LRL

ENGINEERING | INGÉNIERIE

Servicing Report

Site Plan Control Application
Proposed Industrial Development
6160 Thunder Road and 5368 Boundary Road, Ottawa ON

Prepared for:

Thunder Rd Ltd. Partnership
801-250 City Centre Avenue
Ottawa, ON
K1R 6K7

LRL File No.: 200578.10

August 16th, 2024

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1 INTRODUCTION AND SITE DESCRIPTION

LRL Associates Ltd. was retained by Avenue 31 to prepare a servicing report to support site plan application for the property located at the southwest corner of the intersection of Boundary Road and Thunder Road in Ottawa ON. The civic address of the site is 6160 Thunder Road and 5368 Boundary Road, Ottawa, ON K0A 1K0.

Figure 1: Aerial View of Subject Lands

The proposed development will consist of one (1) industrial and office use building (used as the main administrative building for management and operation of the site) with a footprint area of 745 m^2 and a small accessory building to be utilized as a shop, storage and detailing operations with a footprint of approximately 465 m^2. Surrounding the building towards Thunder Road will be asphalt parking lot and travel ways for vehicular maneuverability, an asphalt loading & drop-off zone for the function of the end user's business, granular outdoor parking storage area for vehicles in the rear, and landscaping. The site will have four (4) entrances from Thunder Road with two (2) being two-way entrance/exits, and two (2) designed for one way traffic. A detailed site plan has been included in **Appendix A** for reference.

The specifics of the proposed buildings outlined in the site plan are summarized in table 1 below.

Table 1: Site Development, Proposed Building Details

Building Type	Building Size	Approximate Number of Staff	Number of Auto Parking Spaces	General Function of end user
Light Industrial (Main Building, Proposed One Storey)	745.3 m^2	25	26	Office and main administrative building for management and operation of the site.
Light Industrial (VIC Structure/MC Shed)	464.8 m^2	0	0	Storage, shop and detailing operations

This report has been prepared with considerations given to the conditions noted above. The civil drawings and design specifics are based off of the site plan in **Appendix A.** Should there be any changes in the design features, which may relate to the servicing and stormwater considerations, LRL Associates Ltd. should be advised to review the report recommendations and design conclusions.

2 PRE-CONSULTATION

An initial pre consultation with the City of Ottawa staff took place on August 9th, 2021 with follow-up discussions which took place in 2024 following initial submissions with an alternative site plan design. Following the meeting, notes were circulated outlining general submission requirements and engineering considerations relating to the domestic water supply and stormwater management criteria. Refer to **Appendix B** for the circulated initial pre consultation notes.

Additional consultation has taken place over the duration of advancements of this development concept, throughout the Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBLA) process to further discuss water servicing capacities to support the development.

This submission details an altered site plan than initially circulated, while also responding to the City's comments to past submissions.

3 ADDITIONAL SITE PLAN CONTROL ENGINEERING REPORT

To support the civil design aspects of the subject site, additional investigations and reports were completed. Where appropriate, the conclusions of the reports listed below were incorporated into the detailed civil design.

The following documents were prepared for the development and have been referenced:

- Environmental Impact Statement, prepared by Kilgour and Associates Ltd, dated August 16th , 2024.
- Geotechnical Investigation, prepared by Patterson Group Inc., dated August 9th, 2024
- Grading and Site Servicing Review by Paterson Group, dated August 12, 2024.
- Stormwater Management Report, prepared by J.F. Sabourin and Associates Inc., dated August 2024.

- Geomorphological and Erosion Assessment, Tributary of Bear Brook, Prepared by Geomorphix, dated August 16th, 2024.

4 Existing Site and Available Services

The subject site measures approximately 15.16 ha with most of the land vacant with ground cover consisting primarily of long grasses, shallow vegetation and trees surrounding the boundary of the property and a western portion of the site.

The property is bordered to the east by Boundary Road, north by Thunder Road, and is bounded on the northwest corner by a tributary of Bearbrook. .

Existing topography of the land is relatively flat, with elevations ranging from approximately 76.0 m to 77.5 m. The general elevation interior to the site boundary is slightly lower than those of the surrounding roads. **Appendix C** includes an overall site boundary with contours demonstrating the existing topography.

A portion of the parcel in pre development conditions has historic straightened drainage channels throughout. The subject land drains to a tributary of BearBrook that flows westward along the northern border of the site through a forested area. The tributary proceeds through forest and beaver meadow towards a crossing with Thunder Road, downstream of which it drains into Bear Brook.

The site does not have access to municipal storm, sanitary or traditional water service as the infrastructure does not exist on Boundary Road or Thunder Road; however, the site is within the service boundary of the Carlsbad Springs trickle-feed water system. This system is supplied by the City of Ottawa's central distribution system and distributed via a network of small diameter pipes in the area of the subject lands.

The following infrastructure is in place along the frontage of the property:

- 100mm HDPE Trickle Feed Watermain (Boundary Road)
- 75mm HDPE Trickle Feed Watermain (Thunder Road)

Further discussion relating to the servicing requirements for the industrial development are summarized in the following sections.

5 Water Service

5.1 Carlsbad Springs Trickle-Feed Water Supply System

The proposed development site boundary falls within the Carlsbad Springs trickle-feed Water System. The Carlsbad Springs trickle-feed Water System is intended to provide sufficient water for indoor (domestic) use only through a network of small diameter mainline piping. During the design and planning stages of this system, no allowances were made for outdoor water use fire protection, therefore fire suppression requirements have been addressed with a designed site-specific fire reservoir.

A 102mm diameter pipe exists along Boundary Road and a 75mm pipe exists along Thunder Road which would be utilized for domestic supply.

The subject site has originally been allocated a pre-set constant flow rate, referred to as equivalent residential units (2,700L/d per unit). The original assigned two (2) equivalent residential units for the subject property boundary does not represent the amount of water expected to be consumed

for a site of this magnitude. In fact, given the magnitude of the site, proposed development layout, and potential opportunity for future expansion of the end user, to ensure that the domestic demands of the development could be fulfilled by the trickle-feed system, it has been determined that three (3) equivalent units are required.

Calculations have been completed based on allocated building uses, expected number of staff and associated demands, with contingency associated with potential future expansion. This is further expanded on in section 5.2 below.

Original renditions of the site plan had a combination of warehouses and loading docks which requested seven equivalent residential units. For the proposed use presented in this design, three (3) equivalent units totalling 8 100 L/day will be sufficient.

5.2 Domestic Demands

The domestic demands of the site are intended to be met using the flow provided by the trickle-feed water system in conjunction with building specific cistern to meet peak instantaneous demands. There will be a cistern located within the building footprint designed for the building on site based on the average daily demands as a result of building use, projected number of employees and fixtures within the building. The cistern will have access, and monitoring equipment which will be further detailed at building permit detailed mechanical and electrical design. The cistern has been sized for a working capacity of 2000L to supply water for approximately 4 hour period (1/2 working day) of the average demand for the immediate operations (not sized for projected employee growth)

.

A summary of the domestic water demands for business operation on this site have been presented in Table 1 below.

To calculate the average day water demands for the development, the following design parameters have been used based on available City of Ottawa Design Guidelines.

- Average demand per employee = 75 L/day
- Maximum daily demand factor=1.5
- Maximum hour demand factor = 1.8 x max. day

Table 2: Domestic Water Demands based on Building Operations Summary

Number of Employees (2024)	25
Projected Potential Business Expansion Employees	20
Total Employees (Current + Growth Potential)	45
Average total domestic demand	3 375 l/day
Auto detailing hose bib (10 cars / day)	1 060 l/day
Additional hose bib + misc. demands	1 500 l/day
Total Average Demand	5 935 l/day
Number of Equivalent Residential Units (2 700 L/day ea.)	3
Max Daily Demand	8 902.5 l/day
Peak Hour Demand	16 024.5 l/day

Cistern Volume	2000 l/day

A water meter chamber is proposed at the property line for the incoming service. Within the metering chambers proposed, an automatic flow control will be installed to limit the instantaneous flow to the allowable rates summarized below. Details of the water meter chamber are located on the civil detail drawing C901 located in **Appendix E**.

The flow control provided in the metering chamber located underground at the property boundary and the municipal right-of way has been calculated below.

Flow control =8 100 L/day ÷ 24 hours ÷ 3600 second
=0.094 L/s

5.3 Fire Protection

In order to provide adequate fire protection and fulfill the fire suppression demands for the subject site, an above grade (or equivalent sized underground precast concrete tank) storage tank is required.

The required fire flow was calculated based on table two (2) in appendix A of the OBC 2012 Section 3.2.5. This is applicable given that the development is not supplied by municipal water. Given that there are two buildings on site, both buildings have been assessed, with the larger volume selected for contingency.

The following considerations were utilized when calculating the fire flow and volume required for the storage tank (based on NFPA 22) :

- Volume main building = 4 084 m^3
- Volume Accessory building = 1 931 m^3
- Exposure distance between buildings= Larger than 10m from building face in all direction between buildings.
- Building Classification= F-3
- Water Supply Coefficient= 12
- Water supply duration = 30 min

Approximately 49 100 L (49.1 m^3) is the minimum volume required for the building. Two (2) 25 000 L tanks have been proposed on the site plan for the building and are shown on the servicing drawings for the development. However, prior to construction, shop drawings of the tanks proposed will be submitted which will detail venting, access, dimensions and configuration to ensure volume is achieved. Fire flow calculations are included in **Appendix D** for reference.

An on site fire hydrants have been supplied to ensure coverage for the site and access to the volume of water for fire fighting purposes. Hydrant location can be viewed in the C401 DWG included in ***Appendix E***.

6 SANITARY SERVICE

There is no municipal sanitary sewer in proximity to the proposed development, and the development property is outside of the serviced urban boundary of the City of Ottawa.

An on-site sewage system is required to service the staff and users of the proposed building located on this development parcel.

6.1 Sanitary Demands and Treatment

As per section 5 of this report, the domestic demands are restricted to the available servicing through the Carlsbad Trickle Feed System. Therefore, it also has impact on the effluent expected on this site.

Based on the intended number of employees and building use in the immediate future, the total design daily sanitary sewage flow is based on the following criteria:

- 10 office employees at 75 L/day = 750 L/day
- 15 storage, shop and detailing operations employees @ 75 L/day = 1 125 L/day
- Total flow = 1 875 L/day

The detailed Sewage system layout plan designed and prepared by Paterson Group has been included in ***Appendix G.***

The design for the sanitary it so have 100mm PVC pipe entering into a pretreatment tank and a balancing tank prior to the effluent being pumped via a 38mm force main to the septic bed area located towards Thunder Road.

7 STORMWATER MANAGEMENT

Currently there is no municipal storm sewer adjacent to the subject lot. In pre-development conditions, the stormwater accumulated on the property would be retained from various depressions in the topography, sheet drain in the north direction to the unnamed Bearbrook tributary or towards the undeveloped lands bordering the parcel to the south and west, ultimately reaching the surrounding pervious area.

A combination of an on-site storm sewer network, strategic sawtooth pattern grading to maximize the site's main detention areas, quality treatment units, best management practices and low impact development principles are designed to be implemented to ensure the proposed development will meet the City's stormwater quantity and quality requirements, while also not causing any concern for downstream erosion. This section will discuss the stormwater approach and on site collection and conveyance of the runoff expected. However, J.F. Sabourin and Associates (JFSA) was retained to complete the modeling and summarize further details of the stormwater management approach for the proposed development with considerations given to the existing water levels in the outlet waterway which will further detail the design.

For further details relating to the Stormwater management and modeling of the network and quantity control measured proposed, refer to the stormwater report dated August 2024 completed by JFSA .

7.1 Existing Site and Drainage Description

The existing 15.16 ha site is relatively flat, with a slight topography change in direction dividing the site into three (3) pre development watersheds:

- EWS 01- undeveloped, vegetated land draining with low slopes from east to west towards the site boundary ultimately entering the unnamed watercourse to the west of the site, the Bearbrook tributary.
- EWS02- undeveloped with the exception of one residential home, reaching the roadside ditch along Boundary Road.
- EWS03- undeveloped, vegetated ribbon of the land draining with low slopes from east to west towards the site boundary ultimately entering the unnamed watercourse to the west of the site, the Bearbrook tributary. This section of land for the most part has separate zoning (O1R) from the remainder of the site, which prohibits development. For this reason, the majority of this will remain in pre development state or similar.

7.2 Design Criteria

The stormwater management criteria for this development is based on the pre-consultation with City of Ottawa officials, South Nation Conservation Authority, 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

To provide the controlled runoff water quality control for this site, oil-grit (sediment) separators are proposed which will provide an 80% (minimum) Total Suspended Solids (TSS) removal while treating >90% of the annual runoff. Stormceptor Oil and Grit separators are proposed and will be installed at the downstream ends of both proposed outlets. See ***Appendix F*** for the site specific design, type, and more information on the treatment units proposed.

7.2.2 Water Quantity

In pre-development conditions, the extent of this site is vacant with the majority of the land coverage being treed. The post-development conditions will result in an increase in the impervious surfaces; therefore, quantity control measures will be implemented.

The allowable release rate, to mimic pre-development conditions, was determined by JFSA using SWMHYMO modeling. The 100-year and 5-year post-development flows will be controlled to the respective 100-year and 5-year pre-development levels or below giving consideration to downstream erosion exceedance analysis. To do so, an inlet control device will be installed at the outlets with retention being provided on site in allocated stormwater retention basins, as well as small ponding depths above catch basins in the paved and granular surface.

7.3 Proposed Stormwater Management Design Overview

The site has been designed to mimic predevelopment conditions with 2 separate outlets; a North Outlet encompassing the majority of the site development and the proposed buildings, and an east outlet capturing the parcel of land with frontage along Boundary Road. This is detailed in the pre and post development watershed plans (C701 and C702) included in ***Appendix E***.

Surface grading has been completed to ensure water is directed away from all building envelopes, collected in a series of catch basin manholes or directed overland to and conveyed to stormwater retention areas prior to being attenuated and directed offsite.

To meet quality control requirements, storm quality treatment units (Stormceptor EFO6 (North) and Stormceptor EFO4 (East) or approved equivalent) are proposed at each outlet as specified on the civil engineering drawings which ensure quality control objectives are met. Details of the selected models are included in **Appendix F**.

All storm sewers have been sized using the rational method, further confirmed through the detailed PCSWMM model completed by JFSA for the subject development. Refer to ***Appendix F*** for storm sewer design details.

Given site constraints and design constraints such as soil conditions, surrounding elevations, and long pipe runs, the storm sewers have been proposed with low cover. Therefore; insulation over the pipes has been proposed. The details for the installation of the insulation has been summarized in the geotechnical report prepared by Patterson Group.

8 CONCLUSIONS

This report has been prepared to support the site plan application for the proposed industrial development located at 6160 Thunder Road and 5368 Boundary Road consisting of two (2) industrial buildings with accompanying asphalt parking, vehicular maneuverability and granular parking areas.

Based on the forgoing the conclusions in relation to the serviceability of the site are as follows:

- Water:
    - Domestic demands will be required to be supplied by the Carlsbad Springs trickle-feed supply system. Three (3) equivalent connections are required to meet the domestic demands of the proposed buildings and the potential for future business operation expansions for the end user.
    - A fire water storage tank as well as an site fire hydrant are required to provide the water required for fire fighting purposes. Fire demands of development on the subject property have been calculated using the OBC, and have determined a minimum volume of 49 100 L will be required.
    - The buildings will be connected to the trickle feed system off of Thunder Road controlled to a constant rate of 0.094 L/s at the metering chamber .
    - The building will be equipped with a water storage reservoirs sized to accommodate peak flows and is intended to be constructed under the building slab.
- Sanitary Sewage:
    - Building uses have been assessed to provide an expected sanitary effluent of 1875 L/day.
    - A 100mm diameter PVC sanitary sewer has been proposed to be installed from the proposed building conveying effluent to pretreatment and balancing tanks, prior to pumping via a 38mm force main to a septic bed.
- Stormwater Management:

- The property is mostly pervious area in existing conditions. In developing the lot into a "light industrial" lot, the development has increased the impervious area triggering a large quantity of runoff to be stored on site to meet the quantity targets outlined by JFSA in the detailed stormwater management design. The predevelopment peak flows for the site under the 100 year SCS 24 Hr storm event are 0.286 m^3/s.
- Stormwater release rate will be controlled through two separate outlet control devices: one controlling runoff before entering the ditch along Boundary Road, and one offering flow control before leaving the subject property into the Bearbrook Tributary waterway. The site has been designed to ensure post development flows do not exceed predevelopment values nor downstream erosion thresholds.
- Storm quality treatment units (Stormceptor EFO6 (North) and Stormceptor EFO4 (East) or approved equivalent) are proposed at each outlet as specified on the Civil engineering Drawings which ensure quality control objectives are met.
- Reference to separate Stormwater Management Report Prepared by J.F. Sabourin and Associates Inc. is required for full SWM design description and modeling details.

9 CLOSURE

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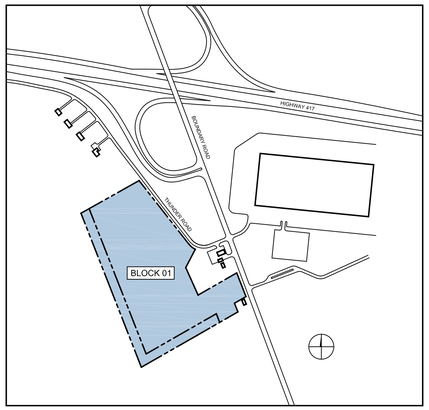
Prepared by:

LRL Associates Ltd.

Virginia Johnson, P. Eng.
Civil Engineer

APPENDIX A

Site Plan



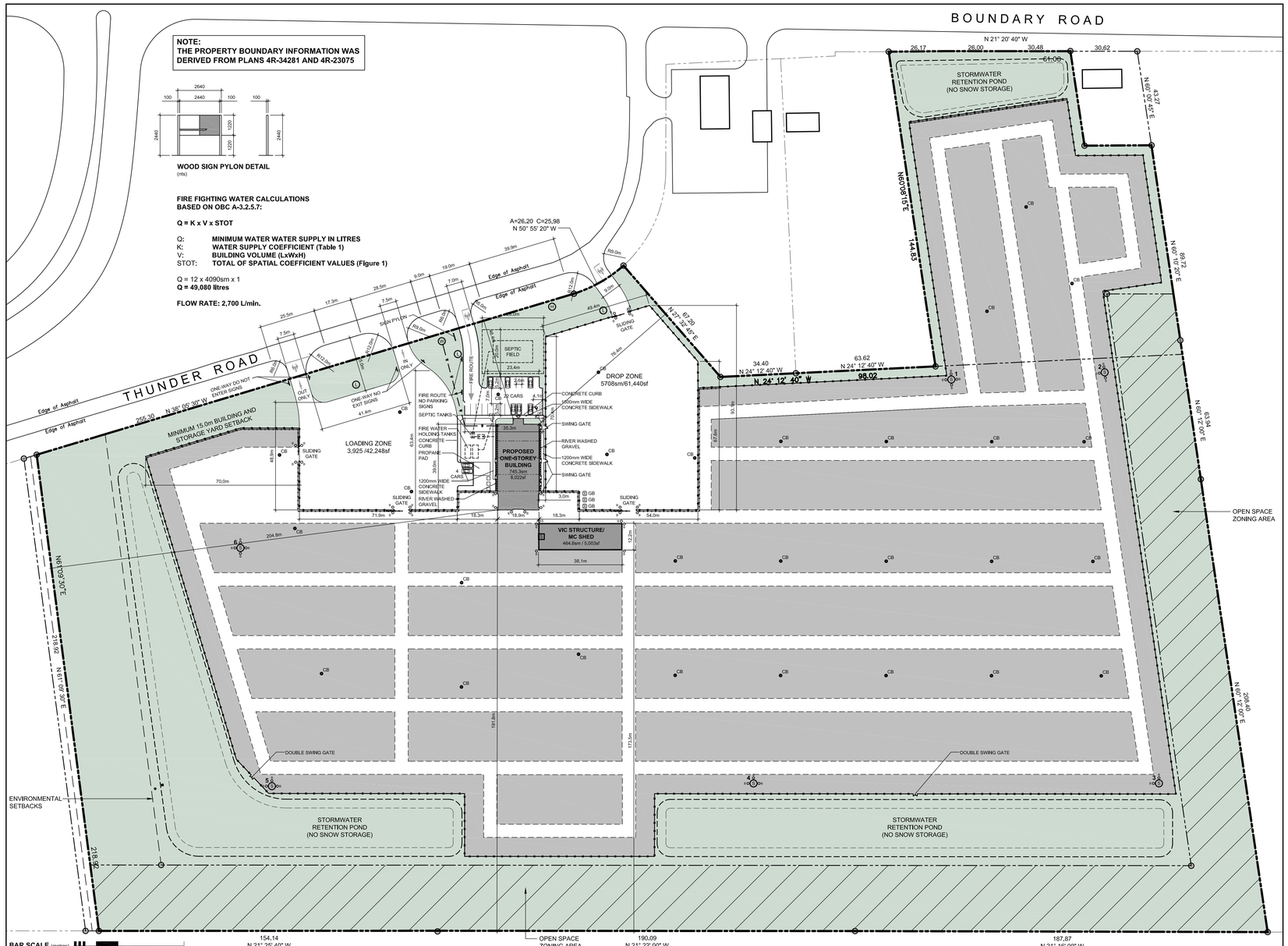
01 SP-A01 LOCATION PLAN
SCALE: NTS

SITE AREA SUMMARY			
	GROSS AREA	OPEN SPACE ZONING AREA	DEVELOPABLE NET AREA
BLOCK 01	15,16 HA 37,46 ACRES	2,38 HA 5,88 ACRES	12,3 HA 30,4 ACRES

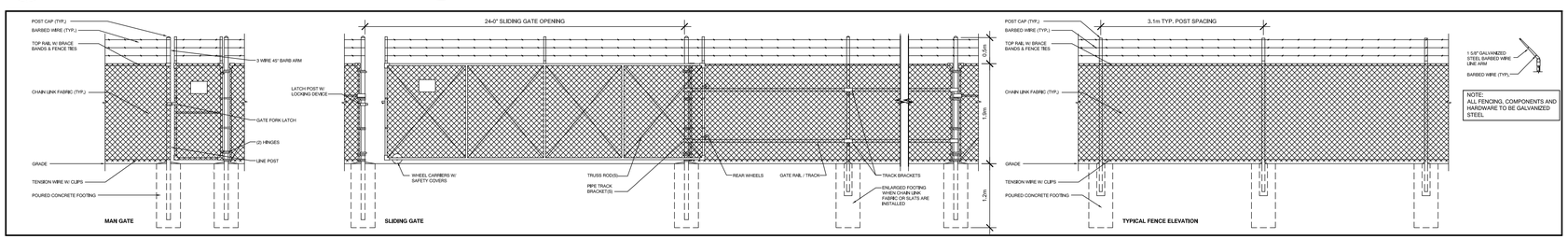
BUILDING AREA SUMMARY	
MAIN BUILDING	GFA = 745,3sm
VIC STRUCTURE /MC SHED	GFA = 464,8sm
TOTAL	GFA = 1,210,1sm

ZONING MECHANISM: ZONING BY-LAW 2008-250 CONSOLIDATION		REQUIRED/PERMITTED	PROVIDED
ZONING:	RG[908R]-h RURAL GENERAL INDUSTRIAL ZONE	LIGHT INDUSTRIAL LIMITED COMMERCIAL	LIGHT INDUSTRIAL
MINIMUM LOT AREA		0,4HA	TOTAL: 15,16HA 37,46 ACRES
MINIMUM LOT WIDTH		30m	281,5m THUNDER ROAD 82,7m BOUNDARY ROAD
MAXIMUM LOT COVERAGE		50,0% MAX	0,80%
MINIMUM FRONT YARD		15m	46,4m
MINIMUM CORNER SIDE YARD		12m	N/A
MINIMUM INTERIOR YARD SETBACK	ABUTTING RG, RH OR RC ZONES	3m	N/A
	ALL OTHER CASES	8m	NORTH: 204,8m SOUTH: 76,4m S
MINIMUM REAR YARD		15m	173,5m
MAXIMUM BUILDING HEIGHT		15m	5.5m
OUTDOOR STORAGE	NOT PERMITTED WITHIN ANY REQUIRED FRONT OR CORNER YARD		NO STORAGE IS PROPOSED IN REQUIRED 15m FRONT YARD
	STORAGE MUST BE SCREEN WHEN ABUTTING RESIDENTIAL ZONES AND PUBLIC STREETS		CHAIN LINK FENCE WITH VINYL SLATS PROPOSED ALONG ROADS
MINIMUM WIDTH OF LANDSCAPING		3,0m	PROVIDED
PARKING - TYPICAL SECTION 101	450,0sm OFFICE (2,4/100sm) 11 295,3sm WAREHOUSE (.8/100sm) 3 464,8sm WAREHOUSE (.8/100sm) 4	18	26
BICYCLE PARKING SECTION 111		NOT REQUIRED IN RURAL ZONE	0
LOADING SECTION 113		0 FOR LESS THAN 1000sm	0

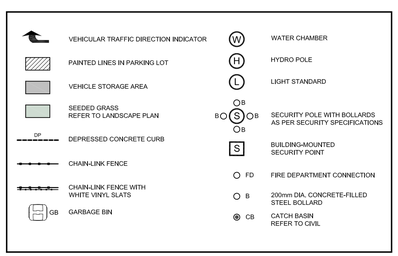
02 SP-A01 SITE & ZONING DATA & STATISTICS
SCALE: NTS



03 SP-A SITE PLAN
SCALE: 1:1500



04 SP-A01 FENCE DETAILS
SCALE: 1:50



05 SP-A01 SYMBOLS LEGEND
SCALE: NTS

24 X 36 – PLOT ARCH D

MCROBIE
ARCHITECTS + INTERIOR DESIGNERS

CLIENT:
AVENUE 31 CAPITAL INC.

