL ROAD AND PARKING LOT CATCH BASINS TO BE INSTALLED WITH ORTHOGONALLY PLACED SUBDRAINS IN ACCORDANCE WITH DETAIL. PERFORATED SUBDRAIN FOR ROAD AND PARKING LOT CATCH BASIN SHALL BE INSTALLED PER CITY STD R1 UNLESS OTHERWISE NOTED.
26. PERFORATED SUBDRAIN FOR REAR YARD AND LANDSCAPING APPLICATIONS SHALL BE INSTALLED PER CITY STD S29, S30 AND S31, WHERE APPLICABLE.
27. RIP-RAP TREATMENT SEWER AND CULVERT OUTLETS PER OPSD 810.010.
28. ALL STORM SEWER/ CULVERTS TO BE INSTALLED WITH FROST TREATMENT PER OPSD 803.031 WHERE APPLICABLE. INSULATION REQUIRED WHERE PIPE COVER IS LESS THAN 2.0m.INSULATION THICKNESS PER OPSD 1109.030 AND DETAIL ON C901.
29. ALL STORM MANHOLES WITH PIPE LESS THAN 900MM IN DIAMETER SHALL BE CONSTRUCTED WITH A 300MM SUMP AS PER SDG, CLAUSE 6.2.6.

WATERMAIN

30. ALL WATERMAIN INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE CITY OF OTTAWA AND THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS).
31. ALL PVC WATERMAINS SHALL BE AWWA C-900 CLASS 150, SDR 18 OR APPROVED EQUIVALENT.
32. ALL WATER SERVICES LESS THAN OR EQUAL TO 50MM IN DIAMETER TO BE TYPE 'K' COPPER.
33. WATERMAIN TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD W17. UNLESS SPECIFIED OTHERWISE. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY THE PROJECT GEOTECHNICAL ENGINEER.
34. ALL PVC WATERMAINS, SHALL BE INSTALLED WITH A 10 GAUGE STRANDED COPPER TWU OR RWU TRACER WIRE IN ACCORDANCE WITH CITY OF OTTAWA STD. W.36.
35. CATHODIC PROTECTION IS REQUIRED ON ALL METALLIC FITTINGS PER CITY OF OTTAWA STD.25.5 AND W25.6.
36. VALVE BOXES SHALL BE INSTALLED PER CITY OF OTTAWA STD W24.
37. WATERMAIN IN FILL AREAS TO BE INSTALLED WITH RESTRAINED JOINTS PER CITY OF OTTAWA STD.25.5 AND W25.6.
38. THRUST BLOCKING OF WATERMAINS TO BE INSTALLED PER CITY OF OTTAWA STD. W25.3 AND W25.4.
39. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY CAPS, PLUGS, BLOW-OFFS, AND NOZZLES REQUIRED FOR TESTING AND DISINFECTION OF THE WATERMAIN.
40. WATERMAIN CROSSING OVER AND BELOW SEWERS SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. W25,2 AND W25, RESPECTIVELY.
41. WATER SERVICES ARE TO BE INSULATED PER CITY STD. W23 WHERE SEPARATION BETWEEN SERVICES AND MAINTENANCE HOLES ARE LESS THAN 2.4M.
42. THE MINIMUM VERTICAL CLEARANCE BETWEEN WATERMAIN AND SEWER/UTILITY IS 0.5M PER MOE GUIDELINES. FOR CROSSING UNDER SEWERS, ADEQUATE STRUCTURAL SUPPORT FOR THE SEWER IS REQUIRED TO PREVENT EXCESSIVE DEFLECTION OF JOINTS AND SETTLING. THE LENGTH OF WATER PIPE SHALL BE CENTERED AT THE POINT OF CROSSING TO ENSURE THAT THE JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER.
43. ALL WATERMAINS SHALL HAVE A MINIMUM COVER OR 2.4M, OTHERWISE THERMAL INSULATION IS REQUIRED AS PER STD DWG W22.
44. GENERAL WATER PLANT TO UTILITY CLEARANCE AS PER STD DWG R20.
45. FIRE HYDRANT INSTALLATION AS PER STD DWG W19, ALL BOTTOM OF HYDRANT FLANGE ELEVATIONS TO BE INSTALLED 0.10M ABOVE PROPOSED FINISHED GRADE AT HYDRANT; FIRE HYDRANT LOCATION AS PER STD DWG W18.
46. BUILDING SERVICE TO BE CAPPED 1.0M OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED AND MUST BE RESTRAINED A MINIMUM OF 12M BACK FROM STUB.
47. ALL WATERMAINS SHALL BE HYDROSTATICALLY TESTED IN ACCORDANCE WITH THE CITY OF OTTAWA AND ONTARIO GUIDELINES UNLESS OTHERWISE DIRECTED. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC. MUST BE PROVIDED.
48. ALL WATERMAINS SHALL BE BACTERIOLOGICALLY TESTED IN ACCORDANCE WITH THE CITY OF OTTAWA AND ONTARIO GUIDELINES. ALL CHLORINATED WATER TO BE DISCHARGED AND PRETREATED TO ACCEPTABLE LEVELS PRIOR TO DISCHARGE. ALL DISCHARGED WATER MUST BE CONTROLLED AND TREATED SO AS NOT TO ADVERSELY EFFECT ENVIRONMENT. IT IS RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL MUNICIPAL AND/OR PROVINCIAL REQUIREMENTS ARE FOLLOWED.
49. ALL WATERMAIN STUBS SHALL BE TERMINATED WITH A PLUG AND 50MM BLOW OFF UNLESS OTHERWISE NOTED.

USE AND INTERPRETATION OF DRAWINGS

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION ARE PART OF THE CONTRACT DOCUMENTS AND DESCRIBE USE AND INTENT OF THE DRAWING. THE CONTRACT DOCUMENTS INCLUDE NOT ONLY THE DRAWINGS, BUT ALSO THE OWNER-CONTRACTOR AGREEMENTS, CONDITIONS OF THE CONTRACT, THE SPECIFICATIONS, ADDENDA, AND MODIFICATIONS ISSUED AFTER EXECUTION OF THE CONTRACT. THESE CONTRACT DOCUMENTS ARE COMPLEMENTARY, AND WHAT IS REQUIRED BY ANY ONE SHALL BE BINDING AS IF REQUIRED BY ALL. WORK NOT COMPLETELY DELINEATED HEREON SHALL BE CONSTRUCTED OF THE SAME MATERIALS AND DETAILED SIMILARLY AS WORK SHOWN MORE COMPLETELY ELSEWHERE IN THE CONTRACT DOCUMENTS.

BY USE OF THE DRAWINGS FOR CONSTRUCTION OF THE PROJECT, THE OWNER CONFIRMS THAT HE HAS REVIEWED AND APPROVED THE DRAWINGS. THE CONTRACTOR CONFIRMS THAT HE HAS VISITED THE SITE, FAMILIARIZED HIMSELF WITH THE LOCAL CONDITIONS, VERIFIED FIELD DIMENSIONS AND CORRELATED HIS OBSERVATIONS WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

AS INSTRUMENTS OF SERVICE, ALL DRAWINGS, SPECIFICATIONS, CADD FILES OR OTHER ELECTRONIC MEDIA AND COPIED THERE OF FURNISHED BY THE ENGINEER ARE HIS PROPERTY. THEY ARE TO BE USED ONLY FOR THIS PROJECT AND ARE NOT TO BE USED ON ANY OTHER PROJECT, INCLUDING REPEATS OF THE PROJECT. CHANGES TO THE DRAWINGS MAY ONLY BE MADE BY THE ENGINEER.

UNLESS THE REVISION TITLE IS "ISSUED FOR CONSTRUCTION", THESE DRAWINGS SHALL BE CONSIDERED PRELIMINARY AND SHALL NOT BE USED AS A CONSTRUCTION DOCUMENT.

THESE DRAWINGS ILLUSTRATES THE WORK TO BE DONE. THE ENGINEER IS NOT RESPONSIBLE FOR THE MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES USED TO DO THE WORK, OR THE SAFETY ASPECTS OF CONSTRUCTION, AND NOTHING ON THESE DRAWINGS EXPRESSED OR IMPLIED CHANGES THIS CONDITION. CONTRACTOR SHALL DETERMINE ALL CONDITIONS AT THE SITE AND SHALL BE RESPONSIBLE FOR KNOWING HOW THEY AFFECT THE WORK. SUBMITTAL OF A BID TO PERFORM THIS WORK IS ACKNOWLEDGEMENT OF THE RESPONSIBILITIES, AND THAT THEY HAVE BEEN FULLY CONSIDERED IN PLANNING OF THE WORK, AND THE BID PRICE. NO CLAIMS FOR EXTRA CHARGES DUE TO THESE CONDITIONS WILL BE FORTHCOMING.

UNAUTHORIZED CHANGES:

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10m 5 0 10 20m

SCALE: 1:500

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
Dec 23, 2022
PROVINCE OF ONTARIO

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LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

No.	REVISIONS	BY	DATE
02	REISSUED FOR SITE PLAN APPROVAL	T.H.	23 DEC 2022
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	31 AUG 2022

CLIENT
AVENUE 31 CAPITAL INC
801-250 City Centre, Ottawa, ON, K1R 6K7
C 613-799-2422

DESIGNED BY:	DRAWN BY:	APPROVED BY:
T.H.	T.H.	V.J.

