# CHORAC OTTAWA
# 2375 ST. LAURENT BOULEVARD, OTTAWA, ONTARIO

# SERVICING & STORM WATER MANAGEMENT REPORT

April 11, 2023


**REINDERS + LAW LTD.**
64 Ontario Street North
Milton, Ontario, Canada L9T 2T1
Phone: 905-457-1618  Fax: 905-478-8552
www.reinders.ca


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**Appendix C**- Boundary Conditions, FUS Calculations, Fire Hydrant Coverage Map

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## 1.0 Introduction

Reinders + Law Ltd. has been retained by the owner (CHORAC) as engineering / architectural consultants responsible for the preparation of functional servicing and storm water management study in support of obtaining site plan approval for the proposed development at 2375 St. Laurent Boulevard.

The total site area is approximately 0.66 ha. Currently, the site is undeveloped and consists of an open grassed area. The proposal is to develop a single storey, church facility including an assembly area. The site will include an associated surface level parking lot. The site will be accessed with one new entrance driveway from St. Laurent Boulevard.

## 1.1 Statement of Objectives and Servicing Criteria

The objective of this Servicing and Stormwater Management Report is to demonstrate that the proposed design meets the servicing requirements for the proposed development, while adhering to the appropriate regulatory requirements.

## 1.2 Location Map and Plan

The location of the site is illustrated in Figure 1. A detailed site layout is provided within the drawings in **Appendix A**.


Figure 1 – Location Plan.

Proposed grading, servicing and erosion & control plans are shown on the drawings included in **Appendix A.**

## 1.3 Background Documents

Existing conditions are shown on the Topographic and Legal Survey (**Appendix G**).

## 1.4 Consultation and Permits

### 1.4.1 Pre-consultation Meetings

A pre-consultation meeting was held with the City of Ottawa in April 2021. The comments related to site servicing are summarized as follows;

**Stormwater Management**

- There is an available 1050 mm diameter concrete storm trunk sewer located on St. Laurent Blvd.
- Existing maintenance hole is available for potential connection.
- Per the RVCA, the downstream outlet to a watercourse for stormwater is less than 1km from the site, therefore, a water quality objective of enhanced (80% TSS removal) is required. LID measures are encouraged into the stormwater management plan.
- The pre-development runoff coefficient or a maximum equivalent 'C' of 0.50.
- Time of concentration (Tc) = 10 minutes
- Post development 100-year storm flows to be controlled to pre development 5-year storm event.

**Watermain**

- There is an available 305 mm diameter DI watermain located on St. Laurent Blvd.
- Existing water stub on north east side of the property requires check whether it is feasible to re-use this service, or whether a new lateral is required.
- Water boundary condition request must include the location of the service connection and the expected loads required by the proposed developments.
- Determine the total water demand based on maximum daily demand and required fire flow as per FUS,199 for water boundary conditions.
- Fire Hydrant Locations.
- Water supply redundancy is required for a water demand exceeding 50 $m^3$ per day.

**Sanitary Sewer**

- There is an available 300 mm diameter concrete sanitary sewer located on St. Laurent Blvd.
- Sanitary Control Manhole is required at the property.
- The sanitary demand needs to be coordinated with the City Planning Dept. to determine if the existing sanitary sewer system has sufficient capacity to support the proposed rezoning.
- The requirement of an approval for sewage works from Ministry of Environment, Conservation and Parks Environmental Compliance Approval (MECP ECA) will be determined. An ECA will be required where the stormwater management services more than one property parcel.

**General Service Design**

- All new services be located within the existing service trench to minimize necessary road cuts.

- Monitoring manholes should be located within the property near the property line in an accessible location to City forces and free from obstruction (i.e. not a parking).
- Where service length is greater than 30 m between the building and the first maintenance hole / connection, a cleanout is required.

The full comments regarding site-servicing and stormwater management-specific requirements can be found in **Appendix B**.

## 1.5 Available Existing Infrastructure

Sewer and watermain mapping collected from the City of Ottawa indicate that the following services exist across the property frontage on St. Laurent Boulevard.

- 305 mm diameter DI watermain
- 1050 mm diameter Conc. storm sewer
- 300 mm diameter Conc. sanitary sewer

Currently, the property is not served by sanitary and storm service connections. The existing water stub at the property development will be used for proposed building connection.

## 2.0 Geotechnical Study

A Geotechnical Investigation was completed by Pinchin Ltd., Revised Geotechnical Investigation, Pinchin File 314869, April 6, 2023.

A total of 3 boreholes were drilled to a maximum depth of 9.75 – 14.88 m below the existing ground surface. The subsurface profile at the borehole locations consists of 150mm topsoil layer underlain by deposit of silty clay deposit up to 9.75 m. Silt clay deposit is underlain by glacial till at about 13.4 m below existing ground surface.

Groundwater was encountered at depths of 2.6 to 4.3 m below the existing ground surface.

The geotechnical report provides recommendations for foundation, excavation, backfill, pavement structure and pipe bedding and backfill.

## 3.0 Water Service

## 3.1 Design Criteria

The water service will be designed in accordance with the 2010 City of Ottawa Water Design Guidelines.

The required water demand and pressure design parameters for the development has been calculated based in Table 1:

**Table 1– Summary of Water Demand Parameters**

| Design Parameter | Value |
|---|---|
| | **Residential** |
| Average Daily Demand | 30 L/d/P[1] |
| Max. Daily Peaking Factor | 1.5 x Average Daily[2] |
| Max. Hourly Peaking Factor | 1.8 x Max. Daily[2] |
| Minimum Watermain Size | 200mm diameter |
| Minimum Depth of Cover | 2.4m from top of watermain to finished grade |
| Min. pressure during normal operating conditions | 345kPa |
| Max. pressure during normal operating conditions | 552kPa |
| Min. pressure during maximum hourly demand | 276kPa |
| Min. pressure during maximum daily demand + fire flow | 140kPa |
| [1] Daily average based on Appendix 4-A from city design guidelines<br>[2] Institutional Max. Daily and Max. Hourly peaking factors per city design guidelines | |

## 3.2 Water Demand

Church Building GFA = 1498.4 $m^2$ (0.15 ha)
No. of Seats = 239 (As per Architect)
Daily Average Water Demand = 239 x 30 l/cap/day = 7,170 L/Day = 0.083 L/sec
Maximum Daily Demand = 0.083 x 1.5 = 0.124 L/sec
Maximum Hourly Demand = 0.124 x 1.8 = 0.223 L/sec
The water demand/fire flow for the development based on the Ottawa Design Guidelines (2010 incl. Technical Bulletins) and the Fire Underwriters Survey (1999) is summarized below;

**Table 2– Summary of Water Demand Calculations**

| Design Parameter | Water Demand (L/s) |
|---|---|
| | **Residential** |
| Average Daily Demand | 0.083 |
| Maximum Daily Demand | 0.124 |
| Maximum Hourly Demand | 0.223 |
| Fire Flow | 83.00 |
| Total Max Daily Demand + Fire Flow | 83.124 |

Fire flow calculations, Fire hydrant coverage map (**DR3**) are provided in **Appendix C**.

The existing 200 mm diameter water stub at property limit is extended up to building for service connection. Refer **Drawing SP3** for details.

## 3.3 Adequacy of Supply for Domestic and Fire Flows

Preliminary water demands and fire flow requirements for the proposed development were provided to the City of Ottawa (Table 2). The City of Ottawa was contacted to obtain boundary conditions associated with the estimated water demand, as indicated in the boundary request correspondence included in **Appendix B**.

The City provided both the anticipated minimum and maximum water pressures, as well as, the estimated water pressure during fire flow, as indicated by the correspondence and results of boundary conditions (**Appendix C**).

Fire flow calculated using the ISTDB-2018-02 method used the following assumptions from the Architect:

- Type of construction – Ordinary;
- Occupancy type – Limited Combustibility;
- Sprinkler Protection – Automatic

The above assumptions result in a maximum estimated fire flow of approximately 5,000 L/min. See **Appendix C** for detailed calculations using the ISDTB-2018-02 method. The minimum and maximum pressures fall within the required range identified in Table 1.

**Table 3 - Results from Boundary Condition Analysis**

| Design Scenario | Head (m) | Pressure (psi) |
|---|---|---|
| Maximum HGL | 124.7 | 58.59 |
| Peak Hour | 130.2 | 66.41 |
| Maximum Day plus Fire | 125.8 | 60.15 |

Ground Elevation = 83.50

It was concluded that fire hydrants available within the 75m radius from the proposed development are shown on Fire hydrant coverage map **DR03**, **Appendix C**. Two fire hydrants rated AA (blue top) having 5700 l/min flow available from each hydrant, thus providing a total flow of 11,440 l/min within the 75m radius. Therefore, the required demand of 83.12 l/sec (5000 l/min) will be met by the two existing hydrants.

## 3.4 Pressure Check

The site is within Pressure Zone 2W2C, which operates at a maximum head of 115 m (City of Ottawa

Water Master Plan, 2013). This would result in a maximum pressure above the finished floor elevation of approximately 519kPa, which falls under the maximum 552kPa defined in the guidelines.

The average day pressures throughout the system are below 552 kPa (Refer **Appendix C**), therefore pressure reducing valves are not required.

## 3.5 Reliability Requirements

A shut off valve for the water service will be provided at the property line.

## 3.6 Water Supply Conclusion

The existing water stub at property limit is proposed to be extended up to building for service.

The anticipated water demand was submitted to the City of Ottawa for establishing boundary conditions. The City provided both the anticipated minimum and maximum water pressures, as well as, the estimated water pressure during fire flow. As demonstrated by Table 2 & 3, based on the City's model, the municipal system is capable of delivering water within the pressure range prescribed in the Water Supply Guidelines.

The required fire and domestic flow can be met with the two existing hydrants on St. Laurent Boulevard.

The available pressure during the fire flow scenario as per the OBC and ISDTB-2018-02 calculations exceeds 140 kPa. The proposed water supply design conforms to all relevant City Guidelines and Policies.

## 4.0 Sanitary Service

### 4.1 Sanitary Flows

The sanitary service will be designed in accordance with the 2010 City of Ottawa Water Design Guidelines.

The estimated sanitary flows for the development have been calculated based on design parameters as defined in Table 4.

**Table 4 - Summarization of Sanitary Servicing Design Parameters**

| Design Parameter | Value |
|---|---|
| Average Daily Flow | 30 L/d/P |
| Institutional Peaking Factor | 1.5 |
| Infiltration and Inflow Allowance | 0.28 L/ha/s |
| Manning's Coefficient 'n' | 0.013 |
| Minimum Depth of Cover | 2.5m from obvert of sewer to grade |
| Minimum Full Flowing Velocity | 0.6m/s |
| Maximum Full Flowing Velocity | 3.0m/s |
| As per Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012 incl. all Tech. Bulletins as of November 2019 | |

No. of Seats = 239 (As per Architect)

Average sanitary flow = 239 x 30 l/cap/day = 7,170 L/Day = 0.083 L/sec

Peak sanitary flow = 0.083 x 1.5 = 0.124 L/sec

Catchment Area = 0.66 ha (Refer sanitary drainage plan **DR4** attached in **Appendix D**)

Infiltration Allowance = 0.28 x 0.66 l/day = 0.185 l/sec

Total Peak Sanitary Flow = 0.124 + 0.185 = 0.31 l/sec.

A 200 mm diameter sanitary service connection is proposed for the development. Refer **Drawing SP3** for details.

## 4.2 Effect of Proposed Development on Downstream Sanitary Infrastructure

As per sanitary flow calculations, an additional flow of 0.31 l/sec is added to the existing 300 mm sanitary sewer on St. Laurent Boulevard. The existing 300 diameter sanitary sewer has the capacity to accommodate the projected sanitary flows. Refer sanitary design sheet attached in **Appendix D**.

## 4.3 Summary and Conclusions

A 200 mm diameter sanitary service connection is proposed. An additional flow of 0.31 l/sec is added to the existing sanitary sewer which is considered a minor addition that will not compromise sanitary sewer capacity or result in significant change to the sanitary hydraulic grade line.

# 5.0 Storm Servicing and Stormwater Management

## 5.1 Background

The existing site does not have a piped storm connection. The site sheet drains towards existing catch basin on St. Laurent Boulevard without any storm water management controls.

## 5.2 Storm Servicing Strategy

The proposed stormwater management system will provide the necessary detention storage on site to meet the stormwater management requirements. Quantity control will be provided to control the post development 100-year flows to pre development 5-year storm event flows.

## 5.3 Proposed Storm Servicing

The storm network is proposed to collect the site flows and outlet to the existing 1050 mm storm sewer on St. Laurent Boulevard. Refer **Drawing SP3** for details. Storm design sheet is attached in **Appendix E**.

The proposed pre-development and post-development catchment areas, runoff coefficients and catchment total areas are indicated in **Appendix E**.

## 5.4 Design Criteria (Minor and Major Systems)

The site specific SWM criteria are as follows,

- Minor site storm is designed for 5-year return period.
- Rational method is used to calculate pre and post development flows

Rational Method (Q) = 2.78CIA, where

Q = peak flow (L/s)

C = runoff coefficient

I = rainfall intensity

Intensity is calculated by the following formulae, $i = \frac{A}{(T_d + C)^B}$

where A, B and C are all factors of the IDF Return Period, $T_d$ being the time of concentration and A the drainage area (Detailed calculations provided in **Appendix E**).

Time of concentration is determined using the inlet time graph (Appendix 5D Ottawa City Sewer Design Guidelines) which results in a value less than 10 minutes. Therefore 10 minutes will be used to calculate peak flows.

## 5.5 Stormwater Quantity Control

### 5.5.1 Catchment Areas

The whole site is considered as one catchment based on proposed development and grading. Catchment Area (A1 - 0.66 ha) consists of building footprint and parking area. Area A1 will be controlled and outlet to existing storm network on St. Laurent Boulevard.

In predevelopment conditions, the whole site runoff is flowing uncontrolled. After development site run off will be controlled to pre-development flows. In proposed development conditions, the uncontrolled area is marked as A2 and 100 year post development flows of Area A2 are reduced from allowable release rate.

Pre and post development drainage area plans are attached as DR1 and DR2 in **Appendix A**. Pre and post development runoff coefficients are calculated as detailed in **Appendix E**.

The pre and post development runoff coefficients are summarised in Table 5.1 below;

**Table 5.1– Pre and Post Development Runoff Coefficients**

| Conditions | Area (ha) | Runoff Coefficient (R) |
|---|---|---|
| Pre Development | 0.66 | 0.25 |
| Post Development | 0.66 | 0.71 |

### 5.5.2 Peak Flows

Pre and post development flows are calculated as detailed in **Appendix E**.

Table 5.2 below summarize the pre and post developments uncontrolled and controlled flows with storage requirements.

**Table 5.2– Allowable Flow and Storage Summary**

| Return Period | Uncontrolled Pre Development Flow | Uncontrolled Post Development Flow | Controlled Post Development Flow | Storage Required |
|---|---|---|---|---|
| (years) | (liters/sec) | (liters/sec) | (liters/sec) | ($m^3$) |
| $Q_5$ | 47.62 | 135.31 | 46.35 | 48 |
| $Q_{100}$ | 102.02 | 289.85 | 46.35 | 196* |

* *Maximum storage required.*

### 5.5.3 Allowable Flow/Orifice Control

5 year Predevelopment Flow = 47.62 l/sec

100 year Post development flows (Uncontrolled Area A2) = 1.27 l/sec (Refer Appendix E)

Allowable release Flow = 47.62 -1.27 = 46.35 l/sec

To ensure that only allowable flow of 46.35 l/sec is released from the project area, a 110 mm diameter orifice plate is proposed to be installed downstream of storm manhole CBMH2. The orifice sizing calculations are attached in **Appendix E**. A stage-storage-discharge sheet showing the outflow from the storm sewer system at varying water levels is also attached in **Appendix E.**

### 5.5.4 Onsite Storage

An allowable flow of 46.35 l/sec has been used for storage calculations using Rational formula. The calculation of required onsite storage volume is given in **Appendix E**.

The required onsite storage is summarized for 5-year and 100-year storms (Refer Table 5.2 above). The maximum onsite storage volume of 196 $m^3$ is required to control 100-year post development site flows to 5-year pre development level.

Parking Detention

Parking surface has the potential to provide 180.79 $m^3$ of detention storage with a 280 mm maximum storage depth for 100-year rainfall event (Refer **Drawing SP4**).

Storm Network Storage

Storm network (pipes, manholes & catch basins) has 28.87 $m^3$ available storage (Refer **Appendix E**).

Therefore, total available storage is (180.79+28.87) = **209.66 $m^3$** which is higher than the required storage of **196 $m^3$**

### 5.5.5 Impact on Existing Storm Infrastructure

The onsite quantity controls limit the site discharge to 46.35 l/sec (5-year predevelopment) to ensure that the downstream storm sewers capacity and hydraulic grade line is not affected by the proposed development.

Storm Sewer Design calculations are provided in **Appendix E**.

## 5.6 Storm Water Quality Control

The required water quality treatment is achieved with the help of a treatment train approach comprising of the following measures,

1- RVCA considers run-off from building roof areas to be "clean", and therefore not require quality control.

2- Oil/grit separator (OGS) has been proposed as Stormceptor EFO4 unit shown on **Drawing SP3**, **Appendix A**. The sizing calculations are attached in **Appendix E** which shows that the unit is capable of achieving 84% TSS removal for site flows.

## 5.7 MECP and Conservation Authority Approvals

MECP approval and ECA will not be required for the proposed design.

## 5.8 Minor and Major Systems

The minor storm sewer system consists of the site storm network up to the city storm sewer on St. Laurent Boulevard. The major system consists of run-off from storms in excess of the 100-year event. The site has been graded to direct run-off from storms in excess of the 100-year event safely to St. Laurent Boulevard. The overland flow routes are shown on **Drawing SP4**.

## 5.9 Impacts to Receiving Watercourses

No negative impacts to receiving watercourses are anticipated.

### 5.10 100-year Flood Levels and Major Flow Routing

The site is not within a 100-year floodplain.

## 6.0 Grading

The proposed grading plan is shown on **Drawing SP4**. The development will be tied into existing grades along St. Laurent Boulevard.

The existing grades will be matched at the property limits along the adjacent property boundary.

## 7.0 Erosion and Sediment Control

During all construction activities, erosion and sedimentation shall be controlled by the following techniques:

- Extent of exposed soils shall be limited at any given time;
- Exposed areas shall be re-vegetated as soon as possible;
- Minimize the area to be cleared and disruption of adjacent areas;
- Silt sack or approved equivalent shall be installed inside all catch basins, catch basin manholes, and storm manholes as identified on the erosion and sediment control plan;
- Mud matt is required at the construction entrance to prevent mud tracking on municipal roads. Mud matt to be installed and maintained as indicated on the erosion and sediment control plan;
- Visual inspection shall be completed daily on sediment control barriers and any damage repaired immediately. Care will be taken to prevent damage during construction operations;
- In some cases, barriers may be removed temporarily to accommodate the construction operations. The affected barriers will be reinstated at night when construction is completed;
- Sediment control devices will be cleaned of accumulated silt as required. The deposits will be disposed of as per the requirements of the contract;
- During construction, if the engineer believes that additional prevention methods are required to control erosion and sedimentation, the contractor will install additional silt fences or other methods as required to the satisfaction of the engineer; and,
- Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification (OPSS) 805.