REGISTERED OWNER:
EXIT 96 DEVELOPMENTS (2019) INC. &
THUNDER ROAD DEVELOPMENTS (2019) INC.
801-250 City Centre
Ottawa, ON K1R 6R7

PLANNING CONSULTANT:
RE:PUBLIC URBANISM
Montreal, QC

CIVIL ENGINEER:
LRL ENGINEERING
5430 Canotek Road
Ottawa, ON K1J 9G2

LANDSCAPE ARCHITECTS:
JAMES B. LENNOX & ASSOCIATES INC.
3332 Carling Avenue
Ottawa, ON K2H 5A8

TRAFFIC ENGINEERING
C.F. CROZIER & ASSOCIATES INC.
211 Yonge Street, Suite 600
Toronto, ON M5B 1M4

North

Revisions

No.	By	Description	Date
01	JAS	REVISED FOR REVIEW	2024-06-21
02	JAS	REVISED FOR REVIEW	2024-06-24
03	JAS	ISSUED FOR APPROVAL	2024-06-26
04	JAS	ISSUED FOR COORDINATION	2024-07-22
05	JAS	REVISED FOR COORD.	2024-07-30
06	JAS	ISSUED AS LEASE SCHEDULE	2024-08-08
07	JAS	REVISED FOR SPA	2024-08-16

Project
THUNDER ROAD INDUSTRIAL PARK
5368 BOUNDARY ROAD and
6160 THUNDER ROAD, OTTAWA

Drawing
LOCATION PLAN, ZONING REVIEW AND SITE PLAN

Scale: AS NOTED
Drawn: ERM
Checked: JAS

Stamp
ONTARIO ASSOCIATION OF ARCHITECTS
JILL TROWER
LICENCE 5833

Project No. 21-135
Date APRIL 2021

Drawing No. SP-A01

PLAN NO. _____

D07-12-21-0005

APPENDIX B

Pre Consultation Notes

Pre-Application Consultation Meeting Notes

Property Address: 6150 Thunder Road- "southern parcel"
File #PC2021-0254
August 9th, 2021

Attendees:
Anissa McAlpine City of Ottawa, Planner anissa.mcalpine@ottawa.ca
Kevin Hall, City of Ottawa, Project Manager Kevin.hall@ottawa.ca
Sami Rehman, City of Ottawa, Environmental Planner sami.rehman@ottawa.ca
Brent Harbers, SNCA bharbers@nation.on.ca
Stephen Kapusta, MTO, Stephen.kapusta@otario.ca

Regrets:
James Holland, SNCA jholland@nation.on.ca
Neeti Paudel, City of Ottawa, infrastructure approvals, Neeti.paudel@ottawa.ca

proponents:
Jennifer Murray, applicant <jmurray@ave31.com>;
Paul Hicks <hicks@republicurbanism.com>;
Gavin MacDonald <gmacdonald@ave31.com>;
Eric Malboeuf <Malboeuf@mcrobie.com>;

Subect:

- This pre-consultation meeting is to discuss the site plan control application needed for an industrial development at 5368 Boundary Road and a portion of 6150 Thunder Road.
- 6150 Thunder Road and 5368 Boundary Road are subject to a current Zoning By-law Amendment and Official Plan Amendment applications. Please note the site is not currently zoned nor designated for industrial development.
- The following notes are provided based on the assumption that the site will be zoned RG for Rural General industrial. Please note that a decision has not been rendered by the City Council on this matter yet. There is no current date expected for these applications to go before the Agriculture and Rural Affairs Committee nor council for a decision.
- Matters of holding symbols, split zoning, or setbacks greater than those typical of the RG zone may be recommended by staff to the ARAC on the above noted OPA and ZBLA applications.
- The following notes are provided based on a typical industrial site plan application. Staff would be pleased to update these pre-consultation notes, and the list of required plans and studies should an Official Plan Amendment and Zoning By-law Amendment be approved on the site.

- Please note that a City of Ottawa New Official Plan is scheduled to go to Council for a decision in Fall of 2021. The required submissions should speak to the proposed policies of the New Official Plan and how the proposal intends to comply with proposed policies. Depending on timing of application submission, the policy regime and requirements may change.

Proposed:

- Proposed is a one storey warehouse with retail and office component. Illustrated in the site plan provided is a 585 m2 office, a 585 m2 retail and a 4,960 m2 warehouse space and 74 parking spaces.
- 6150 Thunder Road is 16.71 ha in size, with frontage on both Thunder Road and Boundary Road. The property is bisected by an unnamed watercourse. The lands subject to the site plan pre-consultation are those located north of the watercourse and understood to be about 2.5 ha in size.
- The subject site is located directly south of a series of existing residences that front onto Thunder Road. Opposite the subject lands are on/off ramps of the 417 Highway. To the west of the property, lands are forested and contain the headwaters of Bearbrook Creek.
- The subject lands are designated General Rural in the Official Plan.
- There site is part of the Natural Heritage System identified on Schedule L1
- The proposed use is not appropriate in the General Rural Area. An OPA is required to bring the lands into the Rural Employment lands to support the use.
- The property is currently zoned RU (Rural Countryside) which does not permit warehouse/office, or retail use. A zoning amendment will be required to permit a warehouse, or retail use.
- The subject lands are serviced with water by the Carlsbad Trickle Feed (Pubic service area). Water availability to the site is limited. Please see Engineering notes below.
- Until such a time as a zoning amendment is approved for the site, it is challenging discuss the permitted uses or zoning provisions. Should a zoning amendment for a rural industrial use be approved by City Council for the site, matters of water servicing, compatibility with adjacent users, natural heritage or hazard lands may result in the use of zoning hold symbols, or setbacks different than those typical in the proposed RG zone being utilized.

Design Considerations

- A planning rationale would be required to support the site plan application: It must assess the types and levels of contaminant discharges expected by the specific industry, including those associated with transportation facilities which serve the industries. **Necessary mitigative measures should be identified based upon technical assessments.** Rationalization of site design should be provided. Discussion of existing and proposed D-6 Guidelines needs to be provided. Greater setbacks than the minimums provided in the zoning by-law may be required.
- The city will be looking for recommendations to reduce energy and water consumption through landscaping and lot layout, as per OP section 4.9
- The public frontage of the site should be designed to include high quality landscaping.
- Elevation drawings are required for the proposed buildings.
- A landscape plan is required as part of the submission package.

Engineering Considerations

- Connection will be to the Carlsbad Trickle Feed Water System. A servicing report or brief will be required to confirm that there is capacity in the system to supply the site. There are 3 residential equivalent connections to the Trickle Feed System available to site (combined with 6150 Thunder road lands to the north of the unnamed water course). Staff advise there

are 6 additional connections available on first come first serve basis for site plans at the time of registration.
- Stormwater will need to be controlled post development to the pre-development rates. Quality controls will come from the CA.
- The site will require a septic system. As the flows are expected to exceed 10,000l/d, then the approval will be the MECP and not the Ottawa Septic Office.
- MECP approval for stormwater will most likely be required. You will need to confirm with the MECP.
- You will need to confirm whether this property is in the capture area of the Municipal Drains in the area. There is some Drainage Act Approvals proceeding in this area.
- All approvals from other authorities, including ECA approvals from the MECP should be identified.

Transportation and Noise Considerations

- Please provide a figure to confirm the sight lines for the access close to Boundary on Thunder.
- Any comments related to the site plan that were not addressed previously at ZBLA and OPA applications should be addressed.
- Ensure the throat length at the access is met per TAC standards for a collector road.
- Stationary noise study will be required (site is in close proximity to noise sensitive use).

Environmental Considerations

- Any development will require an EIS as the site is identified as part of the City's Natural Heritage System (Official Plan Schedule L1). The EIS will need to address,
    - Significant woodlands and compensation for any removal
    - Headwater Drainage Feature assessment and watercourse relocation. Consideration of thermal regimes.
    - Potential SAR habitat, OP Section 4.7.4
    - Watercourse Setbacks, OP section 4.7.3. Low impact development cannot be located in these setbacks.
    - Significant wildlife habitat
    - Setbacks from wetlands on adjacent properties.
- Tree Conservation Report (TCR) will be required. TCR can be combined with the EIS to reduce duplications. Guidance for this report can be found on the city's website through the link provided below.
- We encourage the applicant to review and draw design elements from the City's Bird-Safe Design Guidelines to incorporate into their design, especially for the office section

of their proposal where large glass windows are anticipated. https://ottawa.ca/en/city-hall/public-engagement/projects/bird-friendly-design-guidelines

- The city will be looking for recommendations to reduce energy and water consumption through landscaping and lot layout, as per OP section 4.9
- Please draw best practices from the City's protocol to protection wildlife during construction into the EIS recommendations
- Here are some relevant links:
  https://documents.ottawa.ca/sites/documents/files/documents/eis_guidelines2015_en.pdf

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

  https://documents.ottawa.ca/sites/documents/files/documents/construction_en.pdf
- The applicant should consult with the with Conservation Authority regarding potential floodplain and if any permits will be required.

Conservation Authority Comments

Environmental

- An EIS with mitigation recommendations for the protection of the adjacent natural features, thermal impacts of the stormwater infrastructure, and offsetting requirements for the loss of headwater drainage features.
- headwater drainage features assessment following standard protocols
- A landscaping plan implementing the requirements of the EIS
- A detail design of the any realigned drainage features

Stormwater Management

- Treatment to achieve 80% TSS removal. The stormwater package should include, at a minimum, a report demonstrating how the standards are achieved, a grading and drainage plan and a sediment and erosion control plan.
- The design must implement the recommendations of the floodplain analysis, environmental studies and plans

Hazards

- Completion of a flood analysis demonstrating that development of the property will have no negative impacts on flooding or erosion upstream or downstream of the property.

Conservation Authority Regulations

- Any interference with a watercourse may require a permit under O. Reg. 170/06 and restrictions may apply

MTO comments

- A building and land use permit is required from the MTO. MTO staff will be looking to review a Transportation Impact Assessment, a Stormwater Management Plan, and a Site Illumination Plan.

Development Applications Required

To move forward with this proposal, an Site Plan Control, (standard) will be required. Please review the fees associated with this here.

Enclosed is a *Study and Plan Identification List*, which identifies the required studies and plans to support your application would be provided with these notes. Staff would be pleased to update this list, upon request should the site zoning be approved. For additional information on preparing studies and plans, please click on the following hyperlink: Guide to Preparing Studies and Plans.

The property is in Ward 19-Cumberland, with Councillor Catherine Kitts It is in your best interest to initiate contact with close neighbours as well as the Councillor and Registered Community Groups. In addition, it may be beneficial to contact key technical agencies that may be involved in this file to discuss the proposal before submitting an application.

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

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

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

APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

– SITE PLAN APPLICATION – private/municipal servicing

For information on preparing required studies and plans refer to:
http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans

required	ENGINEERING		required
x	1. Site Servicing Plan	2. Assessment of Adequacy of Servicing / Site Servicing Study / Brief	x
x	3. Grade Control and Drainage Plan	4. Geotechnical Study / Slope Stability Study	X
	5. Composite Utility Plan	6.	
	7. Servicing Options Report	8. Wellhead Protection Study	
x	9. Transportation impact assessment	10. Erosion and Sediment Control Plan / Brief	x
x	11. Storm water Management Report	12. Hydro-geological and terrain analysis	x
	13. Hydraulic Water main Analysis	14. Stationary noise	x
	15. Roadway Modification Design Plan	16. Confederation Line Proximity Study	

required	PLANNING / DESIGN / SURVEY		Required
	17. Draft Plan of Subdivision	18. Plan Showing Layout of Parking Garage	
	19. Draft Plan of Condominium	20. Planning Rationale	x
x	21. Site Plan	22. Minimum Distance Separation (MDS)	
	23. Concept Plan Showing Proposed Land Uses and Landscaping	24. Agrology and Soil Capability Study	
	25. Concept Plan Showing Ultimate Use of Land	26. Cultural Heritage Impact Statement	
x	27. Landscape Plan – on site plan will likely be sufficient	28. Archaeological Resource Assessment Requirements: **S** (site plan) **A** (subdivision, condo)	
x	29. Survey Plan	30. Shadow Analysis	
x	31. Architectural Building Elevation Drawings (dimensioned)	32. Design Brief (includes the Design Review Panel Submission Requirements)	
	33. Wind Analysis		

required	ENVIRONMENTAL		required
	34. Phase 1 Environmental Site Assessment	35. Impact Assessment of adjacent Waste Disposal/Former Landfill Site	
	36. Phase 2 Environmental Site Assessment (depends on the outcome of Phase 1)	37. Assessment of Landform Features	
	38. Record of Site Condition	39. Mineral Resource Impact Assessment	
x	40. Tree Conservation Report	41. Environmental Impact Statement / Impact Assessment of Endangered Species	x
	42. Mine Hazard Study / Abandoned Pit or Quarry Study	43. Site illumination plan	x

Meeting Date: August 9, ***2021***

Application Type: ***Site Plan Control***

File Lead: Anissa McAlpine

Engineer/Project Manager:
Kevin Hall

Site Address: **1650 Thunder Road (Southern parcel)**

It is important to note that the need for additional studies and plans may result during application review. If following the submission of your application, it is determined that material that is not identified in this checklist is required to achieve complete application status, in accordance with the Planning Act and Official Plan requirements, City Planning will notify you of outstanding material required within the required 30 day period. Mandatory pre-application consultation will not shorten the City's standard processing timelines, or guarantee that an application will be approved. It is intended to help educate and inform the applicant about submission requirements as well as municipal processes, policies, and key issues in advance of submitting a formal development application. This list is valid for one year following the meeting date. If the application is not submitted within this timeframe the applicant must again pre-consult with the City.

Notes:

2. The City requires sufficient information (water, stormwater, sanitary) - required as per Official Plan section 4.4.2. for proposals. May be a brief at submission stage.

4. Geotechnical Study / Slope Stability Study – required as per Official Plan section 4.8.3. All site plan applications need to demonstrate the soils are suitable for development. A Slope Stability Study may be required with unique circumstances (Schedule K or topography may define slope stability concerns).

6. Groundwater Impact Assessment required as per Official Plan sections 4.4.2, 4.7.5 & 4.8.2. When reviewing development applications the City will consider the potential impact on groundwater.

8. Wellhead Protection Plan required as per Official Plan sections 4.4.2, 4.4.2.4, 4.7.5 & 4.8.2. When reviewing development applications, the City will consider the potential impact on wellhead protection areas (municipal wells and wells with an MRA).

10. Erosion and Sediment Control Plan – required with all site plan applications as per Official Plan section 4.7.3.

11. Stormwater Management Report/Brief - required with all site plan applications as per Official Plan section 4.7.6.

12. Hydrogeological and Terrain Analysis Study – required as per Official Plan 4.4.2.1, 4.4.2.4 & 4.7.5. Will be required for a proposed change in land use that would allow residential development or institutional uses (such as schools or seniors homes) on private water and wastewater servicing.

14. Noise and Vibration Study – a Noise Study will be required if noise sensitive development is proposed within 250 metres of an existing or proposed highway or a railway right-of-way, or 100 metres of an arterial or collector roadway or rapid-transit corridor. A Vibration Study will be required if the proposed development is within 75 metres of either an existing or proposed railway ROW. A Noise Study may also be required if the proposed development is adjacent to an existing or proposed stationary noise source..

35. An Impact Assessment of an Adjacent Waste Disposal/Former Landfill Site study is required for development proposals within 500 metres of a solid waste disposal site or other appropriate influence area or former landfill site. For contaminated sites a Record of Site Condition or letter of continued use is required.

39.A Mineral Resource Impact Assessment study is required, as per Official Plan section 3.7.4 adjacent to an unlicensed Limestone Resource or Sand and Gravel Resource Area (very limited uses considered within 500 metres of Limestone Resource Area or 300 metres of Sand and Gravel Resource Area). A study is required

- adjacent to, or within 300 metres of, a licensed pit
- adjacent to, or within 500 metres of, a licensed quarry

APPENDIX C

Site Topography

I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.

AUGUST 22ND ,2008

MARC P. PAYETTE
ONTARIO LAND SURVEYOR

PLAN 4R-23015

RECEIVED AND DEPOSITED

Aug 22. 2008

LAND REGISTRAR FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON NO. 4

SCHEDULE

PART	PART OF LOT	CONCESSION	P.I.N.	AREA (square metres)
1	1	9 (OTTAWA FRONT)	ALL OF P.I.N. 04324-0157	1312
2			PART OF P.I.N. 04324-0153	8821

PLAN OF SURVEY OF

PART OF LOT 1
CONCESSION 9 (OTTAWA FRONT)

Geographic TOWNSHIP OF GLOUCESTER, now in the CITY OF OTTAWA

MARC P. PAYETTE, O.L.S.

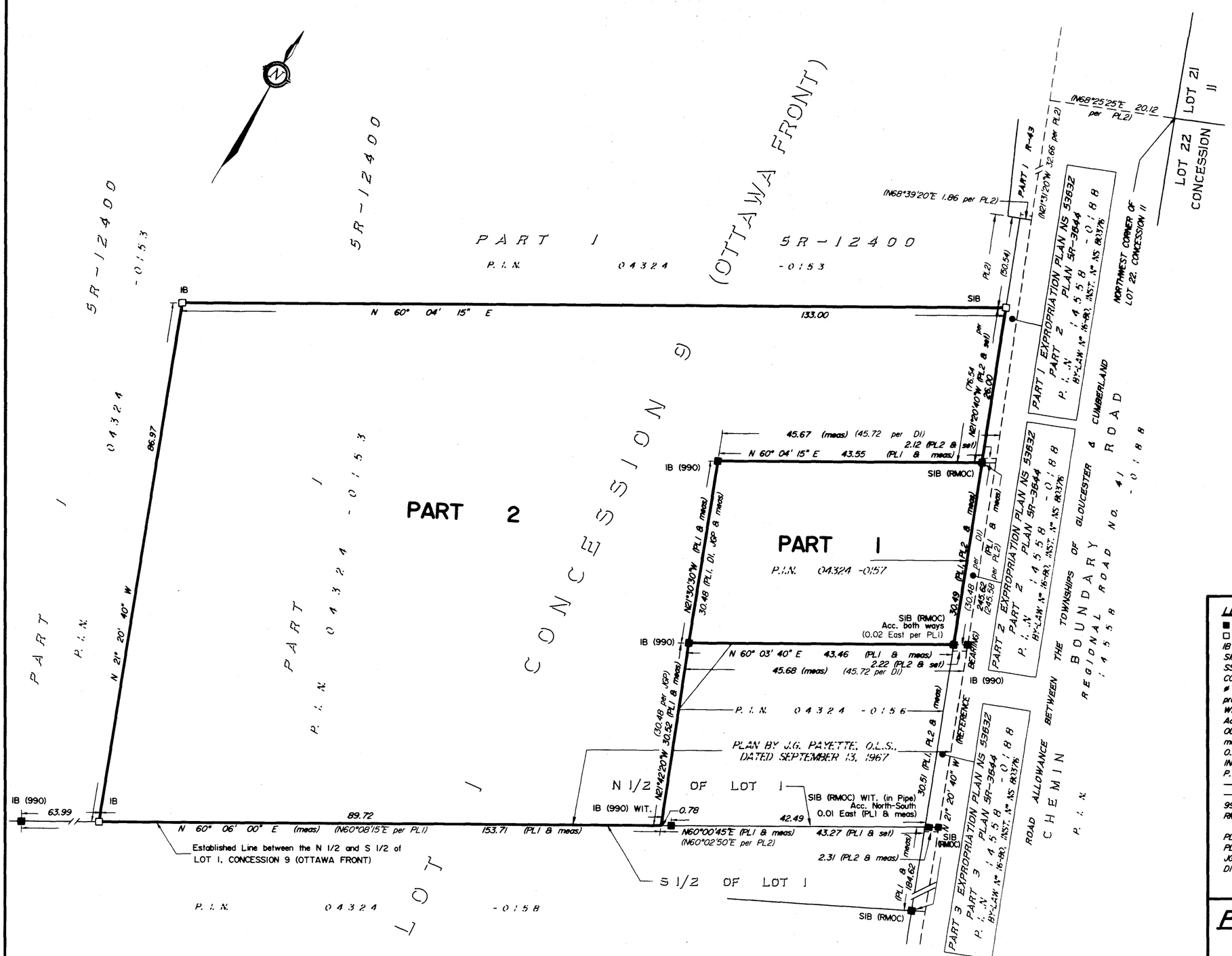
2008

SCALE 1 : 500

0 10 25 50 METRES

METRIC

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



LEGEND

■	SURVEY MONUMENT FOUND
□	SURVEY MONUMENT SET
IB	IRON BAR
SIB	STANDARD IRON BAR
SSIB	SHORT STANDARD IRON BAR
CC	CUT CROSS
ø	ROUND OR DIAMETER
prop	PROPORTIONED
WIT.	WITNESS
Acc.	ACCEPTED
OU	ORIGIN UNKNOWN
meas	MEASURED
O.L.S.	ONTARIO LAND SURVEYOR
INST. N°	INSTRUMENT NUMBER
P.I.N.	PROPERTY IDENTIFIER NUMBER
—//—	NOT TO SCALE
—x—	FENCING
990	PAYETTE, HIMMA, DELORME LTD.
RMOC	REGIONAL MUNICIPALITY OF OTTAWA-CARLETON
PL1	PLAN 5R-12400
PL2	EXPROPRIATION PLAN N° NS 53632
JGP	PLANS BY J.G. PAYETTE, O.L.S.
D1	INST. N° CT 193310

SURVEYOR'S CERTIFICATE

I CERTIFY THAT

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON JULY 7TH, 2008.

DATED: AUGUST 22ND, 2008

MARC P. PAYETTE
ONTARIO LAND SURVEYOR

NOTES

BEARING-BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO PART OF THE WESTERLY LIMIT OF CHEMIN BOUNDARY ROAD (as widened) AS SHOWN ON PLAN 5R-12400 HAVING A BEARING OF N 21° 20' 40" W.

PAYETTE, HIMMA, DELORME LTD./LTÉE.

ONTARIO LAND SURVEYORS

OTTAWA - ROCKLAND, ONTARIO

REF. N° 08-0308

SKETCH ILLUSTRATING TOPOGRAPHIC INFORMATION AT

6150 THUNDER ROAD
5336 to 5376 Boundary Road
CITY OF OTTAWA

Prepared by Annis, O'Sullivan, Vollebekk Ltd.

February 27, 2020.

PROPOSED BORE HOLES (Marked on Site)

	MTM Nad83 (Original) Zone 9		
POINTNUMBER	NORTHING	EASTING	GROUND ELEVATION
BH No 1	5023306.75	387472.69	77.22
BH No 2	5023193.73	387485.63	76.76
BH No 3	5023212.61	387635.78	76.90
BH No 4	5023122.95	387602.13	77.32

Scale 1 : 1000

40 30 20 10 0 20 40 Metres

Metric

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

Notes & Legend

Caution

This is NOT a Plan of Survey and shall not be used except for the purpose indicated in the title block.

Boundary information compiled from Survey Records

Elevations are geodetic CGVD28 and are related to NCC control Monument 019680159

CSP = Corrugated Steel Pipe

BH = Borehole

+65.00 = Location of Elevations

= Property Line

PARCEL A
8029 Sq.m.

PARCEL B
8022 Sq.m.

PARCEL C
8037 Sq.m.

PARCEL C
61098 Sq.m.
6.110 HA
15.098 Acres

PARCEL D
92320 Sq.m.
9.232 HA
22.813 Acres

PARCEL E
1308 Sq.m.
0.131 HA
0.32 Acres
PIN 04324 - 0156

PARCEL F
19432 Sq.m.
1.943 HA
4.80 Acres
PIN 04324 - 0158

PARCEL G
6 Sq.m.
PIN 04324 - 0158
PART 1 PLAN 5R-4318
EASE. INST. NS60057

THUNDER ROAD
PIN 04324 - 0164

BOUNDARY ROAD
PIN 04324

GLOUCESTER FRONT) OTTAWA GEOGRAPHIC TOWNSHIP OF CUMBERLAND

CONCESSION 9 LOT 21 (GEOGRAPHIC TOWNSHIP OF CUMBERLAND)

CONCESSION 1 LOT 22 (GEOGRAPHIC TOWNSHIP OF CUMBERLAND)

CONCESSION 2 LOT 23 (GEOGRAPHIC TOWNSHIP OF CUMBERLAND)

BETWEEN GEOGRAPHIC TOWNSHIPS OF CUMBERLAND AND GLOUCESTER

ALLOWANCE BETWEEN LOTS 21 AND 22

ROAD ALLOWANCE BETWEEN CONCESSIONS 9 AND 1

REGIONAL ROAD NO. 41 CHEMIN BOUNDARY ROAD

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. 17933-18 Ave3I P1 Lt 1 C9 OF GL S2 DI ST

SKETCH ILLUSTRATING TOPOGRAPHIC INFORMATION AT

6150 THUNDER ROAD
5336 to 5376 Boundary Road
CITY OF OTTAWA

Prepared by Annis, O'Sullivan, Vollebekk Ltd.

December 15, 2020.

PROPOSED BORE HOLES (Marked on Site)

MTM Nad83 (Original) Zone 9			
POINTNUMBER	NORTHING	EASTING	GROUND ELEVATION
BH No 1	5023306.75	387472.69	77.22
BH No 2	5023193.73	387485.63	76.76
BH No 3	5023212.61	387635.78	76.90
BH No 4	5023122.95	387602.13	77.32

Scale 1 : 1000

40 30 20 10 0 20 40 Metres

Metric

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

Notes & Legend

Caution

This is NOT a Plan of Survey and shall not be used except for the purpose indicated in the title block.

Boundary information compiled from Survey Records

Elevations are geodetic CGVD28 and are related to NCC control Monument 019680159

CSP = Corrugated Steel Pipe

BH = Borehole

+ 65.00 = Location of Elevations

= Property Line

GEOGRAPHIC TOWNSHIPS OF CUMBERLAND AND GLOUCESTER

BETWEEN CUMBERLAND BOUNDARY ROAD AND

ALLOWANCE TOWNSHIPS CHEMIN ROAD NO. 41

ROAD GEOGRAPHIC REGIONAL

PARCEL A 8029 Sq.m.

PARCEL B 8022 Sq.m.

PARCEL C 8037 Sq.m.

PARCEL C 61098 Sq.m. 6.110 HA 15.098 Acres

PARCEL D 92320 Sq.m. 9.232 HA 22.813 Acres

PARCEL E 1308 Sq.m. PIN 04324 - 0156

PARCEL F 19432 Sq.m. 1.943 HA 4.80 Acres

PARCEL G 6 Sq.m. PIN 04324 - 0158 PART 1 PLAN 5R-4318 EASE. INST. N580057

THUNDER ROAD PIN 04324 - 0161

LIMIT BETWEEN THE NORTH 1/2 AND THE SOUTH 1/2 OF LOT 1

LOT 1 CONCESSION 9 (GEOGRAPHIC TOWNSHIP OF OTTAWA FRONT)

LOT 21 CONCESSION II (GEOGRAPHIC TOWNSHIP OF CUMBERLAND)

LOT 22 CONCESSION II

PIN 04324 - 0159

PIN 14558 - 0415

PIN 14558-0360

PIN 14558-0392

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. 17933-18 Ave3I PI L1 I C9 OF GL S2 D2 | ST

LRL
ENGINEERING | INGÉNIERIE

EXISTING TOPOGRAPHY

5368 Boundary Road and 6150 Thunder Road, Ottawa ON

APPENDIX B

DATE:
DECEMBER 2020

SK02

I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.

