145 Thad Johnson Pvt. Site Plan Commercial/Industrial Development Servicing and Stormwater Management Report

Prepared For:

Jennings Real Estate

Prepared By:

Robinson Land Development

Project No. 23069
Apr 2024

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LEGAL NOTIFICATION

This report was prepared by Robinson Land Development for the account of **Jennings Real Estate.**

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. **Robinson Land Development** accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project

1.0 INTRODUCTION

Robinson Land Development has been retained by Jennings Real Estate to prepare a site servicing and stormwater management design for their new proposed office and cargo handling facility located at 145 Thad Johnson Pvt., in the Ottawa MacDonald-Cartier International Airport property.

The client proposes to develop an approximately 4,000 m^2 building consisting of office and cargo receiving and handling spaces along with the associated shipping and receiving docks, parking, sidewalks, landscaping and stormwater management on the site. To the north and west of the site is the existing airport taxiway which is separated by security fencing. East is an existing commercial site (139 Thad Johnson Pvt.) and to the south is Thad Johnson Pvt., additional commercial/industrial buildings, and the Ottawa International Airport runways. Refer to architectural site plan provided in **Appendix A** for reference. It should be noted that the site access road, Thad Johnson Pvt., is a private right-of-way also owned by the Airport Authority.

This report will detail the proposed means of servicing the site with water and sanitary service and provide details on how to meet the stormwater management requirements. Pre-consultation notes from the City of Ottawa have been provided in **Appendix A** for reference.

2.0 EXISTING CONDITIONS

The 1.73 ha subject site is zoned air transportation facility zone (T1A) and is undeveloped (green field with gravel parking lot). Based on historical aerial photographs the site was part of an aggregate quarry operation but was filled and abandoned since about 1976 and has remained undeveloped since.

The following private infrastructure exists adjacent to the site, owned, and operated by the Airport Authority:

- 300 mm dia. ductile iron watermain along Thad Johnson Pvt.
- 250 mm dia. PVC sanitary sewer along Thad Johnson Pvt. with a service provided for the subject site.
  - The sanitary sewer runs along Thad Johnson Pvt. to a sanitary pumping station that discharges to a 200 mm dia. PVC forcemain to the overall airport sanitary system.
- 1650 mm dia. concrete storm sewer on the north side of the taxiway along the north side of the subject site. The sewer discharges to a ditch east of Alert Rd., which drains to the Lester Road Wetland Complex, which in turn drains to the Sawmill Creek.
  - The site's existing grading runs from the north to the south, to a ditch along the north side of Thad Johnson Private. The ditch continues south along Alert Rd. to a storm pond at an NRC facility. It is understood to be connected to the Lester Road Wetland Complex as well.

Refer to as-built information received of the existing watermain, sanitary, and storm infrastructure provided in **Appendix A** for more details.

3.0 DEVELOPMENT PROPOSAL

The Owner is proposing to develop the subject site into a single approximately 4,000 m^2 building, with a parking lot area for passenger vehicles accessed from the Thad Johnson Pvt. cul-de-sac. A separate shipping and receiving truck access area is also provided from the Thad Johnson Pvt. cul-de-sac. Access to the air side and taxiways is through the truck access area and through a gated restricted access point east of the building. Refer to the Site Plan, prepared by IDEA Inc., in **Appendix A** for more details.

The proposed development will be provided with new water service, sanitary service, and storm infrastructure per City requirements. The proposed civil design drawings are provided in **Appendix B** including:

- Servicing Plan
- Grading Plan
- Notes & Details Plan
- Erosion & Sediment Control Plan
- Existing Conditions & Removals Plan
- Storm Drainage Area Plan

4.0 WATER SERVICING

The subject site will receive water supply via a 150 mm watermain service connected to the existing 150 mm watermain service stub provided for the site off Thad Johnson Private. The watermain system has been designed according to the following standards and guidelines:

- Ottawa Design Guidelines – Water Distribution (2010) periodically amended as part of Technical Bulletins
- Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection (2020)
- MOECC Design Guidelines for Drinking-Water Systems (2008)

Accordingly, the following watermain design criteria have been utilized for the subject site:

- Minimum Pressure During Peak Hour 276 kPa (40 psi)
- Minimum Pressure During Maximum Day Plus Fire 140 kPa (20 psi)
- Maximum Pressure in Unoccupied Areas 689 kPa (100 psi)
- Maximum Pressure in Occupied Areas 552 kPa (80 psi)

4.1 Boundary Conditions

The City of Ottawa provided boundary conditions for the subject site where the Airport private system connects to the City distribution system at the Ottawa South Pump Station (OSPS). Boundary conditions were provided for the current pressure zone configuration and future SUC pressure zone reconfiguration (earliest anticipation for reconfiguration is 2026). Refer to **Appendix C** for proposed domestic and fire demand calculations and received boundary conditions. The demands and boundary conditions have been summarized in the table below:

Table 1 – Water Demands & Boundary Conditions

Current Demand Scenario	Demand (L/s)	Discharge Head (m)	Approx. Pressure at Thad Johnson (psi)
Maximum HGL (Average Day)	0.70 L/s	155.0	57
Minimum HGL (Peak Hour)	1.89 L/s	148.0	47
Max Day + Fire	117.72 L/s	139.2	34
Future PZ Reconfiguration Demand Scenario	**Demand (L/s)**	**Discharge Head (m)**	**Approx. Pressure at Thad Johnson (psi)**
Maximum HGL (Average Day)	0.70 L/s	147.2	46
Minimum HGL (Peak Hour)	1.89 L/s	146.7	45
Max Day + Fire	117.72 L/s	146.7	45

A Master Servicing and Transportation Study was completed for the Airport in 2011 by Delcan. In that report it also confirmed a pump station discharge head between 150-155 m, which results in an operating pressure within the Airport of 45-68 psi. Refer to **Appendix C** for excerpt from the Master Servicing Study. Based on the boundary conditions provided and the Airport's Master Servicing Study, the existing system can sufficiently provide domestic flow to the proposed development. A booster pump may be necessary within the building to ensure sufficient pressure up to the second floor, the details of which will be determined by the Building Mechanical Engineer during detailed design.

4.2 Fire Protection

The two nearest existing hydrants to the site are located at the end of the Thad Johnson cul-de-sac (approximately 60 m from the proposed fire department connection) and by the entrance to 139 Thad Johnson Pvt. (approximately 140 m from the proposed fire department connection). The proposed building will be sprinkled and as such a new hydrant is proposed within the site within 45 m of the proposed fire department connection.

The required fire flow for the subject site was calculated using the Fire Underwriter's Survey (FUS) long form (refer to **Appendix C**). Based on the building construction, occupancy and ground floor area, the required fire flow is 7,000 L/min (150 L/s).

Based on boundary conditions received above the system will be able to support the proposed fire demand under current and future pressure zones. Additionally, based on the Airport's Master Servicing Study it indicated that the available fire flow in the private system's backbone (including the 300mm watermain along Thad Johnson) is in the range of 160-215 L/s, above the proposed fire demand for this site. Further, the Master Servicing Study estimated future demand for anticipated 2031 build-out of the Airport Lands and included a fire demand of 10,000 L/min. The report concluded that the OSPS had sufficient capacity to supply the Airport system at the 2031 build-out, including a 10,000 L/min fire demand (above the proposed fire demand for this site). Refer to **Appendix C** for excerpts from the Master Servicing Study.

5.0 SANITARY SERVICING

5.1 Design Criteria

Sanitary flows from the site will discharge to the 250 mm sanitary sewer on Thad Johnson Private. The sewer discharges to a sanitary pump station at the entrance to Thad Johnson Pvt., with the forcemain running back along Thad Johnson to discharge to the Airport sanitary sewer system. The sanitary sewer system has been designed according to the following standards and guidelines:

- Ottawa Sewer Design Guidelines (2012) periodically amended as part of Technical Bulletins
- MOECC Design Guidelines for Sewage Works (2008)

Accordingly, the following design parameters have been implemented for the subject site:

- Plant worker incl. showers: 125 L/cap/d
- Peaking Factor: 1.5
- Infiltration Allowance: 0.28 L/s/ha
- Velocity: 0.60-3.0 m/s

5.2 Proposed Design

The total population was provided by the owner based on current staff of 120 plus 15% for future growth, as well as assumed average 30 visitors per day utilizing the facilities. This led to a total anticipated population of 168 people. This translates to a peak design flow of 0.85 L/s (including infiltration/extraneous flow).

All proposed sanitary sewers have been designed to have capacities to convey the peak design flows and meet minimum and maximum full flow velocities. Refer to the sanitary sewer design sheet in **Appendix D** for more details. A monitoring maintenance hole is located where the proposed works connect to the existing 150 mm sewer lateral.

The sanitary pump station was upgraded in 2009, including increasing the pump capacity from 33 to 35.3 L/s. A pump station capacity report was conducted by JL Richards in 2015 for the Airport in anticipation of the Hilton Garden Hotel expansion and Fairfield Inn & Suites Hotel on Thad Johnson Private. The anticipated pump station inflow was calculated at 18.1 L/s (51% capacity). Therefore, there is sufficient capacity in the pump station for the proposed development.

Furthermore, given that a sanitary stub was provided to the site, the sanitary sewer to the pump station would have anticipated development of the site. At a gross commercial flow rate of 28,000 L/gross ha/d and a 1.5 peak factor the anticipated peak flow from the site would have been approximately 1.3 L/s (including infiltration/extraneous flow), greater than the estimated flow for this development.

6.0 STORM SERVICING

6.1 Design Criteria

Stormwater runoff collected on the subject site will be discharged to the existing 1650 mm storm sewer that runs north of the site and ultimately discharges to the Lester Road Wetland Complex shortly downstream. The adjacent site at 139 Thad Johnson Pvt. also connected to this 1650 mm storm sewer during its development around 1991. Existing stormwater runoff from the site is directed to the boundaries of the site, largely southerly to the ditch along Thad Johnson Private. The north-westerly portion of the site discharges to an existing ditch catch basin just outside the existing fenceline. The north-easterly and easterly portion of the site discharge to 139 Thad Johnson Pvt. (three existing rip rap outlets connect to the adjacent site's parking lot) where it is captured by the site's storm sewers. The ditch on Thad Johnson Pvt. leads to a storm pond east of Alert Rd., and ultimately to the Lester Road Wetland Complex. The wetland complex further discharges to Sawmill Creek.

The storm sewer system has been designed according to the following standards and guidelines:

- Ottawa Sewer Design Guidelines (2012) periodically amended as part of Technical Bulletins
- MOECC Stormwater Management Planning and Design Manual (2003)
- Sawmill Creek Subwatershed Study Update (2003) by CH2M Hill
- Site Plan Application pre-consultation meeting minutes

Accordingly, the following design parameters have been implemented for the subject site:

- Quantity Control: post- to pre-development (up to 100-yr)
- Quality Control: Enhanced (80% TSS reduction)
- Infiltration: Provide infiltration for 40% of hard surfaces
- Ponding: No ponding during 2-yr, max. 300mm ponding
- Velocity: 0.80-3.0 m/s

The 2-yr up to the 100-yr design storm must be controlled to the respective pre-development discharge rate. Accordingly, accounting for the uncontrolled developed areas (driveways), the required discharge flow from the controlled areas was calculated. Refer to **Appendix E** for details of the calculations. The undeveloped areas along the extremities of the site will retain their existing flow routes and ground cover and as such are not a factor in the stormwater management calculations. The summary of the calculations are as follows:

- 2-year Pre-Development Flow Rate: 62.6 L/s
- Required 2-year Post-Development Flow Rate from Controlled Areas: 52.3 L/s
- 100-year Pre-Development Flow Rate: 181 L/s
- Required 100-year Post-Development Flow Rate from Controlled Areas: 154.3 L/s

6.2 Minor System

Stormwater runoff will be captured on site and collect to a central maintenance hole before discharging to the 1650 mm storm sewer. The controlled flows represent only 2% of the capacity of the 1650 mm storm sewer during the 2-yr storm (3% during the 100-yr storm). The four site driveways cannot be captured by the storm system and will instead discharge to the existing ditches along the north and south ends of the site. Outside of the developed area of the site will continue to drain following the existing drainage paths. The west and south ends of the site will continue to drain to the Thad Johnson Pvt. ditch. The northwest side of the site will continue to drain to the existing catch basin between the site and the asphalt access road. The northeast and east side of the site will continue to drain onto 139 Thad Johnson Pvt., where it is collected and discharged to the 1650 mm storm sewer (though the area discharging to 139 Thad Johnson Pvt. is reduced from pre-development). Culverts have been provided to maintain the flow paths where disrupted by the proposed driveways, sized at minimum for the 25-year storm according to OSDG Table 6.4 (Refer to the storm sewer design sheet in **Appendix E** for reference).

Select structures will be outfitted with inlet control devices to limit the post-development flow rate. The inlet control devices in series are sized recognizing the upstream controlled flows. Three infiltration galleries/storm retention galleries are located in the site to provide additional storage required from the 2-year up to the 100-year storm. The infiltration gallery in Drainage Area 6 is controlled by an orifice plate in the gallery discharge pipe in STMMH202 and is sized to fill during the 2-yr storm without overflowing via the 300 mm gallery bypass pipe at CBMH203 or surface ponding upstream. The infiltration gallery in Drainage Area 11 is controlled by an ICD in CBMH208 causing backflow into the gallery, more than sufficiently sized to fill during the 2-yr storm without causing backup to surface ponding. The infiltration gallery in Drainage Area 9, like that in Drainage Area 6, is controlled by an orifice plate in the gallery discharge pipe in STMMH201 and is sized to fill during the 2-yr storm without overflowing via the 300mm gallery bypass pipe at CBMH206 or surface ponding upstream.

The building will also be outfitted with roof drain control and roof storage. The roof drain is assumed based on a Zurn Z105 model, though the Building Mechanical Engineer will finalize during detailed design (refer to the roof drain cutsheet in **Appendix E** for reference). The roof storage will be limited to 150 mm in depth and maintain a drawdown time of under 24 hours to limit open water. A typical maximum 40 L/s/ha total roof drain discharge rate has been utilized for design purposes (maximum 16.36 L/s for the total roof area). While the overall storm system will be controlled even under the 2-year storm, the system capacity is designed to allow free flow without controls. Refer to the 2-year storm sewer design sheet, ICD and storage calculations in **Appendix E** for details of the calculations and the Storm Drainage Area Plan in **Appendix B** for reference. Under the 2-year storm no surface ponding will occur within the hardscaped areas, though some ponding will occur strictly contained in the north ditch at CB02 (which will also serve for infiltration).

A summary of the calculations is presented in the tables below:

Table 2 – 2-Year Post-Development Discharge Rates

Area	Max Discharge Rate (L/s)
Controlled (1-13)	50.7
Uncontrolled Driveways	10.3
Total	**61.0**
Total Pre-Development Flow	**62.6**

Table 3 – 2-Year Post-Development Storage Volumes

Area	Required Storage (m^3)	Available Storage (m^3)
Infiltration Gallery (1-6)	40.0	40.1
Ditch (7)	1.4	8.9
Infiltration Gallery (9&10)	82.3	84.6
Infiltration Gallery (11&12)	23.8	84.8
Roof (13)	52.5	200
Total	**200.0**	**418.4**

6.3 Major System

The major system flows of the site involve ponding in the respective drainage areas. Quantity storage is provided by surface ponding at catch basins and underground infiltration/retention galleries. Up to and including the 100-yr storm no emergency spillover off-site will occur. Surface ponding depths within hardscaped areas are limited to 300 mm measured from the catch basin top of grate, with all local overflow elevations minimum 300 mm below building entrance elevations. Emergency overflow flow routes are directed towards the north (Drainage Area 7); the north-east which runs through the adjacent site 139 Thad Johnson Pvt. which also overflows to the Thad Johnson Pvt. ditch (Drainage Area 8 & 9); and to the south to the Thad Johnson Pvt. ditch (Drainage Areas 1-6, 10-13). These are the existing drainage paths of the site. It should be noted as well that while 139 and 145 Thad Johnson Pvt. are separate sites, they both remain property owned by the Airport Authority.

Refer to the 100-year storm sewer design sheet, ICD and storage calculations in **Appendix E** for details of the calculations and the Storm Drainage Area Plan in **Appendix B** for reference. For conservative design purposes the storm sewer design sheet utilizes the maximum ICD flow rate (for validating pipe and discharge capacity) and the storage calculations utilize the minimum ICD flow rate (for validating storage capacity)

A summary of the calculations is presented in the tables below:

Table 4 – 100-Year Post-Development Discharge Rates

Area	Max Discharge Rate (L/s)
Controlled (1-13)	137.9
Uncontrolled Driveways	26.6
Total	**164.5**
Pre-Development Flow	**181.0**

Table 5 – 100-Year Post-Development Storage Volumes

Area	Required Storage (m^3)	Available Storage (m^3)
Surface Storage (1&2)	27.3	36.5
Surface Storage (3&4)	22.5	41.2
Surface & Gallery (5&6)	54.9	78.7
Ditch (7)	7.7	8.9
Ditch (8)	8.5	8.7
Infiltration Gallery (9&10)	82.9	84.6
Surface & Gallery (11)	121.2	121.3
Surface Storage (12)	6.7	5.7
Roof (13)	169.9	200
Total	**501.6**	**585.6**

For the infiltration gallery in the Drainage Area 6, the gallery will fill during the 100-yr storm, controlled by an orifice plate in the gallery discharge pipe in STMMH202. After which, controlled by an ICD in CBMH203 at the 300 mm gallery bypass pipe to STMMH202, the drainage area will backfill onto surface storage.

For the infiltration gallery in Drainage Area 11, the gallery will fill during the 100-yr storm, controlled by an ICD in CBMH208 at the 300 mm pipe to CBMH207. Since this gallery is used only for additional storage required during the 100-yr storm it is sized to be filled, and will infiltrate to the ground, without the need for its own outlet or bypass.

For the infiltration gallery in Drainage Area 9, the gallery will fill during the 100-yr storm, controlled by an orifice plate in STMMH201. After which, the gallery will overflow via the 300 mm gallery bypass pipe from STMMH206 to STMMH201. It has been calculated that when the gallery overflows (15 minutes), the total peak flows from the controlled site (137.9 L/s) are still below the required 100-yr pre-development peak flow (154.3 L/s).

For the roof, a secondary calculation was conducted for the future roof expansion to verify the anticipated storage required. During the 100-yr storm 204.9 m^3 storage will be required at the assumed discharge rate (16.36 L/s), however the available storage on the roof will also increase to approximately 235 m^3.

6.5 Infiltration

In line with the Sawmill Creek Subwatershed Study, infiltration of minimum 40% of the impervious area is desired for maintaining overall creek baseflow volumes and water table recharging. The impervious drainage areas account for approximately 90% of the developed area (1.36 ha of 1.54 ha developed). To infiltrate 40% of the runoff from this area, this equates to 3,682 m^3 per year based on Environment Canada monitoring station rainfall data at the Ottawa MacDonald-Cartier International Airport years 1993-2023. This is the same monitoring station the City of Ottawa based their rainfall IDF curves upon from years 1967-1997. It was found that there were an average of 118 storm events per year at an average of 6.4 mm rainfall per event.

Per the geotechnical investigation for 145 Thad Johnson Pvt. prepared by Paterson Group dated September 26, 2023, neither bedrock nor groundwater was encountered and is expected to be well below depths of the boreholes (108.28-111.31 m). The infiltration galleries will have a minimum depth of 111 m (Drainage Area 9 Gallery) therefore bedrock and groundwater are not expected to influence the percolation rate. Based on the boreholes, the soil at the depths of the infiltration galleries is sand. An appropriate percolation rate of 8 min/cm was selected based on MMAH Supplementary Standard SB-6. All infiltration areas will infiltrate within 24 hours.

Based on the percolation rate and the average storm runoff the infiltration from each area was calculated (being the minimum between infiltration capacity and average runoff) for the average 6.4 mm rainfall event noted above. The details of the calculations are provided in **Appendix E** and summarized in the table below.

Table 6 – Summary of Infiltration Volumes

Required Infiltration per Year (m^3)	Minimum Infiltration per Event (m^3)	Number of Average Events Required per Year	Total Infiltration per Average Year (m^3)
3,682	70.3	52	8,301

Therefore, there is more than sufficient infiltration capacity to meet the minimum 40% of impervious areas required.

6.6 Quality Control

Quality control will be provided by an oil-grit separator prior to discharge to the 1650 mm storm sewer sized for 80% TSS reduction based on the restricted flow rates. Refer to OGS sizing cutsheet in **Appendix E** for more details.

7.0 EROSION AND SEDIMENT CONTROL

Prior to construction and until vegetation has been re-established in disturbed areas, erosion and sediment control measures must be implemented to mitigate the impact on receiving watercourses and existing infrastructure. The following erosion and sediment control (ESC) measures have been proposed for the subject site:

- Limiting the extent of exposed soils at any given time.
- Erosion and sediment control measures shall be maintained until vegetation has been re-established in all disturbed areas. Re-vegetate disturbed areas in accordance with approved Landscape Plan as soon as possible.

- Stockpile soil away (15 metres or greater) from watercourses, drainage features and top of steep slopes.
- Installation of silt sacks between frame and cover on all proposed and existing catch basins and open cover storm manholes until construction is completed.
- Silt fence to be installed and maintained along the property boundaries.
- Install mud mats at all construction entrances.
- During active construction periods, visual inspections shall be undertaken on a weekly basis and after major storm events (>25mm of rain in 24 hour period) on ESC and any damage repaired immediately.
- ESC shall also be assessed (and repaired as required) following significant snowmelt events.
- Visual inspections shall also be undertaken in anticipation of large storm events (or a series of rainfall and/or snowmelt days) that could potentially yield significant runoff volumes.
- Care shall be taken to prevent damage to ESC during construction operations.
- In some cases, barriers may be removed temporarily to accommodate construction operations. The affected barriers shall be reinstated immediately after construction operations are completed.
- ESC should be adjusted during construction to adapt to site features as the site becomes developed.
- ESC shall be cleaned of accumulated sedimentation as required and replaced as necessary.
- During the course of construction, if the Engineer believes that additional prevention methods are required to control erosion and sedimentation, the Contractor shall implement additional measures, as required, to the satisfaction of the Engineer.
- Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification (OPSS) 805.

Refer to the Erosion and Sediment Control Plan provided in **Appendix B** for more details.

9.0 CONCLUSIONS

This servicing and stormwater management report has been prepared to support the Site Plan Application for the development of the property located at 145 Thad Johnson Pvt. The report has detailed the proposed means of servicing the site for potable water and sanitary sewer and provided details on how to meet the stormwater management requirements in accordance with City of Ottawa standards and the Sawmill Creek Subwatershed Study. The proposed servicing and stormwater management designs will be achieved by implementing the following key features:

- Domestic water supply will be provided by a 150 mm diameter service watermain connected to the existing 300 mm diameter watermain on Thad Johnson Pvt. via the existing 150 mm diameter stub for the site.
- Fire protection will be provided by existing hydrants on Thad Johnson Pvt. and a proposed on-site hydrant for the proposed sprinklered building.
- Sanitary flows will be conveyed to the existing 250 mm diameter sanitary sewer on Thad Johnson Pvt. via the existing 150 mm diameter stub for the site proposed 250 mm diameter sanitary sewer.
- Stormwater runoff (minor system) will be conveyed by the proposed storm sewer system to the existing 1650 mm storm sewer north of the site.
- Stormwater runoff for all storm events up to and including the 100-year design storm will be controlled on-site to the pre-development rates.

- On-site storage will be provided for all storm events up to and including the 100-year design storm event through surface ponding and underground storage.
- Emergency overland flows will be conveyed to the ditch on Thad Johnson Pvt., in accordance with the pre-development drainage condition.
- Infiltration is provided in the underground infiltration galleries and north ditch lines.
- Quality control will be provided by an oil-grit separator immediately prior to discharge to the 1650 mm sewer.
- Erosion and sediment control measures will be implemented prior to construction and maintained until vegetation has been re-established in disturbed areas.

Report Prepared By:

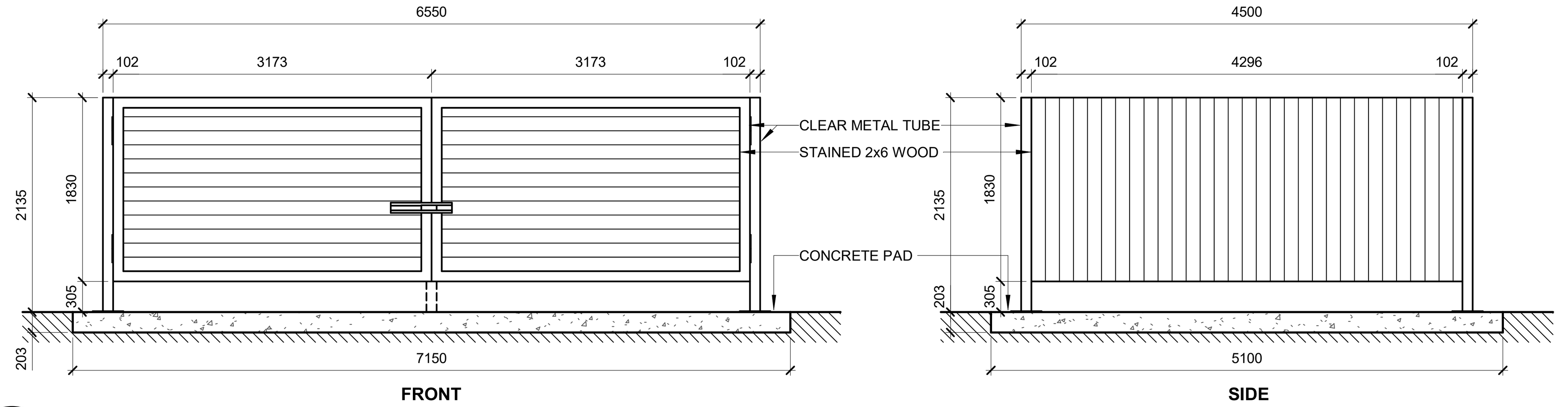
Stephen McCaughey, P.Eng.
Project Engineer

Appendix A

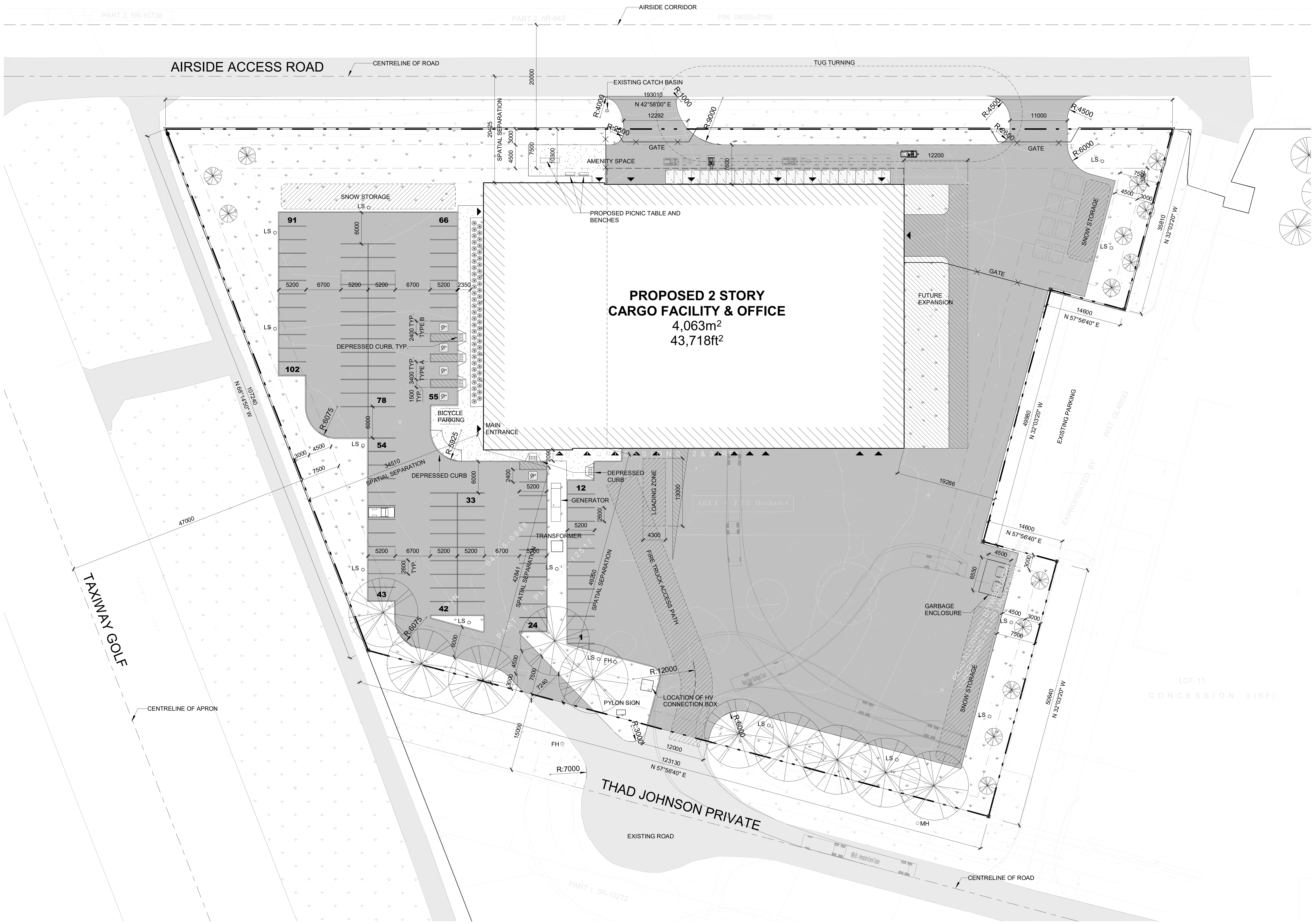
Architectural Site Plan

Pre-Consultation Notes

GeoOttawa existing watermain, sanitary and storm



B1 / A101 **GARBAGE ENCLOSURE**
1 : 50



0 m 10 m 20 m

A1 / A101 **PROPOSED SITE PLAN**
1 : 400

SITE DATA

LEGAL DESCRIPTION:
PART OF LOT 11
GORE BETWEEN CONCESSIONS 2 & 3 (RIDEAU FRONT) PART OF THE ROAD ALLOWANCE BETWEEN THE GORE BETWEEN CONCESSIONS 2 & 3 (RIDEAU FRONT) AND CONCESSION 3 (RIDEAU FRONT)
PART OF LOT 11
CONCESSION 3 (RIDEAU FRONT)
GEOGRAPHIC TOWNSHIP OF GLOUCESTER
CITY OF OTTAWA

REFERENCE LEGAL SURVEY V-64536 BY FAIRHALL MOFFATT & WOODLAND LTD DATED 2023 11 08

ZONING DESIGNATION:
T1A AIR TRANSPORTATION FACILITY ZONE

USE:
TRUCK TRANSPORT TERMINAL/CARGO FACILITY

REQUIRED SETBACKS:

FRONT YARD (m)		
	REQUIRED	7.5
	ACTUAL	42.9
REAR YARD (m)		
	REQUIRED	7.5
	ACTUAL	10.3
SIDE YARD (m)		
	REQUIRED	7.5
	ACTUAL	19.3 & 34.5
INTERIOR SIDE YARD (m)		
	REQUIRED	7.5
	ACTUAL	N/A
MINIMUM LOT WIDTH (m)		
	REQUIRED	-
	ACTUAL	128,617.5
MINIMUM LOT AREA (m^2)		
	REQUIRED	-
	ACTUAL	17,306
FLOOR SPACE INDEX (Maximum)		
	REQUIRED	1.0 (2.0 FOR OFFICES)
	ACTUAL	0.27

REQUIRED PARKING (Area C of ZBL):

OFFICE (2.4 SPACES/100m^2 OF GFA)		
	REQUIRED	45
	ACTUAL	77
WAREHOUSE (0.8 SPACES/100m^2 OF GFA)		
	REQUIRED	25
	ACTUAL	25
TOTAL		
	REQUIRED	70
	ACTUAL	102
NUMBER OF H/C SPACES		
	REQUIRED	2
	ACTUAL	5
BICYCLE PARKING (1 / 2,000m^2 OF WAREHOUSE) (1 / 250m^2 OF OFFICE)		
	REQUIRED	11
	ACTUAL	12

REQUIRED LOADING SPACE:
ONE VEHICLE LOADING SPACE IS REQUIRED FOR LIGHT INDUSTRIAL USE, OVER 5000m^2 OF GROSS FLOOR AREA.

