Stormwater Management Report and Servicing Brief

Site 2 National Capital Business Park
Russel Rd/ Hunt Club Rd
Ottawa, ON

Prepared for:

Avenue 31 Capital Inc.
801-250 City Centre
Ottawa, ON
K1R6K7

Attention: Jennifer Murray

LRL File No.: 220345

September 02nd, 2022

TABLE OF CONTENTS

APPENDICES

Appendix A **Pre-consultation / Correspondence**

Appendix B **Water Supply Calculations**

Appendix C **Wastewater Collection Calculation**

Appendix D **Stormwater Management Calculation**
Watts Roof Drain Specification
Stormceptor OGS
KlassikDrain

Appendix E **Civil Engineering Drawings**

Appendix F **Proposed Site Plan**
Legal Survey

LIST OF TABLES

LIST OF FIGURES

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 two (2) industrial buildings with surface parking areas within Site 2 of the National Capital Business Park, located ta 4120 Russell Road, Ottawa.

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 will be constructed in a single phase, which includes 2 industrial buildings with associated surface parking. Industrial Building D1 is located on the southwest side of the property and has a proposed floor area of approximately 9,368m^2. Industrial Building D2 is located on the northeast side of the property and has a proposed floor area of approximately 9,368m^2. Refer to ***Site Plan*** included in ***Appendix F*** 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. However, there's a storm pond located to the southeast of the site.

3 SCOPE OF WORK

As per applicable guidelines, the scope of work includes the following:

Stormwater management

- Calculate the allowable stormwater release rate.
- Calculate the anticipated post-development stormwater release rates.
- Demonstrate how the target quantity objectives will be achieved.

Water services

- 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.

Sanitary services

- 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

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 WATER SUPPLY AND FIRE PROTECTION

5.1 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 and 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 B*** for the location of fire hydrants.

5.2 Water Supply Servicing Design

It is proposed that two industrial buildings will be constructed on the subject site. A single water service will be provided for each building via the 250mm watermain stubs extended from the existing watermain located within Last Mile Drive. Refer to *Site Servicing Plan* C.401 in ***Appendix E*** 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***

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 9,368m^2 with approximately 460.5m^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:

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

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 Residential Factor = **1.5**
- Peak Hour Demand Residential Factor = **1.8**

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 **0.81** L/s,
- Maximum daily demand is **1.21** L/s, and
- Maximum hourly is **1.45** L/s.

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

Table 2: ***Summary of Anticipated Demands***

Design Parameter	**Anticipated Demands (L/s)**
Average Daily Demand	0.81
Max Day + Fire Flow (per FUS)	1.21 + 166.7
Peak Hour	1.45
Water demand calculation per City of Ottawa Water Design guidelines. ***See Appendix B*** *for details.*	

The City of Ottawa was contacted to obtain boundary conditions associated with the estimated water demand, however, boundary conditions were not made available at the time of submission.

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 A*** for collaborating correspondence:

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

The estimated fire flow demand was estimated to be **10,000 L/min**, for Building D1 and **10,000 L/min** for Building D2. 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 B*** for fire flow calculations and fire hydrant locations. Table 3 below summarizes the aggregate fire flow of the contributing hydrants in close proximity to the proposed buildings based on Table 18.5.4.3 of *ISTB-2018-02*.

Table 3: ***Fire Protection Summary Table***

Industrial Building	**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)**
D1	10,000	2	2	3	(2 x 5678) + (2 x 3785) + (3 x 2839) = 27,443
D2	10,000	1	2	4	(1 x 5678) + (2 x 3785) + (4 x 2839) = 24,604

The total available fire flow from the contributing hydrants is equal to **27,443 L/min** and **24,604 L/min** for buildings D1 and D2 respectively, which 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.

6 SANITARY SERVICE

6.1 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.

6.2 Sanitary Sewer Servicing Design

The sanitary flows from industrial buildings D1 and D2 are proposed to connect to the existing manhole SAN MH201A which extends into the subject site from the existing 250mm dia sanitary sewer within Last Mile Drive. Refer to LRL drawing C.401, included in **Appendix F,** for the proposed sanitary servicing.

The total post-development wet flow for the site was calculated to be **6.04 L/s;** 3.02 L/s from building D1 and 3.02 L/s from building D2. 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. 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 C*** for further information on the calculated sanitary flows.

7 STORMWATER MANAGEMENT

7.1 Existing Stormwater Infrastructure

Stormwater runoff from the subject property is tributary to the McEwan Creek Watershed, approvals for the proposed development within this area are under the approval authority of the City of Ottawa.

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).

EWS-01 drains uncontrolled overland east towards neighboring parcel Site 1 NCBP and is ultimately conveyed via swales to McEwan Creek. EWS-02 drains uncontrolled overland south towards McEwan Creek SWM Pond Facility. Refer to plan C701 included in ***Appendix E*** for pre-development drainage characteristics. There is currently no storm sewers located within Last Mile Drive surrounding the site.

7.2 Design Criteria

The stormwater management criteria for this development are 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).

7.2.1 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***.

7.2.2 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.

7.3 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 D*** for storage calculations.

7.4 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.

7.4.1 Outlet 1 – McEwan Creek

The eastern part of the site has been analyzed and three (3) 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. Table 4 below shows the 2-yr & 100-yr pre-development flows for EWS01 which would set the allowable release rates for outlet 1.

Table 4: ***Outlet 1 Pre-development flows***

Drainage Area Name	2-yr Flow (L/s)	100-yr Flow (L/s)
EWS-01	89.47	208.01

As shown in Table 4, the allowable release rates for Outlet 1 were identified as **89.47 L/s** and **208.01 L/s** for the 2-yr and 100-yr flows respectively.

The post-development watersheds were allocated as follow;

Watershed WS-100 (0.455ha) 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 where it will be collected via an existing ditch located within Site 1. The ditch would convey flows to Hunt Club road-side ditch and ultimately to the McEwan Creek.

Watershed WS-101 (0.937ha) consists of the proposed building D2's envelope. Runoff will be captured via twenty-eight (28) roof drains with controls. Captured flow will then be directed east towards Outlet 1 via a 250mm storm pipe.

Watershed WS-102 (1.001ha) consists mainly of the east parking lot and drive aisles. Runoff in this watershed is proposed to surface drain towards a stormwater retention area with a proposed ICD. Captured flows are then directed to Outlet1.

In order to achieve the allowable post-development stormwater release rate, the proposed watersheds will utilize rooftop storage as well as surface storage.

Table 5 below summarizes post-development drainage areas. Calculations can be seen in ***Appendix D.***

Table 5: *Drainage Areas*

Drainage Area Name	Area (ha)	Weighted Runoff Coefficient	100 Year Weighted Runoff Coefficient (25% increase)
WS-100 (UNCONTROLLED)	0.455	0.22	0.28
WS-101 (CONTROLLED)	0.973	0.90	1.0
WS-102 (CONTROLLED)	1.001	0.74	0.92

The proposed building's rooftop was analysed and divided into twelve (12) ponding areas. A total of **twenty-eight (28)** roof drains, each of which is restricting the discharge rate to a maximum of **1.26 L/s**, resulting in a total release rate from the roof of **35.28 L/s** is proposed. Each of the roof drain flow control devices has been selected to provide a flow rate of **1.26 L/s** at a maximum flow depth of **0.15 m**. Proposed roof drains are to be **WATTS RD-100-A** roof drains with **½ Exposed Wier Opening**. See ***Appendix D*** for more information about the selected roof drain and flow restrictor.

The total available roof storage (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 **468.40 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 D***.

Table 6 below summarizes the release rates and storage volumes required to meet the allowable release rates identified in Table 4.

Table 6: ***Stormwater Release Rate & Storage Volume Summary (100 Year)***

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-100	0.455	21.85	0	63.50	0	0
WS-101 (Roof Controls)	0.937	26.60	121.63	35.28	397.03	468.40
WS-102	1.001	41.02	79.26	57.82	325.15	327.90
TOTAL	**2.392**	**89.47**	**200.89**	**156.60**	**722.19**	**796.30**

To attenuate flows to the allowable release rates, it is calculated that a total of **200.89 m³** and **722.19 m³** of storage will be required in the 2-yr and 100-yr storm respectively. 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;

- ***397.03*** **m³** is required rooftop storage in WS-101 corresponding to a maximum restricted flow of ***35.28 L/s*** via roof drain controls;
- ***325.15*** **m³** is required surface storage in WS-102 corresponding to maximum restricted flow of ***57.82 L/s*** via proposed orifice plate **169mm** diameter ICD located in DICB01;

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

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 D for sizing report and specs.

7.4.2 Outlet 2 – McEwan SWM Pond Facility

The western part of the site has been analyzed and five (5) 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. Table 7 below shows the 2-yr & 100-yr pre-development flows for EWS01 which would set the allowable release rates for Outlet 2.

Table 7: ***Outlet 2 Pre-development flows***

Drainage Area Name	2-yr Flow (L/s)	100-yr Flow (L/s)
EWS-02	187.88	436.79

As shown in Table 7, the allowable release rates for Outlet 2 were identified as **187.88 L/s** and **436.79 L/s** for the 2-yr and 100-yr flows respectively.

The post-development watersheds were allocated as follows;

Watershed WS-200 (0.035ha) consisting of grass will flow uncontrolled. Runoff will surface drain to Last Mile Drive.

Watershed WS-201 (0.973ha) consists of the proposed building D1's envelope. Runoff will be captured via roof drains with **no** roof controls. Captured runoff is proposed to flow uncontrolled via a 600mm storm pipe to a dedicated stormwater retention area downstream where flows will be stored and restricted.

Watershed 202 A (1.639ha) consists mainly of paved docks and parking areas between both buildings. Runoff in this watershed will be captured via several trench drains and directed to the stormwater retention area via a 675mm storm pipe.

Watershed 202 B (0.367ha) consists mainly of paved parking lot and landscaped areas west of Building D1. Runoff in this watershed will be captured via three catchbasins and directed to the stormwater retention area via a 600mm storm pipe.

Watershed 202 C (1.125ha) consists mainly of paved parking area and landscaped areas south of Building D1. Runoff in this watershed will surface drain to the stormwater retention area.

In order to achieve the allowable post-development stormwater release rate, the proposed watersheds will utilize surface storage in the stormwater retention area.

Table 8 below summarizes post-development drainage areas. Calculations can be seen in ***Appendix D.***

Table 8: ***Drainage Areas***

Drainage Area Name	Area (ha)	Weighted Runoff Coefficient	100 Year Weighted Runoff Coefficient (25% increase)
WS-200 (UNCONTROLLED)	0.035	0.20	0.25

WS-201 (CONTROLLED)	0.937	0.90	1.0
WS-202 A (CONTROLLED)	1.639	0.84	1.0
WS-202 B (CONTROLLED)	0.367	0.67	0.83
WS-202 C (CONTROLLED)	1.125	0.53	0.66

No roof controls are proposed for building D1 in watershed WS-201.

Table 9 below summarizes the release rates and storage volumes required to meet the allowable release rates identified in Table 7.

Table 9: ***Stormwater Release Rate & Storage Volume Summary (100 Year)***

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)	0.035	1.87	0.0	4.34	0.0	0.0
WS-201 + **WS-202A & B & C** (CONTROLLED)	4.067	185.24	442.58	259.14	1299.85	1321.00
TOTAL	**4.102**	**187.11**	**442.58**	**263.48**	**1299.85**	**1321.00**

To attenuate flows to the allowable release rates, it is calculated that a total of **442.58 m^3** and **1299.85 m^3** of storage will be required in the 2-yr and 100-yr storm respectively. The required storage is proposed to be met via surface ponding in stormwater retention area. Captured flows will be restricted via a proposed orifice plate **323mm** diameter ICD located in DICB02 in the stormwater retention area.

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

It is anticipated that the McEwan SWM Pond Facility will provide the required treatment for flows directed to Outlet 2. Therefore, further SWM quality controls are not proposed at Outlet 2.

8 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. 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.

9 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 **10,000 L/min** using the FUS method for building D1 and similarly for building D2.
- There are seven (7) existing fire hydrants available to service buildings D1 and D2. They will provide a combined fire flow of **27,443 L/min** and **24,604 L/min** for buildings D1 and D2 respectively.
- Each industrial building in the subject site will be serviced via a 150 mm dia. water service connection to be connected to the existing 250 mm dia. watermain within Last Mile Drive.

Sanitary Service

- The total calculated wet wastewater flow from the proposed development is **6.04 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 **6.04 L/s** to the existing downstream 250 mm dia. sanitary sewer within Last Mile Drive.

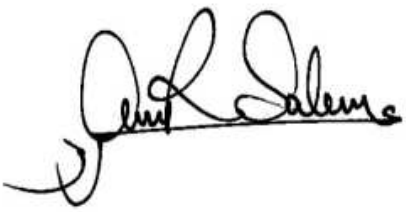
Stormwater Management

- 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 **89.47 L/s** and **156.60 L/s** in the 2-yr and 100-yr storm events respectively.
    - On-site storage is provided via rooftop ponding in Bldg 2 and surface ponding in the dedicated stormwater retention area.
    - 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 **187.11 L/s** and **263.48 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.
    - Required Quality controls are assumed to be provided through the McEwan Pond.

10 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.



Amr Salem, PMP
Civil Designer

Virginia Johnson, P. Eng.
Civil Engineer

APPENDIX A

Pre-consultation / Correspondence

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,
4th Floor / 4ième étage
Ottawa, ON K1P 1J1
Tel. : 613-580-2424 ext. 24025
Cell. : 613-282-0508
E-mail / Courriel : Melanie.Gervais@ottawa.ca
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
T 613-692-3571 | 1-800-267-3504 **F** 613-692-0831 | www.rvca.ca

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

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

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

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
Click here to join the meeting

Meeting ID: 232 932 239 483
Passcode: nZPH4T
Download Teams | Join on the web

APPENDIX B

Water Supply Calculations

Water Supply Calculations

LRL File No.	220345
Date	August 25, 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	17815.0	1.78
Office Space	921.0	0.09
Total	**18736**	**1.87**

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	**69,780**	**L/d**	**0.81**	**L/s**
Maximum Day Factor	1.5			
Maximum Daily Demand	**104,670**	**L/d**	**1.21**	**L/s**
Peak Hour Factor	1.8			
Maximum Hour Demand	**125,604**	**L/d**	**1.45**	**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) =	$(4Q/\pi V)^{1/2}$	
=	0.032	m
=	32	mm
Proposed pipe diameter (d) =	**150**	mm
=	**6**	Inches

Fire Flow Calculations - Industrial Building D1

LRL File No. 220388
Date August 18, 2022
Method Fire Underwriters Survey (FUS)
Prepared by Tamara Harb/Amr Salem

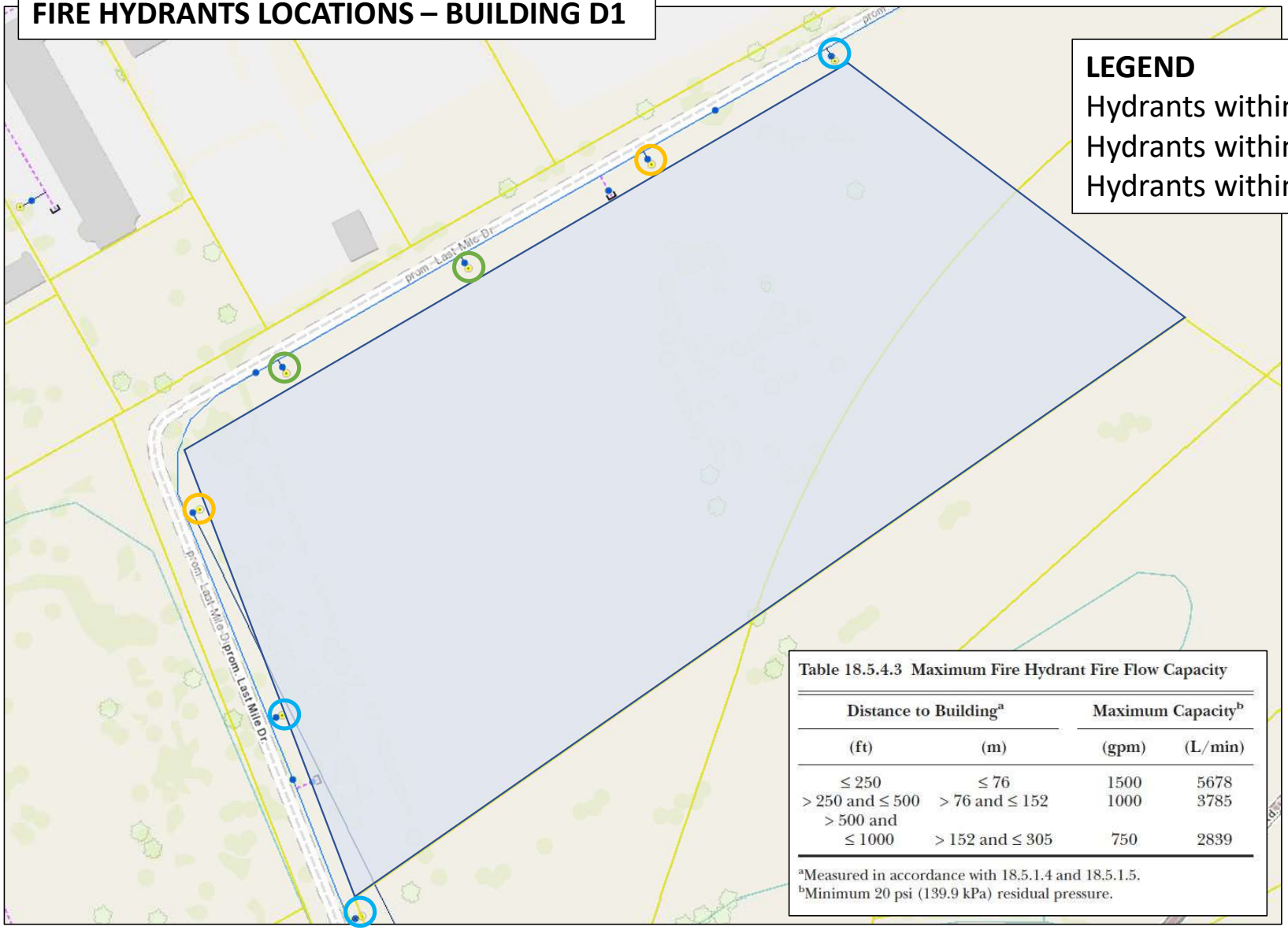
Step	Task	Term	Options	Multiplier	Choose:	Value	Unit	Fire Flow
Structural Framing Material								
1	Choose frame used for building	Coefficient C related to the type of construction	Wood Frame	1.5	Non-combustible construction	**0.8**		
			Ordinary Construction	1.0				
			Non-combustible construction	0.8				
			Fire resistive construction <2 hrs	0.7				
			Fire resistive construction >2 hrs	0.6				
Floor Space Area (A)								
2	Total area					**9,368**	m^2	
3	Obtain fire flow before reductions	Required fire flow	Fire Flow = 220 x C x $A^{0.5}$				L/min	**17,035**
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	**17,035**
			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	**10,221**
			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	**10,221**
			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	**10,000**
					Minimum required fire flow rate		L/s	**166.7**
					Required duration of fire flow		hr	**2**