DATE: ~~JAN. 14, 2022~~

E. H. HERWEYER
ONTARIO LAND SURVEYOR

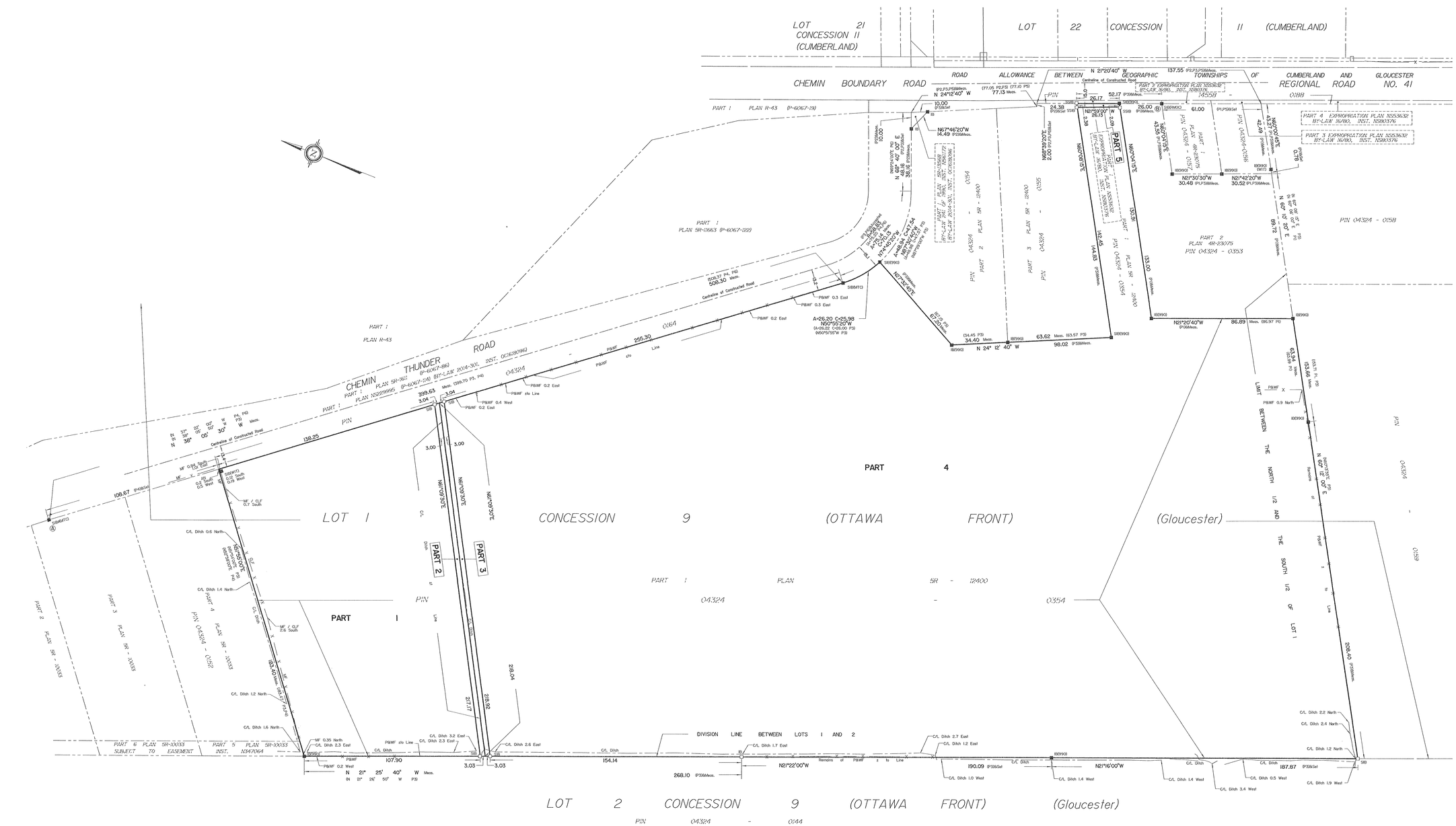
PLAN 4R-34281

RECEIVED AND DEPOSITED
DATE: January 14, 2022

REPRESENTATIVE FOR
LAND REGISTRAR FOR THE
LAND TITLES DIVISION OF
OTTAWA-CARLETON NO. 4.

SCHEDULE

PART	LOT	CONCESSION	PIN
1	PART OF 1	9 (OTTAWA FRONT) (GLOUCESTER)	ALL OF 04324-0354
2			
3			
4			
5			



PLAN OF SURVEY OF

PART OF LOT 1
CONCESSION 9 (OTTAWA FRONT)
Geographic Township of Gloucester
CITY OF OTTAWA

Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

Scale 1 : 1000

40 30 20 10 0 20 40 Metres

Metric

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

Surveyor's Certificate

I CERTIFY THAT :

1. This survey and plan are correct and in accordance with the Surveys Act, the Surveyors Act and the Land Titles Act and the regulations made under them.
2. The survey was completed on the 29th day of September, 2021.

JAN. 14, 2022
Date

E. H. Herweyer
Ontario Land Surveyor

Notes & Legend

—○—	Denotes	Survey Monument Planted
—■—	-	Survey Monument Found
SIB	-	Standard Iron Bar
SSIB	-	Short Standard Iron Bar
IB	-	Iron Bar
(MIT)	-	Witness
(AOG)	-	Annis, O'Sullivan, Vollebekk Ltd.
Meas.	-	Measured
(P1)	-	Plan 4R-23075
(P2)	-	Plan 5R-13568
(P3)	-	Plan 5R-12400
(P4)	-	Plan 5R-10033
(P5)	-	Expropriation Plan NS53632
(P6)	-	Plan 5R-1611 (P-6067-66)
AN	-	Anchor
P&WF	-	Post & Wire Fence
CLF	-	Chain Link Fence
MF	-	Metal Fence
C/L	-	Centreline

Distances shown on this plan are ground distances and can be converted to grid distances by multiplying by the combined scale factor of 0.999972.

Bearings are grid, derived from Can-Net 2016 Real Time Network GPS observations on reference points A and B, shown hereon, and are referenced to Specified Control Points 01919760726 and 00819900461, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

For comparison purposes, bearings shown on Plans P4 & P6 are astronomic bearings.

Coordinates are derived from Can-Net 2016 Real Time Network GPS observations referenced to Specified Control Points 01919760726 and 00819900461, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

Coordinate values are to urban accuracy in accordance with O. Reg. 216/10.

, 01919760726	Northing	5009740.96	Easting	383093.28
, 00819900461	Northing	5007460.66	Easting	432311.81
, Point A	Northing	5023746.86	Easting	387161.20
, Point B	Northing	5023204.99	Easting	387648.64

Caution: Coordinates cannot, in themselves, be used to re-establish corners or boundaries shown on this plan.

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

Job No. 17933-18 Ave3I PI L1 I C9 OF GL RP F

APPENDIX D

Fire Protection Calculations

Fire Flow Calculations as per Ontario Building Code (OBC)

LRL File No. : 200578
Project : Proposed Industrual Development
Location : 6160 Thunder Road, Ottawa
Date : August 2, 2024
Prepared by : V. Johnson
Modified By: S.Vora

Fire Protection Water Supply Calculations

$$Q = KVS_{Tot}$$

where

Q = minimum supply of water (L)
K = water supply coefficient from Table 1 of the OFM guidelines
V = total building volume (m^3)
S_{Tot} = total of spatial coefficient values from property line exposures on all sides

$$S_{Tot} = 1.0 + (S_{side1} + S_{side2} + S_{side3} + S_{side4})$$

		Exposure Distance (m)	
S_{Side1} =	0.00	>10	(North)
S_{Side2} =	0.00	>10	(East)
S_{Side3} =	0.00	>10	(South)
S_{Side4} =	0.00	>10	(West)
1.0 + (Sside 1 + Sside 2 + Sside 3 + Side 4) (Max. value = 2.0)	**= 1.00**		

Building Classification= **F-3** (From Table 3.1.2.1)

Water Supply Coefficient (K)= **12** (From Table A3.2.5.7)
Non Combustale, Fire Sep.

Building Information based on Architectural Drawing

	Building A	VIC/ MC SHED	
Building Volume (m3)	4,084	1,931	
Min Wat Supply Vol	49,011	23,175	0

Per Architect

APPENDIX E

Civil Engineering Drawings

INDUSTRIAL PARK
6160 THUNDER RD AND 5368 BOUNDARY ROAD
OTTAWA, ON

REVISION 03

KEY PLAN (N.T.S.)

DRAWING INDEX	
TITLE PAGE	
GENERAL NOTES PLAN	C000
EROSION AND SEDIMENT CONTROL PLAN	C101
GRADING AND DRAINAGE - OVERALL PLAN	C301
GRADING AND DRAINAGE PLAN	C302
GRADING AND DRAINAGE PLAN	C303
GRADING AND DRAINAGE PLAN	C304
GRADING AND DRAINAGE PLAN	C305
SERVICING - OVERALL PLAN	C401
SERVICING PLAN	C402
SERVICING PLAN	C403
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

PROPOSED DEVELOPMENT
6160 THUNDER ROAD AND 5368 BOUNDARY ROAD
REV.03 - ISSUED FOR APPROVAL - AUGUST 16th 2024
LRL PROJECT no: 200578

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
08-16-2024
PROVINCE OF ONTARIO
NOT AUTHENTIC UNLESS SIGNED AND DATED

D07-12-21-0205

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 ON 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. 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.
5. GRANULAR 'A' SHALL BE PLACED TO A MINIMUM THICKNESS OF 30MM AROUND ALL STRUCTURES WITHIN THE PAVEMENT AREA.
6. SUB-EXCAVATE SOFT AREAS AND FILL WITH GRANULAR 'B' COMPACTED IN MAXIMUM 30MM LIFTS.
7. ALL WORK ON THE MUNICIPAL RIGHT OF WAY AND EASEMENTS TO BE INSPECTED BY THE MUNICIPALITY PRIOR BACKFILLING.
8. CONTRACTOR TO OBTAIN A ROAD OCCUPANCY PERMIT 48 HOURS PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL ROAD ALLOWANCE, IF REQUIRED BY THE MUNICIPALITY.
9. 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.
10. REFER TO ARCHITECTURAL SITE PLAN FOR DIMENSIONS AND SITE DETAILS.
11. STEP JOINTS ARE TO BE USED WHERE PROPOSED ASPHALT MEETS EXISTING ASPHALT. ALL JOINTS MUST BE SEALED.
12. 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. ANY MODIFICATIONS IN ELEVATION BETWEEN THE SURVEY AND CONSTRUCTION THAT WILL AFFECT THE PROJECT ARE TO BE COMMUNICATED WITH THE ENGINEER PRIOR TO START OF CONSTRUCTION.
13. PRIOR TO START OF ANY WORK ON SITE, THE CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY EXISTING GRADES AND ENSURE OVERLAND DRAINAGE IS FEASIBLE WITH ACTUAL SITE CONDITIONS
14. ANY DISCREPANCIES ARE TO BE COMMUNICATED WITH THE ENGINEER PRIOR TO CONSTRUCTION.

ROADWORK SPECIFICATIONS

15. ROADWORK TO BE COMPLETED IN ACCORDANCE WITH GEOTECHNICAL REPORT, PREPARED BY PATERSON GROUP, DATED JULY 22ND 2021.
16. AL 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. SERVICES TO BUILDING TO BE TERMINATED 1.0M FROM THE OUTSIDE FACE OF BUILDING UNLESS OTHERWISE NOTED.
3. 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.
4. "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.
5. SAFETY PLATFORMS SHALL BE PER OPSD 404.02.
6. 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.
7. 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

8. REFER TO SEPTIC DESIGN PERFORMED BY PATERSON FOR SPECIFIC REQUIREMENTS.

STORM

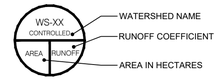
9. ALL REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.2, OR LATEST AMENDMENT. ALL NON-REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.1, OR LATEST AMENDMENT. PIPE SHALL BE JOINED WITH STD. RUBBER GASKETS AS PER CSA A257.3, OR LATEST AMENDMENT.
10. 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.
11. ALL PVC STORM SEWERS ARE TO BE SDR 35 APPROVED PER C.S.A. B182.2 OR LATEST AMENDMENT, UNLESS OTHERWISE SPECIFIED.
12. CATCH BASIN SHALL BE IN ACCORDANCE WITH OPSD 705.010.
13. ALL CATCH BASINS SHALL HAVE 600MM SUMPS, UNLESS SPECIFIED OTHERWISE.
14. 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.
15. ALL ROAD AND PARKING LOT CBMH STRUCTURES TO BE INSTALLED WITH ORTHOGONALLY PLACED SUBDRAINS EXTENDING A MIN. OF 3.0m IN ALL FOUR DIRECTIONS AND CLEARSTONE WRAPPED IN FILTERCLOTH. PERFORATED SUBDRAIN FOR ROAD AND PARKING LOT CATCH BASIN SHALL BE INSTALLED PER CITY STD R1 UNLESS OTHERWISE NOTED.
16. PERFORATED SUBDRAIN FOR REAR YARD AND LANDSCAPING APPLICATIONS SHALL BE INSTALLED PER CITY STD S29, S30 AND S31, WHERE APPLICABLE.
17. RIP-RAP TREATMENT SEWER AND CULVERT OUTLETS PER OPSD 810.010.
18. ALL STORM SEWER/ CULVERTS TO BE INSTALLED WITH FROST TREATMENT PER OPSD 803.031 WHERE APPLICABLE.
19. ALL STORM MANHOLES WITH PIPE LESS THAN 900MM IN DIAMETER SHALL BE CONSTRUCTED WITH A 300MM SUMP AS PER SDG, CLAUSE 6.2.6.
20. ALL STORM CATCHBASIN MANHOLES TO BE INSTALLED C/W SUBDRAINS 3m LONG IN FOUR ORTHOGONAL DIRECTIONS AS PER GEOTECHNICAL RECOMMENDATIONS.

WATER SERVICE (DOMESTIC)

21. ALL WATERMAIN INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE CITY OF OTTAWA AND THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS).
22. ALL PVC WATERMAINS SHALL BE AWWA C-900 CLASS 150, SDR 18 OR APPROVED EQUIVALENT.
23. 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.
24. 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.
25. CATHODIC PROTECTION IS REQUIRED ON ALL METALLIC FITTINGS PER CITY OF OTTAWA STD.25.5 AND W25.6.
26. VALVE BOXES SHALL BE INSTALLED PER CITY OF OTTAWA STD W24.
27. WATERMAIN IN FILL AREAS TO BE INSTALLED WITH RESTRAINED JOINTS PER CITY OF OTTAWA STD.25.5 AND W25.6.
28. THRUST BLOCKING OF WATERMAINS TO BE INSTALLED PER CITY OF OTTAWA STD. W25.3 AND W25.4.
29. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY CAPS, PLUGS, BLOW-OFFS, AND NOZZLES REQUIRED FOR TESTING AND DISINFECTION OF THE WATERMAIN.
30. WATERMAIN CROSSING OVER AND BELOW SEWERS SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. W25,2 AND W25, RESPECTIVELY.
31. WATER SERVICES ARE TO BE INSULATED PER CITY STD. W23 WHERE SEPARATION BETWEEN SERVICES AND MAINTENANCE HOLES ARE LESS THAN 2.4M.
32. 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.
33. ALL WATERMAINS SHALL HAVE A MINIMUM COVER OR 2.4M, OTHERWISE THERMAL INSULATION IS REQUIRED AS PER STD DWG W22.
34. GENERAL WATER PLANT TO UTILITY CLEARANCE AS PER STD DWG R20.
35. 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.
36. 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.
37. 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.
38. 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.
39. ALL WATERMAIN STUBS SHALL BE TERMINATED WITH A PLUG AND 50MM BLOW OFF UNLESS OTHERWISE NOTED.
40. FOR FIRE PROTECTION WATERMAIN INSTALLATION REQUIREMENTS, DETAILS TO BE CONFIRMED BY FIRE CONSULTANTS.

LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- 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
- ×50.00BC PROPOSED BOTTOM OF CURB / ASPHALT ELEVATION
- ×50.00TC PROPOSED TOP OF CURB ELEVATION
- ×50.00EX MATCH INTO EXISTING ELEVATION
- ×70.19 EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- SUB SUB PROPOSED 100mmØ PERFORATED SUBDRAIN
- STM STM PROPOSED STORM SEWER
- SAN SAN PROPOSED SANITARY SEWER
- WTR WTR PROPOSED 75mmØ WATER SERVICE
- WM-FP WM-FP PROPOSED 250mmØ WATERMAIN (FIRE PROTECT)
- STM STM EXISTING STORM SEWER
- SAN SAN EXISTING SANITARY SEWER
- WTR WTR EXISTING WATERMAIN
- GAS GAS EXISTING GAS LINE
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED MANHOLE
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 5 YEAR HIGH WATER LEVEL
- PROPOSED 100 YEAR HIGH WATER LEVEL
- PROPOSED 100 YEAR + 20% HIGH WATER LEVEL
- STORM WATERSHED EXTENT



BENCHMARK:

BENCHMARK IS THE CONCRETE CULVERT CROSSING THUNDER ROAD (SEE C301 FOR LOCATION)
BENCHMARK IS TO BE FIELD VERIFIED AND CONFIRMED BY ANNIS O'SULLIVAN PRIOR TO CONSTRUCTION

PAVEMENT STRUCTURE

COURSE	MATERIAL	THICKNESS (mm) AUTOMOBILE PARKING	THICKNESS (mm) TRUCK ROUTE (HEAVY TRAFFIC)
SURFACE	HL.3 OR SUPERPAVE 12.5 ASPHALTIC CONCRETE	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:
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.

PAVEMENT STRUCTURE AS PER GEOTECHNICAL REPORT PREPARED BY PATERSON GROUP, DATED AUGUST 9th, 2024.

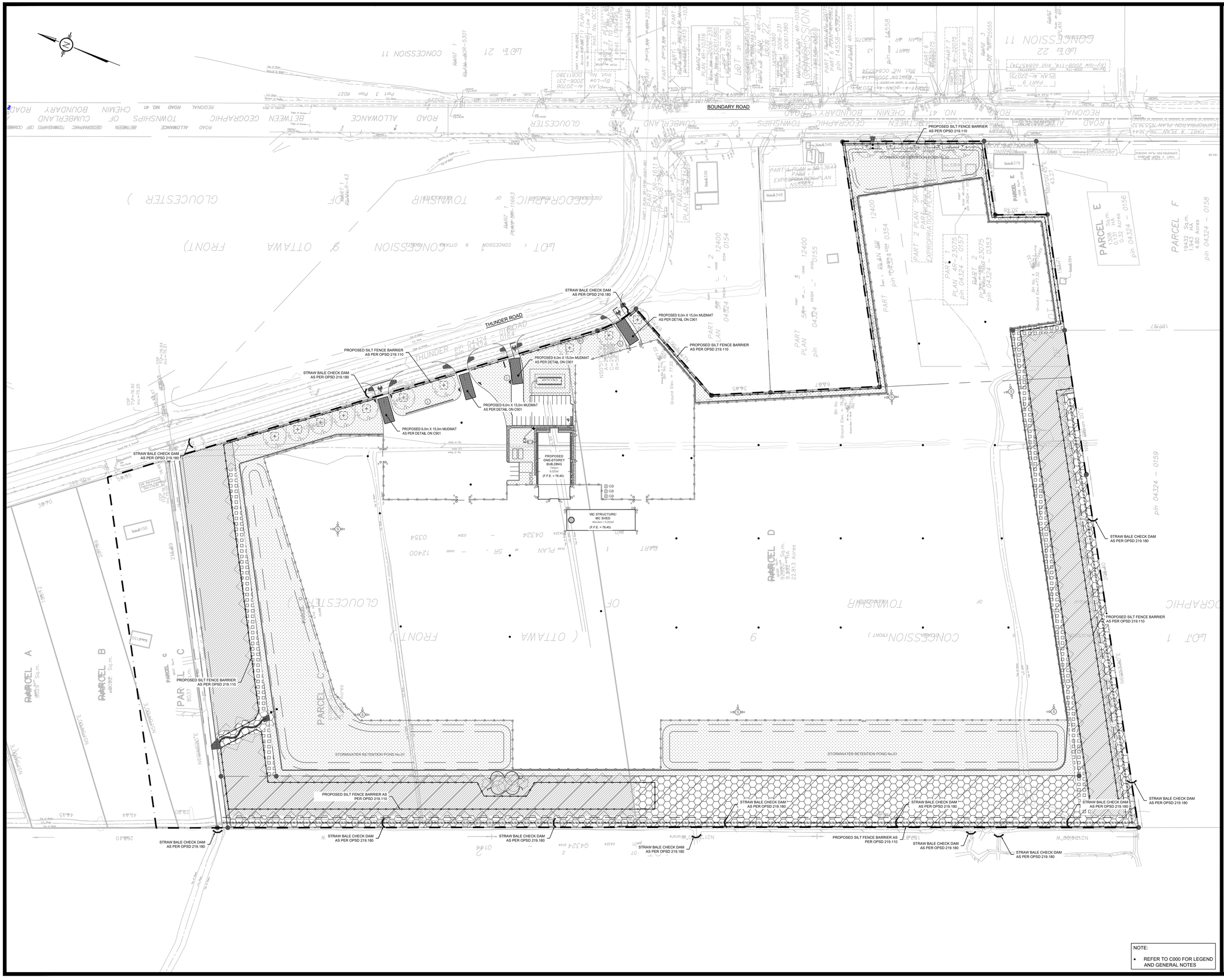
USE AND INTERPRETATION OF DRAWINGS

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 "



NOTE:
- REFER TO C000 FOR LEGEND AND GENERAL NOTES

USE AND INTERPRETATION OF DRAWINGS

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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.

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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.

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SCALE: 1:1000

No.	REVISIONS	BY	DATE
03	ISSUED FOR APPROVAL	V.J.	16 AUG 2024
02	ISSUED FOR APPROVAL	V.J.	24 MAY 2023
01	ISSUED FOR APPROVAL	V.J.	25 NOV 2021

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
08-16-2024
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

CLIENT
AVENUE 31

DESIGNED BY:	DRAWN BY:	APPROVED BY:
V.J.	M.L.	V.J.

PROJECT
INDUSTRIAL PARK
6160 THUNDER RD AND 5368 BOUNDARY RD
OTTAWA, ON

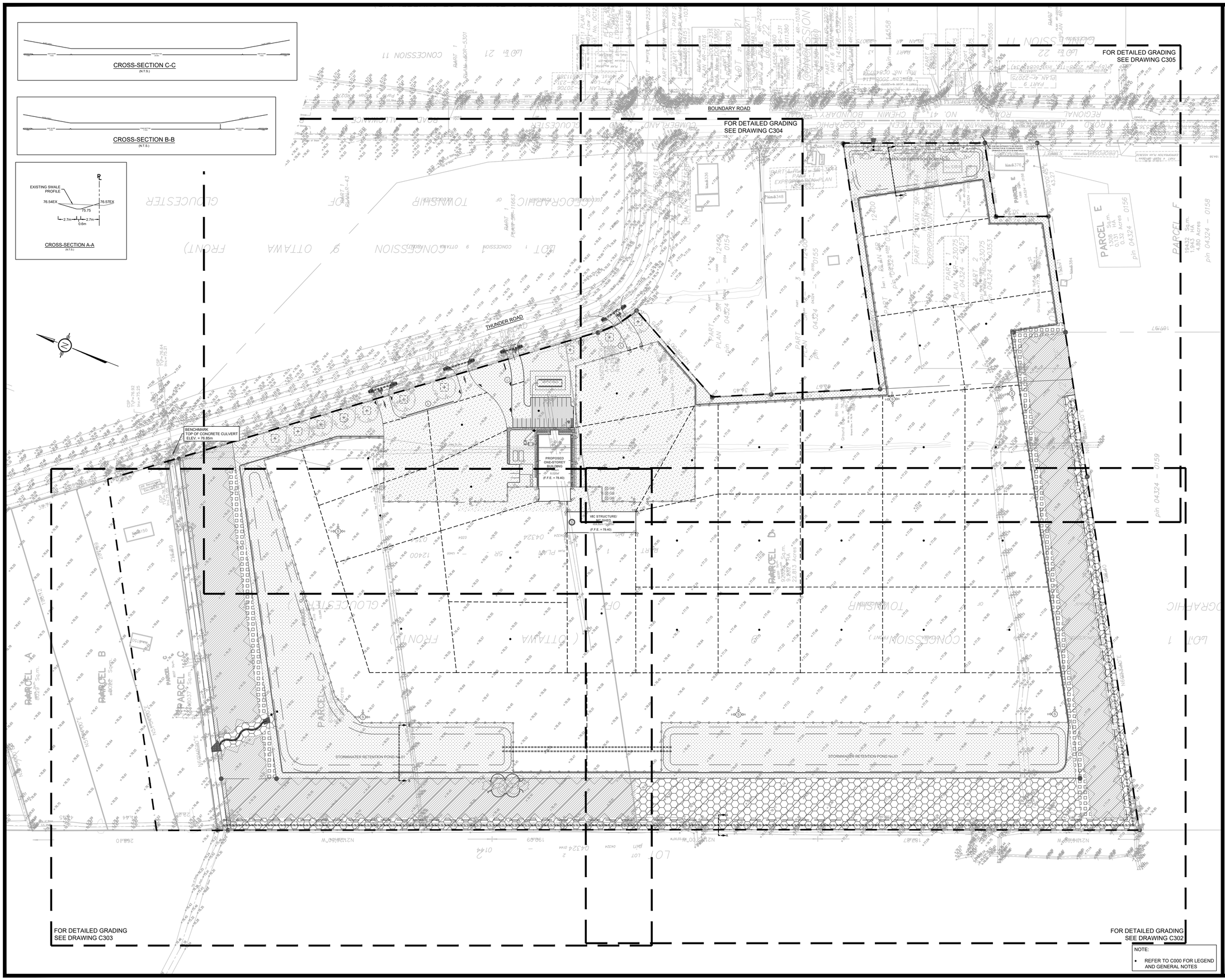
DRAWING TITLE
EROSION AND SEDIMENT CONTROL PLAN

PROJECT NO.
200578

DATE
NOVEMBER 2020

C101

D07-12-21-0205



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LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
08-16-2024
PROVINCE OF ONTARIO

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www.lrl.ca | (613) 842-3434

CLIENT
AVENUE 31

DESIGNED BY:	DRAWN BY:	APPROVED BY:
V.J.	M.L.	V.J.

PROJECT
INDUSTRIAL PARK
6160 THUNDER RD AND 5368 BOUNDARY RD
OTTAWA, ON

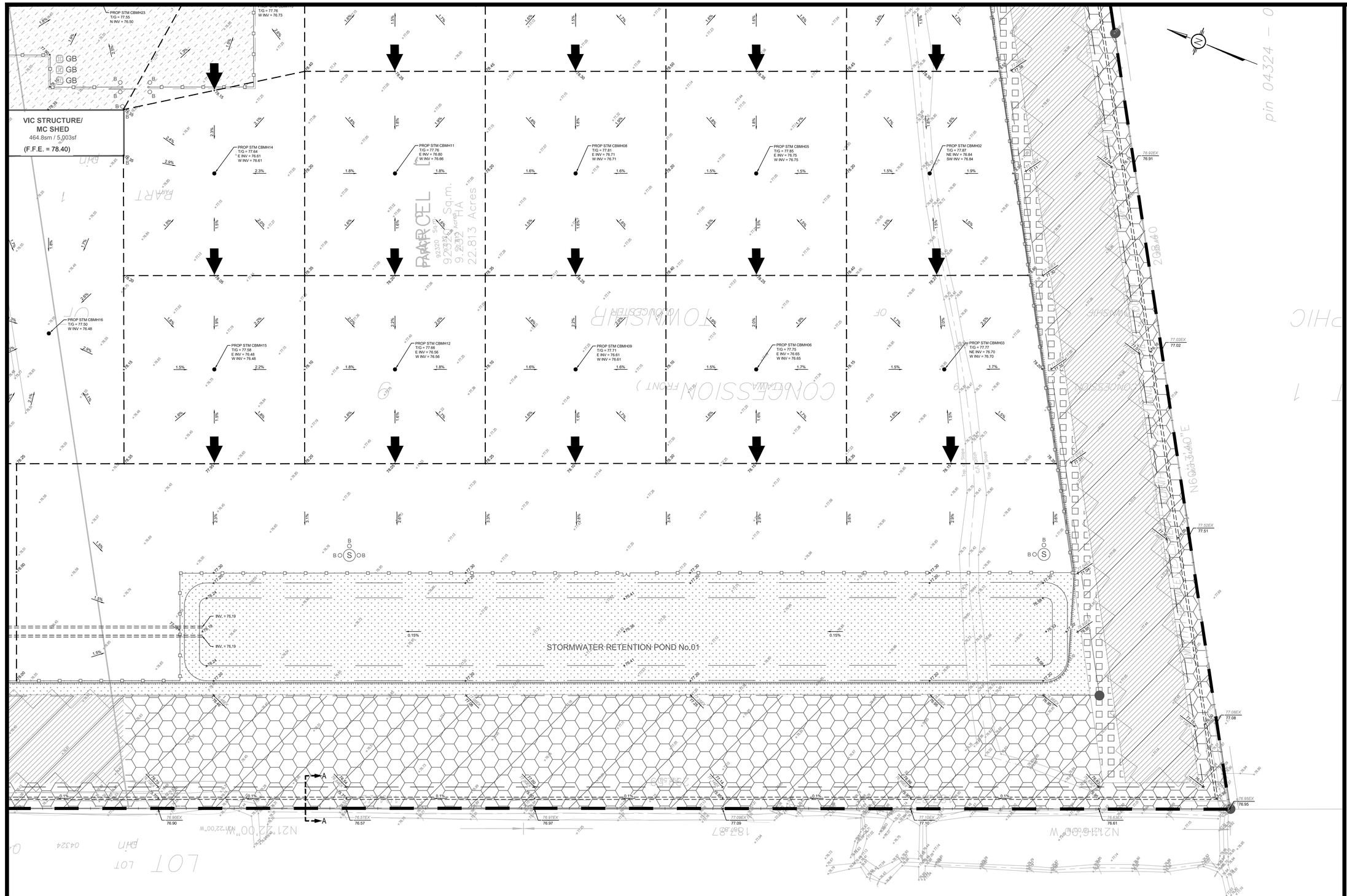
DRAWING TITLE
GRADING AND DRAINAGE - OVERALL PLAN

PROJECT NO.
200578

DATE
NOVEMBER 2020

C301

D07-12-21-0205



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SCALE: 1:500

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LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
08-16-2024
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

CLIENT

AVENUE 31

DESIGNED BY:	DRAWN BY:	APPROVED BY:
V.J.	M.L.	V.J.