BUILDING DATA

BUILDING AREA (m^2)	4,063
BUILDING GROSS FLOOR AREA (m^2)	5,249
LEVEL 1 (m^2)	4,063
LEVEL 2 (m^2)	1,186
AREA OF OFFICE (m^2)	2,372
AREA OF CARGO WAREHOUSE (m^2)	2,877

LEGEND

GRASS AREA
ASPHALT PAVING
CONCRETE WALKWAY
TWSI
PLANTING
PROPERTY LINE
SETBACK LINE
CENTRELINE
OVERHEAD LINE
FH FIRE HYDRANT
LS LIGHT STANDARD

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SEAL

SEAL
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LICENCE
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GENERAL NOTES
DO NOT SCALE DRAWINGS.
CONTRACTOR TO VERIFY ALL DIMENSIONS & CONDITIONS AND REPORT ANY DISCREPENCIES.

TRUE NORTH

No.	DATE	DESCRIPTION
8	2024-04-03	ISSUED FOR SITE PLAN CONTROL
7	2024-04-02	ISSUED FOR PHASE 3 SPA UPDATE
6	2024-02-29	ISSUED FOR PHASE 3 SPA
5	2024-01-11	ISSUED FOR SPA
4	2023-12-15	ISSUED FOR OIAA REVIEW
3	2023-11-14	ISSUED FOR CLIENT REVIEW UPDATE
2	2023-10-31	ISSUED FOR CLIENT REVIEW
1	2023-10-13	ISSUED FOR PRE-APPLICATION CONSULTATION

REVISIONS

PROJECT
CANADIAN NORTH YOW HQ

145 Thad Johnson Pvt,
Ottawa, ON K1V 0R4

IDEA #
23566
CLIENT #

SHEET NAME
PROPOSED SITE PLAN

DATE 2024-02-29
SCALE AS NOTED.
CHECKED BY CWS
DRAWN BY ND
SHEET No. A101

D (36"x24")

File No.: PC2023-0286

Ryan Crowle
IDEA Inc
Via email: rcrowle@integrateddesign.ca

Subject: Pre-Consultation: Meeting Feedback
Proposed Site Plan Control Application –145 Thad Johnson

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on November 6, 2023.

Pre-Consultation Preliminary Assessment

1 ☐	2 ☐	3 ☐	4 ☐	5 ☒

One (1) indicates that considerable major revisions are required while five (5) suggests that the proposal appears to meet the City's key land use policies and guidelines. This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.

Next Steps

1. A review of the proposal and materials submitted for the above-noted pre-consultation has been undertaken. Please proceed to complete a Phase 2 Pre-consultation Application Form and submit it together with the necessary studies and/or plans to planningcirculations@ottawa.ca.

2. In your subsequent pre-consultation submission, please ensure that all comments or issues detailed herein are addressed. A detailed cover letter stating how each issue has been addressed must be included with the submission materials. Please coordinate the numbering of your responses within the cover letter with the comment number(s) herein.

3. Please note, if your development proposal changes significantly in scope, design, or density before the Phase 3 pre-consultation, you may be required to complete or repeat the Phase 2 pre-consultation process.

Supporting Information and Material Requirements

1. The attached **Study and Plan Identification List** outlines the information and material that has been identified, during this phase of pre-consultation, as either required (R) or advised (A) as part of a future complete application submission.

    a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.

Consultation with Technical Agencies

1. You are encouraged to consult with technical agencies early in the development process and throughout the development of your project concept. A list of technical agencies and their contact information is enclosed (Appendix A).

Planning (Katie O'Callaghan)

Comments to Deem Complete:

1. The subject site is within the Outer Urban Transect and falls within District 6 – Ottawa International Airport Economic District. Strategic direction 7, in the Official Plan, denotes the Ottawa International Airport Economic District as a major economic engine for the City that will continue to play an important role in the future.

2. As per strategic direction 7, the Ottawa International Airport plays an important role in the mega-region as part of the transportation network providing connections regionally, nationally, and internationally for both people and goods. It functions as a gateway to the city and a transportation hub, which includes connections to the O-Train network. There are opportunities in the surrounding area to broaden the employment and commercial uses that benefit from proximity to the airport and O-Train connection.

3. The subject property is zoned T1A – Macdonald-Cartier International Airport, Airport Transport Facility Zone, Subzone 1. Both warehouse and office uses are permitted. The subject property also falls with Schedule C14, the Airport Vicinity Development Zone and is within the 35 Line. Also included in Schedule C14 in OP and Section 10.2.2 of OP.

4. Office bicycle parking rate is 1 per 250m2 of GFA, please provide a breakdown of the office use GFA on the site plan. Based on parking rates, approx. 1900 GFA for office? – 8 bicycle stalls required.

5. Landscape requirements

    a. Where possible, plant local native species.

    b. Provide greenery, trees, and soft surfaces to help mitigate urban heat island and support storm water management.

6. It is recommended that a courtesy heads-up be provided to the local ward Councillor Jennifer Bradley – Ward 10 Gloucester-Southgate.

Other Comments:

7. Please refer to the City's Fence By-law, in particular Section 4 – visibility triangles when designing the fence. Please note, for non-residential properties the fence can be no higher than three meters (3m).

Urban Design (Molly Smith)

Comments to Deem Complete:

Applicable Requirements:

- Design Brief
- Site Plan
- Landscape Plan
- Elevations

8. A Design Brief is required, the term of reference is provided in the meeting minutes. Please note that there is a customized terms of reference with required items highlighted. The Design Brief is to follow the structure in Section 3 of the TOW – Contents.
9. Understood that the site is not immediately adjacent to the Airport Parkway but will have visibility. Please demonstrate in the Design Brief the visual impact the proposal will have when on the parkway.
10. Please include landscape screening along the property line nearest to the parkway, particularly to screen parking lots. Please reference the Airport Authority's list of prohibited plant material to dissuade nesting birds, list is attached but note its not exhaustive.
11. Incorporate windows or architectural interest along the Airport Parkway façade, elevations will be required.

Engineering (Reed Adams)

Comments to Deem Complete:

8. Services:

    a. The site has private services (storm, water and sanitary) surrounding it. Coordination with the owner(s) of these services regarding connections would be required.

    b. Storm:

        i. 250mm concrete storm sewer currently servicing 139 Thad Johnson.

        ii. 1650 concrete storm sewer to the north of the site.

iii. The Stormwater Management Criteria, for the subject site, is to be based on the following:

   1. Pre-to-Post stormwater management control.

iv. Enhanced quality control (80% TSS) is required.

c. Sanitary:

   i. 250mm PVC sanitary sewer under Thad Johnson Private.

d. Water:

   i. 305mm DI watermain under Thad Johnson Private.

9. Water Boundary condition requests must include the location of the service (map or plan with connection location(s) indicated) and the expected loads required by the proposed development, including calculations. Please provide the following information:

   a. Location of service

   a. Type of development and the amount of fire flow required (as per FUS).

   b. Average daily demand: ___ l/s.

   c. Maximum daily demand: ___l/s.

   d. Maximum hourly daily demand: ___ l/s.

10. An MECP Environmental Compliance will not be required.

11. Reference the following master servicing studies for further servicing criteria, keeping in mind updated City of Ottawa guidelines:

   a. *Master Servicing and Transportation Strategy* for the Ottawa Airport (prepared by Delcan, 2011)

   b. *Sawmill Creek Subwatershed Study Update* (prepared by CH2MHILL, 2003)

Feel free to contact Reed Adams (reed.adams@ottawa.ca), Infrastructure Project Manager, for follow-up questions.

Noise (Josiane Gervais)

Comments to Deem Complete:

12. As per the City's Noise Control Guidelines, it is best practice to address noise for office spaces. It is therefore recommended to review the roadway noise and airport noise for the site due to the proximity to Airport Parkway and due to the site being on federal airport lands to ensure mitigation is provided (as required) so that workers and visitors are not adversely affected.

Feel free to contact Josiane Gervais, TPM, for follow-up questions.

Transportation (Josiane Gervais)

Comments to Deem Complete:

13. A TIA is not required.

14. Ensure that the development proposal complies with the Right-of-Way protection requirements of the Official Plan's Schedule C16.

    a. See Schedule C16 of the Official Plan.

    b. Any requests for exceptions to ROW protection requirements must be discussed with Transportation Planning and concurrence provided by Transportation Planning management.

15. TMP includes LRT Airport Link, with Uplands and Airport stations.

16. As the proposed site is industrial and for general public use, AODA legislation applies.

    a. 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).

    b. 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.

    c. 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

17. On site plan:

    a. Show all details of the roads abutting the site; include such items as pavement markings, accesses and/or sidewalks.

b. Turning movement diagrams required for all accesses showing the largest vehicle to access/egress the site.

c. Turning movement diagrams required for internal movements (loading areas, garbage).

d. 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).

e. Show dimensions for site elements (i.e., lane/aisle widths, access width and throat length, parking stalls, sidewalks, pedestrian pathways, etc.)

Feel free to contact Josiane Gervais, Transportation Project Manager, for follow-up questions.

Planning Forestry (Hayley Murray)

Comments to Deem Complete:

18. If there are any trees on or adjacent to the site that are 10 cm in diameter or greater, they must be included in a Tree Conservation Report (TCR). The TCR can be combined with the landscape plan.

19. Being in such close proximity to active air space, this will be a unique landscape plan. If there is any feasibility on incorporating trees on the site, that would be favorable. Compensation planting opportunities on other areas further from this location would also be welcomed.

20. The Landscape Plan terms of reference must be adhered to: https://documents.ottawa.ca/sites/documents/files/landscape_tor_en.pdf

21. TCR requirements

- The TCR must list all trees on site, as well as off-site trees if the CRZ extends into the developed area, by species, diameter and health condition
- Please identify trees by ownership – private onsite, private on adjoining site, city owned, boundary (trees on a property line)
- If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained
- All retained trees must be shown, and all retained trees within the area impacted by the development process must be protected as per City guidelines available at Tree Protection Specification or by searching Ottawa.ca
- The location of tree protection fencing must be shown on the plan

- The City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
- For more information on the process or help with tree retention options, contact Hayley Murray hayley.murray@ottawa.ca or on City of Ottawa

22. LP tree planting requirements

Minimum Setbacks

- Maintain 1.5m from sidewalk or MUP/cycle track or water service laterals.
- Maintain 2.5m from curb
- Coniferous species require a minimum 4.5m setback from curb, sidewalk or MUP/cycle track/pathway.
- Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing, except where otherwise approved in naturalization / afforestation areas. Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

Tree specifications

- Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.
- Maximize the use of large deciduous species wherever possible to maximize future canopy coverage
- Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and include watering and warranty as described in the specification (can be provided by Forestry Services).
- Plant native trees whenever possible
- No root barriers, dead-man anchor systems, or planters are permitted.
- No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

Hard surface planting

- Curb style planter is highly recommended
- No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.
- Trees are to be planted at grade

Soil Volume

- Please document on the LP that adequate soil volumes can be met:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12

Medium	25	15
Large	30	18
Conifer	25	15

- ** Please note that these soil volumes are not applicable in cases with Sensitive Marine Clay **
- Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines for trees in the Right of Way
  Tree Canopy
- The landscape plan shall show how the proposed tree planting will replace and increase canopy cover on the site over time, to support the City's 40% urban forest canopy cover target.
- At a site level, efforts shall be made to provide as much canopy cover as possible, through tree planting and tree retention, with an aim of 40% canopy cover at 40 years, as appropriate. Indicate on the plan the projected future canopy cover at 40 years for the site.

Feel free to contact Hayley Murray, Planning Forester, for follow-up questions.

Environment and Trees (Matthew Hayley)

Comments to Deem Complete:

23. Tree preservation / distinctive trees – trees are present on site and the Planning Foresters should be consulted as per the requirements regarding Tree Conservation Reports.

24. There are no significant natural features within the adjacency distance that would trigger and environmental impact study.

25. Species at risk – there does not appear to be species at risk habitat present on this site.

26. Bird-Safe Design Guidelines – the bird safe design guidelines apply and should be consulted. Please contact Amy MacPherson if you have questions: amy.macpherson@ottawa.ca

Feel free to contact Matthew Hayley, Environmental Planner, for follow-up questions.

Parkland (Phil Castro)

Comments to Deem Complete:

Parkland Dedication:

- The amount of required parkland conveyance is to be calculated as per the City of Ottawa Parkland Dedication By-law No.2022-280 (or as amended):
    - (i) For conveyance of parkland, cash-in-lieu of conveyance parkland, or combination thereof:
        - **i. 2% of the gross land area (commercial & industrial uses).**
- PFP will be requesting **cash-in-lieu of conveyance of parkland** for parkland dedication in accordance with the Parkland Dedication By-law.
- PFP requests the following information to confirm and calculate the parkland conveyance:
    - Gross land area, in square meters
    - Number of residential units proposed/existing
    - Gross floor area of proposed residential development
    - Gross floor area of proposed/existing commercial development
    - The proportion of commercial/residential development proposed on site.

Please note that the park comments are preliminary and will be finalized (and subject to change) upon receipt of the development application and the requested supporting documentation.

If you have any questions, please let me know.

Regards Phil Castro (phil.castro@ottawa.ca)

Conservation Authority (Eric Lalande)

There are no comments or concerns with the proposal.

Feel free to contact Eric Lalande, Rideau Valley Conservation Authority, for follow-up questions at eric.lalande@rvca.ca

Other

27. The High Performance Development Standard (HPDS) is a collection of voluntary and required standards that raise the performance of new building projects to achieve sustainable and resilient design. The HPDS was passed by Council on April 13, 2022.

    a. At this time, the HPDS is not in effect and Council has referred the 2023 HPDS Update Report back to staff with direction to bring forward an updated report to Committee with recommendations for revised phasing timelines, resource requirements and associated amendments to the Site Plan Control By-law by no later than Q1 2024.

    b. Please refer to the HPDS information attached and ottawa.ca/HPDS for more information.

Should there be any questions, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Sincerely,
Katie O'Callaghan

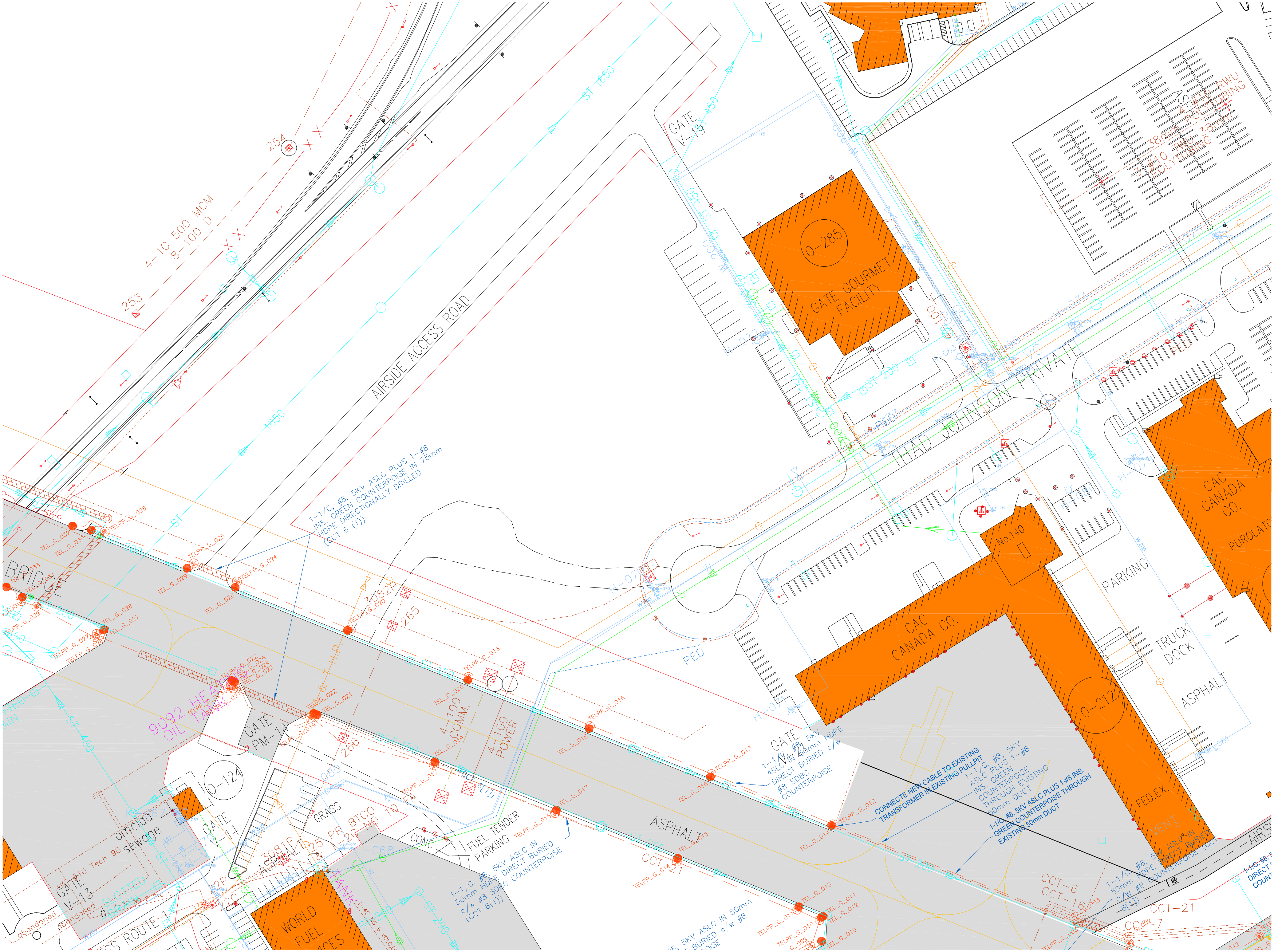
cc.

- Adam Reed, Project Management and Infrastructure Approvals
- Molly Smith, Urban Design
- Josiane Gervais, Transportation Planning
- Matthew Hayley, Environmental Planning
- Hayley Murray, Forestry
- Phil Castro, Park Planning
- Amy MacPherson, Natural Systems and Rural Affairs
- Eric Lalande, RVCA

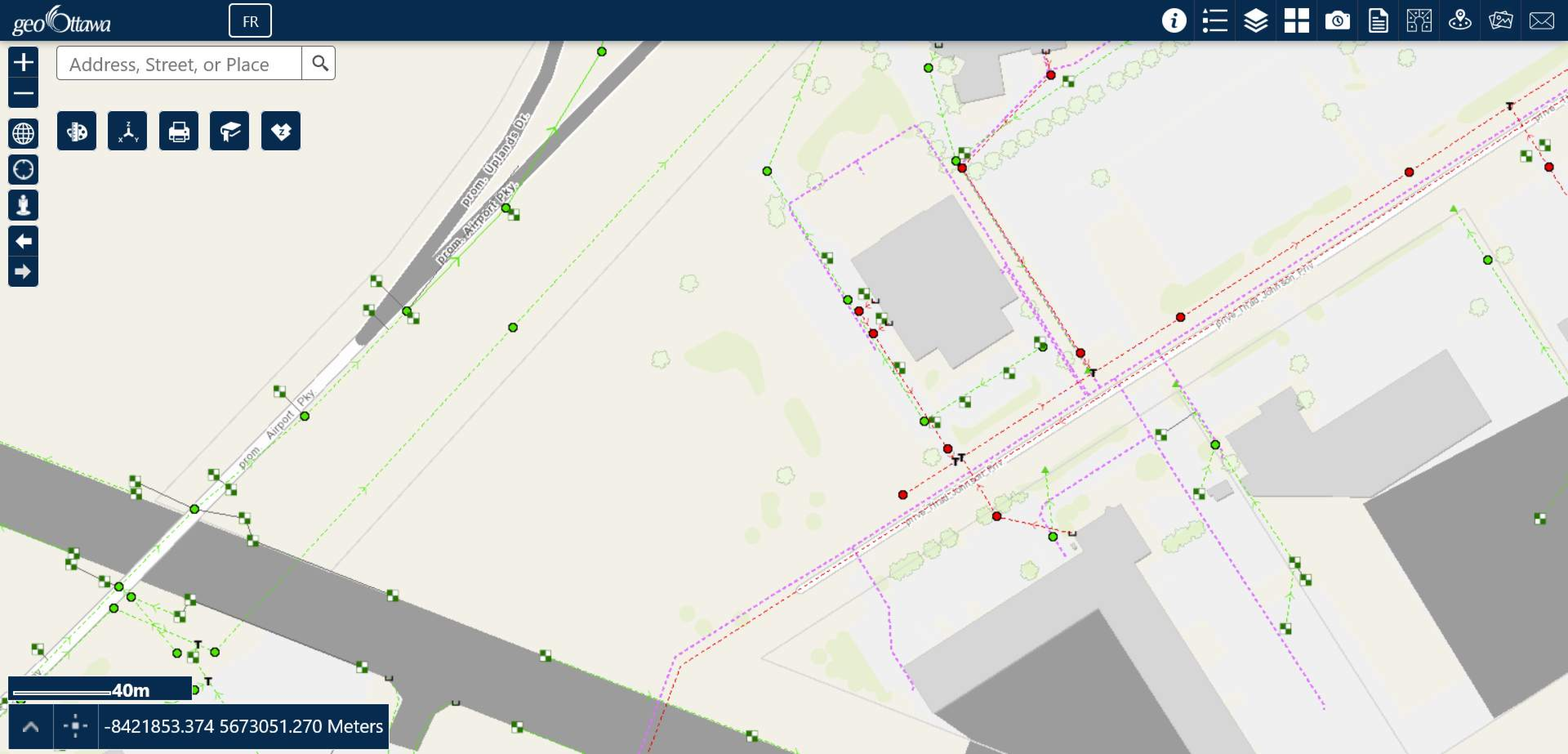
APPENDIX A.

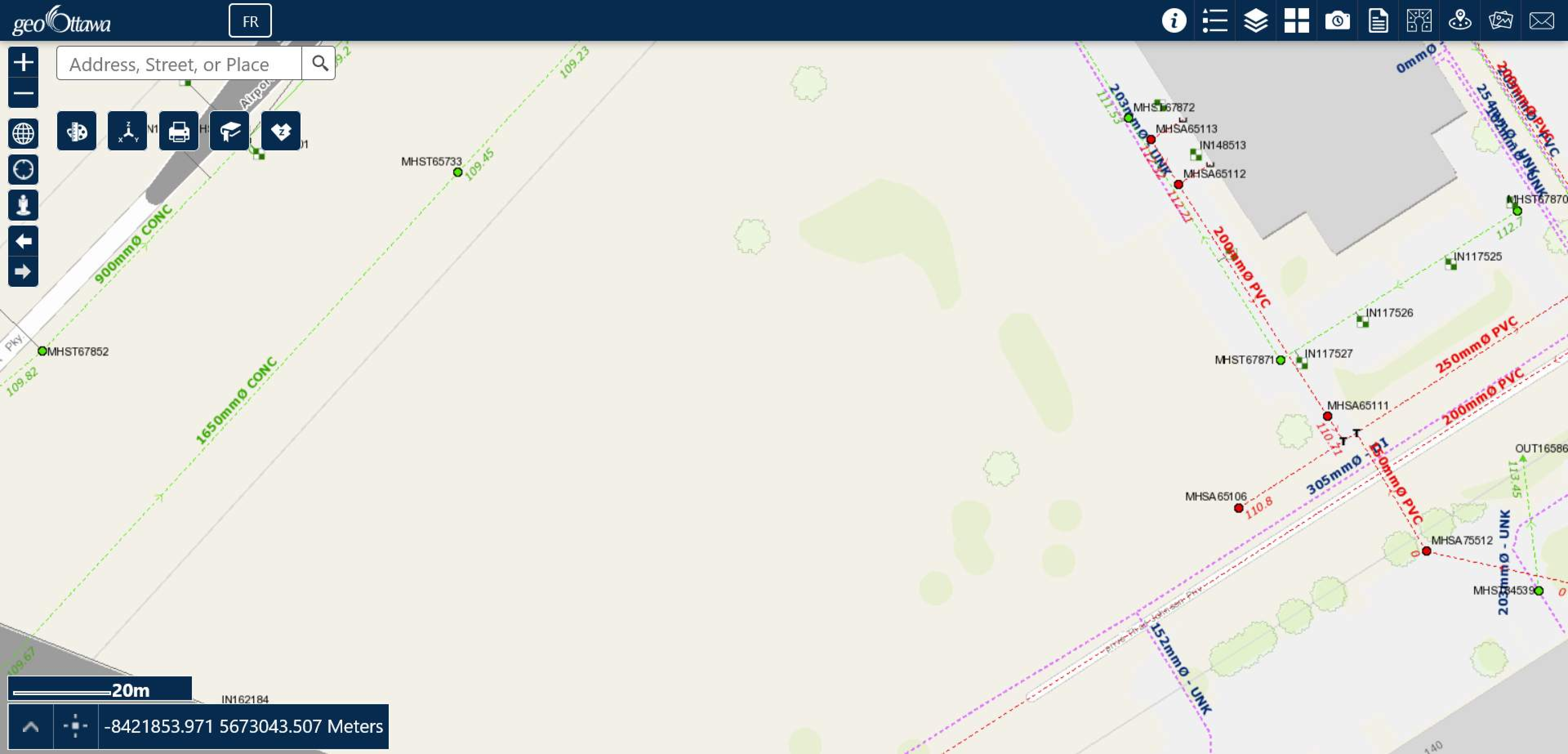
List of Technical Agencies to Consult

☒	Zayo	Utility.Circulations@Zayo.com
☒	Bell Canada	circulations@wsp.com
☒	Telus Communications	telusutilitymarkups@Telecon.ca / jovica.stojanovski@telus.com
☒	Rogers Communications	OPE.Ottawa@rci.rogers.com
☒	Enbridge Gas Distribution	municipalplanning@enbridge.com
☐	O.C. District School Board	planningcirculations@ocdsb.ca
☐	O.C. Catholic School Board	planningcirculations@ocsb.ca
☐	Conseil des écoles publiques	planification@cepeo.on.ca
☐	Conseil des écoles catholiques du Centre-Est	planification@ecolecatholique.ca
☒	Hydro Ottawa (Local Distribution)	ExternalCirculations@HydroOttawa.com
☐	Hydro One Networks (Transmission)	landuseplanning@hydroone.com
☐	Ontario Power Generation	Executivevp.lawanddevelopment@opg.com
☐	Trans Canada Pipeline c/o Lehman & Associates	dpresley@mhbcplan.com
☐	Trans Northern Pipeline Inc.	wwatt@tnpi.com
☐	Railways	Choose an item
☒	National Capital Commission	Ted.Horton@ncc-ccn.ca
☐	Parks Canada	susan.millar@pc.gc.ca
☒	Airport Authority	Ottawa International - delroy.brown@yow.ca
☒	Ministry of Transportation	corridoreast@ontario.ca
☐	Infrastructure Ontario	NoticeReview@infrastructureontario.ca
☐	Propane Operator	Mailing Addresses Only
☒	NAV Canada	landuse@navcanada.ca
☒	Conservation Authority	RVCA – planning@rvca.ca