PROJECT
NATIONAL CAPITAL BUSINESS PARK
SITE 2 - BUILDING D
1100 LAST MILE DRIVE
OTTAWA, ON

DRAWING TITLE
GENERAL NOTES PLAN

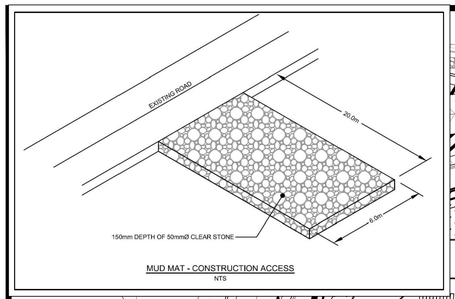
PROJECT NO.
220345

DATE
DECEMBER, 2022

C001

D07-12-22-0125

PLAN NO. 18839



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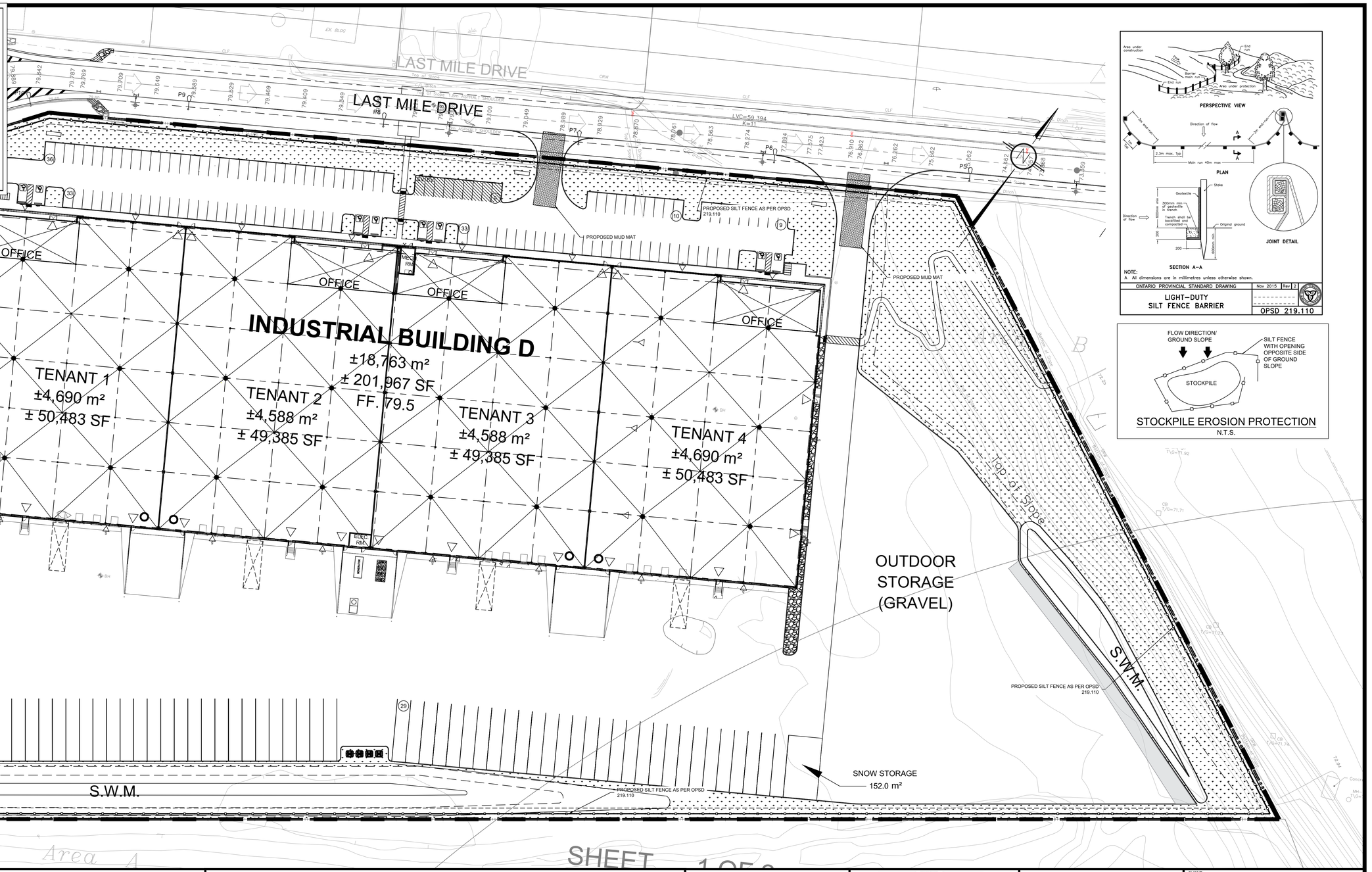

STOCKPILE EROSION PROTECTION
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801-250 City Centre, Ottawa, ON, K1R 6K7
C 613-799-2422

DESIGNED BY:	DRAWN BY:	APPROVED BY:
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PROJECT
NATIONAL CAPITAL BUSINESS PARK
SITE 2 - BUILDING D
1100 LAST MILE DRIVE
OTTAWA, ON

DRAWING TITLE
EROSION SEDIMENT & CONTROL PLAN

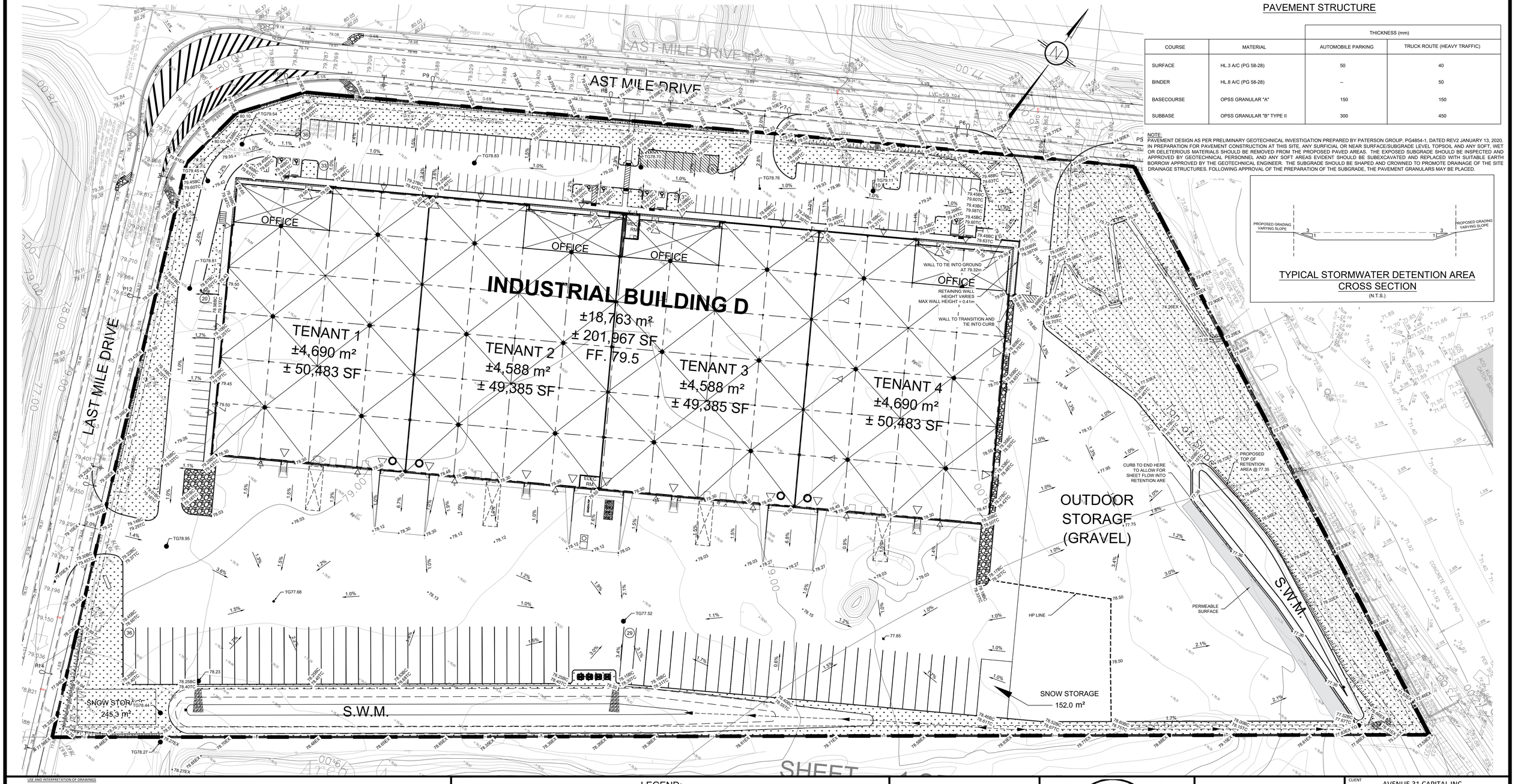
PROJECT NO.
220345

DATE
DECEMBER, 2022

C101

D07-12-22-0125

PLAN NO. 18830



PAVEMENT STRUCTURE

COURSE	MATERIAL	THICKNESS (mm) AUTOMOBILE PARKING	THICKNESS (mm) TRUCK ROUTE (HEAVY TRAFFIC)
SURFACE	HL 3 A/C (PG 58-28)	50	40
BINDER	HL 8 A/C (PG 58-28)	--	50
BASECOURSE	OPSS GRANULAR "A"	150	150
SUBBASE	OPSS GRANULAR "B" TYPE II	300	450

NOTE:
PAVEMENT DESIGN AS PER PRELIMINARY GEOTECHNICAL INVESTIGATION PREPARED BY PATERSON GROUP, PG4854-1, DATED REV2 JANUARY 13, 2020. IN PREPARATION FOR PAVEMENT CONSTRUCTION AT THIS SITE, ANY SURFICIAL OR NEAR SURFACE/SUBGRADE LEVEL TOPSOIL AND ANY SOFT, WET OR DELETERIOUS MATERIALS SHOULD BE REMOVED FROM THE PROPOSED PAVED AREAS. THE EXPOSED SUBGRADE SHOULD BE INSPECTED AND APPROVED BY GEOTECHNICAL PERSONNEL AND ANY SOFT AREAS EVIDENT SHOULD BE SUBEXCAVATED AND REPLACED WITH SUITABLE EARTH BORROW APPROVED BY THE GEOTECHNICAL ENGINEER. THE SUBGRADE SHOULD BE SHAPED AND CROWNED TO PROMOTE DRAINAGE OF THE SITE DRAINAGE STRUCTURES. FOLLOWING APPROVAL OF THE PREPARATION OF THE SUBGRADE, THE PAVEMENT GRANULARS MAY BE PLACED.

TYPICAL STORMWATER DETENTION AREA CROSS SECTION
(N.T.S.)