PROJECT

INDUSTRIAL PARK
6160 THUNDER RD AND 5368 BOUNDARY RD
OTTAWA, ON

DRAWING TITLE

GRADING AND DRAINAGE PLAN

PROJECT NO.
200578

DATE
NOVEMBER 2020

C302

D07-12-21-0205

BUILDING
745sm
8,020sf
(F.F.E. = 78.40)

VIC STRUCTURE/
MC SHED
464.8sm / 5,003sf
(F.F.E. = 78.40)

PROP STM CBMH23
T/G = 77.55
N INV = 76.50

PROP STM CBMH20
T/G = 77.30
NW INV = 76.27
S INV = 76.27

PROP STM CBMH21
T/G = 77.30
SE INV = 76.13

PROP STM CBMH17
T/G = 77.55
W INV = 76.51

PROP STM CBMH16
T/G = 77.50
W INV = 76.48

PROP STM CBMH19
T/G = 77.30
NW INV = 76.03

PROP STM CBMH18
T/G = 77.50
E INV = 76.38
W INV = 76.38

PROP STM OUTLET STRUCTURE 01
T/G = 77.00
(SEE C401-C404 FOR OUTLET DETAILS)

PROP STM OGS MODEL EF06
(OR APPROVED EQUIVALENT)
T/G = 76.82
(SEE C401-C404 FOR OUTLET DETAILS)

PROPOSED RIP-RAP AT OUTLET

PROPOSED RIP-RAP AT OUTLET

PROP. TRAPEZOIDAL CHANNEL AT MIN. 2% SLOPE, 1m WIDE SLOPE AND 3:1 SIDE SLOPE

STORMWATER RETENTION POND No.01

INV. = 76.04

INV. = 76.04

77.70EX
77.70

76.67EX
76.67

77.08EX
77.08

77.03EX
77.03

NOTE:
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USE AND INTERPRETATION OF DRAWINGS

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PROJECT
INDUSTRIAL PARK
6160 THUNDER RD AND 5368 BOUNDARY RD
OTTAWA, ON

DRAWING TITLE
GRADING AND DRAINAGE PLAN

PROJECT NO.
200578

DATE
NOVEMBER 2020

C303

D07-12-21-0205

NOTE:

- REFER TO C000 FOR LEGEND AND GENERAL NOTES

THUNDER ROAD

PROPOSED ONE-STOREY BUILDING
745sm
8,020sf
(F.F.E. = 78.40)

VIC STRUCTURE/ MC SHED
464.8sm / 5,003sf
(F.F.E. = 78.40)

SEPTIC FIELD

PROP STM CBMH17
T/G = 77.55
W INV = 76.51

PROP STM CBMH20
T/G = 77.30
NW INV = 76.27
S INV = 76.27

PROP STM CBMH21
T/G = 77.30
SE INV = 76.13

PROP STM CBMH22
T/G = 77.50
NW INV = 76.48

PROP STM CBMH23
T/G = 77.55
N INV = 76.50

PROP STM CBMH24
T/G = 77.60
NW INV = 76.36
S INV = 76.36
SE INV = 76.36

PROP STM CBMH25
T/G = 77.50
NW INV = 76.25
SE INV = 76.25

PROP STM CBMH26
T/G = 77.40
NW INV = 76.13
SE INV = 76.13

PROP STM CBMH10
T/G = 77.83
W INV = 76.66

PROP STM CBMH13
T/G = 77.76
W INV = 76.73

PROP STM CBMH14
T/G = 77.64
E INV = 76.61
W INV = 76.61

PROP STM CBMH11
T/G = 77.76
E INV = 76.80
W INV = 76.66

INV. = 76.40
INV. = 76.45
INV. = 76.50
INV. = 76.40
INV. = 76.31
INV. = 76.39
INV. = 76.48

USE AND INTERPRETATION OF DRAWINGS

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10m 5 0 10 20m

SCALE: 1:500

No.	REVISIONS	BY	DATE
03	ISSUED FOR APPROVAL	V.J.	16 AUG 2024
02	ISSUED FOR APPROVAL	V.J.	24 MAY 2023
01	ISSUED FOR APPROVAL	V.J.	25 NOV 2021

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
08-16-2024
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

CLIENT
AVENUE 31

DESIGNED BY:	DRAWN BY:	APPROVED BY:
V.J.	M.L.	V.J.

PROJECT
INDUSTRIAL PARK
6160 THUNDER RD AND 5368 BOUNDARY RD
OTTAWA, ON

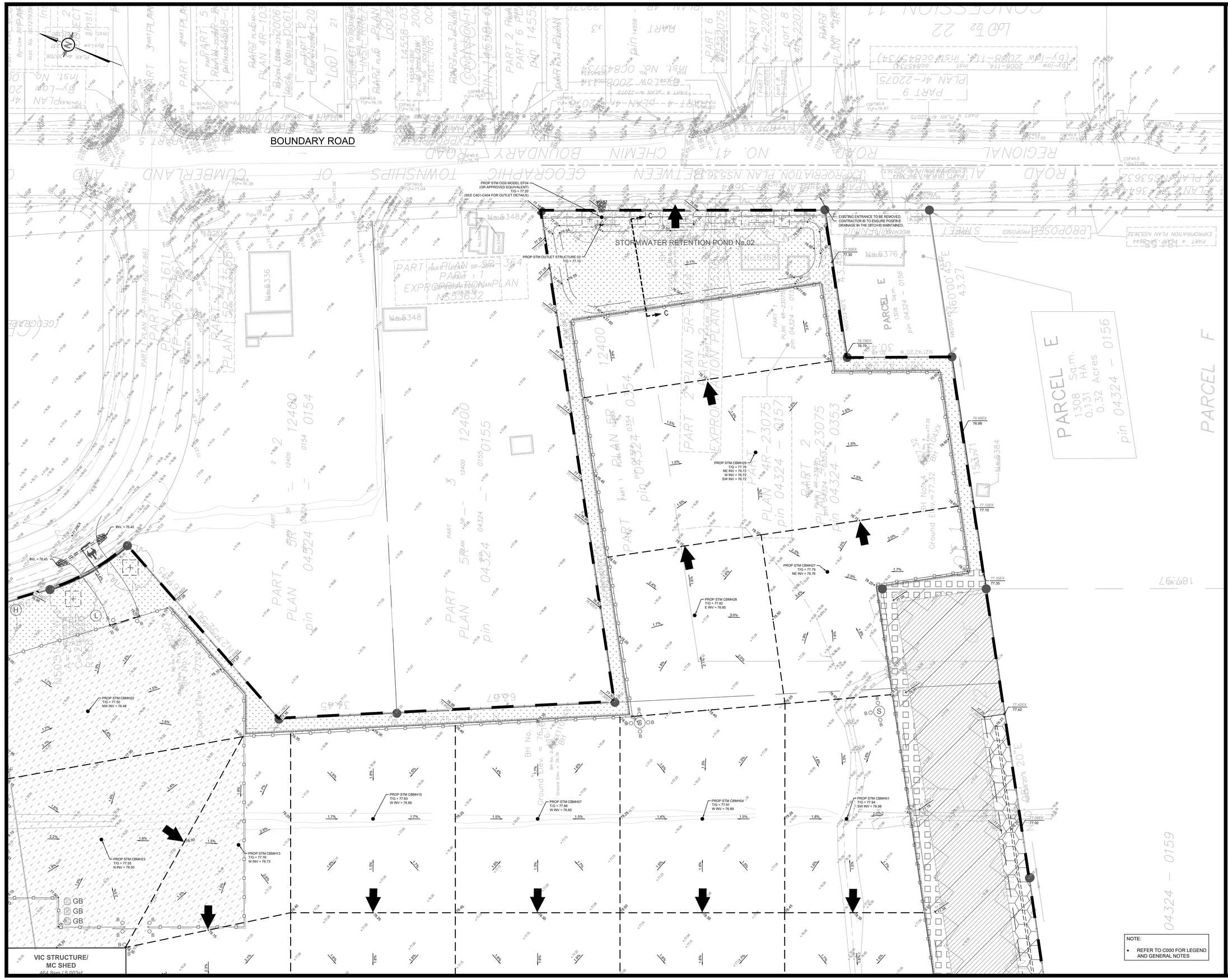
DRAWING TITLE
GRADING AND DRAINAGE PLAN

PROJECT NO.
200578

DATE
NOVEMBER 2020

C304

D07-12-21-0205



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10m 5 0 10 20m

SCALE: 1:500

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LICENSED PROFESSIONAL ENGINEER
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100510576
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PROVINCE OF ONTARIO

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CLIENT

AVENUE 31

DESIGNED BY:	DRAWN BY:	APPROVED BY:
V.J.	M.L.	V.J.

PROJECT

INDUSTRIAL PARK
6160 THUNDER RD AND 5368 BOUNDARY RD
OTTAWA, ON

DRAWING TITLE

GRADING AND DRAINAGE PLAN

PROJECT NO.
200578

DATE
NOVEMBER 2020

C305

D07-12-21-0205

NOTES:

-CROSSINGS ARE TO BE AS PER CITY OF OTTAWA DETAIL W25.2 AND W25
-ALL STORM CATCHBASIN MANHOLES TO BE INSTALLED C/W SUBDRAINS
3m LONG IN FOUR ORTHOGONAL DIRECTIONS AS PER GEOTECHNICAL RECOMMENDATIONS.

BOUNDARY ROAD

THUNDER ROAD

FOR DETAILED SERVICING
SEE DRAWING C404

FOR DETAILED SERVICING
SEE DRAWING C403

FOR DETAILED SERVICING
SEE DRAWING C402

PROP 29,330 ONE-STOREY BUILDING
74Sm
8.00m
(F.F.E. = 78.40)

VIC STRUCTURE/
MC SHED
444.0sm / 5.003sf
(F.F.E. = 78.40)

STORMWATER RETENTION POND No.01

STORMWATER RETENTION POND No.02

PARCEL A 6672.9 Sq.m.
PARCEL B 8037 Sq.m.
PARCEL C 8037 Sq.m.
PARCEL E 1308 Sq.m. 0.32 Acres
PARCEL F 19432 Sq.m. 1.943 HA 4.80 Acres
PARCEL G 92,319 Sq.m. 9.232 HA 22.819 Acres

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20m 10 0 20 40m

SCALE: 1:1000

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CLIENT
AVENUE 31

DESIGNED BY:	DRAWN BY:	APPROVED BY:
V.J.	M.L.	V.J.

PROJECT
INDUSTRIAL PARK
6160 THUNDER RD AND 5368 BOUNDARY RD
OTTAWA, ON

DRAWING TITLE
SERVICING - OVERALL PLAN

PROJECT NO.
200578

DATE
NOVEMBER 2020

C401

D07-12-21-0205

NOTES:

-CROSSINGS ARE TO BE AS PER CITY OF OTTAWA DETAIL W25.2 AND W25

PROP STM 16.5m - 600mmØ PVC DR35 @ 0.30%

INV. = 76.45

2m - 600mmØ PVC DR-35 @ 0.76%

= 76.50

PROP. SEPTIC FIELD
(REFER TO SEPTIC DESIGN BY PATTERSON GROUP, AUGUST 2024)

CROSSING No1
STM OBV. = 76.80
SAN INV. = 77.01
CLEARANCE = 0.21m
UNSHRINKABLE FILL AS PER OPSS 1359 IS TO BE USED WHERE A MIN. OF 0.3m CAN'T BE ACHIEVED

PROP STM CBMH24
T/G = 77.60
NW INV = 76.36
S INV = 76.36
SE INV = 76.36

PROP STM CBMH22
T/G = 77.50
NW INV = 76.48

PROP STM 46.7m - 375mmØ PVC DR-35 @ 0.25%

PROP STM 54.5m - 375mmØ PVC DR-35 @ 0.25%

PROP STM CBMH23
T/G = 77.55
N INV = 76.50

PROP DOMESTIC WATER CISTERN UNDER BUILDING SLAB VOLUME = 2,000L

TOP OF WATER AT BUILDING = 75.93
P. WATER STORAGE TANKS UNDER BUILDING TO BE INSTALLED BY OTHERS AT BUILDING CONSTRUCTION STAGE.

ONE STORY BUILDING
745sm
8,020sf
(F.F.E. = 78.40)

INV. = 77.45
TO BE EQUIPPED WITH A BACKWATER VALVE

GB
GB
GB

VIC STRUCTURE/
MC SHED
464.8sm / 5,003sf
(F.F.E. = 78.40)

PROP STM CBMH13
T/G = 77.76
W INV = 76.73

PROP STM 47.7m - 375mmØ PVC DR-35 @ 0.25%

PROP STM CBMH10
T/G = 77.83
W INV = 76.66

PROP STM CBMH07
T/G = 77.88
W INV = 76.85

PROP STM CBMH04
T/G = 77.91
W INV = 76.89

PROP STM CBMH01
T/G = 77.94
SW INV = 76.98

PROP STM CBMH14
T/G = 77.64
E INV = 76.61
W INV = 76.61

PROP STM CBMH11
T/G = 77.76
E INV = 76.80
W INV = 76.66

PROP STM CBMH08
T/G = 77.81
E INV = 76.71
W INV = 76.71

PROP STM CBMH05
T/G = 77.85
E INV = 76.75
W INV = 76.75

PROP STM CBMH02
T/G = 77.87
NE INV = 76.84
SW INV = 76.84

PROP STM 54.5m - 450mmØ PVC DR-35 @ 0.25%

PROP STM 54.5m - 375mmØ PVC DR-35 @ 0.25%

PROP STM 32.2m - 375mmØ CONC 1400 @ 0.27%

PROP STM CBMH15
T/G = 77.58
E INV = 76.48
W INV = 76.48

PROP STM CBMH12
T/G = 77.66
E INV = 76.56
W INV = 76.56

PROP STM CBMH09
T/G = 77.71
E INV = 76.61
W INV = 76.61

PROP STM CBMH06
T/G = 77.75
E INV = 76.65
W INV = 76.65

PROP STM CBMH03
T/G = 77.77
NE INV = 76.70
W INV = 76.70

PROP STM 60.6m - 450mmØ PVC DR-35 @ 0.25%

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PROP STM 60.6m - 450mmØ PVC DR-35 @ 0.25%

PROP STM 60.6m - 450mmØ PVC DR-35 @ 0.25%

INV. = 76.36
C/W RODENT GRATE

INV. = 76.41
C/W RODENT GRATE

INV. = 76.46
C/W RODENT GRATE

INV. = 76.50
C/W RODENT GRATE

INV. = 76.55
C/W RODENT GRATE

PROP STM CBMH16
T/G = 77.50
W INV = 76.48

PROP STM 99.1m - 375mmØ PVC DR-35 @ 1.25%

PROP STM 98.9m - 600mmØ CSP @ 0.15%

INV. = 76.19
C/W RODENT GRATE

INV. = 76.19
C/W RODENT GRATE

PROP STM 98.9m - 600mmØ CSP @ 0.15%

STORMWATER RETENTION POND No.01

Top of Slope
C/L Ditch
Top of Slope

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

10m 5 0 10 20m

SCALE: 1:500

No.	REVISIONS	BY	DATE
03	ISSUED FOR APPROVAL	V.J.	16 AUG 2024
02	ISSUED FOR APPROVAL	V.J.	24 MAY 2023
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LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
08-16-2024
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

CLIENT
AVENUE 31

DESIGNED BY:	DRAWN BY:	APPROVED BY:
V.J.	M.L.	V.J.

PROJECT
INDUSTRIAL PARK
6160 THUNDER RD AND 5368 BOUNDARY RD
OTTAWA, ON

DRAWING TITLE
SERVICING PLAN

PROJECT NO.
200578

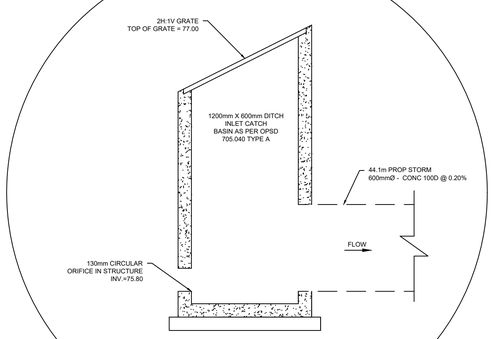
DATE
NOVEMBER 2020

C402

D07-12-21-0205

NOTES:

-CROSSINGS ARE TO BE AS PER CITY OF OTTAWA DETAIL W25.2



PROP. 17.5m - 25mmØ IPEX PIPE (POTABLE WATER) TO BE BURIED 2.4m BELOW GRADE

PROP STM 19.0m - 600mmØ PVC DR-35 @ 0.47%

INV. = 76.40

INV. = 76.31

PROP STM 17.4m - 600mmØ CSP @ 0.52%

INV. = 76.39

INV. = 76.48

PROP 2.4m x 1.8m WATER CHAMBER AS PER MODIFIED W31.1 DET.&L. (C901) WITH FLOW CONTROL VALVE SET TO 0.094L/s

PROP. 54.0m - 25mmØ IPEX PIPE (POTABLE WATER) TO BE BURIED 2.4m BELOW GRADE

CROSSING No1
STM OBV. = 76.80
SAN INV. = 77.01
CLEARANCE = 0.21m
UNSHRINKABLE FILL AS PER OPSS.1359 IS TO BE USED WHERE A MIN. OF 0.3m CANT BE ACHIEVED

CROSSING No2
STM INV. = 75.31
WTR OBV. = 75.55
CLEARANCE = 0.76m

PROP STM 13.2m - 600mmØ PVC DR-35 @ 0.76%

INV. = 76.50

INV. = 76.40

PROP. SEPTIC FIELD (REFER TO SEPTIC DESIGN BY PATTERSON GROUP, AUGUST 2024)

PROP STM CBMH22
T/G = 77.50
NW INV = 76.48

PROP STM CBMH24
T/G = 77.60
NW INV = 76.36
S INV = 76.36
SE INV = 76.36

PROP STM 46.7m - 375mmØ PVC DR-35 @ 0.25%

PROP STM CBMH25
T/G = 77.50
NW INV = 76.25
SE INV = 76.25

PROP STM 45.5m - 450mmØ PVC DR-35 @ 0.25%

38mm FORCEMAIN, 100mm PVS LEAVING BUILDING

PROPOSED DRY HYDRANT, DRY HYDRANT TO BE EQUIPPED W/ (1) 6MH X 4.5NH ADAPTER, DRY HYDRANT CONNECTION SHALL BE PAINTED SAFETY BLUE (TREMCLAD MEDIUM BLUE).

PROP. SEPTIC TANKS (REFER TO SEPTIC DESIGN)

PROP 49,100L (MIN TOTAL VOLUME) U/G FIRE PROTECTION TANKS BALLASTED TO PREVENT HYDRAULIC UPLIFT CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR APPROVAL PRIOR TO CONSTRUCTION

PROPOSED 18.7m - 150mm WATER SERVICE. SERVICE TO BE INSTALLED MIN 2.4m BELOW SURFACE.

PROP STM 39.3m - 100mmØ PVC DR-35 @ 3.00%

PROP STM CBMH00
T/G = 77.30
NW INV = 76.27
S INV = 76.27

PROP STM CBMH26
T/G = 77.40
NW INV = 76.13
SE INV = 76.13

PROP STM 58.1m - 525mmØ PVC DR-35 @ 0.20%

PROP STM 63.9m - 525mmØ PVC DR-35 @ 0.20%

INV. = 76.00
C/W RODENT GRATE

PROP STM CBMH21
T/G = 77.30
SE INV = 76.13

PROP STM 55.7m - 375mmØ PVC DR-35 @ 0.25%

INV. = 76.01
C/W RODENT GRATE

PROP STM 61.4m - 450mmØ PVC DR-35 @ 0.20%

PROP STM CBMH23
T/G = 77.55
N INV = 76.50

TOP OF WATER AT BUILDING = 75.93
F WATER STORAGE TANKS UNDER BUILDING TO BE INSTALLED BY OTHERS AT BUILDING CONSTRUCTION STAGE.

PROP DOMESTIC WATER CISTERN UNDER BUILDING SLAB VOLUME = 2.000L

ONE-STOREY BUILDING
745sm
8,020sf
(F.F.E. = 78.40)

INV. = 77.45
TO BE EQUIPPED WITH A BACKWATER VALVE

GB GB GB

VIC STRUCTURE/ MC SHED
464.8sm / 5,003sf
(F.F.E. = 78.40)

PROP STM CBMH14
T/G = 77.64
E INV = 76.61
W INV = 76.61

PROP STM 47.7m - 375mmØ PVC DR-35 @ 0.25%

PROP STM CBMH17
T/G = 77.55
W INV = 76.51

PROP STM 52.1m - 450mmØ PVC DR-35 @ 0.25%

PROP STM CBMH16
T/G = 77.50
W INV = 76.48

PROP STM 30.3m - 375mmØ PVC DR-35 @ 0.25%

PROP STM CBMH15
T/G = 77.56
E INV = 76.48
W INV = 76.48

PROP STM CBMH18
T/G = 77.50
E INV = 76.38
W INV = 76.38

PROP STM 54.2m - 450mmØ PVC DR-35 @ 0.25%

PROP STM 61.3m - 375mmØ PVC DR-35 @ 0.25%

PROP STM 49.7m - 450mmØ PVC DR-35 @ 0.25%

PROP STM CBMH19
T/G = 77.30
NW INV = 76.03

PROP STM 64.0m - 375mmØ PVC DR-35 @ 0.25%

INV. = 75.90
C/W RODENT GRATE

PROP STM OUTLET STRUCTURE 01
T/G = 77.00
NW INV = 75.80
CW 150mm CIRCULAR ORIFICE PLATE AT OUTLET
INVERT = 75.80 (SEE DETAIL ON PLAN)

PROP STM 3.7m - 600mmØ PVC DR-35 @ 0.20%

PROP STM OGS MODEL EF06
T/G = 76.82
NW INV = 75.75
SE INV = 75.79

PROP STM 3.0m - 600mmØ PVC DR-35 @ 0.20%

INV. = 75.75
C/W RODENT GRATE

STORMWATER RETENTION POND No.01

INV. = 76.24
C/W RODENT GRATE

INV. = 76.25
C/W RODENT GRATE

INV. = 76.04
C/W RODENT GRATE

INV. = 76.04
C/W RODENT GRATE

PROP STM 98.9m - 600mmØ CSP @ 0.15%

PROP STM 98.9m - 600mmØ CSP @ 0.15%

INV. = 76.39
C/W RODENT GRATE

INV. = 76.19
C/W RODENT GRATE

INV. = 76.19
C/W RODENT GRATE

PROP STM 47.7m - 375mmØ PVC DR-35 @ 0.25%

PROP STM 52.1m - 450mmØ PVC DR-35 @ 0.25%

PROP STM 49.7m - 450mmØ PVC DR-35 @ 0.25%

NOTE:
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10m 5 0 10 20m

SCALE: 1:500

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CLIENT
AVENUE 31

DESIGNED BY:	DRAWN BY:	APPROVED BY:
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INDUSTRIAL PARK
6160 THUNDER RD AND 5368 BOUNDARY RD
OTTAWA, ON

DRAWING TITLE
SERVICING PLAN

PROJECT NO.
200578

DATE
NOVEMBER 2020

C403

D07-12-21-0205

NOTES:

-CROSSINGS ARE TO BE AS PER CITY OF OTTAWA DETAIL W25.2 AND W25

PROP STM 16.5m - 600mmØ PVC DR-35 @ 0.30%

INV. = 76.40

INV. = 76.45

STM 13.2m - 600mmØ PVC DR-35 @ 0.76%

INV. = 76.50

PROP. SEPTIC FIELD
(REFER TO SEPTIC DESIGN BY PATTERSON GROUP, AUGUST 2024)

CROSSING No1
STM OBV. = 76.80
SAN INV. = 77.01
CLEARANCE = 0.21m
UNSHRINKABLE FILL AS PER OPSS 1359 IS TO BE USED WHERE A MIN. OF 0.3m CAN'T BE ACHIEVED

PROP STM CBMH22
T/G = 77.50
NW INV = 76.48

PROP STM CBMH24
T/G = 77.60
NW INV = 76.36
S INV = 76.36
SE INV = 76.36

PROP STM 46.7m - 375mmØ PVC DR-35 @ 0.25%

PROP STM 46.7m - 375mmØ PVC DR-35 @ 0.20%

PROP DOMESTIC WATER CISTERN UNDER BUILDING SLAB VOLUME = 2,000L

TOP OF WATER AT BUILDING = 75.93
WATER STORAGE TANKS UNDER BUILDING TO BE INSTALLED BY OTHERS AT BUILDING CONSTRUCTION STAGE.

