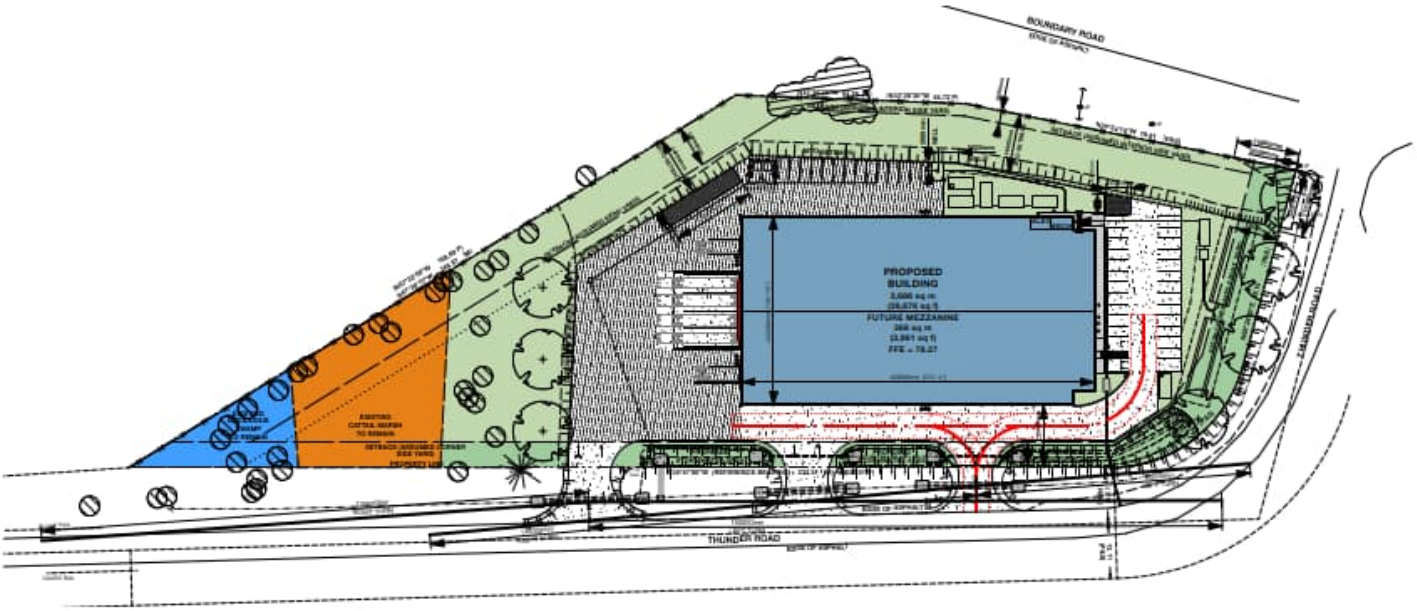
SERVICING & STORMWATER MANAGEMENT REPORT – 6165 THUNDER ROAD



Site Plan Provided by Stewart + TSAI Architects Inc.

Project No.: CCO-23-1882

City File No.:

Prepared for:

Brofort Inc. c/o HP Urban
2161 Thurston Drive
Ottawa, ON K1G 6C9

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1.0 PROJECT DESCRIPTION

1.1 Purpose

Egis Canada (Egis) has been retained by Brofort Inc to prepare this Servicing and Stormwater Management Report in support of the Site Plan Control process for the development located at 6165 Thunder Road within the City of Ottawa.

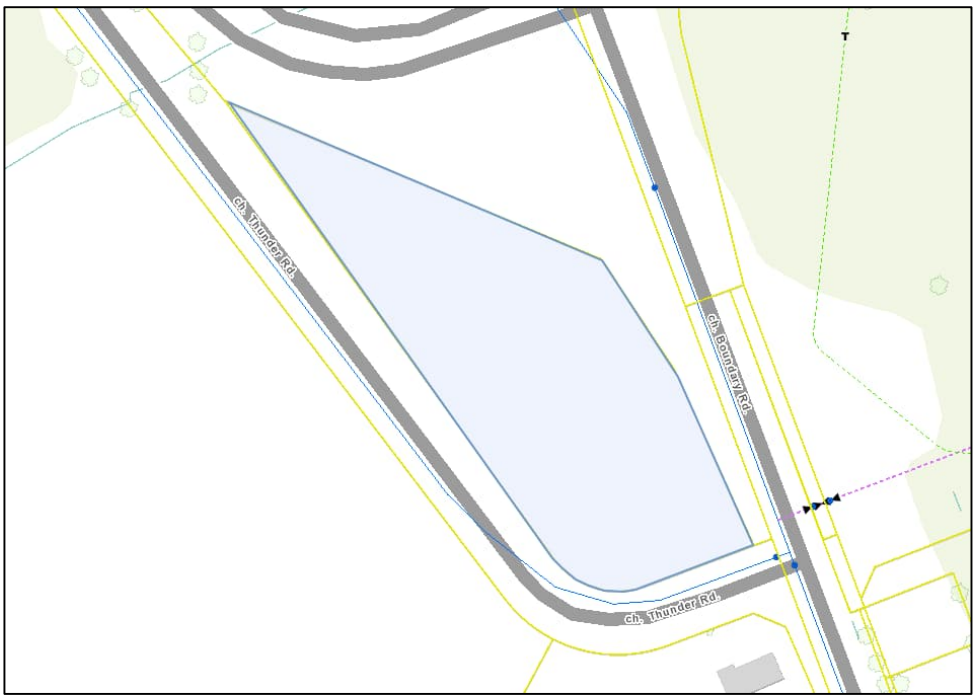
The main purpose of this report is to present a servicing design for the development in accordance with the recommendations and guidelines provided by the City of Ottawa (City), the South Nation Conservation Authority (SNCA), the Ministry of the Environment, Conservation and Parks (MECP), and the Ministry of Transportation (MTO). This report will address the water, sanitary, and storm sewer servicing for the development, ensuring that existing and available services will adequately service the proposed development.

This report should be read in conjunction with the following drawings:

- CCO-23-1882, C101 – Lot Grading, Drainage, Erosion and Sediment Control Plan
- CCO-23-1882, C102 – Site Servicing Plan
- CCO-23-1882, PRE – Pre-Development Drainage Area Plan (Appendix E)
- CCO-23-1882, POST – Post-Development Drainage Area Plan (Appendix F)

1.2 Site Description

Figure 1: Site Map



The subject property, herein referred to as the site, is located at 6165 Thunder Road within the Osgoode Ward. The site covers approximately 1.65 ha and is located at the northwest corner of the Boundary Road and Thunder Road intersection. The site is zoned for Rural Commercial use (RC). It is also noted that the site is located adjacent to Ministry of Transportation (MTO) lands to the north and is therefore subject to a 14m setback. See Site Location Plan in Appendix A for more details.

1.3 Proposed Development and Statistics

The proposed development consists of a 3,686 m² ground floor area warehouse building with a possible future 368 m² mezzanine. Parking and drive aisles will be provided throughout the site along with landscaping. There will be two site accesses for the development from Thunder Road. The development is proposed within 1.06 ha of the site.

1.4 Existing Conditions and Infrastructure

The site is currently undeveloped with no existing infrastructure.

Sewer and watermain mapping collected from the City of Ottawa indicate that the following services exist across the property frontages within the adjacent municipal rights-of-way(s):

- Thunder Road
    - 76mm diameter Polyethylene watermain

1.5 Approvals

The proposed development is subject to the City of Ottawa site plan control approval process. Site plan control requires the City to review, provided concurrence and approve the engineering design package. Permits to construct civil side works can be requested once the City has issued a site plan agreement.

The site is currently zoned for Rural Commercial use and would therefore not require an Environmental Compliance Approval (ECA). Based on coordination with the development team, the development could be considered as an industrial development. An ECA through the Ministry of Environment, Conservation and Parks (MECP) would be required for the stormwater management system should the zoning and/or site usage change to industrial. The ECA would be submitted to the MECP under the Direction Submission process and can be submitted once the City has approved the engineering design.

2.0 BACKGROUND STUDIES, STANDARDS, AND REFERENCES

2.1 Background Reports / Reference Information

As-built drawings of existing services, provided by the City of Ottawa Information centre, within the vicinity of the proposed site were reviewed in order to identify infrastructure available to service the proposed development.

The following reports have previously been completed and are available under separate cover:

- A topographic survey (#Z10100) of the site was completed by Fairhall, Moffat & Woodland and dated February 30th, 2019.
- The Site Plan (SP-01) was prepared by Stewart + Tsai Architects Inc. and dated March 3rd, 2025.
- The Geotechnical Investigation was completed by Paterson Group and dated April 29th, 2024.
- The Carlsbad Springs Trickle Feed System Performance Evaluation report was completed by ETD and dated February, 2000.
- The Lynnwood Mobile Home Park Connection to the Carlsbad Springs Trickle Feed System Feasibility Study was completed by Stantec Consulting Ltd. And dated June 1st, 2009.

2.2 Applicable Guidelines and Standards

City of Ottawa:

- Ottawa Sewer Design Guidelines, City of Ottawa, SDG002, October 2012. (*Ottawa Sewer Guidelines*)
  - Technical Bulletin ISTB-2014-01 City of Ottawa, February 2014. *(ISTB-2014-01)*
  - Technical Bulletin PIEDTB-2016-01 City of Ottawa, September 2016. *(PIEDTB-2016-01)*
  - Technical Bulletin ISTB-2018-01 City of Ottawa, January 2018. *(ISTB-2018-01)*
  - Technical Bulletin ISTB-2018-04 City of Ottawa, March 2018. *(ISTB-2018-04)*
  - Technical Bulletin ISTB-2019-02 City of Ottawa, February 2019. *(ISTB-2019-02)*
  - Technical Bulletin IwSTB-2024-04 City of Ottawa, September 2024. *(IWSTB-2024-04)*
- Ottawa Design Guidelines – Water Distribution City of Ottawa, July 2010. (*Ottawa Water Guidelines*)
  - Technical Bulletin ISD-2010-2 City of Ottawa, December 15, 2010. *(ISD-2010-2)*
  - Technical Bulletin ISDTB-2014-02 City of Ottawa, May 2014. (ISDTB-2014-02)
  - Technical Bulletin ISTB-2018-02 City of Ottawa, March 2018. *(ISTB-2018-02)*
  - Technical Bulletin ISTB-2021-03 City of Ottawa, August 2021. *(ISTB-2021-03)*
  - Technical Bulletin IWSTB-2024-05 City of Ottawa, November 2024. *(IWSTB-2024-05)*

Ministry of Environment, Conservation and Parks:

- Stormwater Planning and Design Manual, Ministry of the Environment, March 2003. *(MECP Stormwater Design Manual)*
- Design Guidelines for Sewage Works, Ministry of the Environment, 2008. (*MECP Sewer Design Guidelines*)

Other:

- Water Supply for Public Fire Protection, Fire Underwriters Survey, 2020. (*FUS Guidelines*)

3.0 PRE-CONSULTATION SUMMARY

A pre-consultation meeting was conducted on April 28th, 2022 regarding the proposed site. Specific design parameters to be incorporated within this design include the following:

- Control 5 & 100-year post-development flows to the 5 & 100-year pre-development flows, respectively.
- Quality control will be required up to an enhanced level of treatment (80% TSS Removal)
- The site will be entitled to one equivalent connection (2,700 L/d) to the Carlsbad Trickle Feed System.

The notes from the City of Ottawa & South Nation Conservation Authority can be found in Appendix B.

4.0 WATER SERVICING

4.1 Existing Watermain

There is an existing 76mm diameter PE watermain within Thunder Road available to service the development.

The municipality upgraded the watermain network in the area to support recent development adjacent to the subject site in 2018. The upgrades included the installation of a 100mm diameter watermain within Boundary Road, and a 76mm diameter watermain within Thunder Road.

The municipal system is a Trickle-Feed Water System; therefore, it will only provide potable water and will not meet the requirements for the fire suppression system. Based on the pre-consultation notes provided by City of Ottawa staff, the Carlsbad Trickle Feed system can supply the site with a maximum of 2,700 L/day (0.03 L/s).

4.2 Proposed Water Servicing

The new building will be serviced via a new 25 mm diameter water service connection to the Carlsbad Trickle-Feed System for potable water supply. Potable water will be stored within a 2,700 Litre underground water storage tank located outside of the building. A water metering chamber based on a modified City Standard W31.1 will be installed prior to the service entering the water storage tank. The metering chamber will include a back flow preventer, a sediment valve, and a flow control valve to ensure that no more than 2,700 Litres per day is drawn from the trickle feed system. The design of the metering chamber will be completed by a mechanical engineer and will be shown on the Site Servicing plan once available.

A new drilled well located within the limits of the site is also proposed. It is understood that the well will provide additional water for non-potable uses only. The exact size and services required for the well and pump will be designed and specified by others. The mechanical designer will need to ensure the potable and non-potable systems are fully separated and that there is no opportunity for contamination of the potable water supply.

Although the building will be partially serviced via a drilled well and pump system as described above, water demands based on light industrial usage are provided below for informational purposes only. The water demands have been calculated based on the *Ottawa Design Guidelines – Water Distribution (ODGWD)* manual and can be found in Appendix 'C'.

Table 1: Water Supply Design Criteria and Water Demands

Site Area	1.65 ha
Light Industrial	35,000 L/gross ha/d
Maximum Daily Peaking Factor	1.5 x avg day
Maximum Hour Peaking Factor	1.8 x max day
Average Day Demand (L/s)	0.16
Maximum Daily Demand (L/s)	0.25
Peak Hourly Demand (L/s)	0.44
FUS Fire Flow Requirement (L/s)	133.33 (8,000 L/min)

A remote hydrant system and on-site water supply are proposed to provide fire suppression to the development. On-site water supply will be provided in the form of underground water storage tanks.

The Fire Underwriters Survey 2020 (FUS), the Ontario Building Code Method, NFPA1142, and NFPA13 were used to determine the required fire flow for the site. Based on coordination with Ottawa Fire Services, fire flow is to be provided for a duration of 30 minutes.

- The results of the FUS calculations yielded a required fire flow of *8,000 L/min* and a required on-site storage volume of *240,000 Litres*.
- The results of the OBC calculations yielded a required fire flow of *9,000 L/min* and a required on-site storage volume of *689,282 Litres*.
- The results of the NFPA1142 calculations yielded a required on-site storage volume of *1,016,179 Litres*.
- The results of the NFPA13 calculations yielded a required on-site storage volume of *187,000 Litres* for the sprinkler system and *85,500 Litres* for handlines.

As Ottawa is Superior Tanker Shuttle qualified, a reduction of *1,900 L/min* or *57,000 Litres* can be applied to the demands and volumes listed above. Detailed fire flow calculations for the FUS, OBC, and NFPA1142 can be found in Appendix 'C'.

Based on further coordination with Ottawa Fire Services, it was determined that the following options would provide a reasonable volume of on-site water supply for fire protection:

Option 1 (Separate sprinkler tanks and firefighting tanks)

- Tank 1 (Sprinklers): *187,000 L* Required as per NFPA13
- Tank 2 (Handlines): *38,000 L* Required

Option 2 (Combined tank)

- Combined Tank: *215,500 L*

Fire protection measures have been designed to conform to *Option 1*, above. Five (5) - 45,460 Litre concrete water storage tanks are proposed to provide a total of *227,300 Litres* to the building sprinkler system. The water storage tanks will be located within the landscaped area north of the building, as Ottawa Fire Services will not require access to them during a firefighting scenario.

An additional *38,000 Litre* concrete water storage tank is proposed adjacent to the drive aisle to provide Ottawa Fire Services with an on-site supply for handlines. The water storage tank will include a fill station and draw pipe as per City of Ottawa Standards W51 and W52.

Correspondence with Ottawa Fire Services is included in Appendix 'C'.

5.0 SANITARY SERVICING

5.1 Existing Sanitary Sewers

There is no municipal sanitary sewer available to service the development. Existing developments in the area rely on private septic systems for sanitary servicing.