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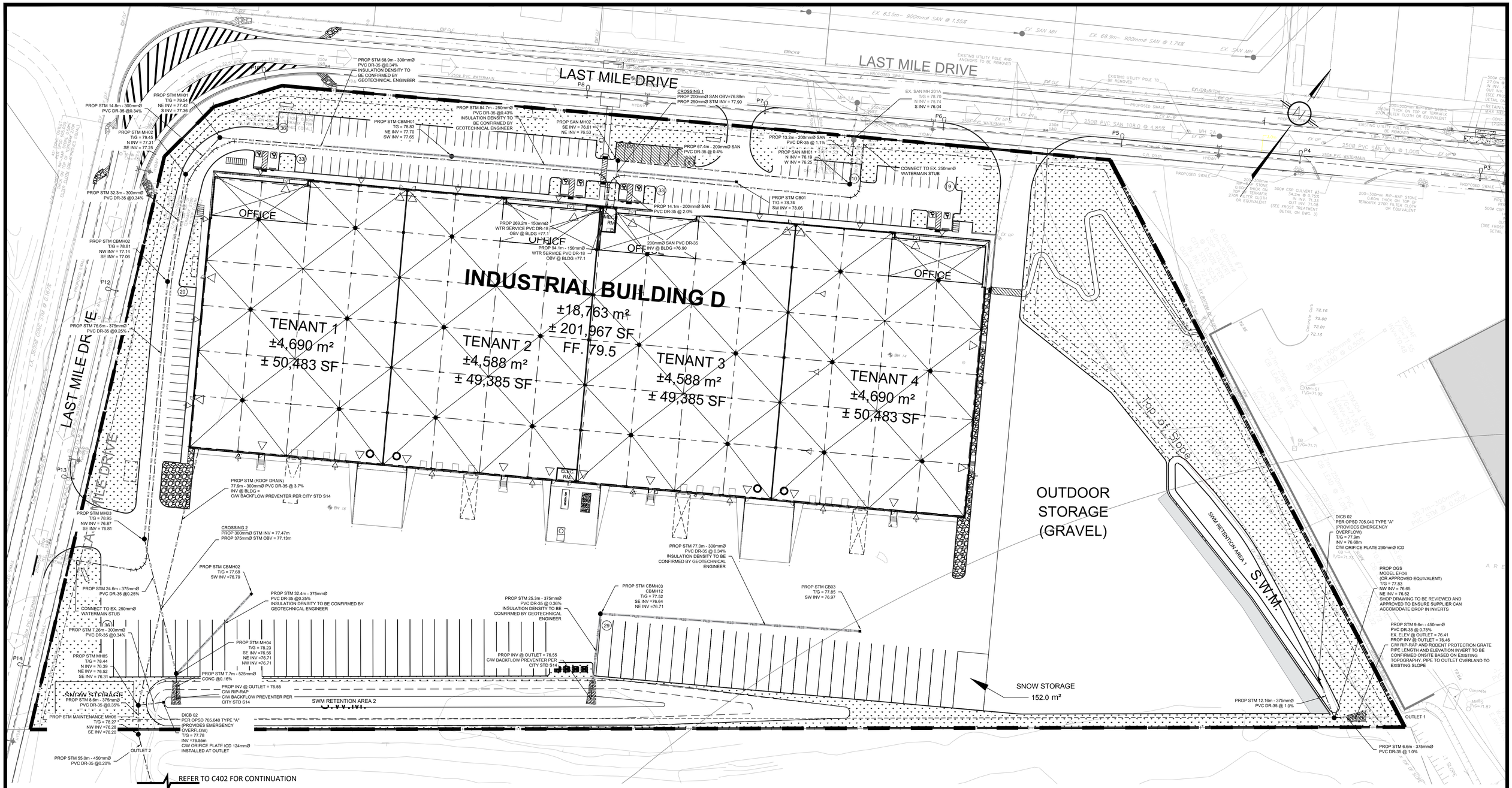
PLAN NO. 18839



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- SAN — PROPOSED SANITARY SEWER
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- PROPOSED PIPE INSULATION PER DETAIL ON C901

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NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road I Ottawa, ON, K1J 9G2
www.lrl.ca I (613) 842-3434

No.	REVISIONS	BY	DATE
02	REISSUED FOR SITE PLAN APPROVAL	T.H.	23 DEC 2022
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	31 AUG 2022

CLIENT
AVENUE 31 CAPITAL INC
801-250 City Centre, Ottawa, ON, K1R 6K7
C 613-799-2422

DESIGNED BY:	DRAWN BY:	APPROVED BY:
T.H.	T.H.	V.J.

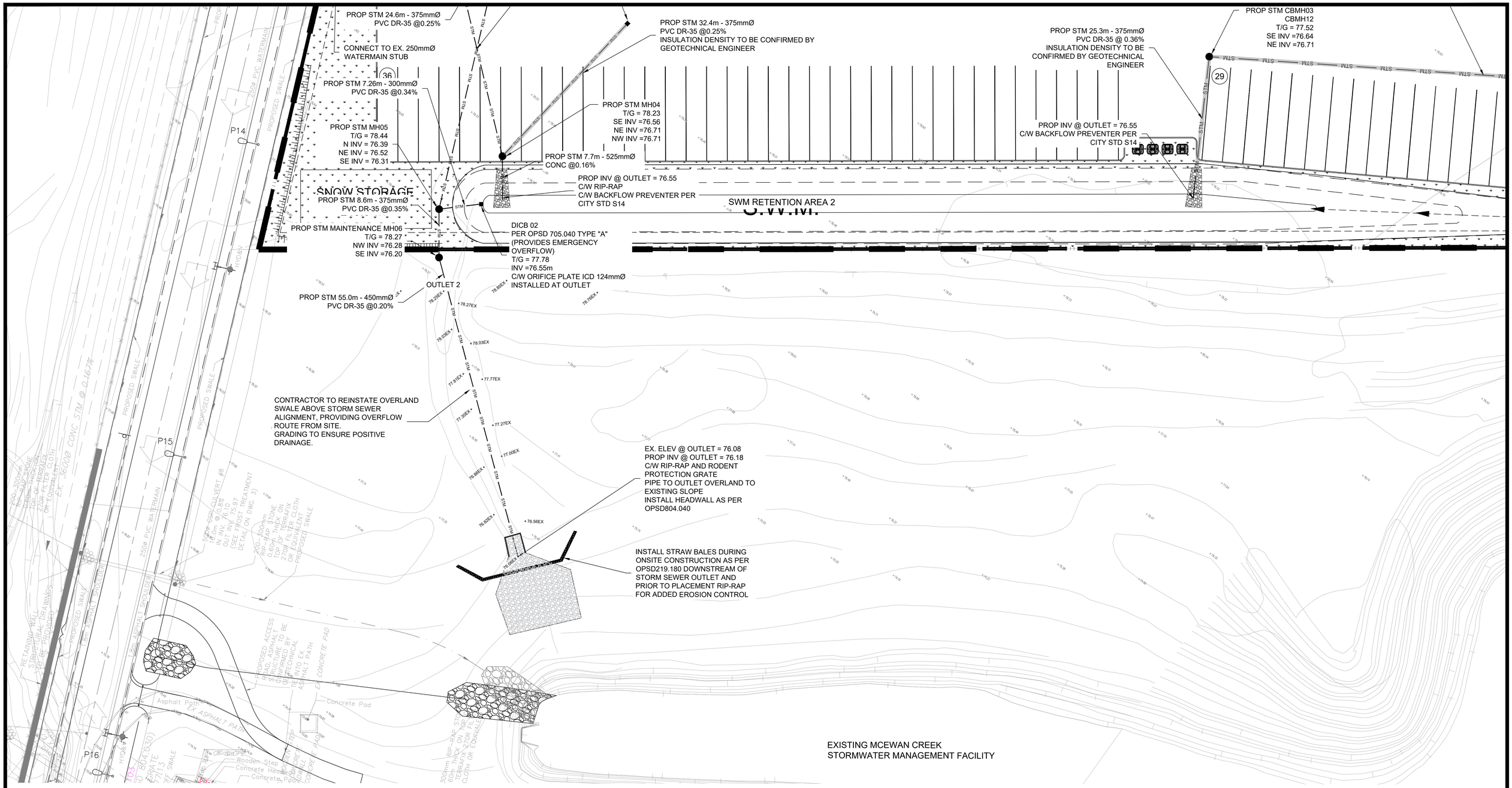
PROJECT
NATIONAL CAPITAL BUSINESS PARK
SITE 2 - BUILDING D
1100 LAST MILE DRIVE
OTTAWA, ON

DRAWING TITLE
SITE SERVICING PLAN

PROJECT NO. 220345
DATE DECEMBER, 2022
C401

D07-12-22-0125

PLAN NO. 18839



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- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED FENCE
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- PROPOSED GRASS AREA (100mm TOP SOIL & SOD)
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED RIP RAP
- SUB — SUB — PROPOSED 100mmØ PERFORATED SUBDRAIN
- STM — STM — PROPOSED STORM SEWER
- SAN — SAN — PROPOSED SANITARY SEWER
- WTR — WTR — PROPOSED WATERMAIN
- STM — STM — EXISTING STORM SEWER
- SAN — SAN — EXISTING SANITARY SEWER
- WTR — WTR — EXISTING WATERMAIN
- GAS — GAS — EXISTING GAS LINE
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED MANHOLE
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION PER DETAIL ON C901

5m 2 0 5 10m

SCALE: 1:300

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
Dec 23, 2022
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

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CLIENT
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801-250 City Centre, Ottawa, ON, K1R 6K7
C 613-799-2422

DESIGNED BY:	DRAWN BY:	APPROVED BY:
T.H.	T.H.	V.J.

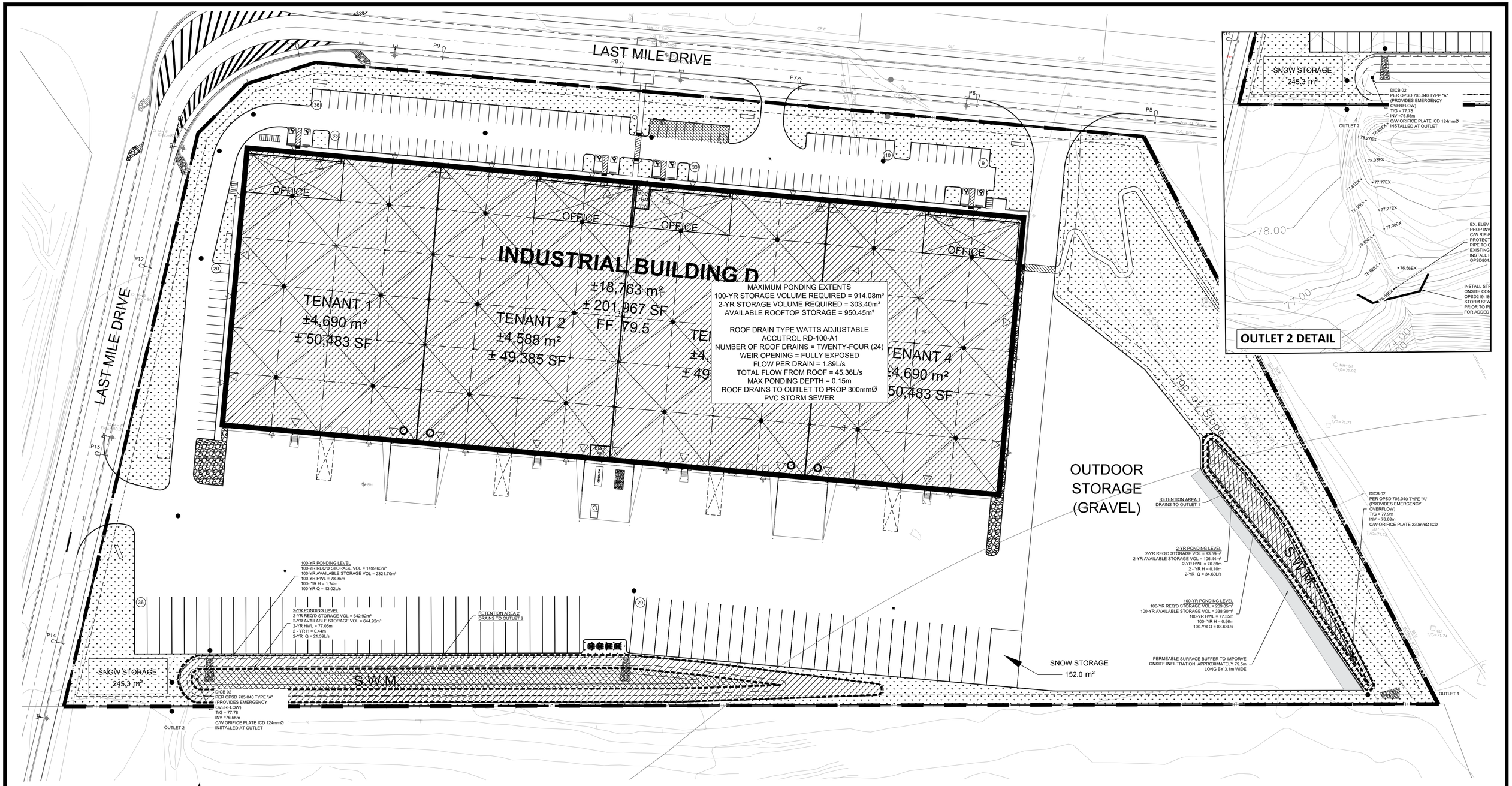
PROJECT
NATIONAL CAPITAL BUSINESS PARK
SITE 2 - BUILDING D
1100 LAST MILE DRIVE
OTTAWA, ON