Fire Flow Calculations - Industrial Building D2

LRL File No. 220345
Date August 18,2022
Method Fire Underwriters Survey (FUS)
Prepared by Tamara Harb/Amr Salem

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					**9,368**	m^2	
3	Obtain fire flow before reductions	Required fire flow	Fire Flow = 220 x C x $A^{0.5}$				L/min	**17,035**
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	**17,035**
			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	**10,221**
			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	**10,221**
			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	**10,000**
		Minimum required fire flow rate					L/s	**166.7**
		Required duration of fire flow					hr	**2**

FIRE HYDRANTS LOCATIONS – BUILDING D1



LEGEND

Hydrants within 75m

Hydrants within 150m

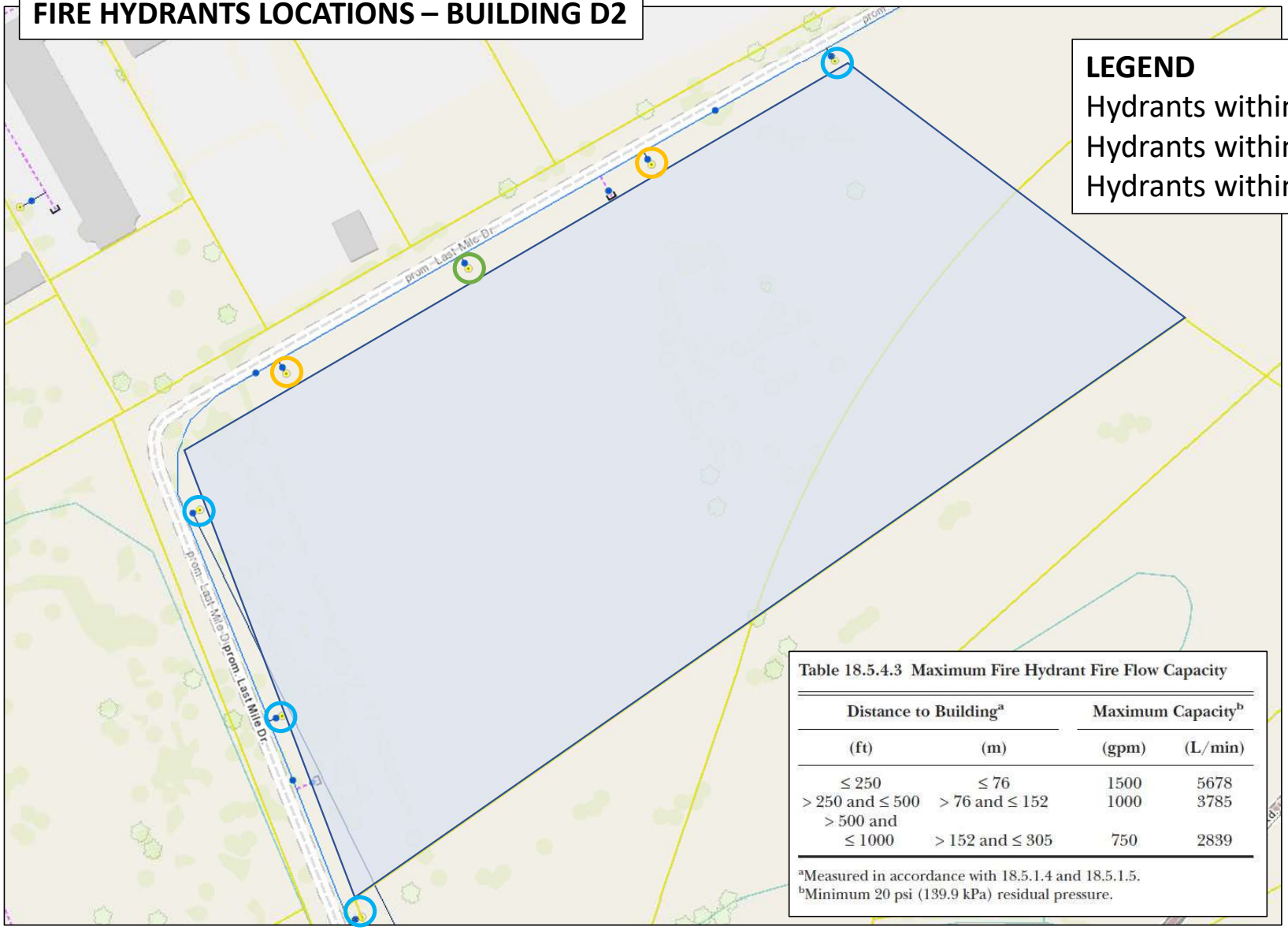
Hydrants within 300m

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.

FIRE HYDRANTS LOCATIONS – BUILDING D2



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.

APPENDIX C

Wastewater Collection Calculations

LRL File No. 220345
Project: Site 2 National Capital Business Park
Location: Russel Rd/ Hunt Club Rd, Ottawa ON
Date: August 17th, 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					
FROM	TO	POP.	AREA (Ha)	CUMMULATIVE AREA (Ha)	CUMMULATIVE 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 D1	SAN MH01							0.05	0.05	0.94	7.0	0.94			2.70	0.983	0.983	0.32	**3.02**	12.4	200	2.00%	PVC	**46.38**	**1.48**
SAN MH01	SAN MH02							0.00	0.05	0.00	7.0	0.94			2.70	0.983	0.983	0.32	**3.02**	74.6	200	0.65%	PVC	**26.44**	**0.84**
SAN MH02	EX SAN MH 201A							0.00	0.05	0.00	7.0	0.94			2.70	0.983	0.983	0.32	**3.02**	74.8	200	0.65%	PVC	**26.44**	**0.84**
Building D2	EX SAN MH 201A							0.05	0.05	0.94	7.0	0.94			2.70	0.983	0.983	0.32	**3.02**	15.4	200	3.00%	PVC	**56.81**	**1.81**
EX SAN MH201A (Site)	*EX SAN MH 1A*							*0.00*	*0.09*	*0.00*	*7.0*	*1.87*			*5.39*	*1.966*	*1.966*	*0.65*	***6.04***	*11.0*	*250*	*0.25%*	*PVC*	***29.73***	***0.61***

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: A.S.	LOCATION: Russel Rd/ Hunt Club Rd		
Dwg. Reference: C.401	File Ref.: 220345	Date: 2022-08-17	Sheet No. 1 of 1

APPENDIX D

Stormwater Management Calculations
Watts Roof Drain Specification
Stormceptor OGS
KlassikDrain

LRL File No.	220345
Project:	Site 2
Location:	NCBP Site 2
Date:	May 31, 2022
Designed:	Amr Salem
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	20952.0	0.0	0.0	20952.0	2.095	0.20
EWS-02	43996.0	0.0	0.0	43996.0	4.400	0.20
TOTAL	**64948.0**	**0.0**	**0.0**	**64948.0**	**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 (UNCONTROLLED)	4388.0		162.0	4550.0	0.455	0.22	OUTLET 1 McEwan Creek
WS-101 (BLDG D2- CONTROLLED)			9368.0	9368.0	0.937	0.90	
WS-102 (CONTROLLED)	2290.0		7716.00	10006.0	1.001	0.74	
WS-200 (UNCONTROLLED)	350.0			350.0	0.035	0.20	OUTLET 2 McEwan SWM Pond
WS-201 (BLDG D1- CONTROLLED)			9368.0	9368.0	0.937	0.90	
WS-202 A (CONTROLLED)	1360.0		15030.0	16390.0	1.639	0.84	
WS-202 B (CONTROLLED)	1230.0		2440.0	3670.0	0.367	0.67	
WS-202 C (CONTROLLED)	5990.0		5256.0	11246.0	1.125	0.53	
TOTAL	**15608.0**	**0.0**	**49340.0**	**64948.0**	**6.495**	**0.73**	

LRL File No. 220345
Project: Site 2
Location: NCBP Site 2
Date: August 19, 2022
Designed: Amr Salem
Drawing Ref.: C600

Stormwater Management Design Sheet

OUTLET 1 - McEwan Creek

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 =	178.6	mm/hr
Tc =	10	min
Total Area =	2.095	ha

134.2557632

Allowable Release Rate= 208.01 L/s

Post-development Stormwater Management

					$\sum R_{2\text{-}5}$	$\sum R_{100}$
	Total Site Area =	**0.1964**	**ha**	**ΣR=**	**0.58**	**1.00**
Controlled	WS-101 (BLDG D2- CONTROLLED)	0.937	ha	R=	0.90	1.00
	WS-102 (CONTROLLED)	1.001	ha	R=	0.74	0.92
	Total Controlled =	**1.937**	**ha**	**ΣR=**	**0.82**	**1.00**
Un-controlled	WS-100	0.455	ha	R=	0.22	0.28
	Total Un-Controlled =	**0.455**	**ha**	**ΣR=**	**0.22**	**0.28**

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

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	63.50	0.00	63.50

Post-development Stormwater Management (WS-101 BLDG D2)

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{****}$ 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	465.02	257.85	35.28	0.00	35.28
15	142.9	372.14	303.17	35.28	0.00	35.28
20	120.0	312.39	332.53	35.28	0.00	35.28
25	103.8	270.45	352.75	35.28	0.00	35.28
30	91.9	239.25	367.15	35.28	0.00	35.28
35	82.6	215.06	377.54	35.28	0.00	35.28
40	75.1	195.70	385.01	35.28	0.00	35.28
45	69.1	179.83	390.28	35.28	0.00	35.28
50	64.0	166.56	393.83	35.28	0.00	35.28
60	55.9	145.57	397.03	35.28	0.00	35.28
70	49.8	129.67	396.43	35.28	0.00	35.28
80	45.0	117.17	393.07	35.28	0.00	35.28
90	41.1	107.07	387.64	35.28	0.00	35.28
100	37.9	98.71	380.59	35.28	0.00	35.28
110	35.2	91.68	372.23	35.28	0.00	35.28
120	32.9	85.67	362.80	35.28	0.00	35.28

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

Summary of Roof Storage

Maximum Required Roof Storage (100 Year) =	397.03	m^3	
Watts Roof Drain Discharge =	0.0084	L/s/mm	
Proposed Head =	150	mm	*An Emergency overflow scupper is provided above this height.
Control Flow/Drain =	1.26	L/s	
Number of Roof Drains =	28		
Total Flow from Roof Drain =	35.28	L/s	
Total Roof Surface =	9368	m^2	
Effective Roof Surface =	9368	m^2	100 (% of total roof surface)
Available Roof Storage =	**468.40**	m^3	
Roof Drain Model =	Watts Roof Drain with Adjustable Flow Setting (**Watts RD-100 Weir Opening = 1/2 exposed**)		

Total Storage Required = **397.03** m^3 refer to LRL Plan C.601
Available Storage = **468.40** m^3

Post-development Stormwater Management (WS-102)

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ 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	459.31	240.90	57.82	0.00	57.82
15	142.9	367.57	278.78	57.82	0.00	57.82
20	120.0	308.55	300.88	57.82	0.00	57.82
25	103.8	267.13	313.97	57.82	0.00	57.82
30	91.9	236.32	321.30	57.82	0.00	57.82
35	82.6	212.42	324.66	57.82	0.00	57.82
40	75.1	193.30	325.15	57.82	0.00	57.82
45	69.1	177.62	323.47	57.82	0.00	57.82
50	64.0	164.51	320.08	57.82	0.00	57.82
60	55.9	143.78	309.46	57.82	0.00	57.82
70	49.8	128.08	295.08	57.82	0.00	57.82
90	41.1	105.75	258.84	57.82	0.00	57.82
110	35.2	90.55	216.05	57.82	0.00	57.82
130	30.9	79.48	168.97	57.82	0.00	57.82
150	27.6	71.02	118.85	57.82	0.00	57.82
170	25.0	64.34	66.48	57.82	0.00	57.82

Total Storage Required = **325.15** m^3 refer to LRL Plan C.601
Available Storage = **327.90** m^3
100-Yr HWL= **77.21** m

Summary of release Rates and Storage Volumes

Catchment Area	Drainage Area (ha)	100-year Release Rate (L/s)	100-Year Required Storage (m3)	Total Available Storage (m3)
WS-100 (Uncontrolled)	0.455	63.50	0	0
WS-101 (BLDG D2- CONTROLLED)	0.937	35.28	397.03	468.40
WS-102 (CONTROLLED)	1.001	57.82	325.15	327.90
TOTAL	**2.392**	**156.60**	**722.19**	**796.30**

LRL File No. 220345
Project: Site 2
Location: NCBP Site 2
Date: August 19, 2022
Designed: Amr Salem
Drawing Ref.: C600

Stormwater Management Design Sheet

OUTLET 1 - McEwan Creek

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 =	76.8	mm/hr
Tc =	10	min
Total Area =	2.095	ha

Allowable Release Rate= 89.47 L/s

Post-development Stormwater Management

					$\sum R_{2ES}$
	Total Site Area =	**0.1964**	ha	**∑R=**	**8.58**
Controlled	WS-101 (BLDG D2- CONTROLLED)	0.937	ha	R=	0.90
	WS-102 (CONTROLLED)	1.001	ha	R=	0.74
	Total Controlled =	**1.937**	**ha**	**∑R=**	**0.82**
Un-controlled	WS-100	0.455	ha	R=	0.22
	Total Un-Controlled =	**0.455**	**ha**	**∑R=**	**0.22**

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)
10	76.8	21.85	0.00	21.85

Post-development Stormwater Management (WS-101 BLDG D2)

2 Year Storm Event:

$I_2 = 732.95 / (Td + 6.199)^{0.81}$ 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	180.02	92.05	26.60	0.00	26.60
15	61.8	144.78	106.36	26.60	0.00	26.60
20	52.0	121.95	114.43	26.60	0.00	26.60
25	45.2	105.87	118.90	26.60	0.00	26.60
30	40.0	93.86	121.06	26.60	0.00	26.60
35	36.1	84.52	121.63	26.60	0.00	26.60
40	32.9	77.03	121.03	26.60	0.00	26.60
45	30.2	70.88	119.55	26.60	0.00	26.60
50	28.0	65.72	117.37	26.60	0.00	26.60
60	24.6	57.56	111.46	26.60	0.00	26.60
70	21.9	51.36	103.99	26.60	0.00	26.60
80	19.8	46.48	95.42	26.60	0.00	26.60
90	18.1	42.52	85.99	26.60	0.00	26.60
100	16.7	39.25	75.91	26.60	0.00	26.60
110	15.6	36.49	65.29	26.60	0.00	26.60
120	14.6	34.13	54.23	26.60	0.00	26.60

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

Summary of Roof Storage

Roof Storage Volume (5 Year) =		m^3	
Maximum Required Roof Storage (100 Year) =	121.63	m^3	
Watts Roof Drain Discharge =	0.0095	L/s/mm	
Proposed Head =	100	mm	*An Emergency overflow scupper is provided above this height.
Control Flow/Drain =	0.95	L/s	
Number of Roof Drains =	28		
Total Flow from Roof Drain =	26.60	L/s	
Total Roof Surface =	9368	m^2	
Effective Roof Surface =	4164	m^2	44 (% of total roof surface)
Available Roof Storage =	**138.80**	m^3	
Roof Drain Model =	Watts Roof Drain with Adjustable Flow Setting (**Watts RD-100 Weir Opening = 1/2 exposed**)		

Total Storage Required = **121.63** m^3 refer to LRL Plan C.601
Available Storage = **138.80** m^3

Post-development Stormwater Management (WS-102)

2 Year Storm Event:

$I_2 = 732.95 / (Td + 6.199)^{0.81}$ 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	158.05	70.22	41.02	0.00	41.02
15	61.8	127.11	77.48	41.02	0.00	41.02
20	52.0	107.07	79.26	41.02	0.00	41.02
25	45.2	92.95	77.89	41.02	0.00	41.02
30	40.0	82.40	74.49	41.02	0.00	41.02
35	36.1	74.21	69.69	41.02	0.00	41.02
40	32.9	67.63	63.86	41.02	0.00	41.02
45	30.2	62.23	57.26	41.02	0.00	41.02
50	28.0	57.70	50.05	41.02	0.00	41.02
60	24.6	50.54	34.25	41.02	0.00	41.02
70	21.9	45.09	17.10	41.02	0.00	41.02
90	18.1	37.34	0.00	41.02	0.00	41.02
110	15.6	32.04	0.00	41.02	0.00	41.02
130	13.7	28.17	0.00	38.00	0.00	38.00
150	12.3	25.21	0.00	38.00	0.00	38.00
170	11.1	22.87	0.00	38.00	0.00	38.00