ONE-STOREY BUILDING
745sm
8,026sf
(F.F.E. = 78.40)

INV. = 77.45
TO BE EQUIPPED WITH A BACKWATER VALVE

GB
GB
GB

VIC STRUCTURE/
MC SHED
464.8sm / 5,003sf
(F.F.E. = 78.40)

PROP STM 2.0m - 300mmØ PVC DR-35 @ 1.00%

INV. = 76.50
C/W RODENT GRATE

PROP STM OGS MODEL EF04
T/G = 77.20
E INV = 76.52
W INV = 76.52

PROP STM OUTLET STRUCTURE 02
T/G = 77.18
C/W ICD AT OUTLET
E INV = 76.54
W INV = 76.54

PROP STM 2.2m - 300mmØ PVC DR-35 @ 1.00%

INV. = 76.56

STORMWATER RETENTION POND No.02

INV. = 76.57
C/W RODENT GRATE

PROP STM 51.35m - 450mmØ PVC DR-35 @ 0.29%

PROP STM CBMH29
T/G = 77.76
NE INV = 76.72
W INV = 76.72
SW INV = 76.72

PROP STM 46.6m - 375mmØ PVC DR-35 @ 0.30%

PROP STM 46.6m - 375mmØ PVC DR-35 @ 0.20%

PROP STM CBMH27
T/G = 77.79
NE INV = 76.76

PROP STM CBMH28
T/G = 77.82
E INV = 76.85

PROP STM CBMH10
T/G = 77.83
W INV = 76.66

PROP STM CBMH13
T/G = 77.76
W INV = 76.73

PROP STM CBMH07
T/G = 77.88
W INV = 76.85

PROP STM CBMH04
T/G = 77.91
W INV = 76.89

PROP STM CBMH01
T/G = 77.94
SW INV = 76.98

PROP STM 54.5m - 375mmØ PVC DR-35 @ 0.25%

PROP STM CBMH14
T/G = 77.64
E INV = 76.61
W INV = 76.61

PROP STM CBMH11
T/G = 77.76
E INV = 76.80
W INV = 76.66

PROP STM CBMH08
T/G = 77.81
E INV = 76.71
W INV = 76.71

PROP STM CBMH05
T/G = 77.85
E INV = 76.75
W INV = 76.75

PROP STM CBMH02
T/G = 77.87
NE INV = 76.84
SW INV = 76.84

PROP STM 52.2m - 375mmØ CONC. @ 0.17%

PROP STM 1.0m - 450mmØ PVC DR-35 @ 0.25%

PROP STM 1.0m - 450mmØ PVC DR-35 @ 0.20%

PROP STM 2.0m - 300mmØ PVC DR-35 @ 1.00%

PROP STM OUTLET STRUCTURE 02
T/G = 77.18
C/W ICD AT OUTLET
E INV = 76.54
W INV = 76.54

PROP STM 2.2m - 300mmØ PVC DR-35 @ 1.00%

PROPOSED ALIGNMENT OF MEDINA STREET

PARCEL E
1308 Sq.m.
0.131 HA
0.32 Acres

PARCEL D
92320 Sq.m.
9.2320 HA
22.813 Acres

BH No. 1
Ground Elev. = 77.22

BH No. 2
Ground Elev. = 76.76

BH No. 3
Ground Elev. = 76.76

BH No. 4
Ground Elev. = 77.32

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SCALE: 1:500

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08-16-2024
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CLIENT

AVENUE 31

DESIGNED BY:	DRAWN BY:	APPROVED BY:
V.J.	M.L.	V.J.

PROJECT

INDUSTRIAL PARK
6160 THUNDER RD AND 5368 BOUNDARY RD
OTTAWA, ON

DRAWING TITLE

SERVICING PLAN

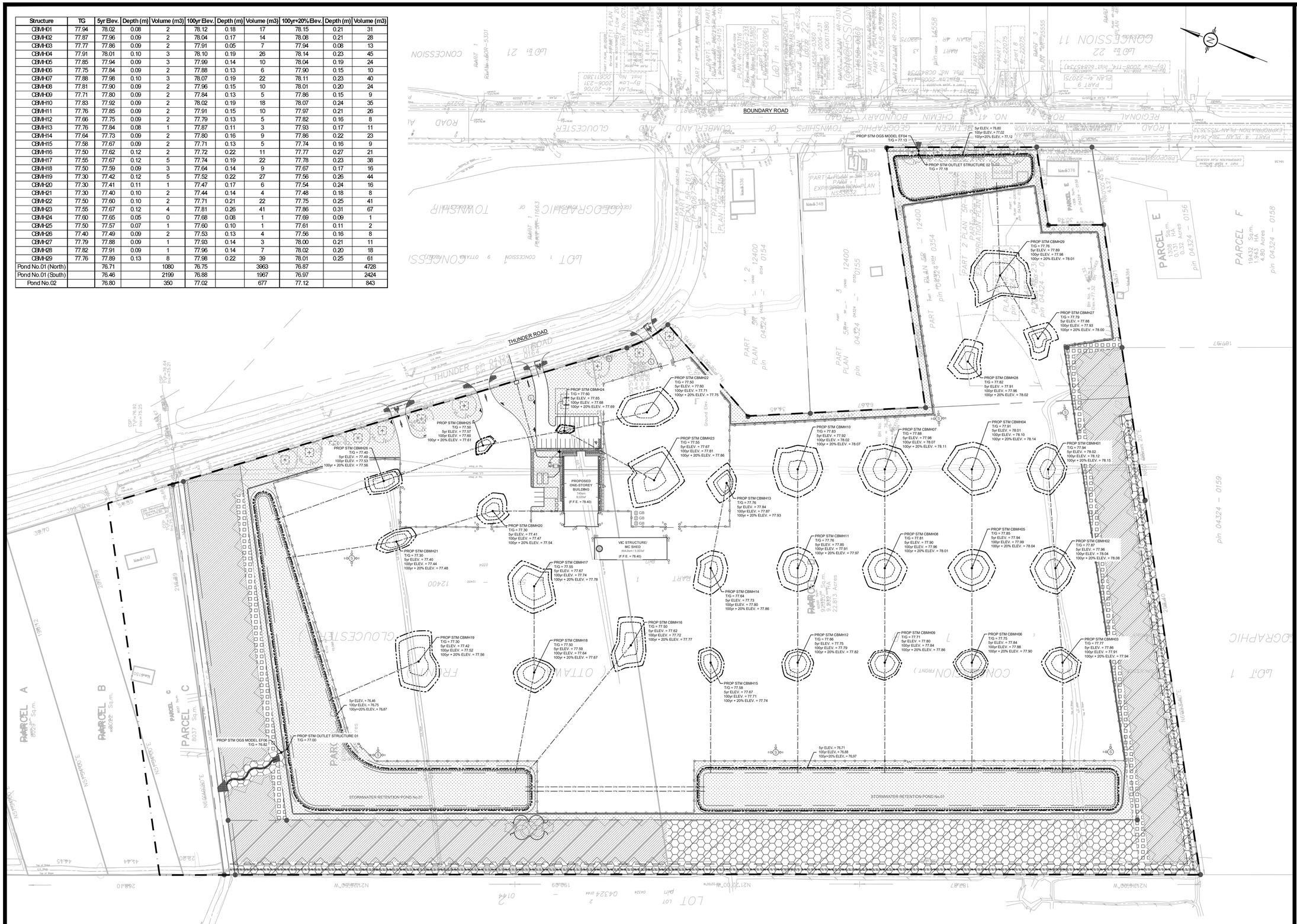
PROJECT NO.
200578

DATE
NOVEMBER 2020

C404

D07-12-21-0205

Structure	TG	5yr Elev.	Depth (m)	Volume (m3)	100yr Elev.	Depth (m)	Volume (m3)	100yr+20% Elev.	Depth (m)	Volume (m3)
CBMH01	77.94	78.02	0.08	2	78.12	0.18	17	78.15	0.21	31
CBMH02	77.87	77.96	0.09	2	78.04	0.17	14	78.09	0.21	28
CBMH03	77.77	77.86	0.09	2	77.91	0.05	7	77.94	0.08	13
CBMH04	77.91	78.01	0.10	3	78.10	0.19	26	78.14	0.23	45
CBMH05	77.85	77.94	0.09	3	77.99	0.14	10	78.04	0.19	24
CBMH06	77.75	77.84	0.09	2	77.88	0.13	6	77.90	0.15	10
CBMH07	77.88	77.98	0.10	3	78.07	0.19	22	78.11	0.23	40
CBMH08	77.81	77.90	0.09	2	77.96	0.15	10	78.01	0.20	24
CBMH09	77.71	77.80	0.09	2	77.84	0.13	5	77.86	0.15	9
CBMH10	77.83	77.92	0.09	2	78.02	0.19	18	78.07	0.24	35
CBMH11	77.76	77.85	0.09	2	77.91	0.15	10	77.97	0.21	26
CBMH12	77.66	77.75	0.09	2	77.79	0.13	5	77.82	0.16	8
CBMH13	77.76	77.84	0.08	1	77.87	0.11	3	77.93	0.17	11
CBMH14	77.64	77.73	0.09	2	77.80	0.16	9	77.86	0.22	23
CBMH15	77.58	77.67	0.09	2	77.71	0.13	5	77.74	0.16	9
CBMH16	77.50	77.62	0.12	2	77.72	0.22	11	77.77	0.27	21
CBMH17	77.55	77.67	0.12	5	77.74	0.19	22	77.78	0.23	38
CBMH18	77.50	77.59	0.09	3	77.64	0.14	9	77.67	0.17	16
CBMH19	77.30	77.42	0.12	5	77.52	0.22	27	77.56	0.26	44
CBMH20	77.30	77.41	0.11	1	77.47	0.17	6	77.54	0.24	16
CBMH21	77.30	77.40	0.10	2	77.44	0.14	4	77.48	0.18	8
CBMH22	77.50	77.60	0.10	2	77.71	0.21	22	77.75	0.25	41
CBMH23	77.55	77.67	0.12	4	77.81	0.26	41	77.86	0.31	67
CBMH24	77.60	77.65	0.05	0	77.68	0.08	1	77.69	0.09	1
CBMH25	77.50	77.57	0.07	1	77.60	0.10	1	77.61	0.11	2
CBMH26	77.40	77.49	0.09	2	77.53	0.13	4	77.56	0.16	8
CBMH27	77.79	77.88	0.09	1	77.93	0.14	3	78.00	0.21	11
CBMH28	77.82	77.91	0.09	1	77.96	0.14	7	78.02	0.20	18
CBMH29	77.76	77.89	0.13	8	77.98	0.22	39	78.01	0.25	61
Pond No.01 (North)		76.71		1080	76.75		3963	76.87		4728
Pond No.01 (Sbuth)		76.46		2199	76.88		1967	76.97		2424
Pond No.02		76.80		350	77.02		677	77.12		843



NOTE:
- REFER TO C000 FOR LEGEND AND GENERAL NOTES

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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.

20m 10 0 20 40m

SCALE: 1:1000

No.	REVISIONS	BY	DATE
03	ISSUED FOR APPROVAL	V.J.	16 AUG 2024
02	ISSUED FOR APPROVAL	V.J.	24 MAY 2023
01	ISSUED FOR APPROVAL	V.J.	25 NOV 2021

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
08-16-2024
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

CLIENT
AVENUE 31

DESIGNED BY:	DRAWN BY:	APPROVED BY:
V.J.	M.L.	V.J.

PROJECT
INDUSTRIAL PARK
6160 THUNDER RD AND 5368 BOUNDARY RD
OTTAWA, ON

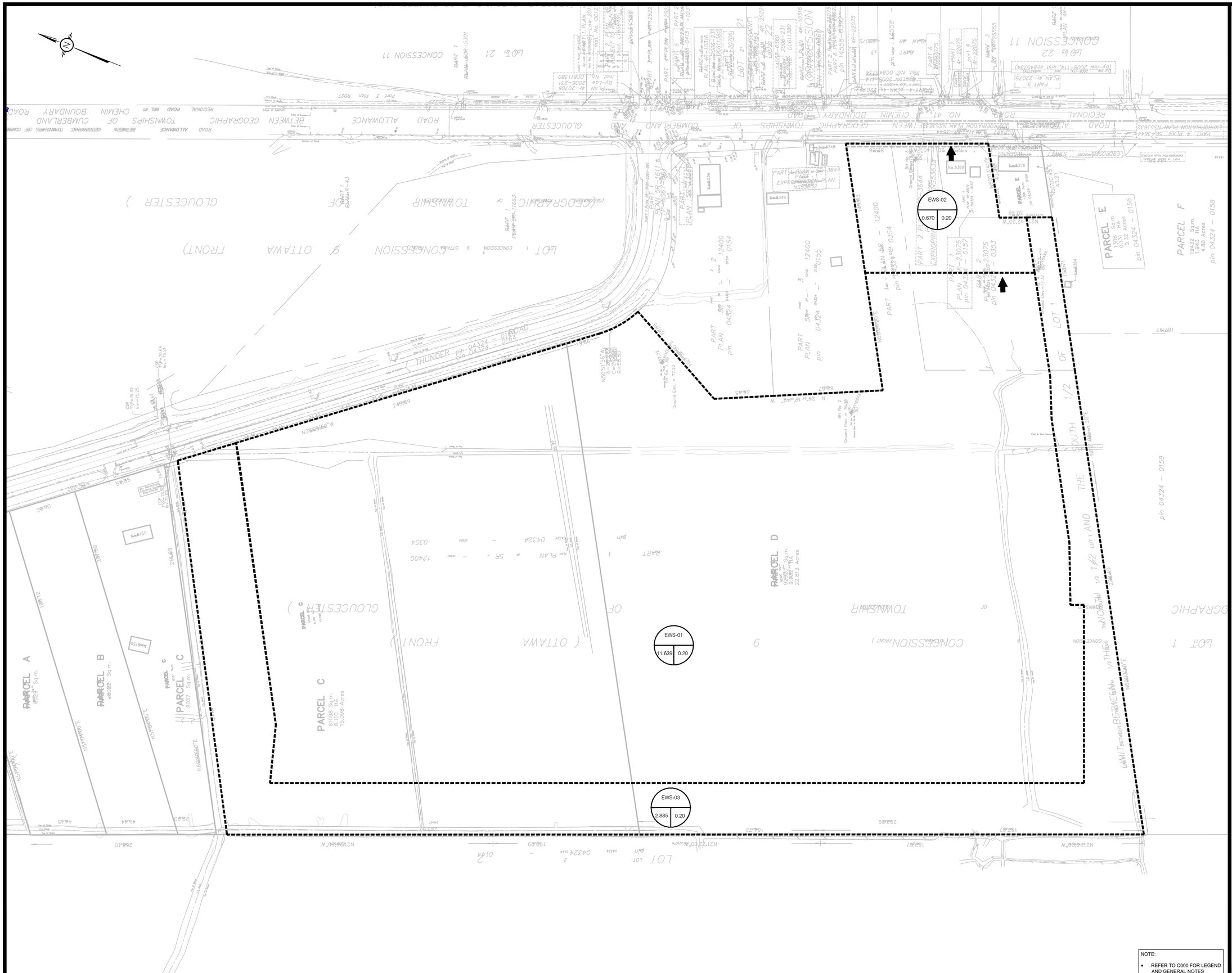
DRAWING TITLE
STORMWATER MANAGEMENT PLAN

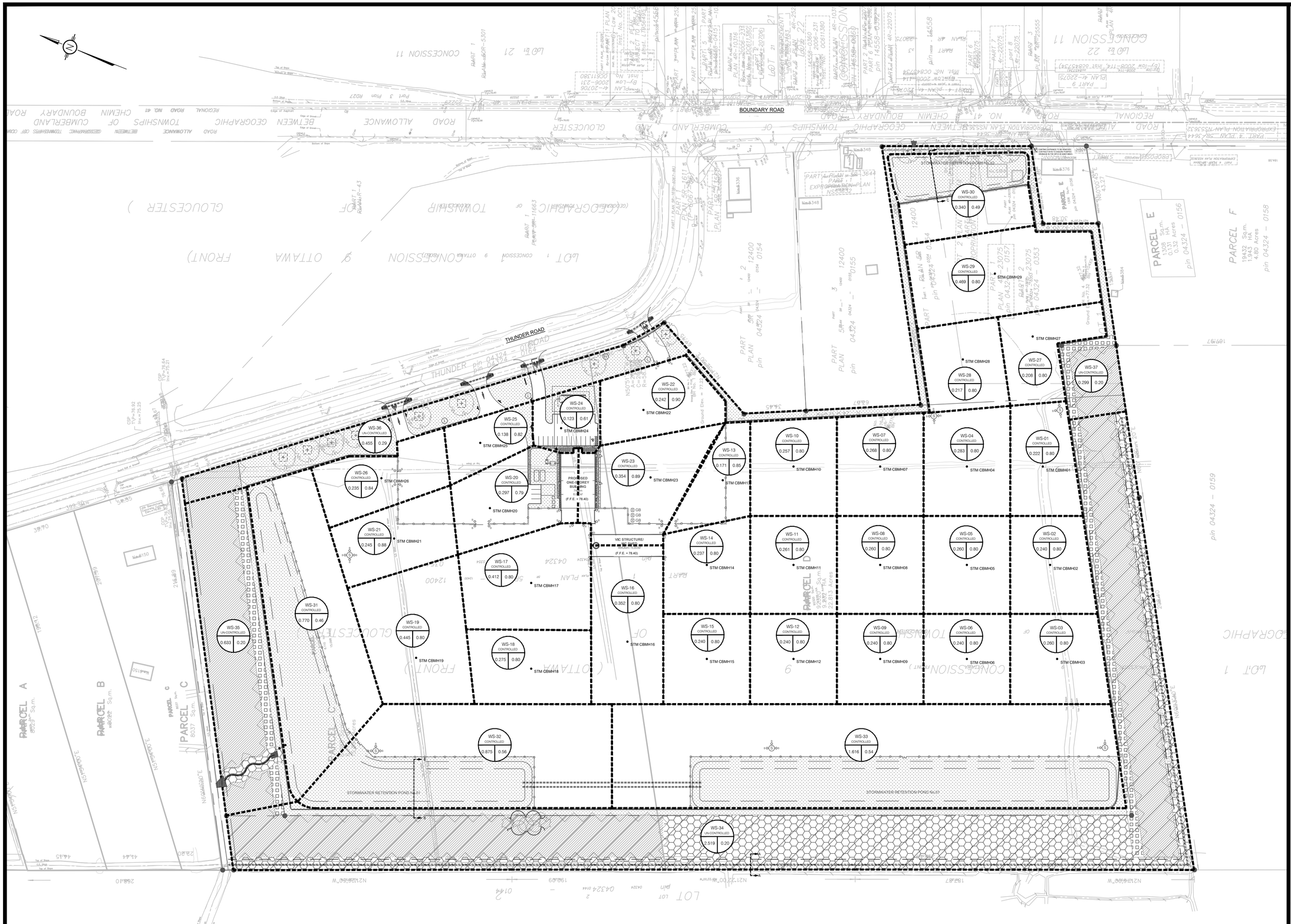
PROJECT NO.
200578

DATE
NOVEMBER 2020

C601

D07-12-21-0205


EWS-02
0.670
0.20
EWS-01
11.639
0.20
EWS-03
2.885
0.20
PARCEL E
1.308 Sq.m.
0.131 HA
0.32 Acres
pin 04324 – 0156
PARCEL F
19432 Sq.m.
1.943 HA
4.80 Acres
pin 04324 – 0158
PARCEL A
PARCEL B
PARCEL C
8037 Sq.m.
PARCEL C
6108 Sq.m.
6.110 HA
15.098 Acres
PARCEL D
9.229 HA
22.813 Acres
THUNDER pin 04324 – 0164 ROAD
LOT 1 CONCESSION 9 OTTAWA (OTTAWA FRONT)
LOT 21 CONCESSION 11 (GEOGRAPHIC TOWNSHIP OF GLOUCESTER)
LOT 22 CONCESSION 11 (GEOGRAPHIC TOWNSHIP OF GLOUCESTER)
PART 1 4R-23075
PART 2 4R-23075
PART 3 4R-23075
PART 1 4R-22075
PART 2 4R-22075
PART 3 4R-22075
PART 7 4R-22075
PART 8 4R-22075
PART 9 4R-22075
PART 1 PLAN 4R-10316
PART 2 PLAN 4R-10316
PART 5 PLAN 4R-10316
PART 1 PLAN 4R-25225
PART 2 PLAN 4R-25225
PART 1 PLAN 4R-25555
PART 3 PLAN 4R-25555
PART 1 PLAN 4R-5611
PART 2 PLAN 4R-5611
PART 1 PLAN 4R-5301
PART 1 PLAN 4R-5667
PART 1 PLAN 4R-11663
PART 1 PLAN 4R-5643
PART 1 PLAN 4R-5644
PART 1 PLAN 4R-5645
PART 1 PLAN 4R-5646
PART 1 PLAN 4R-5647
PART 1 PLAN 4R-5648
PART 1 PLAN 4R-5649
PART 1 PLAN 4R-5650
PART 1 PLAN 4R-5651
PART 1 PLAN 4R-5652
PART 1 PLAN


BOUNDARY ROAD
THUNDER ROAD
STORMWATER RETENTION POND No.02
STORMWATER RETENTION POND No.01
STORMWATER RETENTION POND No.03
PROPOSED ONE-STOREY BUILDING (F.F.E. = 78.40)
VIC STRUCTURE/ (F.F.E. = 78.40)
PARCEL E 1008 Sq.m. 0.131 HA 0.32 Acres pin 04324 – 0156
PARCEL F 19432 Sq.m. 1.943 HA 4.80 Acres pin 04324 – 0158
PARCEL A 8923 Sq.m.
PARCEL B 8048 Sq.m.
PARCEL C 8037 Sq.m.
PARCEL D 22813 Sq.m. 2.281 HA 5.64 Acres
WS-01 CONTROLLED 0.222 0.80 STM CBMH01
WS-02 CONTROLLED 0.240 0.80 STM CBMH02
WS-03 CONTROLLED 0.260 0.80 STM CBMH03
WS-04 CONTROLLED 0.283 0.80 STM CBMH04
WS-05 CONTROLLED 0.260 0.80 STM CBMH05
WS-06 CONTROLLED 0.240 0.80 STM CBMH06
WS-07 CONTROLLED 0.266 0.80 STM CBMH07
WS-08 CONTROLLED 0.260 0.80 STM CBMH08
WS-09 CONTROLLED 0.240 0.80 STM CBMH09
WS-10 CONTROLLED 0.257 0.80 STM CBMH10
WS-11 CONTROLLED 0.261 0.80 STM CBMH11
WS-12 CONTROLLED 0.240 0.80 STM CBMH12
WS-13 CONTROLLED 0.171 0.85 STM CBMH13
WS-14 CONTROLLED 0.237 0.80 STM CBMH14
WS-15 CONTROLLED 0.240 0.80 STM CBMH15
WS-16 CONTROLLED 0.352 0.80 STM CBMH16
WS-17 CONTROLLED 0.412 0.80 STM CBMH17
WS-18 CONTROLLED 0.275 0.80 STM CBMH18
WS-19 CONTROLLED 0.445 0.80 STM CBMH19
WS-20 CONTROLLED 0.297 0.70 STM CBMH20
WS-21 CONTROLLED 0.245 0.88 STM CBMH21
WS-22 CONTROLLED 0.242 0.90 STM CBMH22
WS-23 CONTROLLED 0.354 0.69 STM CBMH23
WS-24 CONTROLLED 0.123 0.61 STM CBMH24
WS-25 CONTROLLED 0.138 0.82 STM CBMH25
WS-26 CONTROLLED 0.235 0.84 STM CBMH26
WS-27 CONTROLLED 0.208 0.80 STM CBMH27
WS-28 CONTROLLED 0.217 0.80 STM CBMH28
WS-29 CONTROLLED 0.469 0.80 STM CBMH29
WS-30 CONTROLLED 0.340 0.49
WS-31 CONTROLLED 0.770 0.46
WS-32 CONTROLLED 0.875 0.56
WS-33 CONTROLLED 1.616 0.54
WS-34 UN-CONTROLLED 2.519 0.20
WS-35 UN-CONTROLLED 0.633 0.20
WS-36 UN-CONTROLLED 0.455 0.29
WS-37 UN-CONTROLLED 0.299 0.20
GB
CBMH
STM
CSP
Inv=75.25
Inv=75.64
Inv=75.21
Inv=75.92
Inv=76.00
Inv=76.08
Inv=76.16
Inv=76.24
Inv=76.32
Inv=76.40
Inv=76.48
Inv=76.56
Inv=76.64
Inv=76.72
Inv=76.80
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Inv=77.12
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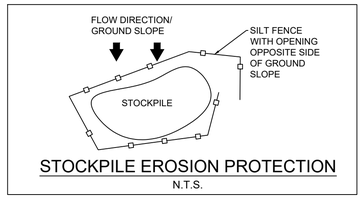
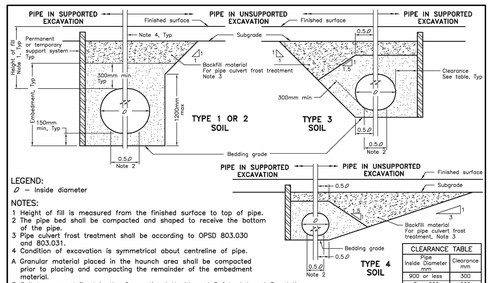
Inv=78.96
Inv=79.04



STOCKPILE EROSION PROTECTION

N.T.S.

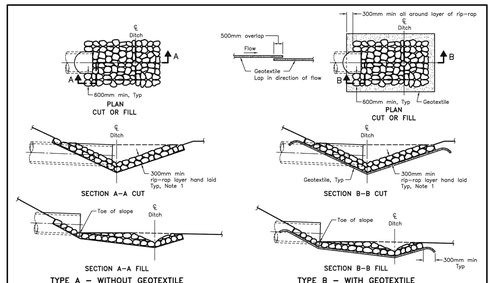


LEGEND:
$\varnothing$ = Inside diameter

NOTES:
1 Height of fill is measured from the finished surface to top of pipe.
2 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
3 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
4 Condition of excavation is symmetrical about centreline of pipe.
A Granular material placed in the haunch area shall be compacted prior to placing and compacting the remainder of the embedment material.
B Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.
C All dimensions are in metres unless otherwise shown.

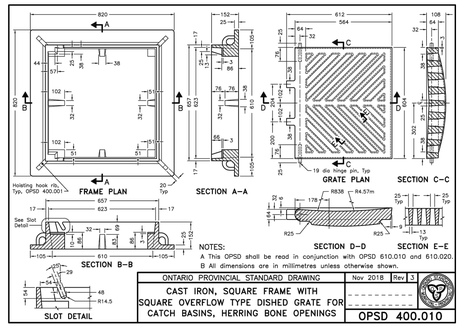
CLEARANCE TABLE	
Pipe Inside Diameter mm	Clearance mm
900 or less	300
Over 900	500

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



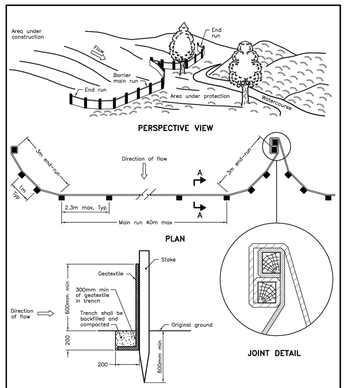
NOTES:
1 The thickness of the rip-rap layer shall be at least 1.5 times the rip-rap mean diameter.
A All dimensions are in millimetres unless otherwise shown.

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



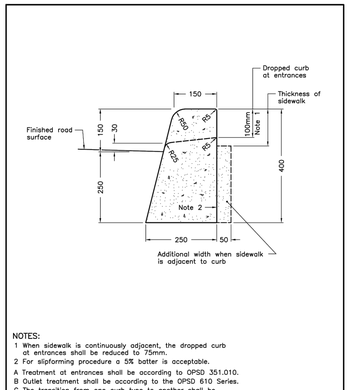
NOTES:
A This OPSD shall be read in conjunction with OPSD 610.010 and 610.020.
B All dimensions are in millimetres unless otherwise shown.

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



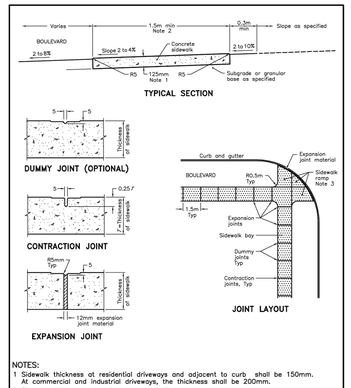
NOTE:
A All dimensions are in millimetres unless otherwise shown.