DRAWING TITLE
SITE SERVICING PLAN
MCEWAN CREEK SWF DETAILS

PROJECT NO.
220345

DATE
DECEMBER, 2022

C402



REFER TO OUTLET DETAIL

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- STORM WATERSHED EXTENT
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- AREA — RUNOFF — AREA IN HECTARES
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- EXSITING OVERLAND MAJOR FLOW ROUTE
- ROOF SCUPPER

10m 5 0 10 20m

SCALE: 1:500

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
Dec 23, 2022
PROVINCE OF ONTARIO

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CLIENT
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801-250 City Centre, Ottawa, ON, K1R 6K7
C 613-799-2422

DESIGNED BY:	DRAWN BY:	APPROVED BY:
T.H.	T.H.	V.J.

PROJECT
NATIONAL CAPITAL BUSINESS PARK
SITE 2 - BUILDING D
1100 LAST MILE DRIVE
OTTAWA, ON

DRAWING TITLE
STORM WATER MANAGEMENT PLAN

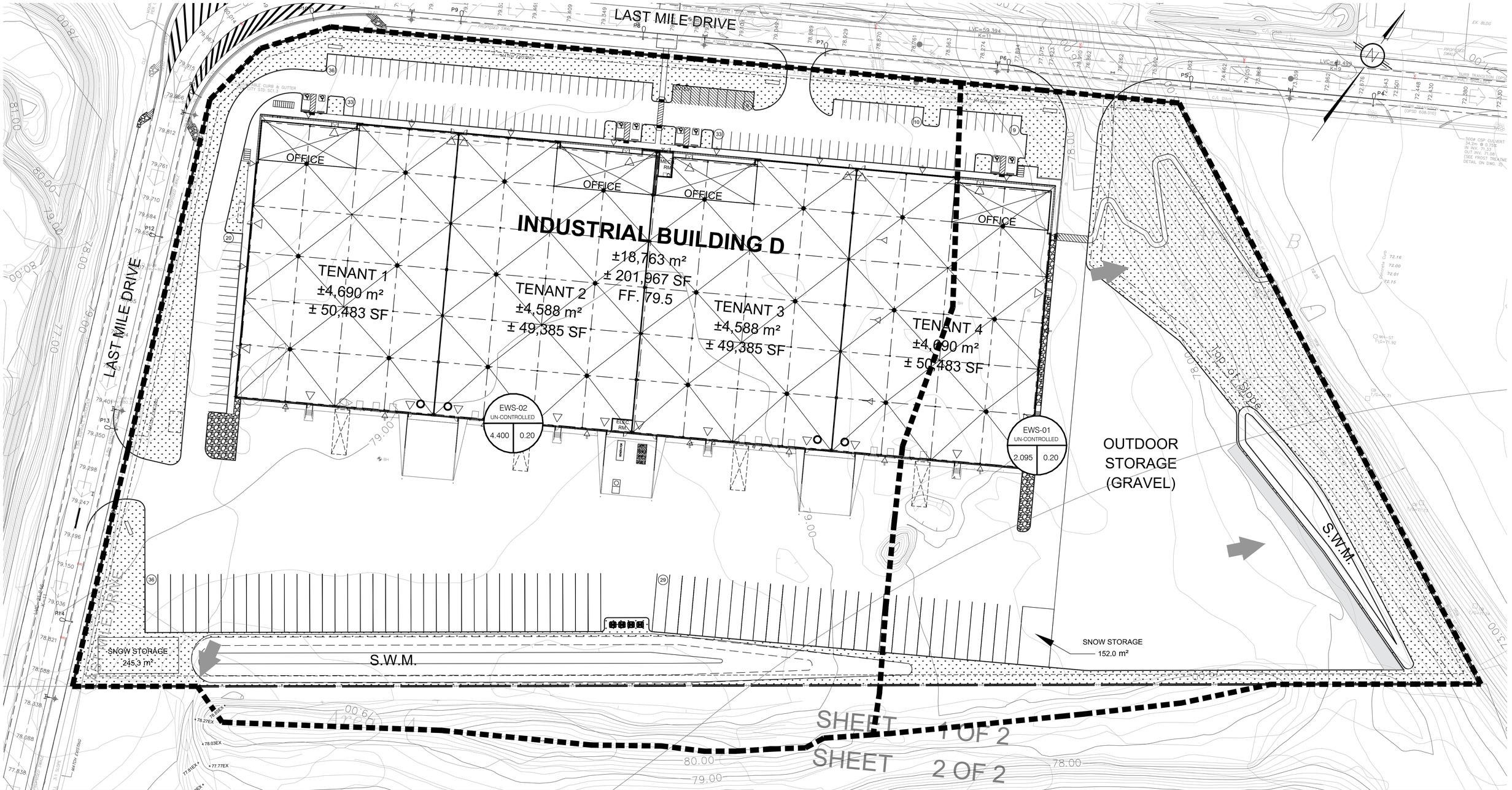
PROJECT NO.
220345

DATE
DECEMBER, 2022

C601

D07-12-22-0125

PLAN NO. 18839



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10m 5 0 10 20m

SCALE: 1:500

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801-250 City Centre, Ottawa, ON, K1R 6K7
C 613-799-2422

DESIGNED BY:	DRAWN BY:	APPROVED BY:
T.H.	T.H.	V.J.

PROJECT
NATIONAL CAPITAL BUSINESS PARK
SITE 2 - BUILDING D
1100 LAST MILE DRIVE
OTTAWA, ON

DRAWING TITLE
PRE-DEVELOPMENT
WATERSHED PLAN

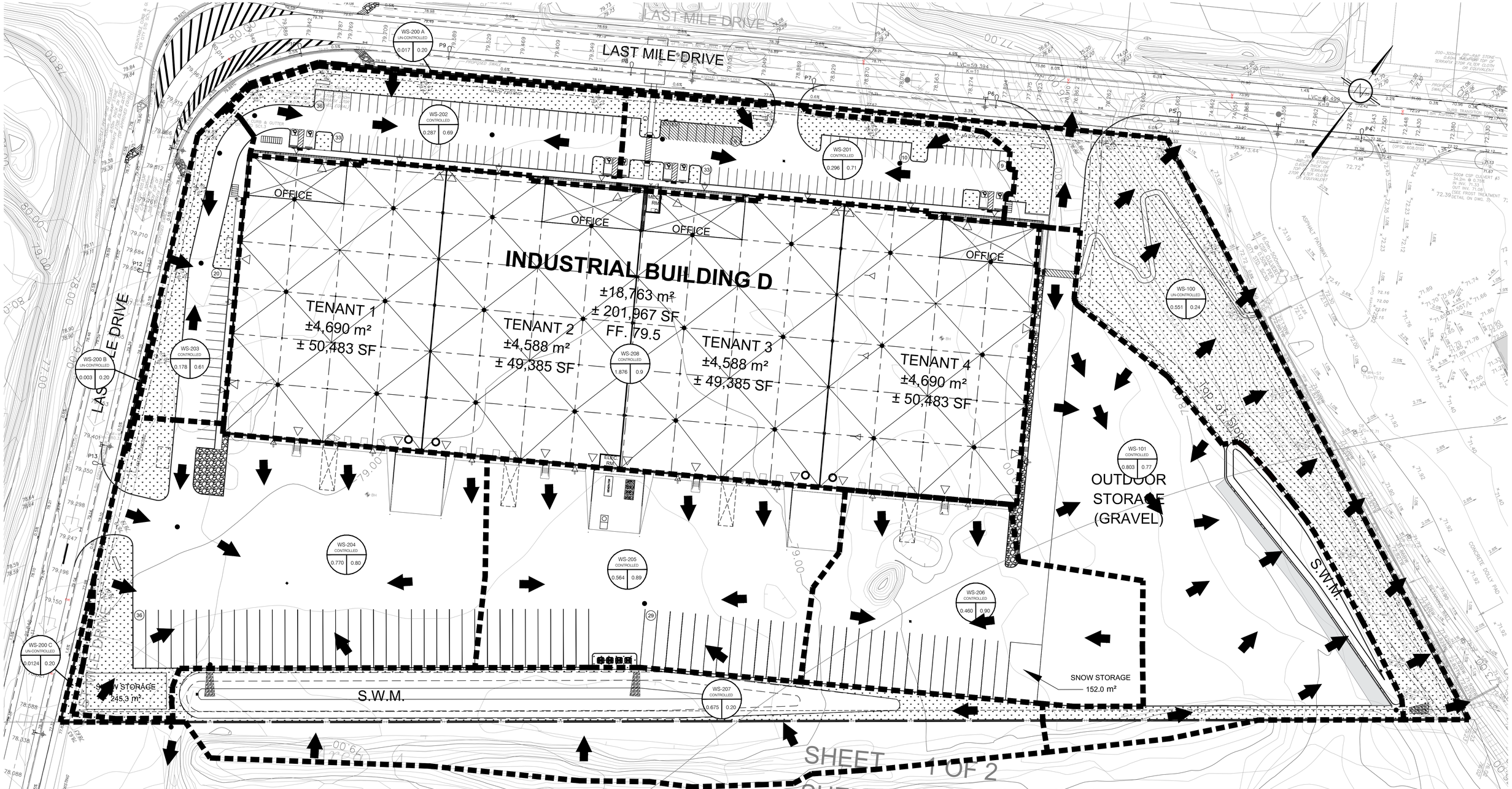
PROJECT NO.
220345

DATE
DECEMBER, 2022

C701

D07-12-22-0125

PLAN NO. 18839



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THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THESE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY, OR FOR PROBLEMS WHICH ARISE FROM OTHERS' FAILURE TO OBTAIN AND/OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED.

CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE WORK COMMENCES. DO NOT SCALE DRAWINGS.

LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED FENCE
- PROPOSED DOOR ENTRANCE/EXIT
- PROPOSED GRASS AREA (100mm TOP SOIL & SOD)
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED RIP RAP
- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX CONTROLLED AREA RUNOFF — WATERSHED NAME; RUNOFF COEFFICIENT; AREA IN HECTARES
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED MANHOLE
- PROPOSED CURB STOP
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- EXSITING OVERLAND MAJOR FLOW ROUTE
- ROOF SCUPPER

10m 5 0 10 20m

SCALE: 1:500

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
Dec 23, 2022
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

No.	REVISIONS	BY	DATE
02	REISSUED FOR SITE PLAN APPROVAL	T.H.	23 DEC 2022
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	31 AUG 2022

CLIENT
AVENUE 31 CAPITAL INC
801-250 City Centre, Ottawa, ON, K1R 6K7
C 613-799-2422

DESIGNED BY:	DRAWN BY:	APPROVED BY:
T.H.	T.H.	V.J.

PROJECT
NATIONAL CAPITAL BUSINESS PARK
SITE 2 - BUILDING D
1100 LAST MILE DRIVE
OTTAWA, ON

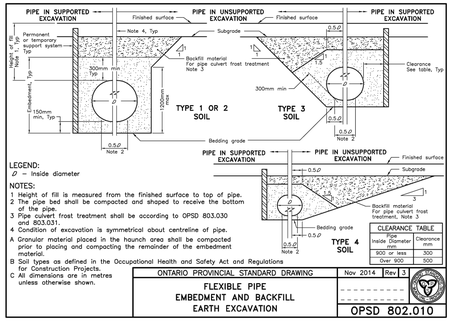
DRAWING TITLE
POST-DEVELOPMENT WATERSHED PLAN

PROJECT NO.
220345

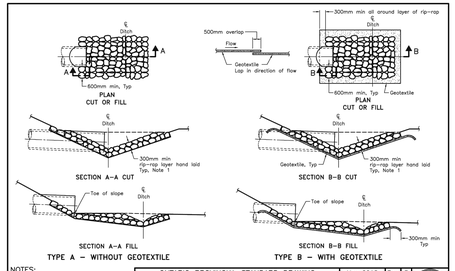
DATE
DECEMBER, 2022

C702

PLAN NO. 18839

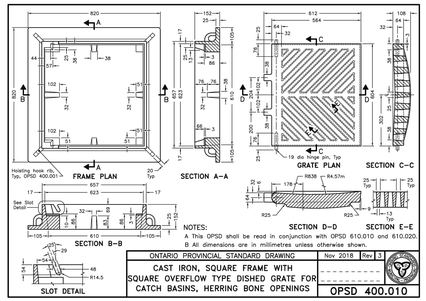


ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev 3
FLEXIBLE PIPE EMBEDMENT AND BACKFILL EARTH EXCAVATION		OPSD 802.010



NOTES:
1 The thickness of the rip-rap layer shall be at least 1.5 times the rip-rap mean diameter.
A All dimensions are in millimetres unless otherwise shown.

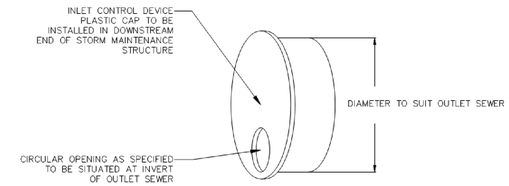
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev 3
GENERAL RIP–RAP LAYOUT FOR SEWER AND CULVERT OUTLETS		OPSD 810.010



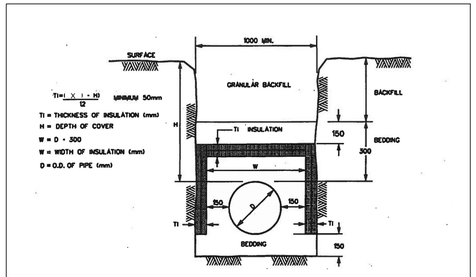
NOTES:
A This OPSD shall be read in conjunction with OPSD 610.010 and 610.020.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev 3
CAST IRON, SQUARE FRAME WITH SQUARE OVERFLOW TYPE DISHED GRATE FOR CATCH BASINS, HERRING BONE OPENINGS		OPSD 400.010

INLET CONTROL DEVICE (ICD) DETAIL
PLASTIC "PLUG" STYLE

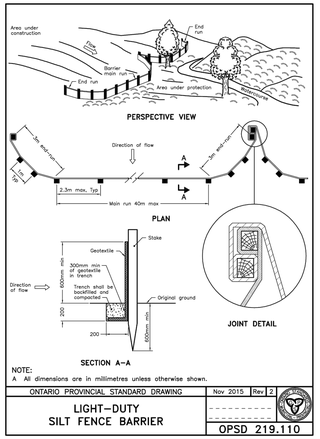


NOT TO SCALE



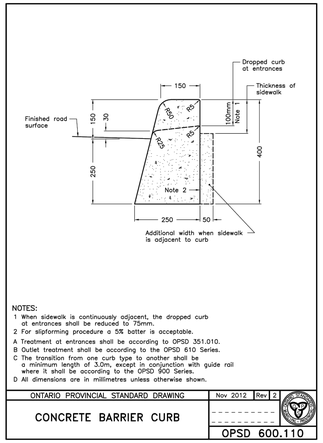
NOTES:
-FOR STORM INSULATION USE AN X VALUE OF 2000 IN THE ABOVE "TI" EQUATION.
-FOR SANITARY INSULATION USE AN X VALUE OF 2500 IN THE ABOVE "TI" EQUATION.
-FOR WATERMAIN INSULATION USE AN X VALUE OF 2400 IN THE ABOVE "TI" EQUATION.
-INCREMENTS OF INSULATION THICKNESS SHALL BE ADJUSTABLE TO 25mm.
-STAGGER JOINTS OF MULTIPLE SHEETS.
-ALL DIMENSIONS ARE IN MILLIMETERS UNLESS SHOWN OTHERWISE.

TYPICAL STORM AND SANITARYSEWER AND WATERMAIN INSULATION DETAIL
(N.T.S.)



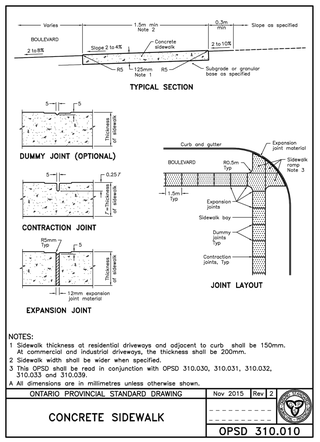
NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT–DUTY SILT FENCE BARRIER		OPSD 219.110



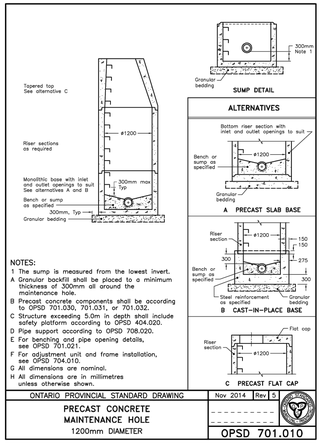
NOTES:
1 When sidewalk is continuously adjacent, the dropped curb at entrances shall be reduced to 75mm.
2 For slipforming procedure a 5% batter is acceptable.
A Treatment at entrances shall be according to OPSD 351.010.
B Outlet treatment shall be according to the OPSD 610 Series.
C The transition from one curb type to another shall be a minimum length of 3.0m, except in conjunction with guide rail where it shall be according to the OPSD 900 Series.
D All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev 2
CONCRETE BARRIER CURB		OPSD 600.110



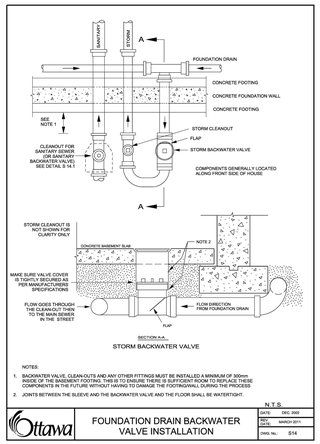
NOTES:
1 Sidewalk thickness at residential driveways and adjacent to curb shall be 150mm. At commercial and industrial driveways, the thickness shall be 200mm.
2 Sidewalk width shall be wider when specified.
3 This OPSD shall be read in conjunction with OPSD 310.030, 310.031, 310.032, 310.033 and 310.039.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
CONCRETE SIDEWALK		OPSD 310.010



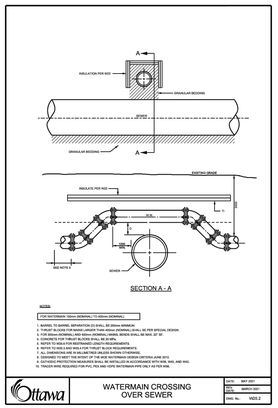
NOTES:
1 The sump is measured from the lowest invert.
A Granular backfill shall be placed to a minimum thickness of 300mm all around the maintenance hole.
B Precast concrete components shall be according to OPSD 701.030, 701.031, or 701.032.
C Structure exceeding 5.0m in depth shall include safety platform according to OPSD 404.020.
D Pipe support according to OPSD 708.020.
E For benching and pipe opening details, see OPSD 701.021.
F For adjustment unit and frame installation, see OPSD 704.010.
G All dimensions are nominal.
H All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev 3
PRECAST CONCRETE MAINTENANCE HOLE 1200mm DIAMETER		OPSD 701.010



NOTES:
1. BACKWATER VALVE, CLEAN-OUTS AND ANY OTHER FITTINGS MUST BE INSTALLED A MINIMUM OF 300mm INSIDE OF THE BASEMENT FOOTING. THIS IS TO ENSURE THERE IS SUFFICIENT ROOM TO REPLACE THESE COMPONENTS IN THE FUTURE WITHOUT HAVING TO DAMAGE THE FOOTINGWALL DURING THE PROCESS.
2. JOINTS BETWEEN THE SLEEVE AND THE BACKWATER VALVE AND THE FLOOR SHALL BE WATERTIGHT.