AIRSIDE ACCESS ROAD
GATE V-19
O-285
GATE GOURMET FACILITY
THAD JOHNSON PRIVATE
PED
CAC CANADA CO.
PUROLATOR
No.140
PARKING
TRUCK DOCK
ASPHALT
O-212
FED.EX.
4-1C 500 MCM
8-100 D
253
254
BRIDGE
1-1/C, #8, 5KV ASLC PLUS 1-#8 INS. GREEN COUNTERPOISE IN 75mm HDPE DIRECTIONALLY DRILLED (CCT 6 (1))
3082P
265
266
4-100 COMM.
4-100 POWER
9092 HEATING OIL TANK
GATE PM-14
O-124
GATE V-14
GATE V-13
GRASS
CONC
FUEL TENDER PARKING
WORLD FUEL
GATE V-21
1-1/C, #8, 5KV ASLC IN 50mm HDPE DIRECT BURIED c/w #8 SDBC COUNTERPOISE
CONNECTE NEW CABLE TO EXISTING TRANSFORMER IN EXISTING PULLPIT
1-1/C, #8, 5KV ASLC PLUS 1-#8 INS. GREEN COUNTERPOISE THROUGH EXISTING 50mm DUCT
1-1/C, #8, 5KV ASLC PLUS 1-#8 INS. GREEN COUNTERPOISE THROUGH EXISTING 50mm DUCT
1-1/C, #8, 5KV ASLC IN 50mm HDPE DIRECT BURIED c/w #8 SDBC COUNTERPOISE (CCT 6(1))
CCT-6
CCT-16
CCT-21
CCT-7


geoOttawa
FR
Address, Street, or Place
prom. Uplands Dr.
prom. Airport Pky.
prom. Airport Pky
40m
-8421853.374 5673051.270 Meters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MHST67852
109.82
900mmØ CONC
1650mmØ CONC
MHST67872
MHSA65113
IN148513
MHSA65112
MHST67870
IN117525
IN117526
MHST67871
IN117527
MHSA65111
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250mmØ PVC
305mmØ
MHSA65106
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OUT16586
MHST84539
152mmØ - UNK
IN162184
20m
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Appendix B

Servicing Plan
(DWG. 23069-S1)

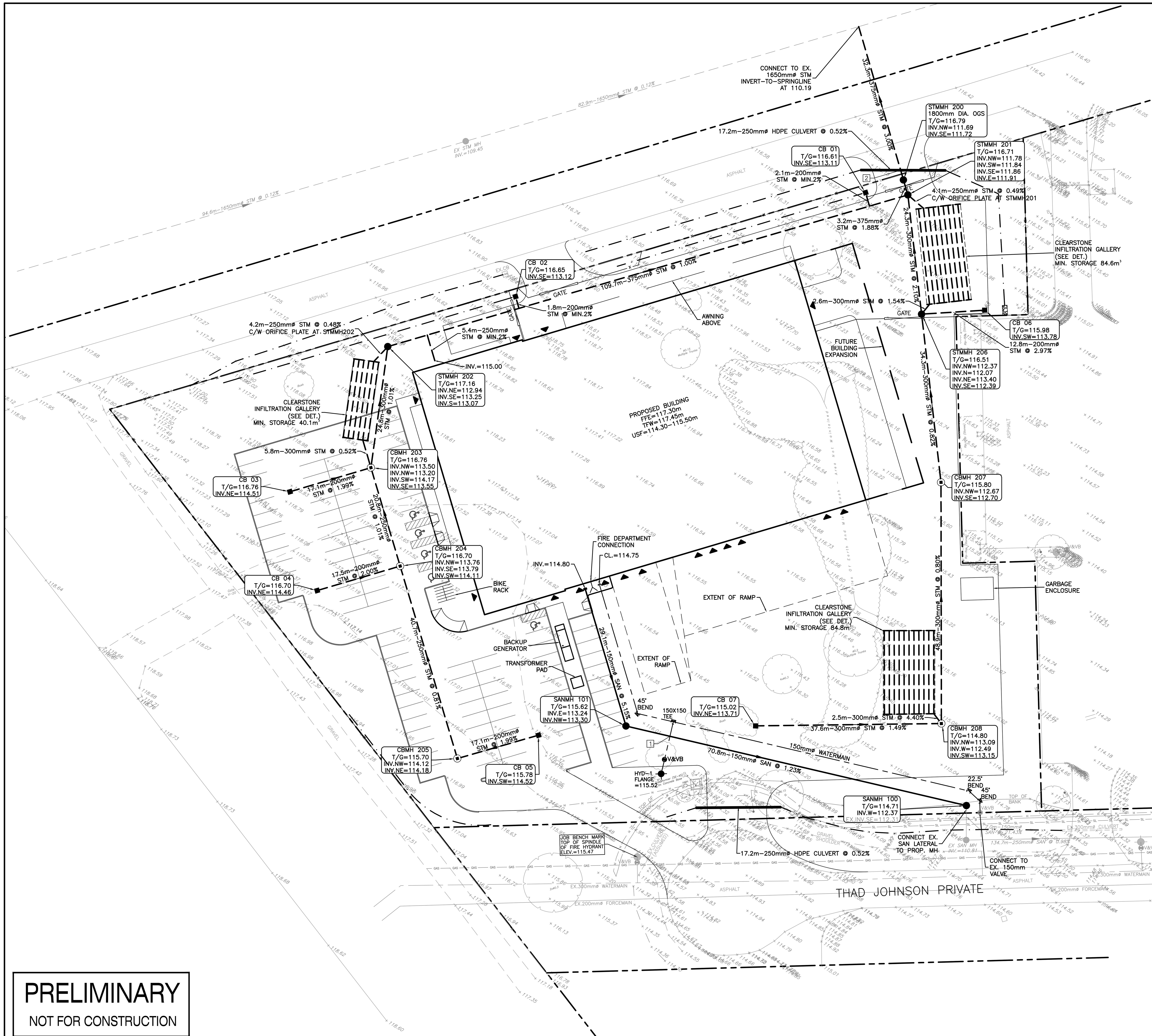
Grading Plan
(DWG. 23069-GR1)

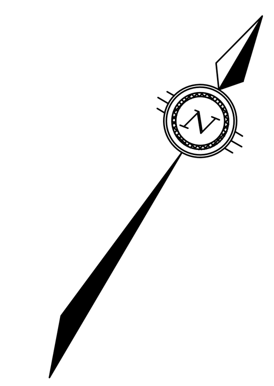
Notes & Details
(DWG. 23069-N1)

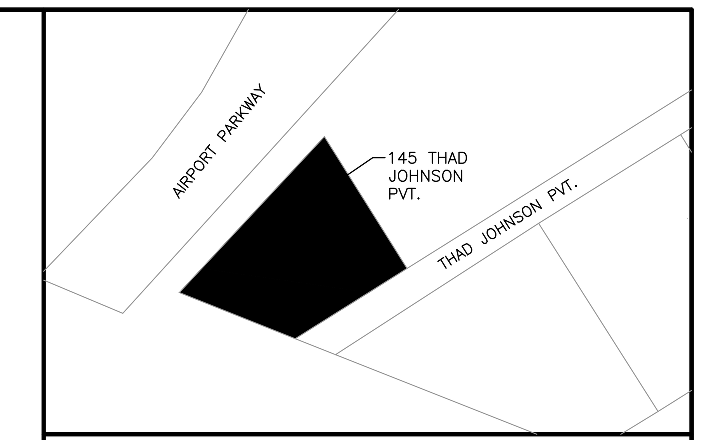
Erosion and Sediment Control Plan
(DWG. 23069-ESC1)

Existing Conditions and Removals Plan
(DWG. 23069-R1)

Storm Drainage Area Plan
(DWG. 23069-STM1)



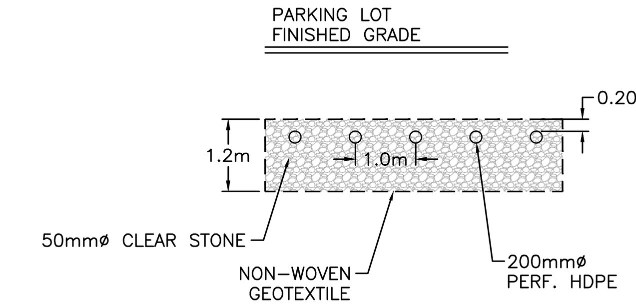




KEY PLAN

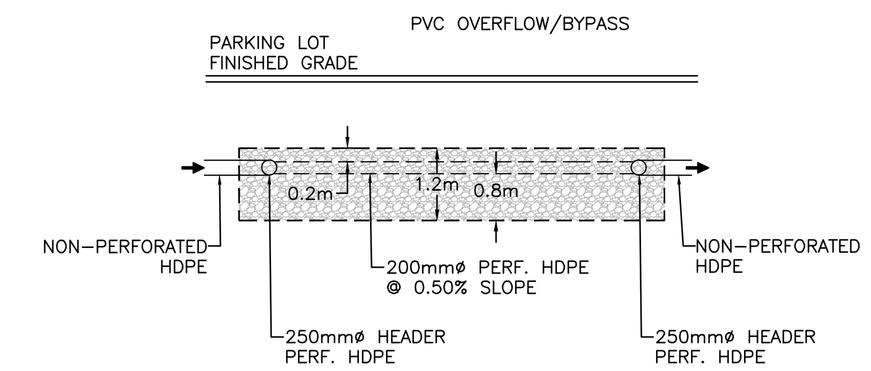
LEGEND

- SITE BOUNDARY
- EXISTING ELEVATION
- EXISTING HYDRANT
- EXISTING VALVE & VALVE BOX
- EXISTING WATERMAIN
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING STORM SEWER & MANHOLE
- EXISTING CATCH BASIN
- EXISTING DITCH CENTRELINE
- EXISTING GAS LINE
- EXISTING BELL LINE
- EXISTING HYDRO LINE
- EXISTING STREETLIGHT LINE
- EXISTING LIGHT STANDARD
- EXISTING FENCE
- EXISTING BOLLARD
- HYDRANT
- VALVE & VALVE BOX
- FIRE DEPARTMENT CONNECTION
- THRUST BLOCK
- WATERMAIN
- SANITARY SEWER & MANHOLE
- STORM SEWER & MANHOLE
- CATCH BASIN
- SWALE
- BUILDING ENTRANCE



INFILTRATION GALLERY TYPICAL SECTION

N.T.S.



INFILTRATION GALLERY TYPICAL SECTION

N.T.S.

INLET CONTROL DEVICE (ICD) TABLE

STRUCTURE	MIN HEAD (m)	MIN FLOW (L/s)	MAX HEAD (m)	MAX FLOW (L/s)	ORIFICE TYPE
CBMH205	1.45	31.5	1.75	34.6	TEMPEST HF B
CBMH204	2.80	43.8	3.10	46.1	TEMPEST HF B
STMMH202	0.41	9.7	3.90	29.8	ORIFICE PLATE 85mm
CBMH203	3.04	15.6	3.34	16.4	TEMPEST LMF–100mm
CB02	3.50	4.3	3.78	4.5	TEMPEST LMF–50mm
CB01	3.40	14.9	3.79	15.8	TEMPEST LMF–95mm
STMMH201	0.21	11.6	2.94	43.3	ORIFICE PLATE 110mm
CBMH208	1.56	40.4	1.86	44.1	TEMPEST HF C
CB07	1.16	103.9	1.27	108.7	ORIFICE PLATE 215mm

UTILITY CROSSING TABLE

CROSSING No.	SERVICE	INVERT/OBVERT	SEPARATION (m)
1	SANITARY	112.98	0.50
	WATER	112.48	
2	CULVERT	116.15	4.55
	STORM	111.60	

PRELIMINARY

NOT FOR CONSTRUCTION

NOTES

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

PROPERTY BOUNDARIES ARE DERIVED FROM TOPOGRAPHIC SURVEY OF PART OF LOT 11 GORE BETWEEN CONCESSIONS 2 & 3 (RIDEAU FRONT), PART OF THE ROAD ALLOWANCE BETWEEN THE GORE BETWEEN CONCESSIONS 2 & 3 (RIDEAU FRONT) AND CONCESSION 3 (RIDEAU FRONT), GEOGRAPHIC TOWNSHIP OF GLOUCESTER, CITY OF OTTAWA. PREPARED BY FAIRHALL, MOFFATT & WOODLAND LTD. ONTARIO LAND SURVEYORS, REF: AD27800. ELEVATIONS ARE REFERRED TO GEODETIC DATUM (CGVD28).

NO.	REVISION DESCRIPTION	DATE	BY
2	REISSUED FOR SITE PLAN	26/02/24	CC
1	ISSUED FOR SITE PLAN	11/01/24	CC

SCALE

0 4m 8m 16m

HORIZONTAL 1:400

Robinson Land Development

350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

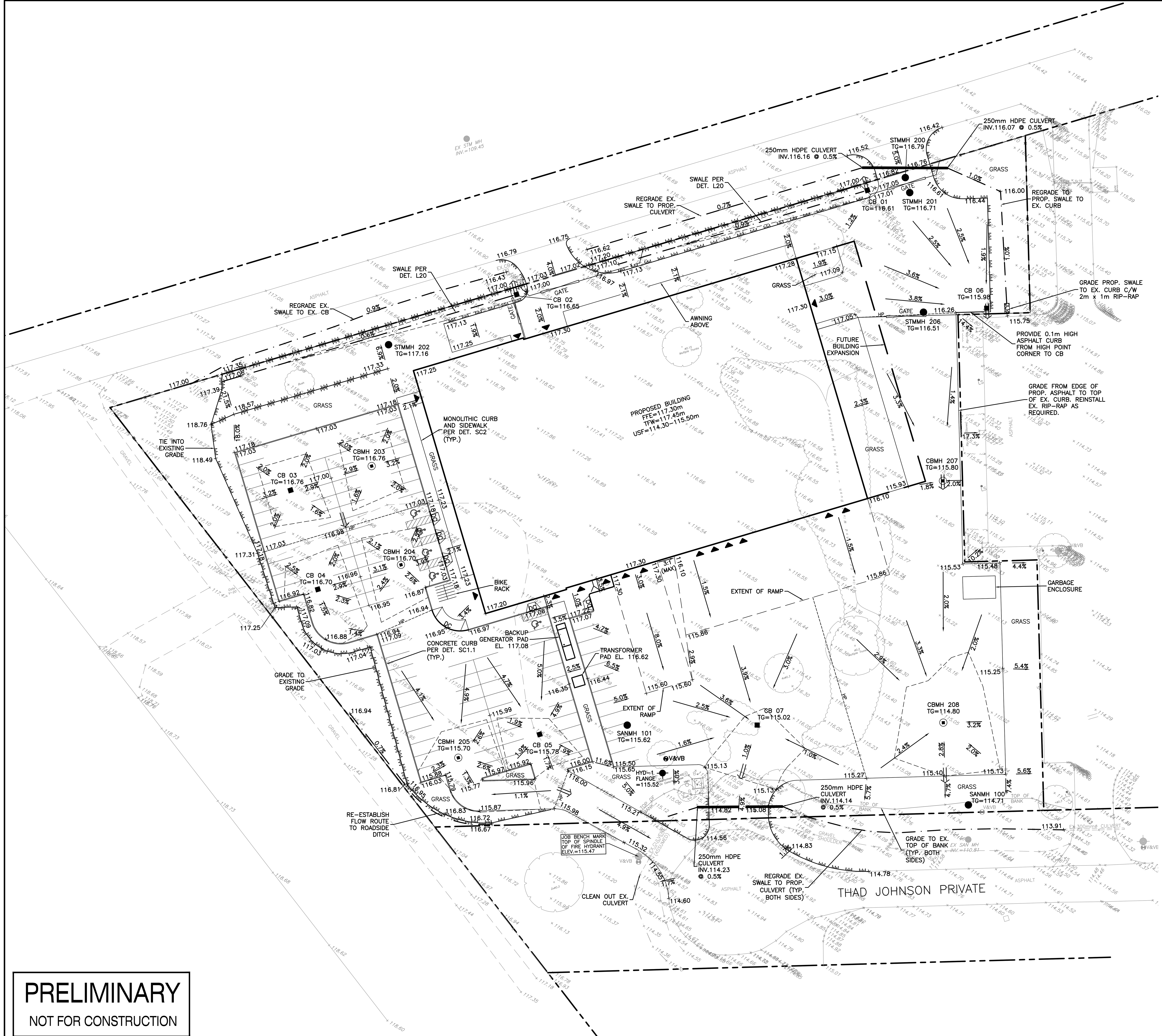
DESIGN	SM
CHECKED	CC
DRAWN	SM
CHECKED	CC
APPROVED	CC

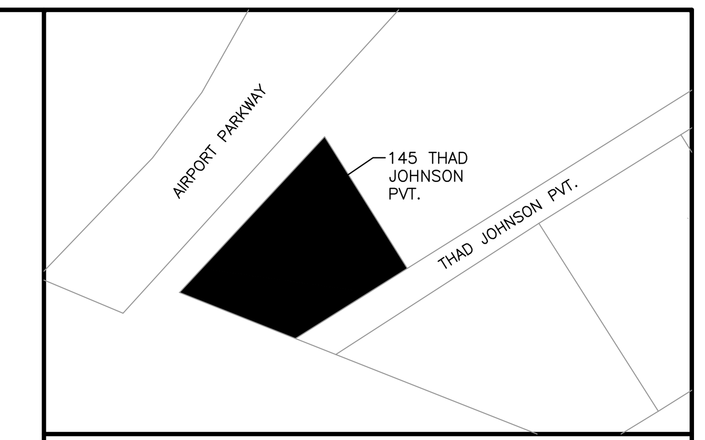
JENNINGS REAL ESTATE

145 THAD JOHNSON PRIVATE
CITY OF OTTAWA

SERVICING PLAN

PROJECT No.	23069
SURVEY	FMW
DATED	FEB 2024
DWG. No:	23069-S1





KEY PLAN

LEGEND

	SITE BOUNDARY
×104.00	EXISTING ELEVATION
	EXISTING HYDRANT
V&VB	EXISING VALVE & VALVE BOX
	EXISTING STORM/SANITARY MANHOLE
	EXISTING CATCH BASIN
	EXISTING DITCH CENTRELINE
LS	EXISTING LIGHT STANDARD
	EXISTING FENCE
	EXISTING BOLLARD
×105.00	PROPOSED GRADE
2.0%	PROPOSED SLOPE
	SWALE
	TERRACING (3H:1V MAX.)
	HYDRANT
V&VB	VALVE & VALVE BOX
	FIRE DEPARTMENT CONNECTION
	STORM/SANITARY MANHOLE (AS NOTED)
	CATCH BASIN
	100-YR PONDING
	MAJOR OVERLAND FLOW PATH
HP	HIGH POINT
	BUILDING ENTRANCE

LIGHT DUTY (WEST PARKING LOT)
- 50mm SUPERPAVE 12.5mm
- 150mm GRANULAR "A"
- 300mm GRANULAR "B" TYPE II

HEAVY DUTY (EAST PARKING LOT AND TRUCK ACCESS LANES)
- 40mm SUPERPAVE 12.5mm
- 50mm SUPERPAVE 19.0mm
- 150mm GRANULAR "A"
- 450mm GRANULAR "B" TYPE II

1. REFER TO GEOTECHNICAL INVESTIGATION PREPARED BY PATERSON GROUP DATED SEPT 2023.
2. SUB-EXCAVATE SOFT AREAS AND BACKFILL WITH GRANULAR 'B' COMPACTED IN MAXIMUM 150mm LIFTS OR AS OTHERWISE DIRECTED.

PAVEMENT STRUCTURE DETAIL
N.T.S.

SURFACE PONDING SUMMARY

STRUCTURE	100-yr STORM	
	PONDING ELEVATION (m)	PONDING DEPTH (m)
CB01	117.00	0.39
CB02	116.99	0.34
CB03	116.92	0.16
CBMH203	116.92	0.16
CB04	116.90	0.20
CBMH204	116.90	0.20
CB05	115.96	0.18
CBMH205	115.96	0.26
CBMH208	115.10	0.30
CBMH209	115.13	0.12

PRELIMINARY
NOT FOR CONSTRUCTION

NOTES
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PROPERTY BOUNDARIES ARE DERIVED FROM TOPOGRAPHIC SURVEY OF PART OF LOT 11 GORE BETWEEN CONCESSIONS 2 & 3 (RIDEAU FRONT), PART OF THE ROAD ALLOWANCE BETWEEN THE GORE BETWEEN CONCESSIONS 2 & 3 (RIDEAU FRONT) AND CONCESSION 3 (RIDEAU FRONT), GEOGRAPHIC TOWNSHIP OF GLOUCESTER, CITY OF OTTAWA. PREPARED BY FAIRHALL, MOFFATT & WOODLAND LTD. ONTARIO LAND SURVEYORS, REF: AD27800. ELEVATIONS ARE REFERRED TO GEODETIC DATUM (CGVD28).

NO.	REVISION DESCRIPTION	DATE	BY
2	REISSUED FOR SITE PLAN	26/02/24	CC
1	ISSUED FOR SITE PLAN	11/01/24	CC

SCALE
0 4m 8m 16m
HORIZONTAL 1:400

Robinson Land Development
350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

DESIGN	SM
CHECKED	CC
DRAWN	SM
CHECKED	CC
APPROVED	CC

JENNINGS REAL ESTATE

145 THAD JOHNSON PRIVATE
CITY OF OTTAWA

GRADING PLAN

PROJECT No.	23069
SURVEY	FMW
DATED	FEB 2024
DWG. No:	23069-GR1

GENERAL NOTES:

1. ALL WORKS AND MATERIALS SHALL CONFORM TO THE LATEST REVISIONS OF THE STANDARDS AND SPECIFICATIONS OF THE CITY OF OTTAWA AND ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS), AS AMENDED BY THE CITY OF OTTAWA.
2. THE CONTRACTOR SHALL CONFIRM THE LOCATION OF ALL EXISTING UTILITIES WITHIN THE SITE AND ADJACENT WORK AREAS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITIES TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OR REPLACEMENT OF ANY SERVICES OR UTILITIES DISTURBED DURING CONSTRUCTION, TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION.
3. ALL DIMENSIONS AND ELEVATIONS 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.
4. DESIGN ELEVATIONS GIVEN ARE TO BE ADHERED TO WITH NO CHANGES WITHOUT PRIOR WRITTEN APPROVAL BY ROBINSON LAND DEVELOPMENT.
5. ALL GROUND SURFACES SHALL BE EVENLY GRADED WITHOUT PONDING AREAS TO PROPOSED GRADES WHERE NOTED, AND EXISTING GRADES OTHERWISE.
6. CONTRACTOR SHALL ADJUST FINAL GRADE OF EXISTING MAINTENANCE HOLES, VALVE BOXES, ETC. AS REQUIRED TO MATCH PROPOSED GRADES.
7. ANY AREAS 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.
8. RELOCATION OF EXISTING SERVICES AND/OR UTILITIES SHALL BE AS SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE ENGINEER AT THE EXPENSE OF THE CONTRACTOR.
9. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE "OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS". THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
10. ALL CONSTRUCTION SIGNAGE MUST CONFORM TO THE M.T.O. MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (LATEST AMENDMENT).
11. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
12. THE SUPPORT OF ALL UTILITIES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
13. THE CONTRACTOR WILL BE RESPONSIBLE FOR ADDITIONAL BEDDING OR ADDITIONAL STRENGTH PIPE IF THE MAXIMUM TRENCH WIDTH, AS SPECIFIED BY OPSD, IS EXCEEDED.
14. ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR. REVIEW WITH THE CITY OF OTTAWA PRIOR TO AND TREE CUTTING.
15. REFER TO GEOTECHNICAL INVESTIGATION PREPARED BY PATERSON GROUP, DATED SEPT 2023.
16. THE CONTRACTOR IS RESPONSIBLE FOR AND SHALL PROVIDE FOR DEWATERING, SUPPORT AND PROTECTION OF EXCAVATIONS AND TRENCHING AS WELL AS RELEASE OF ANY PUMPED GROUNDWATER IN A CONTROLLED AND APPROVED MANNER.
17. DO NOT CONSTRUCT USING DRAWINGS THAT ARE NOT MARKED "ISSUED FOR CONSTRUCTION".
18. CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT FOR CONSTRUCTION PURPOSES.
19. THE CONTRACTOR SHALL BE RESPONSIBLE TO MANAGE EXCESS SOIL IN ACCORDANCE WITH ONTARIO REGULATION 406/19.

STORM SEWERS:

1. ALL REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.2 (LATEST AMENDMENT). ALL NON-REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.1 (LATEST AMENDMENT). PIPE SHALL BE JOINTED WITH STD. RUBBER GASKETS AS PER CSA A257.3 (LATEST AMENDMENT).
3. ALL PVC STORM SEWERS ARE TO BE SDR 35 APPROVED PER C.S.A. B182.2 OR LATEST AMENDMENT, UNLESS OTHERWISE SPECIFIED.
4. ALL STORM SEWER TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. S6 AND S7 CLASS 'B' UNLESS OTHERWISE SPECIFIED. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY PROJECT GEOTECHNICAL ENGINEER.
5. CONNECTION TO EXISTING STORM SEWER SHALL BE DONE WITH APPROVED SETTLEMENT CONTROL JOINT PER OTTAWA STD. S11.
6. STORM MANHOLE FRAME AND COVERS SHALL BE AS PER CITY OF OTTAWA STD. S24.1. CB FRAME AND COVER PER OPSD 400.030
7. STORM SEWER MANHOLES SERVING SEWERS LESS THAN 900mm SHALL BE CONSTRUCTED WITH A 300mm SUMP. FOR STORM SEWERS 900mm AND OVER USE BENCHING IN ACCORDANCE WITH OPSD 701.021.
8. THE STORM SEWER CLASSES HAVE BEEN DESIGNED BASED ON BEDDING CONDITIONS SPECIFIED ABOVE. WHERE THE SPECIFIED TRENCH WIDTH IS EXCEEDED, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE ADDITIONAL BEDDING, A DIFFERENT TYPE OF BEDDING OR A HIGHER PIPE STRENGTH AT HIS OWN EXPENSE AND SHALL ALSO BE RESPONSIBLE FOR EXTRA TEMPORARY AND/OR PERMANENT REPAIRS MADE NECESSARY BY THE WIDENED TRENCH.
9. ALL STORM MANHOLES SHALL BE 1200mm DIAMETER AS PER OPSD 701.010 UNLESS OTHERWISE NOTED.
10. ALL CATCH BASINS SHALL BE 600mm X 600mm AS PER OPSD 705.010 UNLESS OTHERWISE NOTED.
11. CB AND BUILDING SERVICE LATERALS CONNECTING DIRECTLY TO A SEWER SHALL BE RUN AT 2.0% FOR 1m BEFORE VERTICAL BEND TO TIE INTO SEWER.
12. SEWERS WITH LESS THAN 2m COVER SHALL BE INSULATED PER CITY OF OTTAWA STD. S35.
13. HDPE STORM CULVERT TO BE INSTALLED PER OTTAWA STD. S26., MINIMUM 300mm COVER.
14. PROVIDE FROST TAPER TO CULVERT PER OPSD 803.030

SANITARY SEWERS:

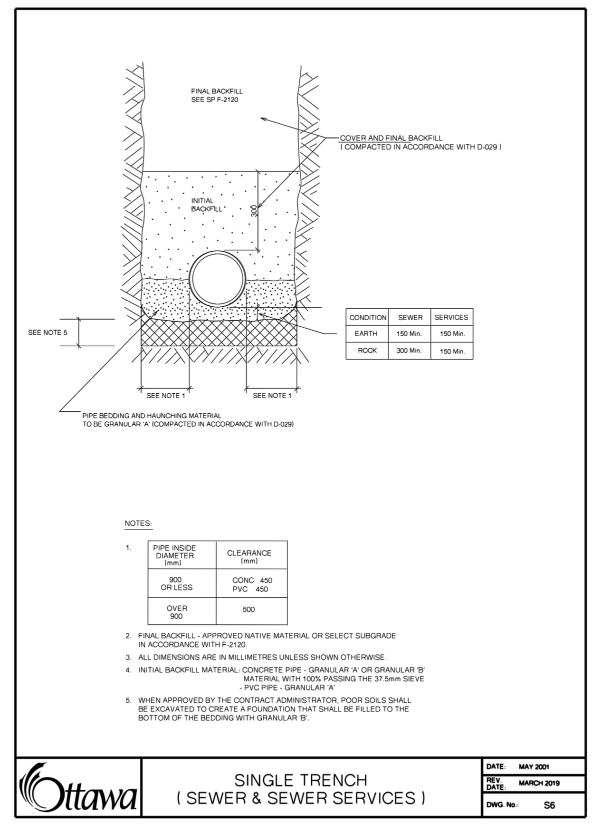
1. ALL SANITARY SEWERS SHALL BE PVC SDR 35, IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS.
2. SANITARY SEWER TRENCH AND BEDDING SHALL BE AS PER CITY OF OTTAWA STD. S6 AND S7, CLASS 'B' BEDDING UNLESS OTHERWISE NOTED.
3. SANITARY MANHOLE FRAME AND COVERS SHALL BE WATERTIGHT AS PER CITY OF OTTAWA STD. S24.
4. SANITARY SEWER MANHOLES SHALL BE BENCHED AS PER OPSD 701.021.
5. SANITARY PRE-CAST MANHOLE SHALL BE CONSTRUCTED WITH A HIGHER PERCENTAGE OF SILICA FUME IN THE CONCRETE TO MAKE IT MORE DENSE AND LESS SUSCEPTIBLE TO CORROSION OR PINHOLE LEAKS.
6. CONTRACTOR SHALL PERFORM LEAKAGE TESTING, IN THE PRESENCE OF THE CONSULTANT, FOR SANITARY SEWERS IN ACCORDANCE WITH OPSS 410 AND OPSS 407. CONTRACTOR SHALL PERFORM VIDEO INSPECTION OF ALL STORM AND SANITARY SEWERS. A COPY OF THE VIDEO AND INSPECTION REPORT SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.
7. SEWERS AND LATERALS WITH LESS THAN 2m COVER SHALL BE INSULATED PER CITY OF OTTAWA STD. S35.