We trust you will find this submission complete and in order. Should you have any questions, please contact the undersigned.

Respectfully submitted,

**Reinders + Law Ltd.**


Yasar Ayub, M.Eng., P.Eng.
Senior Municipal Engineer
905-457-1618 x 1324

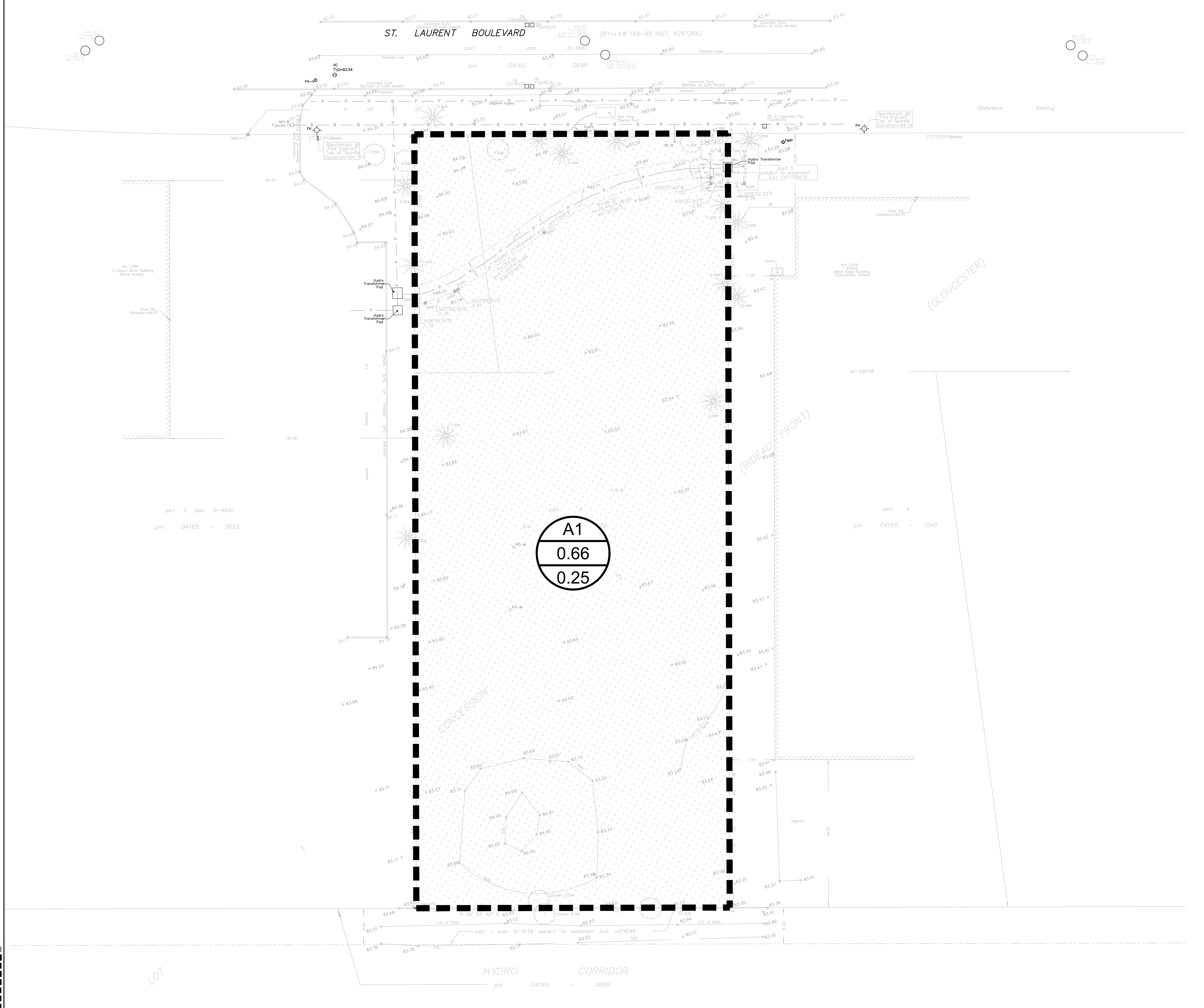
Appendix A

# Figures

DR01 Pre Development Drainage Areas

DR02 Post Development Drainage Areas

Site Servicing, Grading and Erosion and Sediment Control Plan

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*TOPOGRAPHICAL PLAN OF SURVEY*

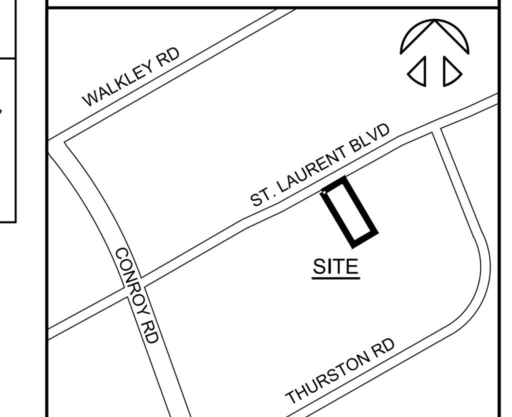
PART OF LOT 1
CONCESSION 5 (RIDEAU FRONT)
Geogaphic Township of Nepean
CITY OF OTTAWA
Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

Plan Amended September 7, 2017 to illustrate additional services.

| OWNERS | APPLICANT |
|---|---|
| OWNERS NAME The CornerStone House of Refuge Apostolic Church (CHORAC)<br>ADDRESS<br>1196 Wellington St West, Ottawa, ON. K1Y 2Z5<br>(613) PHONE #: 725-1432 | REINDERS + LAW LTD.<br>64 ONTARIO STREET NORTH, MILTON ON L9T 2T1<br>P (905)457-1618<br>F (905)457-8852 |

TRUE NORTH

CONSTRUCTION NORTH



KEY PLAN (N.T.S)

LEGEND:

CATCHMENT AREA BOUNDARY

A1 — CATCHMENT AREA No.

0.25 — CATCHMENT AREA IN HECTARES.

0.76 — WEIGHTED RUN-OFF COEFFICIENT

| no. | revisions | date | init. |
|---|---|---|---|
| 0 | ISSUED FOR APPROVAL | 10/12/2022 | YA |



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date plotted 12/7/2022 plot scale 1:1

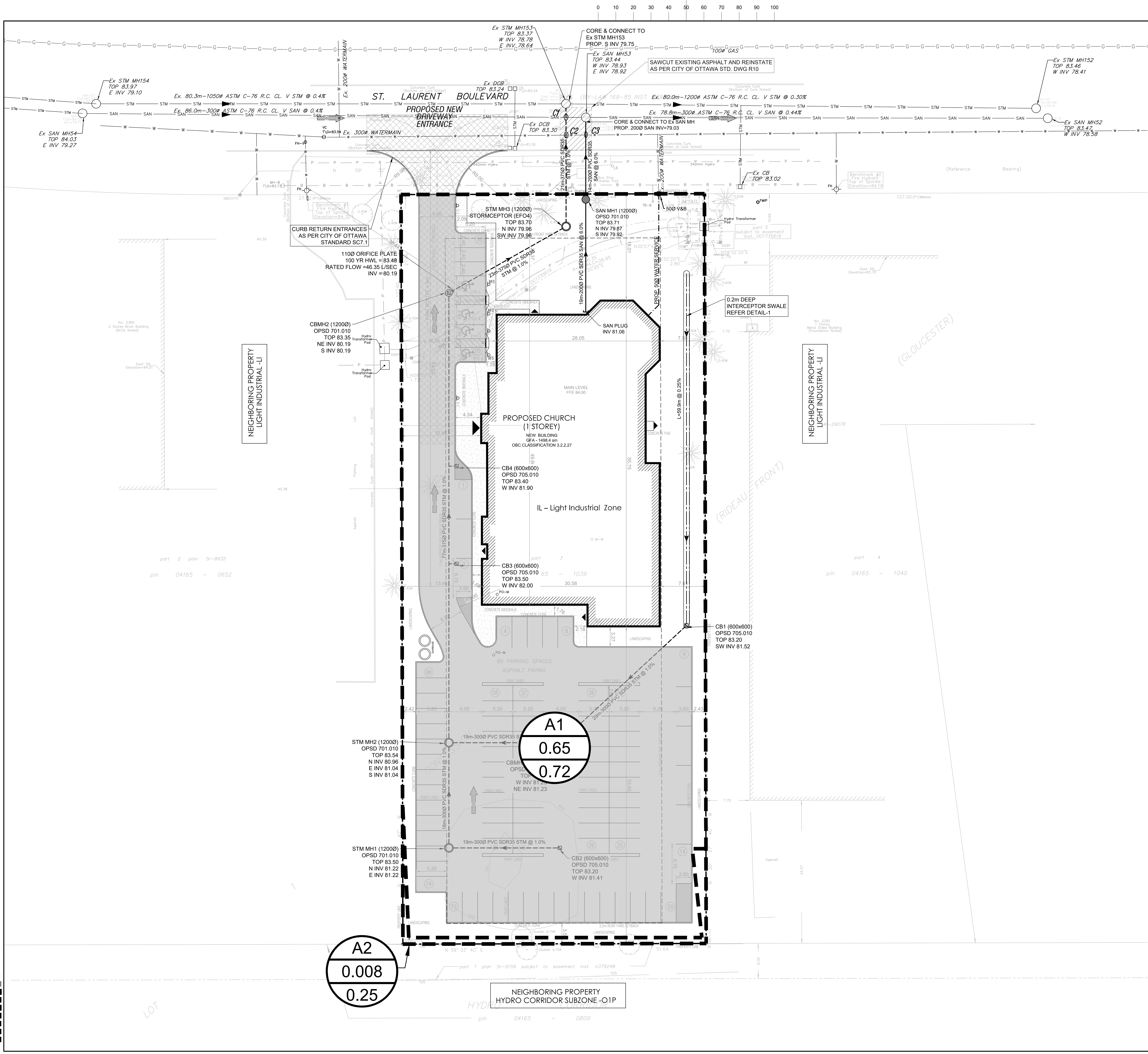
drawn CC
designed YA
reviewed YA
date 12/7/2022
scale 1:300

project
CHORAC OTTAWA
2375 ST. LAURENT BLVD
OTTAWA, ON

drawing
PRE DEVELOPMENT DRAINAGE PLAN


REINDERS + LAW
ARCHITECTURE . ENGINEERING
REINDERS + LAW LTD.
ARCHITECTURE . ENGINEERING
64 ONTARIO STREET NORTH
MILTON, ON L9T 2T1
T. 905.457.1618 F. 905.457.8852
EMAIL@REINDERS.CA WWW.REINDERS.CA


drawing no. 20037_DR1
rev. no. 0

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TRUE NORTH

CONSTRUCTION NORTH

WALKLEY RD
ST. LAURENT BLVD
SITE
CONROY RD
THURSTON RD
KEY PLAN (N.T.S)

LEGEND:

CATCHMENT AREA BOUNDARY
CATCHMENT AREA No.
CATCHMENT AREA IN HECTARES.
WEIGHTED RUN-OFF COEFFICIENT

A1
0.66
0.71

| no. | revisions | date | init. |
|---|---|---|---|
| 1 | ISSUED FOR APPROVAL | 12/07/2022 | YA |
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reviewed YA
date 2/6/2023
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2375 ST. LAURENT BLVD
OTTAWA, ON

drawing
POST DEVELOPMENT DRAINAGE PLAN

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64 ONTARIO STREET NORTH
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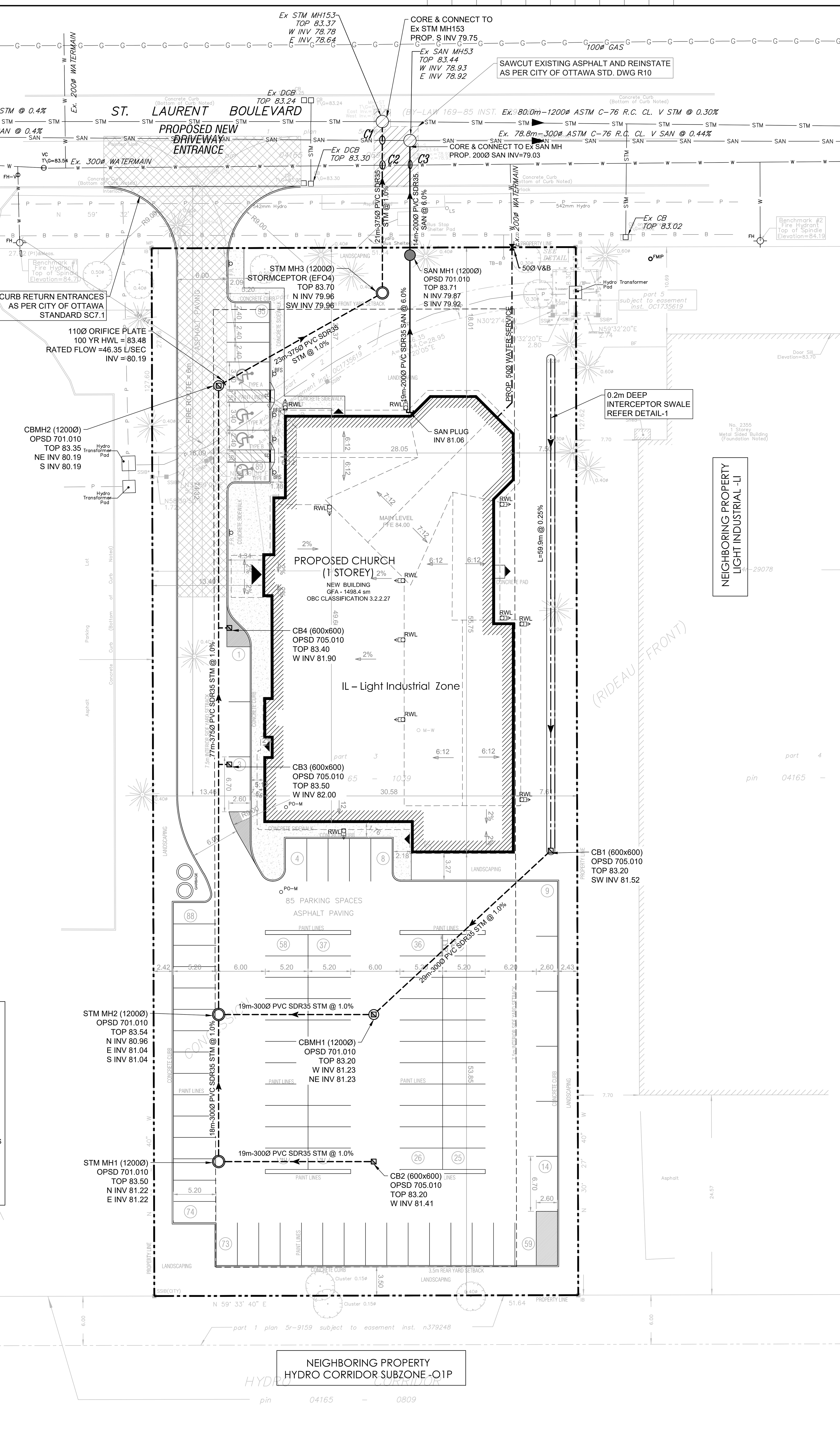
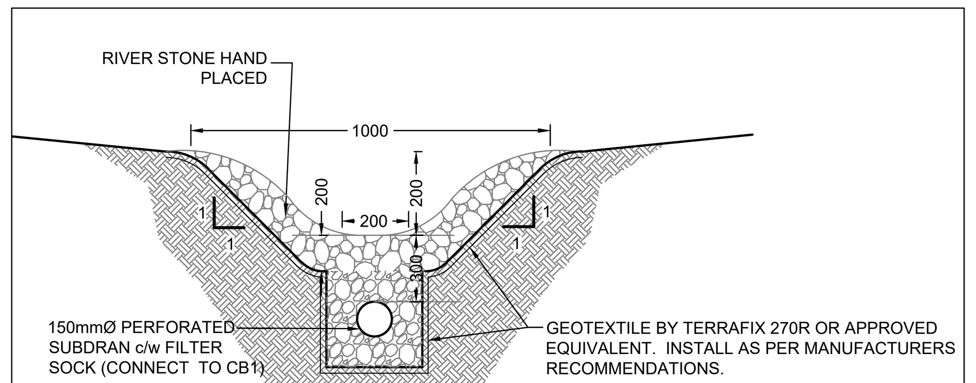



| SERVICE CROSSING TABLE | | | | |
|---|---|---|---|---|
| CROSSING NO. | SERVICES | INVERT/ OBVERT | | CLEARANCE (m) |
| C1 | PROP 375mmØ STORM | 79.77 | (INV) | 0.53 |
| | Ex 300mmØ SANITARY | 79.24 | (OBV) | |
| C2 | PROP 375mmØ STORM | 80.38 | (OBV) | 0.53 |
| | Ex 300mmØ WATERMAIN | 80.90 | (INV) | |
| C3 | PROP 200mmØ SANITARY | 79.41 | (OBV) | 1.59 |
| | Ex 300mmØ WATERMAIN | 81.00 | (INV) | |




DETAIL-1 (DRAINAGE SWALE)
ALL DIMENSIONS IN MILIMETERS

SHEET SIZE: A1 609.6mm X 914.4mm

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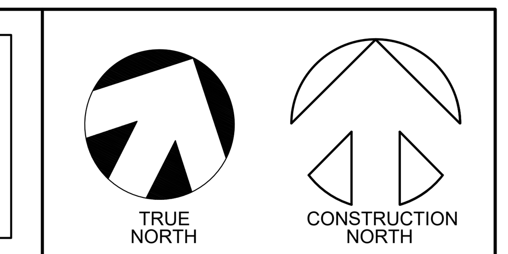
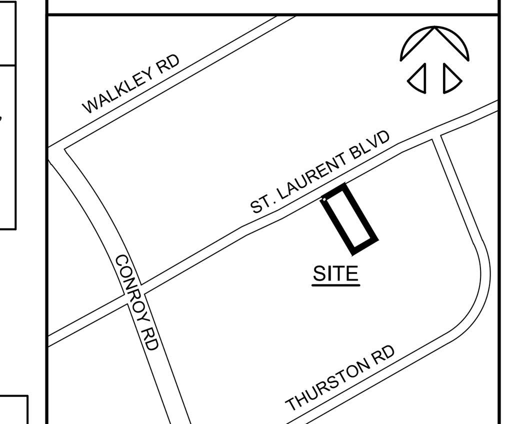
Geogaphic Township of Nepean
CITY OF OTTAWA
Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

Plan Amended September 7, 2017 to illustrate additional services.