Ottawa	FOUNDATION DRAIN BACKWATER VALVE INSTALLATION	N.T.S. DATE: DEC. 2009 REV. DATE: MARCH 2011 DWG. No. S14

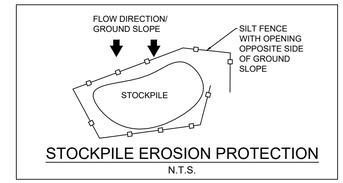


NOTES

FOR WATERMAIN 150mm (NOMINAL) TO 400mm (NOMINAL)

1. BARREL TO BARREL SEPARATION (S) SHALL BE 200mm MINIMUM
2. T-PIECE BLOCKS FOR MAINS LARGER THAN 400mm (NOMINAL) SHALL BE PER SPECIAL DESIGN.
3. FOR 350mm (NOMINAL) AND 400mm (NOMINAL) MAINS, SEWER SHALL BE MAX. 20° 30'.
4. FOR 300mm (NOMINAL) MAINS, SEWER SHALL BE MAX. 20°.
5. NOTICE TO HOLD FOR WATERMAIN LENGTH REQUIREMENTS.
6. INSULATION TO BE PLACED ON WATERMAIN ONLY WHEN SEWER IS PVC.
7. ALL DIMENSIONS ARE MINIMUM UNLESS SHOWN OTHERWISE.
8. ENSURE TO MEET THE INTENT OF THE AWA WATERMAIN DESIGN MANUAL (JUNE 2012)
9. ENSURE TO MEET THE MINIMUM VERTICAL SEPARATION DISTANCE BETWEEN WATER, SEWER, AND YARD
10. TRACER WIRE REQUIRED FOR PVC, PE3 AND HDPE WATERMAIN PIPE ONLY AS PER NS8.

Ottawa	WATERMAIN CROSSING OVER SEWER	DATE: MAY 2011 REV. DATE: MARCH 2012 DWG. No. W03.2



STOCKPILE EROSION PROTECTION
N.T.S.

USE AND INTERPRETATION OF DRAWINGS

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION ARE PART OF THE CONTRACT DOCUMENTS AND DESCRIBE USE AND INTENT OF THE DRAWING. THE CONTRACT DOCUMENTS INCLUDE NOT ONLY THE DRAWINGS, BUT ALSO THE OWNER-CONTRACTOR AGREEMENTS, CONDITIONS OF THE CONTRACT, THE SPECIFICATIONS, ADDENDA, AND MODIFICATIONS ISSUED AFTER EXECUTION OF THE CONTRACT. THESE CONTRACT DOCUMENTS ARE COMPLEMENTARY, AND WHAT IS REQUIRED BY ANY ONE SHALL BE BINDING AS IF REQUIRED BY ALL. WORK NOT COMPLETELY DELINEATED HEREON SHALL BE CONSTRUCTED OF THE SAME MATERIALS AND DETAILED SIMILARLY AS WORK SHOWN MORE COMPLETELY ESSEWHERE IN THE CONTRACT DOCUMENTS.

BY USE OF THE DRAWINGS FOR CONSTRUCTION OF THE PROJECT, THE OWNER CONFIRMS THAT HE HAS REVIEWED AND APPROVED THE DRAWINGS. THE CONTRACTOR CONFIRMS THAT HE HAS VISITED THE SITE, FAMILIARIZED HIMSELF WITH THE LOCAL CONDITIONS, VERIFIED FIELD DIMENSIONS AND CORRELATED HIS OBSERVATIONS WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

AS INSTRUMENTS OF SERVICE, ALL DRAWINGS, SPECIFICATIONS, CADD FILES OR OTHER ELECTRONIC MEDIA AND COPIED THERE OF FURNISHED BY THE ENGINEER ARE HIS PROPERTY. THEY ARE TO BE USED ONLY FOR THIS PROJECT AND ARE NOT TO BE USED ON ANY OTHER PROJECT, INCLUDING REPEATS OF THE PROJECT. CHANGES TO THE DRAWINGS MAY ONLY BE MADE BY THE ENGINEER.

UNLESS THE REVISION TITLE IS "ISSUED FOR CONSTRUCTION", THESE DRAWINGS SHALL BE CONSIDERED PRELIMINARY AND SHALL NOT BE USED AS A CONSTRUCTION DOCUMENT.

THESE DRAWINGS ILLUSTRATES THE WORK TO BE DONE. THE ENGINEER IS NOT RESPONSIBLE FOR THE MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES USED TO DO THE WORK, OR THE SAFETY ASPECTS OF CONSTRUCTION, AND NOTHING ON THESE DRAWINGS EXPRESSED OR IMPLIED CHANGES THIS CONDITION. CONTRACTOR SHALL DETERMINE ALL CONDITIONS AT THE SITE AND SHALL BE RESPONSIBLE FOR KNOWING HOW THEY AFFECT THE WORK. SUBMITTAL OF A BID TO PERFORM THIS WORK IS ACKNOWLEDGEMENT OF THE RESPONSIBILITIES, AND THAT THEY HAVE BEEN FULLY CONSIDERED IN PLANNING OF THE WORK, AND THE BID PRICE. NO CLAIMS FOR EXTRA CHARGES DUE TO THESE CONDITIONS WILL BE FORTHCOMING.

UNAUTHORIZED CHANGES:

IN THE EVENT THE CLIENT, THE CLIENT'S CONTRACTORS OR SUBCONTRACTORS, OR ANYONE FOR WHOM THE CLIENT IS LEGALLY LIABLE MAKES OR PERMITS TO BE MADE ANY CHANGES TO ANY REPORTS, PLANS, SPECIFICATIONS OR OTHER CONSTRUCTION DOCUMENTS PREPARED BY LRL ASSOCIATES LTD. (LRL) WITHOUT OBTAINING LRL'S PRIOR WRITTEN CONSENT, THE CLIENT SHALL ASSUME FULL RESPONSIBILITY FOR THE RESULTS OF SUCH CHANGES. THEREFORE THE CLIENT AGREES TO WAIVE ANY CLAIM AGAINST LRL AND TO RELEASE LRL FROM ANY LIABILITY ARISING DIRECTLY OR INDIRECTLY FROM SUCH UNAUTHORIZED CHANGES.

IN ADDITION, THE CLIENT AGREES, TO THE FULLEST EXTENT PERMITTED BY LAW, TO INDEMNIFY AND HOLD HARMLESS LRL FROM ANY DAMAGES, LIABILITIES OR COST, INCLUDING REASONABLE ATTORNEY'S FEES AND COST OF DEFENSE, ARISING FROM SUCH CHANGES.

IN ADDITION, THE CLIENT AGREES TO INCLUDE IN ANY CONTRACTS FOR CONSTRUCTION APPROPRIATE LANGUAGE THAT PROHIBITS THE CONTRACTOR OR ANY SUBCONTRACTORS OF ANY TIER FROM MAKING ANY CHANGES OR MODIFICATIONS TO LRL'S CONSTRUCTION DOCUMENTS WITHOUT THE PRIOR WRITTEN APPROVAL OF LRL AND THAT FURTHER REQUIRES THE CONTRACTOR TO INDEMNIFY BOTH LRL AND THE CLIENT FROM ANY LIABILITY OR COST ARISING FROM SUCH CHANGES MADE WITHOUT SUCH PROPER AUTHORIZATION.

GENERAL NOTES:

EXISTING SERVICES AND UTILITIES SHOWN ON THESE DRAWINGS ARE TAKEN FROM THE BEST AVAILABLE RECORDS, BUT MAY NOT BE COMPLETE OR TO DATE. CONTRACTOR SHALL VERIFY IN FIELD FOR LOCATION AND ELEVATION OF PIPES AND CHECK WITH THE UTILITY COMPANIES BEFORE DIGGING OR PERFORMING WORK.

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10m 5 0 10 20m
SCALE: 1:500

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
Dec 23, 2022
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

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ENGINEERING | INGÉNIERIE
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No.	REVISIONS	BY	DATE
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01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	31 AUG 2022

CLIENT
AVENUE 31 CAPITAL INC
801-250 City Centre, Ottawa, ON, K1R 6K7
C 613-799-2422

DESIGNED BY:	DRAWN BY:	APPROVED BY:
T.H.	T.H.	V.J.

PROJECT
NATIONAL CAPITAL BUSINESS PARK
SITE 2 - BUILDING D
1100 LAST MILE DRIVE
OTTAWA, ON

DRAWING TITLE
CONSTRUCTION DETAIL PLAN

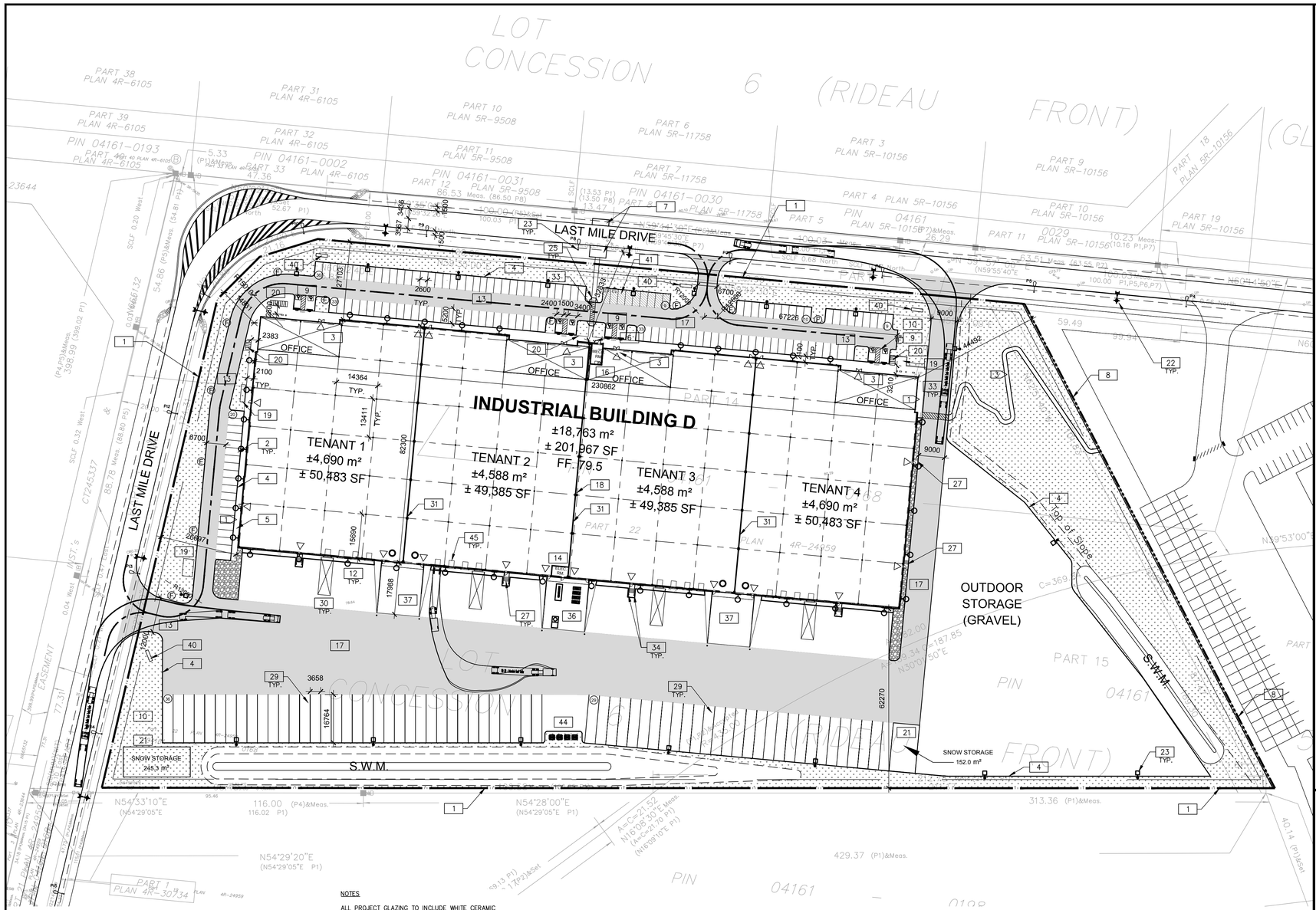
PROJECT NO. 220345
DATE DECEMBER, 2022
C901