5.2 Proposed Sanitary Servicing

The new building will be serviced via a new private septic system installed within the southeast landscaped area of the property. The septic design including the size, location, and anticipated flow rates will be specified and designed by Paterson Group.

The proposed sewage system completed by Paterson Group has been designed to support a commercial type usage consisting of office, store and warehouse spaces. The design has accounted for 5,415 L/day of anticipated sewage flow, based on OBC Table 8.2.1.3.B. The system consists of an Eljen leaching field, complete with a balance pump chamber and a 16,245 L septic tank.

The septic designer will be responsible for obtaining all required permits and approvals. The on-site septic treatment will be governed by the OBC, as it is anticipated that the Daily Design Flow for the proposed building will be less than 10,000 litres per day. The proposed septic system will need to be constructed with all appropriate setbacks, treatment units and stipulations as per applicable Ontario regulations.

6.0 STORM SEWER SERVICING

6.1 Existing Storm Sewers

Storm runoff from the site is currently tributary to the Bear Brook subwatershed via the watercourse located at the northwest corner of the site. There are no existing storm sewers within Thunder Road available to service the proposed development.

6.2 Proposed Storm Servicing

A new stormwater management area located within the landscaped buffer along Thunder Road will be constructed to collect and control runoff within the site prior to discharging to the Right-of-Way (ROW) ditch.

Runoff collected on the roof of the proposed building will be stored and controlled internally using roof drains. Roof drains will be used to limit the flow from the roof to the specified allowable release rate. For calculation purposes a Watts Accutrol roof drain was used estimate a reasonable roof flow. Other products may be specified at detailed building design provided release rates and storage volumes are respected. Roof drainage will outlet to surface and be directed towards the proposed stormwater management area.

Runoff from the site will be directed towards the proposed stormwater management area via sheet drainage, culverts, swales, and a proposed catch basin. Runoff within the stormwater management area will be directed towards a proposed oil and grit separator unit, which will provide quality control prior to releasing runoff to the ROW ditch.

A plate style orifice is proposed on the inlet of the pipe directed to the OGS unit, which, in combination with a rip-rap lined weir, will restrict runoff and result in temporary retention of stormwater within the stormwater management area. A spill point has been incorporated into the design to ensure that runoff exceeding the 100-year event will spill to the ROW ditch.

Foundation drainage and runoff from the depressed loading dock is proposed to be pumped without flow attenuation to surface, where it will then be directed towards the stormwater management area.

See CCO-23-1882 - *POST* in Appendix F and *Storm Sewer Design Sheet* in Appendix G of this report for more details. The Stormwater Management design for the subject property will be outlined in Section 7.0.

7.0 PROPOSED STORMWATER MANAGEMENT

7.1 Design Criteria and Methodology

Stormwater management for the proposed site will be maintained through rooftop attenuation and surface storage. The proposed stormwater management design will direct runoff from the roof, drive aisles, and parking lot to a stormwater management area located along the Thunder Road frontage. The restricted flow will then be released into the existing municipal ditch along Thunder Road at the established release rate. The emergency overland flow route for the proposed site will be directed west towards the existing ditch. The quantitative and qualitative properties of the storm runoff for both the pre & post development flows are further detailed below. Stormwater Best Management Practices (SWM BMP's) will be implemented at the "Lot level", "Conveyance" and "End of Pipe" locations. These concepts will be explained further in Section 7.6. In summary, the following design criteria have been employed in developing the stormwater management design for the site as directed by the SNCA and City:

Quality Control

- The site has been designed to achieve an 80% total suspended solids removal (enhanced level of treatment) using a proposed oil and grit separator unit (OGS).

Quantity Control

- Post-development 5- & 100-year flows will be restricted to match the pre-development 5- & 100-year flows, respectively.

7.2 Runoff Calculations

Runoff calculations presented in this report are derived using the Rational Method, given as:

$$Q = 2.78CIA$$

Where:
Q = Flow (L/sec)
C = Runoff coefficient
I = Rainfall intensity in mm/hr (City of Ottawa IDF curves)
A = Drainage area in hectares

It is recognized that the Rational Method tends to overestimate runoff rates. As a result, the conservative calculation of runoff ensures that any SWM facility sized using this method is expected to function as intended. As per the *City of Ottawa - Sewer Design Guidelines*, the 5-year balanced 'C' value must be increased by 25% for a 100-year storm event to a maximum of 1.0. The following coefficients were used to develop an average C for each area:

Roofs/Concrete/Asphalt	0.90
Gravel	0.60
Undeveloped and Grass	0.20

7.3 Pre-Development Drainage

It has been assumed that the site contains no stormwater management controls for flow attenuation. The estimated pre-development peak flows for the 5 and 100-year events are summarized in *Table 2*, below. Note the restricted release rate is based solely on the development area *A1*, as changes to existing release rates or drainage patterns are not proposed within the *0.59 ha* MTO setback and undeveloped area (Area *A2*). See CCO-23-1882 - *PRE* in Appendix E and Appendix G for calculations.

Table 2: Pre-Development Runoff Summary

Drainage Area	Area (ha)	Runoff Coefficient (5/100-Year)	Time of Concentration (min)	Q (L/s)	
				5-Year	100-Year
A1	1.06	0.20/0.25	20	41.28	88.10
A2 (Undeveloped)	0.59	0.20/0.25	10	34.14	73.14
Total	1.65			75.42	161.24

7.4 Post-Development Drainage

The proposed site drainage limits are demonstrated on the Post-Development Drainage Area Plan. See CCO-23-1882 - POST in Appendix F of this report for more details. A summary of the Post-Development Runoff Calculations can be found below. See Appendix G for calculations.

Table 3: Post-Development Unrestricted Runoff Summary

Drainage Area	Area (ha)	Runoff Coefficient (2/5-Year)	Runoff Coefficient (100-Year)	5-year Peak Flow (L/s)	100-year Peak Flow (L/s)
B1	0.35	0.62	0.75	62.64	128.70
B2	0.28	0.61	0.70	49.76	97.43
B3	0.37	0.90	1.00	96.08	182.95
B4	0.06	0.20	0.25	3.45	7.39
Total (Site)	1.06	-	-	211.93	416.46
B5 (Undeveloped)	0.59	0.20	0.25	34.14	73.14
Total	1.65			246.07	489.61

Runoff for areas *B1 & B2* will consist of runoff from the parking lot and drive aisles. Runoff will be conveyed to the proposed stormwater management area by drainage conveyance swales, culverts, surface drainage and one proposed catch basin.

Area *B3* represents the roof of the proposed building. Runoff collected on the roof of the building will be controlled and stored internally using flow-controlled roof drains. Restricted runoff from the roof area will outlet to surface before sheet draining to the proposed stormwater management area.

Runoff from area *B4* will consist of unrestricted runoff directed towards the municipal ROW along Thunder Road. Flow attenuation in other areas will compensate for the unrestricted flow from area *B4* leaving the site.

Runoff from area *B5* will consist of existing unrestricted drainage within the MTO setback and undeveloped areas. No changes are proposed to the existing drainage patterns within this area. Runoff from area *B5* will continue to surface drain towards the municipal ditch along Thunder Road and the existing watercourse located at the northwest corner of the site.

7.5 Quantity Control

Post development drainage leaving the site area will be restricted to a maximum release rate of *40.76 L/s* during the 5-year storm event and *86.34 L/s* during the 100-year storm event. Controlled flows will be achieved using flow restrictions and will create the need for onsite storage. The restricted runoff summary is outlined in *Table 4*, below.

Table 4: Post-Development Controlled Runoff Summary

Drainage Area	Area (ha)	5-year Peak Flow (L/s)	100-year Peak Flow (L/s)	100-year Storage Required (m^3)	100-year Storage Available (m^3)
B1	0.35	37.31	78.95	103.4	104.8
B2	0.28				
B3	0.37				
B4	0.06	3.45	7.39	-	-
Total (Site)	1.06	40.76	86.34	103.4	104.8
B5 (Undeveloped)	0.59	34.14	73.14	-	-
Total (Inc. Undeveloped)	1.65	74.90	159.48		

See Appendix G for calculations.

Runoff from area *B3* will be stored on the roof of the proposed building and restricted using eight (8) Watts Accutrol roof drains (or equivalent product) and will provide up to *159.71 m^3* of storage. Restricted runoff will outlet to surface and sheet drain towards the proposed stormwater management area.

Runoff leaving the stormwater management area (Areas *B1-B3*) will be controlled by a 1.1m rip-rap lined weir and a 151 mm diameter plate style orifice located on the inlet of the pipe directed towards the OGS unit. Runoff will be restricted to a maximum release rate of *37.31 L/s* and *78.95 L/s* during the 5- and 100-year events, respectively, resulting in ponding depths of *0.67 m* and *0.81 m*, respectively.

In the event there is a rainfall above the 100-year storm event, or a blockage within the storm sewer system, an emergency overland flow route has been provided so that the storm water runoff will be conveyed towards the existing municipal ditch along Thunder Road.

7.6 Quality Control

The development of this lot will employ Best Management Practices (BMP's) wherever possible. The intent of implementing stormwater BMP's is to ensure that water quality and quantity concerns are addressed at all stages of development. Lot level BMP's typically include temporary retention of the parking lot runoff, minimizing ground slopes and maximizing landscaped areas. Some of these BMP's cannot be provided for this site due to site constraints and development requirements.

A quality treatment unit has been sized to provide a TSS removal rate of 80% as per SNCA requirements. The oil & grit separator unit will provide a water quality of at least 80% TSS. The unit will be placed downstream of the restriction in order to provide the required water quality treatment for the site runoff before discharging to the municipal ditch along Thunder Road.

8.0 EROSION AND SEDIMENT CONTROL

8.1 Temporary Measures

Before construction begins, temporary silt fence, straw bale or rock flow check dams will be installed at all natural runoff outlets from the property. It is crucial that these controls be maintained throughout construction and inspection of sediment and erosion control will be facilitated by the Contractor or Contract Administration staff throughout the construction period.

Silt fences will be installed where shown on the final engineering plans, specifically along the downstream property limits. The Contractor, at their discretion or at the instruction of the City, Conservation Authority or the Contract Administrator shall increase the quantity of sediment and erosion controls on-site to ensure that the site is operating as intended and no additional sediment finds its way off site. The rock flow, straw bale & silt fence check dams and barriers shall be inspected weekly and after rainfall events. Care shall be taken to properly remove sediment from the fences and check dams as required. Fibre roll barriers are to be installed at all existing curb inlet catchbasins and filter fabric is to be placed under the grates of all existing catchbasins and manholes along the frontage of the site and any new structures immediately upon installation. The measures for the existing/proposed structures is to be removed only after all areas have been paved. Care shall be taken at the removal stage to ensure that any silt that has accumulated is properly handled and disposed of. Removal of silt fences without prior removal of the sediments shall not be permitted.

Although not anticipated, work through winter months shall be closely monitored for erosion along sloped areas. Should erosion be noted, the Contractor shall be alerted and shall take all necessary steps to rectify the situation. Should the Contractor's efforts fail at remediating the eroded areas, the Contractor shall contact the City and/or Conservation Authority to review the site conditions and determine the appropriate course of action. As the ground begins to thaw, the Contractor shall place silt fencing at all required locations as soon as ground conditions warrant. Please see the *Site Grading, Drainage Plan* and *Sediment & Erosion Control Plan* for additional details regarding the temporary measures to be installed and their appropriate OPSD references.

8.2 Permanent Measures

Rip-rap will be placed at all locations that have the potential for concentrated flow. It is crucial that the Contractor ensure that the geotextile is keyed in properly to ensure runoff does not undermine the rip rapped area. Additional rip rap is to be placed at erosion prone locations as identified by the Contractor / Contract Administrator / City or Conservation Authority. It is expected that the Contractor will promptly ensure that all disturbed areas receive topsoil and seed/sod and that grass be established as soon as possible. Any areas of excess fill shall be removed or levelled as soon as possible and must be located a sufficient distance from any watercourse to ensure that no sediment is washed out into the watercourse. As the vegetation growth within the site provides a key component to the control of sediment for the site, it must be properly maintained once established. Once the construction is complete, it will be up to the landowner to maintain the vegetation and ensure that the vegetation is not overgrown or impeded by foreign objects.

9.0 SUMMARY

- A new 3,686 m² warehouse building is proposed at 6165 Thunder Road.
- Potable water servicing will be provided by a connection to the Carlsbad Trickle-Feed System.
- A private well will be drilled to provide additional water for non-potable uses.
- Fire suppression will be provided by a remote hydrant system and underground water storage tanks.
- Sanitary servicing will be provided by a new private septic system located within the southeast landscaped area.
- Flow controlled roof drains and a stormwater management area will be used to restrict runoff to the established release rate.
- Storage for the 5- through 100-year storm events will be provided on the roof of the proposed building and within the proposed stormwater management area.
- Quality control will be provided by a grit separator unit adjacent to the ROW ditch.

10.0 RECOMMENDATIONS

Based on the information presented in this report, we recommend that City of Ottawa approve this Servicing and Stormwater Management Report in support of the proposed development at 6165 Thunder Road.

This report is respectfully being submitted for approval.

Regards,

Egis Canada Ltd.

Francis Valenti, P.Eng.
Junior Project Engineer, Land Development
E: Francis.VALENTI@egis-group.com

Robert Freel, P.Eng.
Senior Project Manager, Land Development
E: Robert.FREEL@egis-group.com

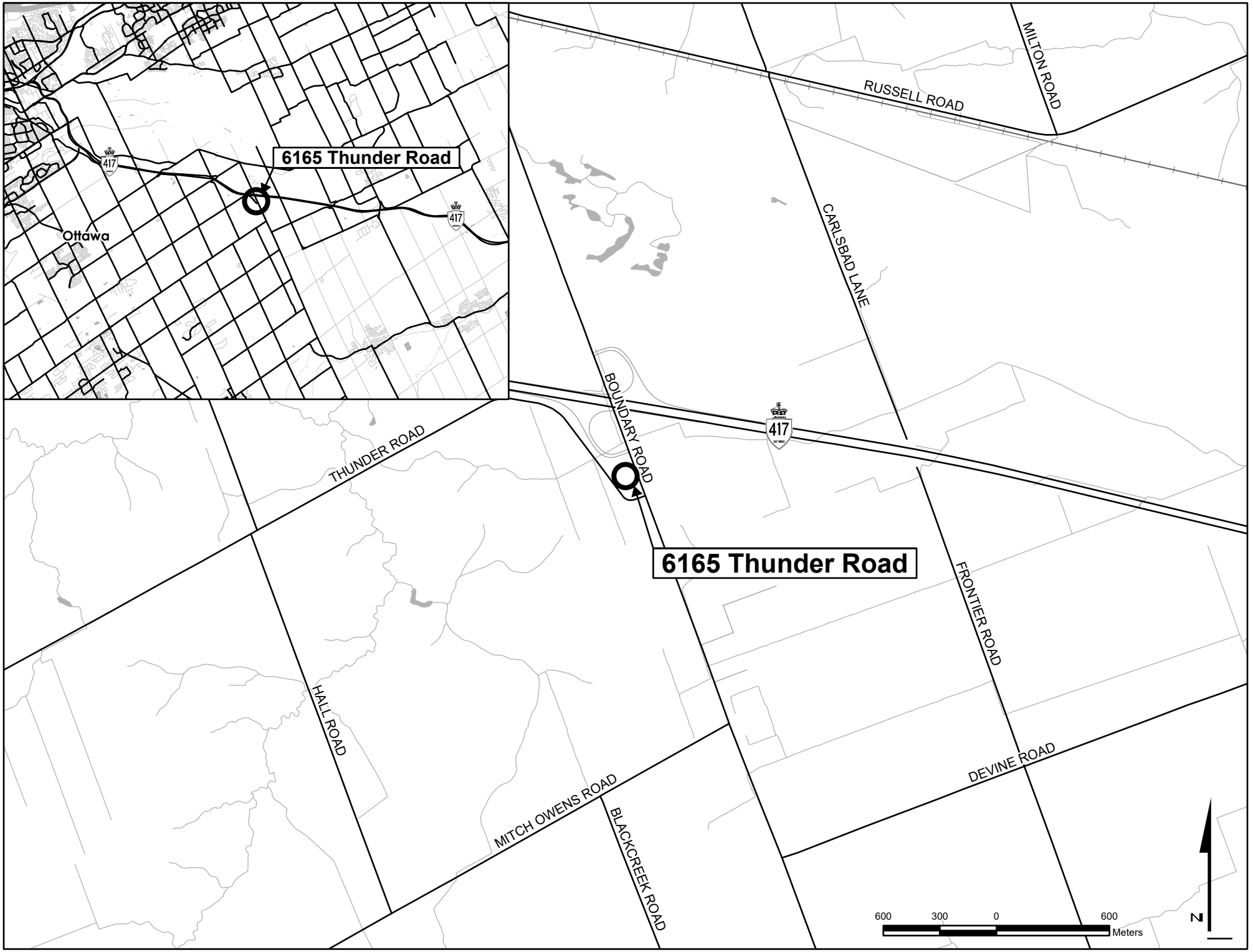
11.0 STATEMENT OF LIMITATIONS

This report was produced for the exclusive use of Brofort Inc. The purpose of the report is to assess the existing stormwater management system and provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry of the Environment, Conservation and Parks, City of Ottawa and local approval agencies. Egis Canada reviewed the site information and background documents listed in Section 2.0 of this report. While the previous data was reviewed by Egis Canada and site visits were performed, no field verification/measures of any information were conducted.