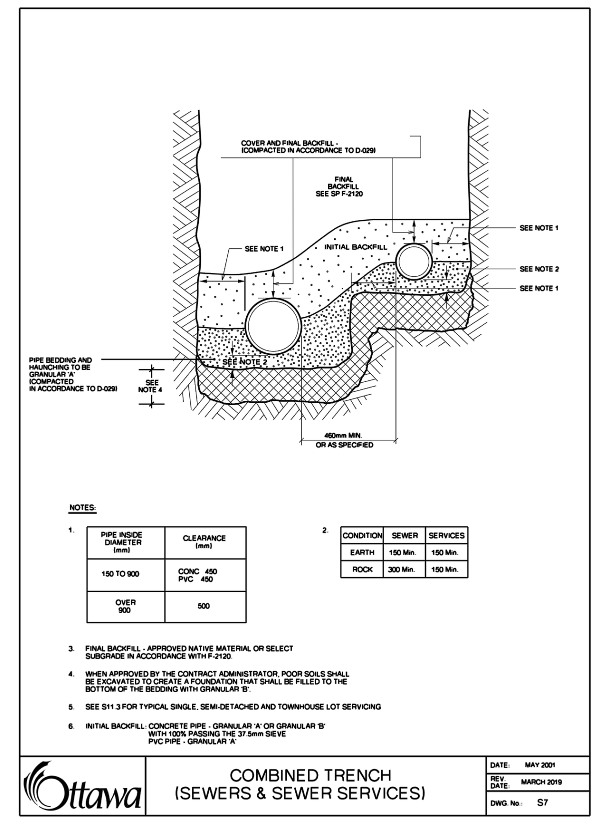
WATER SUPPLY:

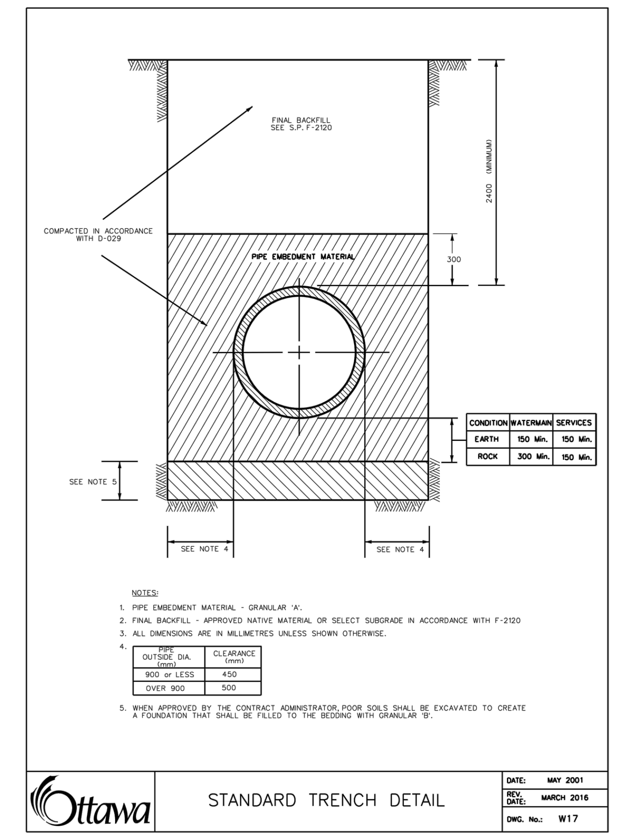
1. ALL PVC WATERMAINS SHALL BE EQUAL TO AWWA C-900 CLASS 150, SDR 18, OR APPROVED EQUAL.
2. WATERMAIN TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD W17, UNLESS OTHERWISE SPECIFIED. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY PROJECT GEOTECHNICAL ENGINEER.
3. ALL PVC WATERMAINS SHALL BE INSTALLED WITH A 10 GAUGE STRANDED COPPER TWU OR RWU TRACER WIRE IN ACCORDANCE WITH CITY OF OTTAWA STD. W36.
4. CATHODIC PROTECTION IS REQUIRED ON ALL METALLIC FITTINGS AS PER CITY OF OTTAWA STD. W40 AND W42.
5. CONTRACTOR TO SUPPLY HYDRANT EXTENSION TO ADJUST THE LENGTH OF HYDRANT BARREL IF REQUIRED.
6. FIRE HYDRANTS SHALL BE INSTALLED AS PER CITY OF OTTAWA STD. W19, AND LOCATED AS PER CITY STD. W18.
7. VALVE IN BOXES SHALL BE INSTALLED AS PER CITY OF OTTAWA STD. W24.
8. THRUST BLOCKING OF WATERMAIN TO BE INSTALLED AS PER CITY OF OTTAWA STD. W25.3 AND W25.4.
9. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY CAPS, PLUGS AND BLOW-OFFS AND NOZZLES REQUIRED FOR TESTING AND DISINFECTION OF THE WATERMAIN.
10. INSULATION FOR WATERMAIN CROSSING OVER AND BELOW SEWER SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. W25.2 AND W25, RESPECTIVELY, WHERE WATERMAIN COVER IS LESS THAN 2.4m.
11. AS PER CITY GUIDELINE, THE MINIMUM VERTICAL CLEARANCE BETWEEN WATERMAIN AND SEWER / UTILITY IS 0.25m FOR CROSSING OVER THE SEWER, AS PER CITY STD. W25.2. FOR CROSSING UNDER SEWER, ADEQUATE STRUCTURAL SUPPORT FOR THE SEWERS IS REQUIRED TO PREVENT EXCESSIVE DEFLECTION OF JOINTS AND SETTLING. THE LENGTH OF WATER PIPE SHALL BE CENTERED AT THE POINT OF CROSSING SO THAT THE JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER AS PER CITY STD. W25.
12. SWABBING, DISINFECTION, AND HYDROSTATIC TESTING TO BE CONDUCTED AS PER CITY OF OTTAWA STANDARDS IN THE PRESENCE OF A CITY INSPECTOR AND/OR CONSULTANT.

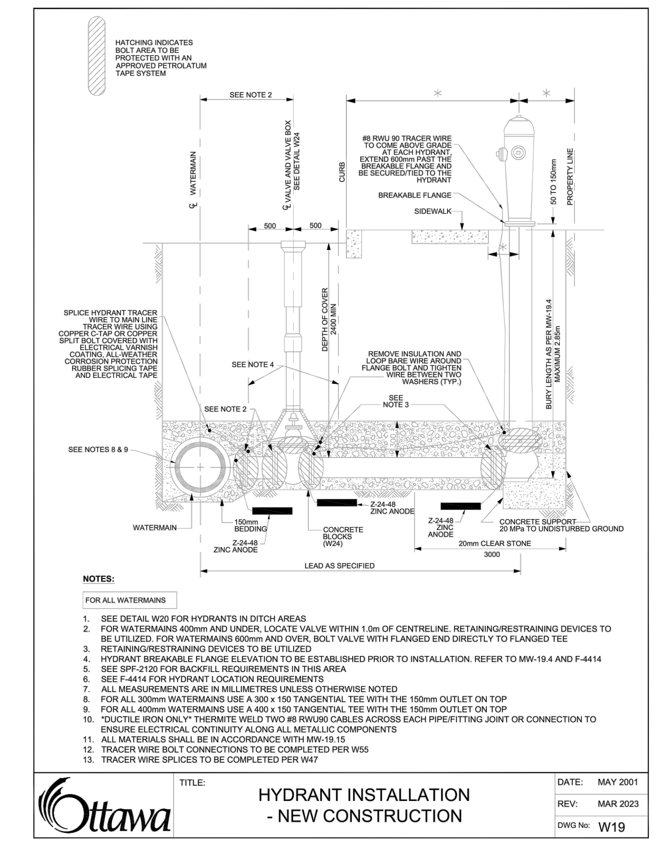
ROADWORK SPECIFICATIONS:

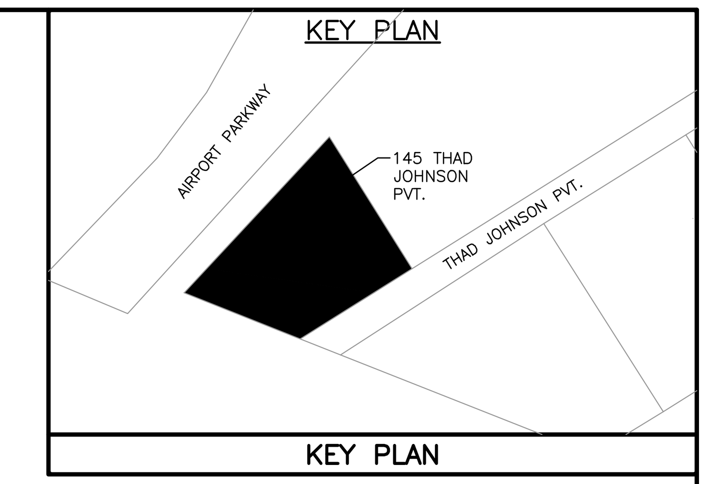
1. CONCRETE CURB SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. SC1.1 (BARRIER CURB). PROVISION SHALL BE MADE FOR CURB DEPRESSIONS AT SIDEWALKS AND DRIVEWAYS.
2. ALL BARRIER CURB TO BE 150mm ABOVE FINISHED ASPHALT GRADE UNLESS OTHERWISE NOTED.
3. MONOLITHIC CURB AND SIDEWALK SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. SC2.
4. GRANULAR "A" SHALL BE PLACED TO A MINIMUM THICKNESS OF 300mm AROUND ALL STRUCTURES WITHIN PAVEMENT AREA.
5. ASPHALT WEAR COURSE SHALL NOT BE PLACED UNTIL THE VIDEO INSPECTION OF SEWERS & NECESSARY REPAIRS HAVE BEEN CARRIED OUT TO THE SATISFACTION OF THE ENGINEER.
6. SUB-EXCAVATE SOFT AREAS AND FILL WITH GRANULAR 'B' COMPACTED IN MAXIMUM 300mm LIFTS.
7. ALL EDGES OF DISTURBED PAVEMENT SHALL BE SAW-CUT TO FORM A NEAT AND STRAIGHT LINE PRIOR TO PLACING NEW ASPHALT.
8. PAVEMENT DESIGN AS PER GEOTECHNICAL RECOMMENDATIONS. SEE REPORT BY PATERSON GROUP, DATED SEPT 2023.

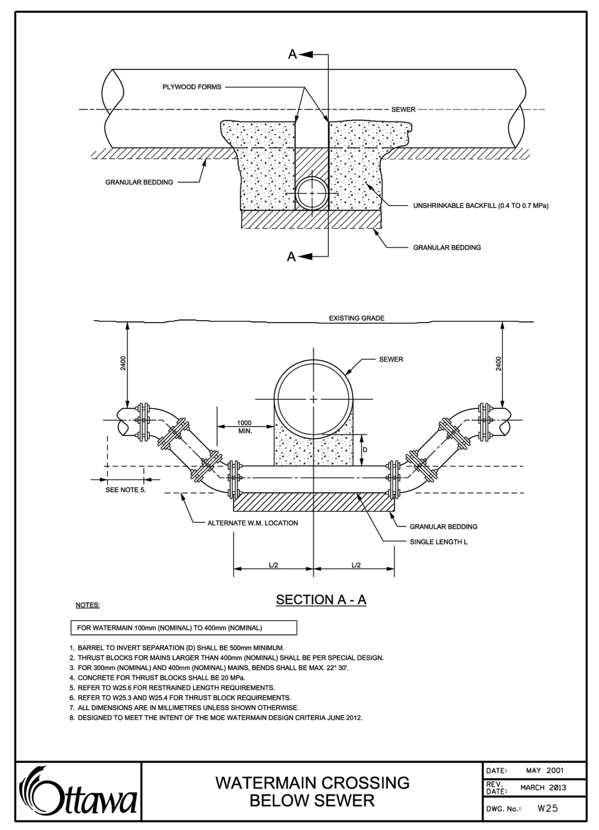


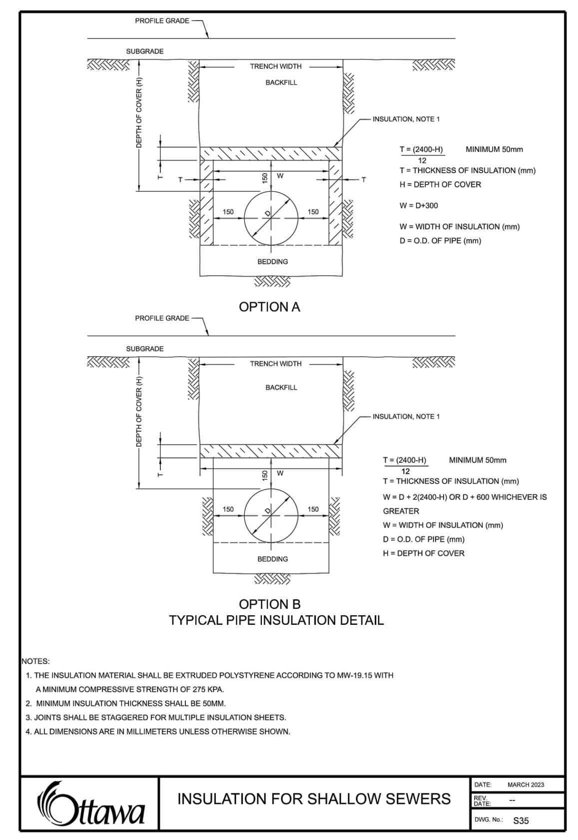


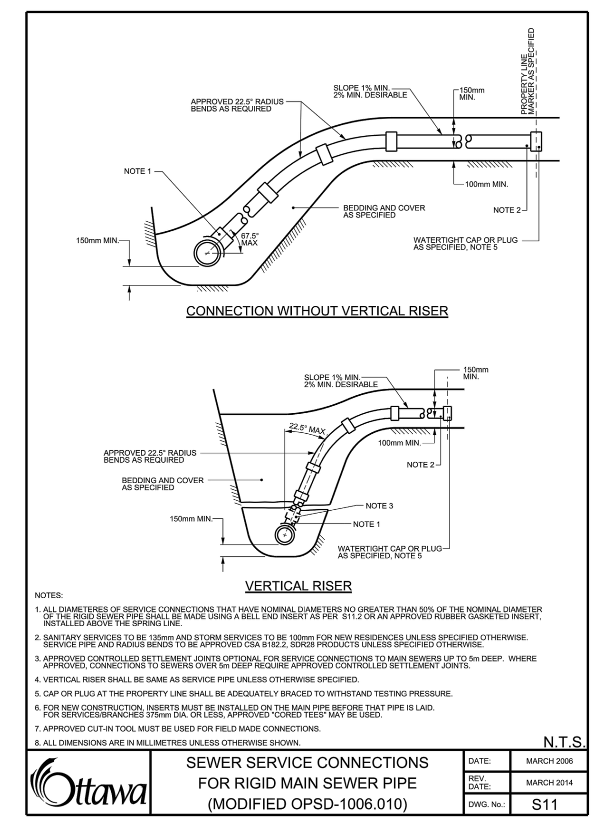


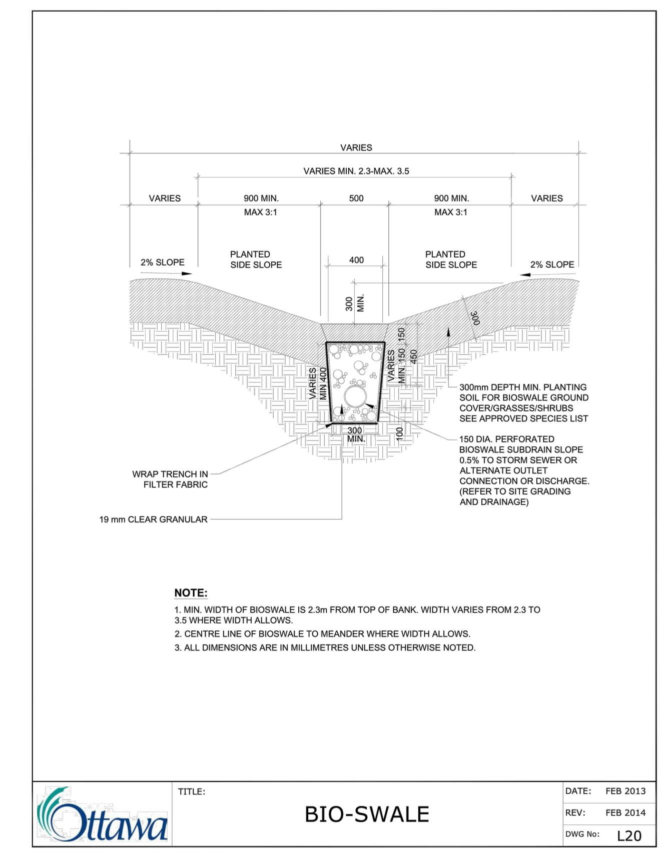


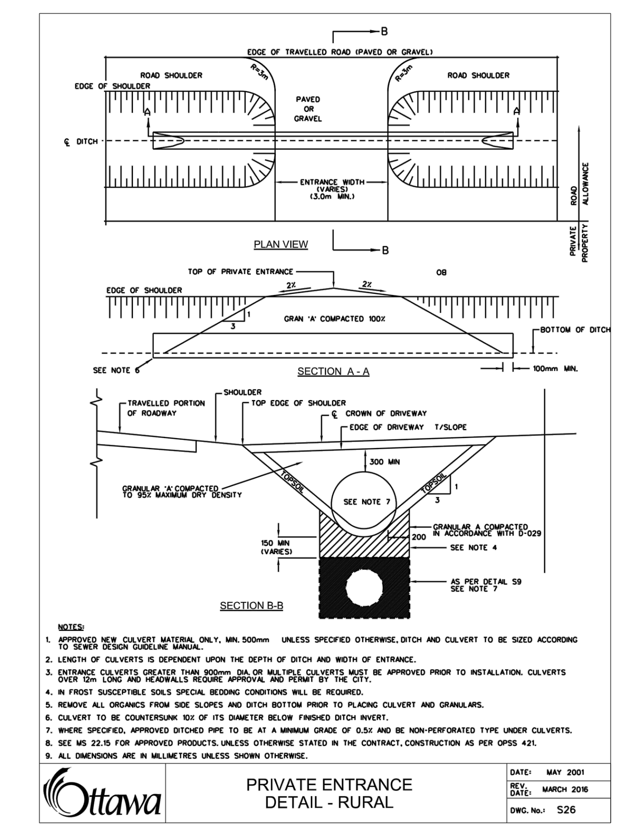


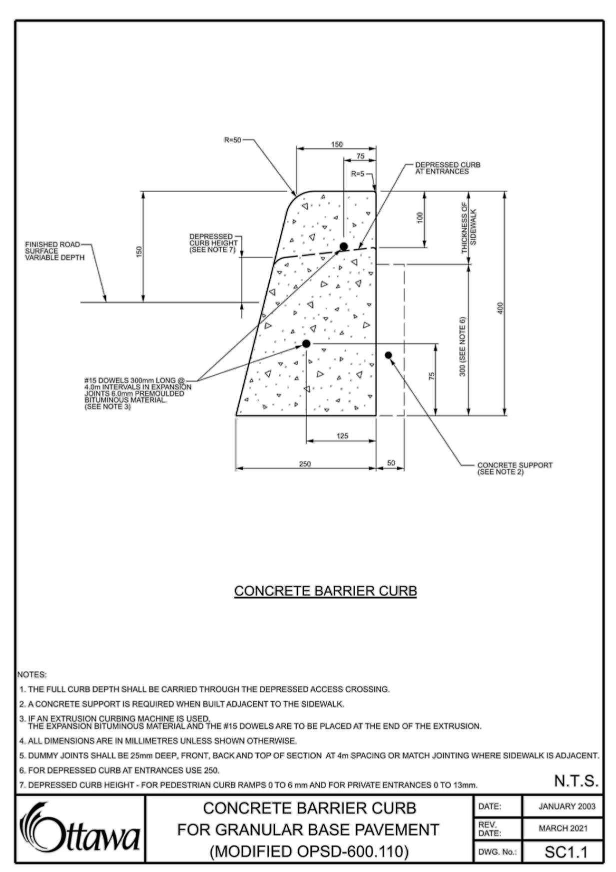


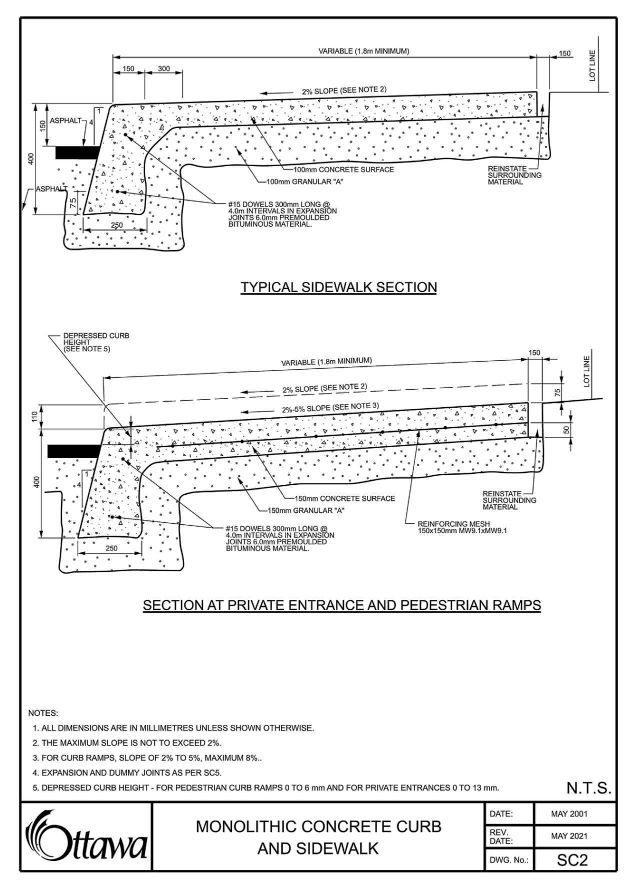












PRELIMINARY

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NOTES

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2	REISSUED FOR SITE PLAN	26/02/24	CC
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SCALE

Robinson Land Development
350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

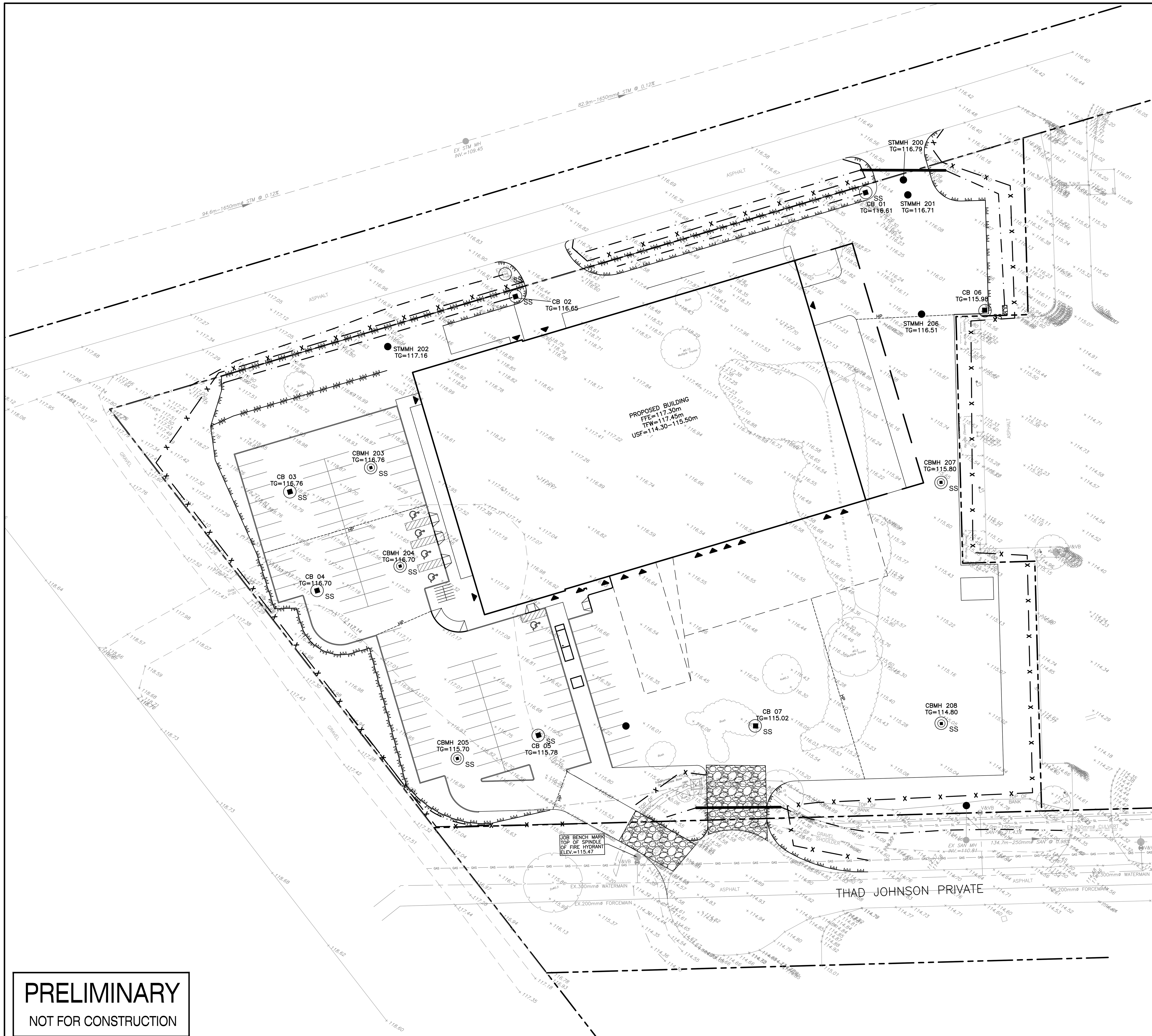
DESIGN	SM
CHECKED	CC
DRAWN	SM
CHECKED	CC
APPROVED	CC

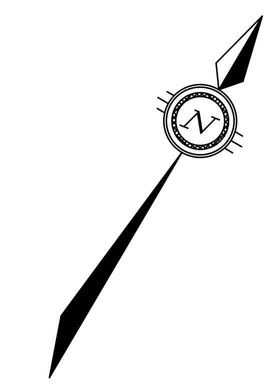
JENNINGS REAL ESTATE

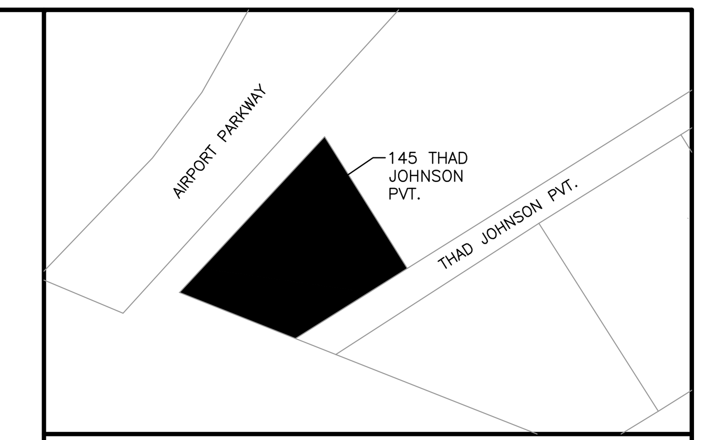
145 THAD JOHNSON PRIVATE
CITY OF OTTAWA

NOTES AND DETAILS PLAN

PROJECT No.	23069
SURVEY	FMW
DATED	FEB 2024
DWG. No:	23069-N1





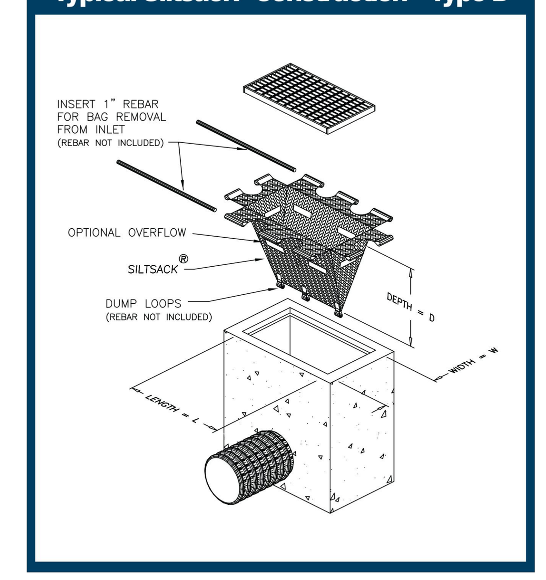


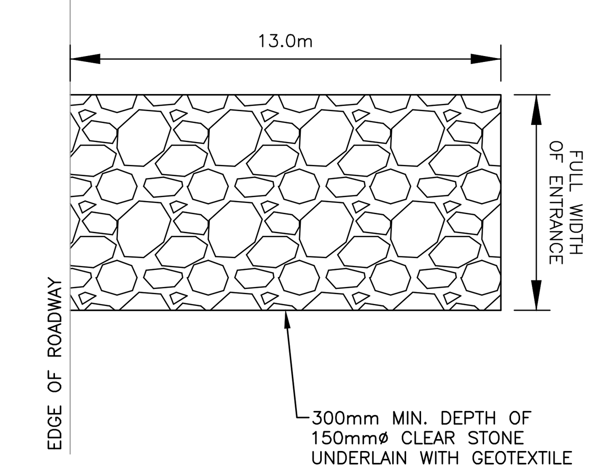
KEY PLAN

LEGEND

- SITE BOUNDARY
- EXISTING ELEVATION
- EXISTING HYDRANT
- EXISTING VALVE & VALVE BOX
- EXISTING WATERMAIN
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING STORM SEWER & MANHOLE
- EXISTING CATCH BASIN
- EXISTING DITCH CENTRELINE
- EXISTING GAS LINE
- EXISTING BELL LINE
- EXISTING HYDRO LINE
- EXISTING STREETLIGHT LINE
- EXISTING LIGHT STANDARD
- EXISTING FENCE
- EXISTING BOLLARD
- STORM SEWER & MANHOLE
- CATCH BASIN
- SWALE
- BUILDING ENTRANCE
- SILT FENCE
- SILT SACK (OR APPROVED EQUIVALENT)

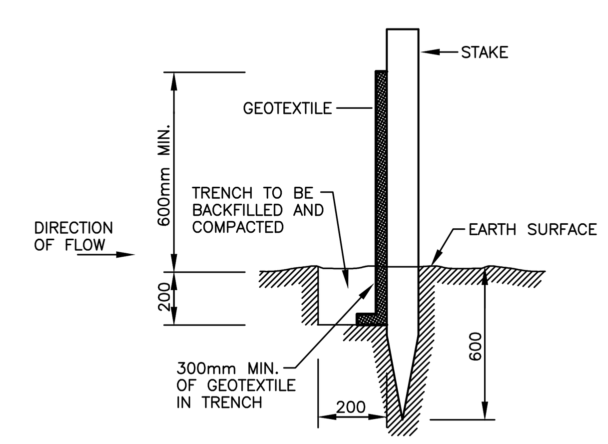
Typical Siltsack® Construction - Type B



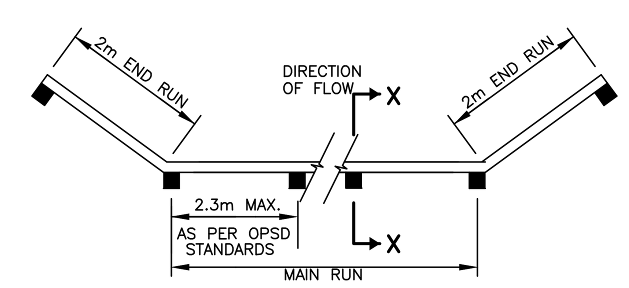


NOTES:
1. MUD MAT TO BE UNDERLAIN WITH A GEOTEXTILE FABRIC.
2. SEDIMENT SHALL BE CLEANED FROM ROADWAYS AS REQUIRED.
3. STORM INLETS IN CLOSE VICINITY TO MUD MAT SHALL BE PROTECTED WITH INLET CONTROL MEASURES.