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



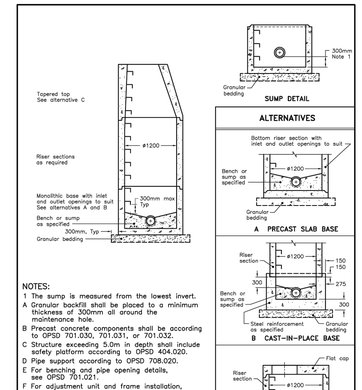
NOTES:
1 When sidewalk is continuously adjacent, the dropped curb at entrances shall be reduced to 75mm.
2 For slipforming procedure a 5% batter is acceptable.
A Treatment at entrances shall be according to OPSD 351.010.
B Outlet treatment shall be according to the OPSD 610 Series.
C The transition from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

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



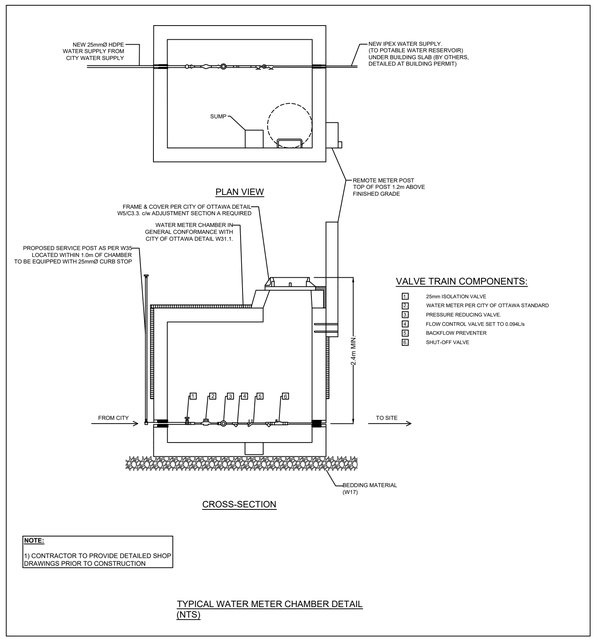
NOTES:
1 Sidewalk thickness at residential driveways and adjacent to curb shall be 150mm. At commercial and industrial driveways, the thickness shall be 200mm.
2 Sidewalk width shall be wider when specified.
3 This OPSD shall be read in conjunction with OPSD 310.030, 310.031, 310.032, 310.033 and 310.039.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

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



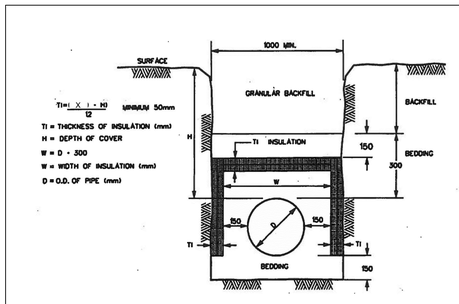
NOTES:
1 The sump is measured from the lowest invert.
A Granular backfill shall be placed to a minimum thickness of 300mm all around the maintenance hole.
B Precast concrete components shall be according to OPSD 701.030, 701.031, or 701.032.
C Structure exceeding 5.0m in depth shall include safety platform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

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev. 5
PRECAST CONCRETE MAINTENANCE HOLE 1200mm DIAMETER		OPSD 701.010



NOTE:
1) CONTRACTOR TO PROVIDE DETAILED SHOP DRAWINGS PRIOR TO CONSTRUCTION

TYPICAL WATER METER CHAMBER DETAIL (NTS)



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

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

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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.

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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.

No.	REVISIONS	BY	DATE
03	ISSUED FOR APPROVAL	V.J.	16 AUG 2024
02	ISSUED FOR APPROVAL	V.J.	24 MAY 2023
01	ISSUED FOR APPROVAL	V.J.	25 NOV 2021

LICENSED PROFESSIONAL ENGINEER
V. JOHNSON
100510576
08-16-2024
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

CLIENT
AVENUE 31

DESIGNED BY:	DRAWN BY:	APPROVED BY:
V.J.	M.L.	V.J.

PROJECT
INDUSTRIAL PARK
6160 THUNDER RD AND 5368 BOUNDARY RD
OTTAWA, ON

DRAWING TITLE
CONSTRUCTION DETAIL PLAN

PROJECT NO.
200578

DATE
NOVEMBER 2020

C901

D07-12-21-0205

APPENDIX F

Stormwater Management Details

(Storm Sewer Design Sheet, OGS)

LRL Associates Ltd.

Storm Watershed Summary

LRL File No.	200578
Project:	Thunder Development
Location:	Boundary Rd, Ottawa (ON)
Date:	August 16, 2024
Designed:	M. Longtin
Checked:	V. Johnson
Drawing Reference:	C701, C702

Pre-Development Catchments

WATERSHED	C = 0.20	C = 0.80	C = 0.90	Total Area (ha)	Combined C
EWS-01	11.639	0.000	0.000	11.639	0.20
EWS-02	0.670	0.000	0.000	0.670	0.20
EWS-03	2.885	0.000	0.000	2.885	0.20
TOTAL	**15.194**	**0.000**	**0.000**	**15.194**	**0.15**

Post-Development Catchments Controlled

WATERSHED	C = 0.20	C = 0.80	C = 0.90	Total Area (ha)	Combined C
WS-01	0.000	0.222	0.000	0.222	0.80
WS-02	0.000	0.240	0.000	0.240	0.80
WS-03	0.000	0.260	0.000	0.260	0.80
WS-04	0.000	0.283	0.000	0.283	0.80
WS-05	0.000	0.260	0.000	0.260	0.80
WS-06	0.000	0.240	0.000	0.240	0.80
WS-07	0.000	0.268	0.000	0.268	0.80
WS-08	0.000	0.260	0.000	0.260	0.80
WS-09	0.000	0.240	0.000	0.240	0.80
WS-10	0.000	0.257	0.000	0.257	0.80
WS-11	0.000	0.261	0.000	0.261	0.80
WS-12	0.000	0.240	0.000	0.240	0.80
WS-13	0.000	0.079	0.092	0.171	0.85
WS-14	0.000	0.237	0.000	0.237	0.80
WS-15	0.000	0.240	0.000	0.240	0.80
WS-16	0.000	0.352	0.000	0.352	0.80
WS-17	0.000	0.412	0.000	0.412	0.80

LRL Associates Ltd.

Storm Watershed Summary

WS-18	0.000	0.275	0.000	0.275	0.80
WS-19	0.000	0.445	0.000	0.445	0.80
WS-20	0.044	0.032	0.221	0.297	0.79
WS-21	0.000	0.049	0.196	0.245	0.88
WS-22	0.000	0.000	0.242	0.242	0.90
WS-23	0.005	0.000	0.349	0.354	0.89
WS-24	0.052	0.000	0.071	0.123	0.61
WS-25	0.017	0.000	0.121	0.138	0.82
WS-26	0.000	0.142	0.092	0.235	0.84
WS-27	0.000	0.208	0.000	0.208	0.80
WS-28	0.000	0.217	0.000	0.217	0.80
WS-29	0.000	0.469	0.000	0.469	0.80
WS-30	0.174	0.166	0.000	0.340	0.49
WS-31	0.438	0.332	0.000	0.770	0.46
WS-32	0.357	0.518	0.000	0.875	0.56
WS-33	0.688	0.929	0.000	1.616	0.54
TOTAL	**0.118**	**6.185**	**1.384**	**7.687**	**1.08**

Post-Development Catchments Uncontrolled

WATERSHED	C = 0.20	C = 0.80	C = 0.90	Total Area (ha)	Combined C
WS-34	2.519	0.000	0.000	2.519	0.20
WS-35	0.633	0.000	0.000	0.633	0.20
WS-36	0.399	0.000	0.056	0.455	0.29
WS-37	0.299	0.000	0.000	0.299	0.20
TOTAL	**3.850**	**0.000**	**0.056**	**3.906**	**0.21**

LRL Associates Ltd.

Storm Design Sheet

LRL File No.	200578
Project:	Thunder Development
Location:	Boundary Rd, Ottawa (ON)
Date:	August 16, 2024
Designed:	M. Longtin
Checked:	V. Johnson
Drawing Reference:	C.401

Storm Design Parameters

Rational Method
Q = 2.78CIA
Q = Peak flow (L/s)
A = Drainage area (ha)
C = Runoff coefficient
I = Rainfall intensity (mm/hr)

Runoff Coefficient (C)

Grass	0.2
Gravel	0.80
Asphalt / rooftop	0.90

Ottawa Macdonald-Cartier International Airport IDF curve
Equation (2 year event, intensity in mm/hr)
$I=732.951 / (Td +6.199)^{0.810}$

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)	Pipe Diameter (mm)	Type	Slope (%)	Length (m)	Capacity Full (L/s)	Velocity Full (m/s)	Time of Flow (min.)	Ratio (Q/Q_{FULL})
WS-01	CBMH01	CBMH02	0.000	0.222	0.000	0.49	0.49	10.00	76.81	37.84	375	PVC	0.25%	54.6	87.7	0.79	1.15	**0.43**
WS-02	CBMH02	CBMH03	0.000	0.240	0.000	0.53	1.03	11.15	72.67	74.58	375	PVC	0.27%	52.2	91.1	0.82	1.05	**0.82**
WS-03	CBMH03	OUTLET	0.000	0.260	0.000	0.58	1.60	12.20	69.27	111.16	450	PVC	0.25%	60.7	142.6	0.90	1.13	**0.78**
WS-04	CBMH04	CBMH05	0.000	0.283	0.000	0.63	0.63	10.00	76.81	48.31	375	PVC	0.25%	56.5	87.7	0.79	1.19	**0.55**
WS-05	CBMH05	CBMH06	0.000	0.260	0.000	0.58	1.21	11.19	72.53	87.61	450	PVC	0.20%	52.1	127.5	0.80	1.08	**0.69**
WS-06	CBMH06	OUTLET	0.000	0.240	0.000	0.53	1.74	12.27	69.07	120.27	450	PVC	0.25%	60.7	142.6	0.90	1.13	**0.84**
WS-07	CBMH07	CBMH08	0.000	0.268	0.000	0.60	0.60	10.00	76.81	45.78	375	PVC	0.25%	56.0	87.7	0.79	1.18	**0.52**
WS-08	CBMH08	CBMH09	0.000	0.260	0.000	0.58	1.17	11.18	72.57	85.26	450	PVC	0.20%	50.0	127.5	0.80	1.04	**0.67**
WS-09	CBMH09	OUTLET	0.000	0.240	0.000	0.53	1.71	12.22	69.23	118.26	450	PVC	0.25%	60.7	142.6	0.90	1.13	**0.83**
WS-10	CBMH10	CBMH11	0.000	0.257	0.000	0.57	0.57	10.00	76.81	43.83	375	PVC	0.25%	52.9	87.7	0.79	1.11	**0.50**
WS-11	CBMH11	CBMH12	0.000	0.261	0.000	0.58	1.15	11.11	72.79	83.72	450	PVC	0.20%	48.5	127.5	0.80	1.01	**0.66**
WS-12	CBMH12	OUTLET	0.000	0.240	0.000	0.53	1.68	12.12	69.53	117.13	450	PVC	0.25%	60.7	142.6	0.90	1.13	**0.82**
WS-13	CBMH13	CBMH14	0.000	0.079	0.092	0.40	0.40	10.00	76.81	31.09	375	PVC	0.25%	50.5	87.7	0.79	1.06	**0.35**
WS-14	CBMH14	CBMH15	0.000	0.237	0.000	0.53	0.93	11.06	72.96	67.94	375	PVC	0.25%	56.2	87.7	0.79	1.18	**0.77**
WS-15	CBMH15	OUTLET	0.000	0.240	0.000	0.53	1.47	12.24	69.15	101.35	450	PVC	0.20%	56.2	127.5	0.80	1.17	**0.79**
WS-16	CBMH16	OUTLET	0.000	0.352	0.000	0.78	0.78	10.00	76.81	60.04	375	PVC	0.25%	46.5	87.7	0.79	0.98	**0.68**
WS-17	CBMH17	CBMH18	0.000	0.412	0.000	0.92	0.92	10.00	76.81	70.34	375	PVC	0.25%	57.7	87.7	0.79	1.21	**0.80**
WS-18	CBMH18	OUTLET	0.000	0.275	0.000	0.61	1.53	11.21	72.45	110.71	450	PVC	0.25%	46.8	142.6	0.90	0.87	**0.78**

LRL Associates Ltd.
Storm Design Sheet

LRL File No.	200578
Project:	Thunder Development
Location:	Boundary Rd, Ottawa (ON)
Date:	August 16, 2024
Designed:	M. Longtin
Checked:	V. Johnson
Drawing Reference:	C.401

Storm Design Parameters

Rational Method	Runoff Coefficient (C)		Ottawa Macdonald-Cartier International Airport IDF curve
Q = 2.78CIA	Grass	0.2	Equation (2 year event, intensity in mm/hr)
Q = Peak flow (L/s)	Gravel	0.80	$I=732.951 / (Td +6.199)^{0.810}$
A = Drainage area (ha)	Asphalt / rooftop	0.90	
C = Runoff coefficient			Manning's "n" = 0.013
I = Rainfall intensity (mm/hr)			

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)	Pipe Diameter (mm)	Type	Slope (%)	Length (m)	Capacity Full (L/s)	Velocity Full (m/s)	Time of Flow (min.)	Ratio (Q/Q_{FULL})
WS-19	CBMH19	OUTLET	0.000	0.445	0.000	0.99	0.99	10.00	76.81	75.96	375	PVC	0.25%	46.5	87.7	0.79	0.98	**0.87**
WS-20	CBMH20	CBMH21	0.044	0.032	0.221	0.65	0.65	10.00	76.81	49.71	375	PVC	0.25%	50.5	87.7	0.79	1.06	**0.57**
WS-21	CBMH21	OUTLET	0.000	0.049	0.196	0.60	1.25	11.06	72.96	90.96	450	PVC	0.20%	56.2	127.5	0.80	1.17	**0.71**
WS-22	CBMH22	CBMH24	0.000	0.000	0.242	0.60	0.60	10.00	76.81	46.43	375	PVC	0.25%	50.5	87.7	0.79	1.06	**0.53**
WS-23	CBMH23	CBMH24	0.005	0.000	0.349	0.88	0.88	10.00	76.81	67.34	375	PVC	0.25%	56.2	87.7	0.79	1.18	**0.77**
WS-24	CBMH24	CBMH25	0.052	0.000	0.071	0.21	1.69	12.24	69.15	116.70	450	PVC	0.25%	56.2	142.6	0.90	1.05	**0.82**
WS-25	CBMH25	CBMH26	0.017	0.000	0.121	0.31	2.00	13.29	66.13	132.24	525	CONC	0.20%	56.2	192.3	0.89	1.05	**0.69**
WS-26	CBMH26	OUTLET	0.000	0.142	0.092	0.55	2.55	14.34	63.37	161.39	525	CONC	0.20%	56.2	192.3	0.89	1.05	**0.84**
WS-27	CBMH27	CBMH29	0.000	0.208	0.000	0.46	0.46	10.00	76.81	35.51	375	PVC	0.25%	56.2	87.7	0.79	1.18	**0.41**
WS-28	CBMH28	CBMH29	0.000	0.217	0.000	0.48	0.48	10.00	76.81	37.05	375	PVC	0.25%	56.2	87.7	0.79	1.18	**0.42**
WS-29	CBMH29	OUTLET	0.000	0.469	0.000	1.04	1.99	12.36	68.79	136.72	450	CONC	0.30%	56.2	156.2	0.98	0.95	**0.88**

Detailed Stormceptor Sizing Report – WS-1-39

Project Information & Location			
Project Name	6160 Thunder Rd.	**Project Number**	200578
City	Ottawa	**State/ Province**	Ontario
Country	Canada	**Date**	5/17/2023
Designer Information		**EOR Information (optional)**	
Name	Brandon O'Leary	**Name**	Virginia Johnson
Company	Rinker	**Company**	LRL Associates Ltd.
Phone #	905-630-0359	**Phone #**	613-915-9503
Email	brandon.oleary@rinkerpipe.com	**Email**	vjohnson@lrl.ca

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WS-1-39
Recommended Stormceptor Model	EFO6
TSS Removal (%) Provided	83
Particle Size Distribution (PSD)	Fine Distribution
Rainfall Station	OTTAWA MACDONALD-CARTIER INT'L A

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

EFO Sizing Summary			
EFO Model	**% TSS Removal Provided**	**% Runoff Volume Captured Provided**	**Standard EFO Hydrocarbon Storage Capacity**
EFO4	72	88	265 L (70 gal)
EFO6	83	99	610 L (160 gal)
EFO8	88	99	1070 L (280 gal)
EFO10	91	99	1670 L (440 gal)
EFO12	97	99	2475 L (655 gal)
Parallel Units / MAX	Custom	Custom	Custom

For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

OVERVIEW

Stormceptor ® EF is a continuation and evolution of the most globally recognized oil-grit separator (OGS) stormwater treatment technology - **Stormceptor ®.** Also known as a hydrodynamic separator, the enhanced flow Stormceptor EF is a high performing oil-grit separator that effectively removes a wide variety of pollutants from stormwater and snowmelt runoff at higher flow rates as compared to the original Stormceptor. Stormceptor EF captures and retains sediment (TSS), free oils, gross pollutants and other pollutants that attach to particles, such as nutrients and metals. Stormceptor EF's patent-pending treatment and scour prevention technology and internal bypass ensures sediment is retained during all rainfall events.

Design Methodology

Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:

- Site parameters
- Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
- Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
- TSS load
- Detention time of the system

Hydrology Analysis
PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour). Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station			
State/Province	Ontario	**Total Number of Rainfall Events**	4093
Rainfall Station Name	OTTAWA MACDONALD-CARTIER INT'L A	**Total Rainfall (mm)**	20978.1
Station ID #	6000	**Average Annual Rainfall (mm)**	567.0
Coordinates	45°19'N, 75°40'W	**Total Evaporation (mm)**	1657.0
Elevation (ft)	370	**Total Infiltration (mm)**	5442.4
Years of Rainfall Data	37	**Total Rainfall that is Runoff (mm)**	13878.7

Notes
• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules. • Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed. • For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

ONLINE APPLICATION

Stormceptor EF's internal bypass and patent-pending scour prevention technology has demonstrated very effective retention of pollutants in third-party testing and verification following the Canadian ETV's **Procedure for Laboratory Testing of Oil-Grit Separators.** Sediment scour prevention demonstrated an effluent concentration of less than 10 mg/L for sediment particles ranging from 1 to 1,000 microns, even during peak influent flow rates associated with infrequent high intensity storm events. While Stormceptor EF will capture oil, only the Stormceptor EFO configuration has been third-party tested and verified to retain greater than 99% of captured oil. Based on these verified performance attributes, the most efficient and widely accepted application of Stormceptor EF is an online configuration, which allows all upstream conveyance flows to enter and exit the unit. The online application eliminates the need for costly additional bypass structures, piping and installation expense.

FLOW ENTRANCE OPTIONS

Single Inlet Pipe – A common design which includes one inlet pipe and one outlet pipe. A 90-degree (maximum) bend is also accepted with this configuration.

Inlet Grate – Allows surface runoff to enter the unit from grade. The inlet grate option can also be used in conjunction with one inlet pipe or multiple inlet pipes. A removable flow deflector is added in the Stormceptor EF4/EFO4.

Maximum Pipe Diameter		
Model	Inlet (in/mm)	Outlet (in/mm)
EF4 / EFO4	24 / 610	24 / 610
EF6 / EFO6	36 / 915	36 / 915
EF8 / EFO8	48 / 1220	48 / 1220
EF10 / EFO10	72 / 1828	72 / 1828
EF12 / EFO12	72 / 1828	72 / 1828

Multiple Inlet Pipe – Allows for multiple inlet pipes of various diameters to enter the unit.

Maximum Pipe Diameter		
Model	Inlet (in/mm)	Outlet (in/mm)
EF4 / EFO4	18 / 457	24 / 610
EF6 / EFO6	30 / 762	36 / 915
EF8 / EFO8	42 / 1067	48 / 1220
EF10 / EFO10	60 / 1524	72 / 1828
EF12 / EFO12	60 / 1524	72 / 1828

Drainage Area	
Total Area (ha)	10.00
Imperviousness %	74.00

Up Stream Storage	
Storage (ha-m)	Discharge (cms)
0.0000	0.000
0.2061	0.022
0.3279	0.026
0.5930	0.032

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cms)	

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	90.00
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	32.00
Water Quality Flow Rate (L/s)	20.00

Design Details	
Stormceptor Inlet Invert Elev (m)	
Stormceptor Outlet Invert Elev (m)	
Stormceptor Rim Elev (m)	
Normal Water Level Elevation (m)	
Pipe Diameter (mm)	
Pipe Material	
Multiple Inlets (Y/N)	No
Grate Inlet (Y/N)	No

Particle Size Distribution (PSD)

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Site Name	WS-1-39

Site Details

Drainage Area	
Total Area (ha)	10.00
Imperviousness %	74.00
Oil Spill Capture Volume (L)	

Infiltration Parameters	
Horton's equation is used to estimate infiltration	
Max. Infiltration Rate (mm/hr)	61.98
Min. Infiltration Rate (mm/hr)	10.16
Decay Rate (1/sec)	0.00055
Regeneration Rate (1/sec)	0.01

Surface Characteristics	
Width (m)	632.00
Slope %	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Evaporation	
Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow	
Dry Weather Flow (L/s)	0

Maintenance Frequency	
Maintenance Frequency (months) >	12

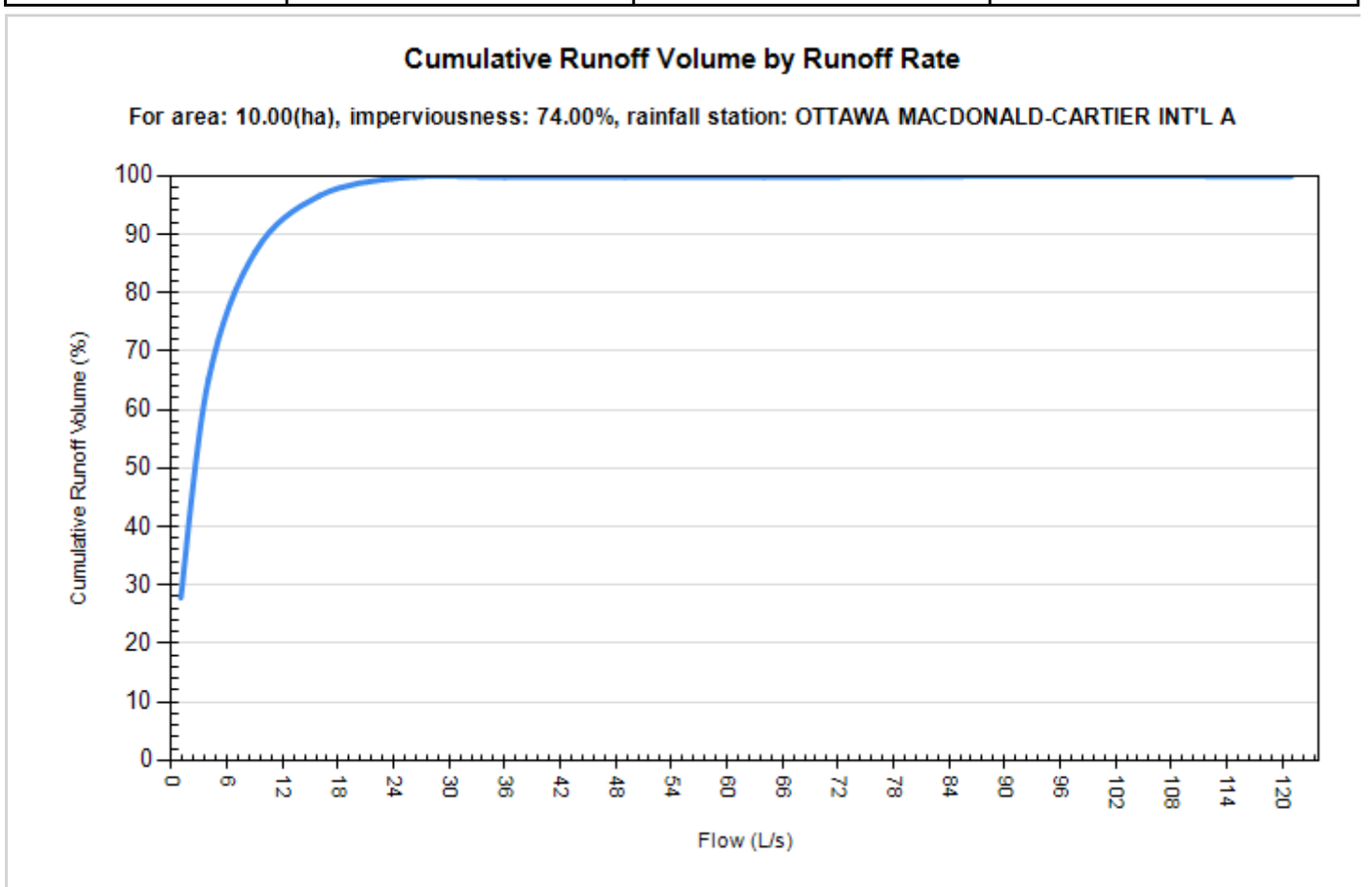
Winter Months	
Winter Infiltration	0

TSS Loading Parameters	
TSS Loading Function	Build Up/ Wash-off

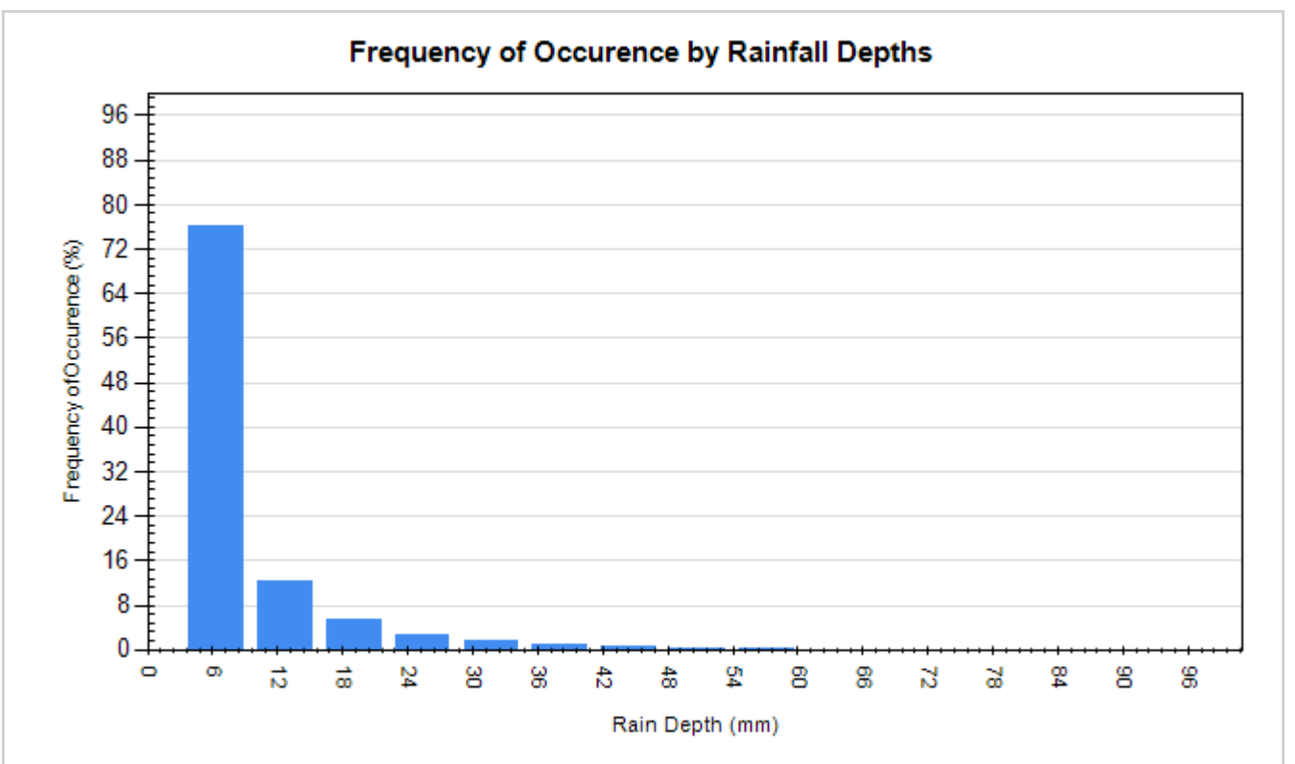
Buildup/Wash-off Parameters	
Target Event Mean Conc. (EMC) mg/L	125
Exponential Buildup Power	0.40
Exponential Washoff Exponent	0.20