Any use of this review by a third party, or any reliance on decisions made based on it, without a reliance report is the responsibility of such third parties. Egis Canada accepts no responsibility for damages, if any, suffered by any third party as a result of decisions or actions made based on this review.

The findings, conclusions and/or recommendations of this report are only valid as of the date of this report. No assurance is made regarding any changes in conditions subsequent to this date. If additional information is discovered or becomes available at a future date, Egis Canada should be requested to re-evaluate the conclusions presented in this report, and provide amendments, if required.

APPENDIX A
KEY PLAN


6165 Thunder Road
Ottawa
417
417
RUSSELL ROAD
MILTON ROAD
CARLSBAD LANE
BOUNDARY ROAD
417
THUNDER ROAD
6165 Thunder Road
FRONTIER ROAD
HALL ROAD
DEVINE ROAD
MITCH OWENS ROAD
BLACKCREEK ROAD
600
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APPENDIX B
BACKGROUND DOCUMENTS

Pre-Application Consultation Meeting Notes

6165 Thunder Road
PC2022- 0076
April 28th, 2022 – 10 – 1:30 am

Applicant: Peter Hume

Ward: 5 - West Carleton March

Proposal Summary: Warehouse

Attendees:

Kevin Hall – Senior Project Manager Engineering - City of Ottawa
Jeffrey Ostafichuk – Planner - City of Ottawa
Adam Brown – Development Review Manager Rural - City of Ottawa
Anissa McAlpine- Parks Planner - City of Ottawa
Sami Rehman – Environmental Planner - City of Ottawa
Josiane Gervais -Transportation Engineer - City of Ottawa
James Holland – Environmental Planner- SNC
Christopher Moise Urban Design – City of Ottawa

Peter Hume – Consultant/Applicant
Renaud Brault

Regrets:

Tessa Di Iorio – Hydrology - City of Ottawa *(Notes provided in advance of meeting)*

Meeting Notes:

Proposal Details – *Provided by – Peter Hume*

Located on the west side of Boundary Rd., adjacent the Amazon fulfillment centre. and south of highway 417 Boundary Rd. interchange. The property is zoned Rural Commercial and designated Rural Countryside in the new OP. The current zoning by-law permits a warehouse use.

Site Information

- Legal Description Part Of Lot 1 Concession (Ottawa Front) Part 1 Plan 5R-11663
- Pin 04324-0163
- Total Site Area 16,480.59 sq m
- Zoning RC Rural Commercial
- Building Proposed 3,623 sq m
- No buildings exist on site
- Main Access Thunder Road

Planning Comments - *Provided by Jeffrey Osafichuk*

RC - Rural Commercial Zone (Sections 217 and 218)

Purpose of the Zone

The purpose of the RC – Rural Commercial Zone is to:

1. *permit the development of highway and recreational commercial uses which serve the rural community and visiting public in areas mainly designated as General Rural Area, Village and Carp Road Corridor Rural Employment Area in the Official Plan;*

2. *accommodate a range of commercial uses including services for the traveling public as well as agriculture-related, vehicle-oriented and construction products and services;*

3. *permit research facilities in areas designated Greenbelt Employment and Institutional Area in the Official Plan, and*

4. *regulate development in a manner that has a minimal impact on the surrounding rural area or villages.*

Section 217

In the RC Zone:

Permitted Uses

1. The following uses are permitted subject to:

    1. the provisions of subsection 217(3) to (5);

    2. despite the definition amusement park, a go-cart track is not permitted in an RC zone which abuts in whole or in part any VM, V1, V2 or V3 zone;

    3. retail store is limited to the sale of agricultural, construction, gardening or landscaping-related products, equipment or supplies;

    4. the detached dwelling or dwelling unit is limited to one in total and must be accessory to a permitted use;
    amusement centre
    amusement park
    animal care establishment
    animal hospital
    artist studio
    automobile rental establishment
    automobile dealership
    automobile service station

bar
campground
car wash
click and collect facility (By-law 2016-289)
detached dwelling
dwelling unit
gas bar
heavy equipment and vehicle sales, rental and servicing
hotel
kennel, see Part 3, Section 84
parking lot
restaurant
retail food store, limited to a farmers' market (By-law 2016-134)
retail store
storefront industry, *see Part 3, Section 99* (By-law 2018-171)
warehouse (By-law 2013-58)

Urban Design Comments – *Provided by Christopher Moiser*

This proposal does not run along or does not meet the threshold in one of the City's Design Priority Areas and need not attend the City's UDRP. Staff will be responsible for evaluating the proposal and providing design direction.

We have the following comments about the design presented:

- Trees: To prevent a site characterized by asphalt and grass for vehicles and storm water management we recommend a thorough tree planting approach which is focused on trees along the street and any available areas around parking lots, between parking and vehicle circulation, and within areas not dedicated to water/vehicle management;
- Pedestrian access/safety: We recommend a careful approach to pedestrian movement and safety from the parking area to the pedestrian doors of the building to protect from large vehicle circulation patterns;

A scoped Design Brief is a required submittal for all Site Plan/Re-zoning applications and can be combined with the Planning Rationale. Please see the Design Brief Terms of Reference provided.

- *Note. The Design Brief submittal should have a section which addresses these pre-consultation comments;*

This is an exciting project in an area full of potential. We look forward to helping you achieve its goals with the highest level of design resolution. We are happy to assist and answer any questions regarding the above. Good luck.

Hydrogeological and Terrain Comments *Provided by Tessa Di Iorio*

It is understood this it is a Site Plan Control application for a warehouse building on 6165 Thunder Road. The development will be serviced by municipal water (the trickle feed system) and a private on-site septic system.

** Note that if a private well is required, then additional discussion will be required prior to submission – groundwater quality is likely to be an issue in this area.

Septic Impact Assessment – A septic impact assessment is required to ensure that septic effluent will not be contaminating any local supply aquifers or the natural environment.

- If the septic system will be >10,000 L/day, then a ECA will be required from the MECP
- If the septic system will be <10,000 L/day, then an impact assessment will be required as per City of Ottawa Hydrogeological and Terrain Analysis Guidelines, which is based on MECP Guideline D-5-4
    - The septic impact assessment may be completed as per Guideline D-5-4 Section 5.6.3 Predictive Assessment – Industrial/Commercial Developments; note that since the application does not pertain to lot creation or zoning, the main goal is to ensure that the proper level of treatment will be implemented to protect the groundwater.
    - Alternatively, due to the presence of thick marine clays around the site, the assessment may be completed based on system isolation (See Guideline D-5-4, Section 5.5). Pre-consultation is recommended if system isolation will be applied, note that adjacent planning applications have used system isolation and relied on presented supporting geological and geotechnical information. If system isolation is used, then confirmation needs to be provided that there are no local downgradient shallow dug wells which supply water above the marine clay isolating unit.
- Either the ECA (if >10,000 L/day) or the septic permit from the OSSO (is <10,000 L/day) must be included with the application to confirm the size and type/ construction requirements of the septic system.

Engineering Comments – *Provided by Kevin Hall*

Stormwater:

- Control the post development runoff to the pre-development rates for the 5 to 100 Year storm
- Quality requirements will be as per the direction of the conservation authority.

Site Lighting:

- Control spillage of light off site to City requirements.
- City required full cut off fixtures for free standing light and wall mounted lights.
- I assume there will be a MTO requirement for this as well.

Water:

- As of now this site is entitled to one equivalent connect to the Carlsbad Tricklefeed System. Flow to the site will be controlled to 2700 L/d.
- The City is finishing a study to review the capacity of the Trickle Feed system in this area and I don't have the results yet. One this study is completed then we will know if there is any more capacity available.
- I am working with Infrastructure Policy to see if alternative water servicing (tricklfeed/well water combination) can be permitted in this area.

Other:

- Is Thunder Road able to handle heavier trucks?

Require Plans and Reports:

- Stormwater Report
- Servicing Report
- Geotech Report
- Phase 1 ESA
- Grading Plan
- Servicing Plan
- Erosion and Sediment Control Plan
- Drainage Area Plan

Environmental Comments – *Provided by Sami Rehman*

The subject property is adjacent to a watercourse, so an EIS will be required for the application. The EIS should address the following:

- The interface with and mitigation measures to protect the watercourse/fish habitat
- Potential significant habitat for threatened or endangered species

For the Site Plan Control application, a Tree Conservation Report (TCR) will be required; it can be combined with the EIS to avoid duplications. City staff will be looking for recommendations for tree retention and tree plantings around the proposal.

I would also advise consulting with the South Nation Conservation Authority to determine if any permits or approvals are required under their regulations.

Transportation Engineering Comments – *Provided by Josiane Gervais*

Follow Transportation Impact Assessment Guidelines:

- Submit a Screening Form at your earliest convenience to josiane.gervais@ottawa.ca. A full Transportation Impact Assessment is required if any of the triggers on the screening form are satisfied.
- Start this process asap. The application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).
- Request base mapping asap if RMA is required. Contact Engineering Services (https://ottawa.ca/en/city-hall/planning-and-development/engineering-services)
- An update to the *TRANS Trip Generation Manual* has been completed (October 2020). This manual is to be utilized for this TIA. A copy of this document can be provided upon request.

Corner triangles as per OP Annex 1 - Road Classification and Rights-of-Way at the following locations on the final plan will be required (measure on the property line/ROW protected line; no structure above or below this triangle): Collector Road to Arterial Road: 10 m x 10 m.

The access location on Thunder Road is supported.
Clear throat requirements for a collector is 8m. Ensure this length is provided. The clear throat length is measured from the ends of the driveway curb return radii at the roadway and the point of first conflict on-site.

As the proposed site is industrial and for general public use, AODA legislation applies.
Ensure all crosswalks located internally on the site provide a TWSI at the depressed curb, per requirements of the Integrated Accessibility Standards Regulation under the AODA.

- Clearly define accessible parking stalls and ensure they meet AODA standards (include an access aisle next to the parking stall and a pedestrian curb ramp at the end of the access aisle, as required).
- Please consider using the City's Accessibility Design Standards, which provide a summary of AODA requirements. https://ottawa.ca/en/city-hall/creating-equal-inclusive-and-diverse-city/accessibility-services/accessibility-design-standards-features#accessibility-design-standards

On site plan:

- Ensure site access meets the City's Private Approach Bylaw.

- Site Plan must show additional details, i.e. drive aisles, parking stalls, etc.
- Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
- Turning movement diagrams required for all accesses showing the largest vehicle to access/egress the site.
- Turning movement diagrams required for internal movements (loading areas, garbage).
- Show all curb radii measurements; ensure that all curb radii are reduced as much as possible and fall within TAC guidelines (Figure 8.5.1).
- Show dimensions for site elements (i.e. lane/aisle widths, access width and throat length, parking stalls, sidewalks, pedestrian pathways, etc.

Conservation Authority Comments – *Provided by James Holland SNC*

Natural Heritage

- There is a mapped watercourse with permanent flows north of the property. The feature has been assumed to contain fish at all times of the year by an adjacent development. Roadside ditches also occur adjacent to the property, which may contribute flows to the permanent watercourse
- An Environmental Impact Statement should be completed to provide suitable setbacks from the watercourses and to demonstrate no negative impacts to fish habitat. The study should also confirm that all provincial and federal requirements for species at risk have been addressed. The Conservation Partners will provide a technical review of the study.

Natural Hazards

- There are no mapped hazards on the property.
- A 100-year floodplain analysis has been completed for the permanent watercourse, approximately 360m downstream from the property. Development of the property must not negatively impact flooding and erosion downstream of the property.

Stormwater Management

- The stormwater management design should follow the 2003 MECP Stormwater guidelines. The Conservation Partners request 80% TSS removal, and runoff quantity post-development equal to pre-development runoff for the 1 or 5 and the 100-year event.
- The Conservation Partners will provide a technical review of the stormwater design. At a minimum, the stormwater design package should include a report, demonstrating how water quantity and quality standards will be achieved, a grading and drainage plan, and a sediment and erosion control plan.

O. Reg. 170/06

- Any interference with a watercourse, including a stormwater outlet to a roadside ditch, may require a permit from the South Nation Conservation, and restriction may apply.

Parks Comments - *Provided by Anissa McAlpine*

Cash in lieu of parkland will be needed if they register a site plan at a rate of 2% of the gross land area of the site being developed.

Submission requirements/Next Steps

Based on the sketch filed for the Pre-Consultation the following applications will be required:

Zoning Amendment/Site Plan Control

- Planning Rationale (Design Statement and Integrated Environmental Review Statement)
- Site Plan
- Landscape
- Survey
- Building Elevations
- Archaeological Resource Report
- Scoped Urban Design Brief
- Stormwater management report
- Site Servicing Plan and Report
- Erosion and Sediment Control Plan
- Site Servicing Study, including assessment of adequacy of public services
- Geotechnical Investigation Report
- Drainage Area Plan
- Phase 1 Environmental Site Assessment (ESA)
- Transportation Impact Assessment Screening Form (Prior to submission)
- Environmental Impact Study
- Tree Conservation Report
- Urban Design brief that follows the provided Terms of Reference is required upon submission of the application(s).

NOTE: Changes to the proposal may change the required applications and studies. The following are the required studies

Attachments:

Design Brief Terms of Reference
Transportation Assessment Screening Form

SITE INFORMATION

ADDRESS
6165 THUNDER ROAD

LEGAL DESCRIPTION
PART OF LOT 1 CONCESSION 9 (OTTAWA FRONT) PART 1 PLAN 5R-11663
PIN 04324-0163

TOTAL SITE AREA* 16,480.59 sq m
*based on GeoOttawa property report

ZONING
RC RURAL COMMERICAL

SETBACKS
Front Yard
Minimum Required: 10.00 m
Interior Side Yard
Minimum Required: 3.00 m
Corner Side Yard
Minimum Required: 6.00 m
Rear Yard
Minimum Required: 10.00 m
Proposed Building meets all setback requirements.

BUILDING HEIGHT
Maximum Height 11.00 m
Proposed Height 12.00 m

GROSS FLOOR AREA

Building	Proposed	3,686 sq m
Future Mezzanine	Proposed	368 sq m
TOTAL		4,054 sq m

LOT COVERAGE
Proposed 22.4%
Maximum Allowed 25.0%

LANDSCAPED AREA
Landscaping of yards: Required front and corner side yards to be landscaped, except for driveways crossing the front or corner side yard leading to a parking area.