PLAN NO. 188

APPENDIX Q

Proposed Site Plan

CAUTION: IF THIS SHEET IS NOT 24"x36" IT IS A REDUCED PRINT



LEGAL DESCRIPTION:
PLAN OF SURVEY OF
PART OF LOT 5
CONCESSION 6 (Rideau Front)
(GEOGRAPHIC TOWNSHIP OF Gloucester)
TOWN OF OTTAWA

SITE SURVEY INFORMATION:
INFORMATION ON THIS PLAN WAS TAKEN FROM THE SURVEY PLAN PREPARED BY ANNIS, O'SULLIVAN, VOLLEBEKK ltd DATED 2022-06-08

NOTES

ALL PROJECT GLAZING TO INCLUDE WHITE CERAMIC FRITTING IN A 5mm DOT PATTERN, SPACED 50mm IN ALL DIRECTIONS IN COMPLIANCE WITH BIRD SAFE DESIGN GUIDELINES.

GARBAGE ROOM LOCATION SUBJECT TO INTERIOR FIT UP PERMIT APPLICATION.

EXCESS SNOW TO BE REMOVED FROM SITE.

LIGHT-COLOURED ROOF MEMBRANE TO BE USED.

SITE PLAN

SCALE: 1:1000

CONSTRUCTION NORTH TRUE NORTH

SITE PLAN NOTES

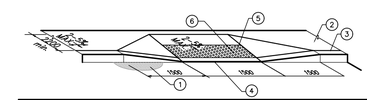
1. PROPERTY LINE
2. 2600x5200mm PARKING STALL, PAINTED PARKING STRIPING PER CITY OF OTTAWA ZONING BY-LAW NO. 2008-250
3. PRINCIPLE ENTRY – TENANT FIT-UP SUBJECT TO INTERIOR ALTERATION PERMIT
4. 150mm WIDE CURB TYPICAL
5. SIDEWALK – SEE LANDSCAPE DWGS FOR CONSTRUCTION DETAILS
6. FIRE DEPARTMENT/SIAMESE CONNECTION
7. PROPOSED BUS STOP LOCATION
8. PROJECT LIMIT LINE
9. TYPICAL ACCESSIBLE PARKING STALLS, PAINTED PARKING STRIPING PER BY-LAW OTTAWA ZONING BY-LAW NO. 2008-250. EACH PAIR OF SHARED STALLS TO HAVE TYPE A: 3.4m X 5.2m AND TYPE B: 2.4m x 5.2m WITH 1.5m WIDE PAINTED BARRIER FREE AISLE AND SIGNAGE REFER TO ONTARIO INTEGRATED ACCESSIBILITY STANDARDS.
10. LANDSCAPE AREA – SEE LANDSCAPE DRAWINGS
11. GUARDRAIL SET INTO RETAINING WALL. REFER TO CIVIL DRAWINGS FOR EXTENT AND DETAILS.
12. 12.0mx3.5m TRUCK LOADING SPACE (TYP.)
13. FIRE ACCESS ROUTE W/ 12.0M TURNING RADIUS
14. PROPOSED LOCATION OF ELECTRICAL RM
15. GALVANIZED STEEL GUARDRAIL WITH HANDRAIL,
16. PROPOSED LOCATION OF MECHANICAL RM
17. SHADED AREA DENOTES HEAVY DUTY ASPHALT. TYPICAL FOR ALL AREAS REQUIRING FIRE OR TRACTOR TRUCK ACCESS.
18. BUILDING EXPANSION JOINT
19. EMPLOYEE AMENITY SPACE
20. GALV. BICYCLE RACKS – SEE LANDSCAPE DRAWINGS
21. SNOW STORAGE AREA
22. EXISTING FIRE HYDRANT
23. PROPOSED LIGHT POLE. REFER TO ELECTRICAL DRAWINGS
24. FIRE ROUTE SIGNAGE PER CITY OF OTTAWA STANDARDS. REFER TO FIRE ROUTE BY-LAW NO. 2003-499 FOR SIGN REQUIREMENTS. SIGNS TO BE SPACED NO MORE THAN 25m APART
25. TACTILE WALKING SURFACE INDICATOR STRIP
26. CONCRETE PENINSULA – REFER TO CIVIL DRAWINGS
27. EXTERIOR GALV. STEEL STAIRS W/ TUBE STEEL GUARDRAIL, TYP.
28. EMPLOYMENT AMENITY SPACE – REFER TO LANDSCAPE DRAWINGS
29. TRUCK TRAILER PARKING
30. 13mx4.3m OVERSIZED TRUCK LOADING SPACE
31. FUTURE TENANT DEMISING WALL. SUBJECT TO TENANT FIT UP
32. CONCRETE APRON
33. PAINTED LINES PEDESTRIAN CROSSING
34. STEEL BOLLARD
35. PROPOSED RETAINING WALL – REFER TO CIVIL DRAWINGS
36. UTILITY PENINSULA INCLUDING PADMOUNT TRANSFORMER, GENERATOR, AND GAS
37. ASPHALT RAMP BOUNDED BY RETAINING WALLS WITH GUARDRAILS WHERE GRADE CHANGE IS MORE THAN 600mm – REFER TO CIVIL DWGS
38. RESERVED
39. RESERVED
40. PYLON SIGNAGE
41. EV PARKING STALLS (2 PROPOSED; 7 FUTURE)
42. RESERVED
43. ASPHALT PAD
44. IN GROUND EARTH-BIN GARBAGE RECEPTACLES WITH SCREENING
45. TRUCK LOADING DOCK (TYP.)
46. RESERVED
47. STANDARD BARRIER CURB WITH CONC PAD UNDER STAIRS.

SITE LEGEND

- NEW HEAVY DUTY PAVEMENT (HATCHED)
- NEW LANDSCAPED AREA (HATCHED)
- NEW RIVER STONE AREA (HATCHED)
- PAINTED DIAGONAL LINES WHERE INDICATED
- FUTURE EV PARKING STALLS
- PROPERTY LINE
- SITE BOUNDARY LINE
- GM GAS METER LOCATION.
- FIRE DEPT CONNECTION (VERIFY LOCATION WITH CIVIL DRAWINGS)
- EXISTING FIRE HYDRANT (VERIFY LOCATION WITH CIVIL DRAWINGS)
- PROPOSED FIRE HYDRANT
- LIGHT POLE
- WALL MOUNTED LIGHT
- MH DENOTES MANHOLE
- PROPOSED CATCHBASIN
- TACTILE INDICATORS AT DEPRESSED CURB
- BICYCLE RACK (1800 x 600 PER BIKE)
- MAN DOOR
- DOCK HIGH TRUCK DOOR
- GRADE LEVEL TRUCK DOOR
- F FIRE ROUTE SIGNS
- PYLON SIGNAGE
- 1 CONCRETE SIDEWALK
- 2 ASPHALT PATHWAY
- 3 STONE DUST PATHWAY

TOR21-0007-00 NATIONAL CAPITAL - BUILDING D

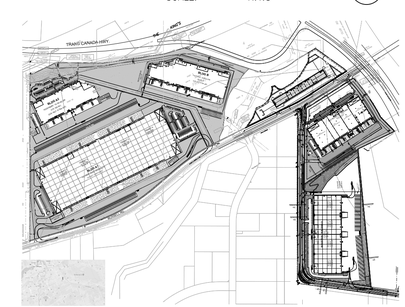
SITE STATISTICS		
ZONING	IH	
GROSS SITE AREA	61,147.00m²	
Zone Permitted Use *(OTTAWA ZONING BY-LAW NO. 2008-250)*		
Proposed Use	Warehouse	
Regulations (Part 11: Industrial Zones)		
	Proposed	**Required**
Min. Front Yard Building Setback (m)	27.1 m	7.5 m
Min. Corner Side Yard Building Set back (m)	14.8 m	7.5 m
Min. Interior Side Yard Building Set back (m)	44.4 m	7.5 m
Min.Rear Yard Building Setback (m)	62.3 m	7.5 m
Min.Landscape Front Yard Setback (m)	> 3 m	3 m
Min.Landscape Side Yard Setback (m) (Abuts an E Zone)	> 3 m	3 m
Min.Landscape Rear Yard Setback (m) (Abuts an E Zone)	> 3 m	3 m
Min. Corner Side Yard Setback	> 3 m	3 m
Max. Floor Space Index	0.30	2
Max. Building Height	11.4 m	22 m
BUILDING FLOOR AREA		
Building D		
Warehouse Area	17,534.00m²	
Office Area	1,280.00m²	
TOTAL BUILDING GFA	**18,814.00m²**	
PARKING REQUIREMENT		
	PROPOSED	***REQUIRED***
Warehouse GFA @ 0.8 Spaces per 100m²; first 5000m² Warehouse GFA @ 0.4 Spaces per 100m²; above 5000m²	150	96
Total No. of Parking Spaces	150	96
Barrier Free Parking Spaces	8	6
Parking Stall Dimensions	2.6 m X 5.2 m	
Barrier Free Parking Stall Type A	3.4m X 5.2m	
Barrier Free Parking Stall Type B	2.4m X 5.2m	
Bicycle Parking Space Dimensions	1.8m X 0.6m	
No. Of Bicycle Parking (Warehouse: 1 per 2000m² , Office 1 per 250m²)	14	14
Loading Space Dimensions	3.5m X 9.0m	
Oversized Loading Space Dimensions	4.3m X 13.0m	
No. Of Loading Spaces	16	2
No. Of Oversized Loading Spaces	4	2
Trailer Parking	65	
DOCK STATISTICS	Proposed	
DOCK-HIGH DOORS	16	
OVER-HEAD DOORS	4	