MUD MAT DETAIL
N.T.S.



SECTION X-X
N.T.S.



SILT FENCE BARRIER DETAIL
N.T.S.

NOTES:
1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE ULTIMATE 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.
2. LIMIT THE EXTENT OF EXPOSED SOILS AT ANY GIVEN TIME.
3. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED UNTIL VEGETATION HAS BEEN RE-ESTABLISHED IN ALL DISTURBED AREAS. RE-VEGETATE DISTURBED AREAS AS SOON AS POSSIBLE.
4. STOCKPILE SOIL AWAY (15 METRES OR GREATER) FROM WATERCOURSES, DRAINAGE FEATURES AND TOP OF STEEP SLOPES.
5. SILT SACKS ARE TO BE PLACED UNDERNEATH THE FRAME AND COVER OF ALL PROPOSED AND EXISTING CATCH BASIN AND OPEN COVER STORM MANHOLES UNTIL CONSTRUCTION IS COMPLETED.
6. A SILT FENCE BARRIER SHALL BE INSTALLED AS PER OPSD 219.110 WHERE INDICATED AND MAINTAINED AS REQUIRED.
7. INSTALL MUD MATS AT ALL CONSTRUCTION ENTRANCES.
8. DURING ACTIVE CONSTRUCTION PERIODS, VISUAL INSPECTIONS SHALL BE UNDERTAKEN ON A WEEKLY BASIS AND AFTER MAJOR STORM EVENTS (>25mm RAIN IN 24 HOUR PERIOD) ON SEDIMENT CONTROL BARRIERS AND ANY DAMAGE REPAIRED IMMEDIATELY.
9. EROSION AND SEDIMENT CONTROL BARRIERS SHALL ALSO BE ASSESSED (AND REPAIRED AS REQUIRED) FOLLOWING SIGNIFICANT SNOWMELT EVENTS.
10. VISUAL INSPECTIONS SHALL ALSO BE UNDERTAKEN IN ANTICIPATION OF LARGE STORM EVENTS (OR A SERIES OF RAINFALL AND/OR SNOWMELT DAYS) THAT COULD POTENTIALLY YIELD SIGNIFICANT RUNOFF VOLUMES.
11. CARE SHALL BE TAKEN TO PREVENT DAMAGE TO EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION OPERATIONS.
12. IN SOME CASES, BARRIERS MAY BE REMOVED TEMPORARILY TO ACCOMMODATE THE CONSTRUCTION OPERATIONS. THE AFFECTED BARRIERS SHALL BE REINSTATED IMMEDIATELY AFTER CONSTRUCTION OPERATIONS ARE COMPLETED.
13. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE ADJUSTED AS REQUIRED AS THE SITE BECOMES DEVELOPED.
14. SEDIMENT CONTROL DEVICES SHALL BE CLEANED OF ACCUMULATED SEDIMENTATION AS REQUIRED AND REPLACED AS NECESSARY.
15. DURING THE COURSE OF CONSTRUCTION, IF THE ENGINEER BELIEVES THAT ADDITIONAL PREVENTION METHODS ARE REQUIRED TO CONTROL EROSION AND SEDIMENTATION, THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL MEASURES, AS REQUIRED, TO THE SATISFACTION OF THE ENGINEER.
16. CONSTRUCTION AND MAINTENANCE REQUIREMENTS FOR EROSION AND SEDIMENT CONTROLS ARE TO COMPLY WITH OPSS 805.

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NOT FOR CONSTRUCTION

NOTES
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NO.	REVISION DESCRIPTION	DATE	BY
2	REISSUED FOR SITE PLAN	26/02/24	CC
1	ISSUED FOR SITE PLAN	11/01/24	CC

SCALE
0 4m 8m 16m
HORIZONTAL 1:400

Robinson Land Development
350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

DESIGN	SM
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DRAWN	SM
CHECKED	CC
APPROVED	CC

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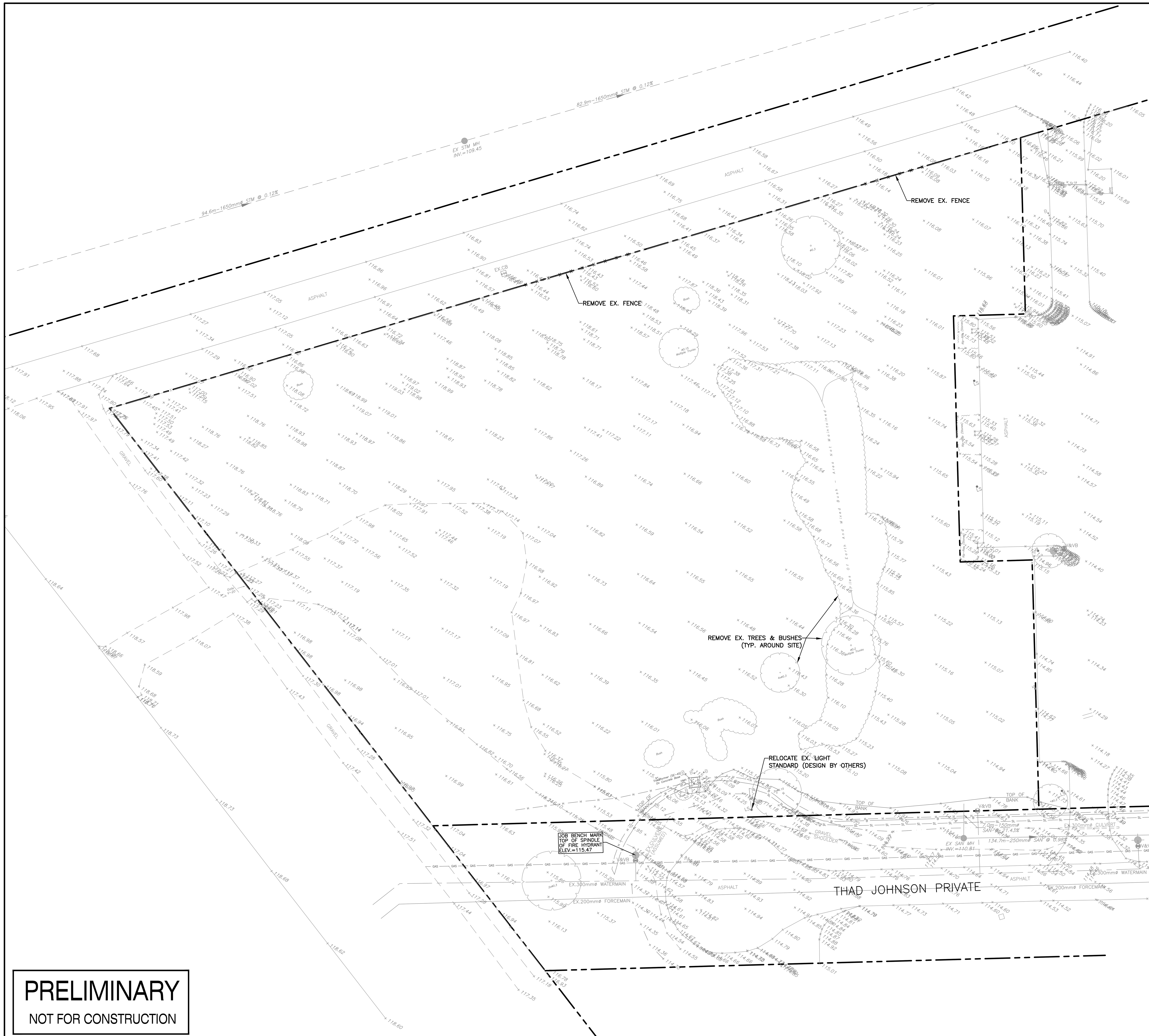
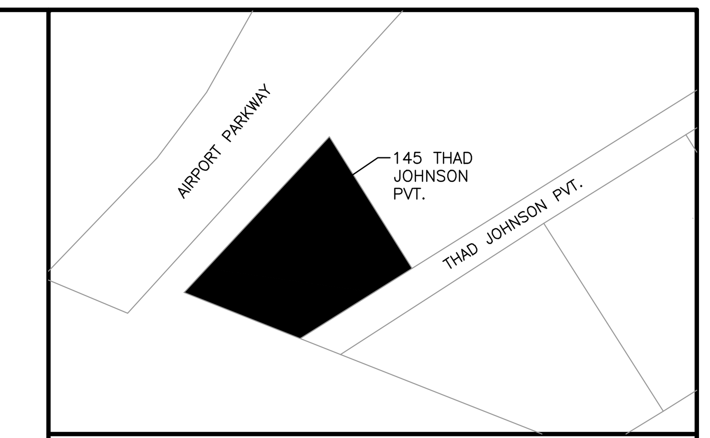
145 THAD JOHNSON PRIVATE
CITY OF OTTAWA

EROSION AND SEDIMENT
CONTROL PLAN

PROJECT No.	23069
SURVEY	FMW
DATED	FEB 2024
DWG. No:	23069-ESC1





KEY PLAN

LEGEND

- SITE BOUNDARY
- EXISTING ELEVATION
- EXISTING HYDRANT
- EXISTING VALVE & VALVE BOX
- EXISTING WATERMAIN
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING STORM SEWER & MANHOLE
- EXISTING CATCH BASIN
- EXISTING DITCH CENTRELINE
- EXISTING GAS LINE
- EXISTING BELL LINE
- EXISTING HYDRO LINE
- EXISTING STREETLIGHT LINE
- EXISTING LIGHT STANDARD
- EXISTING FENCE
- EXISTING BOLLARD

PRELIMINARY
NOT FOR CONSTRUCTION

NOTES

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2	REISSUED FOR SITE PLAN	26/02/24	CC
1	ISSUED FOR SITE PLAN	11/01/24	CC

SCALE
0 4m 8m 16m
HORIZONTAL 1:400

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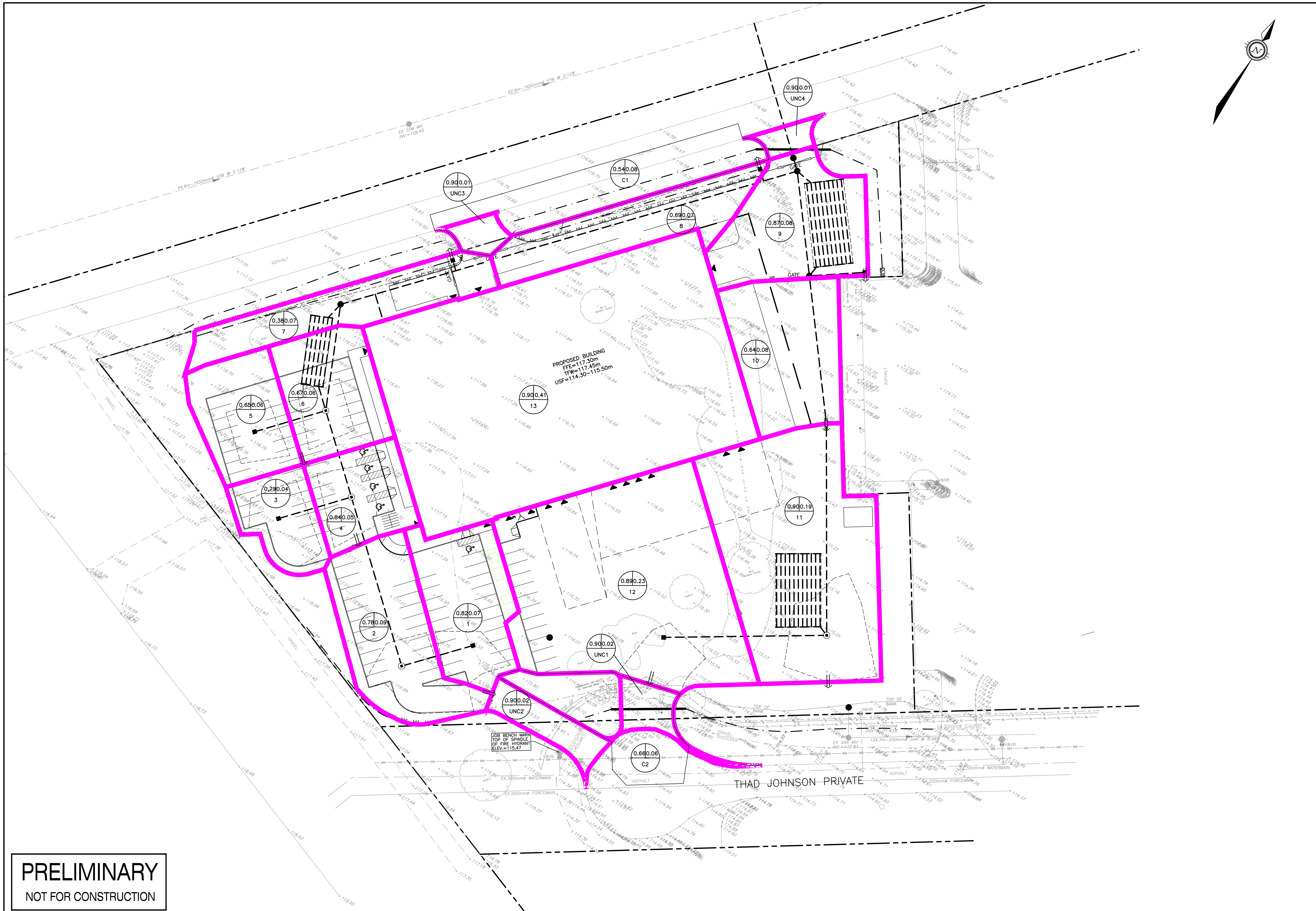
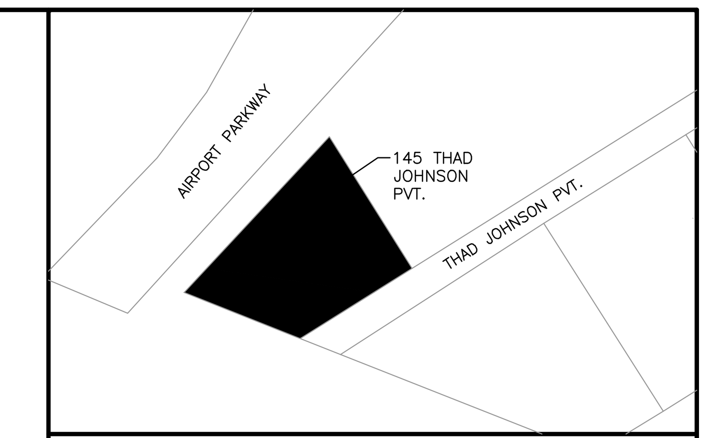
145 THAD JOHNSON PRIVATE
CITY OF OTTAWA

EXISTING CONDITIONS AND REMOVALS PLAN

PROJECT No.	23069
SURVEY	FMW
DATED	FEB 2024
DWG. No:	23069-R1





KEY PLAN

LEGEND

- SITE BOUNDARY
- EXISTING ELEVATION
- EXISTING HYDRANT
- EXISTING VALVE & VALVE BOX
- EXISTING WATERMAIN
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING STORM SEWER & MANHOLE
- EXISTING CATCH BASIN
- EXISTING DITCH CENTRELINE
- EXISTING GAS LINE
- EXISTING BELL LINE
- EXISTING HYDRO LINE
- EXISTING STREETLIGHT LINE
- EXISTING LIGHT STANDARD
- EXISTING FENCE
- EXISTING BOLLARD
- CATCH BASIN
- STORM SEWER & MANHOLE
- STORM DRAINAGE AREA BOUNDARY
- STORM DRAINAGE AREA BOUNDARY (CULVERT)
- MAJOR OVERLAND FLOW ROUTE
- 100-YEAR PONDING LIMIT

RUNOFF COEFFICIENT — 0.50 | 0.28 — AREA (ha) — STM1 — DRAINAGE AREA ID

PRELIMINARY
NOT FOR CONSTRUCTION

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1	ISSUED FOR SITE PLAN	11/01/24	CC

SCALE: 0 4m 8m 16m HORIZONTAL 1:400

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JENNINGS REAL ESTATE

145 THAD JOHNSON PRIVATE
CITY OF OTTAWA

STORM AREA DRAINAGE PLAN

PROJECT No.	23069
SURVEY	FMW
DATED	FEB 2024
DWG. No:	23069-STM1

Appendix C

Water Demand Calculations

Fire Demand Calculations

Boundary Conditions

Excerpts from Master Servicing & Transportation Study (Delcan, 2011)

WATERMAIN DESIGN SHEET

145 Thad Johnson Pvt., City of Ottawa
Project No. 23069

Robinson Consultants

Junction Node Number	RESIDENTIAL POPULATION ACTUAL COUNT				NON-RES			AVG. DAILY DEMAND (L/s)					MAX. DAILY DEMAND (L/s)					PEAK HOURLY DEMAND (L/s)				
	Low Density	Medium Density	High Density	Total Population	IND. (ha)	COMM. (ha)	INST. (ha)	RES.	IND.	COMM.	INST.	TOTAL	RES.	IND.	COMM.	INST.	TOTAL	RES.	IND.	COMM.	INST.	TOTAL
BLDG					1.73				0.70			0.70		1.05			1.05		1.89			1.89
Total					**1.73**							**0.70**					**1.05**					**1.89**

Residential Densities

Low Density (SFH's) =	3.4	cap/unit
Medium Density (Townhouses) =	2.7	cap/unit
High Density (Apartments) =	1.8	cap/unit

Avg. Daily Demand:			Max. Daily Demand:		Max. Hourly Demand:	
Residential =	280	L/cap/day	2.5	x Avg. Day	2.2	x Max. Day
Industrial (Light) =	35000	L/ha/day	1.5	x Avg. Day	1.8	x Max. Day
Commercial =	28000	L/ha/day	1.5	x Avg. Day	1.8	x Max. Day
Institutional =	28000	L/ha/day	1.5	x Avg. Day	1.8	x Max. Day

Project Name:	145 Thad Johnson Pvt.
Project Location:	Ottawa ON
Project No:	23069
Date:	20-Feb-24
Building Type:	Commercial
Building Being Considered:	BLDG

Robinson Land Development

Calculations for Total Required Fire Flow

Step	Parameter				Value	
A	**Type of Construction**	**Options**	**C**	Non-Combustible Construction (Type II)	0.8	
		Wood Frame (Type V)	1.5			
		Ordinary Construction (Type III)	1.0			
		Non-Combustible Construction (Type II)	0.8			
		Fire Resistive Construction (Type I)	0.6			
B	Ground Floor Area				5244.0	m^2
	Total Effective Floor Area				**5,244.0**	**m^2**
C	**Fire Flow**				**13,000**	**L/min**
D	**Occupancy Class**	**Options**	**Charge**	Free burning	0.15	
		Non-combustible	-0.25			
		Limited Combustible	-0.15			
		Combustible	0.00			
		Free burning	0.15			
		Rapid Burning	0.25			
	Occupancy Adjustment				**1950**	**L/min**
	Fire Flow				**14,950**	**L/min**
E	**Sprinkler Protection**	**Options**	**Charge**			
		Automatic Sprinkler Protection	-0.30	Automatic Sprinkler Protection	-0.30	
		None	0.00			
		Water Supply is Standard for System and Hose Lines	-0.10	Yes	-0.10	
		Full Supervision of the Sprinker System	-0.10	Yes	-0.10	
	Sprinkler Reduction				**-7,475**	**L/min**
F	**Exposures**					
	West Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				46	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				92	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings			
		Wood Frame				
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				
		Noncombustible or Fire Resistive without Unprotected Openings				
	Separation Distance			**>30m; No Exposure**	100	m
	West Side Exposure Charge				**0.00**	
	North Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				4.7	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				9.4	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings			
		Wood Frame				
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				
		Noncombustible or Fire Resistive without Unprotected Openings				
	Separation Distance			**>30m; No Exposure**	100	m
	North Side Exposure Charge				**0.00**	
	East Side					

Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
Exposed Building Fully Protected with Automatic Sprinker Systems			No	
Exposed Wall Length			10	m
Exposed Wall No. of Storeys			2	
Length-Height Factor of Exposed Wall			20	m.storeys
Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
	Wood Frame			
	Ordinary with Unprotected Openings			
	Ordinary without Unprotected Openings			
	Noncombustible or Fire Resistive with Unprotected Openings			
	Noncombustible or Fire Resistive without Unprotected Openings			
Separation Distance		**>30m; No Exposure**	44	m
East Side Exposure Charge			**0.00**	
South Side				
Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
Exposed Building Fully Protected with Automatic Sprinker Systems			No	
Exposed Wall Length			62.5	m
Exposed Wall No. of Storeys			2	
Length-Height Factor of Exposed Wall			125	m.storeys
Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
	Wood Frame			
	Ordinary with Unprotected Openings			
	Ordinary without Unprotected Openings			
	Noncombustible or Fire Resistive with Unprotected Openings			
	Noncombustible or Fire Resistive without Unprotected Openings			
Separation Distance		**>30m; No Exposure**	100	m
South Side Exposure Charge			**0.00**	
Total Exposure Charage			**0**	**< 0.75**
Increase for Exposures			**0**	**L/min**

G	**Total Required Fire Flow**	**7,000**	**L/min**

Notes:

1. Fire flow calculations have been prepared in accordance with Fire Underwriters Survey (v. 2020)

2. Floor areas used in Step B based on 1,182 m2 two-storey office space and 2,880 m2 warehouse space

3. Where buildings are at a diagonal to each other, the shortest separtion distance is increased by 3 metres and used as the exposure distance (Ref. FUS v.2020 pg.30).

Stephen McCaughey

From:	Adams, Reed <reed.adams@ottawa.ca>
Sent:	February 16, 2024 1:40 PM
To:	Stephen McCaughey
Subject:	RE: 145 Thad Johnson Pvt - Boundary Conditions Request
Attachments:	145 Thad Johnson Private REVISED February 2024.pdf
Follow Up Flag:	Follow up
Flag Status:	Flagged

"CAUTION: External Sender"

Hi Stephen,

Like clockwork, as soon as I send them an email, they give me the BCs:

The following are boundary conditions, HGL, for hydraulic analysis at 145 Thad Johnson Private (zone 2W2C, future SUC) connected to the publicly owned 610 mm watermain off Albion Road (see attached PDF for location).

Existing Conditions:
Minimum HGL: 148.0 m
Maximum HGL: 155.0 m
MAXDY + FF (116.67 L/s): 139.2 m

Future Conditions (SUC pressure zone reconfiguration) :
Minimum HGL: 146.7 m
Maximum HGL: 147.2 m
MAXDY + FF (116.67 L/s): 146.7 m

These are for current conditions and are based on computer model simulation.

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

For your question on the private approach by-law, it doesn't apply here because it is indeed on private land and Thad Johnson is not the City ROW.

Thanks and you too!

Reed

From: Stephen McCaughey <smccaughey@rcii.com>
Sent: February 16, 2024 10:54 AM

To: Adams, Reed <reed.adams@ottawa.ca>
Subject: RE: 145 Thad Johnson Pvt - Boundary Conditions Request

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Hi Reed,

Just touching base if there are any updates to the updated boundary request.

I also got the full City comments back from SPA and I had one question I wanted to clarify: under Planning Comments (and I know you made the comment as well) it references the Private Approach By-Law regarding the access driveways. Since, as I understand, Thad Johnson Pvt. is a private road of the Airport's, does the By-Law even apply?

From a grading perspective, because the site is so high from the north side to the south we need to have the steeper driveways (max 5%)

Thanks very much, and have a good long weekend,

RCI Robinson Consultants

Stephen McCaughey, P.Eng.| Project Engineer
210-350 Palladium Drive, Ottawa ON, K2V 1A8
O: 613-592-6060 x160 | smccaughey@rcii.com | www.rcii.com

From: Adams, Reed <reed.adams@ottawa.ca>
Sent: Thursday, February 1, 2024 12:06 PM
To: Stephen McCaughey <smccaughey@rcii.com>
Subject: RE: 145 Thad Johnson Pvt - Boundary Conditions Request

"CAUTION: External Sender"
Hi Stephen,

Sounds good, I forwarded your request over to our water group and I'll let you know when I hear back.

Thanks,

Reed

From: Stephen McCaughey <smccaughey@rcii.com>
Sent: February 01, 2024 10:24 AM
To: Adams, Reed <reed.adams@ottawa.ca>
Subject: RE: 145 Thad Johnson Pvt - Boundary Conditions Request

Hi Reed,

I just wanted to follow up with respect to the fire demand and boundary conditions. The building consists of a 2-storey office space and a high 1-storey warehouse space for the moving of cargo. Previously I just treated the entire building as a 2-storey building as a conservative estimate. Since then, I want to reassess a more reasonable fire demand per FUS and don't think the warehouse space should be treated as 1-storey. After consulting the architect and owner and confirmed that the warehouse is going to be in constant flux with cargo coming in and out daily, there won't be provisions made to have high stacking racks or the need for them. Therefore, I've reassessed the fire demand with the 2-storey office space and 1-storey warehouse space to get a new fire demand of 7,000 L/min.

So, I wanted to request new boundary conditions for 145 Thad Johnson Pvt. based on the adjusted fire demand. Domestic demands have remained the same:

Max Day + Fire (7,000 L/min): 117.72 L/s

Thanks very much

Robinson Consultants

Stephen McCaughey, P.Eng.| Project Engineer
210-350 Palladium Drive, Ottawa ON, K2V 1A8
O: 613-592-6060 x160 | smccaughey@rcii.com | www.rcii.com

From: Adams, Reed <reed.adams@ottawa.ca>
Sent: Thursday, January 4, 2024 10:25 AM
To: Stephen McCaughey <smccaughey@rcii.com>
Subject: RE: 145 Thad Johnson Pvt - Boundary Conditions Request

Hi Stephen,

The earliest that the change to the SUC pressure zone will occur is early 2026 and yes, 146.7m for MAXDY + FF for the future SUC configuration is correct.

Thanks,

Reed

From: Stephen McCaughey <smccaughey@rcii.com>
Sent: January 03, 2024 3:43 PM
To: Adams, Reed <reed.adams@ottawa.ca>
Subject: RE: 145 Thad Johnson Pvt - Boundary Conditions Request

Hi Reed,

To clarify about the future SUC pressure zone reconfiguration, when is that expected to switchover? And that 146.7 m MAXDY+FF under SUC is correct?