PARKING/LOADING CALCULATIONS

PARKING REQUIRED	Rate	Required Spaces
Building All Light Industrial/Warehouse	0.8	29
Mezzanine All Light Industrial/Warehouse	0.8	3
Building 95% All Light Industrial/Warehouse	0.8	28
Building 05% Office	2.4	4
Accessible Parking (20-99 spaces in parking lot)		1

PARKING PROVIDED

Spaces	38
Accessible Spaces	2
Total	40

NOTES

N49 Light Industrial	0.8/100 sq m of GFA of first 5,000 sq m of GFA
N59 Office	2.4/100 sq m of GFA sq m
N88 Storage Yard	1.0/100 sq m of GFA
N95 Warehouse	0.8/100 sq m of GFA of first 5,000 sq m of GFA

LOADING

Required Spaces (GFA = 2,000-4,999 sq m)	1
Provided Spaces (oversized spaces not required)	6

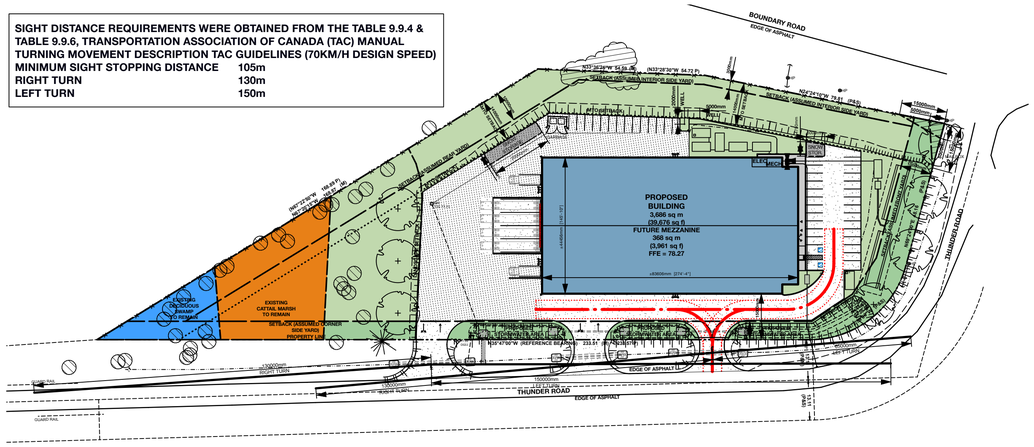
PARKING LANDSCAPED AREA

15% of area of parking lot must be provided as perimeter or interior landscaped areas

Parking Area 'A'		730 sq m
Required Landscape Area	15.0%	
Proposed Landscape Area	15.1%	110 sq m
Parking Area 'B'		457 sq m
Required Landscape Area	15.0%	
Proposed Landscape Area	15.1%	69 sq m

SIGHT DISTANCE REQUIREMENTS WERE OBTAINED FROM THE TABLE 9.9.4 & TABLE 9.9.6, TRANSPORTATION ASSOCIATION OF CANADA (TAC) MANUAL TURNING MOVEMENT DESCRIPTION TAC GUIDELINES (70KM/H DESIGN SPEED)

MINIMUM SIGHT STOPPING DISTANCE	105m
RIGHT TURN	130m
LEFT TURN	150m



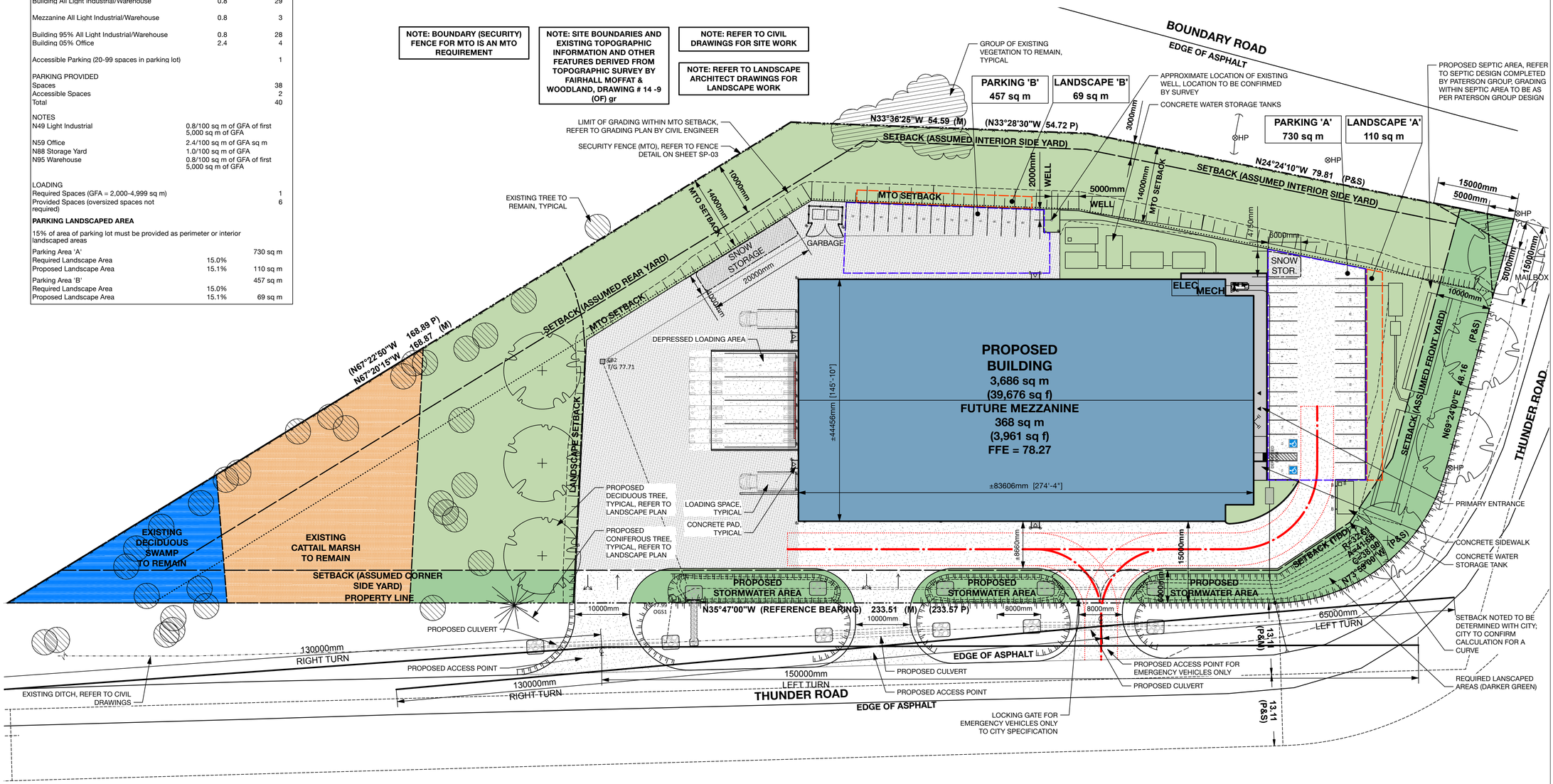
2 SP-01 SITE PLAN - TURN LINES REFERENCE
Scale: 1:1000

NOTE: BOUNDARY (SECURITY) FENCE FOR MTO IS AN MTO REQUIREMENT

NOTE: SITE BOUNDARIES AND EXISTING TOPOGRAPHIC INFORMATION AND OTHER FEATURES DERIVED FROM TOPOGRAPHIC SURVEY BY FAIRHALL MOFFAT & WOODLAND, DRAWING # 14 -9 (OF) gr

NOTE: REFER TO CIVIL DRAWINGS FOR SITE WORK

NOTE: REFER TO LANDSCAPE ARCHITECT DRAWINGS FOR LANDSCAPE WORK



1 SP-01 SITE PLAN
Scale: 1:400

DEVELOPER/OWNER INFORMATION
BROFORT DEVELOPMENTS INC.
2161 THURSTON DRIVE
OTTAWA, ONTARIO K1G 6C9

LEGEND

- PROPERTY LINE
- SETBACK LINE
- MTO SETBACK
- LANDSCAPE SETBACK (WETLAND)
- SECURITY FENCE
- FIRE ROUTE
- TO BE REMOVED OR DEMOLISHED AS NOTED
- HP HYDRO POLE
- SIAMESE CONNECTION
- MAIN/PRIMARY ENTRANCE
- SECONDARY ENTRANCE/EXIT
- EXISTING CATTAIL MARSH
- EXISTING DECIDUOUS SWAMP
- LANDSCAPED AREA
- REQUIRED LANDSCAPED SETBACK
- CONCRETE
- ASPHALT
- GRANULAR/GRAVEL

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SEAL

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2025-05-16 REVIEW & COORDINATION

KEY PLAN

ISSUE / REVISION		DATE
01	REVIEW & COORDINATION	FEB 23, 2023
02	REVIEW & COORDINATION	MAR 01, 2023
03	REVIEW & COORDINATION	JUN 28, 2023
04	REVIEW & COORDINATION	SEP 28, 2023
05	REVIEW	JAN 17, 2024
06	REVIEW & COORDINATION	APR 8, 2024
07	REVIEW & COORDINATION	MAY 7, 2024
08	SITE PLAN CONTROL	MAY 17, 2024
09	REVIEW & COORDINATION	SEP 04, 2024
10	REV. SITE PLAN CONTROL	OCT 18, 2024
11	REV. SITE PLAN CONTROL	OCT 29, 2024
12	REV. SITE PLAN CONTROL	MAR 03, 2025

PROJECT NAME

THUNDER ROAD DEVELOPMENT
6165 THUNDER ROAD
OTTAWA, ON

SHEET TITLE

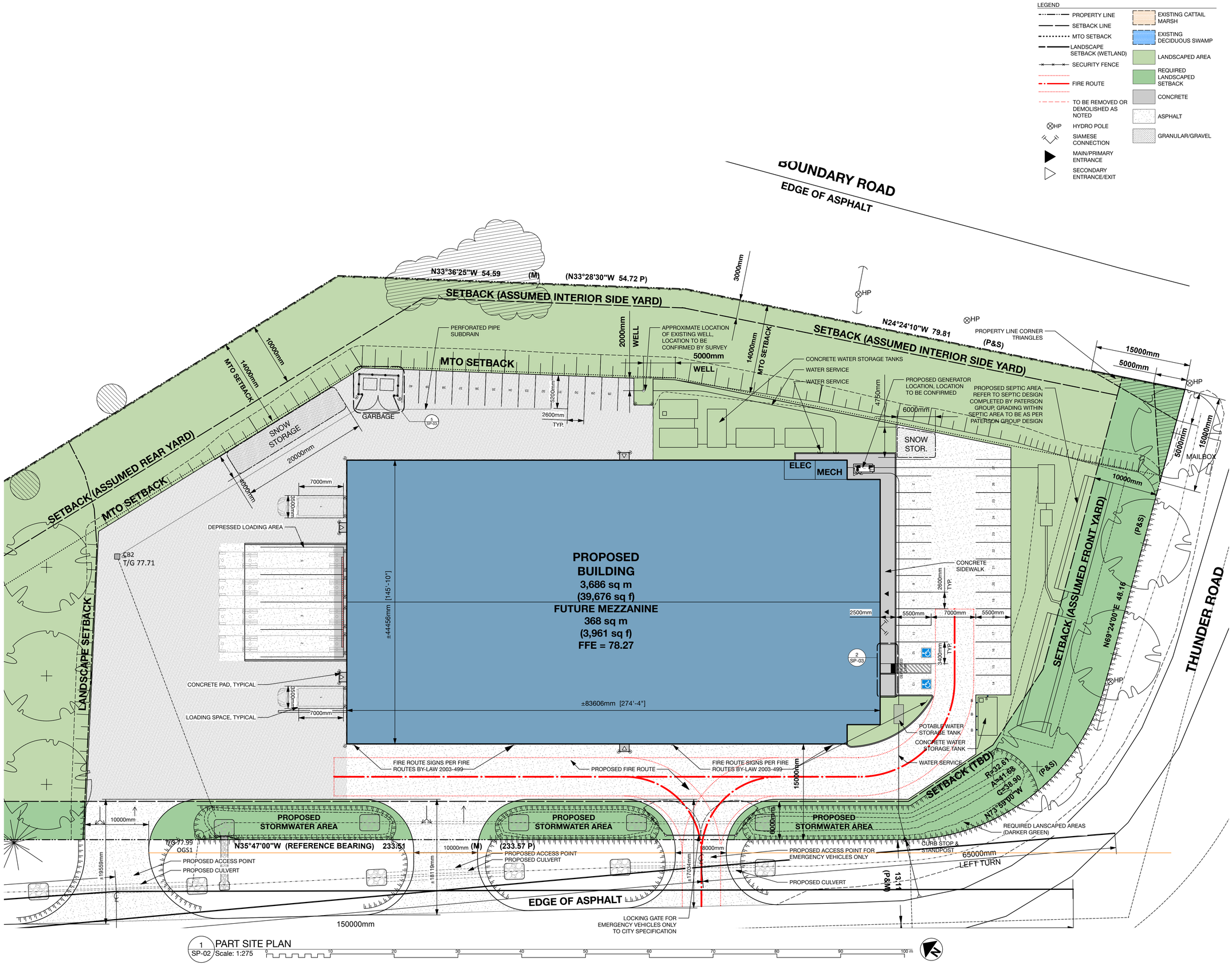
PROPOSED SITE PLAN

PROJECT NO: 22003
DRAWN BY GS
CHECKED BY GS

SHEET

SP-01

2025 May 16
22003 6165Thunder.vwx



1 SP-02 PART SITE PLAN
Scale: 1:275
0 10 20 30 40 50 60 70 80 90 100 m

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2025-05-16 REVIEW & COORDINATION

KEY PLAN

ISSUE / REVISION		DATE
01	REVIEW & COORDINATION	JUN 28, 2023
02	REVIEW & COORDINATION	SEP 28, 2023
03	REVIEW	JAN 17, 2024
04	REVIEW & COORDINATION	APR 8, 2024
05	REVIEW & COORDINATION	MAY 7, 2024
06	SITE PLAN CONTROL	MAY 17, 2024
07	REVIEW & COORDINATION	SEP 04, 2024
08	REV. SITE PLAN CONTROL	OCT 18, 2024
09	REV. SITE PLAN CONTROL	OCT 29, 2024
10	REV. SITE PLAN CONTROL	MAR 03, 2025