Total Storage Required = **79.26** m^3 refer to LRL Plan C.601
Available Storage = **81.60** m^3
100-Yr HWL= **76.76** m

Summary of release Rates and Storage Volumes

Catchment Area	Drainage Area (ha)	2-year Release Rate (L/s)	2-Year Required Storage (m3)	2 Available Storage (m3)
WS-100 (Uncontrolled)	0.455	21.85	0	0
WS-101 (BLDG D2- CONTROLLED)	0.937	26.60	121.63	138.80
WS-102 (CONTROLLED)	1.001	41.02	79.26	81.60
TOTAL	**2.392**	**89.47**	**200.89**	**220.40**

2-YEAR

TABLE 7 - ORIFICE CALCULATIONS (Revised February 03, 2021)

Product Orifice Plate

Invert Level =	76.30	masl.	
HWL =	0.46	m	from inv.
HWL =	76.76	masl.	
Orifice Dia. =	**169**	mm	
Orifice Invert =	76.30	masl.	
Orifice Area =	0.0224	m^2	
C =	0.61		
Controlled Release =	41.03	L/s	

100-YEAR

TABLE 7 - ORIFICE CALCULATIONS (Revised February 03, 2021)

Product Orifice Plate

Invert Level =	76.30	masl.	
HWL =	0.91	m	from inv.
HWL =	77.21	masl.	
Orifice Dia. =	**169**	mm	
Orifice Invert =	76.30	masl.	
Orifice Area =	0.0224	m^2	
C =	0.61		
Controlled Release =	57.82	L/s	

LRL File No.	220345
Project:	Site 2
Location:	NCBP Site 2
Date:	August 19, 2022
Designed:	Amr salem
Drawing Ref.:	C600

Stormwater Management Design Sheet

OUTLET 2 - MCEWAN SWM POND FACILITY

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 =	178.6	mm/hr
Tc =	10	min
Total Area =	4.400	ha

Allowable Release Rate= **436.79** L/s

Post-development Stormwater Management

					$\sum R_{2&5}$	$\sum R_{100}$
	Total Site Area =	**0.1964**	ha	**∑R=**	**15.62**	**1.00**
Controlled	WS-201 (BLDG D1- CONTROLLED)	0.937	ha	R=	0.90	1.00
	WS-202 A (CONTROLLED)	1.639	ha	R=	0.84	1.00
	WS-202 B (CONTROLLED)	0.367	ha	R=	0.67	0.83
	WS-202 C (CONTROLLED)	1.125	ha	R=	0.53	0.66
	Total Controlled =	**4.067**	**ha**	**∑R=**	**0.75**	**0.94**
Un-controlled	WS-200 (UNCONTROLLED)	0.035	ha	R=	0.20	0.25
	Total Un-Controlled =	**0.035**	**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	4.34	0.00	4.34

Post-development Stormwater Management (WS-201 & WS202 A+B+C)

100 Year Storm Event:

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	1898.74	983.76	259.14	0.00	259.14
15	142.9	1519.49	1134.32	259.14	0.00	259.14
20	120.0	1275.52	1219.65	259.14	0.00	259.14
25	103.8	1104.28	1267.71	259.14	0.00	259.14
30	91.9	976.90	1291.97	259.14	0.00	259.14
35	82.6	878.12	1299.85	259.14	0.00	259.14
40	75.1	799.07	1295.84	259.14	0.00	259.14
45	69.1	734.26	1282.83	259.14	0.00	259.14
50	64.0	680.07	1262.79	259.14	0.00	259.14
60	55.9	594.37	1206.82	259.14	0.00	259.14
70	49.8	529.45	1135.30	259.14	0.00	259.14
90	41.1	437.16	961.32	259.14	0.00	259.14
110	35.2	374.33	760.27	259.14	0.00	259.14
130	30.9	328.56	541.49	259.14	0.00	259.14
150	27.6	293.60	310.18	259.14	0.00	259.14
170	25.0	265.95	69.51	259.14	0.00	259.14

Total Storage Required = **1299.85** m^3 refer to LRL Plan C.601

Available Storage = **1321.00** m^3

100-Yr HWL= **77.87** m

Summary of release Rates and Storage Volumes

Catchment Area	Drainage Area (ha)	100-year Release Rate (L/s)	100-Year Required Storage (m3)	Total Available Storage (m3)
WS-200 (Uncontrolled)	0.035	4.34	0	0
WS-201 & WS-202 A+B+C	0.367	259.14	1299.85	1321.00
TOTAL	**0.402**	**263.48**	**1299.85**	**1321.00**

LRL File No.	220345
Project:	Site 2
Location:	NCBP Site 2
Date:	August 19, 2022
Designed:	Amr salem
Drawing Ref.:	C600

Stormwater Management Design Sheet

OUTLET 2 - MCEWAN SWM POND FACILITY

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 =	76.8	mm/hr
Tc =	10	min
Total Area =	4.400	ha

Allowable Release Rate= 187.88 L/s

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**0.1964**	ha	**∑R=**	**15.62**	**1.00**
Controlled	WS-201 (BLDG D1- CONTROLLED)	0.937	ha	R=	0.90	1.00
	WS-202 A (CONTROLLED)	1.639	ha	R=	0.84	1.00
	WS-202 B (CONTROLLED)	0.367	ha	R=	0.67	0.83
	WS-202 C (CONTROLLED)	1.125	ha	R=	0.53	0.66
	Total Controlled =	**4.067**	**ha**	**∑R=**	**0.75**	**0.94**
Un-controlled	WS-200 (UNCONTROLLED)	0.035	ha	R=	0.20	0.25
	Total Un-Controlled =	**0.035**	**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 = 0.81** **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	1.87	0.00	1.87

Post-development Stormwater Management (WS-201 & WS202 A+B+C)

2 Year Storm Event:

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	816.72	378.89	185.24	0.00	185.24
15	61.8	656.82	424.42	185.24	0.00	185.24
20	52.0	553.29	441.65	185.24	0.00	185.24
25	45.2	480.29	442.58	185.24	0.00	185.24
30	40.0	425.81	433.03	185.24	0.00	185.24
35	36.1	383.44	416.23	185.24	0.00	185.24
40	32.9	349.47	394.15	185.24	0.00	185.24
45	30.2	321.56	368.06	185.24	0.00	185.24
50	28.0	298.18	338.82	185.24	0.00	185.24
60	24.6	261.14	273.23	185.24	0.00	185.24
70	21.9	233.01	200.65	185.24	0.00	185.24
90	18.1	192.93	41.51	185.24	0.00	185.24
110	15.6	165.56	0.00	185.24	0.00	185.24
130	13.7	145.57	0.00	185.24	0.00	185.24
150	12.3	130.28	0.00	185.24	0.00	185.24
170	11.1	118.17	0.00	185.24	0.00	185.24

Total Storage Required = 442.58 m^3 refer to LRL Plan C.601
Available Storage = 470.00 m^3
2-Yr HWL= 77.20 m

Summary of release Rates and Storage Volumes

Catchment Area	Drainage Area (ha)	2-year Release Rate (L/s)	2-Year Required Storage (m3)	Total Available Storage (m3)
WS-200 (Uncontrolled)	0.035	1.87	0	0
WS-201 & WS-202 A+B+C	0.367	185.24	442.58	470.00
TOTAL	**0.402**	**187.11**	**442.58**	**470.00**

2-YEAR

TABLE 7 - ORIFICE CALCULATIONS (Revised February 03, 2021)

	Product Orifice Plate		
Invert Level =	76.50	masl.	
HWL =	0.70	m	from inv.
HWL =	77.20	masl.	
Orifice Dia. =	**323**	mm	
Orifice Invert =	76.50	masl.	
Orifice Area =	0.0819	m^2	
C =	0.61		
Controlled Release =	185.24	L/s	

100-YEAR

TABLE 7 - ORIFICE CALCULATIONS (Revised February 03, 2021)

	Product Orifice Plate		
Invert Level =	76.50	masl.	
HWL =	1.37	m	from inv.
HWL =	77.87	masl.	
Orifice Dia. =	**323**	mm	
Orifice Invert =	76.50	masl.	
Orifice Area =	0.0819	m^2	
C =	0.61		
Controlled Release =	259.14	L/s	

LRL File No. 220345
Project: Site 2
Location: NCBP Site 2
Date: April 18, 2022
Designed: Amr Salem
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							
WATERSHED / STREET	From MH	To MH	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																			
WS-101 (BLDG D2-CONTROLLED)	BLDG D2	OUTLET	0.000	0.000	0.937	2.344	2.34	10.00	104.2	244.22		450	PVC	1.00%	58.6	285.1	1.79	0.54	0.86
WS-102 (CONTROLLED)	DICB01	OGS	0.229	0.000	0.772	2.058	2.06	10.00	104.2	214.42		450	PVC	0.75%	8.2	246.9	1.55	0.09	0.87
	OGS	OUTLET				2.058	2.06	10.09	103.7	213.46		450	PVC	0.75%	9.6	246.9	1.55	0.10	0.86
OUTLET 2 - McEwan SWM Facility																			
WS-201 (BLDG D1-CONTROLLED)	BLDG D1	STMMH200	0.000	0.000	0.937	2.344	2.34	10.00	104.2	244.22		450	PVC	1.00%	7.4	285.1	1.79	0.07	0.86
WS-202 B (CONTROLLED)	STMMH200	SWM2	0.123	0.000	0.244	0.679	3.02	10.07	103.8	313.85		600	CONC	0.40%	8.4	388.3	1.37	0.10	0.81
WS-202 A (CONTROLLED)	STM MH 202	STM MH 203	0.136	0.000	1.503	3.836	3.84	10.00	104.2	399.70		675	CONC	0.35%	106.7	497.3	1.39	1.28	0.80
	STM MH 203	SWM2				3.836	3.84	11.28	97.9	375.51		675	CONC	0.35%	23.0	497.3	1.39	0.28	0.76
WS-202 C (CONTROLLED)	DICB02	OUTLET	0.599	0.000	0.526	1.648	6.16	10.17	103.3	636.65		750	CONC	0.55%	11.4	825.6	1.87	0.10	0.77

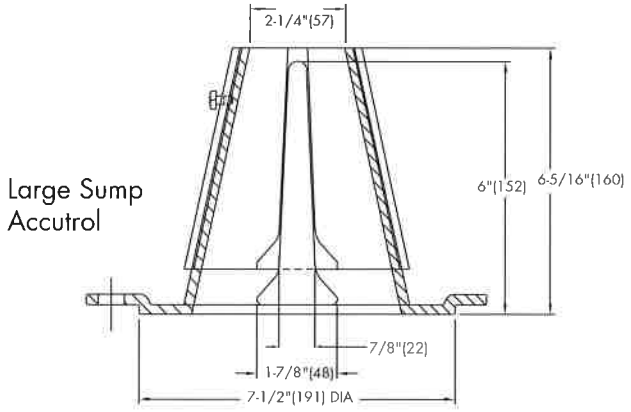
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

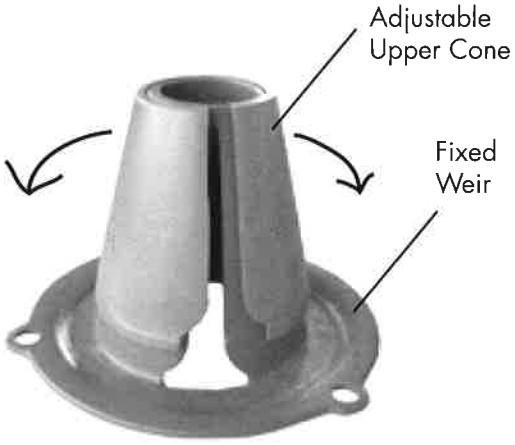
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the 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.** _____

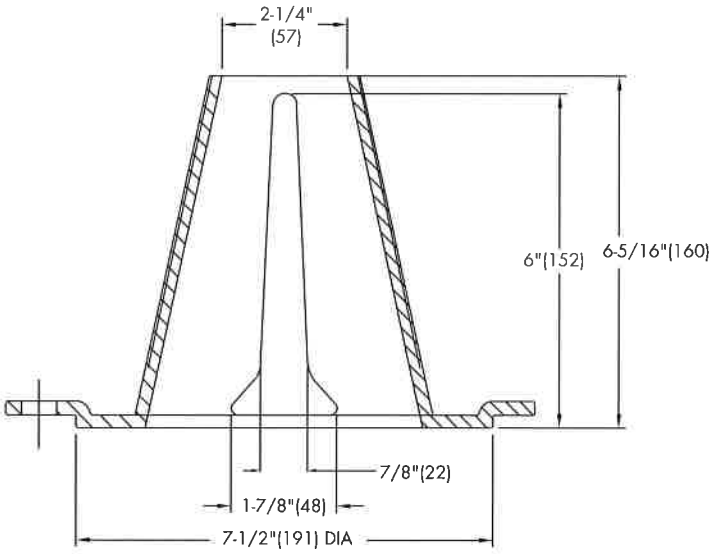
Job Location _____ Contractor _____

Engineer _____ Representative _____

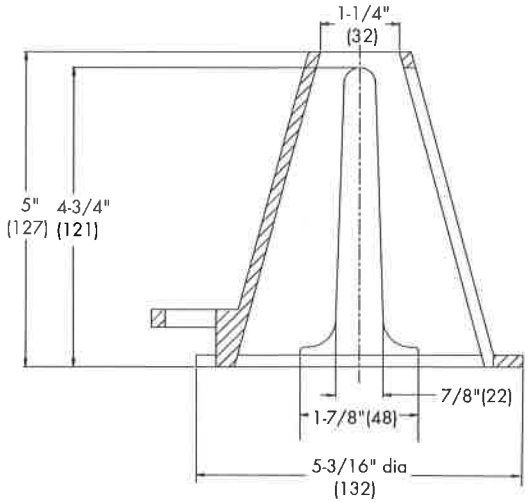
ACCUTROL WEIR FLOW CONTROL

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 _____

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

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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

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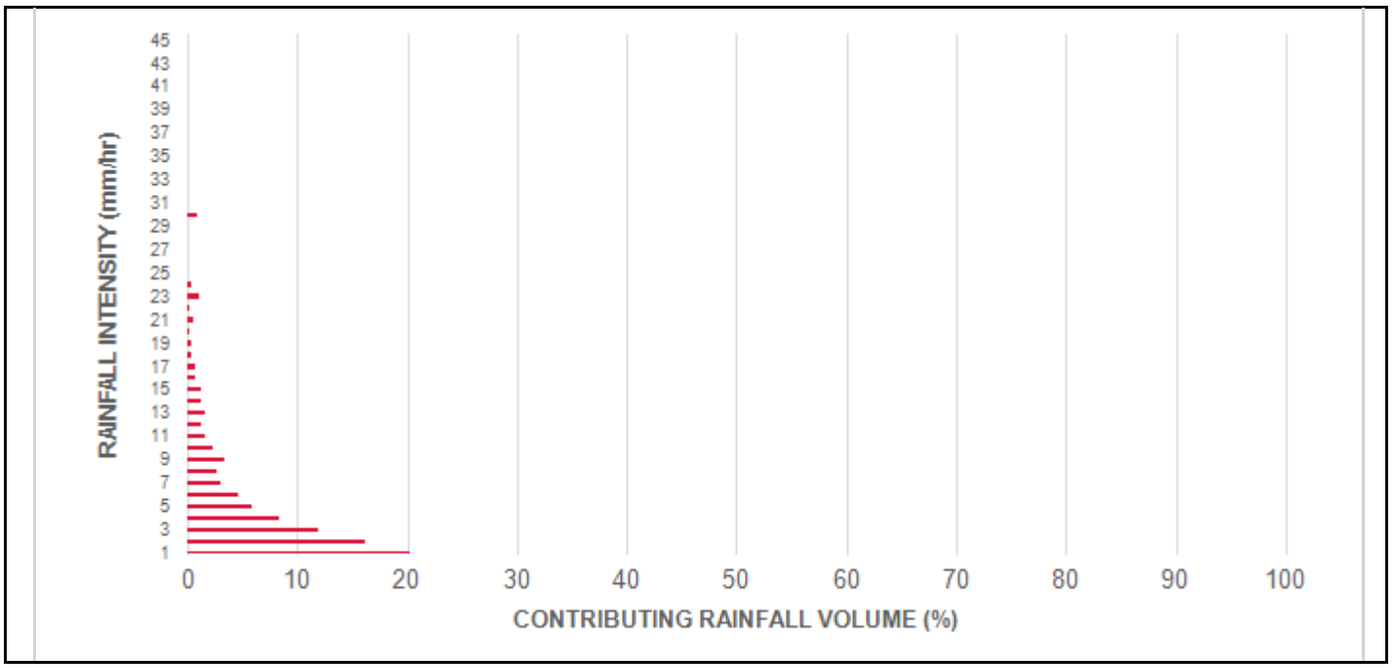
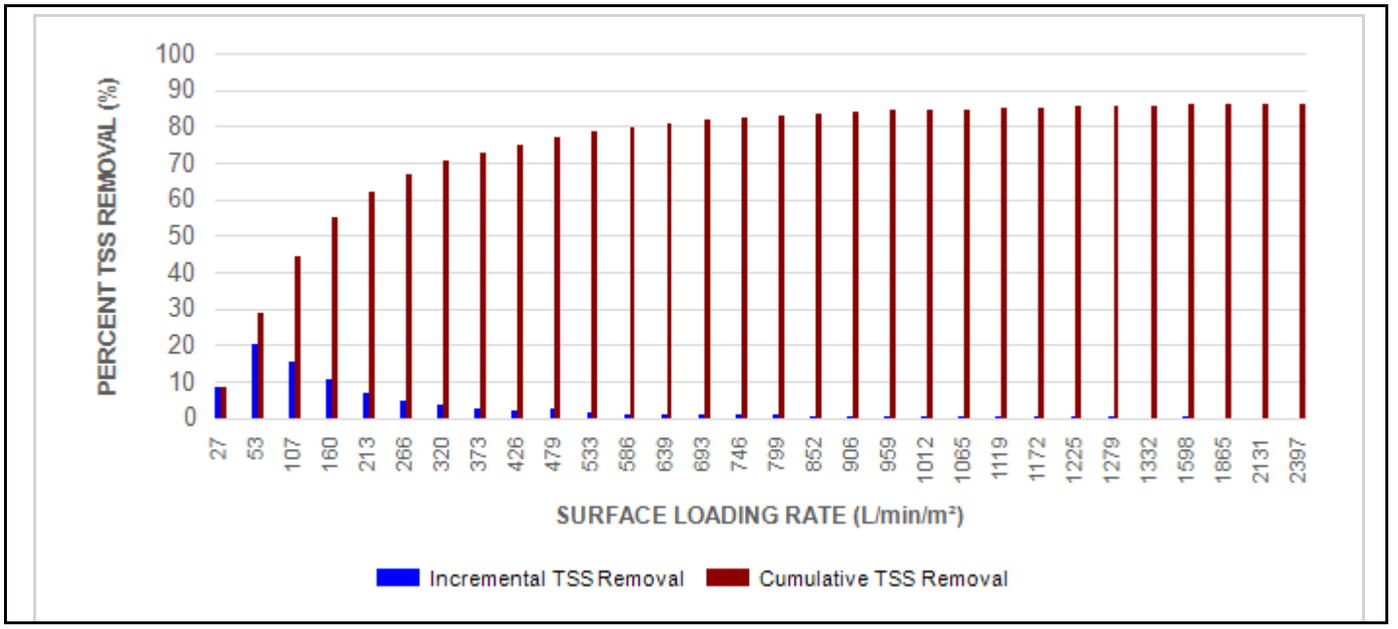
RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL
FOR THE RECOMMENDED STORMCEPTOR® MODEL