| OWNERS | APPLICANT |
|---|---|
| **OWNERS NAME The CornerStone House of Refuge Apostolic Church (CHORAC)**<br>ADDRESS<br>1196 Wellington St West, Ottawa, ON. K1Y 2Z5<br>(613) PHONE #: 725-1432 | **REINDERS + LAW LTD.**<br>64 ONTARIO STREET NORTH, MILTON ON L9T 2T1<br>P (905)457-1618<br>F (905)457-8852 |




KEY PLAN (N.T.S)

## LEGEND:

- PROPERTY LINE
- BUILDING SETBACK LINE
- PROPOSED FIRE ROUTE (USING HEAVY DUTY PAVING)
- HEAVY DUTY PAVING
- LIGHT DUTY PAVING
- CONCRETE PAD OR SIDEWALK
- PROPOSED CONCRETE CURB
- C/C OR D/C — PROPOSED CONCRETE CURB WITH CURB CUT OR DEPRESSED CURB
- NEW BUILDING AREA (FOOTPRINT)
- PRINCIPAL ENTRANCE TO THE BUILDING
- BARRIER FREE LOGO (PAVED ON ASPHALT)
- EXISTING MANHOLE
- EXISTING CATCH BASIN
- EXISTING DOUBLE CATCH BASIN
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE
- VC T\G=83.54 — EXISTING VALVE CHAMBER FOR WATERMAIN
- FH-V — EXISTING FIRE HYDRANT VALVE
- PROPOSED SANITARY MANHOLE
- PROPOSED STORM MANHOLE
- PROPOSED CATCH BASIN MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED VALVE & BOX
- G — EXISTING GAS
- P — EXISTING UNDERGROUND POWER
- B — EXISTING UNDERGROUND BELL
- W — EXISTING WATER PIPE
- SAN — EXISTING SANITARY PIPE
- STM — EXISTING STORM PIPE
- PROPOSED WATER PIPE
- PROPOSED SANITARY PIPE
- PROPOSED STORM PIPE
- C2 — PIPE CROSSING
- RWL — RAIN WATER LEADER
- 6:12 — SLOPE ROOF DOWN IN DIRECTION INDICATED

## STORM AND SANITARY SEWERS

1. SANITARY AND STORM SEWER MATERIALS AND INSTALLATION SHALL CONFORM TO THE CURRENT CITY OF OTTAWA STANDARD DRAWINGS AND SPECIFICATION AND OPSS 407 AND 410.
2. SEWER BEDDING AS PER CITY STANDARD S6 & S7.
3. ALL SANITARY SEWERS ARE TO BE SIZES INDICATED AND THE MATERIAL SHALL BE PVC SDR35.
4. ALL STORM SEWERS ARE TO BE SIZES INDICATED AND THE MATERIAL SHALL BE PVC SDR35 OR REINFORCED CONCRETE IN ACCORDANCE WITH CSA STANDARDS A257.2 AND A257.3 (JOINTS).
5. ALL MANHOLES , CATCHBASINS AND CATCHBASIN MANHOLES TO BE BACKFILLED WITH MIN. 0.3m HORIZONTAL THICKNESS GRANULAR 'A'.
6. SUPPLY AND INSTALL ALL PIPING AND APPURTENANCES AS SHOWN TO WITHIN 1.0m OF BUILDING WALLS AND PROVIDE TEMPORARY CAPS.
7. THE CONTRACTOR SHALL CONDUCT INFILTRATION/EXFILTRATION (AS PER CURRENT OPSS) TESTING ON ALL NEWLY INSTALLED SANITARY SEWERS. THE TEST SHALL BE PERFORMED IMMEDIATELY AFTER SEWER INSTALLATION AND SUPERVISED BY THE ENGINEER.
8. THE CONTRACTOR SHALL CONDUCT CCTV INSPECTION OF ALL NEWLY INSTALLED STORM AND SANITARY SEWERS AND EXISTING SEWERS CONNECTED TO. THE TEST SHALL BE PERFORMED IMMEDIATELY AFTER SEWERS INSTALLED AND SUPERVISED BY THE ENGINEER.
9. ALL SERVICE CONNECTIONS TO BE CONSTRUCTED AS PER CITY STANDARD S11 & S11.1.
10. ALL SANITARY BUILDING DRAINS TO BE EQUIPPED WITH SANITARY BACKWATER VALVES INSTALLED PER CITY OF OTTAWA STANDARD DRAWING S14.1
11. MINIMUM SOIL COVER TO BE 2.0m TO PROTECT SEWERS FROM FROST DAMAGE. IN AREAS WHERE ADEQUATE COVER CANNOT BE ACHIEVED, THERMAL INSULATION TO BE INSTALLED AS PER OPSD 514.010.
12. THE PROPER BENCHING IS TO BE PROVIDED IN ALL MANHOLES AS PER SDG 6.2.12

## WATERMAIN

1. ALL WATERMAIN AND WATER SERVICE MATERIALS AND INSTALLATION SHALL CONFORM TO THE CURRENT CITY OF OTTAWA STANDARD DRAWINGS AND SPECIFICATIONS.
2. ALL WATERMAIN TO BE INSTALLED AT MINIMUM COVER OF 2.4m. THERMAL INSULATION SHALL BE INSTALLED WHERE ADEQUATE SEPARATION CANNOT ACHIEVED AS PER CITY STANDARD W21, W22 AND W23.
3. ALL WATERMAIN WORK AND MATERIAL SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS. NO WORK SHALL COMMENCE UNLESS A CITY WATER WORKS INSPECTOR IS ON SITE. WATERMAIN CONNECTIONS BY CITY OF OTTAWA FORCES WITH ALL EXCAVATION BACKFILL AND ROAD REINSTATEMENT BY CONTRACTOR.
4. WATERMAIN IS TO BE PVC DR18 WITH TRACER WIRE AS PER CITY OF OTTAWA STANDARD W36 UNLESS OTHERWISE NOTED.
5. VALVE BOXES AS PER CITY OF OTTAWA DETAIL W24.
6. ALL FIRE HYDRANTS TO BE INSTALLED AS PER CITY STANDARD W19 AND LOCATED AS PER CITY STANDARD W18 AND/OR CITY STANDARD CROSS SECTIONS.
7. WATERMAIN BEDDING IS TO BE AS PER CITY OF OTTAWA DETAIL W17.
8. THRUST BLOCKS AND RESTRAINT AS PER CITY OF OTTAWA DWGS: W25.3, W25.4, W25.5 AND W25.6.
9. CATHODIC PROTECTION REQUIRED FOR ALL IRON FITTINGS PER CITY OF OTTAWA DWGS W389,W40, W41.
10. IF WATERMAIN MUST BE DEFLECTED TO MEET ALIGNMENT, ENSURE THAT THE AMOUNT OF DEFLECTION USED IS LESS THAN HALF THAT RECOMMENDED BY THE MANUFACTURER.
11. DISINFECTION AND TESTING OF WATERMAIN TO BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS.
12. WATER SERVICES TO BE INSTALLED AS PER CITY OF OTTAWA STANDARD W26 AND W35.
13. WITHIN THE FROST ZONE, THE BACKFILL IN THE SERVICE TRENCHES SHOULD MATCH THE SOIL ON SIDES TO MINIMIZE DIFFERENTIAL FROST HEAVING IN THE SUBGRADE.
14. INSTALLATION OF WATER METER AND REMOTE RECEPTACLE SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS.
15. GATE VALVE TO BE INSTALLED INSIDE THE WATER ROOM OF THE EXISTING BUILDING FOR THE PHASE 2 WATER SUPPLY AND SHALL REMAIN CLOSED UNTIL PHASE 2 IS COMMISSION TO ENSURE NO STAGNANT WATER RESIDES WITHIN THE SERVICE STUB.
16. BACKFLOW VALVE TO BE INSTALLED TO PREVENT CROSS-CONNECTION BETWEEN WELL AND MUNICIPAL WATER SUPPLIES.

| no. | revisions | date | init. |
|---|---|---|---|
| 2 | ISSUED FOR APPROVAL | 02/06/2023 | YA |
| 1 | ISSUED FOR APPROVAL | 12/13/2022 | YA |
| 0 | ISSUED FOR APPROVAL | 02/14/2022 | YA |



cad file 20037_SP3
date plotted 2/6/2023 plot scale 1:1

LICENSED PROFESSIONAL ENGINEER
Y.AYUB
FEB 06,23
PROVINCE OF ONTARIO

drawn CC
designed YA
reviewed YA
date 2/6/2023
scale 1:300

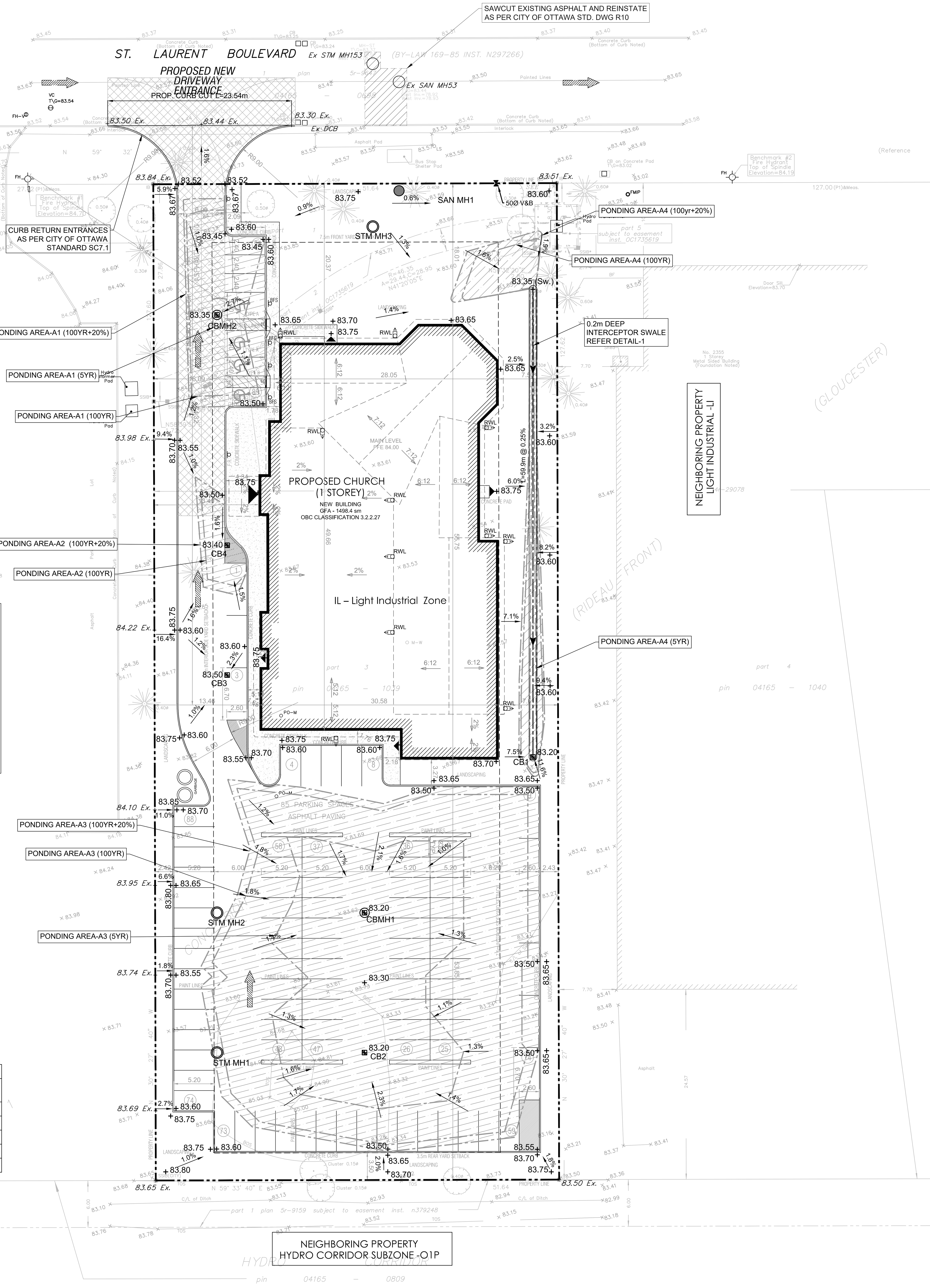
project
CHORAC OTTAWA
2375 ST. LAURENT BLVD
OTTAWA, ON

drawing
SITE SERVICING PLAN

PLAN#18738
007-12-22-0061

REINDERS +LAW
ARCHITECTURE.ENGINEERING
REINDERS + LAW LTD.
ARCHITECTURE.ENGINEERING
64 ONTARIO STREET NORTH
MILTON, ON L9T 2T1
T. 905.457.1618 F. 905.457.8852
EMAIL@REINDERS.CA WWW.REINDERS.CA

drawing no. 20037_SP3
rev. no. 2




## PAVEMENT SPECIFICATION

FOR THE ACCESS ROADWAYS AND PARKING LOTS, THE FOLLOWING MINIMUM PAVEMENT STRUCTURE SHOULD BE USED:

- 100 MILLIMETRES OF HOT MIX ASPHALTIC CONCRETE, OVER
- 150 MILLIMETRES OF OPSS GRANULAR A BASE, OVER
- 450 MILLIMETRES OF OPSS GRANULAR B, TYPE II SUBBASE

THE HOT MIX ASPHALT SHOULD CONSIST OF THE FOLLOWING LAYERS:

- 40 MILLIMETRES OF SUPERPAVE 12.5 (TRAFFIC LEVEL B), OVER
- 60 MILLIMETRES OF SUPERPAVE 19.0 (TRAFFIC LEVEL B)

**PARKING DETENTION-5 YEAR**

| Ponding Area No. | Area (sq.m.) | Depth (m) | Volume (cu.m.) | HWL (m) (5yr) |
|---|---|---|---|---|
| A1 | 5.00 | 0.17 | 0.28 | 83.37 |
| A2 | 0.00 | 0.00 | 0.00 | 83.37 |
| A3 | 700.00 | 0.17 | 39.67 | 83.37 |
| A4 | 30.00 | 0.17 | 1.70 | 83.37 |
| | **TOTAL VOLUME:** | | **41.65** | |

**PARKING DETENTION -100 YEAR**

| Ponding Area No. | Area (sq.m.) | Depth (m) | Volume (cu.m.) | HWL (m) (100yr) |
|---|---|---|---|---|
| A1 | 182.00 | 0.28 | 16.99 | 83.48 |
| A2 | 42.00 | 0.08 | 1.12 | 83.48 |
| A3 | 1599.00 | 0.28 | 149.24 | 83.48 |
| A4 | 144.00 | 0.28 | 13.44 | 83.48 |
| | **TOTAL VOLUME:** | | **180.79** | |

**PARKING DETENTION - 100 YEAR + 20%**

| Ponding Area No. | Area (sq.m.) | Depth (m) | Volume (cu.m.) | HWL (m) (100yr+20%) |
|---|---|---|---|---|
| A1 | 245.00 | 0.30 | 24.50 | 83.50 |
| A2 | 59.00 | 0.10 | 1.97 | 83.50 |
| A3 | 1788.00 | 0.30 | 178.80 | 83.50 |
| A4 | 160.00 | 0.30 | 16.00 | 83.50 |
| | **TOTAL VOLUME:** | | **221.27** | |

SHEET SIZE: A1 609.6mm X 914.4mm

*TOPOGRAPHICAL PLAN OF SURVEY*

PART OF LOT 1
CONCESSION 5 (RIDEAU FRONT)
Geogaphic Township of Nepean
CITY OF OTTAWA
Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

Plan Amended September 7, 2017 to illustrate additional services.

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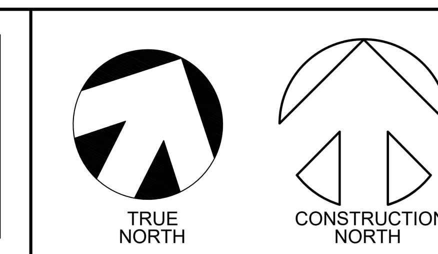


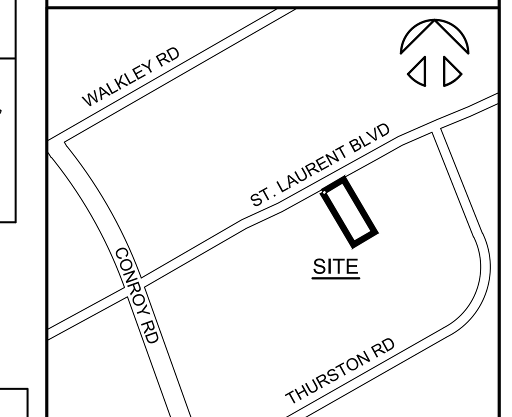


KEY PLAN (N.T.S)

## LEGEND:

| | | | |
|---|---|---|---|
| | PROPERTY LINE | | PROPOSED SANITARY MANHOLE |
| | BUILDING SETBACK LINE | | PROPOSED STORM MANHOLE |
| | PROPOSED FIRE ROUTE (USING HEAVY DUTY PAVING) | | PROPOSED CATCH BASIN MANHOLE |
| | HEAVY DUTY PAVING | | PROPOSED CATCH BASIN |
| | LIGHT DUTY PAVING | | PROPOSED VALVE & BOX |
| | CONCRETE PAD OR SIDEWALK | | OVERLAND FLOW ROUTE |
| | PROPOSED CONCRETE CURB | 1.9% | PROPOSED SLOPE |
| C/C OR D/C | PROPOSED CONCRETE CURB WITH CURB CUT OR DEPRESSED CURB | | EXISTING ELEVATION FROM SURVEY |
| | NEW BUILDING AREA (FOOTPRINT) | +83.25 | PROPOSED GRADES |
| | PRINCIPAL ENTRANCE TO THE BUILDING | ×83.30 Ex. | EXISTING ELEVATION TO REMAIN |
| | BARRIER FREE LOGO (PAVED ON ASPHALT) | | PONDING AREA |
| | EXISTING MANHOLE | RWL | RAIN WATER LEADER |
| | EXISTING CATCH BASIN | 6:12 | SLOPE ROOF DOWN IN DIRECTION INDICATED |
| | EXISTING DOUBLE CATCH BASIN | | |
| | EXISTING FIRE HYDRANT | | |
| | EXISTING WATER VALVE | | |
| | EXISTING VALVE CHAMBER FOR WATERMAIN | | |
| FH–V | EXISTING FIRE HYDRANT VALVE | | |