PROJECT NAME

THUNDER ROAD DEVELOPMENT
6165 THUNDER ROAD
OTTAWA, ON

SHEET TITLE

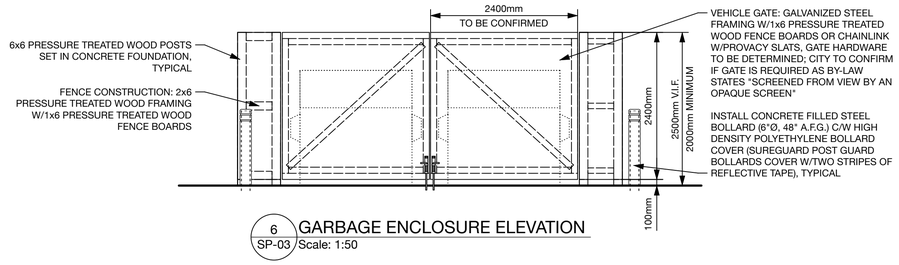
PROPOSED PART SITE PLAN

PROJECT NO: 22003
DRAWN BY GS
CHECKED BY GS

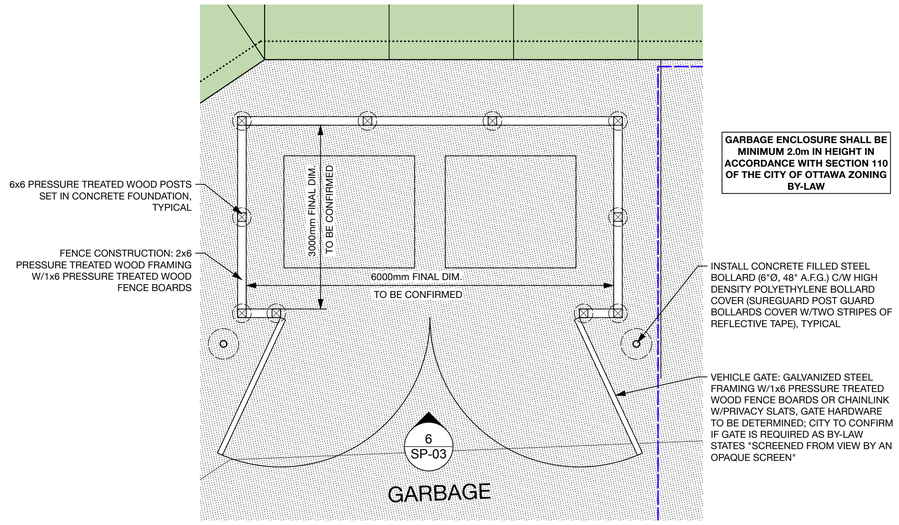
SHEET

SP-02

2025 May 16
22003 6165Thunder.vwx

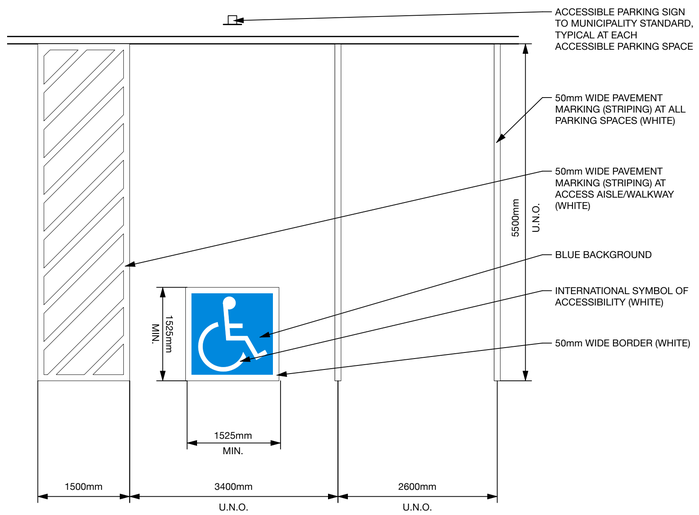


6 SP-03 GARBAGE ENCLOSURE ELEVATION
Scale: 1:50

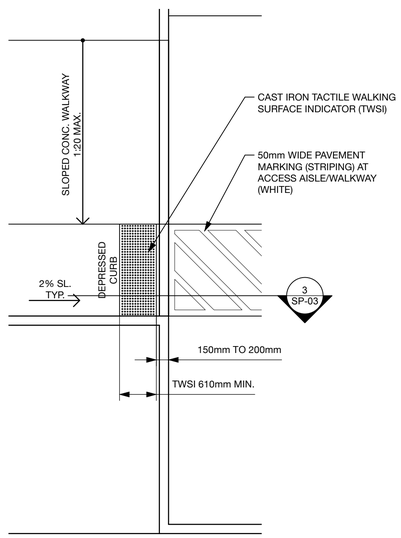


GARBAGE ENCLOSURE SHALL BE MINIMUM 2.0m IN HEIGHT IN ACCORDANCE WITH SECTION 110 OF THE CITY OF OTTAWA ZONING BY-LAW

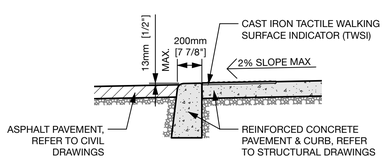
5 SP-03 GARBAGE ENCLOSURE PLAN
Scale: 1:50



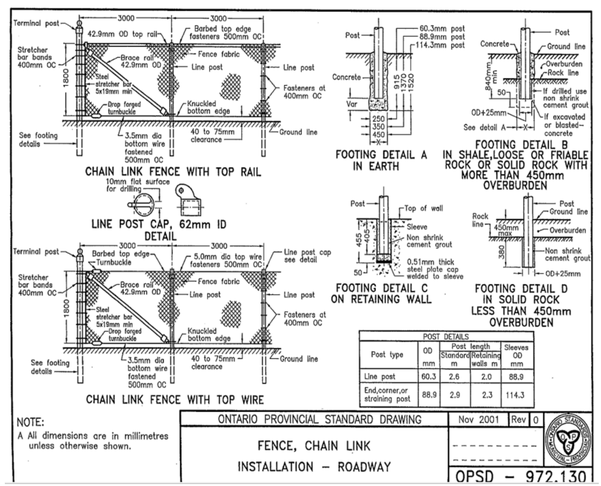
1 SP-03 TYPICAL PAVEMENT MARKING
Scale: 1:50



2 SP-03 DEPRESSED CURB PLAN
Scale: 1:50



3 SP-03 DEPRESSED CURB SECTION
Scale: 1:25



4 SP-03 SECURITY FENCE (MTO)
Scale: N.T.S.

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SEAL

CONSULTANTS

2025-05-16 REVIEW & COORDINATION

KEY PLAN

ISSUE / REVISION	DATE
01	MMM 00, 2025

PROJECT NAME

THUNDER ROAD DEVELOPMENT
6165 THUNDER ROAD
OTTAWA, ON

SHEET TITLE

SITE PLAN DETAILS

PROJECT NO: 22003
DRAWN BY GS
CHECKED BY GS

SHEET

SP-03

2025 May 16
22003 6165Thunder.vwx

APPENDIX C
WATERMAIN CALCULATIONS

CCO-23-1882 - 6165 Thunder Road - Water Demands

Project:	6165 Thunder Road
Project No.:	CCO-23-1882
Designed By:	FV
Checked By:	JH
Date:	October 31, 2024
Site Area:	1.65 gross ha

Industrial - Light 4054 m2

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	280	L/c/d
Industrial - Light	35,000	L/gross ha/d
Industrial - Heavy	55,000	L/gross ha/d
Shopping Centres	2,500	L/(1000m² /d
Hospital	900	L/(bed/day)
Schools	70	L/(Student/d)
Trailer Park with no Hook-Ups	340	L/(space/d)
Trailer Park with Hook-Ups	800	L/(space/d)
Campgrounds	225	L/(campsite/d)
Mobile Home Parks	1,000	L/(Space/d)
Motels	150	L/(bed-space/d)
Hotels	225	L/(bed-space/d)
Tourist Commercial	28,000	L/gross ha/d
Other Commercial	28,000	L/gross ha/d

AVERAGE DAILY DEMAND	Residential	0.00	L/s
	Commercial/Industrial/ Institutional	0.16	L/s

MAXIMUM DAILY DEMAND

DEMAND TYPE	AMOUNT		UNITS
Residential	9.5	x avg. day	L/c/d
Industrial	1.5	x avg. day	L/gross ha/d
Commercial	1.5	x avg. day	L/gross ha/d
Institutional	1.5	x avg. day	L/gross ha/d

MAXIMUM DAILY DEMAND	Residential	0.00	L/s
	Commercial/Industrial/ Institutional	0.25	L/s

MAXIMUM HOUR DEMAND

DEMAND TYPE	AMOUNT		UNITS
Residential	14.3	x avg. day	L/c/d
Industrial	1.8	x max. day	L/gross ha/d
Commercial	1.8	x max. day	L/gross ha/d
Institutional	1.8	x max. day	L/gross ha/d

MAXIMUM HOUR DEMAND	Residential	0.00	L/s
	Commercial/Industrial/ Institutional	0.44	L/s

WATER DEMAND DESIGN FLOWS PER UNIT COUNT
CITY OF OTTAWA - WATER DISTRIBUTION GUIDELINES, JULY 2010

AVERAGE DAILY DEMAND	0.16	L/s
MAXIMUM DAILY DEMAND	0.25	L/s
MAXIMUM HOUR DEMAND	0.44	L/s

CCO-23-1882 - 6165 Thunder Road - Fire Underwriters Survey

Project:	6165 Thunder Road
Project No.:	CCO-23-1882
Designed By:	FV
Checked By:	JH
Date:	October 31, 2024

From the Fire Underwriters Survey (2020)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:
City of Ottawa Technical Bulletin ISTB-2018-02 Applied Where Applicable

A. BASE REQUIREMENT (Rounded to the nearest 1000 L/min)

F = 220 x C x vA Where:

F = Required fire flow in liters per minute
C = Coefficient related to the type of construction.
A = The total floor area in square meters (including all storey's, but excluding basements at least 50 percent below grade) in the building being considered.

Construction Type: Non-Combustible Construction

C	0.8	A	4,054.0 m^2	
	Total Floor Area (per the 2020 FUS Page 20 - Total Effective Area)		4,054.0 m^2	**Unprotected Vertical Openings*

Calculated Fire Flow	11,206.1 L/min
	11,000.0 L/min

B. REDUCTION FOR OCCUPANCY TYPE (No Rounding)

From Page 24 of the Fire Underwriters Survey:

Free Burning	15%	
Fire Flow		12,650.0 L/min

C. REDUCTION FOR SPRINKLER TYPE (No Rounding)

Fully Supervised Sprinklered	-40%	
Reduction		-5,060.0 L/min

D. INCREASE FOR EXPOSURE (No Rounding)

	Separation Distance (m)	Cons.of Exposed Wall	Length Exposed Adjacent Wall (m)	Height (Stories)	Length-Height Factor	
Exposure 1	Over 30 m	Ordinary - Mass Timber (Unprotected)	N/A	1	N/A	0%
Exposure 2	Over 30 m	Ordinary - Mass Timber (Unprotected)	N/A	1	N/A	0%
Exposure 3	Over 30 m	Ordinary - Mass Timber (Unprotected)	N/A	1	N/A	0%
Exposure 4	Over 30 m	Ordinary - Mass Timber (Unprotected)	N/A	1	N/A	0%
					% Increase*	0%

Increase*	0.0 L/min

E. Total Fire Flow (Rounded to the Nearest 1000 L/min)

Fire Flow	7,590.0 L/min
Fire Flow Required**	8,000.0 L/min

*In accordance with Part II, Section 4, the Increase for separation distance is not to exceed 75%
**In accordance with Section 4 the Fire flow is not to exceed 45,000 L/min or be less than 2,000 L/min

CCO-23-1882 - 6165 Thunder Road - OBC Fire Calculations

Project:	6165 Thunder Road
Project No.:	CCO-23-1882
Designed By:	FV
Checked By:	JH
Date:	October 31, 2024

Ontario 2006 Building Code Compendium (Div. B - Part 3)

Water Supply for Fire-Fighting - Warehouse Building

Building is classified as Group : F2

Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with subsections 3.2.2., including loadbearing walls, columns and arches

From Div. B A-3.2.5.7. of the Ontario Building Code - 3. Building On-Site Water Supply:

(a) Q = K x V x Stot

where:

Q = minimum supply of water in litres

K = water supply coefficient from Table 1

V = total building volume in cubic metres

Stot = total of spatial coefficient values from the property line exposures on all sides as obtained from the formula:

Stot = 1.0 + [Sside1+Sside2+Sside3+...etc.]

K	17	
V	40,546	(Total building volume in m³.)
Stot	1.0	(From figure 1 pg A-32)
Q =	689,282.00	L

From Figure 1 (A-32)

Snorth	24.3	m	0.0
Seast	21.7	m	0.0
Ssouth	18	m	0.0
Swest	15	m	0.0

*approximate distances

From Table 2: Required Minimum Water Supply Flow Rate (L/s)

9000 L/min if Q > 270,000 L

2378 gpm

CCO-23-1882 - 6165 Thunder Road - NFPA 1142 Fire Calculations

Project:	6165 Thunder Road
Project No.:	CCO-23-1882
Designed By:	FV
Checked By:	JH
Date:	October 31, 2024

NFPA 1142 - 2022 Edition

$Ws_{min} = (VS_{tot}/OHC)*(CC)*3.785$

Where:

WS_{min} = Minimum supply of water in Litres

VS_{tot} = Total volume of structure in ft^3

OHC = Occupancy Hazard Classification Number

CC = Construction Classification Number

3.785 = Conversion Factor (Gallons to Litres)

Building volume is calculated as: 3686 m^2 * 11 m

VS_{tot}= 40,546 m^3

VS_{tot}= 1,431,868.5 ft^3

Building Occupancy is classified as: 4 (Warehouse) as per 5.2.2.2 (13)

OHC = 4

Construction Classification Number is determined as: 0.75 (Type II - 111) as per Table 6.2.1

CC= 0.75

Ws_{min} = $[(1{,}431{,}868.5\ ft^3)/(4)] * 0.75 * 3.785$

Ws_{min} = 1,016,179 Litres

Note: As per 4.6.1, the AHJ shall be permitted to reduce the water supply required by this standard for manual firefighting pruposes when a structure is protected by an automatic sprinkler system that fully meets the requirements of NFPA 13, NFPA 13D, or NFPA13R.

VALENTI Francis

From: Francis.VALENTI@egis-group.com
Subject: FW: 6165 Thunder Road Fire Protection Review

Importance: High

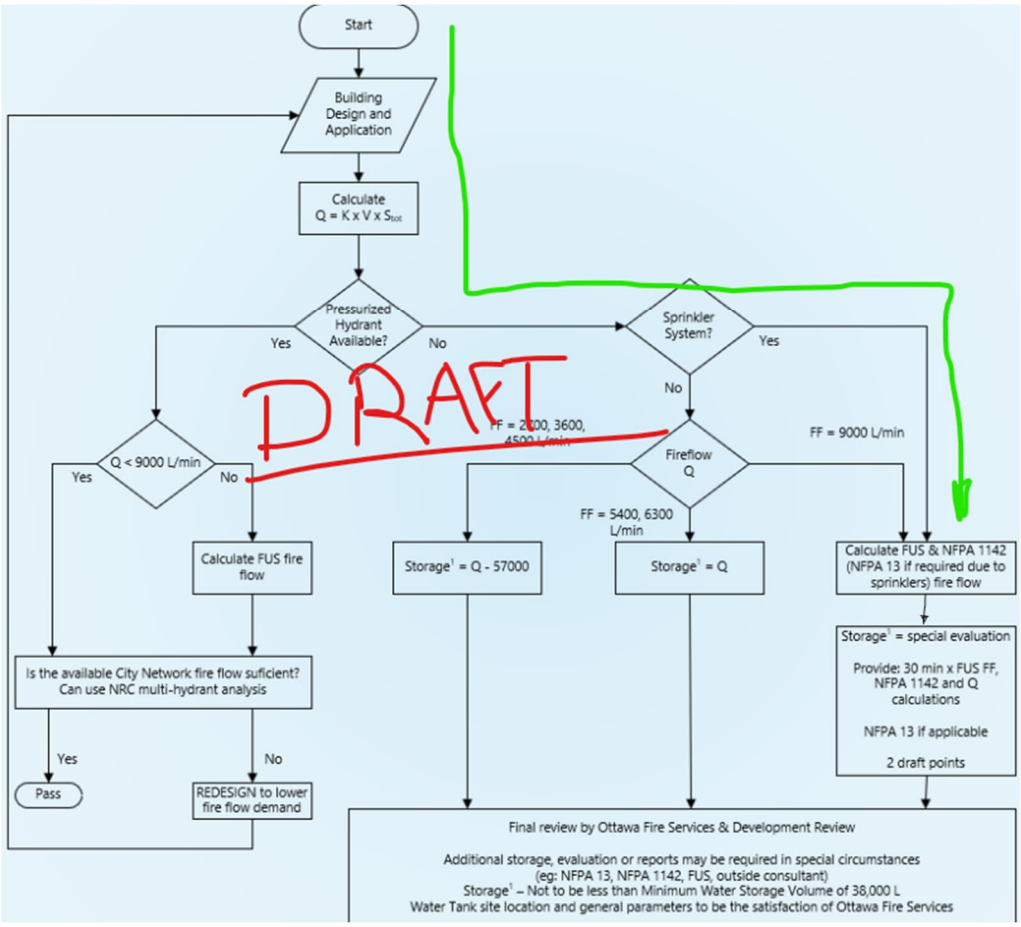
Francis Valenti, EIT
Engineering Intern, North America
Phone: +1 613-714-6895, Mobile: +1 613-808-2123
From: Evans, Allan <Allan.Evans@ottawa.ca>
Sent: Tuesday, September 17, 2024 10:50 AM
To: HEWSON James <james.hewson@egis-group.com>; FREEL Robert <Robert.FREEL@egis-group.com>; Whittaker, Damien <Damien.Whittaker@ottawa.ca>
Subject: FW: 6165 Thunder Road Fire Protection Review
Importance: High

Below are the code sections and reasoning that I took into consideration for determining storage requirements for this site. As with all reviews (especially under the “special review” category), this is only applicable for this site application and may be subject to change in the future as this process evolves.