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Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

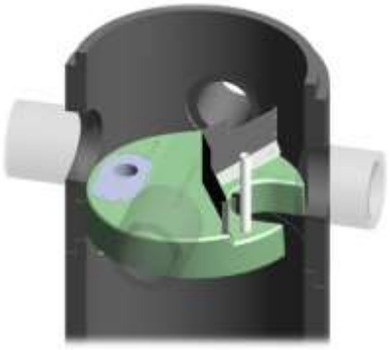
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

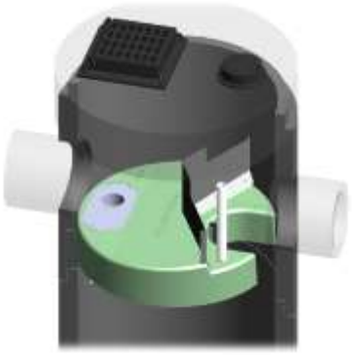
DESIGN FLEXIBILITY

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

OIL CAPTURE AND RETENTION

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





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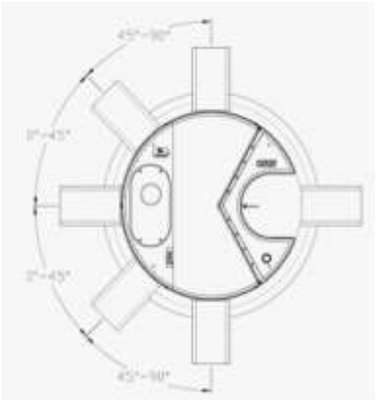

INLET-TO-OUTLET DROP

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

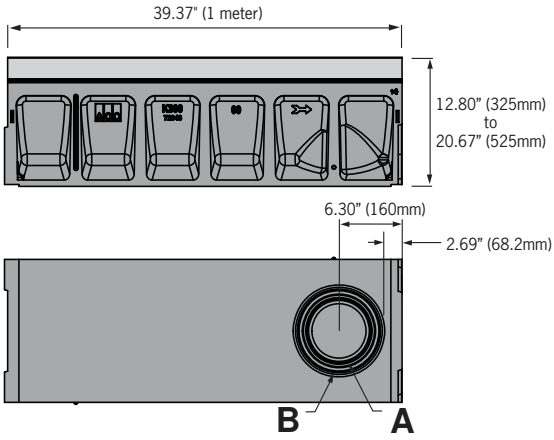
3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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.

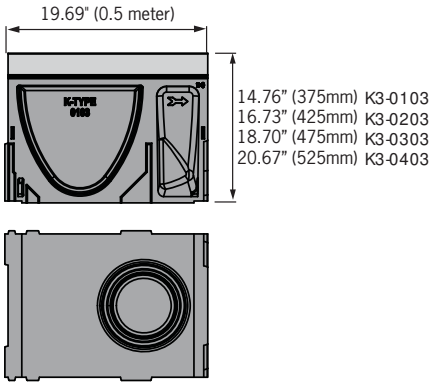
KlassikDrain - K300 Galvanized steel edge rail channel system

One meter channel

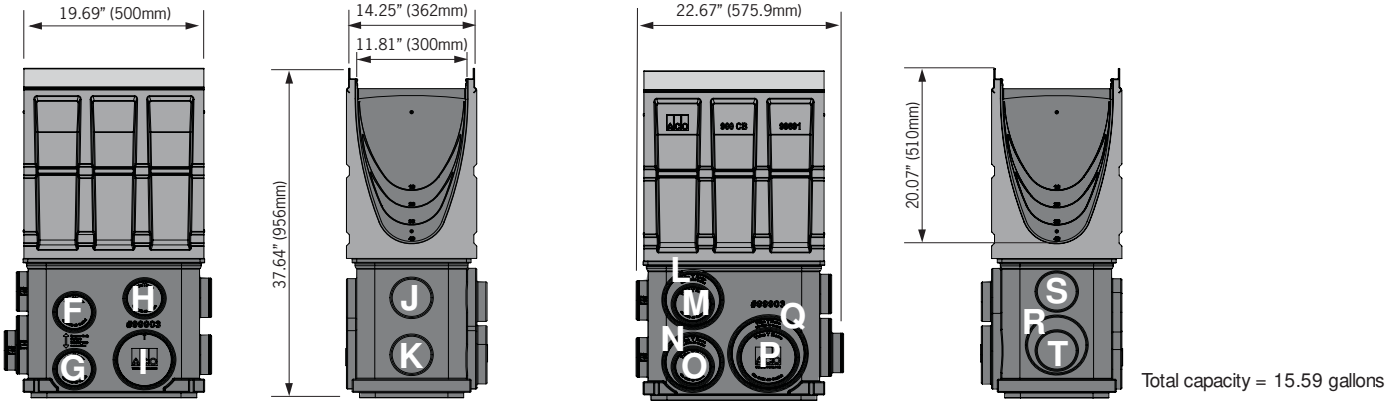


Knock-outs included on every 5th channel

Half meter channel



Type 903G In-line catch basin



Total capacity = 15.59 gallons

Outlet flow rates

Outlet	Product	Outlet size (Sch. 40)	Invert Depth	GPM	CFS
A	Bottom outlet - K3-00	6" round	11.81"	421	0.94
A	Bottom outlet - K3-040	6" round	19.69"	544	1.21
B	Bottom outlet - K3-00	8" round	11.81"	748	1.67
B	Bottom outlet - K3-040	8" round	19.69"	966	2.15
C	End outlet - K3-00	6" round	11.81"	364	0.81
C	End outlet - K3-40	6" round	19.69"	500	1.11
D	End outlet - K3-10	8" round	13.78"	681	1.52
D	End outlet - K3-40	8" round	19.69"	863	1.92
E	End outlet - K3-20	10" round	15.75"	1116	2.49
E	End outlet - K3-40	10" round	19.69"	1304	2.91
F	Type K3-903G	4" round	29.80"	287	0.64
G	Type K3-903G	4" round	36.29"	319	0.71
H	Type K3-903G	4" round	28.22"	279	0.62
I	Type K3-903G	6" round	36.29"	707	1.57
J	Type K3-903G	4" round	28.37"	280	0.62
K	Type K3-903G	4" round	34.87"	312	0.70
L	Type K3-903G	6" round	29.15"	626	1.40
M	Type K3-903G	4" round	28.59"	281	0.63
N	Type K3-903G	6" round	36.28"	707	1.57
O	Type K3-903G	4" round	35.72"	316	0.70
P	Type K3-903G	6" round	35.72"	701	1.56
Q	Type K3-903G	8" round	36.28"	1237	2.76
R	Type K3-903G	6" round	34.78"	690	1.54
S	Type K3-903G	4" round	27.65	276	0.61
T	Type K3-903G	4" round	34.36	310	0.69

Note: These are the pipe flow rates at the specified outlet, **NOT** channel flow rates.* Catch basin flow rates are without trash bucket - using trash bucket reduces flow.

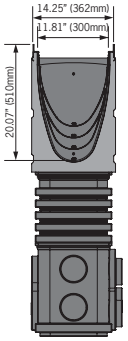
Type 904G In-line catch basin

Notes:
1. Riser can be cut dow in 1" (25mm) increments.

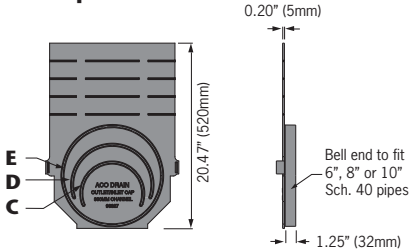
2. Maximum capacity including riser 27.82 gallons.

3. Add 12" (300mm) to all heights if using riser.

4. Outlet flow rates will be higher due to increased depth - contact ACO Sales Office for more details.



End Cap



ACO Specification Information

ACO DRAIN

KlassikDrain - K300 Galvanized steel edge rail channel system

Description	Part No.	Invert Inches[2]	Invert mm[2]	Weight Lbs.
K3-00 Neutral channel - 39.37" (1m)[1]	**76041**	**11.81**	**300**	**132.6**
K3-1 Sloped channel - 39.37" (1m)	**76001**	12.01	305	132.6
K3-2 Sloped channel - 39.37" (1m)	**76002**	12.20	310	133.8
K3-3 Sloped channel - 39.37" (1m)	**76003**	12.40	315	135.0
K3-4 Sloped channel - 39.37" (1m)	**76004**	12.60	320	136.2
K3-5 Sloped channel - 39.37" (1m)[1]	**76005**	12.80	325	137.4
K3-6 Sloped channel - 39.37" (1m)	**76006**	12.99	330	138.6
K3-7 Sloped channel - 39.37" (1m)	**76007**	13.19	335	139.8
K3-8 Sloped channel - 39.37" (1m)	**76008**	13.39	340	141.0
K3-9 Sloped channel - 39.37" (1m)	**76009**	13.58	345	142.2
K3-10 Sloped channel - 39.37" (1m)[1]	**76010**	13.78	350	143.4
K3-010 Neutral channel - 39.37" (1m)[1]	**76043**	**13.78**	**350**	**143.4**
K3-0103 Neutral channel - 19.69" (0.5m)[1]	**76044**	**13.78**	**350**	**75.3**
K3-11 Sloped channel - 39.37" (1m)	**76011**	13.98	355	144.6
K3-12 Sloped channel - 39.37" (1m)	**76012**	14.17	360	145.8
K3-13 Sloped channel - 39.37" (1m)	**76013**	14.37	365	147.0
K3-14 Sloped channel - 39.37" (1m)	**76014**	14.57	370	148.2
K3-15 Sloped channel - 39.37" (1m)[1]	**76015**	14.76	375	149.4
K3-16 Sloped channel - 39.37" (1m)	**76016**	14.96	380	150.6
K3-17 Sloped channel - 39.37" (1m)	**76017**	15.16	385	151.8
K3-18 Sloped channel - 39.37" (1m)	**76018**	15.35	390	153.0
K3-19 Sloped channel - 39.37" (1m)	**76019**	15.55	395	154.2
K3-20 Sloped channel - 39.37" (1m)[1]	**76020**	15.75	400	155.4
K3-020 Neutral channel - 39.37" (1m)[1]	**76045**	**15.75**	**400**	**155.4**
K3-0203 Neutral channel - 19.69" (0.5m)[1]	**76046**	**15.75**	**400**	**82.3**
K3-21 Sloped channel - 39.37" (1m)	**76021**	15.94	405	156.7
K3-22 Sloped channel - 39.37" (1m)	**76022**	16.14	410	157.9
K3-23 Sloped channel - 39.37" (1m)	**76023**	16.34	415	159.1
K3-24 Sloped channel - 39.37" (1m)	**76024**	16.54	420	160.3
K3-25 Sloped channel - 39.37" (1m)[1]	**76025**	16.73	425	161.5
K3-26 Sloped channel - 39.37" (1m)	**76026**	16.93	430	162.7
K3-27 Sloped channel - 39.37" (1m)	**76027**	17.13	435	163.9

Description	Part No.	Invert Inches[2]	Invert mm[2]	Weight Lbs.
K3-28 Sloped channel - 39.37" (1m)	**76028**	17.32	440	165.1
K3-29 Sloped channel - 39.37" (1m)	**76029**	17.52	445	166.3
K3-30 Sloped channel - 39.37" (1m)[1]	**76030**	17.72	450	167.5
K3-030 Neutral channel - 39.37" (1m)[1]	**76047**	**17.72**	**450**	**167.5**
K3-0303 Neutral channel - 19.69" (0.5m)[1]	**76048**	**17.72**	**450**	**89.5**
K3-31 Sloped channel - 39.37" (1m)	**76031**	17.91	455	168.7
K3-32 Sloped channel - 39.37" (1m)	**76032**	18.11	460	169.9
K3-33 Sloped channel - 39.37" (1m)	**76033**	18.31	465	171.1
K3-34 Sloped channel - 39.37" (1m)	**76034**	18.50	470	172.3
K3-35 Sloped channel - 39.37" (1m)[1]	**76035**	18.70	475	173.5
K3-36 Sloped channel - 39.37" (1m)	**76036**	18.90	480	174.7
K3-37 Sloped channel - 39.37" (1m)	**76037**	19.09	485	175.9
K3-38 Sloped channel - 39.37" (1m)	**76038**	19.29	490	177.1
K3-39 Sloped channel - 39.37" (1m)	**76039**	19.49	495	178.3
K3-40 Sloped channel - 39.37" (1m)[1]	**76040**	19.69	500	179.5
K3-040 Neutral channel - 39.37" (1m)[1]	**76049**	**19.69**	**500**	**179.5**
K3-0403 Neutral channel - 19.69" (0.5m)[1]	**76050**	**19.69**	**500**	**97.7**
K3-903G In-line catch basin - 19.69" (0.5m)[3]	**94614**	37.40	950	88.0
K3-904G In-line catch basin - 19.69" (0.5)[3]	**94635**	37.40	950	98.0
K3-Series 600 Optional plastic riser	**99902**	-	-	10.0
Foul air trap - fits both 900 & 600 series basins	**90854**	-	-	1.2
Universal end cap	**96826**	15.71	399	2.5
K3-Installation device	**97479**	-	-	4.9
Grate removal tool	**01318**	-	-	0.3
K3-QuickLok locking bar	**10458**	-	-	0.7

Notes:
1. This channel offers a bottom knockout feature; 6" & 8" round
2. Inverts shown are for the male end; for female invert depth subtract 5mm (≈0.2") from the male invert (except for neutral channels, where it will be same as male invert). To calculate the overall channel depth add 20mm (≈0.8") to invert depth.
3. This catch basin kit includes a polymer concrete top, removable Quicklok locking bar, trash bucket and plastic base. Select an appropriate grate.
4. This catch basin kit includes a polymer concrete top, removable Quicklok locking bar, deep trash bucket, plastic riser and plastic base. Select an appropriate grate.

Specifications

General
The surface drainage system shall be ACO Drain K300 complete with gratings secured with 'QuickLok' locking as manufactured by ACO Polymer Products, Inc. or approved equal.

Materials
The trench system bodies shall be manufactured from polyester polymer concrete with the minimum properties as follows:

Compressive strength:	14,000 psi
Flexural strength:	4,000 psi
Water absorption	0.07%
Frost proof	YES
Salt proof	YES
Dilute acid and alkali resistant	YES

The nominal clear opening shall be 12" (300mm) with overall width of 14.17" (360mm). Pre-cast units shall be manufactured with either an invert slope of 0.5% or with neutral invert and have a wall thickness of at least 0.50" (13mm). Each unit will feature a partial radius in the trench bottom and a male to female interconnecting end profile. Units shall have horizontal cast in anchoring keys on the outside wall to ensure maximum mechanical bond to the surrounding bedding material and pavement surface. The galvanized steel edge rail will be integrally cast in by the manufacturer to ensure maximum homogeneity between polymer concrete body and edge rail. Each edge rail shall be at least 3/32" (2.5mm) thick.

Grates
Grates shall be specified. See separate ACO Spec Info grate sheets for details. After removal of grates and 'QuickLok' bar there shall be uninterrupted access to the trench to aid maintenance.

Installation
The trench drain system shall be installed in accordance with the manufacturer's installation instructions and recommendations.

ACO Polymer Products, Inc.