## GENERAL NOTES

1. CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT FOR CONSTRUCTION.
2. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
3. JOB BENCH MARK - CONFIRM WITH JIC LTD. PRIOR TO UTILIZATION.
4. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE STATED. ALL DRAWINGS SHOULD NOT BE SCALED BY THE CONTRACTOR. ANY MISSING OR QUESTIONABLE DIMENSIONS ARE TO BE CONFIRMED WITH THE CONSULTANT IN WRITING.
5. CONSTRUCTION SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA AND ONTARIO PROVINCIAL STANDARD DRAWING SUPPLEMENTS WHERE APPLICABLE AND ONTARIO PROVINCIAL STANDARDS SHALL APPLY WHERE NO CITY STANDARDS ARE AVAILABLE.
6. ANY DISCREPANCIES, INTERPRETATIONS, CHANGES AND ADDITIONS TO THESE DRAWINGS MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER, WHEN NOTED AND BEFORE PROCEEDING WITH CONSTRUCTION WORKS.
7. REFER TO ARCHITECT'S SITE PLAN FOR BUILDING DIMENSIONS AND SITE LAYOUT DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
8. REFER TO THE LANDSCAPE ARCHITECT'S PLAN FOR SIDEWALK, PATHWAYS, PLANTING AND OTHER LANDSCAPE FEATURE MATERIALS AND LOCATIONS.
9. FOR GEOTECHNICAL INFORMATION REFER TO THE GEOTECHNICAL INVESTIGATION REPORT PREPARED BY GEMTEC CONSULTING ENGINEERS AND SCIENTISTS LTD. DATED OCTOBER 2020.
10. ALL DISTURBED AREAS TO BE REINSTATED TO EQUAL OR BETTER CONDITION. ALL NEW WORK SHALL TIE INTO EXISTING.
11. ALL GROUND SURFACES SHALL BE EVENLY GRADED WITHOUT PONDING AREAS AND WITHOUT LOW POINTS EXCEPT WHERE APPROVED SWALE OR CATCHBASIN OUTLETS ARE PROVIDED.
12. ALL EDGES OF DISTURBED PAVEMENT SHALL BE SAWCUT TO FORM A NEAT AND STRAIGHT LINE PRIOR TO PLACING NEW PAVEMENT.
13. CONTRACTOR IS TO COMPLY WITH THE CITY OF OTTAWA REQUIREMENTS FOR TRAFFIC CONTROL WHEN WORKING ON CITY STREETS.
14. ALL MATERIAL SUPPLIED AND PLACED FOR PARKING LOT AND ACCESS ROAD CONSTRUCTION SHALL BE TO CITY OF OTTAWA AND OPSS STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE NOTED (CONSTRUCTION OPSS 206, 310 & 314 MATERIALS OPSS 1001, 1003 & 1010).
15. THE CONTRACTOR SHALL CONFIRM LOCATIONS AND ELEVATIONS OF EXISTING SERVICES AND STRUCTURES TO BE CONNECTED TO AND EXISTING SERVICES THAT MAY BE DAMAGED OR CAUSE CONFLICTS PRIOR TO CONSTRUCTION OF ANY NEW SEWER, WATER AND/OR STORM WATER WORKS. THE ENGINEER SHALL BE INFORMED IMMEDIATELY OF ANY ERRORS, DISCREPANCIES, CONFLICTS, OMISSIONS ETC THAT ARE FOUND. DO NOT CONTINUE CONSTRUCTION IN AREAS WHERE DISCREPANCIES APPEAR UNTIL SUCH DISCREPANCIES HAVE BEEN RESOLVED.
16. THE CONTRACTOR SHALL PROTECT ANY SUCH EXISTING SERVICES & FACILITIES. SUCH REQUIRED MEASURES INCLUDE, BUT ARE NOT LIMITED TO: ENSURE ALL CONCERNED UTILITIES HAVE LOCATED THEIR PLANT PRIOR TO ANY EXCAVATING, LOCATE AND FLAG/PAINT THE LOCATIONS OF OTHER U/G PLANT WHICH MIGHT BE DAMAGED BY EXCAVATION AND CONSTRUCTION TRAFFIC, HAND DIG IN PROXIMITY TO EXISTING BURIED SERVICES TO LOCATE THEM WITHOUT ANY RESULTING DAMAGE, BRACE AND SUPPORT WHERE REQUIRED.
17. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES FOR THE PROTECTION OF THE AREA'S DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE DURING CONSTRUCTION ACTIVITIES. THIS INCLUDES LIMITING THE AMOUNT OF EXPOSED SOIL, USING FILTER CLOTH UNDER GRATES OF CATCHBASINS AND MANHOLES AND INSTALLING SILT FENCES AND OTHER EFFECTIVE SEDIMENT TRAPS. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
18. DESIGN ELEVATIONS GIVEN ON THESE PLANS ARE TO BE ADHERED TO WITH NO CHANGES WITHOUT PRIOR WRITTEN APPROVAL BY JIC LTD. SURFACE PONDING STORAGE VOLUMES AND INLET CONTROL DEVICE DIMENSIONS MUST COMPLY WITH THE DESIGN REPORT PREPARED BY JIC LTD. FOR THIS PROJECT.
19. THE CONTRACTOR IS RESPONSIBLE FOR AND SHALL PROVIDE FOR DEWATERING, SUPPORT AND PROTECTION OF EXCAVATION AND TRENCHING AS WELL AS RELEASE OF ANY PUMPED GROUND WATER IN A CONTROLLED AND APPROVED MANNER. THE CONTRACTOR SHALL APPLY FOR A PERMIT TO TAKE WATER FROM THE MINISTRY OF ENVIRONMENT IF MORE THAN 50,000 LITERS PER/DAY OF GROUNDWATER IS PUMPED FOR CONSTRUCTION ACTIVITIES.
20. FOR TOPOGRAPHICAL INFORMATION REFER TO PLAN PREPARED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD. FOR LEGAL PROPERTY LINE DESCRIPTIONS.
21. CITY INSPECTOR IS TO NOTIFIED OF ANY WORKS IN THE ROW WITH SUFFICIENT NOTICE.
22. CLAY SEAL TO BE AS PER OPSD 802.095.
23. SHOULD ANY CONDITIONS AT THE SITE BE ENCOUNTERED WHICH DIFFER FROM THE TEST LOCATIONS IDENTIFIED IN THE GEOTHECHICAL REPORT, GEMTEC'S GEOTHECHNICAL ENGINEER IS TO BE NOTIFIED IMMEDIATELY IN ORDER TO PERMIT REASSESSMENT OF THE GEOTECHNICAL RECOMMENDATIONS.

| no. | revisions | date | init. |
|---|---|---|---|
| 2 | ISSUED FOR APPROVAL | 02/06/2023 | YA |
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| 0 | ISSUED FOR APPROVAL | 02/14/2022 | YA |



cad file 20037_SP3
date plotted 2/6/2023 plot scale 1:1

LICENSED PROFESSIONAL ENGINEER
Y.AYUB
FEB 06,23
PROVINCE OF ONTARIO

drawn CC
designed YA
reviewed YA
date 2/6/2023
scale 1:300

project
CHORAC OTTAWA
2375 ST. LAURENT BLVD
OTTAWA, ON

drawing
SITE GRADING PLAN

PLAN#18738
007–12–22–0061

REINDERS + LAW
ARCHITECTURE.ENGINEERING
REINDERS + LAW LTD.
ARCHITECTURE.ENGINEERING
64 ONTARIO STREET NORTH
MILTON, ON L9T 2T1
T. 905.457.1618 F. 905.457.8852
EMAIL@REINDERS.CA WWW.REINDERS.CA

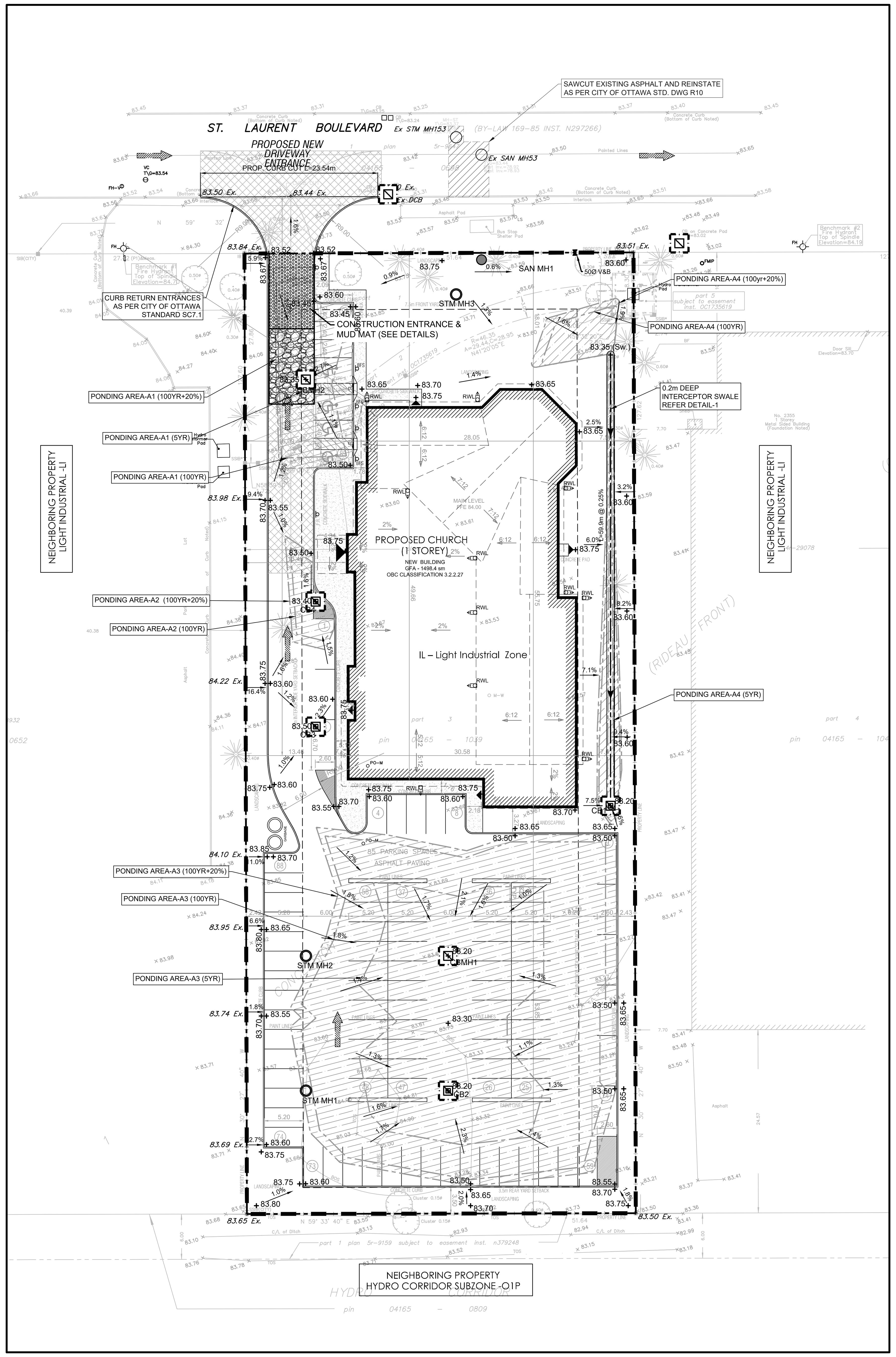
drawing no. 20037_SP4 rev. no. 2

## EROSION AND SEDIMENT CONTROL NOTES

1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THIS INCLUDES LIMITING THE AMOUNT OF EXPOSED SOIL, USING FILTER CLOTH UNDER THE GRATES OF CATCHBASINS AND MANHOLES, AND INSTALLING SILT FENCES AND OTHER EFFECTIVE SEDIMENT TRAPS. 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. THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE ENGINEER, THE MEASURES ARE NO LONGER REQUIRED. NO CONTROL MEASURES MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE ENGINEER.
3. REGULAR INSPECTION AND MAINTENANCE OF THE EROSION AND SEDIMENT MEASURES SHALL BE UNDERTAKEN. THE IMPLEMENTATION AND ADJUSTMENT AND/OR CORRECTIVE MAINTENANCE OF THE EROSION AND SEDIMENT MEASURES IS AN INTEGRAL PART OF THE PLAN AND MUST BE PERFORMED.
4. GEOTEXTILE FILTER FABRIC SHALL BE PLACED BETWEEN THE STRUCTURE FRAME AND COVER FOR ALL MANHOLES, CATCHBASINS, AND CATCHBASIN MANHOLES IN THE VICINITY OF WORK.
5. THE CONTRACTOR SHALL MAINTAIN ADJACENT ROADS IN A CLEAN CONDITION AT ALL TIMES.
6. PROVIDE MUD MATS AT SITE CONSTRUCTION ENTRANCE(S) AND EGRESS(S).

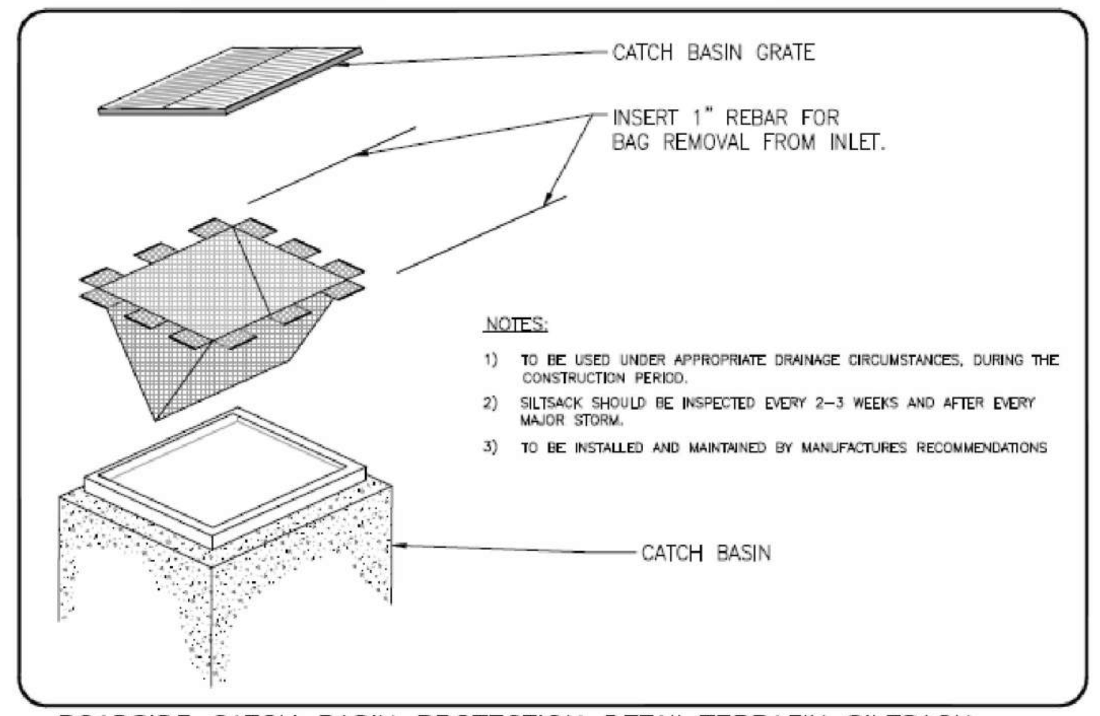
**LEGEND:**

- SEDIMENT CONTROL FENCE
- CATCH BASIN SEDIMENT PROTECTION




## PLAN OF SEDIMENT CONTROL FENCE & MUD MAT

SCALE : 1: 400

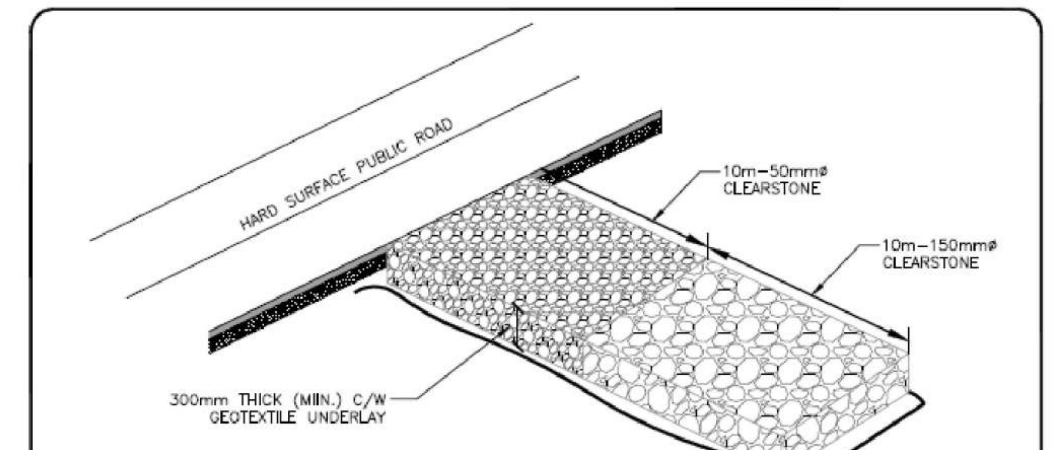



NOTES:

1) TO BE USED UNDER APPROPRIATE DRAINAGE CIRCUMSTANCES, DURING THE CONSTRUCTION PERIOD.
2) SILTSACK SHOULD BE INSPECTED EVERY 2–3 WEEKS AND AFTER EVERY MAJOR STORM.
3) TO BE INSTALLED AND MAINTAINED BY MANUFACTURES RECOMMENDATIONS

ROADSIDE CATCH BASIN PROTECTION DETAIL:TERRAFIX SILTSACK

SCALE: N.T.S.