All recommendations subject to Building Code Services approval.

Please let me know if you have any concerns.

Rural Water Supply (DRAFT):



NFPA 13:

19.1.4.2* The minimum water demand requirements for a sprinkler system shall be determined by adding the hose stream allowance to the water demand for sprinklers.

19.1.5 Water Supplies.

19.1.5.1 The minimum water supply shall be available for the minimum duration specified in Chapter 19.

19.1.5.2* Tanks shall be sized to supply the equipment that they serve.

19.1.5.3* Pumps shall be sized to supply the equipment that they serve.

Table 19.2.3.1.2 Hose Stream Allowance and Water Supply Duration Requirements for Hydraulically Calculated Systems

Occupancy	Inside Hose		Total Combined Inside and Outside Hose		Duration (minutes)
	gpm	L/min	gpm	L/min	
Light hazard	0, 50, or 100	0, 190, or 380	100	380	30
Ordinary hazard	0, 50, or 100	0, 190, or 380	250	950	60 or 90
Extra hazard	0, 50, or 100	0, 190, or 380	500	1900	90 or 120

19.2.3.1.2 The minimum water supply shall be available for the minimum duration specified in Table 19.2.3.1.2.

NFPA 1142:

4.4* Structures with Automatic Sprinkler Protection.

4.4.1 The AHJ shall be permitted to reduce the water supply required by this standard for manual firefighting purposes when a structure is protected by an automatic sprinkler system that fully meets the requirements of NFPA 13, NFPA 13D, or NFPA 13R. *(See Annex F.)*

OBC A-3.2.5.7. Water Supply:

For larger more complex buildings, an on-site water supply for firefighting would be needed to provide an exten of hose stream use by the fire department to allow search and evacuation of the building, exposure protection an suppression. The volume of this on-site water supply would be dependent on the building size, construction, occ exposure and environmental impact potential, and should be sufficient to allow at least 30 minutes of fire depart stream use.

Comparison of FF and volumes:

Address	OBC		FUS		NFPA 1142	
	FF	Q	FF	Storage (30 min)	Storage	
6165 Thunder Road	9000	689282	8000	240000	1016179	

Our new process within the city is focused upon using the OBC method as much as practical for calculating water storage requirements. Since the OBC method does not directly take into consideration having sprinklers for a water storage reduction, we will use other methodologies to compliment the OBC and determine an appropriate storage volume.

The FUS calculation shows 8000 L/min and a total storage of close to 1 million liters – even with our proposed reduction to 30 minutes, this is 240000 L total storage which is a very large volume of water – FUS does take into account sprinklers, but we still consider FUS to be a conservative methodology. NFPA 1142 is supported by FUS as an alternative and it also produces a storage volume of also close to 1 million liters. However, NFPA 1142 also permits the AHJ to reduce the water supply for manual firefighting (ie: handlines) when a sprinkler system is installed that "fully meets the requirements of NFPA 13…" (confirmation will be required by applicant). Moving on to NFPA 13, the applicant has provided a storage volume of 187000L for the sprinklers (assumption here made that this is SOLELY for the use of the sprinklers as it was not clear from provided information). NFPA 13 also assigns required storage for handlines based upon Table 19.2.3.1.2.. Occupancy is F2 but also stated as industrial – Light in the provided documentation, so I chose Ordinary Hazard and worst case 950 L/min x 90 min duration (it is the responsibility of the applicant to confirm that this selection is correct). 950 x 90 = 85500L additional storage. So, according to NFPA 13, the total water required is 187000 + 85500 = 272500L. Ottawa is also Superior Tanker Shuttle qualified which means we are capable of delivering 1900 L/min and some form of credit can be afforded towards a water storage reduction - similar to our standard flowchart process, a 30 min x 1900 L/min = 57000L. However, we also have a minimum tank size of 38000L (10000 USgal), so the following two options are proposed:

Option 1 (separate sprinkler tanks and firefighting tanks):

Tank 1 (sprinklers) = 187000L as per NFPA 13 design
Tank 2 (handlines) = 38000L (85500 – 57000 = 28500 < minimum tank size) – single draft point

Option 2 (combined tank for sprinklers and firefighting draft):

Combined tank = 187000 + 85500 – 57000 = 215500L – single draft point

With Option 1, the tank for the sprinklers can be located wherever it makes sense and meets code as fire would not need direct access to it but would require a fire department connection for the sprinkler system as is standard. The separate 38000 L tank would have to be located where it meets our requirements (normal restrictions/requirements). With Option 2, a single combined tank would provide water for both the sprinkler system and firefighting handlines. The location of the tank would need to meet OFS requirements and there are several options we have seen in the past that allows the draft point to be more remote than the tank location when shared with sprinkler systems.

Due to the large size of this building, we will want a large distance away for our draft point. OFS will likely request >45m whereas OBC wants <45m for distance from hydrant to FDC – this will have to be determined, but is applicable for both options above. NFPA 13 does not have a large handline flowrate requirement, so a single draft point is sufficient.

Allan Evans

Fire Protection Engineer / Ingénieur de Protection d'Incendies
Prevention Division / Prévention des Incendies
Ottawa Fire Services / Service des Incendies d'Ottawa
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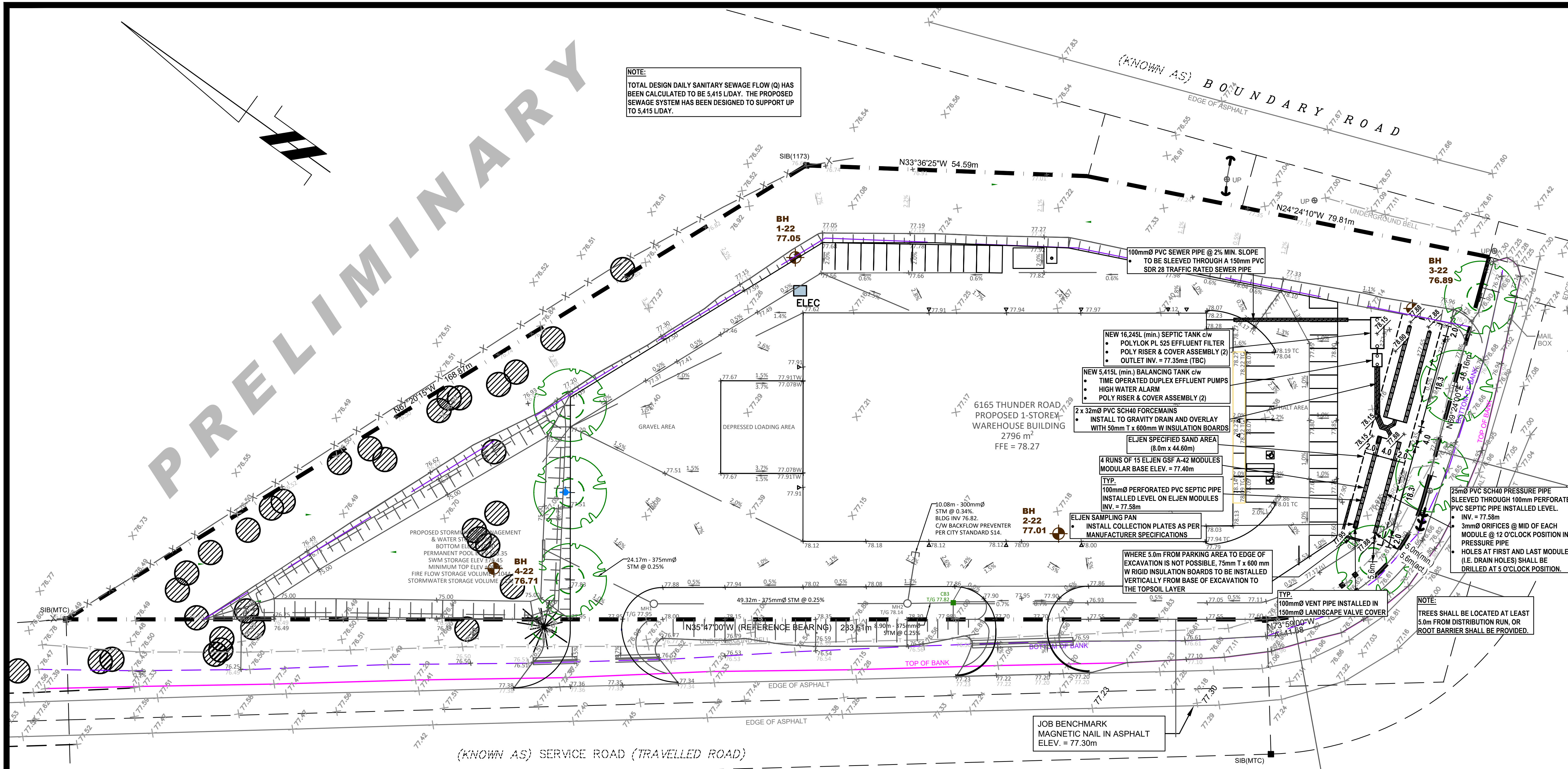
An internationally accredited agency 2019-2024

OTTAWA FIRE SERVICES
SERVICE DES INCENDIES D'OTTAWA

Protecting Our Nation's Capital With Honour
Protéger notre capitale nationale avec honneur

APPENDIX D
DRAFT SEPTIC DESIGN (BY PATERSON GROUP)



PRELIMINARY
NOTE:
TOTAL DESIGN DAILY SANITARY SEWAGE FLOW (Q) HAS BEEN CALCULATED TO BE 5,415 L/DAY. THE PROPOSED SEWAGE SYSTEM HAS BEEN DESIGNED TO SUPPORT UP TO 5,415 L/DAY.
(KNOWN AS) BOUNDARY ROAD
EDGE OF ASPHALT
N33°36'25"W 54.59m
N24°24'10"W 79.81m
UNDERGROUND BELL
SIB(1173)
BH 1-22 77.05
BH 3-22 76.89
BH 2-22 77.01
BH 4-22 76.71
ELEC
100mmØ PVC SEWER PIPE @ 2% MIN. SLOPE
TO BE SLEEVED THROUGH A 150mm PVC SDR 28 TRAFFIC RATED SEWER PIPE
NEW 16,245L (min.) SEPTIC TANK c/w
POLYLOK PL 525 EFFLUENT FILTER
POLY RISER & COVER ASSEMBLY (2)
OUTLET INV. = 77.35m± (TBC)
NEW 5,415L (min.) BALANCING TANK c/w
TIME OPERATED DUPLEX EFFLUENT PUMPS
HIGH WATER ALARM
POLY RISER & COVER ASSEMBLY (2)
2 x 32mmØ PVC SCH40 FORCEMAINS
INSTALL TO GRAVITY DRAIN AND OVERLAY WITH 50mm T x 600mm W INSULATION BOARDS
ELJEN SPECIFIED SAND AREA (8.0m x 44.60m)
4 RUNS OF 15 ELJEN GSF A-42 MODULES MODULAR BASE ELEV. = 77.40m
TYP. 100mmØ PERFORATED PVC SEPTIC PIPE INSTALLED LEVEL ON ELJEN MODULES INV. = 77.58m
ELJEN SAMPLING PAN
INSTALL COLLECTION PLATES AS PER MANUFACTURER SPECIFICATIONS
WHERE 5.0m FROM PARKING AREA TO EDGE OF EXCAVATION IS NOT POSSIBLE, 75mm T x 600 mm W RIGID INSULATION BOARDS TO BE INSTALLED VERTICALLY FROM BASE OF EXCAVATION TO THE TOPSOIL LAYER
TYP. 100mmØ VENT PIPE INSTALLED IN 150mmØ LANDSCAPE VALVE COVER
25mmØ PVC SCH40 PRESSURE PIPE SLEEVED THROUGH 100mm PERFORATED PVC SEPTIC PIPE INSTALLED LEVEL.
INV. = 77.58m
3mmØ ORIFICES @ MID OF EACH MODULE @ 12 O'CLOCK POSITION IN PRESSURE PIPE
HOLES AT FIRST AND LAST MODULES (I.E. DRAIN HOLES) SHALL BE DRILLED AT 5 O'CLOCK POSITION.
NOTE:
TREES SHALL BE LOCATED AT LEAST 5.0m FROM DISTRIBUTION RUN, OR ROOT BARRIER SHALL BE PROVIDED.
6165 THUNDER ROAD
PROPOSED 1-STOREY WAREHOUSE BUILDING
2796 m²
FFE = 78.27
GRAVEL AREA
DEPRESSED LOADING AREA
ASPHALT AREA
MAIL BOX
N67°20'15"W 168.87m
N35°47'00"W (REFERENCE BEARING) 233.51m
N23°59'00"W 41.88
N39°24'00"E 48.16m
10.08m - 300mmØ STM @ 0.34%, BLDG INV 76.82, C/W BACKFLOW PREVENTER PER CITY STANDARD S14.
24.17m - 375mmØ STM @ 0.25%
49.32m - 375mmØ STM @ 0.25%
8.90m - 375mmØ STM @ 0.25%
MH1
MH2
CB3
TOP OF BANK
BOTTOM OF BANK
EDGE OF ASPHALT
UNDERGROUND BELL
SIB(MTC)
(KNOWN AS) SERVICE ROAD (TRAVELLED ROAD)
JOB BENCHMARK
MAGNETIC NAIL IN ASPHALT
ELEV. = 77.30m
SCALE: 1:750
0 10 20 30 50m

LEGEND:

(symbol)	Bore Hole Location
x 70.81	Existing Ground Surface Elev. (m)
x 72.70	Proposed Ground Surface Elev. (m)
(arrow)	Surficial Flow Direction
(symbol)	Proposed Structure

BENCHMARK INFORMATION:

TBM: Top of Magnetic Nail In Asphalt of Thunder Road near south west corner of subject Property
Approximate Geodetic Elevation = 77.30m

REFERENCE:

Base Plan and Topographic Information obtained from Lot Grading Drainage and Servicing Plan No. C101, provided on April 22, 2024, by McINTOSH PERRY

p:\autocad drawings\hydrogeology\ph46xx\ph4650 - brofort investments - 6165 thunder road - prelim nia\ph4650-1(rev.2).dwg

Consultant

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

DD/MM/YY	Description	Rev.
05/03/25	Revised to Include Tree Locations	2
29/04/24	Issued for Site Plan Application	1
26/02/23	Issued for Preliminary Discussion Purposes	0