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P.O. Box 245
Chardon, OH 44024
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Toll free: (800) 543-4764
Fax: (440) 285-7005

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Casa Grande, AZ 85130
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Toll Free: (888) 490-9552
Fax: (520) 421-9899

Southeast Sales Office
4211 Pleasant Road
Fort Mill, SC 29708
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Fax: (803) 802-1063

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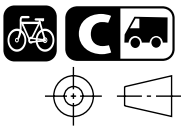
Type 860D Ductile iron slotted grate



Product Features

- Certified to EN 1433 Load Class C - 56,000 lbs - 967 psi
- Uses 'DrainLok' boltless locking system
- Suitable for use with K300, KS300, and H300K-13 channels and 621G, 621S, 631G, 631S catch basins
- Manufactured from ductile iron to ASTM A 536-84 - Grade 65-45-12
- E- coated for improved resistance against rust
- Bicycle Tire Penetration Resistant to AS 3996 - 2006

Specifications

General

The surface drainage system shall be ACO Drain K300, KS300, and H300K-13, channels*, and 621G, 621S, 631G, and 631S catch basins complete with ACO Type 860D Ductile iron slotted grate with 'DrainLok' locking as manufactured by ACO Polymer Products, Inc. or similar approved.

Materials

The covers shall be manufactured from ductile iron and have ***minimum*** properties as follows:

- ***Independently certified to meet Load Class C to EN 1433 - 56,000 lbs - 967 psi***
- ***Ductile iron to ASTM A 536-84 - Grade 65-45-12***
- ***Intake area of 88.1 sq. in. (549.90 cm²) per half meter of grate***

The overall width of 13.31" (338mm) and overall length of 19.69" (500mm). Slots measure at 0.47" (11.93mm) by 2.57" (65.27mm).

Installation

The trench drain system and grates shall be installed in accordance with the manufacturer's installation instructions and recommendations.

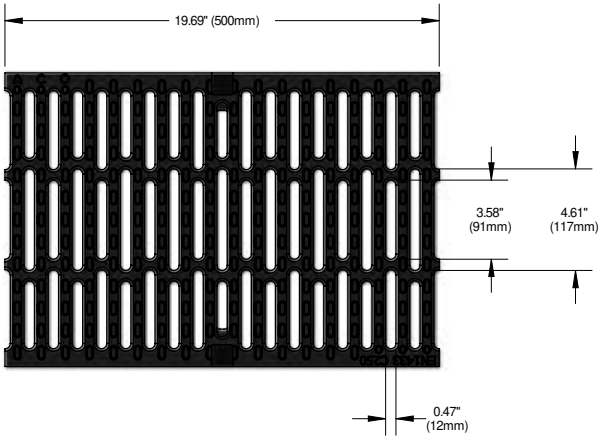
* delete as appropriate

ACO Specification Information

ACO DRAIN

Type 860D Ductile iron slotted grate

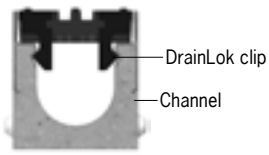
Plan view



Side elevation

Description	Part No.	Length inches *(mm)*	Width inches *(mm)*	Weight lbs.
DrainLok grate Type 860D Ductile iron slotted grate	**13870**	19.69 (*500*)	13.35 (*339*)	38.0

'DrainLok' locking mechanism



ACO DrainLok™ is a patented, boltless locking system that removes the need for bolts and bars and improves the hydraulic capacity of the channel. The DrainLok™ mechanism simply clips into the channel edge rail for rapid installation. ACO DrainLok™ grates are fitted with an anti-shunt mechanism that restricts unwanted grate movement when installed, improving durability and longevity of the system.

ACO Polymer Products, Inc.

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APPENDIX E

Civil Engineering Drawings

NATIONAL CAPITAL BUSINESS PARK - SITE 2
4120 RUSSELL ROAD
(1100 & 1200 LAST MILE DR), OTTAWA

REVISION 01

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
STORMWATER MANAGEMENT PLAN	C601
PRE-DEVELOPMENT WATERSHED PLAN	C701
POST-DEVELOPMENT WATERSHED PLAN	C702
CONSTRUCTION DETAIL PLAN	C901

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

NATIONAL CAPITAL BUSINESS PARK - SITE 2
4120 RUSSELL ROAD
(1100 & 1200 LAST MILE DR), OTTAWA
REV.01 - ISSUED FOR MUNICIPAL APPROVAL - 02 SEPTEMBER 2022
LRL PROJECT no: 220345

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
Sept 2, 2022
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

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.

SUBJECT TO APPROVAL

10m 5 0 10 20m

SCALE: 1:500

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
Sept 2, 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
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	02 SEPT 2022

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

DESIGNED BY:	DRAWN BY:	APPROVED BY:
A.S.	A.S.	V.J.

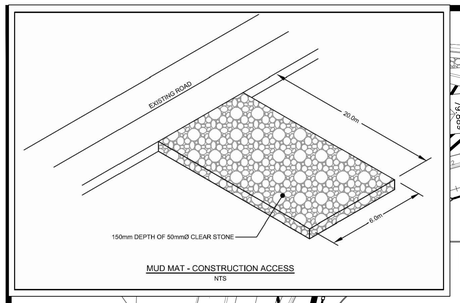
PROJECT
NATIONAL CAPITAL BUSINESS PARK - SITE 2
4120 RUSSELL RD
(1100 & 1200 LAST MILE DR), OTTAWA

DRAWING TITLE
GENERAL NOTES PLAN

PROJECT NO.
220345

DATE
AUGUST, 2022

C001



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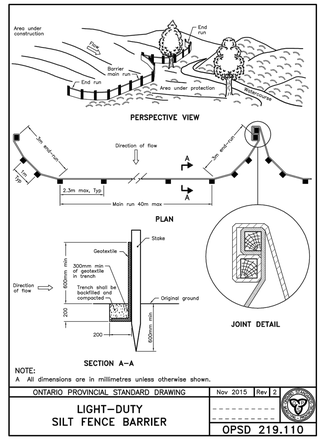
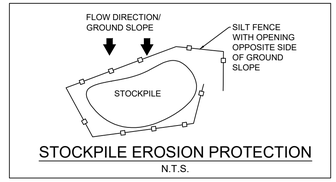


NOTE:
A All dimensions are in millimetres unless otherwise shown.

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



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 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:

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.

CONTRACTOR IS ADVISED TO COLLECT INFORMATION ON SOIL CONDITIONS BEFORE START OF CONSTRUCTION.

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

×50.00	PROPOSED ELEVATION
×50.00HP	PROPOSED HIGH POINT ELEVATION
×50.00S	PROPOSED SWALE ELEVATION
×50.00BC	PROPOSED BOTTOM OF CURB / ASPHALT ELEVATION
×50.00TC	PROPOSED TOP OF CURB ELEVATION
×50.00BW	PROPOSED EXPOSED BOTTOM OF RETAINING WALL
×50.00TW	PROPOSED TOP OF RETAINING WALL
×50.00EX	MATCH INTO EXISTING ELEVATION
× 50.00	EXISTING ELEVATION
	PROPOSED OVERLAND MAJOR FLOW ROUTE
	EXISTING MANHOLE
	EXISTING CATCHBASIN
	PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
	PROPOSED MANHOLE
	PROPOSED CURB STOP

SUBJECT TO APPROVAL

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

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
Sept 2, 2022
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

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No.	REVISIONS	BY	DATE
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	02 SEPT 2022

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

DESIGNED BY:	DRAWN BY:	APPROVED BY:
A.S.	A.S.	V.J.

PROJECT
NATIONAL CAPITAL BUSINESS PARK - SITE 2
4120 RUSSELL RD
(1100 & 1200 LAST MILE DR), OTTAWA

DRAWING TITLE
EROSION SEDIMENT & CONTROL PLAN

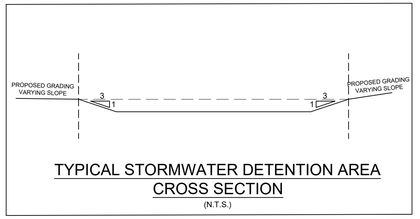
PROJECT NO. 220345
DATE AUGUST, 2022

C101

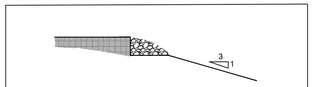
PAVEMENT STRUCTURE

COURSE	MATERIAL	THICKNESS (mm)	
		AUTOMOBILE PARKING	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.)



TYPICAL GRAVEL SHOULDER CROSS SECTION
(N.T.S.)

PROPOSED BLDG D1
(G.F.A. = ±9,700m²)
F.F.E. = 79.50

PROPOSED BLDG D2
(G.F.A. = ±7,800m²)
F.F.E. = 79.20

PROP STM MH202
T/G = 78.75

PROP STM MH200
T/G = 79.00

PROP STM MH203
T/G = 78.85

PROP CB 01
T/G = 78.90

PROP CB 02
T/G = 78.80

PROP CB 03
T/G = 78.80

PROPOSED TRENCH DRAIN
MODEL KLASSIKDRAIN K300
C/W 860D DUCTILE IRON
SLOTTED GRATE
(OR APPROVED EQUIVALENT)
T/G = 78.28

PROPOSED TRENCH DRAIN
MODEL KLASSIKDRAIN K300
C/W 860D DUCTILE IRON
SLOTTED GRATE
(OR APPROVED EQUIVALENT)
T/G = 77.98

PROPOSED RETAINING WALL
INSTALL GUARD RAIL WERE WALL
HEIGHT EXCEEDS 600mm,
EXTENTS OF WALL 1m OR HIGHER
TO BE DEISGNED BY A
STRUCTURAL ENGINEER.

PROPOSED CURB CUTS
C/W RIP-RAP

PROPOSED
BERM AT 77.30

DICB 01
PER OPSD 705.040 TYPE "A"
(PROVIDES EMERGENCY
OVERFLOW)
T/G = 77.29

DICB 02
PER OPSD 705.040 TYPE "A"
(PROVIDES EMERGENCY
OVERFLOW)
T/G = 78.27

PROPOSED ELEV @ EDGE OF ASPHALT = 78.50
PROPOSED ELEV BOTTOM OF GRAVEL = 78.35
REFER TO DETAIL

PROP OGS
MODEL EFO6
(OR APPROVED EQUIVALENT)
T/G = 77.50

LAST MILE DRIVE

FAIRWAY DRIVE

SHEET

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- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED RIP RAP

- ×50.00 PROPOSED ELEVATION
- ×50.00HP PROPOSED HIGH POINT ELEVATION
- ×50.00S PROPOSED SWALE ELEVATION
- ×50.00BC PROPOSED BOTTOM OF CURB / ASPHALT ELEVATION
- ×50.00TC PROPOSED TOP OF CURB ELEVATION
- ×50.00BW PROPOSED EXPOSED BOTTOM OF RETAINING WALL
- ×50.00TW PROPOSED TOP OF RETAINING WALL
- ×50.00EX MATCH INTO EXISTING ELEVATION
- EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED MANHOLE
- PROPOSED CURB STOP

SUBJECT TO APPROVAL

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

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
Sept 7, 2022
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
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5430 Canotek Road | Ottawa, ON, K1J 9G2
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No.	REVISIONS	BY	DATE
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	02 SEPT 2022

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

DESIGNED BY:	DRAWN BY:	APPROVED BY:
A.S.	A.S.	V.J.

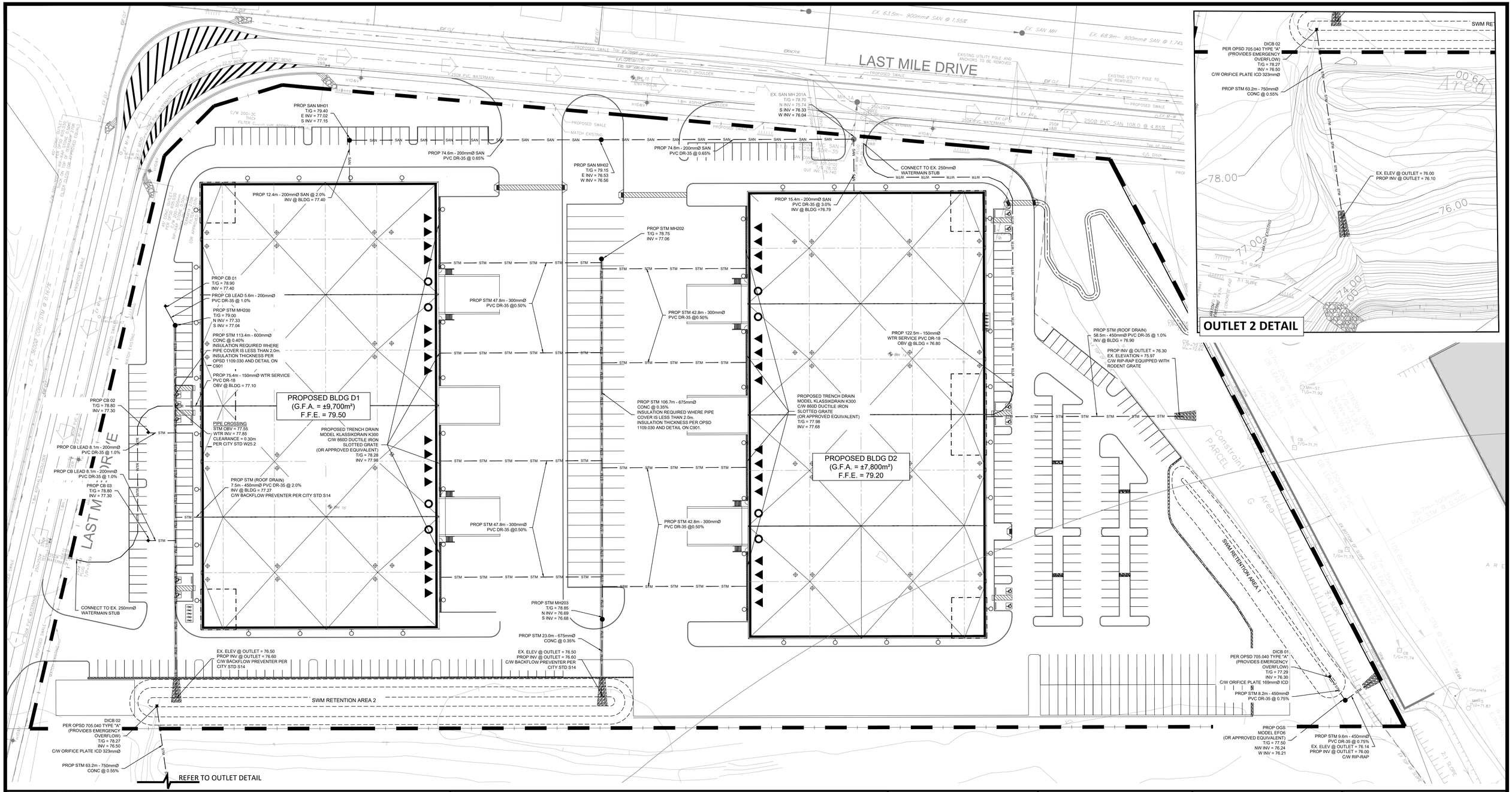
PROJECT
NATIONAL CAPITAL BUSINESS PARK - SITE 2
4120 RUSSELL RD
(1100 & 1200 LAST MILE DR), OTTAWA

DRAWING TITLE
GRADING AND DRAINAGE PLAN

PROJECT NO.
220345

DATE
AUGUST, 2022

C301



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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
- PROPOSED 100mmØ PERFORATED SUBDRAIN
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING GAS LINE
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED MANHOLE
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION PER DETAIL ON C901

SCALE: 1:500

SUBJECT TO APPROVAL

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
SEPT 2, 2022
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

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

No.	REVISIONS	BY	DATE
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	02 SEPT 2022

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

DESIGNED BY:	DRAWN BY:	APPROVED BY:
A.S.	A.S.	V.J.