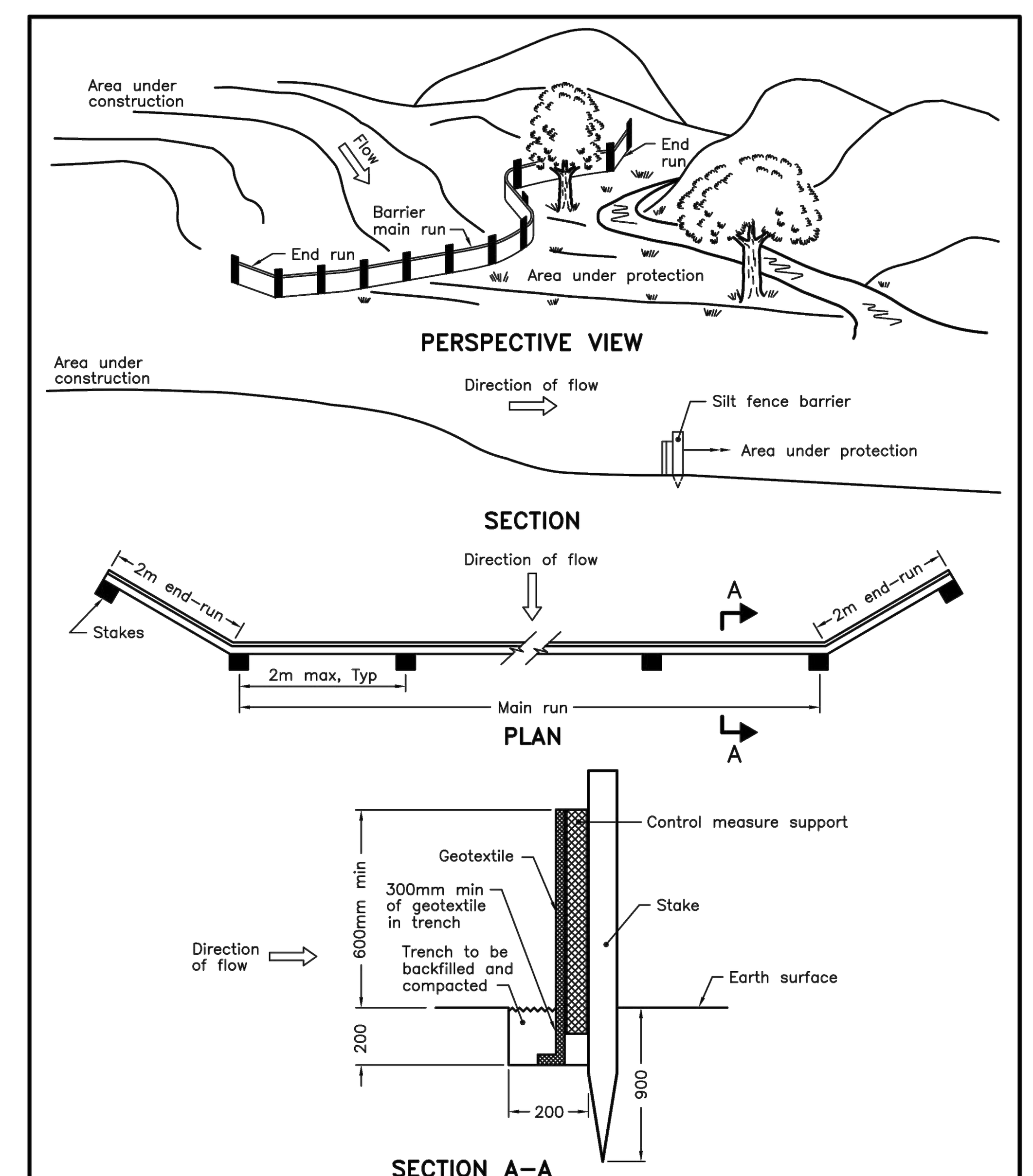



NOTES:

1. MUD MAT TO BE INSTALLED AT ALL CONSTRUCTION ENTRANCES
2. MUD MAT TO EXTEND FULL WIDTH OF ENTRANCE
3. IN THE CASE THAT THE ACCESS CROSSES A CULVERT OR DITCH, SEDIMENT FENCING SHOULD BE INSTALLED ALONG THE EDGES OF THE ACCESS TO PREVENT SEDIMENT FROM BEING WASHED AWAY WITH RUNOFF.
4. THE GRANULAR MATERIAL WILL REQUIRE PERIODIC REPLACEMENT AS IT BECOMES CONTAMINATED BY VEHICLE TRAFFIC.
5. SEDIMENT SHALL BE CLEANED FROM PUBLIC ROADS AT THE END OF EACH DAY.
6. STORM INLETS BOTH ON AND IN THE PROXIMITY OF THE SITE SHALL BE PROTECTED WITH INLET CONTROL MEASURES PRIOR TO ROAD CLEANING ACTIVITIES.

MUD MAT ENTRANCE DETAIL

SCALE: N.T.S.




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

| ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2006 | Rev 1 |
|---|---|---|
| HEAVY-DUTY SILT FENCE BARRIER | | |
| | OPSD 219.130 | |

*TOPOGRAPHICAL PLAN OF SURVEY*

PART OF LOT 1
CONCESSION 5 (RIDEAU FRONT)
Geographic Township of Nepean
CITY OF OTTAWA
Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

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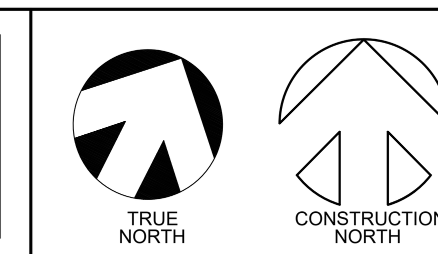


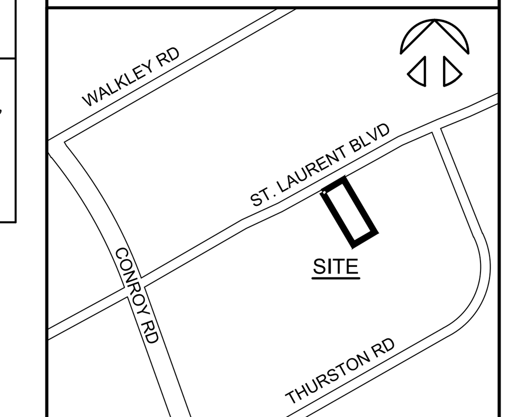


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| 2 | ISSUED FOR APPROVAL | 02/06/2023 | YA |
| 1 | ISSUED FOR APPROVAL | 12/13/2022 | YA |
| 0 | ISSUED FOR APPROVAL | 02/14/2022 | YA |

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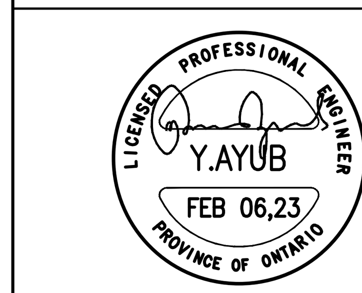
date plotted 2/6/2023 plot scale 1:1




drawn CC

designed YA

reviewed YA

date 2/6/2023

scale AS SHOWN

project
CHORAC OTTAWA
2375 ST. LAURENT BLVD
OTTAWA, ON

drawing
EROSION AND SEDIMENT CONTROL PLAN, NOTES & DETAILS

PLAN#18738
007-12-22-0061

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64 ONTARIO STREET NORTH
MILTON, ON L9T 2T1
T. 905.457.1618 F. 905.457.8852
EMAIL@REINDERS.CA WWW.REINDERS.CA

drawing no. 20037_SP5 rev. no. 2

SHEET SIZE: A1 609.6mm X 914.4mm

# Appendix B
## Correspondence with Regulatory Authorities

**Site Plan Pre- Application Consultation Notes**

**Date:** April 14, 2021
**Site Location:** 2375 St.Laurent
**Type of Development: ☐ Residential (☐ townhomes, ☐ stacked, ☐ singles, ☐ apartments), ☐ Office Space, ☐ Commercial, ☐ Retail, ☒ Institutional, ☐ Industrial, Other:** N/A
**Representative/Agent:**
**Project Manager:** Eric Harrold
**Assigned Planner:** Sarah Ezzio

## Infrastructure

Confirmation from the easement holder will be required for the proposed services location.

The previous geotechnical report for this site indicated potential sensitive soils which will require additional considerations.

## Water

Existing public services:

- St.Laurent Blvd. – 305mm DI
- Existing water stub existing on north east side of the property. The applicants consultant should determine whether it is feasible to re-use this service, or whether a new lateral is required.
- Watermain Frontage Fees to be paid ($190.00 per metre) ☐ **Yes** ☒ **No**

**Boundary conditions:**
Civil consultant must request boundary conditions from the City's assigned Project Manager prior to first submission.

- Water boundary condition requests must include the location of the service(s) and the expected loads required by the proposed developments. Please provide all the following information:
  - Location of service(s)
  - Type of development and the amount of fire flow required (as per FUS, 1999).
  - Average daily demand: ___ l/s.
  - Maximum daily demand: ___l/s.
  - Maximum hourly daily demand: ___ l/s.
- Fire protection (Fire demand, Hydrant Locations)
- A water meter sizing questionnaire (water data card) will have to be completed prior to receiving a water permit (water card will be provided post approval)
- Water supply redundancy is required for a water demand exceeding 50 $m^3$ per day

## Sanitary Sewer

Existing public services:

- St.Laurent Blvd. – 300mm Conc

Is a monitoring manhole required on private property? ☒ **Yes** ☐ **No**

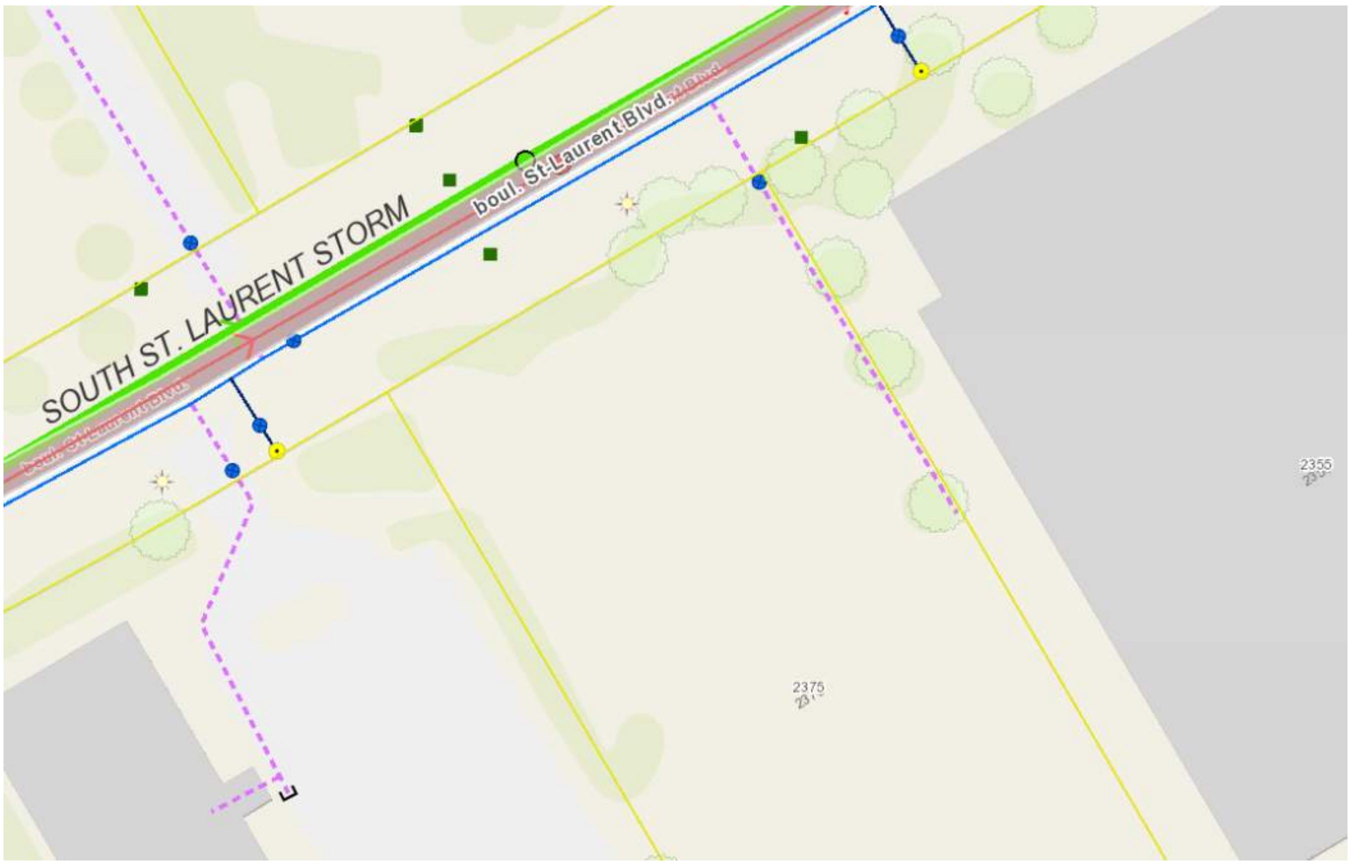
- The designer should be aware there may be limited capacity in the downstream sanitary sewer system. The sanitary demand needs to be coordinated with the City Planning Dept. to determine if the existing sanitary sewer system has sufficient capacity to support the proposed rezoning. Provide sanitary demands to the City project manager for coordination.

## Storm Sewer

Existing public services:

- St.Laurent Blvd. – 1050mm Conc (Trunk)
- Maintenance hole will be required at the connection to the storm main. (Existing maintenance hole present for potential connection)

- The Environmental Site Assessment (ESA) may provide recommendations where site contamination may be present. The recommendations from the ESA need to be coordinated with the servicing report to ensure compliance with the Sewer Use By-Law.




**Stormwater Management**

Quality Control:

- Per the RVCA, the downstream outlet to a watercourse for stormwater is less than 1km from the site, therefore, a water quality objective of enhanced (80% TSS removal) is required. The applicant is encouraged to incorporate LID measures into the stormwater management plan for this site.

Quantity Control:

- Allowable Runoff coefficient (C): C = the lesser of the existing pre-development conditions to a maximum of 0.5.
- Time of concentration (Tc): Tc = pre-development; maximum Tc = 10 minutes
- Allowable flowrate: Control the 100-year storm events to the 5-year storm event.

**Ministry of Environment, Conservation and Parks (MECEP)**

All development applications should be considered for an Environmental Compliance Approval, under MECP regulations.

a. The consultants determine if an approval for sewage works under Section 53 of OWRA is required and determines what type of application. The City's project manager may help confirm and coordinate with the MECP as required.
b. The project will be either transfer of review (standard), transfer of review (additional), direct submission, or exempt as per O. Reg. 525/98.
c. Pre-consultation is not required if applying for standard or additional works (Schedule A of the Agreement) under Transfer Review.
d. Pre-consultation with local District office of MECP is recommended for direct submission.
e. Consultant completes an MECP request form for a pre-consultation. Sends request to moeccottawasewage@ontario.ca
f. ECA applications are required to be submitted online through the MECP portal. A business account required to submit ECA application. For more information visit https://www.ontario.ca/page/environmental-compliance-approval

g. An ECA will be required where the stormwater management services more than one property parcel.

**NOTE: Site Plan Approval, or Draft Approval, is required before any Ministry of the Environment and Climate Change (MOECC) application is sent.**

**General Service Design Comments**

- The City of Ottawa requests that all new services be located within the existing service trench to minimize necessary road cuts.
- Monitoring manholes should be located within the property near the property line in an accessible location to City forces and free from obstruction (i.e. not a parking).
- Where service length is greater than 30 m between the building and the first maintenance hole / connection, a cleanout is required.
- The City of Ottawa Standard Detail Drawings should be referenced where possible for all work within the Public Right-of-Way.
- The upstream and downstream manhole top of grate and invert elevations are required for all new sewer connections.
- Services crossing the existing watermain or sewers need to clearly provide the obvert/invert elevations to demonstration minimum separation distances. A watermain crossing table may be provided.

**Other**

Are there are Capital Works Projects scheduled that will impact the application? ☐ **Yes** ☒ **No**

**References and Resources**

- A previous Site Plan application was processed for this property in 2017. The geotechnical report indicated that the site is underlain by sensitive soils, which may have an impact on the grade raise, foundation design, and other geotechnical considerations. The applicant may acquire the report through the ISD Information Centre by emailing informationcentre@ottawa.ca. Any potential for re-use of the findings in the geotechnical report should be discussed with the preparer of the report, and an addendum would also required.
- As per section 53 of the Professional Engineers Act, O. Reg 941/40, R.S.O. 1990, all documents prepared by engineers must be signed and dated on the seal.
- All required plans are to be submitted on standard A1 size sheets (594mm x 841mm) sheets, utilizing a reasonable and appropriate metric scale as per City of Ottawa Servicing and Grading Plan Requirements: title blocks are to be placed on the right of the sheets and not along the bottom. Engineering plans may be combined, but the Site Plans must be provided separately. Plans shall include the survey monument used to confirm datum. Information shall be provided to enable a non-surveyor to locate the survey monument presented by the consultant.
- All required plans & reports are to be provided in *.pdf format (at application submission and for any, and all, re-submissions)
- Please find relevant City of Ottawa Links to Preparing Studies and Plans below: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans#standards-policies-and-guidelines
- To request City of Ottawa plan(s) or report information please contact the City of Ottawa Information Centre:
  InformationCentre@ottawa.ca
  (613) 580-2424 ext. 44455
- geoOttawa
  http://maps.ottawa.ca/geoOttawa/

**PLEASE NOTE – THESE ARE ONLY THE INFRASTRUCTURE PLANS & STUDIES REQUIREMENTS. THE COMBINED SUBMISSION REQUIREMENTS WILL BE PROVIDED BY THE FILE LEAD FOR THE APPLICATION.**

For information on preparing required studies and plans refer to:

http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans

| S/A | Number of copies | ENGINEERING | | S/A | Number of copies |
|---|---|---|---|---|---|
| S | | 1. Site Servicing Plan | 2. Assessment of Adequacy of Public Services / Site Servicing Study | S | |
| S | | 3. Grade Control and Drainage Plan | 4. Geotechnical Study | S | |
| | | 5. Composite Utility Plan | 6. Groundwater Impact Study | | |
| | | 7. Servicing Options Report | 8. Wellhead Protection Study | | |
| | | 9. Community Transportation Study and/or Transportation Impact Study / Brief | 10. Erosion and Sediment Control Plan / Brief | S | |
| S | | 11. Storm water Management Report | 12. Hydro-geological and Terrain Analysis | | |
| | | 13. Water main Analysis | 14. Noise / Vibration Study | | |
| | | 15. Roadway Modification Design Plan | 16. Confederation Line Proximity Study | | |

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

# Appendix C
## Boundary Conditions and FUS Calculations
## DR03 Fire Hydrant Coverage Map

Please provide the boundary conditions for the water service connection for the proposed Church Building at 2375 St. Laurent Boulevard.

a. Location of service (map/plan view)


b. Site plan or similar plan for building location (Attached)

| Design Parameter | Water Demand (L/s) |
|---|---|
| Average Daily Demand | 0.083 |
| Maximum Daily Demand | 0.124 |
| Maximum Hourly Demand | 0.149 |
| Fire Flow | 100.00 |
| Total Max Daily Demand + Fire Flow | 100.124 |

c. Supporting calculations for domestic demands

Church Building GFA = 1498.4 $m^2$ (0.15 ha)

No. of Seats = 239

Daily Average Water Demand = 239 x 30= 7,170 L/Day (0.083 L/sec)

Maximum Daily Demand = 0.083 x 1.5 = 0.124 L/sec

Maximum Hourly Demand = 0.083 x 1.8 = 0.149 L/sec

d. Supporting calculations for FUS required fire flow
Attached

e. Offset distance from adjacent buildings

**FIRE FLOW CALCULATION as per**
**FIRE UNDERWRITERS SURVEY (1999)**

**Date:** 12-Oct-22
**Designer:** UA
**Checked By:** YA

**PROJECT:** 2375 St. Laurent Boulevard
Ottawa, ON

## 1. Fire Flow Equation

$$F = 220\, C \sqrt{A}$$

where
F is the required fire flow [LPM]
C is the coefficient determined by type of construction [unitless]
A is the total protection area [sq.m]

## 2. Architecture Information (To be confirmed)

| | | |
|---|---|---|
| Type of Construction | Ordinary | |
| Fire Rating | Joisted Masonary | |
| Sprinkler Provided (Y/N) | N | |
| | | |
| **Total Floor Area [sq.m]** | 1498 | GFA |
| Coefficient, C [1] | 1.0 | |
| Fire Flow, F [LPM] | 8516 | |

## 3. Occupancy Reduction

| | | |
|---|---|---|
| Occupancy Adjustment | 0.85 | - 15 % reduction (Limited Combustible) |
| Fire Flow, F [LPM] | 7239 | |

## 4. Sprinkler Reduction

| | | |
|---|---|---|
| Sprinkler Reduction | 0.30 | Automatic sprinkler system |
| Sprinkler Reduction [LPM] | 2172 | |
| Standard water supply for sprinkler system and fire department hose | 0.10 | Additional 10 % credit |
| | 724 | |

## 5. Exposure Adjustment

| | | |
|---|---|---|
| North | 0.00 | More than 45 m |
| East | 0.15 | 15 m |
| South | 0.00 | More than 45 m |
| West | 0.00 | More than 45 m |
| **Total** | **0.15** | |
| Exposure Adjustment [LPM] | 1086 | |

See attachment for off set distance

## 6. Required Fire Flow, Duration & Volume

| | | |
|---|---|---|
| Fire Flow, F [LPM] | 7239 | |
| Sprinkler Reduction [LPM] | 2895 | |
| Exposure Adjustment [LPM] | 1086 | |
| Required Fire Flow [LPM] | 5429 | |
| Required Fire Flow [LPM] | **5000** | Round to nearest 1000 |
| Required Fire Flow [LPS] | **83** | |
| Req. Duration of Fire Flow [hrs] | 2 | |
| Req. Storage [cubic.m] | 600 | |

-------- Original message --------
From: "Harrold, Eric" <eric.harrold@ottawa.ca>
Date: 2022-02-17 7:35 a.m. (GMT-05:00)
To: Yasar Ayub <yayub@jainconsultants.com>, yasara@reinders.ca
Subject: RE: 2375 St. Laurent Boulevard (Cornerstone Church) - Boundary Conditions Request

Good morning Yasar,

Please see the below boundary conditions for 2375 St. Laurent, based on the attached condition request.