TSS Availability Parameters	
Availability Constant A	0.057
Availability Factor B	0.04
Availability Exponent C	1.10
Min. Particle Size Affected by Availability (micron)	400

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (L/s)	**Runoff Volume (m³)**	**Volume Over (m³)**	**Cumulative Runoff Volume (%)**
1	386840	1004826	27.8
4	906169	490108	65.2
9	1208098	182261	86.9
16	1343630	47577	96.6
25	1385946	4655	99.7
36	1388007	2542	99.8
49	1388159	2390	99.8
64	1388327	2221	99.8
81	1388509	2034	99.9
100	1388707	1836	99.9
121	1388907	1634	99.9



Rainfall Event Analysis				
Rainfall Depth (mm)	**No. of Events**	**Percentage of Total Events (%)**	**Total Volume (mm)**	**Percentage of Annual Volume (%)**
6.35	3113	76.1	5230	24.9
12.70	501	12.2	4497	21.4
19.05	225	5.5	3469	16.5
25.40	105	2.6	2317	11.0
31.75	62	1.5	1765	8.4
38.10	35	0.9	1206	5.8
44.45	28	0.7	1163	5.5
50.80	12	0.3	557	2.7
57.15	7	0.2	378	1.8
63.50	1	0.0	63	0.3
69.85	1	0.0	64	0.3
76.20	1	0.0	76	0.4
82.55	0	0.0	0	0.0
88.90	1	0.0	84	0.4
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0



Stormceptor®

Rinker MATERIALS® A QUIKRETE® COMPANY

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

08/13/2024

Province:	Ontario
City:	Ottawa
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20

Site Name:	WS-40

Drainage Area (ha):	1.23
Runoff Coefficient 'c':	0.74

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?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	4
Peak Conveyance (maximum) Flow Rate (L/s):	4

Project Name:	6160 Thunder Rd.
Project Number:	200578
Designer Name:	Brandon O'Leary
Designer Company:	Rinker
Designer Email:	brandon.oleary@rinkerpipe.com
Designer Phone:	905-630-0359
EOR Name:	Virginia Johnson
EOR Company:	LRL Associates Ltd.
EOR Email:	vjohnson@lrl.ca
EOR Phone:	613-915-9503

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	94
EFO6	100
EFO8	100
EFO10	100
EFO12	100

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 94

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

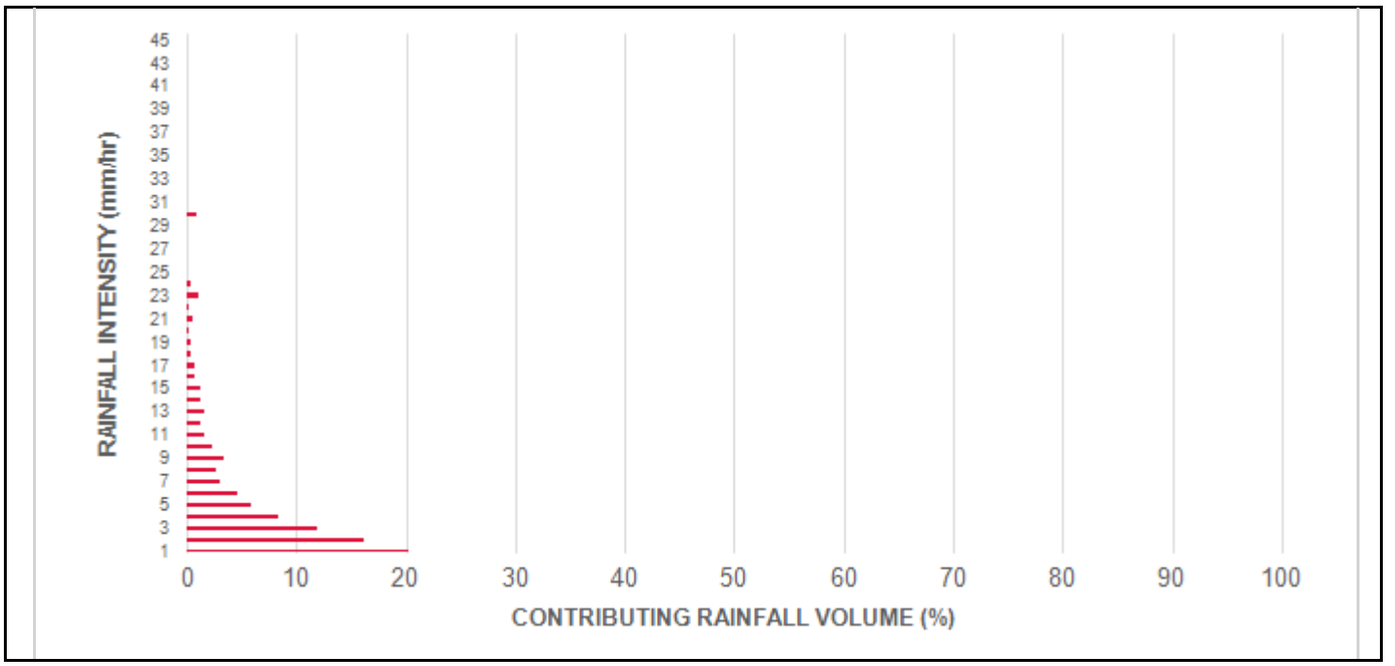
Stormceptor® EF Sizing Report

Upstream Flow Controlled Results

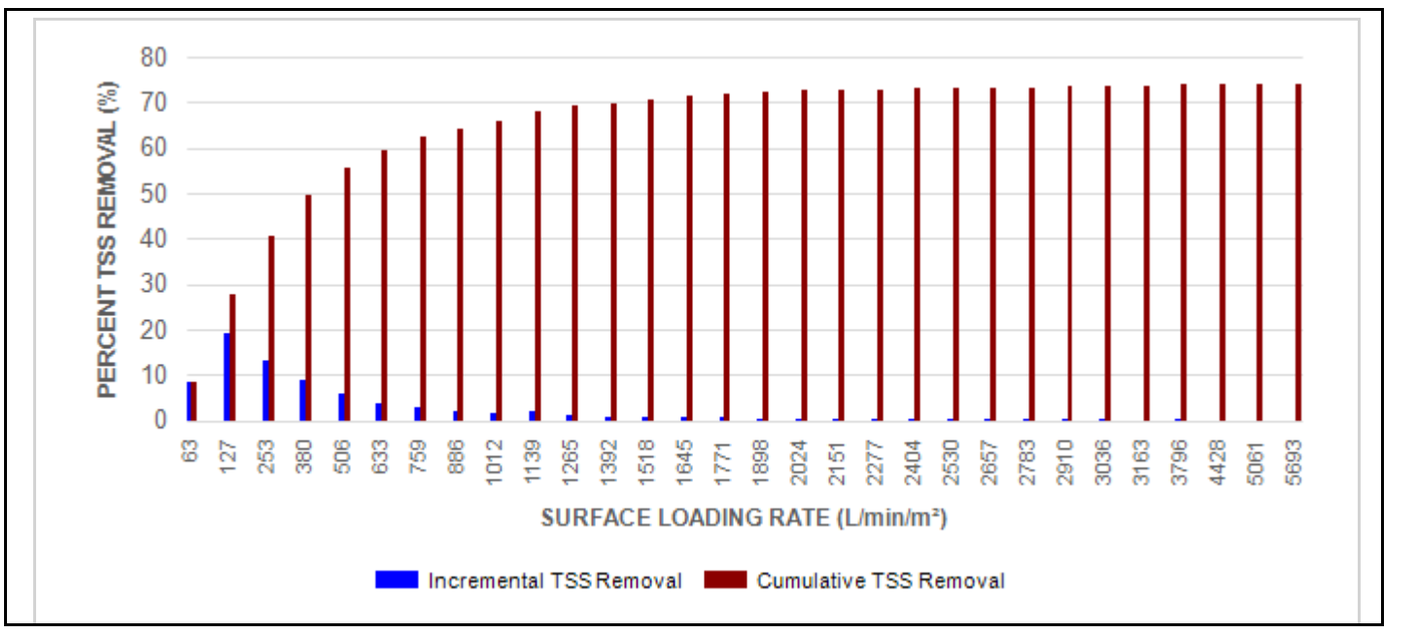
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	1.27	76.0	63.0	100	8.6	8.6
1.00	91.4	100.0	2.53	152.0	127.0	93	85.3	93.9
2.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
3.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
4.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
5.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
6.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
7.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
8.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
9.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
10.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
11.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
12.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
13.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
14.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
15.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
16.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
17.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
18.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
19.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
20.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
21.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
22.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
23.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
24.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
25.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
30.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
35.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
40.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
45.00	0.0	100.0	4.00	240.0	200.0	83	0.0	93.9
Estimated Net Annual Sediment (TSS) Load Reduction =								**94 %**

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

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL
FOR THE RECOMMENDED STORMCEPTOR® MODEL



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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

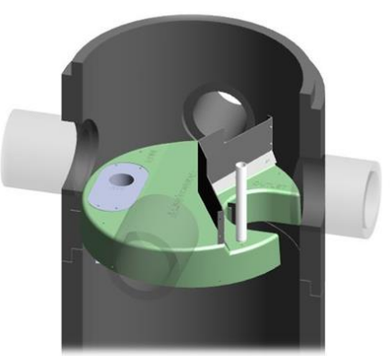
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test 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.

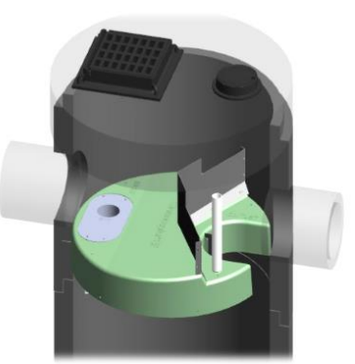
DESIGN FLEXIBILITY

►**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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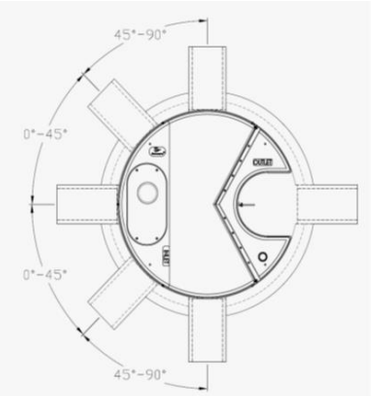

INLET-TO-OUTLET DROP

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.

STANDARD SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREAMENT DEVICE WITH THIRD-PARTY VERIFIED LIGHT LIQUID RE-ENTRAINMENT SIMULATION PERFORMANCE TESTING RESULTS

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, designing, maintaining, and constructing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, **specifically an OGS device that has been third-party tested for oil and fuel retention capability using a protocol for light liquid re-entrainment simulation testing, with testing results and a Statement of Verification in accordance with all the provisions of ISO 14034 Environmental Management – Environmental Technology Verification (ETV)**. Work includes supply and installation of concrete bases, precast sections, and the appropriate precast section with OGS internal components correctly installed within the system, watertight sealed to the precast concrete prior to arrival to the project site.

1.2 REFERENCE STANDARDS

1.2.1 For Canadian projects only, the following reference standards apply:

CAN/CSA-A257.4-14: Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections, and Fittings Using Rubber Gaskets
CAN/CSA-A257.4-14: Precast Reinforced Circular Concrete Manhole Sections, Catch Basins, and Fittings
CAN/CSA-S6-00: Canadian Highway Bridge Design Code

1.2.2 For ALL projects, the following reference standards apply:

ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks
ASTM C 478: Specification for Precast Reinforced Concrete Manhole Sections
ASTM C 443: Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C 891: Standard Practice for Installation of Underground Precast Concrete Utility Structures
ASTM D2563: Standard Practice for Classification of Visual Defects in Reinforced Plastics

1.3 SHOP DRAWINGS

1.3.1 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 the precast concrete components and OGS internal components prior to shipment, including the sequence for installation.

1.3.2 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 based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record. Any and all changes to project cost estimates, bonding amounts, plan check fees for revision of approved documents, or design impacts due to regulatory requirements as a result of a product substitution shall be coordinated by the Contractor with the Engineer of Record.

1.4 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

1.4.1 OGS internal components supplied by the Manufacturer for attachment to the precast concrete vessel shall be pre-fabricated, bolted to the precast and watertight sealed to the precast vessel surface prior to site delivery to ensure Manufacturer's internal assembly process and quality control processes are fully adhered to, and to prevent materials damage on site.

1.4.2 Follow all instructions including the sequence for installation in the shop drawings during installation.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 The OGS vessel shall be cylindrical and constructed from precast concrete riser and slab components.

2.1.2 The precast concrete OGS internal components shall include a fiberglass insert bolted and watertight sealed inside the precast concrete vessel, prior to site delivery. Primary internal components that are to be anchored and watertight sealed to the precast concrete vessel shall be done so only by the Manufacturer prior to arrival at the job site to ensure product quality.

2.1.3 The OGS shall be allowed to be specified and have the ability to function as a 240-degree bend structure in the stormwater drainage system, or as a junction structure.

2.1.4 The OGS to be specified shall have the capability to accept influent flow from an inlet grate and an inlet pipe.

2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be designed and manufactured to meet highway loading conditions per State/Provincial or local requirements.

2.3 GASKETS

Only profile neoprene or nitrile rubber gaskets that are oil resistant shall be accepted. For Canadian projects only, gaskets shall be in accordance to CSA A257.4-14. Mastic sealants, butyl tape/rope or Conseal CS-101 alone are not acceptable gasket materials.

2.4 JOINTS

The concrete joints shall be watertight and meet the design criteria according to ASTM C-990. For projects where joints require gaskets, the concrete joints shall be watertight and oil resistant and meet the design criteria according to ASTM C-443. Mastic sealants or butyl tape/rope alone are not an acceptable alternative.

2.5 FRAMES AND COVERS

Frames and covers shall be manufactured in accordance with State/Provincial or local requirements for inspection and maintenance access purposes. A minimum of one cover, at least 22-inch (560 mm) in diameter, shall be clearly embossed with the OGS manufacturer's product name to properly identify this asset's purpose is for stormwater quality treatment.

2.6 PRECAST CONCRETE

All precast concrete components shall conform to the appropriate CSA or ASTM specifications.

2.7 FIBERGLASS

The fiberglass portion of the OGS device shall be constructed in accordance with ASTM D2563, and in accordance with the PS15-69 manufacturing standard, and shall only be installed, bolted and watertight sealed to the precast concrete by the Manufacturer prior to arrival at the project site to ensure product quality.

2.8 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a fiberglass insert for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The total sediment storage capacity shall be a minimum 40 ft^3 (1.1 m^3). The total petroleum hydrocarbon storage capacity shall be a minimum 50 gallons (189 liters). The access opening to the sump of the OGS device for periodic inspection and maintenance purposes shall be a minimum 16 inches (406 mm) in diameter.

2.9 LADDERS

Ladder rungs shall be provided upon request or to comply with State/Provincial or local requirements.

2.10 INSPECTION

All precast concrete sections shall be level and inspected to ensure dimensions, appearance, integrity of internal components, and quality of the product meets State/Provincial or local specifications and associated standards.

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 HYDROLOGY AND RUNOFF VOLUME

The OGS device shall be engineered, designed and sized to treat a minimum of 90 percent of the average annual runoff volume, unless otherwise stated by the Engineer of Record, using historical rainfall data. Rainfall data sets should be comprised of a minimum 15-years of rainfall data or a longer continuous period if available for a given location, but in all cases a minimum 5-year period of rainfall data.

3.3 ANNUAL (TSS) SEDIMIMENT LOAD AND STORAGE CAPACITY

The OGS device shall be capable of removing and have sufficient storage capacity for the calculated annual total suspended solids (TSS) mass load and volume without scouring previously captured pollutants prior to maintenance being required. The annual (TSS) sediment load and volume transported from the drainage area should be calculated and compared to the OGS device's available storage capacity by the specifying Engineer to ensure adequate capacity between maintenance cycles. Sediment loadings shall be determined by land use and defined as a minimum of 450 kg (992 lb) of sediment (TSS) per impervious hectare of drainage area per year, or greater based on land use, as noted in Table 1 below.

Annual sediment volume calculations shall be performed using the projected average annual treated runoff volume, a typical sediment bulk density of 1602 kg/m^3 (100 lbs/ft^3) and an assumed Event Mean Concentration (EMC) of 125 mg/L TSS in the runoff, or as otherwise determined by the Engineer of Record.

Example calculation for a 1.3-hectares parking lot site:

- 1.28 meters of rainfall depth, per year
- 1.3 hectares of 100% impervious drainage area
- EMC of 125 mg/L TSS in runoff
- Treatment of 90% of the average annual runoff volume
- Target average annual TSS removal rate of 60% by OGS

Annual Runoff Volume:

- 1.28 m rain depth x 1.3 ha x 10,000 m^2/ha= 16,640 m^3 of runoff volume
- 16,640 m^3 x 1000 L/m^3 = 16,640,000 L of runoff volume
- 16,640,000 L x 0.90 = 14,976,000 L to be treated by OGS unit

Annual Sediment Mass and Sediment Volume Load Calculation:

- 14,976,000 L x 125 mg/L x kg/1,000,000 mg = 1,872 kg annual sediment mass
- 1,872 kg x m^3/1602 kg = 1.17 m^3 annual sediment volume
- 1.17 m^3 x 60% TSS removal rate by OGS = 0.70 m^3 minimum expected annual storage requirement in OGS

As a guideline, the U.S. EPA has determined typical annual sediment loads per drainage area for various sites by land use (see Table 1). Certain States, Provinces and local jurisdictions have also established such guidelines.

Table 1 – Annual Mass Sediment Loading by Land Use

	Commercial	Parking Lot	Residential			Highways	Industrial	Shopping Center
			High	Med.	Low			
(lbs/acre/yr)	1,000	400	420	250	10	880	500	440
(kg/hectare/yr)	1,124	450	472	281	11	989	562	494

Source: U.S. EPA Stormwater Best Management Practice Design Guide Volume 1, Appendix D, Table D-1, Burton and Pitt 2002

3.4 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 Table 2, Section 3.5, and based on third-party performance testing conducted in accordance with the Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. 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:

3.4.1 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.

3.4.2 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.

3.4.3 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.

3.4.4 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 3.3.

3.4.5 The Peclet Number is not an approved method or model for calculating TSS removal, sizing, or scaling OGS devices.

3.4.6 If an alternate OGS device is proposed, supporting documentation shall be submitted that demonstrates:

- Canadian ETV or ISO 14034 ETV Verification Statement which verifies third-party performance testing conducted in accordance with the **Procedure for Laboratory Testing of Oil-Grit Separators,** including the Light Liquid Re-entrainment Simulation Testing.
- Equal or better sediment (TSS) removal of the PSD specified in Table 2 at equivalent surface loading rates, as compared to the OGS device specified herein.
- Equal or better Light Liquid Re-entrainment Simulation Test results (using low-density polyethylene beads as a surrogate for light liquids such as oil and fuel) at equivalent surface loading rates, as compared to the OGS device specified herein. However, an alternative OGS device shall not be allowed as a substitute if the Light Liquid Re-entrainment Simulation Test was performed with screening components within the OGS device that are effective at retaining the low-density polyethylene beads, but would not be expected to retain light liquids such as oil and fuel.
- Equal or greater sediment storage capacity, as compared to the OGS device specified herein.
- Supporting documentation shall be signed and sealed by a local registered Professional Engineer. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

3.5 PARTICLE SIZE DISTRIBUTION (PSD) FOR SIZING

The OGS device shall be sized to achieve the Engineer-specified average annual percent sediment (TSS) removal based solely on the test sediment used in the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** This test sediment is comprised of inorganic ground silica with a specific gravity of 2.65, uniformly mixed, and containing a broad range of particle sizes as specified in Table 2. No alternative PSDs or deviations from Table 2 shall be accepted.

Table 2
Canadian ETV Program Procedure for Laboratory Testing of Oil-Grit Separators
Particle Size Distribution (PSD) of Test Sediment

Particle Diameter (Microns)	% by Mass of All Particles	Specific Gravity
1000	5%	2.65
500	5%	2.65
250	15%	2.65
150	15%	2.65
100	10%	2.65
75	5%	2.65
50	10%	2.65
20	15%	2.65
8	10%	2.65
5	5%	2.65
2	5%	2.65

3.6 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party scour testing conducted and have in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. This scour testing is conducted with the device pre-loaded with test sediment comprised of the particle size distribution (PSD) illustrated in Table 2.

3.6.1 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.

Data generated from laboratory scour testing performed with an OGS device pre-loaded with a coarser PSD than in Table 2 (i.e. the coarser PSD has no particles in the 1-micron to 50-micron size range, or the D_{50} of the test sediment exceeds 75 microns) shall not be acceptable for the determination of the device's suitability for on-line installation.

3.7 DESIGN ACCOUNTING FOR BYPASS

3.7.1 The OGS device shall be specified to achieve the TSS removal performance and water quality objectives without washout of previously captured pollutants. The OGS device shall also have sufficient hydraulic conveyance capacity to convey the peak storm event, in accordance with hydraulic conditions per the Engineer of Record. To ensure this is achieved, there are two design options with associated requirements:

3.7.1.1 The OGS device shall be placed **off-line** with an upstream diversion structure (typically in an upstream manhole) that only allows the water quality volume to be diverted to the OGS device, and excessive flows diverted downstream around the OGS device to prevent high flow washout of pollutants previously captured. This design typically incorporates a triangular layout including an upstream bypass manhole with an appropriately engineered weir wall, the OGS device, and a downstream junction manhole, which is connected to both the OGS device and bypass structure. In this case with an external bypass required, the OGS device manufacturer must provide calculations and designs for all structures, piping and any other required material applicable to the proper functioning of the system, stamped by a Professional Engineer.

3.7.1.2 Alternatively, OGS devices in compliance with Section 3.6 shall be acceptable for an **on-line** design configuration, thereby eliminating the requirement for an upstream bypass manhole and downstream junction manhole.

3.7.2 The OGS device shall also have sufficient hydraulic conveyance capacity to convey the peak storm event, in accordance with hydraulic conditions per the Engineer of Record. If an alternate OGS device is proposed, supporting documentation shall be submitted that demonstrates equal or better hydraulic conveyance capacity as compared to the OGS device specified herein. This documentation shall be signed and sealed by a local registered Professional Engineer. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

3.8 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.

3.8.1 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.

3.9 PETROLEUM HYDROCARBONS AND FLOATABLES STORAGE CAPACITY

Petroleum hydrocarbons and floatables storage capacity in the OGS device shall be a minimum 50 gallons (189 Liters), or more as specified.

3.9.1 The OGS device shall have gasketed precast concrete joints that are watertight, and oil resistant and meet the design criteria according to ASTM C-443 to provide safe oil and other hydrocarbon materials storage and ground water protection. Mastic sealants or butyl tape/rope alone are not an acceptable alternative.

3.10 SURFACE LOADING RATE SCALING OF DIFFERENT MODEL SIZES

The reference device for scaling shall be an OGS device that has been third-party tested in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. Other model sizes of the tested device shall only be scaled such that the claimed TSS removal efficiency of the scaled device shall be no greater than the TSS removal efficiency of the tested device at identical **surface loading rates** (flow rate divided by settling surface area). The depth of other model sizes of the tested device shall be scaled in accordance with the depth scaling provisions within Section 6.0 of the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**.

3.10.1 The Peclet Number and volumetric scaling are not approved methods for scaling OGS devices.

PART 4 – INSPECTION & MAINTENANCE

The OGS manufacturer shall provide an Owner's Manual upon request.
Maintenance shall be performed by a professional service provider who has experience in cleaning OGS devices and has been trained and certified in applicable health and safety practices, including confined space entry procedures.

4.1 A Quality Assurance Plan that provides inspection for a minimum of 5 years shall be included with the OGS stormwater quality device, and written into the Environmental Compliance Approval (ECA) or the appropriate State/Provincial or local approval document.

4.2 OGS device inspection shall include determination of sediment depth and presence of petroleum hydrocarbons below the insert. Inspection shall be easily conducted from finished grade through a frame and cover of at least 22 inch (560 mm) in diameter.

4.3 Inspection and pollutant removal shall be conducted periodically. For routine maintenance cleaning activities, pollutant removal shall typically utilize a truck equipped with vacuum apparatus, and shall be easily conducted from finished grade through a frame and cover of at least 22-inches (560 mm) in diameter.

4.4 Diameter of the maintenance access opening to the lower chamber and sump shall be scaled consistently across all model sizes, and shall be 1/3 the inside diameter of the OGS structure, or larger.

4.5 No confined space entry shall be required for routine inspection and maintenance cleaning activities.

4.6 For OGS model sizes of diameter 72 inches (1828 mm) and greater, the access opening to the OGS device's lower chamber and sump shall be large enough to allow a maintenance worker to enter the lower chamber to facilitate non-routine maintenance cleaning activities and repairs, as needed.

4.7 The orifice-containing component (i.e. drop pipe, duct, chute, etc.) of the OGS device used to control flow rate into the lower chamber shall be removable from the insert to facilitate cleaning, repair, or replacement of the orifice-containing component, as needed.

PART 5 – EXECUTION

5.1 PRECAST CONCRETE INSTALLATION

The installation of the precast concrete OGS stormwater quality treatment device shall conform to ASTM C 891, ASTM C 478, ASTM C 443, CAN/CSA-A257.4-14, CAN/CSA-A257.4-14, CAN/CSA-S6-00 and all highway, State/Provincial, or local specifications for the construction of manholes. Selected sections of a general specification that are applicable are summarized below. The Contractor shall furnish all labor, equipment and materials necessary to offload, assemble as needed the OGS internal components as specified in the Shop Drawings.

5.2 EXCAVATION

5.2.1 Excavation for the installation of the OGS stormwater quality treatment device shall conform to highway, State/Provincial or local specifications. Topsoil that is removed during the excavation for the OGS stormwater quality treatment device shall be stockpiled in designated areas and not be mixed with subsoil or other materials. Topsoil stockpiles and the general site preparation for the installation of the OGS stormwater quality device shall conform to highway, State/Provincial or local specifications.

5.2.2 The OGS device shall not be installed on frozen ground. Excavation shall extend a minimum of 12 inch (300 mm) from the precast concrete surfaces plus an allowance for shoring and bracing where required. If the bottom of the excavation provides an unsuitable foundation additional excavation may be required.

5.2.3 In areas with a high water table, continuous dewatering shall be provided to ensure that the excavation is stable and free of water.