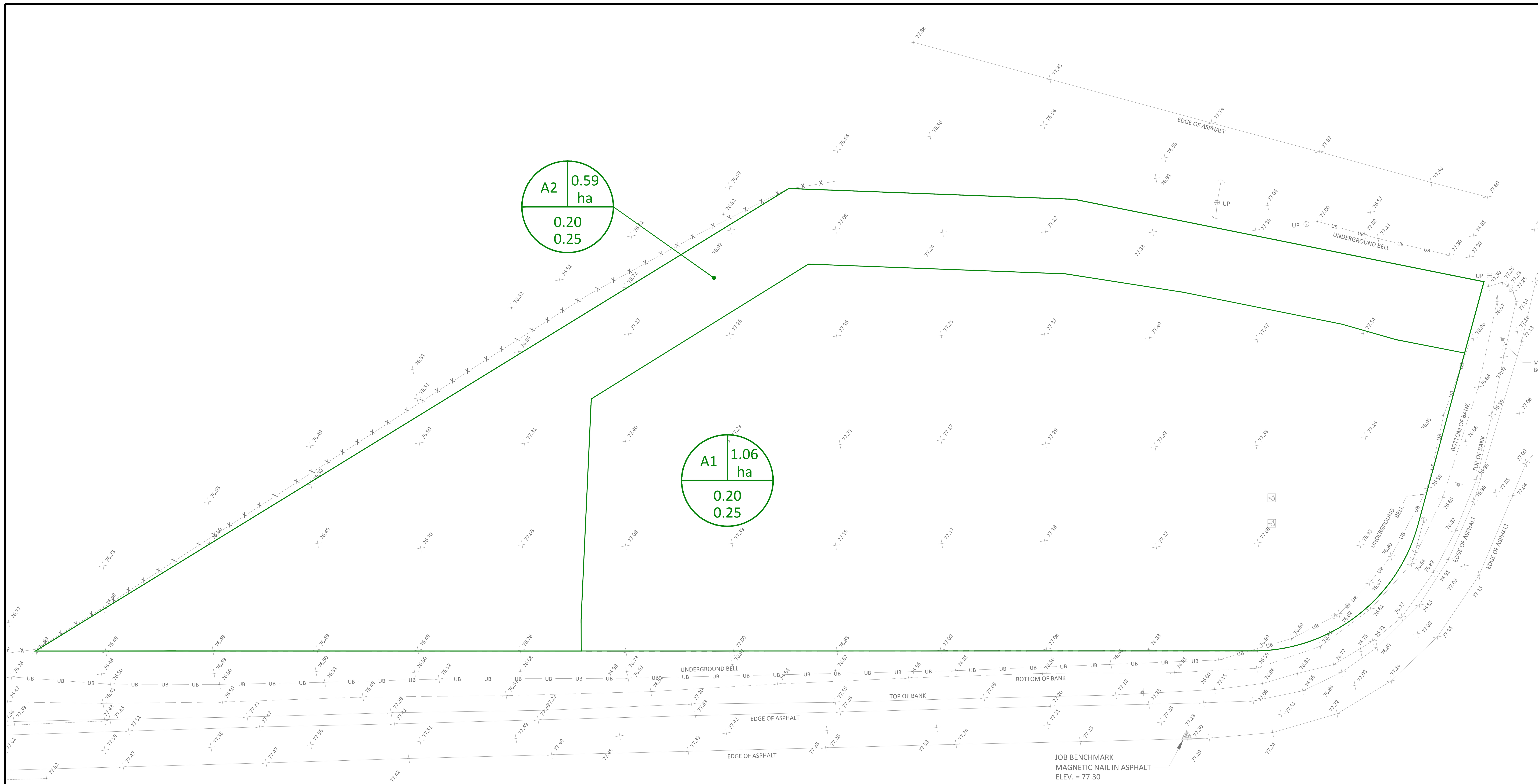
Client: **BROFORT INVESTMENTS**

Project: **PROPOSED COMMERCIAL DEVELOPMENT**
6165 THUNDER ROAD
OTTAWA (CARLSBAD SPRINGS), ONTARIO

Drawing: **SEWAGE SYSTEM LAYOUT PLAN**

Scale: 1:750	Drawn by: HV
Date: 03/2025	Checked by: MK
Drawing no.: **PH4650-1(rev.2)**	

APPENDIX E
PRE-DEVELOPMENT DRAINAGE PLAN



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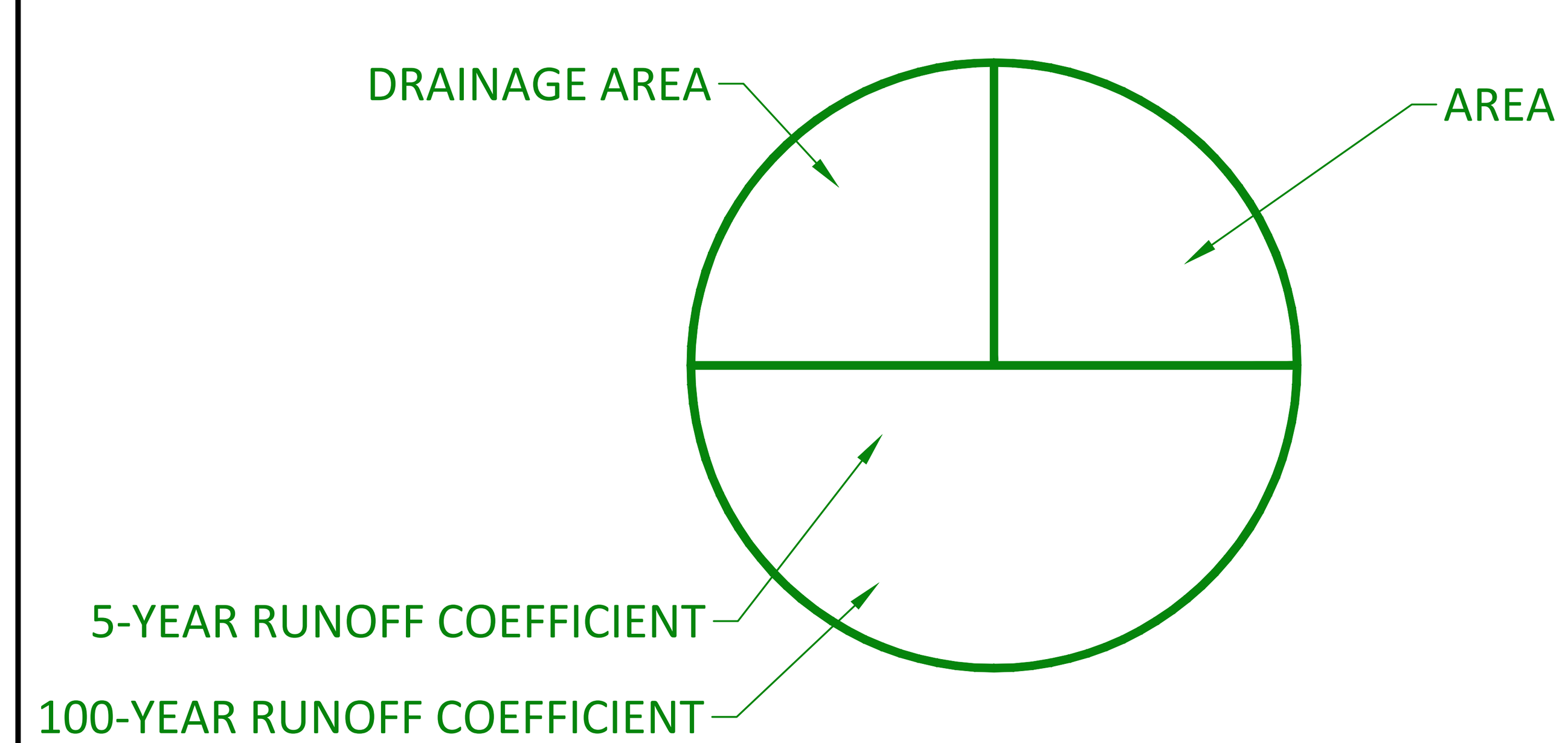
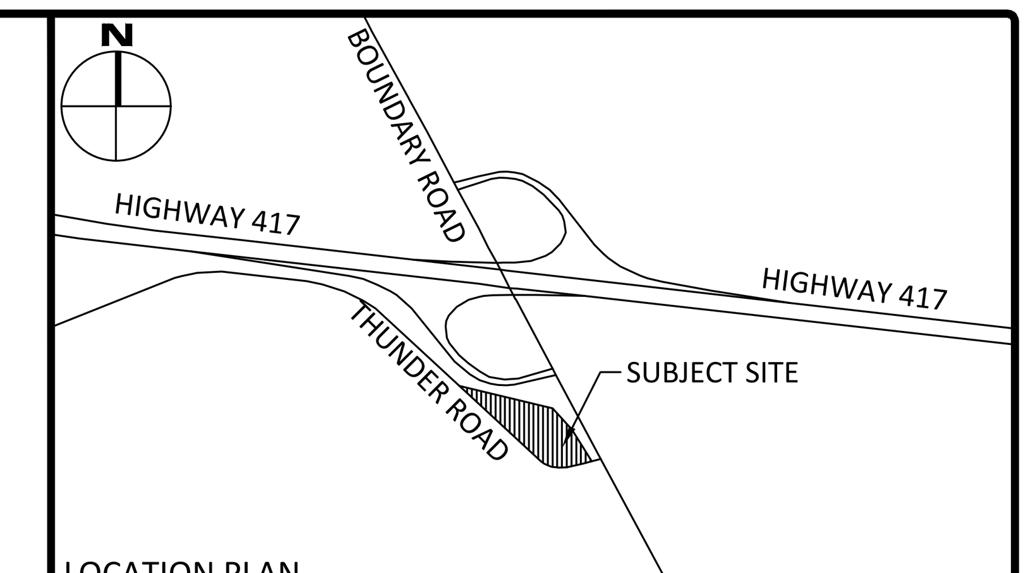




LOCATION PLAN

LEGEND

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revisions	Date
3	ISSUED FOR REVIEW	FEB. 07, 2025
2	ISSUED FOR REVIEW	OCT. 31, 2024
1	ISSUED FOR REVIEW	MAY 14, 2024

Check and verify all dimensions before proceeding with the work — Do not scale drawings

SCALE 1 : 400
0 10 20 30 40 Metres

egis

Stamp:

Client:
BROFORT INC.
2161 THURSTON DRIVE
OTTAWA, ON K1G 6C9

Project:
PROPOSED WAREHOUSE
6165 THUNDER ROAD

Drawing Title:
PRE-DEVELOPMENT DRAINAGE AREA PLAN

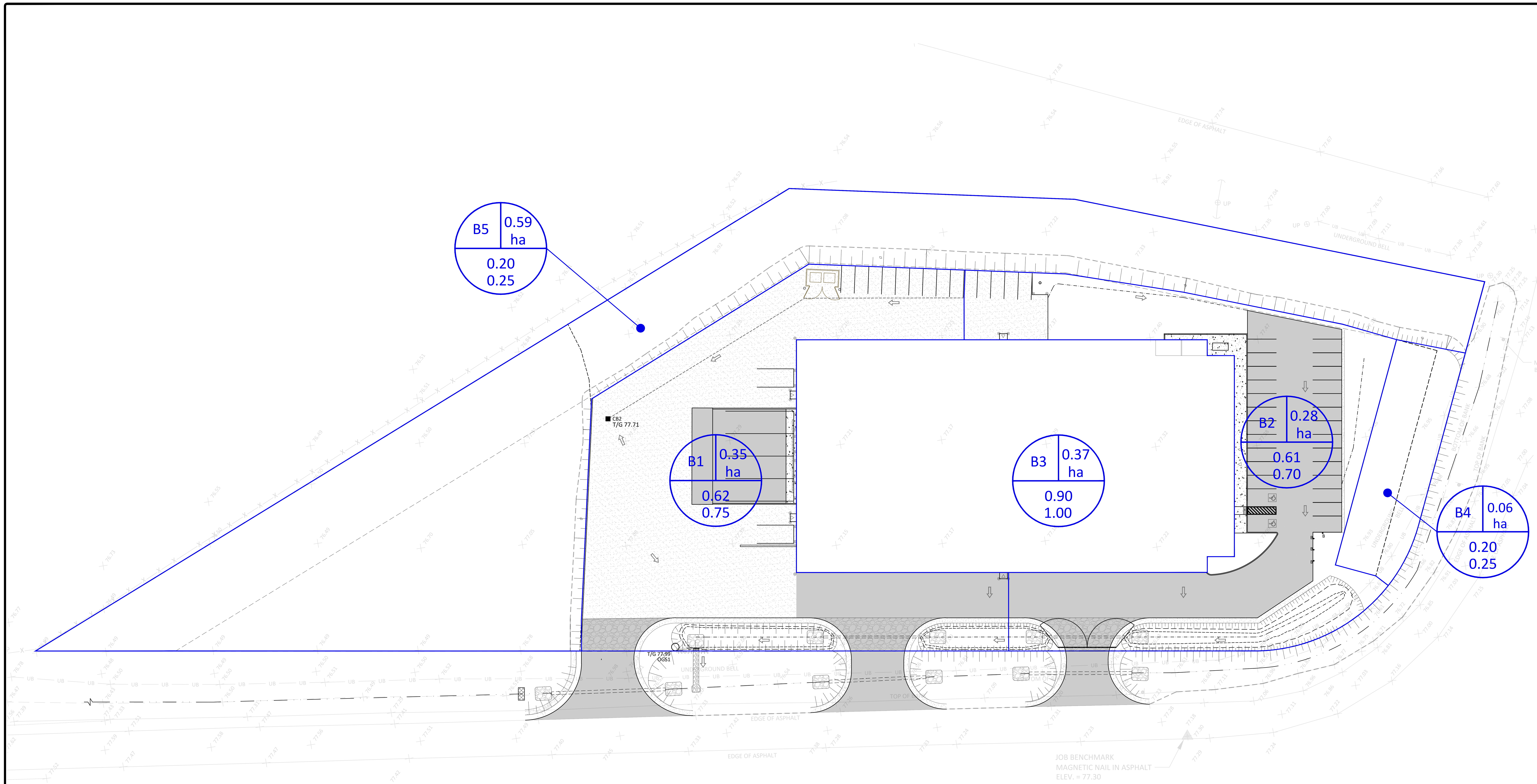
Scale: 1:400	Project Number: CCO-23-1882
Drawn By: FV	
Checked By: RF	Drawing Number: PRE
Designed By: JH	

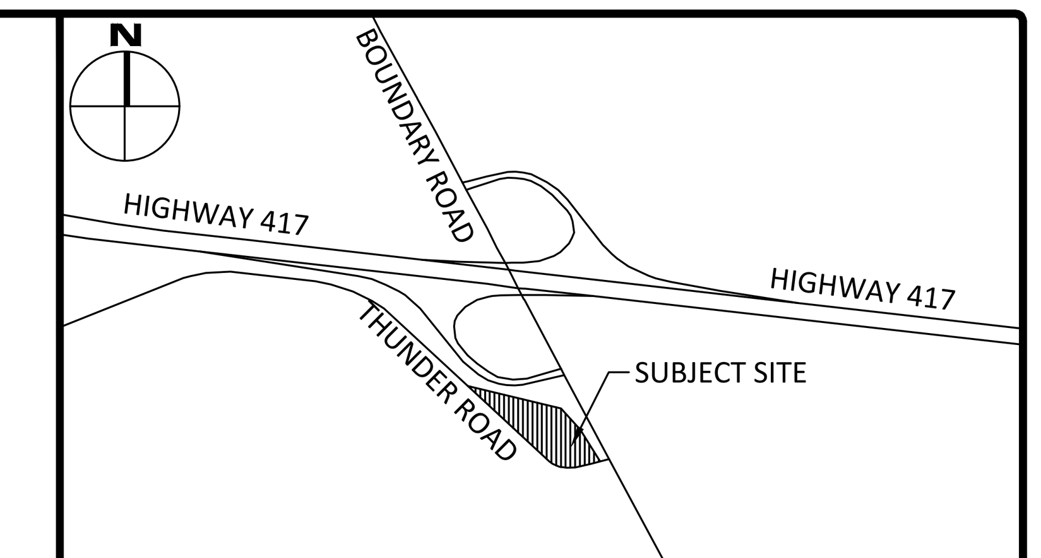
D07-12-24-0152

#XXXXX

FILENAME: U:\Ottawa\01 Project - Proposals\2023 Jobs\CCO\CCO-23-1882 Brofort - 6165 Thunder Rd\12 - Drawings\CCO-23-1882_Presentation.dwg
LAST SAVED: Friday, February 07, 2025 LAST SAVED BY: F.Valenti
LAST PLOTTED: Friday, February 07, 2025 CTB FILE USED: MP-CV-STANDARD.ctb