---

The following are boundary conditions, HGL, for hydraulic analysis at 2375 St-Laurent Boulevard (zone 2W2C) assumed to be connected to the 305 mm watermain on St-Laurent Boulevard (see attached PDF for location).

Minimum HGL: 124.7 m
Maximum HGL: 130.2 m
Max Day + Fire Flow (100 L/s): 125.8 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.*

Please advise me if you have any questions.

Best regards,
Eric
**Eric Harrold, P.Eng**
Project Manager, Infrastructure Approvals
Planning, Real Estate and Economic Development Department
City of Ottawa | Ville d'Ottawa

110 Laurier Avenue West, Ottawa, ON
613.580.2424 ext. 21447, eric.harrold@ottawa.ca

*** Out of Office Alert – Please note that I will be out of office from February 11-16th, 2022 ***

---

**From:** Armstrong, Justin <justin.armstrong@ottawa.ca>
**Sent:** February 10, 2022 4:32 PM
**To:** Yasar Ayub <yayub@jainconsultants.com>
**Cc:** Harrold, Eric <eric.harrold@ottawa.ca>; Ezzio, Sarah <sarah.ezzio@ottawa.ca>
**Subject:** FW: 2375 St. Laurent Boulevard (Cornerstone Church) - Boundary Conditions Request

Hi Yasar,

I am looping in Eric and Sarah to this request as they were the Development Review Infrastructure Project Manager and File Lead respectively who handled the pre-consultation meeting. They should be able to let you know who the Project Manager will be to handle this request and moving forward on the file (if it is not still Eric).

Regards,

Justin


**Justin Armstrong, E.I.T.**
Project Manager
Planning, Real Estate and Economic Development Department – Direction générale de la planification, des biens immobiliers et du développement économique
Development Review - West Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 21746, justin.armstrong@ottawa.ca


---

**From:** Yasar Ayub <yasara@reinders.ca>
**Sent:** February 10, 2022 2:47 PM
**To:** Armstrong, Justin <justin.armstrong@ottawa.ca>
**Subject:** 2375 St. Laurent Boulevard (Cornerstone Church) - Boundary Conditions Request



The request for water boundary conditions is attached. Pl review and let us know if any other project info is required. Pl let us know when we can expect a response so that we can schedule our submission accordingly. Request to expedite it as much as possible.

REGARDS,

*Yasar Ayub, P. Eng.* SENIOR MUNICIPAL ENGINEER

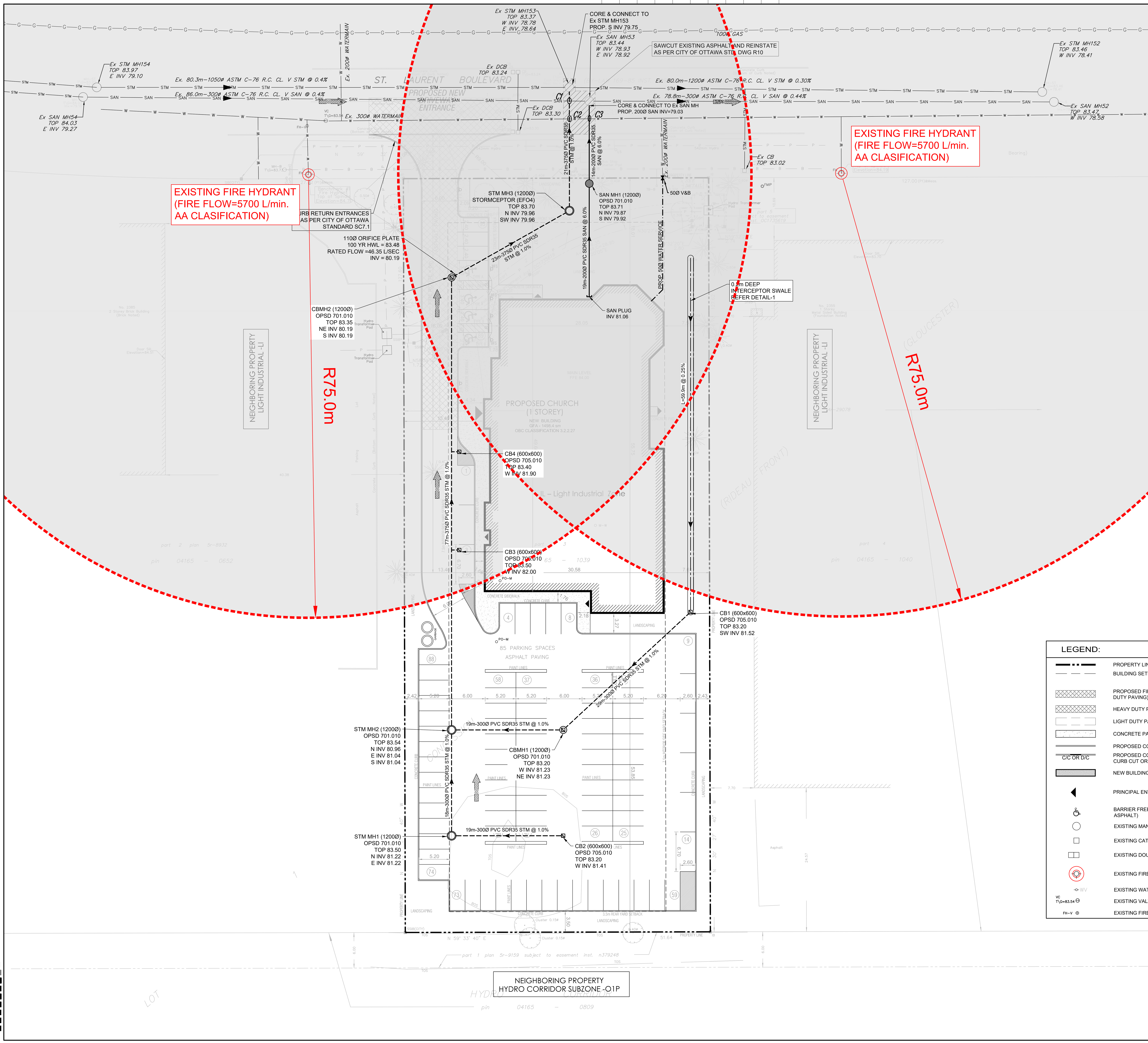
REINDERS +LAW

ARCHITECTURE . ENGINEERING

64 Ontario Street North
Milton, Ontario, Canada L9T 2T1
yasara@reinders.ca /www.reinders.ca
☏ (905) 457-1618 EXT 1324
🖷 (905) 457-8852 CELL (416) 668-6367

**We are excited to announce that our Company's name has changed to Reinders + Law Ltd.**

Boundary Conditions for 2375 St-Laurent Boulevard
boul. St-Laurent Blvd.
305
152
203
102
N
2375
2355
2385
2395
Legend
PRIVATE
PUBLIC
City of Ottawa



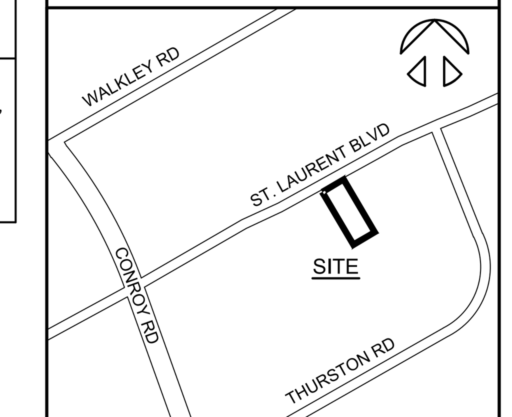

*TOPOGRAPHICAL PLAN OF SURVEY*

PART OF LOT 1
CONCESSION 5 (RIDEAU FRONT)
Geogaphic Township of Nepean
CITY OF OTTAWA
Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

Plan Amended September 7, 2017 to illustrate additional services.

| OWNERS | APPLICANT |
|---|---|
| **OWNERS NAME The CornerStone House of Refuge Apostolic Church (CHORAC)**<br>ADDRESS<br>1196 Wellington St West,<br>Ottawa, ON. K1Y 2Z5<br>(613) PHONE #: 725-1432 | **REINDERS + LAW LTD.**<br>64 ONTARIO STREET NORTH,<br>MILTON ON L9T 2T1<br>P (905)457-1618<br>F (905)457-8852 |

TRUE NORTH — CONSTRUCTION NORTH



KEY PLAN (N.T.S)

## LEGEND:

- PROPERTY LINE
- BUILDING SETBACK LINE
- PROPOSED FIRE ROUTE (USING HEAVY DUTY PAVING)
- HEAVY DUTY PAVING
- LIGHT DUTY PAVING
- CONCRETE PAD OR SIDEWALK
- PROPOSED CONCRETE CURB
- C/C OR D/C — PROPOSED CONCRETE CURB WITH CURB CUT OR DEPRESSED CURB
- NEW BUILDING AREA (FOOTPRINT)
- PRINCIPAL ENTRANCE TO THE BUILDING
- BARRIER FREE LOGO (PAVED ON ASPHALT)
- EXISTING MANHOLE
- EXISTING CATCH BASIN
- EXISTING DOUBLE CATCH BASIN
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE
- EXISTING VALVE CHAMBER FOR WATERMAIN
- EXISTING FIRE HYDRANT VALVE
- PROPOSED SANITARY MANHOLE
- PROPOSED STORM MANHOLE
- PROPOSED CATCH BASIN MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED VALVE & BOX
- EXISTING GAS
- EXISTING UNDERGROUND POWER
- EXISTING UNDERGROUND BELL
- EXISTING WATER PIPE
- EXISTING SANITARY PIPE
- EXISTING STORM PIPE
- PROPOSED WATER PIPE
- PROPOSED SANITARY PIPE
- PROPOSED STORM PIPE
- FIRE HYDRANT COVERAGE BOUNDARY

| no. | revisions | date | init. |
|---|---|---|---|
| 1 | ISSUED FOR APPROVAL | 12/07/2022 | YA |
| 0 | ISSUED FOR APPROVAL | 02/06/2023 | YA |



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date plotted 2/6/2023 plot scale 1:1

drawn CC
designed YA
reviewed YA
date 2/6/2023
scale 1:300

project
CHORAC OTTAWA
2375 ST. LAURENT BLVD
OTTAWA, ON

drawing
FIRE HYDRANT COVERAGE MAP FOR 2375 ST. LAURENT BLVD


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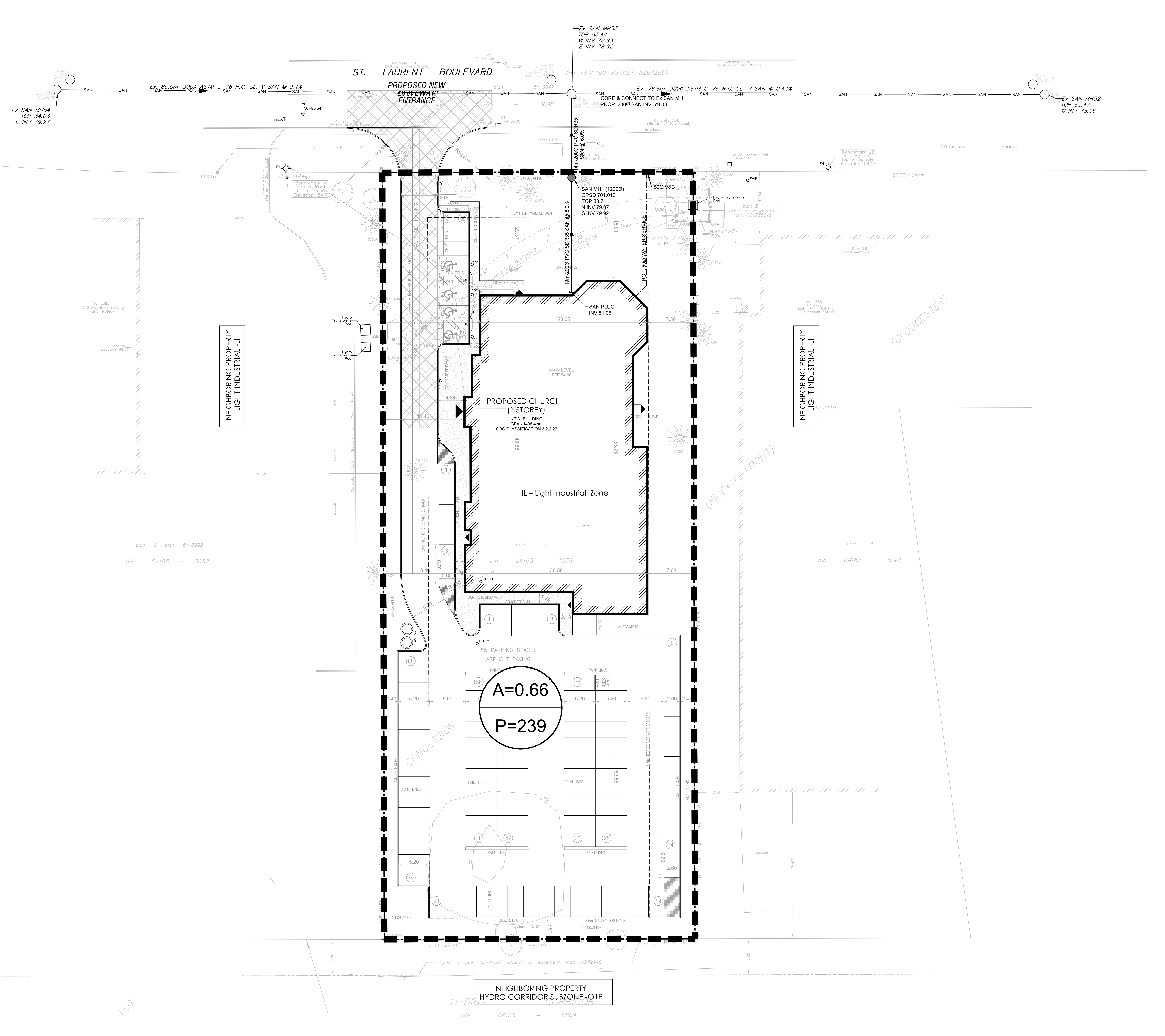
ARCHITECTURE.ENGINEERING
64 ONTARIO STREET NORTH
MILTON, ON L9T 2T1
T. 905.457.1618 F. 905.457.8852
EMAIL@REINDERS.CA WWW.REINDERS.CA


drawing no. 20037_DR3 rev. no. 1

# Appendix D
## DR04 Sanitary Drainage Plan
## Sanitary Flow Calculations




SHEET SIZE: A1 609.6mm X 914.4mm

TOPOGRAPHICAL PLAN OF SURVEY

PART OF LOT 1
CONCESSION 5 (RIDEAU FRONT)
Geogaphic Township of Nepean
CITY OF OTTAWA
Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

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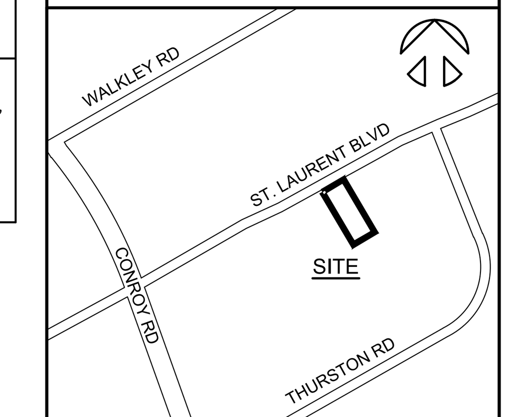
| OWNERS | APPLICANT |
|---|---|
| OWNERS NAME The CornerStone House of Refuge Apostolic Church (CHORAC)<br>ADDRESS<br>1196 Wellington St West, Ottawa, ON. K1Y 2Z5<br>(613) PHONE #: 725-1432 | REINDERS + LAW LTD.<br>64 ONTARIO STREET NORTH, MILTON ON L9T 2T1<br>P (905)457-1618<br>F (905)457-8852 |

TRUE NORTH

CONSTRUCTION NORTH




KEY PLAN (N.T.S)

LEGEND:

CATCHMENT AREA BOUNDARY

A=0.66 — DRAINAGE AREA IN HECTARES

P=239 — POPULATION

| no. | revisions | date | init. |
|---|---|---|---|
| 0 | ISSUED FOR APPROVAL | 02/06/2023 | YA |