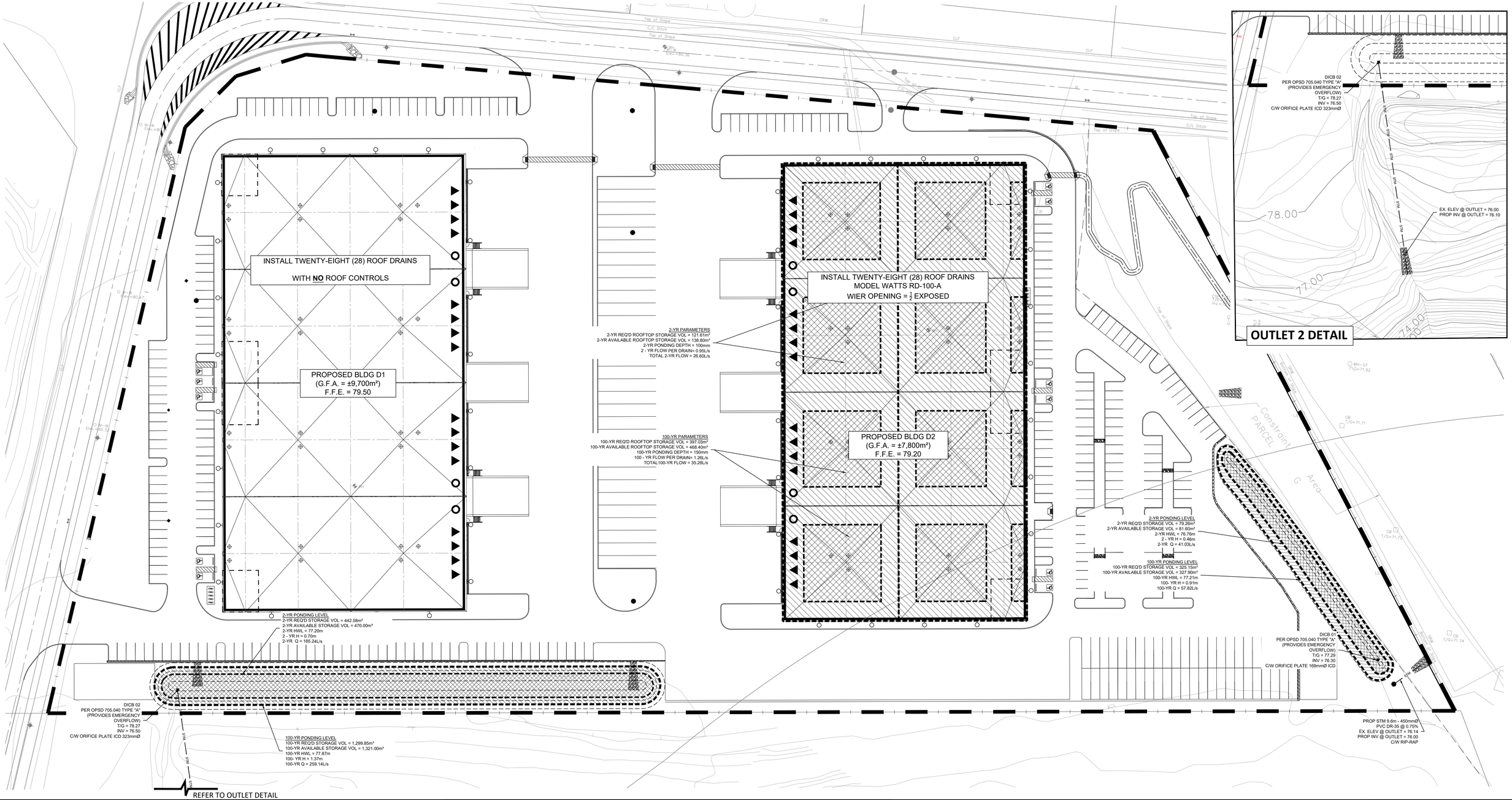
PROJECT
NATIONAL CAPITAL BUSINESS PARK - SITE 2
4120 RUSSELL RD
(1100 & 1200 LAST MILE DR), OTTAWA

DRAWING TITLE
SITE SERVICING PLAN

PROJECT NO.
220345

DATE
AUGUST, 2022

C401



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- PROPOSED LIGHT DUTY ASPHALT
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- PROPOSED 100 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX (CONTROLLED) — WATERSHED NAME
- AREA / RUNOFF — RUNOFF COEFFICIENT
- AREA IN HECTARES
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- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED MANHOLE
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- PROPOSED OVERLAND MAJOR FLOW ROUTE
- EXSITING OVERLAND MAJOR FLOW ROUTE

SUBJECT TO APPROVAL

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

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
Sept 2, 2022
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

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No.	REVISIONS	BY	DATE
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	02 SEPT 2022

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

DESIGNED BY:	DRAWN BY:	APPROVED BY:
A.S.	A.S.	V.J.

PROJECT
NATIONAL CAPITAL BUSINESS PARK - SITE 2
4120 RUSSELL RD
(1100 & 1200 LAST MILE DR), OTTAWA

DRAWING TITLE
STORM WATER MANAGEMENT PLAN

PROJECT NO.
220345

DATE
AUGUST, 2022

C601

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

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
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Sept 2, 2022
PROVINCE OF ONTARIO

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C 613-799-2422

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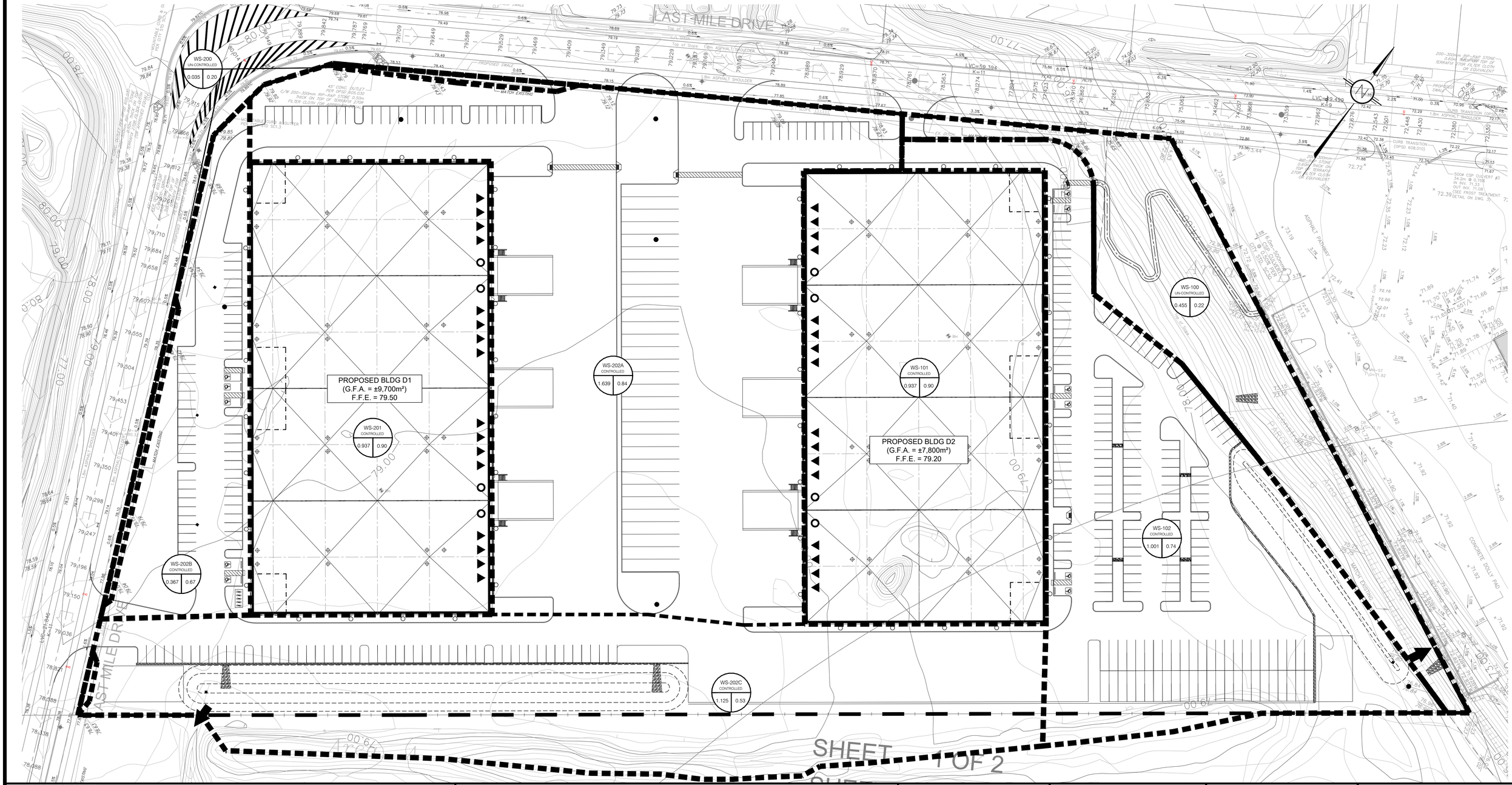
NATIONAL CAPITAL BUSINESS PARK - SITE 2
4120 RUSSELL RD
(1100 & 1200 LAST MILE DR), OTTAWA

DRAWING TITLE
PRE-DEVELOPMENT WATERSHED PLAN

PROJECT NO. 220345
DATE AUGUST, 2022

C701



USE AND INTERPRETATION OF DRAWINGS

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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/UNCONTROLLED; 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

10m 5 0 10 20m

SCALE: 1:500

SUBJECT TO APPROVAL

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
Sept 2, 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
01	ISSUED FOR MUNICIPAL APPROVAL	A.S.	02 SEPT 2022

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

DESIGNED BY:	DRAWN BY:	APPROVED BY:
A.S.	A.S.	V.J.

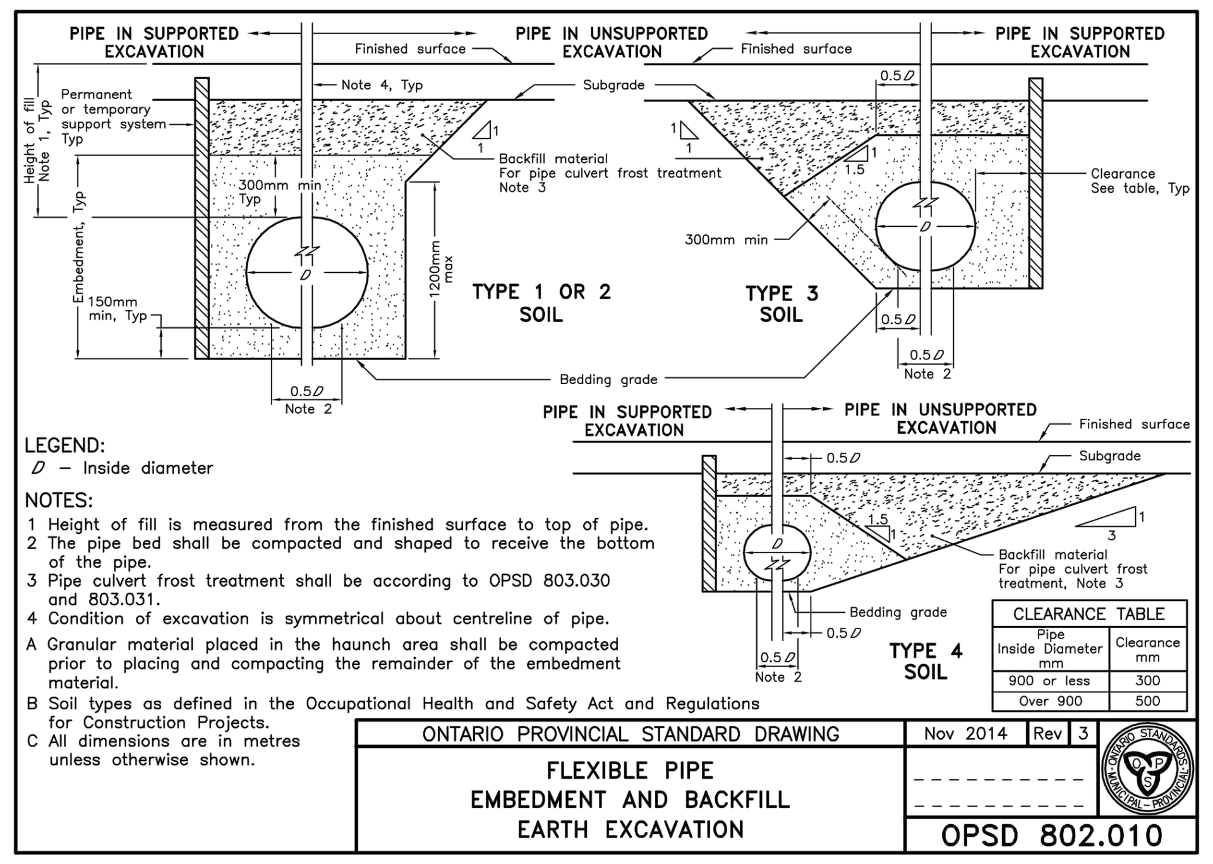
PROJECT
NATIONAL CAPITAL BUSINESS PARK - SITE 2
4120 RUSSELL RD
(1100 & 1200 LAST MILE DR), OTTAWA