Robinson Consultants

Stephen McCaughey, P.Eng. | Project Engineer
210-350 Palladium Drive, Ottawa ON, K2V 1A8
O: 613-592-6060 x160 | smccaughey@rcii.com | www.rcii.com

From: Adams, Reed <reed.adams@ottawa.ca>
Sent: Tuesday, January 2, 2024 10:08 AM
To: Stephen McCaughey <smccaughey@rcii.com>
Subject: RE: 145 Thad Johnson Pvt - Boundary Conditions Request

Hi Stephen,

Happy New Year!

The following are boundary conditions, HGL, for hydraulic analysis at 145 Thad Johnson Private (zone 2W2C, future SUC) assumed to be connected to the publicly owned 610 mm watermain off Albion Road (see attached PDF for location).

Existing Conditions:
Minimum HGL: 148.0 m
Maximum HGL: 155.0 m
MAXDY + FF (150 L/s): 130 m

Future Conditions (SUC pressure zone reconfiguration) :
Minimum HGL: 146.7 m
Maximum HGL: 147.2 m
MAXDY + FF (150 L/s): 146.7 m

These are for current conditions and are based on computer model simulation.

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

As for the 1650mm storm, I unfortunately don't have any other information on it since it's a private sewer. I also don't know who the owner is (besides maybe the airport itself), but make sure that you get the go-ahead from whoever the owner is to connect to the pipe.

Thanks,

Reed

From: Stephen McCaughey <smccaughey@rcii.com>
Sent: December 20, 2023 4:31 PM
To: Adams, Reed <reed.adams@ottawa.ca>
Subject: RE: 145 Thad Johnson Pvt - Boundary Conditions Request

Hi Reed,

Hope all's well just before the Holidays. I'm just following up on our boundary conditions request sent a couple weeks ago if you know when we can expect information back.

I also wanted to confirm from the Preconsultation meeting regarding the storm sewer outlet. As discussed in the meeting we're intending to outlet to the 1650mm storm sewer north of the site, the adjacent site at 139 Thad Johnson we know ties into that sewer. Based on the pre-consultation notes, and the Sawmill Creek Subwatershed Study, we know we are controlling the site from post- to pre-development peak flow rates. We just wanted to confirm if you had any additional information related to the 1650mm sewer and its designed drainage areas, if it had anticipated our site connecting.

Much appreciated,

Robinson Consultants
Stephen McCaughey, P.Eng.| Project Engineer
210-350 Palladium Drive, Ottawa ON, K2V 1A8
O: 613-592-6060 x160 | smccaughey@rcii.com | www.rcii.com

From: Stephen McCaughey
Sent: Friday, December 1, 2023 9:26 AM

To: Adams, Reed <reed.adams@ottawa.ca>
Subject: RE: 145 Thad Johnson Pvt - Boundary Conditions Request

Much appreciated Reed!

Have a good weekend,

Robinson Consultants Inc.

Stephen McCaughey, P.Eng. | Project Engineer – Land Development
210-350 Palladium Drive, Ottawa ON, K2V 1A8
O: 613-592-6060 x160 | smccaughey@rcii.com | www.rcii.com

From: Adams, Reed <reed.adams@ottawa.ca>
Sent: Friday, December 1, 2023 9:25 AM
To: Stephen McCaughey <smccaughey@rcii.com>
Subject: RE: 145 Thad Johnson Pvt - Boundary Conditions Request

Hi Stephen,

I just forwarded your request to our water group. I'll let you know when they get back to me.

Thanks,

Reed

From: Stephen McCaughey <smccaughey@rcii.com>
Sent: December 01, 2023 8:39 AM
To: Adams, Reed <reed.adams@ottawa.ca>
Subject: 145 Thad Johnson Pvt - Boundary Conditions Request

Hi Reed,

Following the preconsultation, I am requesting boundary conditions for the 145 Thad Johnson Pvt site. The connection is the existing 300mm along Thad Johnson for which a stub was already provided for the site.

Based on land usage I've estimated demands as follows (details attached for reference)

Avg. day: 0.70 L/s
Peak hour: 1.89 L/s
Max Day + Fire: 151.05 L/s (9,000 L/min fire demand)

Thank you,

Stephen McCaughey, P.Eng. | Project Engineer – Land Development
210-350 Palladium Drive, Ottawa ON, K2V 1A8
O: 613-592-6060 x160 | smccaughey@rcii.com | www.rcii.com

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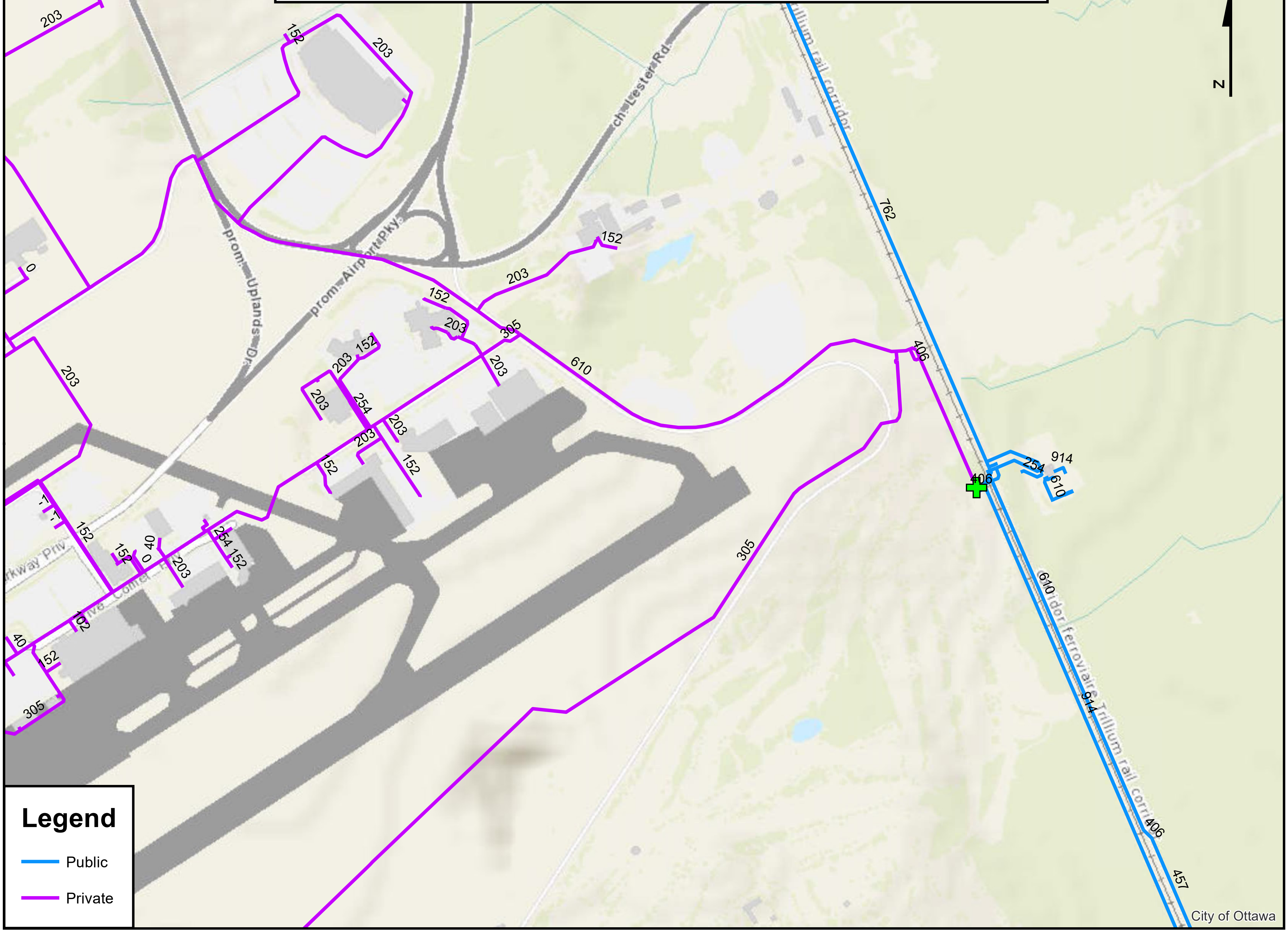
Boundary Conditions for 145 Thad Johnson Private



5.0 EXISTING SERVICING INFRASTRUCTURE

Most of the existing infrastructure which services the existing development located within the MSTSA has been thoroughly documented in the Airport's recent Infrastructure Master Plan (IMP) by JL Richards & Associates Ltd. (2007). However, the IMP study area only included those lands serviced by infrastructure under direct control of the OIAA. Information on infrastructure serving CFB Uplands was implicit in the IMP study documentation, but available details are limited. The following is a description of the key on-site and off-site infrastructure that is fundamental to servicing of the existing development. The information is based on the IMP, various City reports and data associated with off-site infrastructure, and discussions with infrastructure professionals employed by the OIAA, the City of Ottawa, and DND.

5.1 WATER SUPPLY

5.1.1 Water Demand

Based on data provided by the City of Ottawa for the years 2002-2004, the MSTSA demand (with the exception of a few commercial properties on Hunt Club Rd) is 12 L/s on average, reaching up to a peak hour demand of approximately 40 L/s on the maximum day. Based on the City's 2008 system model, demands are higher, but the range in demand is less, with average demand in the order of 34 L/s, peaking at about 48 L/s.

The water distribution sizing is driven by fire demands, and thus accurate estimate of these demands are normally of particular importance. The PTB has been identified as the critical structure requiring fire protection, and the associated fire demand has been estimated at 65 L/s as part of the Airport IMP. The authors of the IMP indicated a need for others to confirm this demand.

5.1.2 Water Sources

The Ottawa South Pump Station (OSPS) is the only source of water supplying the vast majority of the existing development within the MSTSA. The OSPS, which is owned and operated by the City of Ottawa, is located along the CPR corridor, opposite the north end of the golf course. The station itself is supplied by a 1067mm low pressure watermain which brings water from Hunt Club Road to a ground level reservoir located on the OSPS site via a pressure reducing control valve.

The OSPS draws water from this reservoir, and pumps it into the City's 3C pressure zone, which includes the MSTSA and the Leitrim Community. The current discharge head at the station is in the range of 150 m to 155 m, which results in operating pressures in the range of about 315 kPa to 475 kPa (45 to 68 psi) across the MSTSA. The OSPS feeds the Airport via a City-owned 610mm watermain, which connects to a private distribution system, owned and operated by the OIAA.

There is a 2nd City system connection to the OIAA distribution system, located at Hunt Club Road and Canadair Pvt. However, the 610mm City watermain on Hunt Club operates at Zone 2C pressure, which is insufficient to supply the Airport. There are a few commercial properties on the south side of Hunt Club Road which are served by this main, and normal operating pressures at these properties are well below the design criterion of 275 kPa (40 psi). Flow across the Canadair/Hunt Club connection point is prevented by an existing check valve. Without this check valve, water would flow from the Airport lands into Zone 2C under normal conditions. If the supply from the OSPS were cut off, water would flow from the Hunt Club Road watermain to meet Airport demands, but pressures would be very low, with a potential risk of negative pressures at some locations in the MSTSA. There is no on-site storage that could temporarily meet demand within the MSTSA during a supply failure.

5.1.3 Local Distribution

The Airport distribution system consists of watermains ranging in diameter from 50mm to 610mm. The backbone of the local distribution system consists of a 610mm on Alert Rd, which conveys water from the OSPS, splitting into two 305mm branches at Thad Johnson Private, one heading west towards the PTB, the other heading north on Uplands Road to Research Road. The 305mm watermain on Thad Johnson extends past the PTB, heading north along Convair Pvt, turning east on Croil Pvt. The main connects to a 250mm main near Royal Route, and a 406mm main heads north from this point on Canadair Pvt, up to the connection on Hunt Club. Both of the 305mm branches are interconnected by a network of watermains, most of which are in the range of 152mm to 254mm.

The key existing facilities and watermains which feed the MSTSA are illustrated in **Figure 5–1**. Larger watermains are emphasized in this figure to indicate the backbone of the on-site distribution system. Facilities serving the broader area are shown on **Figure 8-1**, as part of the discussion of potential servicing solutions.

For master servicing purposes, the capacity of the distribution system backbone is of particular importance. A 305mm watermain in good condition would be expected to have a normal operating capacity in the range of 110 L/s, or almost twice the estimated 65 L/s required for fire protection. However, a reduced system pressure of 140 kPa (20 psi) is typically considered for design, and JL Richards determined that the available fire flow in the system backbone is in the range of 160 L/s to 215 L/s on this basis.

In summary, the local distribution network provides a high level of service to the MSTSA, with normal operating pressures well in excess of design guidelines, and available flows for fire protection well above the estimated requirement. However, the system lacks redundancy due to the single Zone 3C feed from the OSPS, and the inadequate pressure available from the Zone 2C watermain on Hunt Club Rd.

5.1.4 Watermain Condition

Little information is available on pipe age material, and condition of the water distribution system. Watermains are likely 1940s vintage and newer. Watermains serving the PTB are new and assumed to be PVC. The City's feed from the OSPS is a 1997 vintage concrete pressure pipe, and is likely to be in very good condition.

6.0 FUTURE SERVICING DEMANDS

The future development test scenario (see Table 4-1) for the MSTSA constitutes a potentially substantial increase in the supply of ICI lands in the City of Ottawa. The ultimate development condition would see over 37,000 employees working in the MSTSA, which is approximately one half (1/2) of the projected employment in the City's entire South Urban Community at build-out. The 2031 development condition would see over 17,500 employees working in the MSTSA. However, given the pre-dominance of residential demand expected in the surrounding areas, and the non-coincidence of demand peaks, there is likely to be some opportunity to exploit the capacities of future infrastructure that is already being planned by the City. The demands associated with each service are outlined in the sections which follow:

6.1 WATER DEMAND

Design parameters for water consumption in the MSTSA are provided in **Table 6-1**. These parameters are based on consultation with City staff rather than City design guidelines because the scale of the proposed development is much larger than the subdivision-level planning that the guidelines are typically applied to. Existing demand in the study area is small (less than 3 MLD) in relation to the test scenario build-out and 2031 demands, and so the design parameters that were developed for the project have been applied to both the existing and future demands. A fire demand of 10,000 L/min was selected as a conservative basis for planning. This is well in excess of the design fire demand of 3,900 L/min that has been estimated for the PTB.

Table 6-1: Water Demand Design Parameters

Parameter	Value
Light Industrial Demand (Liters/employee/day)	127
Average Industrial Demand (Liters/employee/day)	173
Heavy Industrial Demand (Liters/employee/day)	276
Commercial Demand (Liters/employee/day)	173
Institutional Demand (Liters/employee/day)	173
ICI[8] Maximum Day Peaking Factor	1.5
ICI Peak Hour Peaking Factor	1.8
Residential Demand (Liters/capita/day)	350
Residential Maximum Day Peaking Factor	1.28[9]
Residential Peak Hour Peaking Factor	1
Fire Demand (L/min)	10,000

The design parameters are qualified as follow:

- The ICI demand includes a 15% allowance for water losses (e.g. pipe leakage, unauthorized withdrawal from the system, etc.)
- The heavy industrial allows for manufacturing typical of that which currently exists in Ottawa, but does not necessarily include water intensive use (e.g. chip manufacturing, bottling , dairies, etc). These types of industries have highly variable water demand, and would need to be given specific consideration as part of the

[8] Industrial, Commercial and Institutional land uses.
[9] Based on a Maximum day Peaking Factor of 2.56 for single family homes, and 0.0 for townhomes.

planning process.[10] For the purposes of this study, it has been assumed that no water-intensive industries will exist in the study area, and that 10% of PUs 8, 10, 12 and 16 will consist of heavy industrial land uses.

- The commercial demand is based on the assumption that the majority of this type of development will be characterized as business park and retail.
- Given that the demand in the study area is strongly dominated by the ICI sector, peak demands will be driven by the timing of peak demand for this sector. The peak hour residential demand is expected to be non-concurrent with peak hour ICI demand, thus the maximum day residential demands are not peaked.

Based on the above parameters, the estimated overall water demands for the MSTSA are summarized in **Table 6-2**. A detailed breakdown of demands on a PU basis is provided in **Appendix A**. Assuming that the future network will be inherently redundant, with two connections to the City's distribution system, then it can be concluded that the entire MSTSA network will be driven by fire demand, given the localized nature of the demand compare to the peak hour demand.

Table 6-2: Total Estimated Future Water Demands

Design Condition	2031 Water Demand (MLD)	Build-Out Water Demand (MLD)
Basic Day	3.6	7.0
Maximum Day	5.3	10.5
Peak Hour	9.0	18.3
Maximum Day + Fire	20.0	25.1

6.2 SANITARY FLOW GENERATION

Design parameters for sanitary sewage flow generation in the MSTSA are provided in **Table 6-3**. As for water demand, employment sanitary flow generation is calculated on a per employee basis. Peak flows are driven by wet weather conditions resulting from extraneous flows into the drainage system. These unit extraneous flow rate indicated in Table 6-3 is consistent with City Sewer Design Guidelines. The employment sanitary flow rates are lower than the water demand rates due to the exclusion of water losses as described previously.

Table 6-3: Sanitary Flow Design Parameters

Parameter	Value
Light Industrial Demand (Liters/employee/day)	110
Average Industrial Demand (Liters/employee/day)	150
Heavy Industrial Demand (Liters/employee/day)	240
Commercial Demand (Liters/employee/day)	150
Institutional Demand (Liters/employee/day)	150
ICI Sanitary Peaking Factor	1.5
Residential Demand (Liters/capita/day)	350
Harmon Correction Factor (residential) [11]	1.0
Extraneous Flow (L/s/ha)	0.28

[10] For example, based on various sources of information from the Intel Corporation web site, per employee water use ranges are estimated at 290 L/employee/day for Intel's Santa Clara operations (6,000 employees), and 1,025 L/employee/day for Intel's Hudson, Massachusetts operations (2,200 employees).

[11] Harmon Peaking Factor equation as per City Sewer Design Guidelines.

8.0 STRATEGIC SERVICING SOLUTIONS

8.1 WATER SUPPLY

Based on a design velocity of 1.5 m/s, the 610mm feed from the OSPS is 38 MLD, and thus has sufficient capacity to convey the peak hour demand and the maximum day plus fire demand under the projected build-out and 2031 test scenario development conditions. Based on the analysis of existing conditions and review of current City initiatives, it has been concluded that once the Zone 3C operating pressure is reduced, the existing Airport lands will need to be served from the OSPS as a separate higher pressure zone. Beyond these key points, water supply opportunities are described as follows:

8.1.1 Airport Pressure Zone Supply

A new Airport Pressure Zone (APZ) will generally be configured as per historical conditions (i.e. before the existing Zone 3C was created by combining the former Uplands and Gloucester South pressure zones). At that time, separate high pressure pumps located at the OSPS served the Airport area. The expected discharge pressure is expected to be equal to or greater than the current Zone 3C discharge head of 150 m to 155 m, which results in operating pressures in the range of about 315 kPa to 475 kPa in the existing development area within the MSTSA. Provided an adequate internal watermain network, the APZ will have the potential to serve the MSTS under both entire built out and 2031 scenarios. However, to provide adequate emergency supply, a redundant supply source is considered to be a critical element of the water supply alternatives.

8.1.2 Zone 3C Supply

As noted previously, the Zone 3C operating pressure will be reduced in order to serve lower elevation areas near the Rideau River (as per City of Ottawa Water Master Plan Update). The expected 3C discharge head at the OSPS is expected to be in the range of 142m, which is equivalent to a drop in pressure of about 100 kPa (14 psi) compared to the existing 3C pressure. The Zone 3C operating head is expected to be sufficient to supply the MSTSA south of Leitrim, where maximum elevations are 4 to 6 below the maximum elevations in the existing Airport area, and where distribution losses can be minimized as part of design and as a result of the proximity of the future 914mm Zone 3C feedermain. This feedermain, which is currently under construction, will be connected to the existing feedermain in Riverside South, which is itself connected to the 2W transmission system west of the Rideau River. The Zone 3C distribution system could also be extended north of Leitrim Road to serve PU 11, which is lower than the MSTSA lands south of Leitrim Road.

8.1.3 Emergency Supply

There are three emergency supply opportunities for the MSTSA under both the build-out and 2031 projections. It should be noted that the Airport Authority conducts business continuity planning on a regular basis. The assessment of reliable water pressure in the event of a supply failure is intended to be part of future analysis. Further details are described in the sections below:

Appendix D

Sanitary Sewer Design Sheet

Robinson Land Development

SANITARY SEWER DESIGN SHEET
for
145 THAD JOHNSON PVT., CITY OF OTTAWA

LOCATION				COMMERCIAL / INSTITUTIONAL FLOW				CUM. PEAK DESIGN FLOW (L/s)	PIPE								
STREET	FROM MH	TO MH	DRAINAGE AREA (ha)	POPULATION	AVG FLOW (L/s)	PEAK FLOW (L/s)	EXTRAN. FLOW (L/s)		LENGTH (m)	DIAMETER (mm)	UPSTREAM MH INV. (m)	DNSTREAM MH INV. (m)	SLOPE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	EXCESS CAPACITY (L/s)	PERCENT FULL
	BLDG	SANMH101	1.7	170	0.25	0.37	0.48	**0.84**	29.1	150.00	114.80	113.30	5.2%	34.61	1.96	33.77	2%
	SANMH101	SANMH100						**0.84**	70.8	150.00	113.24	112.37	1.2%	16.90	0.96	16.05	5%
Thad Johnson Pvt.	SANMH100	EX.SAN MH						**0.84**	7.0	150.00	112.31	110.81	21.4%	70.57	3.99	69.72	1.2%
Thad Johnson Pvt.	EX.SAN MH	EX.SAN MH						**0.84**	134.7	250.00	112.31	110.99	1.0%	58.93	1.20	58.08	1.4%

DESIGN PARAMETERS

Average Daily Flow =	280	L/cap/day	
Comm./Inst. Flow =	28000	L/ha/day	
Comm./Inst. Flow =	**125**	**L/cap/day**	per OSDG App. 4-A
Industrial Flow =	35000	L/ha/day	
Maximum Residential Peak Factor =	4.0		
Harmon - Correction Factor (K) =	0.8		
Institutional/Commercial Peak Factor =	**1.5**		
Industrial Peak Factor =	7	per OSDG App. 4-B	
Extraneous Flow =	**0.28**	**L/s/ha**	
Minimum Velocity =	0.6	m/s	
Maximum Velocity =	3.0	m/s	

Appendix E

Pre-Development Calculations

Storm Sewer Design Sheets

Storage Volume Calculations

ICD Calculations

Infiltration Calculations

Roof Drain Cutsheet

OGS Cutsheet

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	Impervious	Pervious	Gravel
C	0.9	0.2	0.5

Overall Runoff Coefficient Calculations

Development Condition	Impervious Area (ha)	Pervious Area (ha)	Gravel Area (ha)	Total Area (ha)	C	C (100 YR)
PRE		1.361	0.184	1.546	0.24	0.29
POST	1.362	0.184		1.546	0.82	1.00

POST Sub-Drainage Area Runoff Coefficient Calculations

Drainage Area ID	Impervious Area (ha)	Pervious Area (ha)	Gravel Area (ha)	Total Area (ha)	C	C (100 YR)
CONTROLLED	1.31	0.184		1.492	0.81	1.00

POST Uncontrolled Flow Area Runoff Coefficient Calculations

Drainage Area ID	Impervious Area (ha)	Pervious Area (ha)	Gravel Area (ha)	Total Area (ha)	C	C (100 YR)
UNC1	0.015	0.000		0.015	0.90	1.00
UNC2	0.021	0.000		0.021	0.90	1.00
UNC3	0.009	0.000		0.009	0.90	1.00
UNC4	0.008	0.000		0.008	0.90	1.00
TOTAL	**0.054**	**0.000**	**0.000**	**0.054**	**0.90**	**1.00**

Notes:

1. Runoff Coefficients: Cimp=0.90, Cper=0.20, Cgravel=0.50
2. C (100 YR) = C + 25% (to a mximum of 1.0)

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Pre-Development Flow Calculations

Given:

Area (ha) = 1.55

C = 0.24

C (100 YR) = 0.29

Return Period	Time of Concentration (min)	Rainfall Intensity, i (mm/hr)	Flow, Q (L/s)
2 Year	15.0	61.8	62.6
5 Year	15.0	83.6	84.6
100 Year	15.0	142.9	181.0

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method (Q = 2.78CiA).
3. C (100 YR) = C + 25% (to a maximum of 1.0)
4. Time of concentration assumed as 15 minutes for greenfield

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Uncontrolled Flow Calculations

Given:

Area (ha) = 0.05

C = 0.90

C (100 YR) = 1.00

Return Period	Time of Concentration (min)	Intensity[*1], i (mm/hr)	Flow[*2], Q (L/s)
2 Year	10	76.8	10.3
5 Year	10	104.2	14.0
100 Year	10	178.6	26.7

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method (Q = 2.78CiA).

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Allowable Release Rate Calculations

Given:

Area (ha) = 1.49

C = 0.81

C (100 YR)[*3] = 1.00

Return Period	Time of Concentration (min)	Intensity[*1], i (mm/hr)	Flow[*2], Q (L/s)	Allowable Release Rate[*4] (L/s)
2 Year	10	76.8	259.3	52.3
5 Year	10	104.2	351.7	70.6
100 Year	10	178.6	740.6	154.3

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method (Q = 2.78CiA).
3. C (100 YR) = C + 25% (Max. 1.0)
4. Allowable Release Rate = Respective Pre-Development Flow less Uncontrolled Flow

	Impervious	Pervious	Gravel
C	0.9	0.2	0.5

Runoff Coefficient Calculations

Drainage Area ID	Impervious Area (ha)	Pervious Area (ha)	Gravel Area (ha)	Total Area (ha)	C	C (100 YR)	Percent Impervious (%)
1	0.061	0.008		0.07	0.82	1.00	87.9
2	0.073	0.016		0.09	0.78	0.97	82.2
3	0.032	0.006		0.04	0.79	0.98	83.7
4	0.043	0.004		0.05	0.84	1.00	91.1
5	0.036	0.021		0.06	0.65	0.81	63.7
6	0.042	0.020		0.06	0.67	0.84	67.3
7	0.018	0.049		0.07	0.38	0.48	26.3
8	0.048	0.020		0.07	0.69	0.87	70.3
9	0.080	0.004		0.08	0.87	1.00	95.6
10	0.052	0.030		0.08	0.64	0.80	63.1
11	0.192	0.000		0.19	0.90	1.00	100.0
12	0.224	0.005		0.23	0.89	1.00	98.0
13	0.409	0.000		0.41	0.90	1.00	100.0
TOTAL	**1.31**	**0.18**	**0.00**	**1.49**	**0.81**	**1.00**	**87.7**

STORM SEWER DESIGN SHEET
for
145 THAD JOHNSON PVT, OTTAWA

Robinson Consultants

LOCATION			2 YEAR				FLOW				PROPOSED SEWER									
DRAINAGE AREA	FROM MH	TO MH	AREA (ha)	C	INDIV. 2.78AC	ACCUM. 2.78AC	TIME OF CONC. (min)	2 YEAR RAINFALL INTENSITY (mm/hr)	2 YEAR PEAK FLOW (L/s)	CONTROLLED PEAK FLOW (L/s)	PIPE DIA. (mm)	UPSTREAM INV.	DNSTREAM INV.	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	PERCENT FULL (ACTUAL)	PERCENT FULL (PEAK)
1	CB05	CBMH205	0.07	0.82	0.16	0.16	10.00	76.81	12.04	12.0	200	114.52	114.18	1.99	17.1	46.29	1.47	0.19	26%	26%
2	CBMH205	CBMH204	0.09	0.78	0.19	0.35	10.19	76.07	26.49	26.5	250	114.12	113.79	0.81	40.7	53.60	1.09	0.62	49%	49%
3	CB04	CBMH204	0.04	0.79	0.08	0.08	10.00	76.81	6.38	6.4	200	114.46	114.11	2.00	17.5	46.43	1.48	0.20	14%	14%
4	CBMH204	CBMH203	0.05	0.84	0.11	0.54	10.81	73.81	39.96	40.0	250	113.76	113.55	1.01	20.8	59.81	1.22	0.28	67%	67%
5	CB03	CBMH203	0.06	0.65	0.10	0.10	10.00	76.81	7.84	7.8	200	114.51	114.17	1.99	17.1	46.29	1.47	0.19	17%	17%
6	CBMH203	STMMH202	0.06	0.67	0.12	0.76	11.10	72.83	55.32	*15.8*	300	113.50	113.25	1.01	24.8	97.19	1.37	0.30	16%	57%
6	CBMH203	GALLERY	0.06	0.67	0.12	0.76	11.10	72.83	55.32	55.3	300	113.20	113.17	0.52	5.8	69.62	0.98	0.10	79%	79%
	GALLERY	STMMH202	0.00	0.00	0.00	0.76	11.20	72.49	55.07	*8.3*	250	113.09	113.07	0.48	4.2	41.08	0.84	0.37	20%	134%
13	BLDG	202-201	0.41	0.90	1.02	1.02	10.00	76.81	78.60	*16.4*	250	115.00	112.98	2.00	5.4	84.18	1.71	0.05	19%	93%
7	CB02	202-201	0.07	0.38	0.07	0.07	10.00	76.81	5.49	*4.5*	200	113.12	112.83	2.00	1.8	46.43	1.48	0.02	10%	12%
8	CB01	202-201	0.07	0.69	0.13	0.13	10.00	76.81	10.01	10.0	200	113.11	112.09	2.00	2.1	46.43	1.48	0.02	22%	22%
	STMMH202	STMMH201	0.00	0.00	0.00	1.98	11.57	71.27	141.45	*39.2*	375	112.94	111.84	1.00	109.7	175.75	1.59	1.15	22%	80%
12	CB07	CBMH208	0.23	0.89	0.56	0.56	10.00	76.81	43.15	43.1	300	113.71	113.15	1.49	37.6	118.13	1.67	0.37	37%	37%
11	CBMH208	CBMH207	0.19	0.90	0.48	1.04	10.37	75.39	78.51	*40.4*	300	113.09	112.70	0.80	48.9	86.45	1.22	0.67	47%	91%
11	CBMH208	GALLERY	0.19	0.90	0.48	1.04	10.37	75.39	78.51	*44.1*	300	112.49	112.38	4.40	2.5	203.05	2.87	0.01	22%	39%
10	CBMH207	STMMH206	0.08	0.64	0.15	1.19	11.04	73.03	86.76	*48.6*	300	112.67	112.39	0.82	34.3	87.46	1.24	0.46	56%	99%
9	CB06	STMMH206	0.08	0.87	0.20	0.20	10.00	76.81	15.57	15.6	200	113.80	113.42	2.97	12.8	56.57	1.80	0.12	28%	28%
	STMMH206	STMMH201	0.00	0.00	0.00	1.39	11.50	71.48	99.41	*64.2*	300	112.37	111.86	2.10	24.3	140.23	1.98	0.20	46%	71%
	STMMH206	GALLERY	0.00	0.00	0.00	1.39	11.50	71.48	99.41	*64.2*	300	112.07	112.03	1.54	2.6	120.06	1.70	0.03	53%	83%
	GALLERY	STMMH201	0.00	0.00	0.00	1.39	11.53	71.39	99.30	*11.6*	250	111.93	111.91	0.49	4.1	41.58	0.85	0.47	28%	239%
	STMMH201	STMMH200	0.00	0.00	0.00	3.38	12.71	67.75	228.67	*50.7*	375	111.78	111.72	1.88	3.2	240.32	2.18	0.02	21%	95%
	STMMH200	EX. STM	0.00	0.00	0.00	3.38	12.74	67.68	228.43	*50.7*	375	111.69	110.72	3.00	32.3	304.14	2.75	0.20	17%	75%
	EX. STM	EX. STM								*50.7*	1650	109.35	109.23	0.12	98.6	3183.53	1.49	1.10	2%	0%
			1.49						**Max**	**52.3**										