APPENDIX F
POST-DEVELOPMENT DRAINAGE PLAN





LOCATION PLAN

LEGEND

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revisions	Date
4	ISSUED FOR REVIEW	JUN. 10, 2025
3	ISSUED FOR REVIEW	FEB. 07, 2025
2	ISSUED FOR REVIEW	OCT. 31, 2024
1	ISSUED FOR REVIEW	MAY 14, 2024

Check and verify all dimensions before proceeding with the work — Do not scale drawings

SCALE 1 : 400
0 10 20 30 40 Metres

egis

Stamp:

Client:
BROFORT INC.
2161 THURSTON DRIVE
OTTAWA, ON K1G 6C9

Project:
PROPOSED WAREHOUSE
6165 THUNDER ROAD

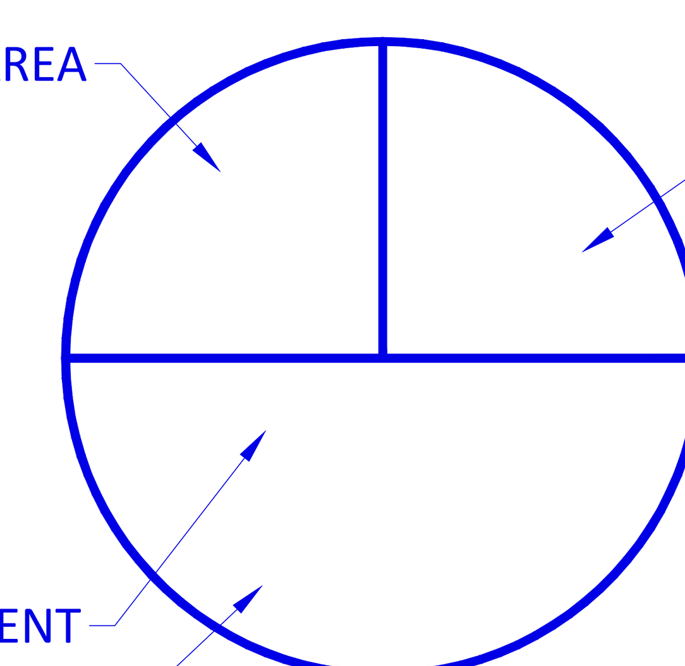
Drawing Title:
POST-DEVELOPMENT DRAINAGE AREA PLAN

Scale:	1:400	Project Number:	CCO-23-1882
Drawn By:	FV		
Checked By:	RF	Drawing Number:	POST
Designed By:	JH		

D07-12-24-0152

#XXXXX

LEGEND:



APPENDIX G
STORMWATER MANAGEMENT CALCULATIONS

Tc (min)	Intensity (mm/hr)	
	5-Year	100-Year
20	70.3	120.0
10	104.2	178.6

C-Values	
Impervious	0.90
Gravel	0.60
Pervious	0.20

Pre-Development Runoff Coefficient

Drainage Area	Impervious Area (m^2)	Gravel (m^2)	Pervious Area (m^2)	Average C (5-year)	Average C (100-year)	
A1	0	0	10,567	0.20	0.25	Development Area
A2	0	0	5,894	0.20	0.25	Existing Unrestricted

Pre-Development Runoff Calculations

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	Q (L/s)		
					5-Year	100-Year	
A1	1.06	0.20	0.25	20	41.28	88.10	Development Area
A2	0.59	0.20	0.25	10	34.14	73.14	Existing Unrestricted
Total	1.65				75.42	161.24	

Post-Development Runoff Coefficient

Drainage Area	Impervious Area (m^2)	Gravel (m^2)	Pervious Area (m^2)	Average C (5-year)	Average C (100-year)	
B1	883	2,129	452	0.62	0.75	Surface Restricted - NW
B2	1,479	296	1,048	0.61	0.70	Surface Restricted - SE
B3	3,686	0	0	0.90	1.00	Building - Restricted
B4	0	0	595	0.20	0.25	Unrestricted
B5	0	0	16,461	0.20	0.25	Existing Unrestricted

Post-Development Runoff Calculations

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	Q (L/s)		
					5-Year	100-Year	
B1	0.35	0.62	0.75	10	62.64	128.70	Surface Restricted - NW
B2	0.28	0.61	0.70	10	49.76	97.43	Surface Restricted - SE
B3	0.37	0.90	1.00	10	96.08	182.95	Building - Restricted
B4	0.06	0.20	0.25	10	3.45	7.39	Unrestricted
B5	0.59	0.20	0.25	10	34.14	73.14	Existing Unrestricted
Total	1.65				246.07	489.61	

Required Restricted Flow for Area B1-B4

Drainage Area	Area (ha)	C 5-Year	Tc (min)	Q (L/s)	Q (L/s)
				5-Year	100-Year
A1	1.06	0.20	20	41.28	88.10

Post-Development Restricted Runoff Calculations

Drainage Area	Unrestricted Flow (L/S)		Restricted Flow (L/S)		Storage Required (m^3)		Storage Provided (m^3)	
	5-year	100-Year	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year
B1	62.64	128.70	37.31	78.95	57.1	103.4	57.5	104.8
B2	49.76	97.43						
B3	96.08	182.95						
B4	3.45	7.39	3.45	7.39	-	-	-	-
Total (Site)	211.93	416.46	40.76	86.34	57.14	103.36	57.46	104.81
B5	34.14	73.14	34.14	73.14				
Total	246.07	489.61	74.90	159.48	57.14	103.36	57.46	104.81

Storage Requirements for Area B1-B3

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B1-B3	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	121.49	37.31	84.18	50.51
20	70.3	84.92	37.31	47.61	57.14
30	53.9	67.23	37.31	29.92	53.86
40	44.2	56.77	37.31	19.46	46.70
50	37.7	49.75	37.31	12.45	37.34

Maximum Storage Required 5-year =	57 m^3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B1-B3	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	239.30	78.95	160.35	96.21
20	120.0	165.09	78.95	86.14	103.36
30	91.9	129.50	78.95	50.55	90.99
40	75.1	108.23	78.95	29.28	70.26
50	64.0	94.17	78.95	15.22	45.66

Maximum Storage Required 100-year =	103 m^3

5-Year Storm Event Storage Summary

Storage Available (m^3) =	57.5	*
Storage Required (m^3) =	57.1	

100-Year Storm Event Storage Summary

Storage Available (m^3) =	104.8	*
Storage Required (m^3) =	103.4	

*Available Storage calculated from AutoCAD

For Orifice Flow, C= 0.61
For Weir Flow, C= 1.84

	Orifice 1	Orifice 2	Weir 1	Weir 2
invert elevation	76.59	X	77.33	X
center of crest elevation	76.67	X		X
orifice width / weir length	151 mm	X	1.10 m	X
weir height				X
orifice area (m^2)	0.018	X	x	X

Elevation Discharge Table - Storm Routing

Elevation	Orifice 1		Orifice 2		Weir 1		Weir 2		Total	
	H [m]	Q [m^3/s]	H [m]	Q [m^3/s]	H [m]	Q [m^3/s]	H [m]	Q [m^3/s]	Q [L/s]	
77.06	0.39	0.030	x	x	x	x	x	x	30.39	
77.07	0.40	0.03	x	x	x	x	x	x	30.77	
77.08	0.41	0.03	x	x	x	x	x	x	31.15	
77.09	0.42	0.03	x	x	x	x	x	x	31.53	
77.10	0.43	0.03	x	x	x	x	x	x	31.89	
77.11	0.44	0.03	x	x	x	x	x	x	32.26	
77.12	0.45	0.03	x	x	x	x	x	x	32.62	
77.13	0.46	0.03	x	x	x	x	x	x	32.98	
77.14	0.47	0.03	x	x	x	x	x	x	33.33	
77.15	0.48	0.03	x	x	x	x	x	x	33.68	
77.16	0.49	0.03	x	x	x	x	x	x	34.03	
77.17	0.50	0.03	x	x	x	x	x	x	34.37	
77.18	0.51	0.03	x	x	x	x	x	x	34.71	
77.19	0.52	0.04	x	x	x	x	x	x	35.04	
77.20	0.53	0.04	x	x	x	x	x	x	35.38	
77.21	0.54	0.04	x	x	x	x	x	x	35.70	
77.22	0.55	0.04	x	x	x	x	x	x	36.03	
77.23	0.56	0.04	x	x	x	x	x	x	36.35	
77.24	0.57	0.04	x	x	x	x	x	x	36.67	
77.25	0.58	0.04	x	x	x	x	x	x	36.99	
77.26	0.59	0.04	x	x	x	x	x	x	37.31	5-Year
77.27	0.60	0.04	x	x	x	x	x	x	37.62	
77.28	0.61	0.04	x	x	x	x	x	x	37.93	
77.29	0.62	0.04	x	x	x	x	x	x	38.24	
77.30	0.63	0.04	x	x	x	x	x	x	38.54	
77.31	0.64	0.04	x	x	x	x	x	x	38.85	
77.32	0.65	0.04	x	x	x	x	x	x	39.15	
77.33	0.66	0.04	x	x	0.00	0.00	x	x	39.44	
77.34	0.67	0.04	x	x	0.01	0.00	x	x	41.76	
77.35	0.68	0.04	x	x	0.02	0.01	x	x	45.76	
77.36	0.69	0.04	x	x	0.03	0.01	x	x	50.84	
77.37	0.70	0.04	x	x	0.04	0.02	x	x	56.80	
77.38	0.71	0.04	x	x	0.05	0.02	x	x	63.53	
77.39	0.72	0.04	x	x	0.06	0.03	x	x	70.93	
77.40	0.73	0.04	x	x	0.07	0.04	x	x	78.95	100-Year
77.41	0.74	0.04	x	x	0.08	0.05	x	x	87.55	
77.42	0.75	0.04	x	x	0.09	0.05	x	x	96.68	
77.43	0.76	0.04	x	x	0.10	0.06	x	x	106.31	

Notes:
1. For Orifice Flow, User is to Input an Elevation Higher than Crown of Orifice.
2. Orifice Equation: $Q = cA(2gh)^{1/2}$
3. Weir Equation: $Q = CLH^{3/2}$
4. These Computations Do Not Account for Submergence Effects Within the Pond Riser.
5. H for orifice equations is depth of water above the centroide of the orifice.
6. H for weir equations is depth of water above the weir crest.

5-Year Storm Event

Tc (min)	I (mm/hr)	B3 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	96.09	9.08	87.00	52.20
20	70.3	64.83	9.08	55.74	66.89
30	53.9	49.70	9.08	40.62	73.11
40	44.2	40.76	9.08	31.67	76.01
50	37.7	34.76	9.08	25.68	77.04
60	32.9	30.34	9.08	21.25	76.51
70	29.4	27.11	9.08	18.03	75.71
80	26.6	24.53	9.08	15.44	74.13

Maximum Storage Required 5-Year (m^3) =	77.04

100-Year Storm Event

Tc (min)	I (mm/hr)	B3 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	182.95	13.12	169.83	101.90
20	120.0	122.90	13.12	109.78	131.73
30	91.9	94.13	13.12	81.00	145.81
40	75.1	76.99	13.12	63.87	153.29
50	64.0	65.53	13.12	52.40	157.21
60	55.9	57.27	13.12	44.15	158.92
70	49.8	51.01	13.12	37.89	159.14
80	45.0	46.10	13.12	32.97	158.28

Maximum Storage Required 100-Year (m^3) =	159.14

Storage Parameters	
Roof Area (m^2)	3,685.54
Usable Roof Area (%)	75%
Usable Roof Area (m^2)	2764.16

5-Year Storage Summary	
Max. Storage Available (m^3)	82.92
Storage Required (m^3)	77.04
Max. Ponding Depth (m)	0.090

100-Year Storage Summary	
Max. Storage Available (m^3)	159.71
100-Year Storage Required (m^3)	159.14
Max. Ponding Depth (m)	0.130

Roof Drain Flow (B3)

Roof Drains Summary	
Type of Control Device	Watts Drainage - Accutrol Weir
Number of Roof Drains	8
Roof Drain Position	Open

	5-Year	100-Year
Rooftop Storage Available (m^3)	82.92	159.71
Rooftop Storage Required (m^3)	77.04	159.14
Storage Depth (m)	0.090	0.130
Flow (Per Roof Drain) (L/s)	1.14	1.64
Total Flow (L/s)	9.08	13.12

Flow Rate Vs. Build-Up (Individual Drain)	
Depth (mm)	Flow (L/s)
0	0.00
5	0.06
10	0.13
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.69
60	0.76
65	0.82
70	0.88
75	0.95
80	1.01
85	1.07
90	1.14
95	1.20
100	1.26
105	1.32
110	1.39
115	1.45
120	1.51
125	1.58
130	1.64
135	1.70
140	1.77
145	1.83
150	1.89

	Roof Drain Flow		
	Individual Flow (l/s)	Storage Depth (mm)	Cumulative Flow (l/s)
	0.00	0	0.00
	0.06	5	0.50
	0.13	10	1.01
	0.19	15	1.51
	0.25	20	2.02
	0.32	25	2.52
	0.38	30	3.03
	0.44	35	3.53
	0.50	40	4.04
	0.57	45	4.54
	0.63	50	5.05
	0.69	55	5.55
	0.76	60	6.06
	0.82	65	6.56
	0.88	70	7.07
	0.95	75	7.57
	1.01	80	8.08
	1.07	85	8.58
5-Year	1.14	90	9.08
	1.20	95	9.59
	1.26	100	10.09
	1.32	105	10.60
	1.39	110	11.10
	1.45	115	11.61
	1.51	120	12.11
	1.58	125	12.62
100-Year	1.64	130	13.12
	1.70	135	13.63
	1.77	140	14.13
	1.83	145	14.64
	1.89	150	15.14

*Roof Drain model to be Accutrol Weirs, See attached sheets
*Roof Drain Flow information taken from Watts Drainage website

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

STORM SEWER DESIGN SHEET

PROJECT: CCO-23-1882
LOCATION: 6165 Thunder Road
CLIENT: Brofort Inc.

LOCATION				CONTRIBUTING AREA (ha)				RATIONAL DESIGN FLOW											SEWER DATA									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		18	19	20	21	22	23	24	25	26	27	28
STREET	AREA ID	FROM MH	TO MH	C-VALUE	AREA	INDIV AC	CUMUL AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	ROOF FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)	
																						DIA	W	H			(L/s)	(%)
Thunder Road																												
	B2	S.E. CULV INLET	S.E. CULV OUTLET	0.61	0.28	0.17	0.17	10.00	0.25	10.25	104.19	122.14	178.56	49.47			9.08		58.55	129.34	17.1	375			0.50	1.134	70.78	54.73%
	B1A	N.W. CULV INLET	N.W. CULV OUTLET	0.62	0.04	0.02	0.19	10.25	0.30	10.55	102.88	120.60	176.29	55.51			9.08		64.59	129.34	20.2	375			0.50	1.134	64.75	50.06%
	B1B	CB2	SWM Area	0.62	0.13	0.08	0.08	10.00	0.84	10.84	104.19	122.14	178.56	24.06					24.06	43.87	43.6	250			0.50	0.866	19.81	45.16%
	B1C	Gravel Area	SWM Area	0.62	0.17	0.11	0.11																					
	B1-B3	375mm Inlet Control	OGS1				0.39	10.84	0.05	10.89	99.96	117.15	171.23	107.14			9.08		116.22	182.91	4.4	375			1.00	1.604	66.69	36.46%
		OGS1	Municipal Ditch				0.39	10.89	0.08	10.97	99.74	116.90	170.85	106.91			9.08		115.99	182.91	8.1	375			1.00	1.604	66.93	36.59%

Definitions:
Q = 2.78CIA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed:
FV

Checked:
RF

Project No.:
CCO-23-1882

No.	Revision	Date
1.	Issued for Review	2024-05-14
2	Issued for Review	2024-10-31
2	Issued for Review	2025-02-07

Date:
2025.02.07

Sheet No:
1 of 1