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drawn CC
designed YA
reviewed YA
date 2/6/2023
scale 1:300

project
CHORAC OTTAWA
2375 ST. LAURENT BLVD
OTTAWA, ON

drawing
SANITARY DRAINAGE PLAN

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64 ONTARIO STREET NORTH
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EMAIL@REINDERS.CA WWW.REINDERS.CA

drawing no. 20037_DR4
rev. no. 0

**City of Ottawa, Ontario**
**Table D1: Sanitary Sewer Design Sheet**

| **Reinders and Law Ltd.** | | |
|---|---|---|
| Project: | | 2375 St. Laurent Boulevard |
| PREPARED BY: | | Y.A |
| FILE No.: | | -- |
| DATE PREPARED | | 06-Feb-23 |

| Manhole No. | | No. of Seats | Accumulated No. of Seats | Average Flow @ 30 lpcd | Accu. Avergae Flow | Line Area | Infiltration @ 0.28 lit/sec/ha | Peak Factor | Peak Flow | Total Sanitary Flow | DESIGN PROFILE | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Length | Pipe Size | Slope | CAPACITY 1/2(Qfull) | CAPACITY 3/4(Qfull) | Capacity (Qfull) | Full Velocity | Actual Velocity |
| **From** | **T0** | **No.** | **No.** | **lit/s** | **lit/s** | **ha** | **lit/s** | **-** | **lit/s** | **lit/s** | **m** | **mm** | **m/m** | **lit/sec** | **lit/sec** | **lit/s** | **m/s** | **m/s** |
| SAN PLUG | SAN MH 1 | 239 | 239 | 0.083 | 0.08 | 0.66 | 0.18 | 1.50 | 0.12 | 0.31 | 19.00 | 200.00 | 6.00% | 43.52 | 65.28 | 87.03 | 2.77 | 0.63 |
| SAN MH 1 | *Ex. SAN MH52* | 0 | 239 | 0.000 | 0.08 | 0.00 | 0.18 | 1.50 | 0.12 | 0.31 | 14.00 | 200.00 | 6.00% | 43.52 | 65.28 | 87.03 | 2.77 | 0.63 |
| *Ex. SAN MH52* | *Ex. SAN MH52* | *0* | *239* | *0.000* | *0.08* | *0.00* | *0.18* | *1.50* | *0.12* | *0.31* | *86.00* | *300.00* | *0.40%* | *33.13* | *49.69* | *66.26* | *0.94* | *0.23* |

# Appendix E

Pre and post Development Runoff Coefficients Calculations
Pre and post Development Flow Calculations
Orifice Sizing Calculations
On-Site Storage Calculations
Storm Network Storage Calculations
Storm Sewer Design Sheet
Stormceptor Sizing Calculations

**TABLE E1.** **Land use Breakdown and Composite Runoff Coefficients Calculations Existing Conditions**

**Project:** 2375 St. Laurent Boulevard, Ottawa, ON
**RRL No:** 20037

**Date:** 01-Mar-22
**By:** YA

**TABLE E1.1 AREA A1**

| Existing Land Use Cover | A, Area (hectares) | R, Runoff Coefficient | A x R |
|---|---|---|---|
| Landscape | 0.658 | 0.25 | 0.16 |
| Overall | 0.658 | 0.25 | 0.16 |

**TABLE E2.** **Land use Breakdown and Composite Runoff Coefficients Calculations Proposed Conditions**

**Project:** 2375 St. Laurent Boulevard, Ottawa, ON
**RRL No:** 20037

**Date:** 06-Feb-23
**By:** YA

**TABLE E2.1 AREA A1**

| Proposed Land Use/ Cover | A, Area (hectares) | R, Runoff Coefficient | A x R |
|---|---|---|---|
| Building | 0.150 | 0.90 | 0.135 |
| Concrete/Asphalt | 0.319 | 0.90 | 0.287 |
| Landscape | 0.181 | 0.25 | 0.045 |
| Overall | 0.650 | 0.72 | 0.468 |

**TABLE E2.2 AREA A2 (Uncontrolled)**

| Existing Land Use Cover | A, Area (hectares) | R, Runoff Coefficient | A x R |
|---|---|---|---|
| Landscape | 0.008 | 0.25 | 0.00 |
| Overall | 0.008 | 0.25 | 0.00 |

**TABLE E3 PEAK FLOWS CALCULATION USING RATIONAL METHOD**
**EXISTING AND PROPOSED CONDITIONS**

**Project:** 2375 St. Laurent Boulevard, Ottawa, ON
**RRL No:** 20037

**Date:** 06-Feb-23
**By:** YA

**TABLE E3.1 Intensity-Duration-Frequency Parameters, Ottawa**

$I = A / (td + C)^B$    td = 10 min

| Return Period | A | B | C |
|---|---|---|---|
| 2 year | 732.951 | 0.810 | 6.199 |
| 5 year | 998.071 | 0.814 | 6.053 |
| 10 year | 1174.184 | 0.816 | 6.014 |
| 25 year | 1402.884 | 0.819 | 6.018 |
| 50 year | 1569.580 | 0.820 | 6.014 |
| 100 year | 1735.688 | 0.820 | 6.014 |

**TABLE E3.2 Peak Flows - Existing Condition**

| Existing Condition | | | Area (ha.) | R | A x R |
|---|---|---|---|---|---|
| | | | 0.658 | 0.25 | 0.16 |
| T c = 10 minutes | | | | | |
| **Storm Event** | | | | | |
| **2 year** | **5 year** | **10 year** | **25 year** | **50 year** | **100 year** |
| **Intensity (mm/hr)** | | | | | |
| 76.8 | 104.2 | 122.1 | 144.7 | 161.5 | 178.6 |
| **Peak Flow (l/sec)** | | | | | |
| 35.11 | 47.62 | 55.83 | 66.14 | 73.81 | 102.02 |

**TABLE E3.3 Peak Flows - Proposed Condition**

| Proposed Condition | | | Area (ha.) | R | A x R |
|---|---|---|---|---|---|
| | | | 0.650 | 0.72 | 0.47 |
| T c = 10 minutes | | | | | |
| **Storm Event** | | | | | |
| **2 year** | **5 year** | **10 year** | **25 year** | **50 year** | **100 year** |
| **Intensity (mm/hr)** | | | | | |
| 76.8 | 104.2 | 122.1 | 144.7 | 161.5 | 178.6 |
| **Peak Flow (l/sec) - Uncontrolled** | | | | | |
| 99.74 | 135.31 | 158.62 | 187.90 | 209.69 | 289.85 |
| **Peak Flow (l/sec) - Controlled** | | | | | |
| 46.35 | 46.35 | 46.35 | 46.35 | 46.35 | 46.35 |

*(100 year pre and post development flows are calculated based on increased Runoff Coefficient of 25% upto maximum of 1.0)*

*5Yr Pre Dev Flow (A1) = 47.62 l/s*
*100Yr Post Dev Flow (A2) = 1.27 l/s*
*Allowable 5 year pre development release rate = 47.62 -1.27 = 46.35 l/sec via orifice control*

**TABLE E3.4 Change in Peak Flows (Reduction -ve; Increase +ve)**

| Percent Change (%) | | | | | |
|---|---|---|---|---|---|
| 32.0% | -2.7% | -17.0% | -29.9% | -37.2% | -54.6% |

**TABLE E3a. PEAK FLOWS CALCULATION USING RATIONAL METHOD**
**EXISTING AND PROPOSED CONDITIONS (Area A2)**

**Project:** 2375 St. Laurent Boulevard, Ottawa, ON **Date:** 06-Feb-23
**RRL No:** 20037 **By:** YA

**TABLE E3.1 Intensity-Duration-Frequency Parameters, Ottawa**

$I = A / (td + C)^B$ td = 10 min

| Return Period | A | B | C |
|---|---|---|---|
| **2 year** | 732.951 | 0.810 | 6.199 |
| **5 year** | 998.071 | 0.814 | 6.053 |
| **10 year** | 1174.184 | 0.816 | 6.014 |
| **25 year** | 1402.884 | 0.819 | 6.018 |
| **50 year** | 1569.580 | 0.820 | 6.014 |
| **100 year** | 1735.688 | 0.820 | 6.014 |

**TABLE E3.2 Peak Flows - Existing Condition**

| **Existing Condition** | | | **Area (ha.)** | **R** | **A x R** |
|---|---|---|---|---|---|
| Area A2 | | | 0.008 | 0.25 | 0.00 |
| T c = 10 minutes | | | | | |
| **Storm Event** | | | | | |
| **2 year** | **5 year** | **10 year** | **25 year** | **50 year** | **100 year** |
| **Intensity (mm/hr)** | | | | | |
| 76.8 | 104.2 | 122.1 | 144.7 | 161.5 | 178.6 |
| **Peak Flow (l/sec)** | | | | | |
| 0.44 | 0.59 | 0.70 | 0.82 | 0.92 | 1.27 |

**TABLE E3.3 Peak Flows - Proposed Condition**

*(100 year pre and post development flows are calculated based on increased Runoff Coefficient of 25% upto maximum of 1.0)*

| **Proposed Condition** | | | **Area (ha.)** | **R** | **A x R** |
|---|---|---|---|---|---|
| Area A2 | | | 0.008 | 0.25 | 0.00 |
| T c = 10 minutes | | | | | |
| **Storm Event** | | | | | |
| **2 year** | **5 year** | **10 year** | **25 year** | **50 year** | **100 year** |
| **Intensity (mm/hr)** | | | | | |
| 76.8 | 104.2 | 122.1 | 144.7 | 161.5 | 178.6 |
| **Peak Flow (l/sec) - Uncontrolled** | | | | | |
| 0.44 | 0.59 | 0.70 | 0.82 | 0.92 | 1.27 |

## Table E4 – Orifice Sizing Calculations

**Project:** 2375 St. Laurent Boulevard, Ottawa, ON **Date:** 06-Feb-23

**RRL No:** 20037 **By:** YA

Orifice Formula $Q = ca(2gh)^{1/2}$

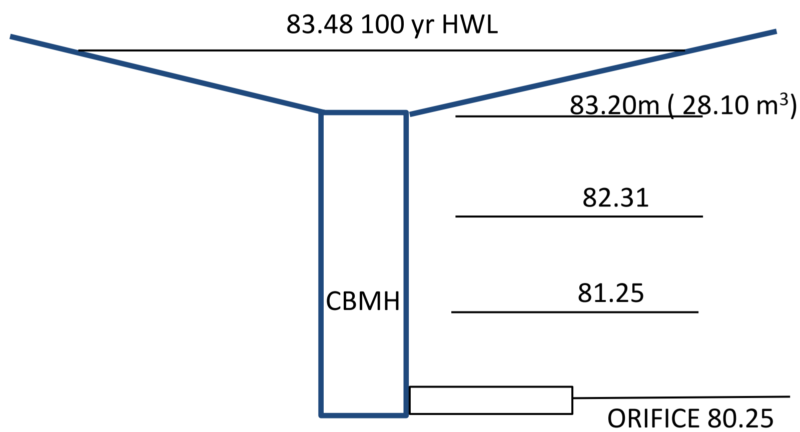
C ( Orifice plate) = 0.62

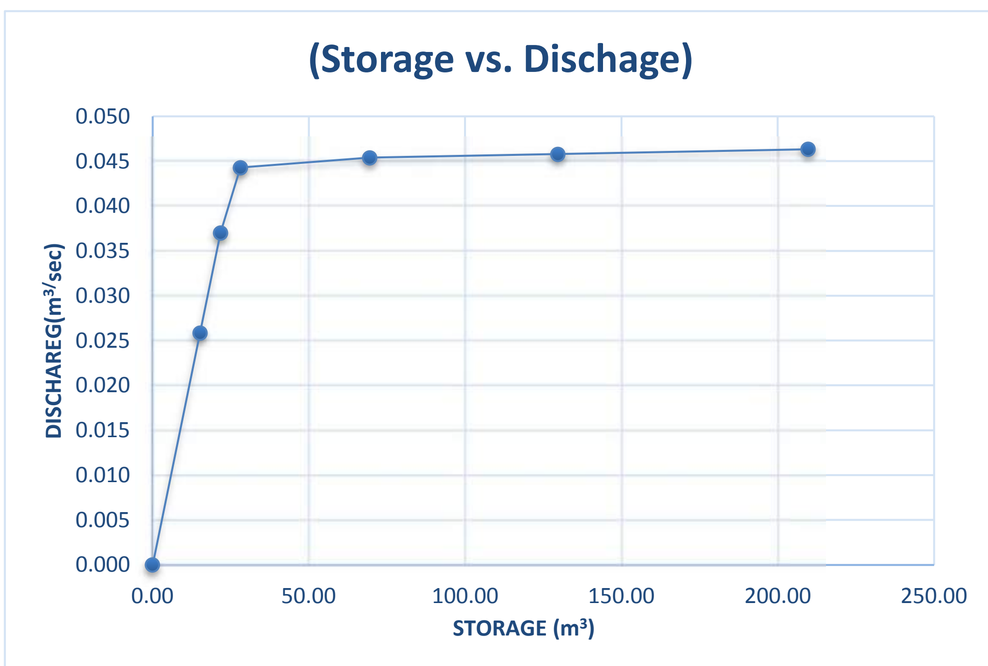
| Manhole | HWL | Orifice Inv. | c | a | g | Orifice dia. | h | Q | |
|---|---|---|---|---|---|---|---|---|---|
| | (m) | (m) | | ($m^2$) | ($m/sec^2$) | (m) | (m) | ($m^3$/sec) | (lit/sec) |
| | | | | | | | | | |
| **STMH3** | 83.48 | 80.19 | 0.62 | 0.009412 | 9.81 | 0.110 | 3.24 | 0.046 | 46.35 |

**TABL E4a.** **Stage-Storage Design Sheet**

**Project:** **2375 St. Laurent Boulevard, Ottawa, ON** **Date:** 06-Feb-23
**RRL No:** **20037** **By:** YA

| Elevation (m) | Depth ($m^3$) | Commulative Depth (m) | Storage ($m^3$) | Discharge ($m^3$/sec) |
|---|---|---|---|---|
| 80.25 | 0 | 0.00 | 0.00 | 0.000 |
| 81.25 | 1.00 | 1.00 | 15.21 | 0.026 |
| 82.31 | 1.07 | 2.07 | 21.80 | 0.037 |
| 83.20 | 0.89 | 2.96 | 28.10 | 0.044 |
| 83.35 | 0.15 | 3.11 | 69.50 | 0.045 |
| 83.40 | 0.05 | 3.16 | 129.66 | 0.046 |
| 83.48 | 0.08 | 3.24 | 209.66 | 0.046 |



## TABLE E5: ON-SITE STORAGE CALCULATION USING RATIONAL METHOD

### 100 YEAR RETURN STORM - 5 yr Pre-Development

**Project:** 2375 St. Laurent Boulevard, Ottawa, ON **Date:** 06-Feb-23

**By:** YA

**RRL No:** 20037

| | | | |
|---|---|---|---|
| **Area** | 0.650 | **ha.** | |
| **Runoff Coefficient** | 0.90 | *Increased by 25% for 100 year Storm* | |
| **Release Rate** | 0.046 | **$m^3/s$** | |

| Duration (min) | Intensity (mm/hr) | Release ($m^3/s$) | Inflow ($m^3/s$) | Inflow Volume ($m^3$) | Outflow Volume ($m^3$) | Storage ($m^3$) |
|---|---|---|---|---|---|---|
| 10 | 178.56 | 0.04635 | 0.290 | 173.9 | 39.5 | 134 |
| 15 | 142.89 | 0.04635 | 0.232 | 208.8 | 52.8 | 156 |
| 20 | 119.95 | 0.04635 | 0.195 | 233.7 | 66.2 | 167 |
| 25 | 103.85 | 0.04635 | 0.169 | 252.9 | 79.6 | 173 |
| 30 | 91.87 | 0.04635 | 0.149 | 268.4 | 93.0 | 175 |
| 35 | 82.58 | 0.04635 | 0.134 | 281.5 | 106.4 | 175 |
| 40 | 75.15 | 0.04635 | 0.122 | 292.8 | 119.9 | 173 |
| 45 | 69.05 | 0.04635 | 0.112 | 302.6 | 133.3 | 169 |
| 50 | 63.95 | 0.04635 | 0.104 | 311.4 | 146.7 | 165 |
| 55 | 59.62 | 0.04635 | 0.097 | 319.4 | 160.2 | 159 |
| 60 | 55.89 | 0.04635 | 0.091 | 326.6 | 173.7 | 153 |
| 65 | 52.65 | 0.04635 | 0.085 | 333.3 | 187.1 | 146 |
| 70 | 49.79 | 0.04635 | 0.081 | 339.5 | 200.6 | 139 |
| 75 | 47.26 | 0.04635 | 0.077 | 345.2 | 214.1 | 131 |
| 80 | 44.99 | 0.04635 | 0.073 | 350.6 | 227.6 | 123 |
| 85 | 42.95 | 0.04635 | 0.070 | 355.6 | 241.0 | 115 |
| 90 | 41.11 | 0.04635 | 0.067 | 360.4 | 254.5 | 106 |
| 95 | 39.43 | 0.04635 | 0.064 | 364.9 | 268.0 | 97 |
| 100 | 49.28 | 0.04635 | 0.080 | 480.0 | 283.9 | 196 |
| 105 | 47.35 | 0.04635 | 0.077 | 484.2 | 297.5 | 187 |
| 110 | 45.58 | 0.04635 | 0.074 | 488.3 | 311.1 | 177 |
| 115 | 43.93 | 0.04635 | 0.071 | 492.0 | 324.7 | 167 |
| 120 | 42.4 | 0.04635 | 0.069 | 495.6 | 338.3 | 157 |
| 150 | 35.11 | 0.04635 | 0.057 | 512.9 | 419.7 | 93 |
| 180 | 29.99 | 0.04635 | 0.049 | 525.8 | 501.2 | 25 |
| 210 | 26.2 | 0.04635 | 0.043 | 535.9 | 582.8 | -47 |
| 240 | 23.27 | 0.04635 | 0.038 | 543.9 | 664.3 | -120 |
| 270 | 20.95 | 0.04635 | 0.034 | 550.9 | 745.8 | -195 |
| 300 | 19.05 | 0.04635 | 0.031 | 556.6 | 827.4 | -271 |
| 330 | 17.47 | 0.04635 | 0.028 | 561.5 | 908.9 | -347 |
| 360 | 16.14 | 0.04635 | 0.026 | 565.9 | 990.5 | -425 |
| 390 | 15.01 | 0.04635 | 0.024 | 570.2 | 1072.0 | -502 |
| 420 | 14.02 | 0.04635 | 0.023 | 573.5 | 1153.6 | -580 |
| | | | | | **Required Storage ($m^3$)** | **196** |

## TABLE E6 Parking, Pipes, Manholes Storage Calculation

**Project: 2375 ST. LAURENT BLVD, OTTAWA, ONTARIO** **Date:** 06-Feb-23
**By** YA

**MANHOLES/ CB'S STORAGE**

| Description | Length (m) | Width (m) | Height (m) | Volume ($m^3$) |
|---|---|---|---|---|
| CB1 | 0.6 | 0.6 | 1.96 | 0.71 |
| CB2 | 0.6 | 0.6 | 2.07 | 0.75 |
| CB3 | 0.6 | 0.6 | 1.48 | 0.53 |
| CB4 | 0.6 | 0.6 | 1.58 | 0.57 |
| CBMH1 | 1.2 | 1.2 | 2.25 | 2.54 |
| CBMH2 | 1.2 | 1.2 | 3.29 | 3.72 |
| STM MH1 | 1.2 | 1.2 | 2.26 | 2.56 |
| STM MH2 | 1.2 | 1.2 | 2.52 | 2.85 |
| TOTAL | | | | 14.22 |