Design Parameters

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Peak flows calculated using the Rational Method.
3. Maximum allowable flow of 52.3 L/s = 2yr pre-development flow - uncontrolled flow (driveways) @ Tc 10min
4. Manning's roughness coefficient = 0.013
5. Full flow velocity: MIN 0.8 m/s; MAX 3.0 m/s (City of Ottawa Sewer Design Guidelines, v.2012)
6. Building roof assumed controlled at 40 L/s/ha; @ 0.409ha = 16.36 L/s
7. Italicized controlled peak flows indicates restricted flow from ICD. Refer to ICD Sizing sheet, minimum flow given no surface ponding (except Drainage Area 7&8)
8. Laterals from CB01, CB02 and BLDG minimum 2.0% before vertical bend to connect
9. Connection from STMMH200 to ex. 1650mm 3.0% before vertical bend to connect invert-to-springline

STORM SEWER DESIGN SHEET
for
145 THAD JOHNSON PVT, OTTAWA

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LOCATION			100 YEAR				FLOW				PROPOSED SEWER								
DRAINAGE AREA	FROM MH	TO MH	AREA (ha)	C	INDIV. 2.78AC	ACCUM. 2.78AC	TIME OF CONC. (min)	100 YEAR RAINFALL INTENSITY (mm/hr)	100 YEAR PEAK FLOW (L/s)	CONTROLLED PEAK FLOW (L/s)	PIPE DIA. (mm)	UPSTREAM INV.	DNSTREAM INV.	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	PERCENT FULL (ACTUAL)
1	CB05	CBMH205	0.07	1.00	0.19	0.19	10.00	178.56	34.35	34.4	200	114.52	114.18	1.99	17.1	46.29	1.47	0.19	74%
2	CBMH205	CBMH204	0.09	0.97	0.24	0.43	10.19	176.81	76.32	*34.5*	250	114.12	113.79	0.81	40.7	53.60	1.09	0.62	64%
3	CB04	CBMH204	0.04	0.98	0.10	0.10	10.00	178.56	18.53	18.5	200	114.46	114.11	2.00	17.5	46.43	1.48	0.20	40%
4	CBMH204	CBMH203	0.05	1.00	0.13	0.67	10.81	171.44	114.34	*45.8*	250	113.76	113.55	1.01	20.8	59.81	1.22	0.28	76%
5	CB03	CBMH203	0.06	0.81	0.13	0.13	10.00	178.56	22.77	22.8	200	114.51	114.17	1.99	17.1	46.29	1.47	0.19	49%
6	CBMH203	STMMH202	0.06	0.84	0.15	0.94	11.10	169.10	158.90	*16.3*	300	113.50	113.25	1.01	24.8	97.19	1.37	0.30	17%
6	CBMH203	GALLERY	0.06	0.84	0.15	0.94	11.10	169.10	158.90	*90.3*	300	113.20	113.17	0.52	5.8	69.62	0.98	0.10	130%
	GALLERY	STMMH202	0.00	0.00	0.00	0.94	11.20	168.31	158.15	*29.3*	250	113.09	113.07	0.48	4.2	41.08	0.84	0.37	71%
13	BLDG	202-201	0.41	1.00	1.14	1.14	10.00	178.56	203.03	*16.4*	250	115.00	112.98	2.00	5.4	84.18	1.71	0.05	19%
7	CB02	202-201	0.07	0.48	0.09	0.09	10.00	178.56	15.95	*4.5*	200	113.12	112.83	2.00	1.8	46.43	1.48	0.02	10%
8	CB01	202-201	0.07	0.87	0.16	0.16	10.00	178.56	29.08	*15.8*	200	113.11	112.09	2.00	2.1	46.43	1.48	0.02	34%
	STMMH202	STMMH201	0.00	0.00	0.00	2.33	11.57	165.41	385.21	*82.3*	375	112.94	111.84	1.00	109.7	175.75	1.59	1.15	47%
12	CB07	CBMH208	0.23	1.00	0.63	0.63	10.00	178.56	113.23	*108.7*	300	113.71	113.15	1.49	37.6	118.13	1.67	0.37	92%
11	CBMH208	CBMH207	0.19	1.00	0.53	1.17	10.37	175.20	204.47	*44.1*	300	113.09	112.70	0.80	48.9	86.45	1.22	0.67	51%
11	CBMH208	GALLERY	0.19	1.00	0.53	1.17	10.37	175.20	204.47	*200.0*	300	112.49	112.38	4.40	2.5	203.05	2.87	0.01	98%
10	CBMH207	STMMH206	0.08	0.80	0.18	1.35	11.04	169.57	228.99	*68.6*	300	112.67	112.39	0.82	34.3	87.46	1.24	0.46	78%
9	CB06	STMMH206	0.08	1.00	0.23	0.23	10.00	178.56	41.65	41.6	200	113.80	113.42	2.97	12.8	56.57	1.80	0.12	74%
	STMMH206	STMMH201	0.00	0.00	0.00	1.58	11.50	165.89	262.72	*110.3*	300	112.37	111.86	2.10	24.3	140.23	1.98	0.20	79%
	STMMH206	GALLERY	0.00	0.00	0.00	1.58	11.50	165.89	262.72	*110.3*	300	112.07	112.03	1.54	2.6	120.06	1.70	0.03	92%
	GALLERY	STMMH201	0.00	0.00	0.00	1.58	11.53	165.69	262.40	*43.3*	250	111.93	111.91	0.49	4.1	41.58	0.85	0.47	104%
	STMMH201	STMMH200	0.00	0.00	0.00	3.68	12.71	157.04	577.80	*137.9*	375	111.78	111.72	1.88	3.2	240.32	2.18	0.02	57%
	STMMH200	EX. STM	0.00	0.00	0.00	3.68	12.74	156.87	577.18	*137.9*	375	111.69	110.72	3.00	32.3	304.14	2.75	0.20	45%
	EX. STM	EX. STM								*137.9*	1650	109.35	109.23	0.12	98.6	3183.53	1.49	1.10	4%
			1.49						**Max**	**154.3**									

Design Parameters

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. C (100yr) = C + 25% (Max. 1.0)
3. Peak flows calculated using the Rational Method.
4. Maximum allowable flow of 154.3 L/s = 100yr pre-development flow - uncontrolled flow (driveways) @ Tc 10min
5. Manning's roughness coefficient = 0.013
6. Full flow velocity: MIN 0.8 m/s; MAX 3.0 m/s (City of Ottawa Sewer Design Guidelines, v.2012)
7. Building roof assumed controlled at 40 L/s/ha; @ 0.409ha = 16.36 L/s
8. Italicized controlled peak flows indicates restricted flow from ICD. Refer to ICD Sizing sheet, maximum flow rate assumed for capacity and discharge rate validation
9. Total site discharge from STMMH201 (137.9 L/s) is maximum peak flow discharging site, occuring when Drainage Area 9 Infiltration Gallery overflows (at 15 min). Refer to Surface Storage Calculations sheet.
10. Laterals from CB01, CB02 and BLDG minimum 2.0% before vertical bend to connect
11. Connection from STMMH200 to ex. 1650mm 3.0% before vertical bend to connect invert-to-springline

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Surface Storage Volume Calculations

Drainage Area = **1&2 (100yr)** Oveflow El. = 115.98 Ponding Area (m2) = 456
2.78* AC = 0.43 Min. T/G = 115.70 Available Storage (m3) = **36.5**

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Controlled Flow (L/s)*	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**10**	**178.6**	**77.1**	**31.6**	**45.5**	**27.3**
	15	142.9	61.7	31.6	30.1	27.1
	20	120.0	51.8	31.6	20.2	24.2
	25	103.8	44.8	31.6	13.3	19.9
	30	91.9	39.7	31.6	8.1	14.5
	35	82.6	35.6	31.6	4.1	8.5

*Controlled discharge flow based on ICD min flow at CBMH205 TG to conservatively estimate required storage

Drainage Area = **3&4 (100yr)** Oveflow El. = 116.94 Ponding Area (m2) = 515
2.78* AC = 0.24 T/G = 116.70 Available Storage (m3) = **41.2**

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)*	Controlled Flow (L/s)**	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	10	178.6	76.5	43.9	32.6	19.5
	15	142.9	68.1	43.9	24.2	21.8
	20	120.0	62.7	43.9	18.8	22.5
	25	**103.8**	**58.9**	**43.9**	**15.0**	**22.5**
	30	91.9	56.1	43.9	12.2	21.9
	35	82.6	53.9	43.9	10.0	21.0

*Flow in includes upstream flow up to ICD max flow
**Controlled discharge flow based on ICD min flow at CBMH204 TG to conservatively estimate required storage

Drainage Area = **5&6 (100yr)** Oveflow El. = 116.98 Ponding Area (m2) = 526
2.78* AC = 0.27 T/G = 116.76 Available Storage (m3) = 38.6
Infiltration Gallery Gallery Area (m2) = 83.5
Total Storage (m3) = **78.7** Max Depth = 1.2 Max Available Storage (m3) = 40.1

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)*	Controlled Flow (L/s)**	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	35	82.6	68.3	44.3	24.0	50.5
	40	75.1	66.3	44.3	22.0	52.8
	45	**69.1**	**64.6**	**44.3**	**20.3**	**54.9**
	50	64.0	60.1	44.3	15.8	47.5
	55	59.6	56.0	44.3	11.8	38.9
	60	55.9	52.5	44.3	8.3	29.8

*Flow in includes upstream flow up to ICD max flow
**Controlled discharge flow based on gallery ICD flow plus gallery bypass at CBMH203 TG to conservatively estimate required storage

Drainage Area = **1-6 (2yr)** Infiltration Gallery Gallery Area (m2) = 83.5
2.78* AC = 0.76 Max Depth = 1.2 Max Available Storage (m3) = **40.1**

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Controlled Flow (L/s)*	Net Runoff to be Stored (L/s)	Storage Required (m^3)
2 Year	25	45.2	34.3	8.3	26.0	39.0
	30	40.0	30.4	8.3	22.1	39.8
	35	**36.1**	**27.4**	**8.3**	**19.1**	**40.0**
	40	32.9	25.0	8.3	16.6	39.9
	45	30.2	23.0	8.3	14.6	39.5
	50	28.0	21.3	8.3	13.0	38.9

*Controlled discharge flow based on gallery ICD min flow at CBMH203 bypass invert to conservatively estimate required storage

Drainage Area = **7 (2yr)** Oveflow El. = 117.00 Ponding Area (m2) = 76.5
2.78* AC = 0.07 T/G = 116.65 Available Storage (m3) = **8.9**

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Controlled Flow (L/s)*	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**10**	**76.8**	**6.9**	**4.3**	**2.6**	**1.6**
	15	61.8	5.5	4.3	1.3	1.1
	20	52.0	4.6	4.3	0.4	0.5
	25	45.2	4.0	4.3	-0.2	-0.3
	30	40.0	3.6	4.3	-0.7	-1.2
	35	36.1	3.2	4.3	-1.0	-2.2

*Controlled discharge flow based on ICD min flow at CB02 TG to conservatively estimate required storage

Drainage Area = **7 (100yr)** Oveflow El. = 117.00 Ponding Area (m2) = 76.5
2.78* AC = 0.09 T/G = 116.65 Available Storage (m3) = **8.9**

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Controlled Flow (L/s)*	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	10	178.6	15.9	4.3	11.7	7.0
	15	142.9	12.8	4.3	8.5	7.6
	20	**120.0**	**10.7**	**4.3**	**6.4**	**7.7**
	25	103.8	9.3	4.3	5.0	7.5
	30	91.9	8.2	4.3	3.9	7.1
	35	82.6	7.4	4.3	3.1	6.5

*Controlled discharge flow based on ICD min flow at CB02 TG to conservatively estimate required storage

Drainage Area = **8 (100yr)** Oveflow El. = 117.00 Ponding Area (m2) = 66.7
2.78* AC = 0.16 T/G = 116.61 Available Storage (m3) = **8.7**

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Controlled Flow (L/s)*	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**10**	**178.6**	**29.1**	**14.9**	**14.1**	**8.5**
	15	142.9	23.3	14.9	8.3	7.5
	20	120.0	19.5	14.9	4.6	5.5
	25	103.8	16.9	14.9	2.0	2.9
	30	91.9	15.0	14.9	0.0	0.0
	35	82.6	13.4	14.9	-1.5	-3.1

*Controlled discharge flow based on ICD min flow at CB01 TG to conservatively estimate required storage

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Drainage Area = **9&10 (2yr)** Infiltration Gallery Gallery Area (m2) = 176.2
2.78* AC = 0.35 Max Depth = 1.2 Max Available Storage (m3) = **84.6**

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)*	Controlled Flow (L/s)**	Net Runoff to be Stored (L/s)	Storage Required (m^3)
2 Year	40	32.9	45.7	11.6	34.1	81.9
	45	30.2	42.1	11.6	30.5	82.3
	50	**28.0**	**39.0**	**11.6**	**27.4**	**82.3**
	55	26.2	36.4	11.6	24.8	81.9
	60	24.6	34.2	11.6	22.6	81.3
	65	23.2	32.2	11.6	20.6	80.4

*Flow in includes upstream flow up to ICD max flow
**Controlled discharge flow based on gallery ICD min flow at CBMH206 bypass invert to conservatively estimate required storage

Drainage Area = **9&10 (100yr)** Infiltration Gallery Gallery Area (m2) = 176.2
2.78* AC = 0.42 Max Depth = 1.2 Max Available Storage (m3) = **84.6**

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)*	Controlled Flow (L/s)**	Net Runoff to be Stored (L/s)	Storage Required (m^3)	Time to Fill Gallery (min)	Max Flow from Site during Overflow (L/s)***
100 Year	13	155.1	108.7	11.6	97.1	75.8	15	
	14	148.7	106.1	11.6	94.5	79.4	15	
	15	**142.9**	**103.6**	**11.6**	**92.1**	**82.9**	**15**	**137.9**
	16	137.5	101.4	11.6	89.8	86.2	16	136.8
	17	132.6	99.4	11.6	87.8	89.5	16	136.0
	18	128.1	97.5	11.6	85.9	92.8	16	135.3

*Flow in includes upstream flow up to ICD max flow
**Controlled discharge flow based on gallery ICD min flow at CBMH206 bypass invert to conservatively estimate required storag
***When infiltration gallery overflows total flow from site must be below 154.3 L/s

Drainage Area = **11&12 (2yr)** Infiltration Gallery Gallery Area (m2) = 176.7
2.78* AC = 1.04 Max Depth = 1.2 Max Available Storage (m3) = 84.8

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Controlled Flow (L/s)*	Net Runoff to be Stored (L/s)	Storage Required (m^3)
2 Year	**10**	**76.8**	**80.0**	**40.4**	**39.6**	**23.8**
	15	61.8	64.3	40.4	23.9	21.5
	20	52.0	54.2	40.4	13.8	16.6
	25	45.2	47.0	40.4	6.6	10.0
	30	40.0	41.7	40.4	1.3	2.4
	35	36.1	37.6	40.4	-2.8	-6.0

*Controlled discharge flow based on ICD min flow at CBMH208 TG to conservatively estimate required storage

Drainage Area = **11 (100yr)** Oveflow El. = 115.10 Ponding Area (m2) = 365
2.78* AC = 0.53 T/G = 114.80 Available Storage (m3) = 36.5

Infiltration Gallery Gallery Area (m2) = 176.7
Total Storage (m3) = **121.3** Max Depth = 1.2 Max Available Storage (m3) = 84.8

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)*	Controlled Flow (L/s)**	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	10	178.6	203.9	40.4	163.5	98.1
	15	142.9	166.8	40.4	126.4	113.7
	20	120.0	140.0	40.4	99.6	119.5
	25	**103.8**	**121.2**	**40.4**	**80.8**	**121.2**
	30	91.9	107.2	40.4	66.8	120.3
	35	82.6	96.4	40.4	56.0	117.6

*Flow in includes upstream flow up to ICD max flow
**Controlled discharge flow based on ICD min flow at CBMH208 TG to conservatively estimate required storage

Drainage Area = **12 (100yr)** Oveflow El. = 115.13 Ponding Area (m2) = 181.7
2.78* AC = 0.63 T/G = 115.02 Available Storage (m3) = **6.7**

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Controlled Flow (L/s)*	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**10**	**178.6**	**113.2**	**103.9**	**9.3**	**5.6**
	15	142.9	90.6	103.9	-13.3	-12.0
	20	120.0	76.1	103.9	-27.9	-33.4
	25	103.8	65.9	103.9	-38.1	-57.1
	30	91.9	58.3	103.9	-45.7	-82.2
	35	82.6	52.4	103.9	-51.6	-108.3

*Controlled discharge flow based on ICD min flow at CB07 TG to conservatively estimate required storage

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Drainage Area = **13 (Roof) (2yr)**
2.78* AC = 1.02
Max Depth = 0.15
Ponding Area (m2) = 4000
Max Available Storage (m3) = 200.0

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Controlled Flow (L/s)*	Net Runoff to be Stored (L/s)	Storage Required (m^3)
2 Year	15	61.8	70.2	16.4	53.9	48.5
	20	52.0	59.2	16.4	42.8	51.4
	25	**45.2**	**51.4**	**16.4**	**35.0**	**52.5**
	30	40.0	45.5	16.4	29.2	52.5
	35	36.1	41.0	16.4	24.6	51.7
	40	32.9	37.4	16.4	21.0	50.4

*Controlled flow assumed based on 40 L/s/ha; @ 0.409ha = 16.36 L/s

Drainage Area = **13 (Roof) (100yr)**
2.78* AC = 1.14
Max Depth = 0.15
Ponding Area (m2) = 4000
Max Available Storage (m3) = 200.0

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Controlled Flow (L/s)*	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	50	64.0	72.7	16.4	56.4	169.1
	55	59.6	67.8	16.4	51.4	169.7
	60	**55.9**	**63.6**	**16.4**	**47.2**	**169.9**
	65	52.6	59.9	16.4	43.5	169.7
	70	49.8	56.6	16.4	40.3	169.1
	75	47.3	53.7	16.4	37.4	168.2

*Controlled flow assumed based on 40 L/s/ha; @ 0.409ha = 16.36 L/s

Drainage Area = **13 (Roof w. Expansion) (100yr)**
2.78* AC = 1.31
Max Depth = 0.15
Ponding Area (m2) = 4700
Max Available Storage (m3) = 235.0

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Controlled Flow (L/s)*	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	55	59.6	78.0	16.4	61.7	203.5
	60	55.9	73.1	16.4	56.8	204.4
	65	**52.6**	**68.9**	**16.4**	**52.5**	**204.9**
	70	49.8	65.2	16.4	48.8	204.9
	75	47.3	61.8	16.4	45.5	204.6
	80	45.0	58.9	16.4	42.5	204.1

*Controlled flow assumed based on 40 L/s/ha; @ 0.409ha = 16.36 L/s

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ICD Sizing

Drainage Area 1&2 - CBMH205

Cl. El.	114.25	m
TG	115.70	m
Head	1.46	m
Overflow	115.98	m
Max. Head	1.74	m
Min Flow	31.6	L/s
Max Flow	34.5	L/s
HF B		

Drainage Area 3&4 - CBMH204

Cl. El.	113.89	m
TG	116.70	m
Head	2.82	m
Overflow	116.94	m
Max. Head	3.05	m
Min Flow	43.9	L/s
Max Flow	45.8	L/s
HF B		

Drainage Area 5&6 - Infiltration Gallery to STMMH20

Cl. El.	113.20	m
Max Head (2yr)	113.50	m
Min. Head	0.31	m
TG	116.76	m
Head	3.57	m
Overflow	116.98	m
Max. Head	3.79	m
Min Flow	8.3	L/s
TG Flow	28.5	L/s
Max Flow	29.3	L/s
Orifice Plate	**85**	**mm**

Drainage Area 5&6 - CBMH203

Cl. El.	113.65	m
TG	116.76	m
Head	3.11	m
Overflow	116.98	m
Max. Head	3.33	m
Min Flow	15.8	L/s
Max Flow	16.3	L/s
LMF 14 - 100mm		

Drainage Area 7 - CB02

Cl. El.	113.22	m
TG	116.65	m
Head	3.43	m
Overflow	117.00	m
Max. Head	3.78	m
Min Flow	4.3	L/s
Max Flow	4.5	L/s
LMF 14 - 50mm		

Drainage Area 8 - CB01

Cl. El.	113.21	m
TG	116.61	m
Head	3.40	m
Overflow	117.00	m
Max. Head	3.79	m
Min Flow	14.9	L/s
Max Flow	15.8	L/s
LMF 14 - 95mm		

Drainage Area 9&10 - Infiltration Gallery to STMMH201

Cl. El.	112.16	m
Min. Head (2yr)	112.37	m
Head	0.21	m
Overflow	115.10	m
Max. Head	2.94	m
Min Flow	11.6	L/s
Max Flow	43.3	L/s
Orifice Plate	**110**	**mm**

Drainage Area 11 - CBMH208

Cl. El.	113.24	m
TG	114.80	m
Head	1.56	m
Overflow	115.10	m
Max. Head	1.86	m
Min Flow	40.4	L/s
Max Flow	44.1	L/s
HF C		

Drainage Area 12 - CB07

Cl. El.	113.86	m
TG	115.02	m
Head	1.16	m
Overflow	115.13	m
Max. Head	1.27	m
Min Flow	103.9	L/s
Max Flow	108.7	L/s
Orifice Plate	**215**	**mm**

1. Min. flow based on head from centre of discharge pipe to TG. Used to conservatively estimate storage requirements
2. Min. flow at Area 5&6 and 9&10 based on head from centre of discharge pipe to bypass invert. Used to conservatively estimate storage requirements
3. Max. flow based on head from centre of discharge pipe to overflow elevation. Used to conservatively validate max. site discharge and pipe capacity

Chart 1: LMF 14 Preset Flow Curves

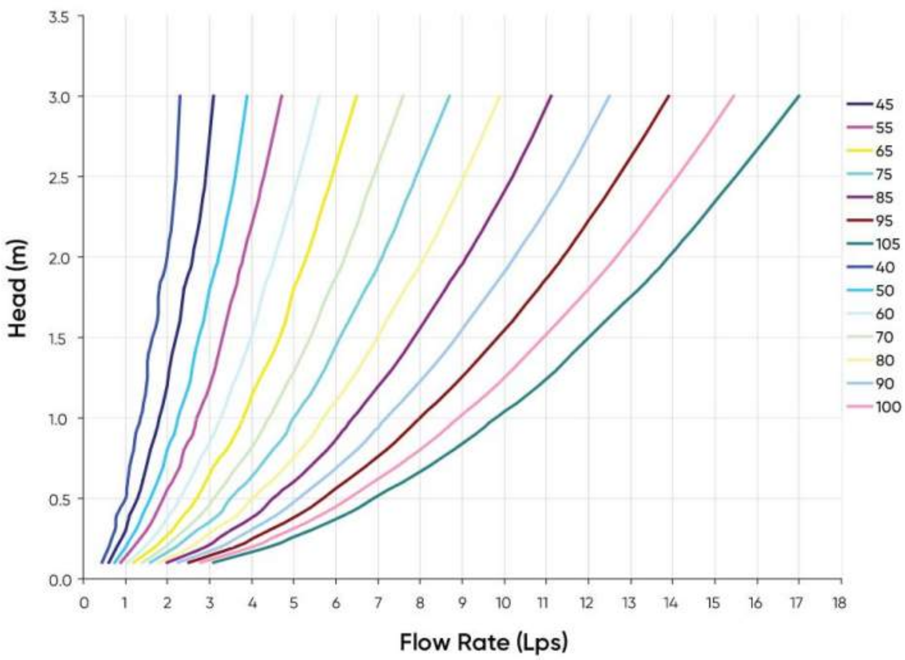
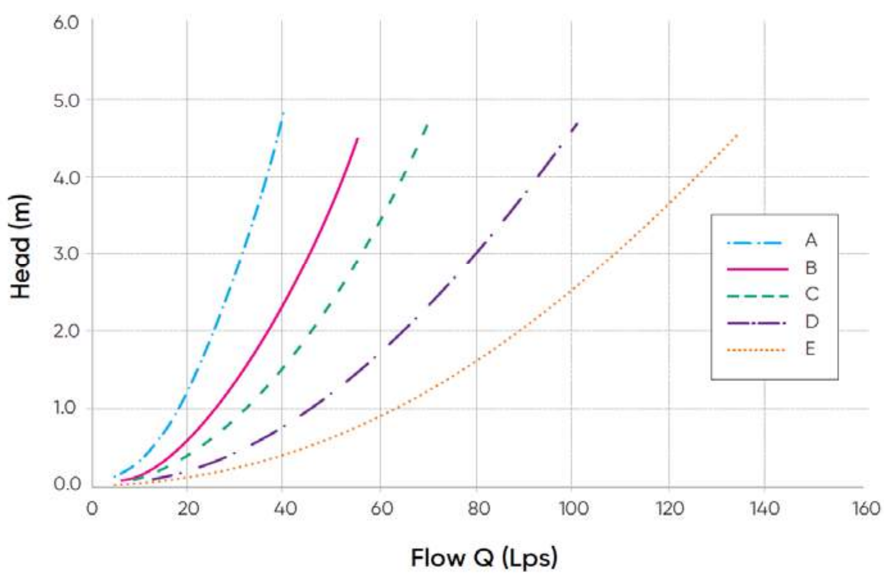


Chart 3: HF & MHF Preset Flow Curves



Infiltration

Total Impervious Area	1.36	ha	(includes uncontrolled areas)
Required Infiltration	40%		
Total Runoff to Infiltrate	3682	m3	(per year, per below average total yearly rainfall)

Percolation Rate	8	min/cm	(typical for sand)

Average total yearly rainfall	750.95	mm	(per Environment Canada monitoring station at Ottawa MacDonald-Cartier International Airport; years 1993-2023)
Average number of rain events per year	118		(per Environment Canada monitoring station at Ottawa MacDonald-Cartier International Airport; years 1993-2023)
Average rainfall per event	6.4	mm	

Drainage Area 5&6 Infiltration Gallery

Infiltration Area	83.5	m2	
Infiltration Depth	1.2	m	
Void Ratio	40%		
Infiltratable Volume	40.1	m3	
Percolation Time	16.0	hr	
Total Drainage Area	0.36	ha	
Runoff Coefficient	0.67		
Runoff to Infiltrate per Event	15.5	m3	(per above average rainfall per event)

CB01 Ditch Line

Infiltration Area	15.6	m2	
Infiltration Depth	0.4	m	
Void Ratio	40%		
Infiltratable Volume	2.5	m3	
Percolation Time	5.3	hr	
Total Drainage Area	0.07	ha	
Runoff Coefficient	0.69		
Runoff to Infiltrate per Event	3.0	m3	(per above average rainfall per event)

CB02 Ditch Line

Infiltration Area	18.3	m2	
Infiltration Depth	0.4	m	
Void Ratio	40%		
Infiltratable Volume	2.9	m3	
Percolation Time	5.3	hr	
Total Drainage Area	0.07	ha	
Runoff Coefficient	0.38		
Runoff to Infiltrate per Event	1.6	m3	(per above average rainfall per event)

Drainage Area 9&10 Infiltration Gallery

Infiltration Area	176.2	m2	
Infiltration Depth	1.2	m	
Void Ratio	40%		
Infiltratable Volume	84.6	m3	
Percolation Time	16.0	hr	
Total Drainage Area	0.17	ha	
Runoff Coefficient	0.76		
Runoff to Infiltrate per Event	8.0	m3	(per above average rainfall per event)