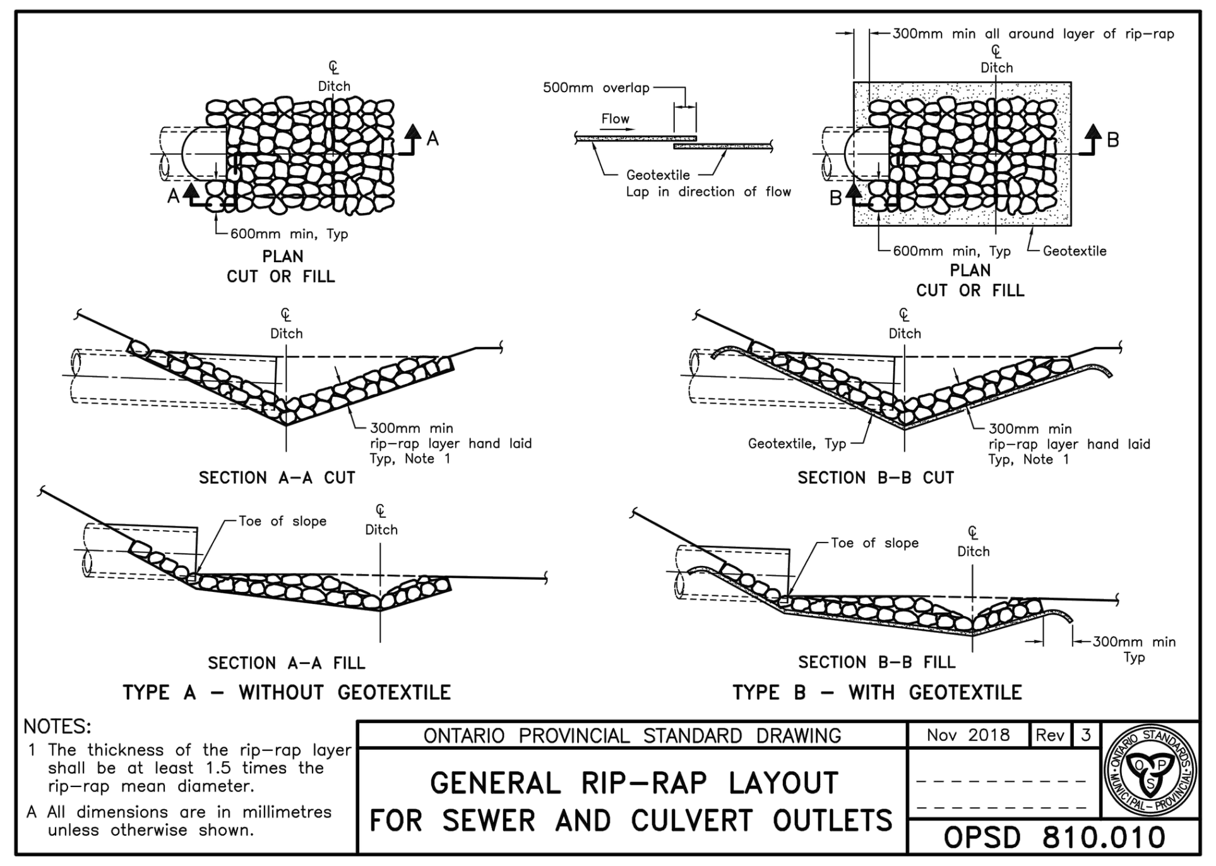
DRAWING TITLE
POST-DEVELOPMENT WATERSHED PLAN

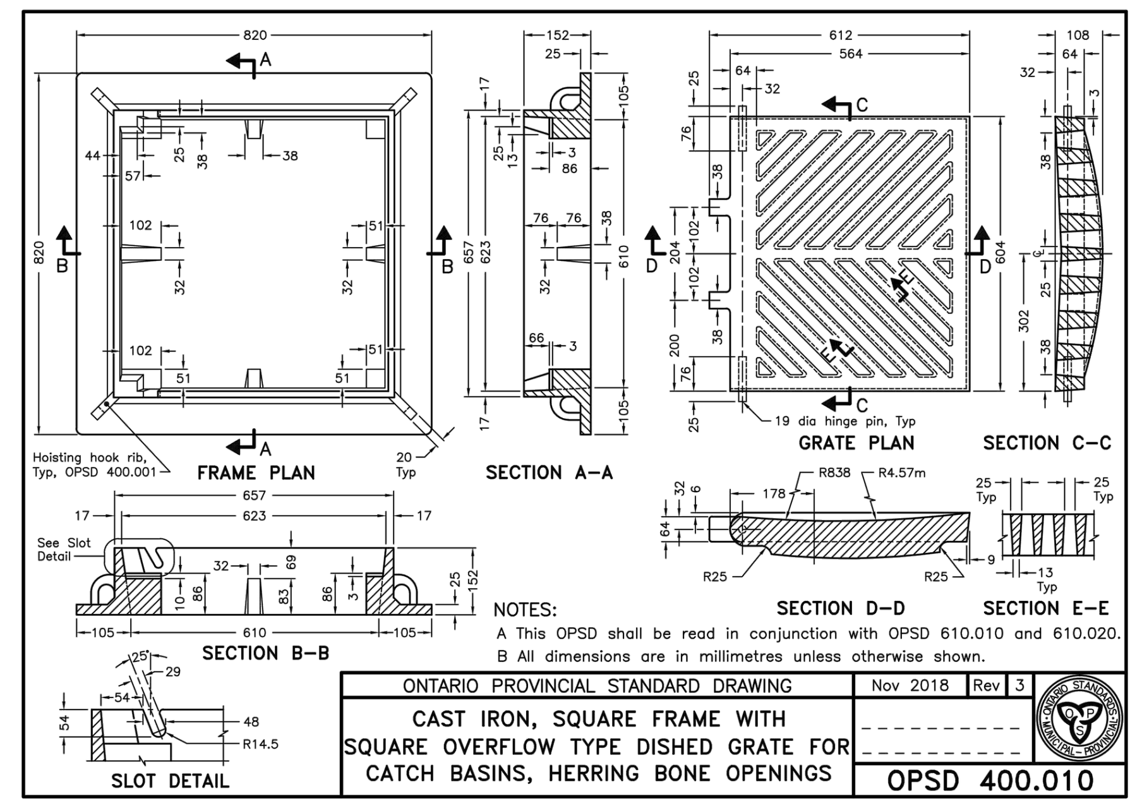
PROJECT NO.
220345

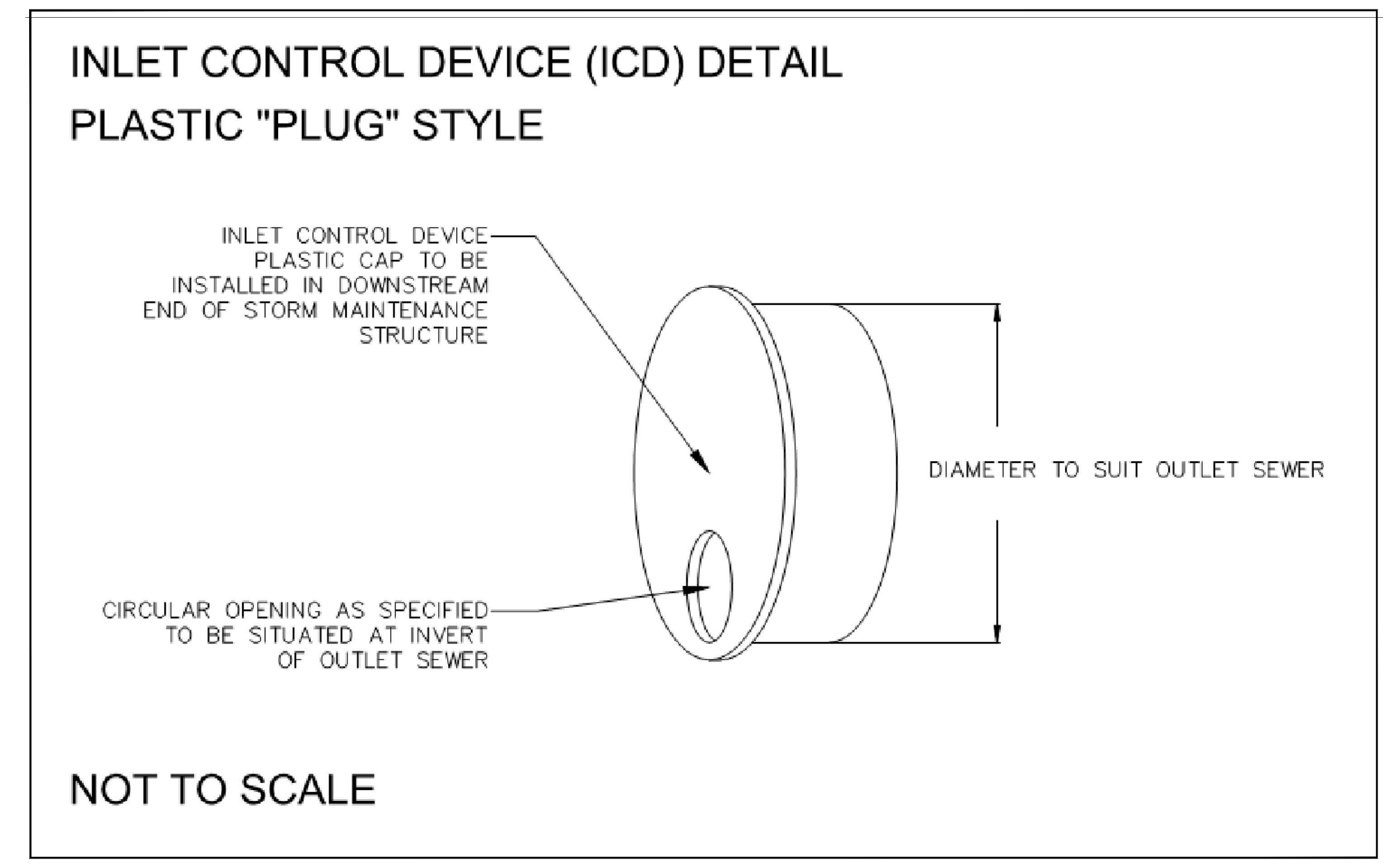
DATE
AUGUST, 2022

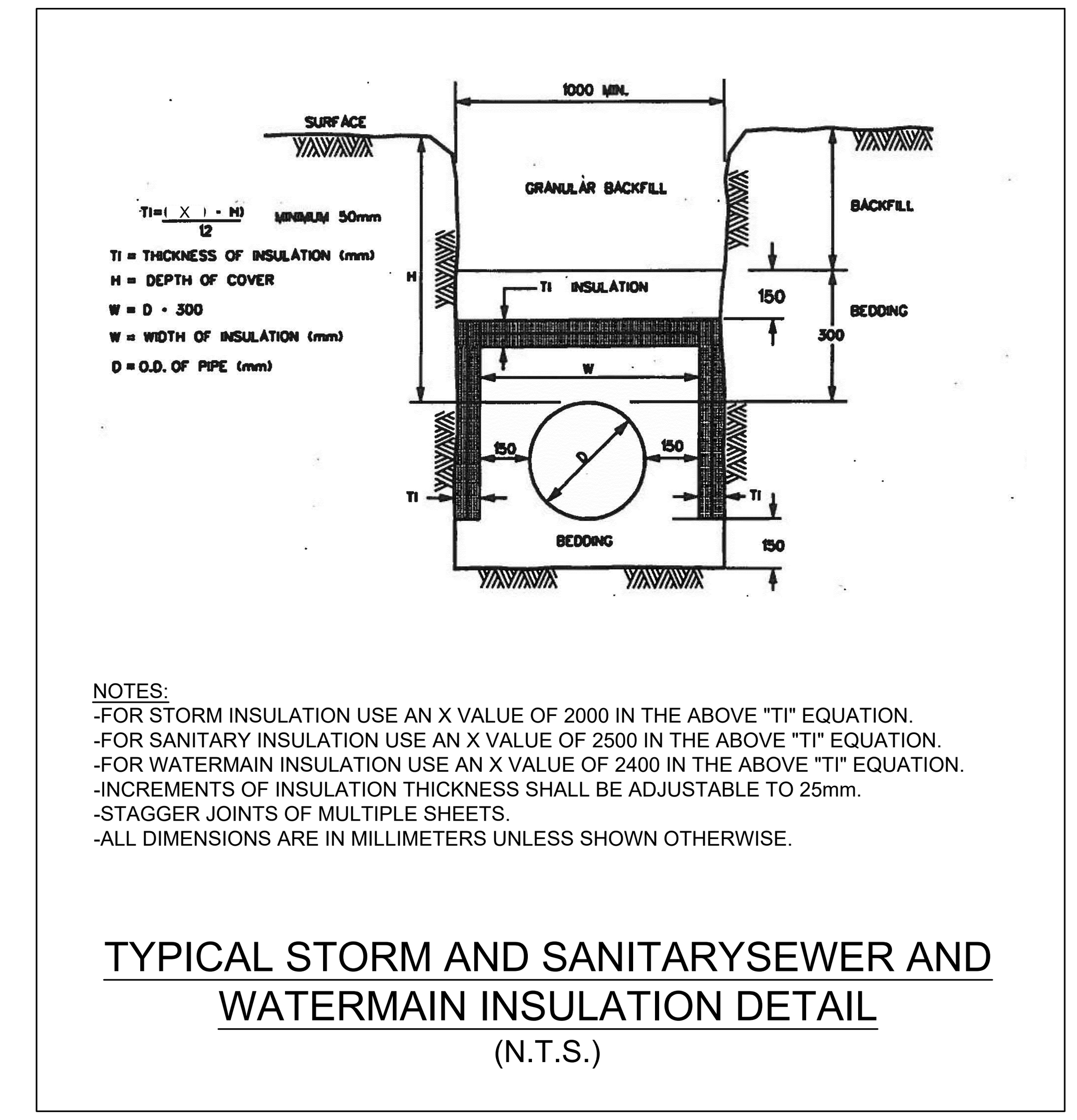
C702

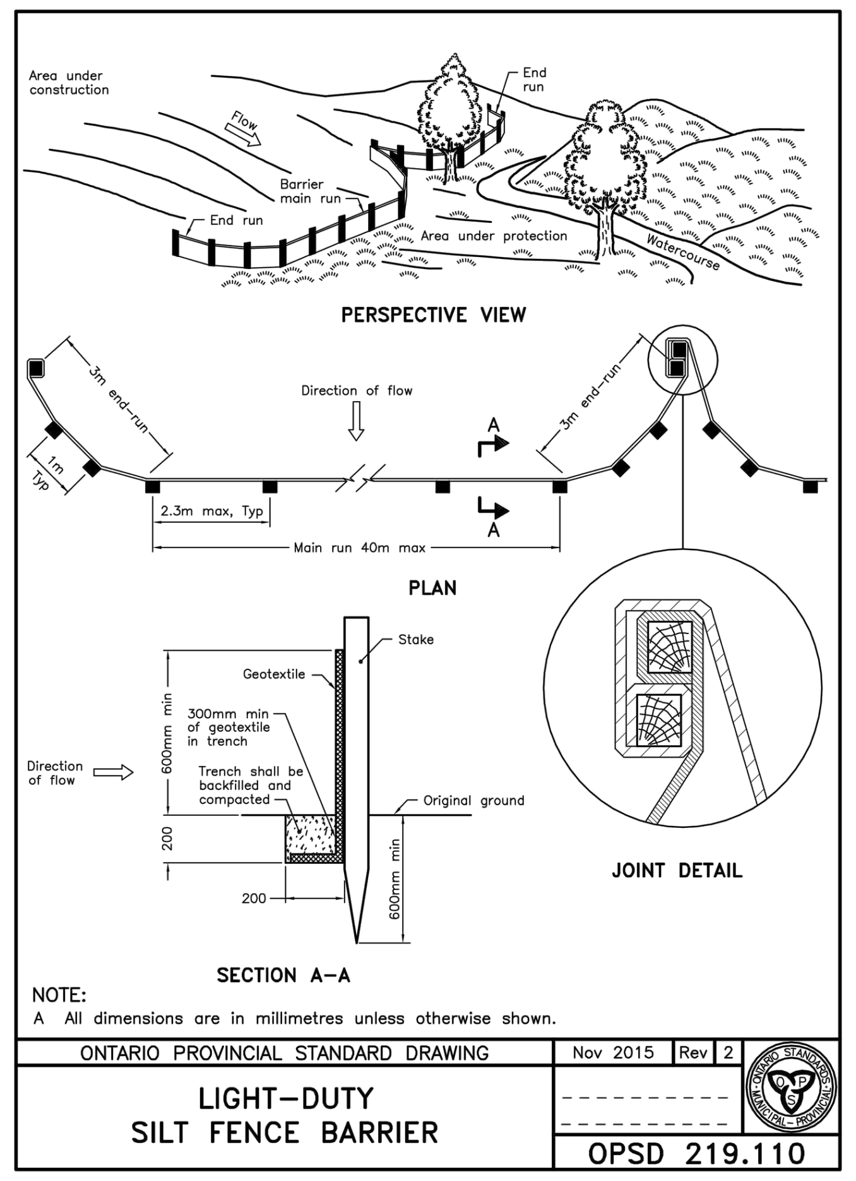


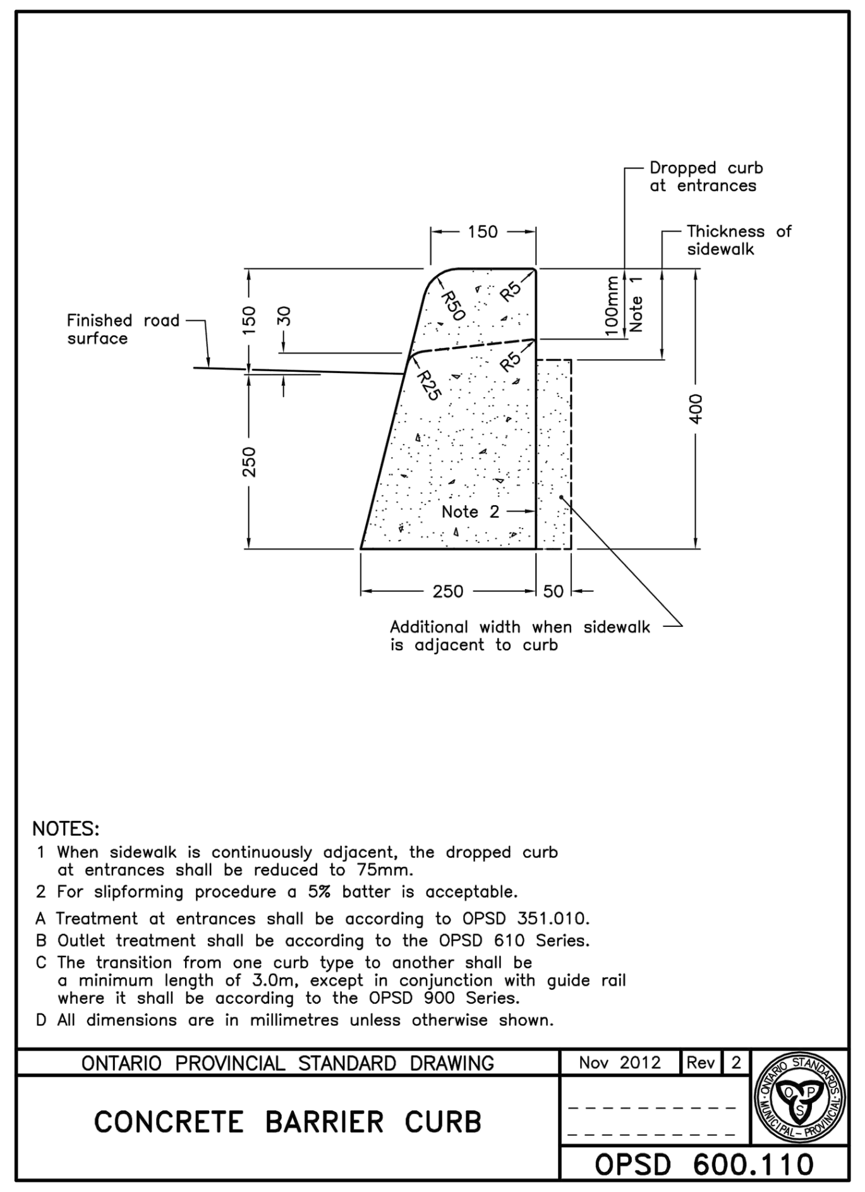


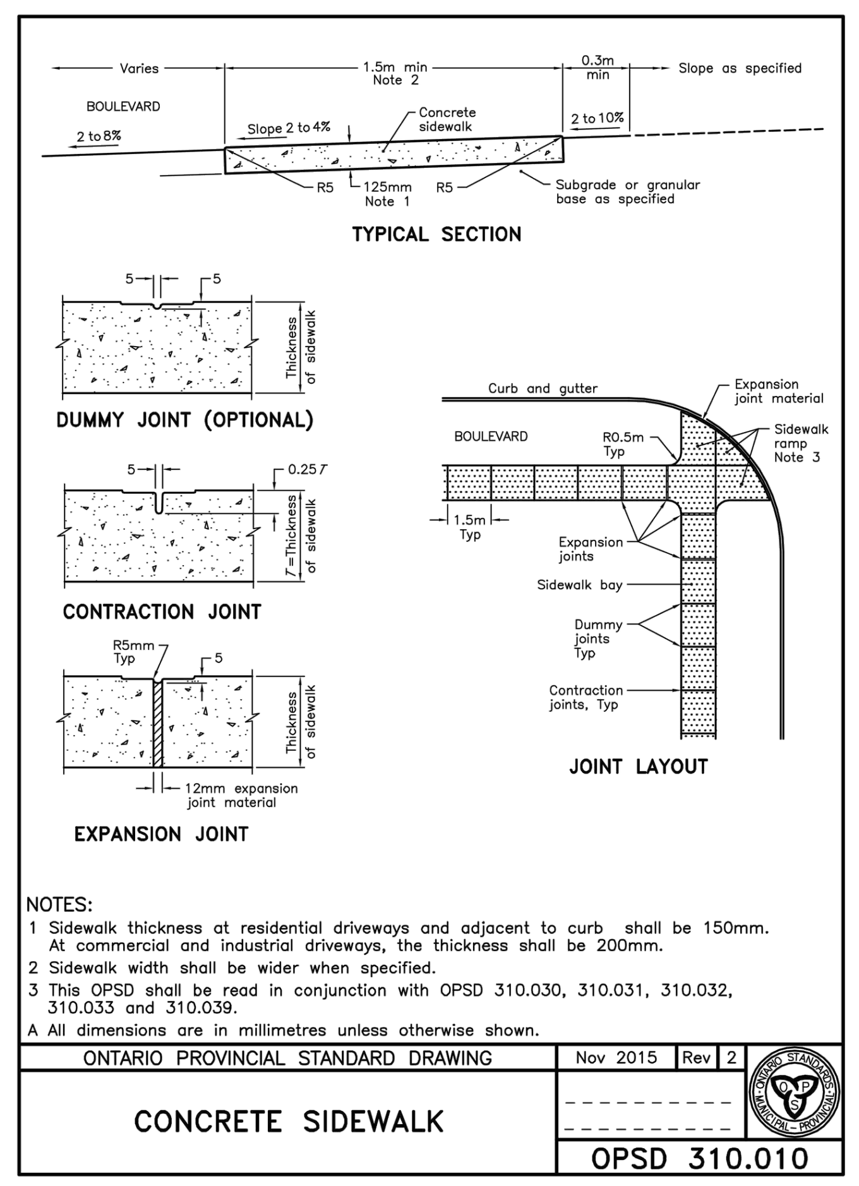


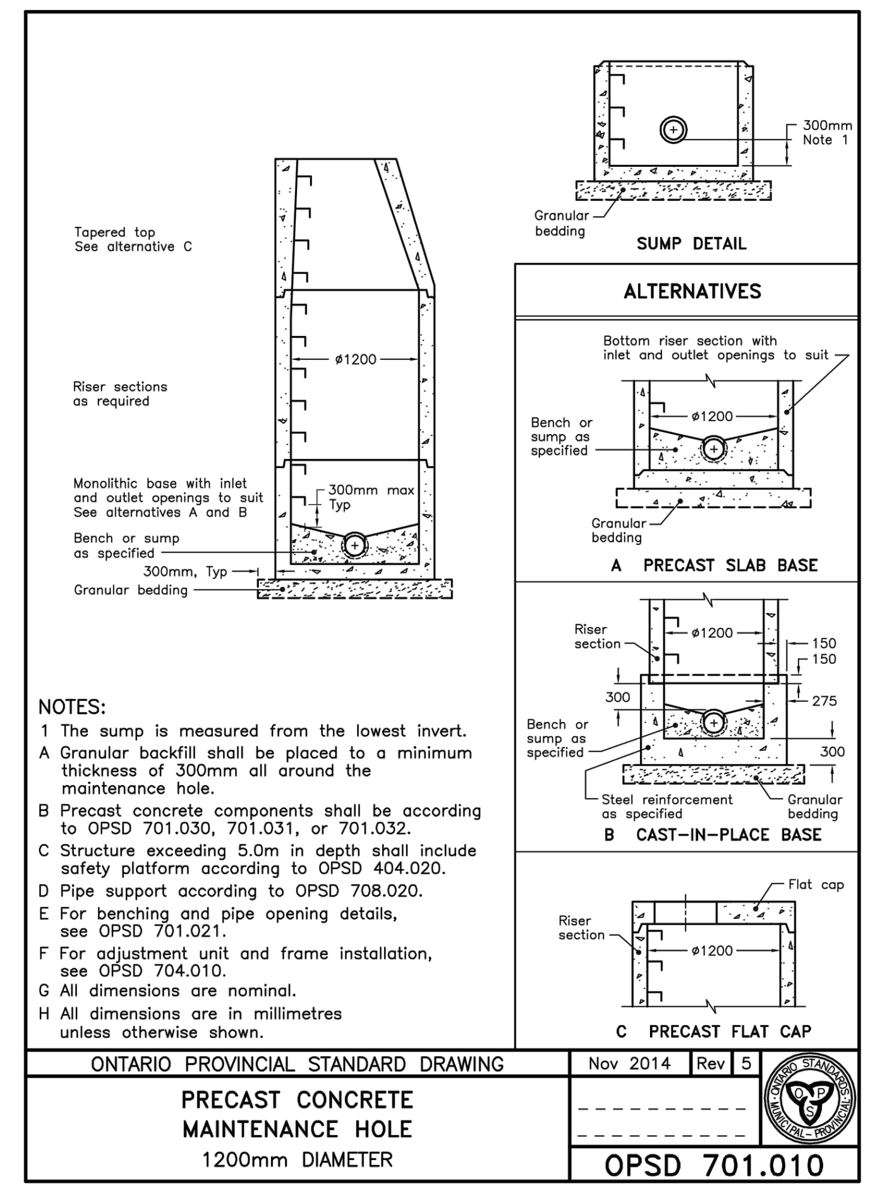


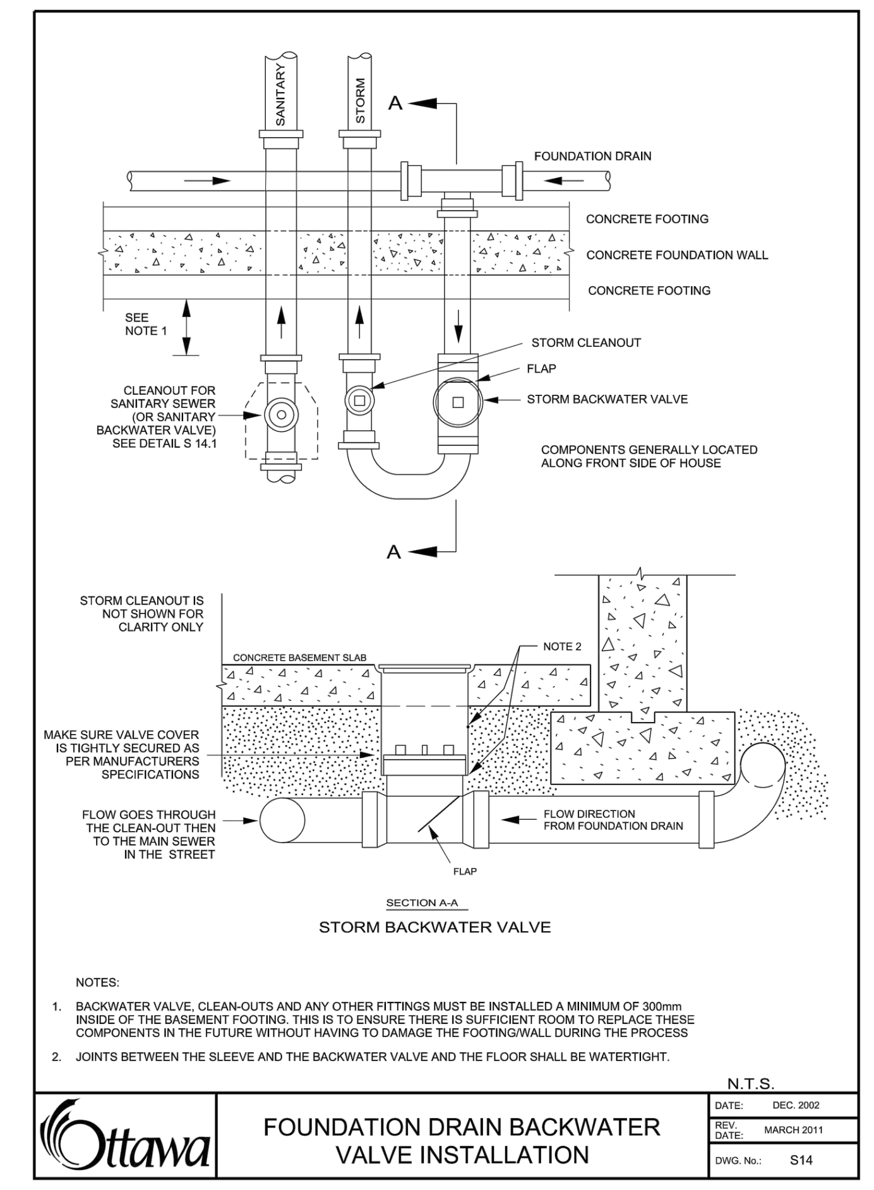


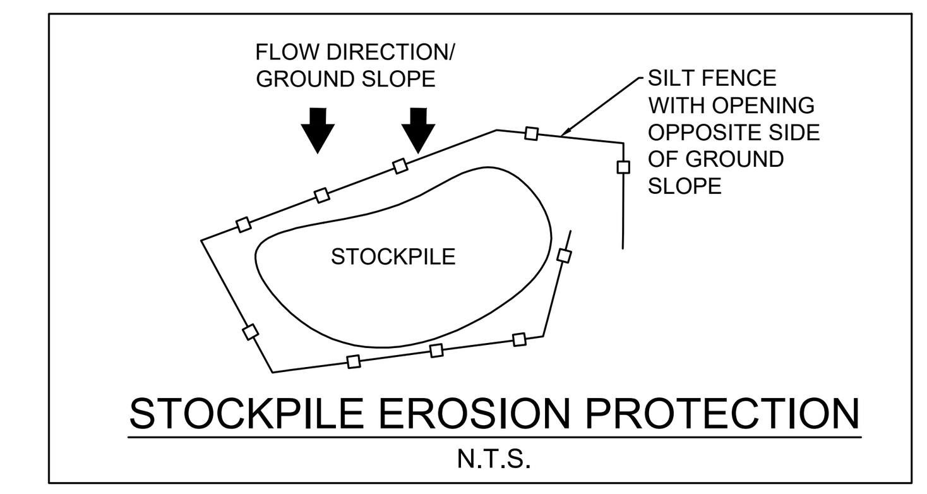


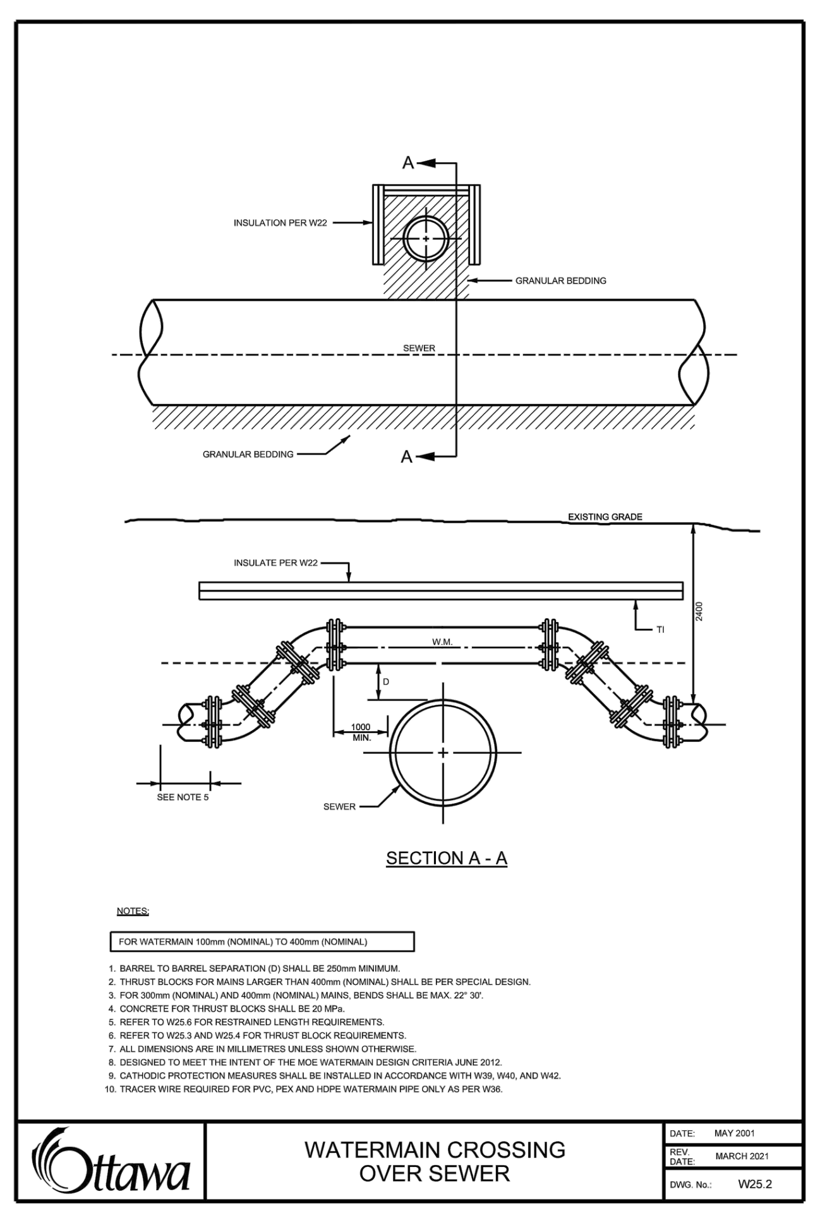












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10m 5 0 10 20m
SCALE: 1:500

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
Sept 2, 2022
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

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C 613-799-2422

DESIGNED BY:	DRAWN BY:	APPROVED BY:
A.S.	A.S.	V.J.

PROJECT
NATIONAL CAPITAL BUSINESS PARK - SITE 2
4120 RUSSELL RD
(1100 & 1200 LAST MILE DR), OTTAWA

DRAWING TITLE
CONSTRUCTION DETAIL PLAN

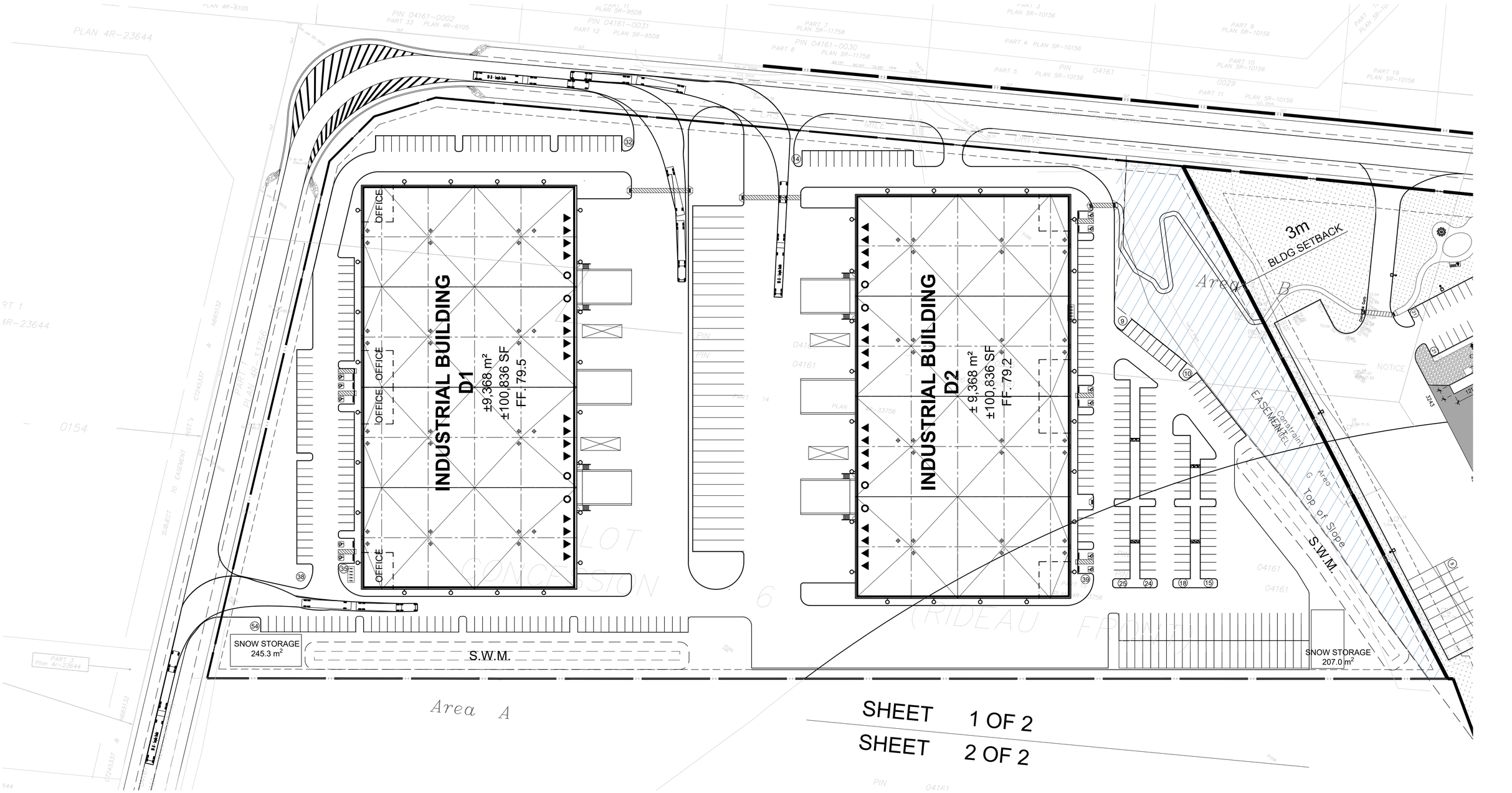
PROJECT NO.
220345

DATE
AUGUST, 2022

C901

DRAWINGS/FIGURES

Proposed Site Plan
Legal Survey



SITE PLAN

SCALE: 1:500

CONSTRUCTION NORTH TRUE NORTH

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

20 15 10 5 0 10 20 Metres

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

	Denotes	
MH–ST	"	Maintenance Hole (Storm Sewer)
MH-S	"	Maintenance Hole (Sanitary)
MH-B	"	Maintenance Hole (Bell)
MH-T	"	Maintenance Hole (Traffic)
MH	"	Maintenance Hole (Unidentified)
—— OHW ——	"	Overhead Wires
UP	"	Utility Pole
AN	"	Anchor
LS	"	Light Standard
CB	"	Catch Basin
CBI	"	Catch Basin Inlet