5.3 BACKFILLING

Backfill material shall conform to highway, State/Provincial or local specifications. Backfill material shall be placed in uniform layers not exceeding 12 inches (300 mm) in depth and compacted to highway, State/Provincial or local specifications.

5.4 OGS WATER QUALITY DEVICE CONSTRUCTION SEQUENCE

5.4.1 The precast concrete OGS stormwater quality treatment device is installed and leveled in sections in the following sequence:

- aggregate base
- base slab, or base
- riser section(s) (if required)
- riser section w/ pre-installed fiberglass insert
- upper riser section(s)
- internal OGS device components
- connect inlet and outlet pipes
- riser section, top slab and/or transition (if required)
- frame and access cover

5.4.2 The precast concrete base shall be placed level at the specified grade. The entire base shall be in contact with the underlying compacted granular material. Subsequent sections, complete with oil resistant, watertight joint seals, shall be installed in accordance with the precast concrete manufacturer's recommendations.

5.4.3 Adjustment of the OGS stormwater quality treatment device can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets shall be repaired or replaced as necessary. Once the OGS stormwater quality treatment device has been constructed, any lift holes must be plugged with mortar.

5.5 DROP PIPE AND OIL INSPECTION PIPE

Once the upper precast concrete riser has been attached to the lower precast concrete riser section, the OGS device Drop Pipe and Oil Inspection Pipe must be attached, and watertight sealed to the fiberglass insert using Sikaflex 1a. Installation instructions and required materials shall be provided by the OGS manufacturer.

5.6 INLET AND OUTLET PIPES

Inlet and outlet pipes shall be securely set using grout or approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight. Non-secure inlets and outlets will result in improper performance.

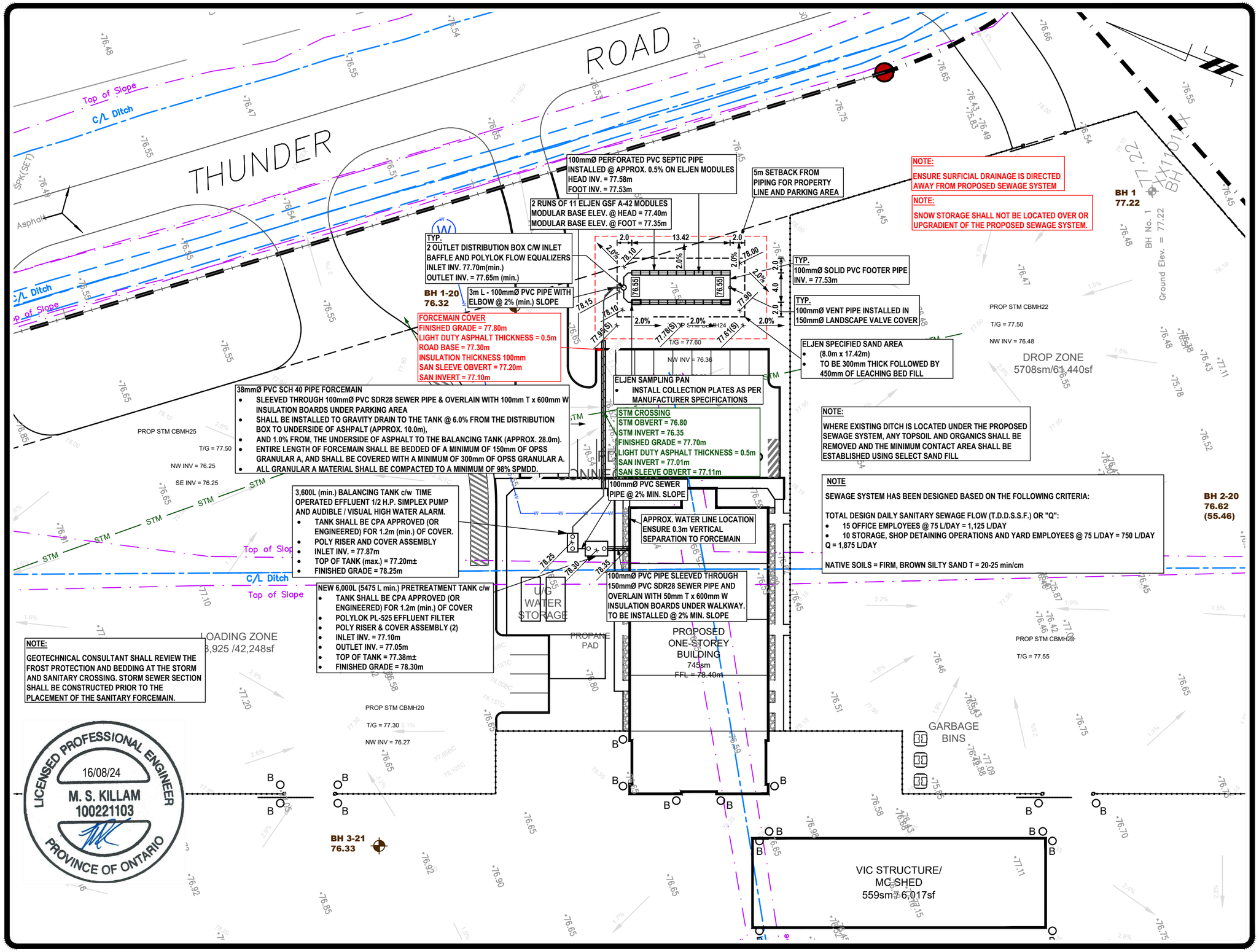
5.7 FRAME AND COVER OR FRAME AND GRATE INSTALLATION

Precast concrete adjustment units shall be installed to set the frame and cover/grate at the required elevation. The adjustment units shall be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover/grate should be set in a full bed of mortar at the elevation specified.

5.7.1 A minimum of one cover, at least 22-inch (560 mm) in diameter, shall be clearly embossed with the OGS device brand or product name to properly identify this asset's purpose is for stormwater quality treatment.

APPENDIX G

Sewage System Layout Plan



LEGEND:

✥	Bore Hole Location - as per Paterson Group Report No. PG5161-1(rev.3)
x 100.99	Existing Ground Surface Elev. (m)
x 102.30	Proposed Ground Surface Elev. (m)
x 102.30(s)	Proposed Swale Elev. (m)
77.55	Proposed Subgrade Elev. (m)
TBC	To be Confirmed
⌐	Proposed Structure
←	Surficial Flow Direction

All units are in meters unless otherwise specified.

BENCHMARK INFORMATION:

Refer to Grading and Drainage Plan No. C304, dated July, 2024, by LRL Engineering.

REFERENCE:

Base Plan Information obtained from Site Plan No. SPA-1, dated June 26, 2024, by McRobie Architects and Interior Designers

Topographic obtained from Grading and Drainage Plan No. C304, dated July, 2024, by LRL Engineering.

DD/MM/YY	DESCRIPTION	REV.
16/08/24	Revised Per Client Request	5
15/08/24	Issued for Final Review	4
08/08/24	Revised Forcemain Layout	3
06/08/24	Revised per Storm Crossing Elevations.	2
30/07/24	Revised per Preliminary Discussion Comments	1
12/07/24	Issued for Preliminary Review	0

Consultant:

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7Z9
TEL: (613) 226-7381

Client:

THUNDER ROAD LIMITED PARTNERSHIP

Project:

PROPOSED COMMERCIAL FACILITY

6160 THUNDER ROAD
OTTAWA (VARS), ONTARIO

Drawing:

SEWAGE SYSTEM LAYOUT PLAN

Scale:	Drawn by:
1:500	HV
Date: 08/2024	Checked by: MK

Drawing No.:

PH4944-1(rev.5)

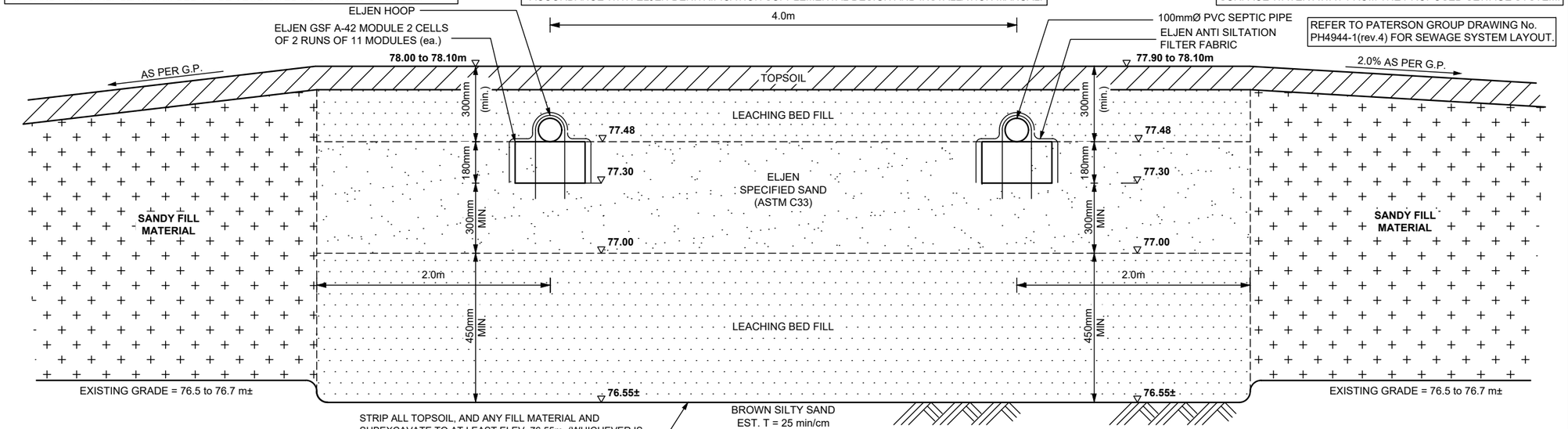
p:\autocad drawings\hydrogeology\ph49xx\ph4944 - thunder road limited partnership - 6160 thunder road, ottawa\ph4944-1(rev.5).dwg

COVER MATERIAL TO CONSIST OF LEACHING BED FILL FOLLOWED BY APPROX. 100mm OF SANDY TOPSOIL. LEACHING BED TO BE VEGETATED AS SOON AS POSSIBLE.

SEWAGE SYSTEM DESIGN, SPECIFICATION, DETAILS AND NOTES HAVE BEEN COMPLETED IN ACCORDANCE WITH ELJEN DENITRIFICATION SUPPLEMENTAL DESIGN AND INSTALLATION MANUAL.

FINAL GRADING SHALL BE SUITABLY SHAPED TO DIRECT SURFACE WATER AWAY FROM THE PROPOSED SEWAGE SYSTEM.

REFER TO PATERSON GROUP DRAWING No. PH4944-1(rev.4) FOR SEWAGE SYSTEM LAYOUT.



PROFILE

N.T.S.

NOTES:

1) ESTIMATE OF DAILY SEWAGE FLOW (Q)

THE PROPOSED SEWAGE SYSTEM HAS BEEN DESIGNED TO SUPPORT A COMMERCIAL TYPE USAGE CONSISTING OF OFFICE, AND STORAGE, SHOP AND DETAINING OPERATIONS SPACE. THE DAILY DESIGN SEWAGE FLOW RATE IS CALCULATED IN ACCORDANCE WITH O.B.C. TABLE 8.2.1.3.B.

OFFICE SPACE:

- 75 L/DAY x 15 EMPLOYEES = 1,125 L/DAY

STORAGE, SHOP, DETAINING OPERATIONS AND YARD SPACE:

- 75 L/DAY x 10 EMPLOYEES = 750 L/DAY

ESTIMATED SEWAGE FLOW = 1,875 L/DAY

2) SOIL CONDITIONS

SOILS INFORMATION GATHERED BY PATERSON GROUP INC. ON JULY 1, 2020. REFER TO PATERSON GROUP REPORT PG6308-1 FOR FULL SOILS BREAKDOWN.

BH 1-20, ELEV. 76.32m		BH 2-20, ELEV. 76.62m	
0-0.25	TOPSOIL	0-0.56	VERY LOOSE, BROWN SISA, SOME ORGANICS
0.25-0.38	BROWN SILTY SAND	0.56-1.52	BROWN SILTY SAND
0.38-7.47	FIRM BROWN SILTY CLAY GREYING @ 3.0m DEPTH	1.52-7.32	FIRM TO SOFT GREY SILTY CLAY
- TH DRY UPON COMPLETION		- TH DRY UPON COMPLETION	

1) PRETREATMENT TANK

- TANK SHALL BE CONNECTED TO BUILDING BY A 150mm Ø PVC PIPE SLEEVED THROUGH A 200mmØ PVC SDR 28 PIPE AND OVERLAIN WITH 50mm T x 600mm W RIGID INSULATION BOARDS (UNDER ROADWAY) AND SHALL BE INSTALLED AT 2.0% (min.) SLOPE TO THE PRETREATMENT TANK.
- MINIMUM WORKING CAPACITY OF PRETREATMENT TANK = (3 x Q) = 3 x 1,875 L/DAY = 5,625 L (min.)
- IT IS RECOMMENDED THAT A NEW 6,000L MIN. TWO-COMPARTMENT CONCRETE SEPTIC TANK BE INSTALLED.
- AN OBC APPROVED EFFLUENT FILTER (I.E. POLYLOK PL-525 EFFLUENT FILTER, OR EQUIVALENT) SHALL BE INSTALLED ON THE OUTLET PIPE IN THE PRETREATMENT TANK.
- THE ACCESS LIDS TO THE TANK OPENINGS SHALL BE EXTENDED TO THE GROUND SURFACE. INSTALL RISERS AND COVERS TO SUIT.
- ACCESS LIDS SHALL INCLUDE SAFETY DEVICES AS PER CSA B66-21.

4) LEACHING BED SIZING CRITERIA

- NO. OF MODULES REQUIRED = Q/95 = 1,875/95 = 19.7 MODULES
- USE 2 RUNS OF 11 (22) ELJEN GSF A-42 MODULES EACH
- SAND AREA REQUIRED = QT/400 = 1,875(20)/400 = 117.2m²
- SAND AREA PROVIDED = 8.0m x 17.42m = 139.4m² (min.)

5) BALANCING TANK

- INSTALL A 3,600L MIN. BALANCING TANK IN SERIES AND DOWNSTREAM FROM THE NEW SEPTIC TANK.
- A TIME OPERATED SIMPLEX PUMPING SYSTEM (I.E. MYERS ME3F, OR SIMILAR) AND A HIGH WATER ALARM SHALL BE INSTALLED IN THE BALANCING TANK.
- THE TIME OPERATIONAL PUMPING SYSTEM SHALL OPERATE EVERY HOUR (I.E. 79 L/DOSE + VOLUME TO CHARGE THE SYSTEM - 33 L)
- A 3mmØ DRAIN HOLE SHALL BE INSTALLED IN THE UNDERSIDE OF THE FORCEMAIN IN THE BALANCING TANK NEAR THE WALL CONNECTION.
- RISERS WITH A COVER SHALL BE INSTALLED OVER THE BALANCING TANK TO PROVIDE ACCESS FROM THE GROUND SURFACE.
- DISCHARGE PIPING FOR PUMP SHALL BE CONFIGURED SUCH THAT THE PUMP IS EASILY SERVICED FROM THE GROUND SURFACE.

6) DISTRIBUTION BOX / FORCEMAIN

- A 38mmØ (NOMINAL) PVC SCH 40 FORCEMAIN SHALL BE USED TO CARRY THE EFFLUENT FROM THE BALANCING TANK TO THE 3m L x 100mm Ø PVC SEWER PIPE.
- 100mm SEWER PIPE SHALL DRAIN BY GRAVITY TO A 2 OUTLET DISTRIBUTION BOX.
- THE FORCE MAIN SHALL BE INSTALLED TO GRAVITY DRAIN TO THE BALANCING TANK @ 6.0% FROM THE DISTRIBUTION BOX TO THE UNDERSIDE OF ASPHALT (APPROX. 10m) AND 1.0% FROM THE UNDERSIDE OF ASPHALT TO THE BALANCING TANK (APPROX. 28.0m).
- THE FORCE MAIN SHALL BE OVERLAIN WITH 100mm T x 600mm C/W RIGID INSULATION AND SHALL BE SLEEVED THROUGH A 100mmØ SDR 28 SEWER PIPE.
- THE FORCEMAIN SHALL BE BEDDED ON A MINIMUM OF 150mm OF OPSS GRANULAR 'A' AND SHALL BE COVERED WITH A MINIMUM OF 300mm GRANULAR 'A'. GRANULAR SHALL BE COMPACTED TO A MINIMUM OF 98% SPMDD.
- THE DISTRIBUTION BOX SHALL BE EQUIPPED WITH AN INLET BAFFLE AND OUTLET PIPES (4).
- EACH PIPING RUN SHALL BE FED BY A 2 OUTLET DISTRIBUTION BOX.
- THE DISTRIBUTION BOX SHALL BE CONNECTED TO THE DISTRIBUTION PIPING RUNS USING 100mmØ SOLID PVC SEWER PIPE @ 2% (min.) SLOPE.

7) LEACHING BED CONSTRUCTION GUIDELINES

- REMOVE ALL EXISTING TOPSOIL, ORGANICS AND ANY FILL MATERIAL, WITHIN THE LIMITS OF THE SAND AREA AND SUBEXCAVATE TO AT LEAST ELEVATION 76.55m, WHICHEVER IS GREATER. RE-ESTABLISH THE SPECIFIED CONTACT LEVEL USING SELECT SAND FILL, WHERE REQUIRED.
- THE SUBGRADE SURFACE SHALL BE SCARIFIED, UNDER DRY CONDITIONS.
- PLACE A 450mm MIN. THICK LAYER OF LEACHING BED FILL OVER THE SUITABLY PREPARED SUBGRADE.
- LEACHING BED SAND FILL SHALL BE UNIFORM SAND WITH GRADING LIMITS SIMILAR TO 100% PASSING 13.2mm SIEVE, LESS THAN 5% PASSING 0.075mm SIEVE, AND HAVING A PERCOLATION TIME OF 6 TO 8 min/cm. LEACHING BED FILL SHALL BE PRE- APPROVED BY THE CONSULTANT.
- PLACE A 300mm MIN. THICK LAYER OF ELJEN SPECIFIED SAND FILL OVER THE LEACHING BED FILL.
- THE ELJEN SPECIFIED SAND FILL SHALL CONSIST OF WASHED SAND MEETING THE REQUIREMENTS OF ASTM C33 "STANDARD SPECIFICATION FOR CONCRETE AGGREGATES" WITH LESS THAN THAN 5% PASSING 0.075mm SIEVE. ELJEN SPECIFIED SAND FILL SHALL BE PRE-APPROVED BY THE CONSULTANT.
- THE MODULES SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- THE MODULES SHALL BE INSTALLED AT A 0.5% SLOPE, END TO END AND WITH THE WHITE DEMARCATION LINE FACING UP.
- THE MODULAR BASE LEVEL (ELEV. 76.40 AT THE HEAD AND 76.35m AT THE FOOT) SHALL BE ESTABLISHED WITH ELJEN SPECIFIED SAND FILL, HAVING A MINIMUM THICKNESS OF 150mm.
- THE ELJEN MODULES SHALL BE FED BY GRAVITY BY A 100mmØ PVC SEWER PIPE @ 2% (min.) SLOPE FROM THE DISTRIBUTION BOX TO BE OVERLAIN WITH 50mm T x 600mm W RIGID INSULATION BOARDS
- THE DISTRIBUTION PIPE SHALL CONSIST OF A 100mmØ PERFORATED PVC PIPE CENTRED OVER THE MODULES. THE PIPE SHALL BE SECURED TO THE TOP OF THE MODULES USING AN ELJEN HOOP (MINIMUM 1 HOOP PER MODULE).
- THE INVERT LEVEL OF THE DISTRIBUTION PIPE SHALL BE SET ON THE MODULES AT A 0.5% AT ELEVATION 77.58m AT THE HEAD AND 77.53m AT THE FOOT. THE END OF THE PIPE RUNS SHALL BE CONNECTED TO A 100mmØ SOLID PVC FOOTER PIPE
- INSTALL ELJEN SYSTEM SAMPLING DEVICE AS PER MANUFACTURER'S RECOMMENDATIONS.
- THE ELJEN ANTI-SILTATION FILTER FABRIC SHALL BE SPREAD LENGTHWISE OVER THE PERFORATED SEPTIC PIPE AND DOWN THE SIDES OF THE MODULES. ENSURE ENDS OF MODULES ARE ALSO COVERED WITH FABRIC.
- THE MODULES SHALL BE BACKFILLED, WITH ELJEN SPECIFIED SAND FILL TO AT LEAST THE TOP OF THE ELJEN MODULES, FOLLOWED BY 200mm (min.) TO 500mm (max.) OF LEACHING BED FILL, FOLLOWED BY 100mm OF SANDY TOPSOIL, WITHIN THE LIMITS OF THE SAND AREA. THE BED AREA SHOULD BE VEGETATED AS SOON AS POSSIBLE.
- THE SIDES OF THE BED SHOULD BE SLOPED AT 3H:1V OR SHALLOWER.
- VENT SYSTEM SHALL BE INSTALLED ON THE FOOTER PIPE. CONNECT A 100mmØ PVC VENT PIPE TO FOOTER PIPE, EXTENDING TO GROUND SURFACE. VENT PIPE TO BE INSTALLED IN 150mmØ LANDSCAPE VALVE COVER.

8) MINIMUM CLEARANCE DISTANCE FROM DISTRIBUTION PIPE

- 5.7m FROM ANY PROPERTY LINE
- 7.7m FROM ANY STRUCTURE: 5.0m FROM ANY BASEMENTLESS STRUCTURE
- 17.7m FROM ANY DRILLED WELL
- 5.0m FROM ANY TREE (UNLESS OTHERWISE APPROVED)

9) MINIMUM CLEARANCE DISTANCE FROM TANK(S)

- 1.5m FROM ANY STRUCTURE
- 15.0m FROM ANY DRILLED OR DUG WELL
- 3.0m FROM ANY PROPERTY LINE

10) GENERAL

- SNOW STORAGE SHALL NOT BE LOCATED OVER PROPOSED SEWAGE SYSTEM.
- THE SEWAGE SYSTEM HAS NOT BEEN DESIGNED TO SUPPORT TRAFFIC LOADING.
- THE BACKFILLING OF THE SEWAGE SYSTEM SHOULD MINIMIZE THE RISK OF OVER COMPACTION WITH THE USE RUBBER TRACKED EQUIPMENT AND BY AVOIDING THE CREATION OF ANY CONSTRUCTION ROUTES OR PATHWAYS OVER THE SYSTEM.
- ANY NEW IRRIGATION / SPRINKLER SYSTEM SHOULD NOT BE USED IN PROXIMITY OF THE PROPOSED SEWAGE SYSTEM.
- ENSURE WALKWAYS AND/OR SHRUBBERY ARE NOT PLACED WITHIN PROXIMITY OF THE TANKAGE.
- THE BACKWASH WATERS FROM ANY WATER TREATMENT UNIT, SUCH AS WATER SOFTENER, SHOULD NOT DISCHARGE INTO THE SEWAGE SYSTEM.
- THE SEWAGE SYSTEM HAS NOT BEEN DESIGNED FOR THE USE OF A GARBAGE DISPOSAL.
- SEWAGE SYSTEM INSTALLER SHALL BE QUALIFIED AND REGISTERED UNDER PART 8 OF THE ONTARIO BUILDING CODE AND SHALL BE AN AUTHORIZED EJLEN TREATMENT SYSTEM INSTALLER.
- ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE LATEST BY-LAWS, CODES AND REGULATIONS.
- CONTRACTOR SHALL REVIEW DRAWINGS IN DETAIL AND SHALL INFORM THE CONSULTANT OF ANY ERRORS AND/OR OMISSIONS ON DESIGN DRAWINGS IMMEDIATELY.
- CONTRACTOR SHALL BE RESPONSIBLE TO LOCATE AND PROTECT ALL EXISTING UNDERGROUND SERVICES.
- CONTRACTOR SHALL VISIT THE SITE AND REVIEW ALL DOCUMENTATION TO BECOME FAMILIAR WITH THE SITE AND SUBSURFACE SOIL CONDITIONS TO DETERMINE SUITABLE METHODS OF CONSTRUCTION.
- THE MANUFACTURER PROVIDES A LIMITED WARRANTY OF THE SYSTEM COMPONENTS. THE OWNER OF THE SYSTEM MUST SIGN A MAINTENANCE AGREEMENT WITH THE MANUFACTURER'S REPRESENTATIVE. THE SYSTEM OWNER IS RESPONSIBLE FOR THE ANNUAL FEES ASSOCIATED WITH THE MAINTENANCE.
- THE FIRM OF PATERSON GROUP INC. HAS PROVIDED DESIGN SERVICES ONLY FOR THE SUBJECT SEWAGE SYSTEM. THE DESIGN HAS BEEN CARRIED OUT IN ACCORDANCE WITH THE MANUFACTURER'S GUIDELINES AND OUR INTERPRETATION OF PART 8 OF THE ONTARIO BUILDING CODE.
- INSPECTIONS BY THE CONSULTANT DURING THE INSTALLATION OF THE SYSTEM IS A REQUIREMENT OF SOME REGULATING AUTHORITIES AND IS STRONGLY RECOMMENDED BY THIS FIRM.
- THE PROPERTY LINE / SEPARATION DISTANCES SHOULD BE CONFIRMED PRIOR TO CONSTRUCTION.
- CONSTRUCTION INSPECTIONS DURING THE INSTALLATION OF THE SEWAGE SYSTEM MAY BE REQUIRED BY THE REGULATING AUTHORITY AND ARE STRONGLY RECOMMENDED BY THIS FIRM. IF THIS FIRM IS TO COMPLETE ANY CONSTRUCTION INSPECTION(S), ADDITIONAL FEES MAY BE APPLIED. CONFIRMATION OF PAYMENT WILL BE REQUIRED PRIOR TO THE INSPECTION.
- THE TEST HOLE INFORMATION PROVIDED, IS INTENDED TO BE USED FOR DESIGN PURPOSES ONLY, AND SHOULD NOT BE RELIED UPON FOR CONSTRUCTION PURPOSES. IF DISCREPANCIES ARE FOUND DURING THE CONSTRUCTION PROCESS, IT IS THE CLIENT'S RESPONSIBILITY TO CONTACT THIS FIRM TO MAKE ANY NECESSARY COMMENTS OR REVISIONS. ADDITIONAL REVISIONS ARE NOT CONSIDERED PART OF THE DESIGN WORKS AND WILL BE CONSIDERED AS AN ADDITIONAL COST.

LICENSED PROFESSIONAL ENGINEER
16/08/24
M. S. KILLAM
100221103
PROVINCE OF ONTARIO

DD/MM/YY	DESCRIPTION	REV.
16/08/24	Revised per Client Request	5
15/08/24	Issued for Final Review	4
08/08/24	Revised Forcemain Layout	3
06/08/24	Revised per Storm Crossing Elevations.	2
30/07/24	Revised per Preliminary Discussion Comments	1
12/07/24	Issued for Preliminary Review	0

Consultant:

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7Z9
TEL: (613) 226-7381

Client:

THUNDER ROAD LIMITED PARTNERSHIP

Project:

PROPOSED COMMERCIAL FACILITY

6160 THUNDER ROAD
OTTAWA (VARS), ONTARIO

Drawing:

SEWAGE SYSTEM DETAILS AND NOTES

Scale:	Drawn by:
N.T.S.	HV
Date: 08/2024	Checked by: MK

Drawing No.:

PH4944-2(rev.5)

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