Drainage Area 11&12 Infiltration Gallery

Infiltration Area	176.7	m2	
Infiltration Depth	1.2	m	
Void Ratio	40%		
Infiltratable Volume	84.8	m3	
Percolation Time	16.0	hr	
Total Drainage Area	0.42	ha	
Runoff Coefficient	0.89		
Runoff to Infiltrate per Event	23.8	m3	(per above average rainfall per event)

Natural Infiltration in Green Spaces on Property

Total Drainage Area	0.40	ha	(including uncontrolled grassed areas)
Runoff Coefficient	0.20		
Retained Flow Infiltrated per Event	19	m3	(per above average rainfall per event)

<u>Check</u>

Number of Avg. Events Required	52		(based on min. infiltration in each area: avg. runoff volume or infiltration gallery capacity)
Total Infiltration per Year	8301	m3	(per average number of rain events per year)

2012 MMAH Supplementary Standard SB-6 Ontario

Table 2
Approximate Relationship of Coarse Grained Soil Types to Permeability and Percolation Time

Soil Type (Unified Soil Classification) Coarse Grained More than 50% Larger than #200		Coefficient of Permeability, K - cm/sec	Percolation Time, T - mins/cm	Comment
G.W. -	Well graded gravels, gravel-sand mixtures, little or no fines.	10^{-1}	<1	very permeable unacceptable
G.P. -	Poorly graded gravels, gravel-sand mixtures, little or no fines.	10^{-1}	<1	very permeable unacceptable
G.M. -	Silty gravels, gravel-sand-silt mixtures.	10^{-2} - 10^{-4}	4 - 12	Permeable to medium permeable depending on amount of silt.
G.C. -	Clayey gravels, gravel-sand-clay mixtures.	10^{-4} - 10^{-6}	12 - 50	Important to estimate amount of silt and clay
S.W. -	Well graded sands, gravelly sands little or no fines.	10^{-1} - 10^{-4}	2 - 12	medium permeability
S.P. -	Poorly graded sands, gravelly sand, little or no fines.	10^{-1} - 10^{-3}	2 - 8	medium permeability
S.M. -	Silty sands, sand-silt mixtures.	10^{-3} - 10^{-5}	8 - 20	medium to low permeability
S.C. -	Clayey sands, sand-clay mixtures.	10^{-4} - 10^{-6}	12 - 50	medium to low permeability depending on amount of clay
Column 1		2	3	4

STORM SEWER DESIGN SHEET
for
145 THAD JOHNSON PVT, OTTAWA

Robinson Consultants

LOCATION			25 YEAR				FLOW				PROPOSED SEWER								
DRAINAGE AREA	FROM MH	TO MH	AREA (ha)	C	INDIV. 2.78AC	ACCUM. 2.78AC	TIME OF CONC. (min)	25 YEAR RAINFALL INTENSITY (mm/hr)	25 YEAR PEAK FLOW (L/s)	DESIGN PEAK FLOW (L/s)	PIPE DIA. (mm)	UPSTREAM INV.	DNSTREAM INV.	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	PERCENT FULL
NORTH ENTRANCE																			
C1			0.08	0.54	0.11	0.11	10.00	144.69	16.53	16.53	250	116.16	116.07	0.52	17.2	23.35	0.48	0.60	71%
SOUTH ENTRANCE																			
C2			0.06	0.66	0.11	0.11	10.00	144.69	15.73	15.73	250	114.23	114.14	0.52	17.2	23.36	0.48	0.60	67%

Design Parameters

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Peak flows calculated using the Rational Method.
3. Manning's roughness coefficient = 0.024

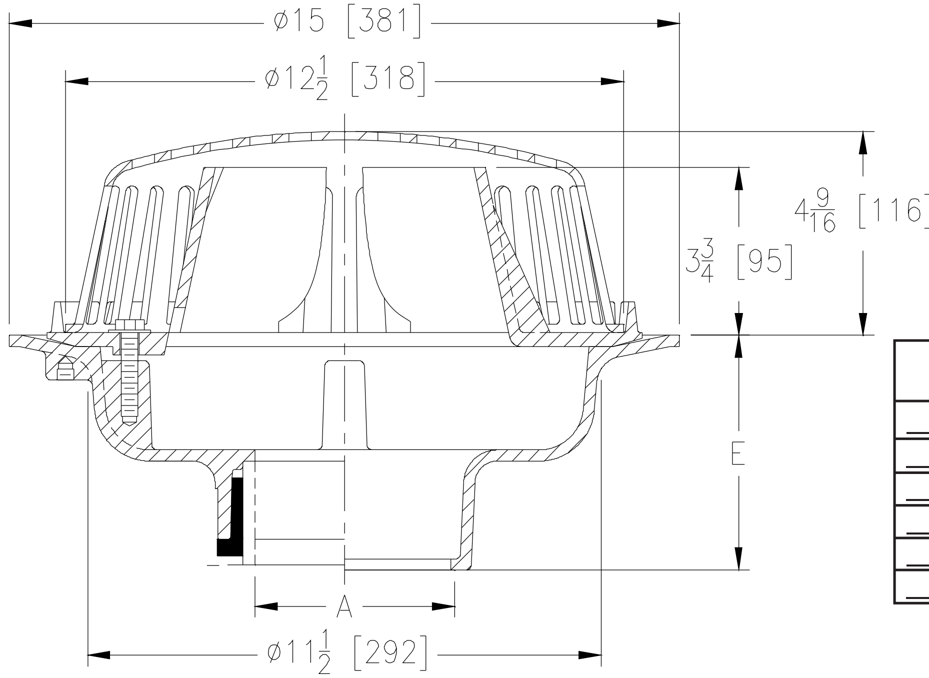
Z105

CONTROL-FLO ROOF DRAIN
W/ PARABOLIC WEIR

SPECIFICATION SHEET

TAG ________

Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice



Specify Number of Notches in Weir	
___-N1	One Notch
___-N2	Two Notches
___-N3	Three Notches
___-N4	Four Notches
___-N5	Five Notches
___-N6	Six Notches

A- Pipe Size In.[mm]	Approx. Wt. Lbs. [kg]	Dome Open Area Sq. In. [cm^2]
2,3,4 [51,76,102]	34 [15]	103 [665]

ENGINEERING SPECIFICATION: ZURN Z105
15" [381mm] Diameter Control-Flo roof drain for dead-level roof construction, Dura-Coated cast iron body, Control-Flo weir shall be linear functioning with integral membrane flashing clamp/gravel guard and Poly-Dome. All data shall be verified proportional to flow rates. Each notch will allow 10 GPM [LPM] of flow per 1" [25mm] of rain water build up above the drain.

OPTIONS (Check/specify appropriate options)

PIPE SIZE	(Specify size/type) **OUTLET**		**E BODY HT. DIM.**
3, 4 [76, 102]	_____ IC	Inside Caulk	5-1/4 [133]
2 , 3, 4 [51, 76, 102]	_____ NH	No-Hub	5-1/4 [133]
2 , 3, 4 [51, 76, 102]	_____ NL	Neo-Loc	4-9/16 [116]

PREFIXES

____ Z D.C.C.I. Body with Poly-Dome*
____ ZA D.C.C.I. Body with Aluminum Dome
____ ZC D.C.C.I. Body with Cast Iron Dome

SUFFIXES

____ -C Underdeck Clamp
____ -DP Top-Set® Deck Plate (Replaces both -C & -R)
____ -E Static Extension 1 [25] thru 4 [102] (Specify Ht.)
____ -EA Adjustable Extension Assembly 2-1/8 [54] thru 3-1/2 [89]
____ -G Galvanized Cast Iron
____ -R Roof Sump Receiver
____ -TC Neo-Loc Test Cap Gasket (2,3,4 [51,76,102] NL Bottom Outlet Only)
____ -VP Vandal Proof Secured Top
____ -10 6 [152] High Parabolic Weir for Sloped Roof (ZC or ZA)

* Regularly furnished unless otherwise specified.

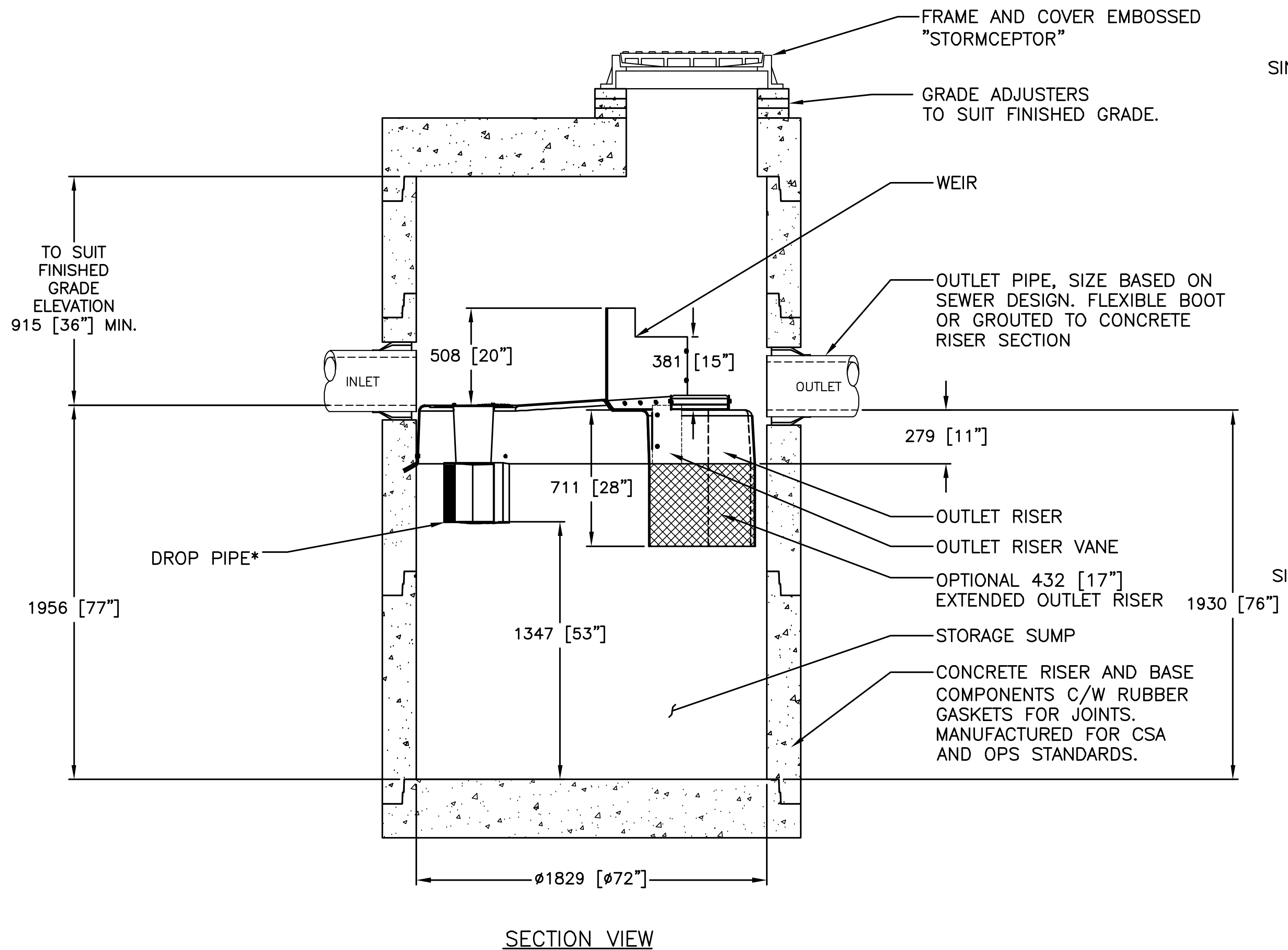
Zurn Industries, LLC | Specification Drainage Operation
1801 Pittsburgh Avenue, Erie, PA U.S.A. 16502 · Ph. 855-663-9876, Fax 814-454-7929

In Canada | **Zurn Industries Limited**
3544 Nashua Drive, Mississauga, Ontario L4V 1L2 · Ph. 905-405-8272, Fax 905-405-1292

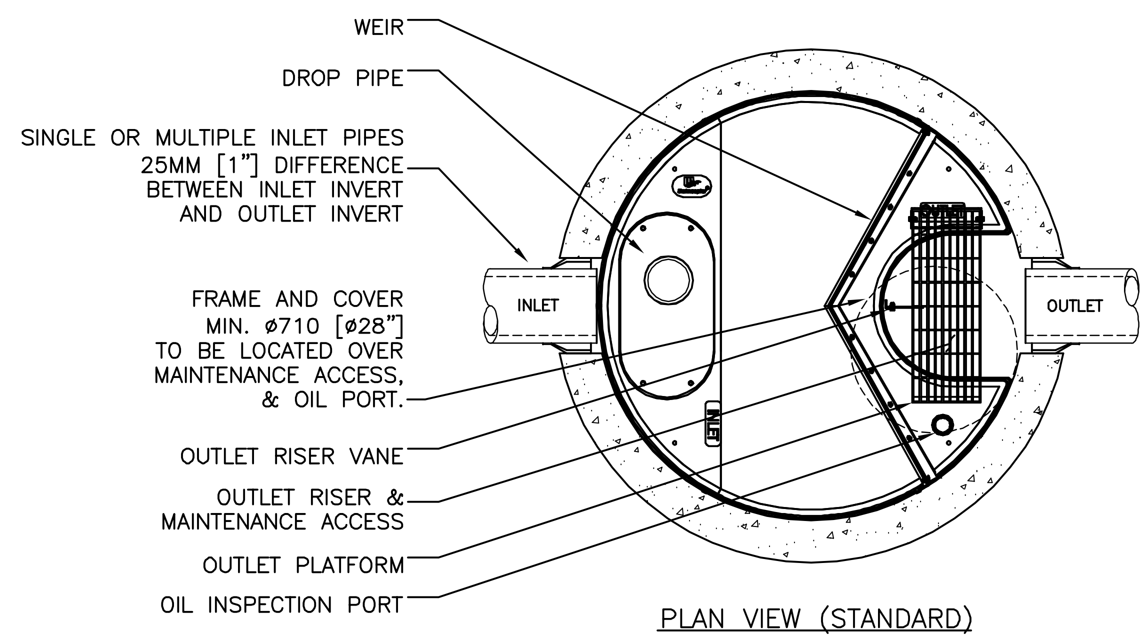
www.zurn.com

Rev. K
Date: 09/25/17
C.N. No. 137793
Prod. | Dwg. No. Z105

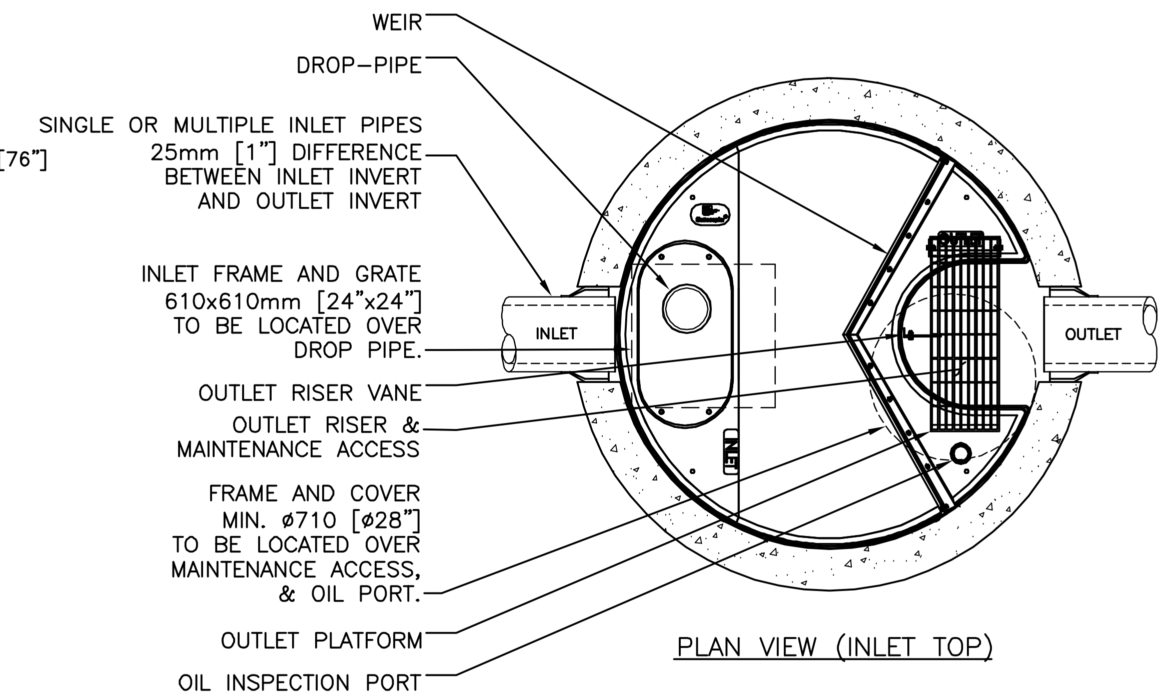
DRAWING NOT TO BE USED FOR CONSTRUCTION



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

GENERAL NOTES:

* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m^2 (27.9 gpm/ft^2) FOR STORMCEPTOR EF6 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO6 (OIL CAPTURE CONFIGURATION).

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EFO6				
STRUCTURE ID					*
HYDROCARBON STORAGE REQ'D (L)					*
WATER QUALITY FLOW RATE (L/s)					*
PEAK FLOW RATE (L/s)					*
RETURN PERIOD OF PEAK FLOW (yrs)					*
DRAINAGE AREA (HA)					*
DRAINAGE AREA IMPERVIOUSNESS (%)					*
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

MARK	DATE	REVISION DESCRIPTION	BY
####	####	####	####
####	####	####	####
####	####	####	####
1	6/8/18	OUTLET PLATFORM	JSK
0	05/26/17	INITIAL RELEASE	JSK

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Stormceptor® EF

SCALE = NTS

imbrium®

407 FAIRVIEW DRIVE, WHITBY, ON L1N 3A9
TF 800-565-4801 CA 416-960-9900 INTL +1-416-960-9900

DATE: 10/13/2017	
DESIGNED: JSK	DRAWN: JSK
CHECKED: BSF	APPROVED: SP
PROJECT No.: EFO6	SEQUENCE No.: *
SHEET: 1 OF 1	

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Stormceptor

Stormceptor EF Sizing Report

Imbrium® Systems

ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

01/08/2024

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

Site Name:	Canadian North

Drainage Area (ha):	1.48
Runoff Coefficient 'c':	0.83

Project Name:	Canadian North
Project Number:	23069
Designer Name:	Stephen McCaughey
Designer Company:	Robinson Consultants
Designer Email:	smccaughey@rcii.com
Designer Phone:	613-592-6060
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	39.65
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	93.50
Peak Conveyance (maximum) Flow Rate (L/s):	139.90
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	1459
Estimated Average Annual Sediment Volume (L/yr):	1186

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	68
EFO6	82
EFO8	89
EFO10	93
EFO12	96

Recommended Stormceptor EFO Model:	**EFO6**
Estimated Net Annual Sediment (TSS) Load Reduction (%):	**82**
Water Quality Runoff Volume Capture (%):	**> 90**

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

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

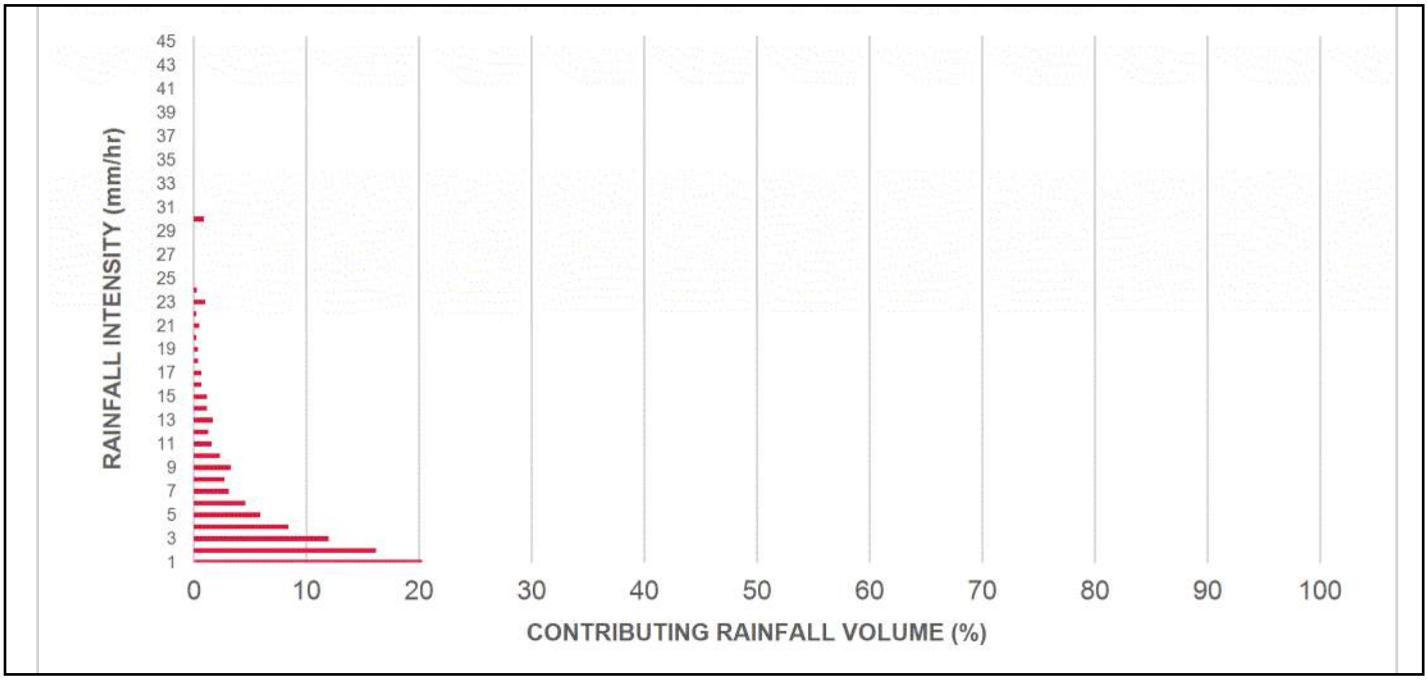
Particle Size (μm)	Percent Less Than	Particle Size Fraction (μm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Upstream Flow Controlled Results

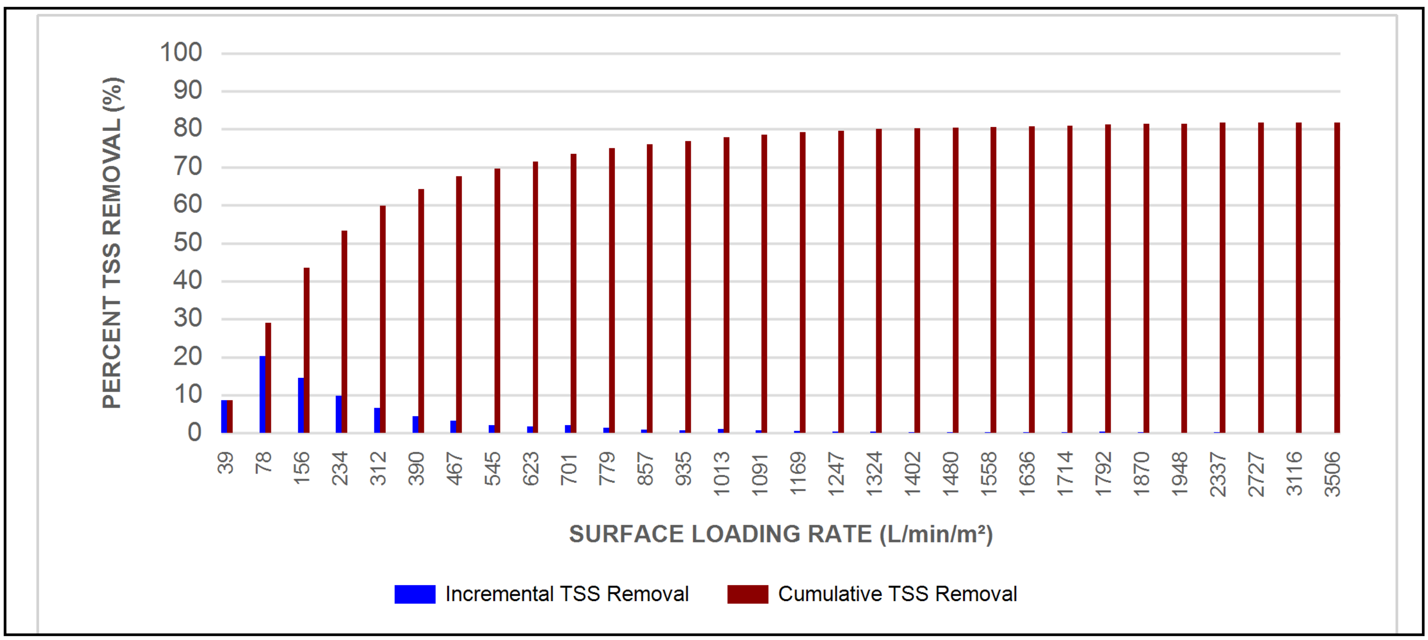
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	1.71	102.0	39.0	100	8.6	8.6
1.00	20.3	29.0	3.41	205.0	78.0	100	20.3	29.0
2.00	16.2	45.2	6.83	410.0	156.0	89	14.5	43.5
3.00	12.0	57.2	10.24	615.0	234.0	82	9.8	53.3
4.00	8.4	65.6	13.66	820.0	312.0	78	6.6	59.9
5.00	5.9	71.6	17.07	1024.0	390.0	74	4.4	64.3
6.00	4.6	76.2	20.49	1229.0	467.0	71	3.3	67.6
7.00	3.1	79.3	23.90	1434.0	545.0	67	2.1	69.6
8.00	2.7	82.0	27.32	1639.0	623.0	64	1.8	71.4
9.00	3.3	85.3	30.73	1844.0	701.0	64	2.1	73.5
10.00	2.3	87.6	34.15	2049.0	779.0	63	1.5	75.0
11.00	1.6	89.2	37.56	2254.0	857.0	63	1.0	76.0
12.00	1.3	90.5	40.98	2459.0	935.0	62	0.8	76.8
13.00	1.7	92.2	44.39	2664.0	1013.0	61	1.1	77.8
14.00	1.2	93.5	47.81	2869.0	1091.0	59	0.7	78.6
15.00	1.2	94.6	51.22	3073.0	1169.0	58	0.7	79.2
16.00	0.7	95.3	54.64	3278.0	1247.0	56	0.4	79.6
17.00	0.7	96.1	58.05	3483.0	1324.0	54	0.4	80.0
18.00	0.4	96.5	61.47	3688.0	1402.0	52	0.2	80.2
19.00	0.4	96.9	64.88	3893.0	1480.0	49	0.2	80.4
20.00	0.2	97.1	68.30	4098.0	1558.0	47	0.1	80.5
21.00	0.5	97.5	71.71	4303.0	1636.0	45	0.2	80.7
22.00	0.2	97.8	75.13	4508.0	1714.0	43	0.1	80.9
23.00	1.0	98.8	78.54	4713.0	1792.0	41	0.4	81.3
24.00	0.3	99.1	81.96	4918.0	1870.0	39	0.1	81.4
25.00	0.9	100.0	85.37	5122.0	1948.0	38	0.4	81.7
30.00	0.0	100.0	94.00	5640.0	2144.0	34	0.0	81.7
35.00	0.0	100.0	94.00	5640.0	2144.0	34	0.0	81.7
40.00	0.0	100.0	94.00	5640.0	2144.0	34	0.0	81.7
45.00	0.0	100.0	94.00	5640.0	2144.0	34	0.0	81.7
Estimated Net Annual Sediment (TSS) Load Reduction =								**82 %**

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

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL
FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

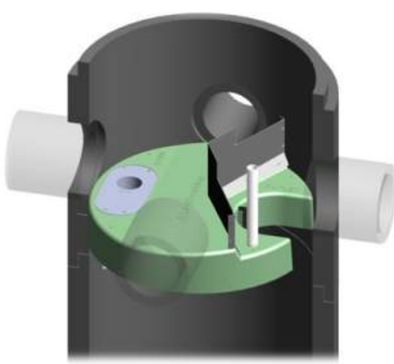
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

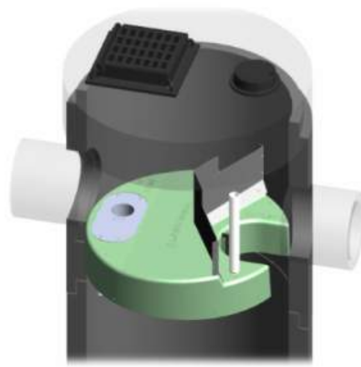
DESIGN FLEXIBILITY

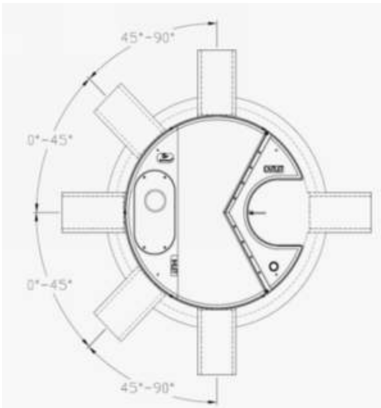
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

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







INLET-TO-OUTLET DROP

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

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

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

HEAD LOSS

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

Pollutant Capacity

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

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

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

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

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

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

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

3.2 SIZING METHODOLOGY

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

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

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

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

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

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

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

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

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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

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