CSP	"	Corrugated Steel Pipe
CPP	"	Corrugated Plastic Pipe
FH	"	Fire Hydrant
WV	"	Water Valve
Inv.	"	Invert
T/G	"	Top of Grate
T/P	"	Top of Pipe
B	"	Bollard
S	"	Sign
CLF	"	Chain Link Fence
P&WF	"	Post and Wire Fence
PO–W	"	Wood Pole
Ø	"	Diameter
+ 65.00	"	Location of Elevations
+ 65.00	"	Top of Curb Elevations
+ 65.00*	"	Top of Wall Elevations
TOS	"	Top of Slope
BOS	"	Bottom of Slope
C/L	"	Centreline
————	"	Property Line
—— – – ——	"	Limit of Notice of Sublease Inst. OC2427131
— — — –	"	Limit of Constraint Area
HH	"	Handhole
TB–B	"	Bell Terminal Box
TB-T	"	Traffic Terminal Box
CRW	"	Concrete Retaining Wall
SRW	"	Stone Retaining Wall
TSP	"	Traffic Signal Post
M-W	"	Monitoring Well

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum and are referred to Control Monument 0011962U3456 having an elevation of 73.746 metres and Control Monument 00819678094 having an elevation of 69.215 metres.
2. 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. 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 confirmation.
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, probing, excavating etc.

SHEET 1 OF 2

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovltd.com
Ontario Land Surveyors

Job No. 17730-19 Russell Rd PtLts 3 To 6 C6 RF GL T 500 D6 SHEET 1 OF 2 | ig

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

20 15 10 5 0 10 20 Metres

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

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SHEET 2 OF 2

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
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Job No. 17730-19 Russell Rd PtLts 3 To 6 C6 RF GL T 500 D6 SHEET 2 OF 2 | ig