1. PAVEMENT
2. ACCESSIBLE ROUTE OF PEDESTRIAN TRAVEL 2200mm MIN. (UNLESS OTHERWISE NOTED ON PLANS)
3. TOP FACE OF CURB.
4. DEPRESSED CURB
5. TRUNCATED DOMES WITH A HEIGHT OF 4.5–5.5mm, BASE DIAMETER OF 21–25mm REGULAR SPACING PATTERN AT 55–65mm ON CENTRE
6. A MINIMUM 600mm WIDE SECTION DETECTABLE WARNING SURFACE SHALL BE PROVIDED WHEN FLAT TRAVEL SURFACE ADJOINS A VEHICULAR WAY (0mm CURB FACE)

ACCESSIBLE CURB RAMP (1)

SCALE: N.T.S



KEY PLAN

SCALE: N.T.S

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NATIONAL CAPITAL BUSINESS PARK - SITE 2
BUILDING D
1100 LAST MILE DR.
OTTAWA, ONTARIO, CANADA

OVERALL SITE PLAN

	DATE	REMARKS
1	2022-12-22	ISSUED FOR SPA

PA / PM:	HW/JH
DRAWN BY:	HW
JOB NO.:	TOR21-0035-00

SHEET
A1.0

CITY APPLICATION NUMBER D07-12-22-0125 PLAN #18839

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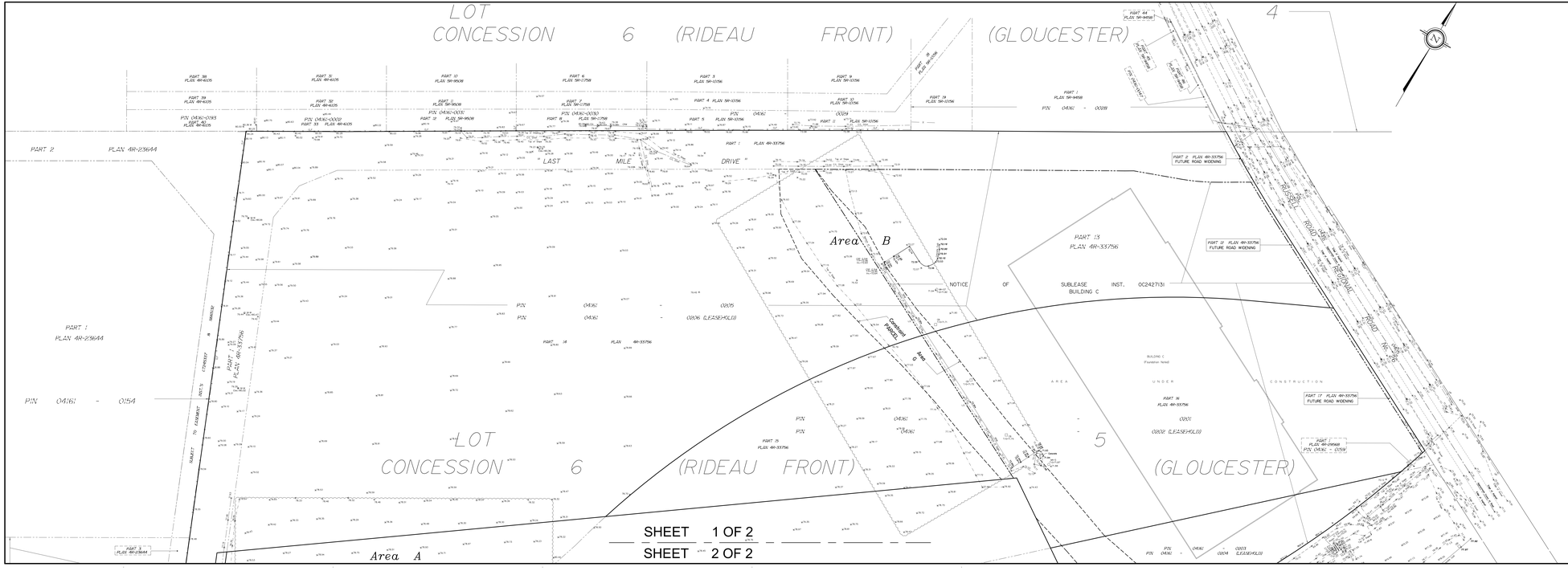
APPENDIX R

Legal Survey



SKETCH SHOWING
TOPOGRAPHICAL FEATURES ON

No. 4055 and 4120 Russell Road
CITY OF OTTAWA

Prepared by Annis , O'Sullivan , Vollebekk Ltd.
June 13, 2022

Scale 1 : 500

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

NOTES:

Boundary compiled from existing survey records.

Topographical features illustrated within areas A and B were located on June 8, 2022.
All other topographical features were located previously on March 11, 2022 and on October 20, 2020.

Notes & Legend

Description		
Maintenance Hole (Storm Sewer)	-	
Maintenance Hole (Sanitary)	-	
Maintenance Hole (Bell)	-	
Maintenance Hole (Hydro)	-	
Maintenance Hole (Unidentified)	-	
Overhead Wires	-	
Utility Pole	-	
Anchor	-	
Light Standard	-	
Catch Basin	-	
Catch Basin Inlet	-	
Corrugated Steel Pipe	-	
Corrugated Plastic Pipe	-	
Fire Hydrant	-	
Water Valve	-	
Invert	-	
Top of Grate	-	
Top of Pipe	-	
Bollard	-	
Sign	-	
Chain Link Fence	-	
Post and Wire Fence	-	
Wood Pole	-	
Diameter	-	
Top of Curb Elevations	-	
Top of Curb Elevations	-	
Top of Wall Elevations	-	
Top of Slope	-	
Bottom of Slope	-	
Centreline	-	
Property Line	-	
Limit of Sublease Inst. OC2427131	-	
Limit of Constant Area	-	
Handhole	-	
Bell Terminal Box	-	
Traffic Terminal Box	-	
Concrete Retaining Wall	-	
Stone Retaining Wall	-	
Traffic Signal Post	-	
Monitoring Well	-	

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum and are referred to Control Monument 00190GLD400 having an elevation of 73.746 metres.
2. Contours are interpolated from spot elevations and may not be accurate.
3. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.

UTILITY NOTES

1. The drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contract the respective utility authorities for locations.
2. Only visible surface utilities were located.
3. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, pulling, excavating etc.

SHEET 1 OF 2

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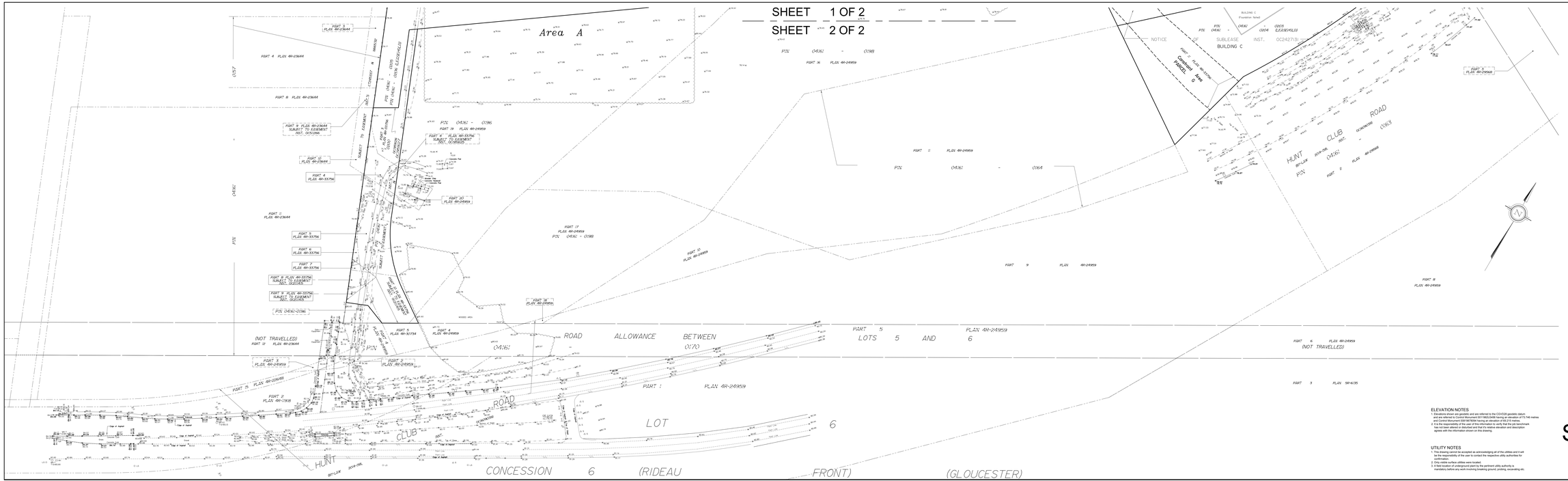
Job No. 17-2012 Date: 11.13.17 D.B. Dr. Ck. 17-2012 DB 24027 / CP 2 - 1 of 2

SHEET 1 OF 2
SHEET 2 OF 2



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No. 4055 and 4120 Russell Road
CITY OF OTTAWA

Prepared by Annis , O'Sullivan , Vollebekk Ltd.
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Notes & Legend

		Denotes
	-	Maintenance Hole (Storm Sewer)
	-	Maintenance Hole (Sanitary)
	-	Maintenance Hole (Bell)
	-	Maintenance Hole (Traffic)
	-	Maintenance Hole (Unidentified)
	-	Overhead Wires
	-	Utility Pole
	-	Anchor
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	-	Corrugated Steel Pipe
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	-	Fire Hydrant
	-	Water Valve
	-	Tree
	-	Top of Grate
	-	Top of Edge
	-	Bollard
	-	Sign
	-	Chain Link Fence
	-	Post and Wire Fence
	-	Wood Fire
	-	Diameter
	-	Top of Foundation of Elevations
	-	Top of Curb Elevations
	-	Top of Wall Elevations
	-	Top of Slope
	-	Bottom of Slope
	-	Centreline
	-	Property Line
	-	Limit of Sublease Inst. OC242713
	-	Limit of Constant Area
	-	Handhole
	-	Bell Terminal Box
	-	Traffic Terminal Box
	-	Concrete Retaining Wall
	-	Stone Retaining Wall
	-	Traffic Signal Post
	-	Monitoring Well

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum and are referred to Control Monument 3001M0JA06 having an elevation of 73.748 metres and Control Monument 3001M0TM06M having an elevation of 69.215 metres
2. Elevations shown are based on a benchmark which is assumed that the benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.

UTILITY NOTES

1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for more detailed information.
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SHEET 2 OF 2

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