**PIPES STORAGE**

| FROM MH | TO MH | Length (m) | DIA (m) | Volume (m3) |
|---|---|---|---|---|
| CB1 | CBMH1 | 29 | 0.3 | 2.05 |
| CB2 | STM MH1 | 19 | 0.3 | 1.34 |
| CB3 | 375 DIA PIPE | 1 | 0.3 | 0.07 |
| CB4 | 375 DIA PIPE | 1 | 0.3 | 0.07 |
| CBMH1 | STM MH2 | 19 | 0.3 | 1.34 |
| STM MH1 | STM MH2 | 18 | 0.3 | 1.27 |
| STM MH2 | CBMH2 | 77 | 0.375 | 8.50 |
| TOTAL | | | | 14.65 |

**VOLUME:** **28.87 m³**

| PARKING DETENTION -100 YEAR | | | | |
|---|---|---|---|---|
| Ponding Area No. | Area (sq.m.) | Depth (m) | Volume (cu.m.) | HWL (m) (100yr) |
| A1 | 182.00 | 0.28 | 16.99 | 83.48 |
| A2 | 42.00 | 0.08 | 1.12 | 83.48 |
| A3 | 1599.00 | 0.28 | 149.24 | 83.48 |
| A4 | 144.00 | 0.28 | 13.44 | 83.48 |
| | **TOTAL VOLUME:** | | **180.79** | |

**TOTAL VOLUME:** **209.66 m³**

**City of Ottawa, Ontario**
**Table E7 - Storm Drainage Design Chart**

| | |
|---|---|
| DESIGN STORM: | 5 YEAR RETURN |
| I (5-YEAR): | I= A / (td +C)$^{B}$ (mm/hr) |
| td (start): | 10.0 minutes |

| **Reinders and Law Ltd.** | |
|---|---|
| PROJECT: | 2375 St. Laurent Boulevard |
| PREPARED BY: | YA |
| Project No.: | 20037 |
| DATE PREPARED | 06-Feb-23 |

| **LOCATION** | **MANHOLES** | | **A** | **C** | **A x C** | **ACC.** | **td (min)** | **I (mm/hr)** | **Q** | **STORM SEWER DESIGN INFORMATION** | | | | | **TIME** | **REMARKS** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FROM MH# | TO MH# | area (ha) | runoff Coeffi. | | A x C | | | (5-YR) (l/s) | size (mm) | slope (%) | length (m) | Q full (l/s) | V full (m/s) | SECT. (min) | |
| Parking | CB2 | STM MH1 | 0.10 | 0.72 | 0.07 | 0.07 | 10.00 | 104.91 | 21 | 300 | 1.00 | 19.00 | 97 | 1.37 | 0.23 | |
| Parking | STM MH1 | STM MH2 | 0.00 | 0.72 | 0.00 | 0.07 | 10.23 | 103.80 | 21 | 300 | 1.00 | 18.00 | 97 | 1.37 | 0.22 | |
| | | | | | | | | | | | | | | | | |
| Parking | CB1 | CBMH1 | 0.09 | 0.72 | 0.06 | 0.06 | 10.00 | 104.91 | 19 | 300 | 1.00 | 29.00 | 97 | 1.37 | 0.35 | |
| Parking | CBMH1 | STM MH2 | 0.09 | 0.72 | 0.06 | 0.13 | 10.35 | 103.22 | 37 | 300 | 1.00 | 19.00 | 97 | 1.37 | 0.23 | |
| | | | | | | | | | | | | | | | | |
| Parking | STM MH2 | CBMH2 | 0.10 | 0.72 | 0.07 | 0.27 | 10.45 | 102.76 | 78 | 375 | 1.00 | 77.00 | 175 | 1.59 | 0.81 | |
| Parking | CBMH2 | STM MH3 | 0.22 | 0.72 | 0.16 | 0.43 | 11.26 | 99.13 | 119 | 375 | 1.00 | 23.00 | 175 | 1.59 | 0.24 | |
| Parking | STM MH3 | *EX. STM MH153* | 0.00 | 0.72 | 0.00 | 0.43 | 11.50 | 98.10 | 118 | 375 | 1.00 | 21.00 | 175 | 1.59 | 0.22 | Orifice Control @ 46.35 l/sec |

## STORMCEPTOR®
## ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

12/06/2022

| | |
|---|---|
| Province: | Ontario |
| City: | Ottawa |
| Nearest Rainfall Station: | OTTAWA CDA RCS |
| Climate Station Id: | 6105978 |
| Years of Rainfall Data: | 20 |
| Site Name: | |
| Drainage Area (ha): | 0.66 |
| Runoff Coefficient 'c': | 0.71 |
| Particle Size Distribution: | Fine |
| Target TSS Removal (%): | 80.0 |
| Required Water Quality Runoff Volume Capture (%): | 90.00 |
| Estimated Water Quality Flow Rate (L/s): | 15.12 |
| Oil / Fuel Spill Risk Site? | Yes |
| Upstream Flow Control? | Yes |
| Upstream Orifice Control Flow Rate to Stormceptor (L/s): | 47.62 |
| Peak Conveyance (maximum) Flow Rate (L/s): | |
| Site Sediment Transport Rate (kg/ha/yr): | |

| | |
|---|---|
| Project Name: | 2375 St. Laurent Blvd |
| Project Number: | 20037 |
| Designer Name: | USMAN ARIF |
| Designer Company: | Jain Infrastructure Consultants |
| Designer Email: | uarif@jainconsultants.com |
| Designer Phone: | 647-510-0353 |
| EOR Name: | |
| EOR Company: | |
| EOR Email: | |
| EOR Phone: | |

**Net Annual Sediment (TSS) Load Reduction Sizing Summary**

| Stormceptor Model | TSS Removal Provided (%) |
|---|---|
| EFO4 | 84 |
| EFO6 | 92 |
| EFO8 | 96 |
| EFO10 | 98 |
| EFO12 | 100 |

| | |
|---|---|
| **Recommended Stormceptor EFO Model:** | **EFO4** |
| **Estimated Net Annual Sediment (TSS) Load Reduction (%):** | **84** |
| **Water Quality Runoff Volume Capture (%):** | **> 90** |

## 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.

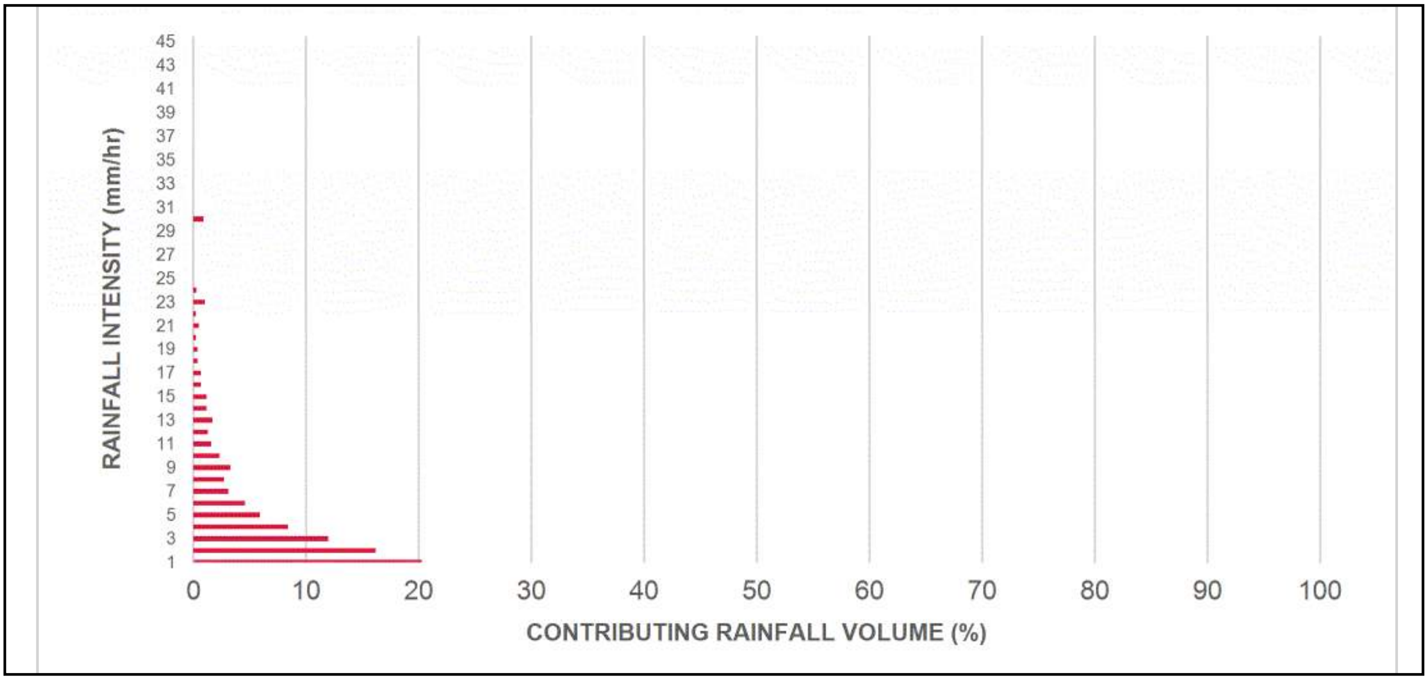
| Particle Size (µm) | Percent Less Than | Particle Size Fraction (µm) | Percent |
|---|---|---|---|
| 1000 | 100 | 500-1000 | 5 |
| 500 | 95 | 250-500 | 5 |
| 250 | 90 | 150-250 | 15 |
| 150 | 75 | 100-150 | 15 |
| 100 | 60 | 75-100 | 10 |
| 75 | 50 | 50-75 | 5 |
| 50 | 45 | 20-50 | 10 |
| 20 | 35 |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

## Upstream Flow Controlled Results

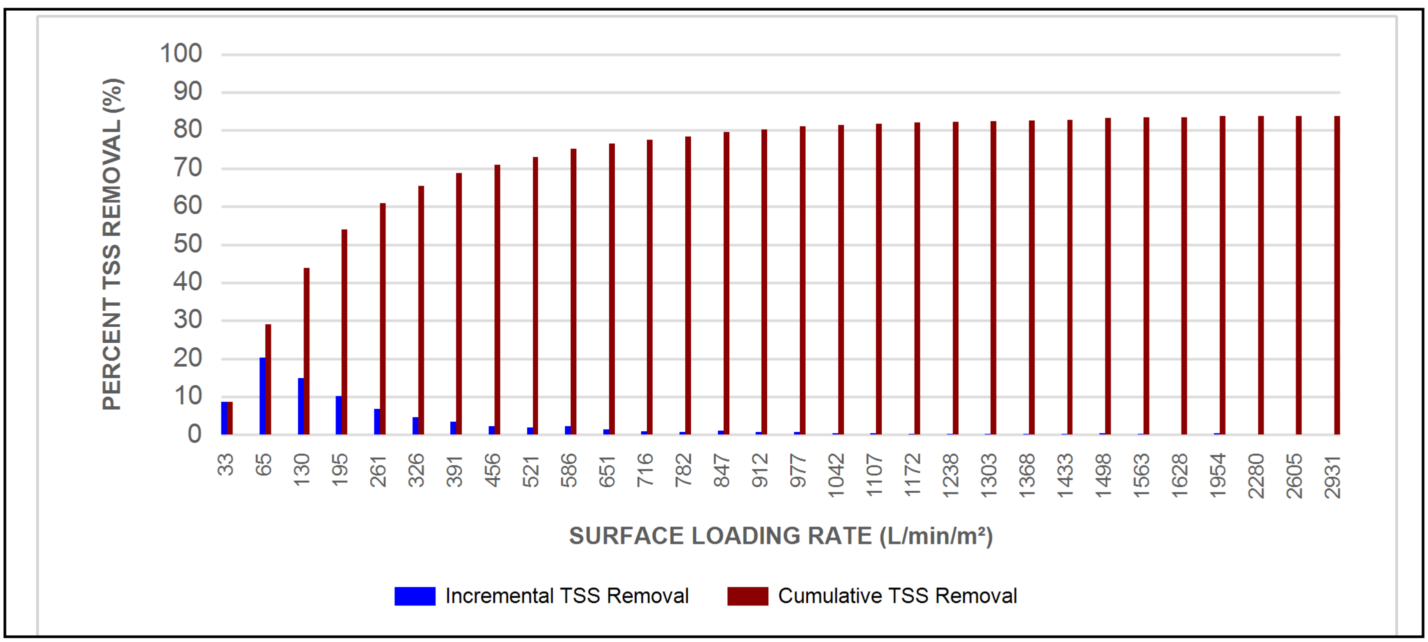
| Rainfall Intensity (mm / hr) | Percent Rainfall Volume (%) | Cumulative Rainfall Volume (%) | Flow Rate (L/s) | Flow Rate (L/min) | Surface Loading Rate (L/min/m²) | Removal Efficiency (%) | Incremental Removal (%) | Cumulative Removal (%) |
|---|---|---|---|---|---|---|---|---|
| 0.5 | 8.6 | 8.6 | 0.65 | 39.0 | 33.0 | 100 | 8.6 | 8.6 |
| 1 | 20.3 | 29.0 | 1.30 | 78.0 | 65.0 | 100 | 20.3 | 29.0 |
| 2 | 16.2 | 45.2 | 2.61 | 156.0 | 130.0 | 92 | 14.9 | 43.9 |
| 3 | 12.0 | 57.2 | 3.91 | 234.0 | 195.0 | 84 | 10.1 | 54.0 |
| 4 | 8.4 | 65.6 | 5.21 | 313.0 | 261.0 | 80 | 6.8 | 60.8 |
| 5 | 5.9 | 71.6 | 6.51 | 391.0 | 326.0 | 78 | 4.6 | 65.4 |
| 6 | 4.6 | 76.2 | 7.82 | 469.0 | 391.0 | 74 | 3.4 | 68.8 |
| 7 | 3.1 | 79.3 | 9.12 | 547.0 | 456.0 | 72 | 2.2 | 71.0 |
| 8 | 2.7 | 82.0 | 10.42 | 625.0 | 521.0 | 68 | 1.9 | 72.9 |
| 9 | 3.3 | 85.3 | 11.72 | 703.0 | 586.0 | 66 | 2.2 | 75.1 |
| 10 | 2.3 | 87.6 | 13.03 | 782.0 | 651.0 | 64 | 1.5 | 76.6 |
| 11 | 1.6 | 89.2 | 14.33 | 860.0 | 716.0 | 64 | 1.0 | 77.6 |
| 12 | 1.3 | 90.5 | 15.63 | 938.0 | 782.0 | 63 | 0.8 | 78.4 |
| 13 | 1.7 | 92.2 | 16.94 | 1016.0 | 847.0 | 63 | 1.1 | 79.5 |
| 14 | 1.2 | 93.5 | 18.24 | 1094.0 | 912.0 | 62 | 0.8 | 80.2 |
| 15 | 1.2 | 94.6 | 19.54 | 1172.0 | 977.0 | 62 | 0.7 | 81.0 |
| 16 | 0.7 | 95.3 | 20.84 | 1251.0 | 1042.0 | 61 | 0.4 | 81.4 |
| 17 | 0.7 | 96.1 | 22.15 | 1329.0 | 1107.0 | 59 | 0.4 | 81.8 |
| 18 | 0.4 | 96.5 | 23.45 | 1407.0 | 1172.0 | 58 | 0.2 | 82.0 |
| 19 | 0.4 | 96.9 | 24.75 | 1485.0 | 1238.0 | 56 | 0.2 | 82.3 |
| 20 | 0.2 | 97.1 | 26.05 | 1563.0 | 1303.0 | 55 | 0.1 | 82.4 |
| 21 | 0.5 | 97.5 | 27.36 | 1641.0 | 1368.0 | 53 | 0.2 | 82.6 |
| 22 | 0.2 | 97.8 | 28.66 | 1720.0 | 1433.0 | 51 | 0.1 | 82.8 |
| 23 | 1.0 | 98.8 | 29.96 | 1798.0 | 1498.0 | 49 | 0.5 | 83.3 |
| 24 | 0.3 | 99.1 | 31.26 | 1876.0 | 1563.0 | 47 | 0.1 | 83.4 |
| 25 | 0.9 | 100.0 | 32.57 | 1954.0 | 1628.0 | 45 | 0.4 | 83.8 |
| 30 | 0.9 | 100.9 | 39.08 | 2345.0 | 1954.0 | 38 | 0.4 | 84.2 |
| 35 | -0.9 | 100.0 | 45.59 | 2736.0 | 2280.0 | 32 | N/A | 83.9 |
| 40 | 0.0 | 100.0 | 48.00 | 2880.0 | 2400.0 | 31 | 0.0 | 83.9 |
| 45 | 0.0 | 100.0 | 48.00 | 2880.0 | 2400.0 | 31 | 0.0 | 83.9 |
| **Estimated Net Annual Sediment (TSS) Load Reduction =** | | | | | | | | **84 %** |

*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

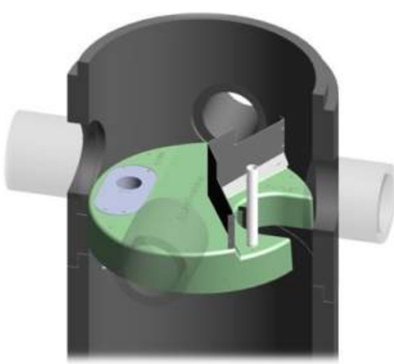
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

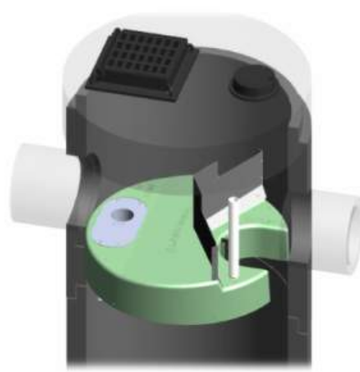
## DESIGN FLEXIBILITY

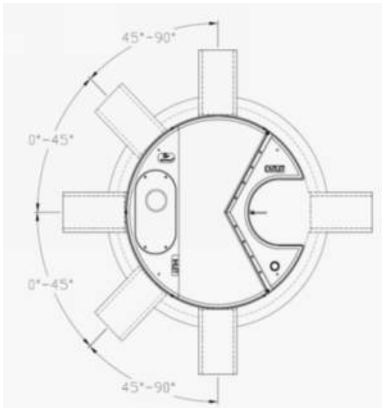
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend 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) | (ft³) | (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/ft³ )

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

**STANDARD STORMCEPTOR EF/EFO DRAWINGS**

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

**STANDARD STORMCEPTOR EF/EFO SPECIFICATION**

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

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

**PART 1 – GENERAL**

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

**PART 2 – PRODUCTS**

2.1 OGS POLLUTANT STORAGE

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

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

**PART 3 – PERFORMANCE & DESIGN**

3.1 GENERAL

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

3.2 SIZING METHODOLOGY

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

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

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

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

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

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

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

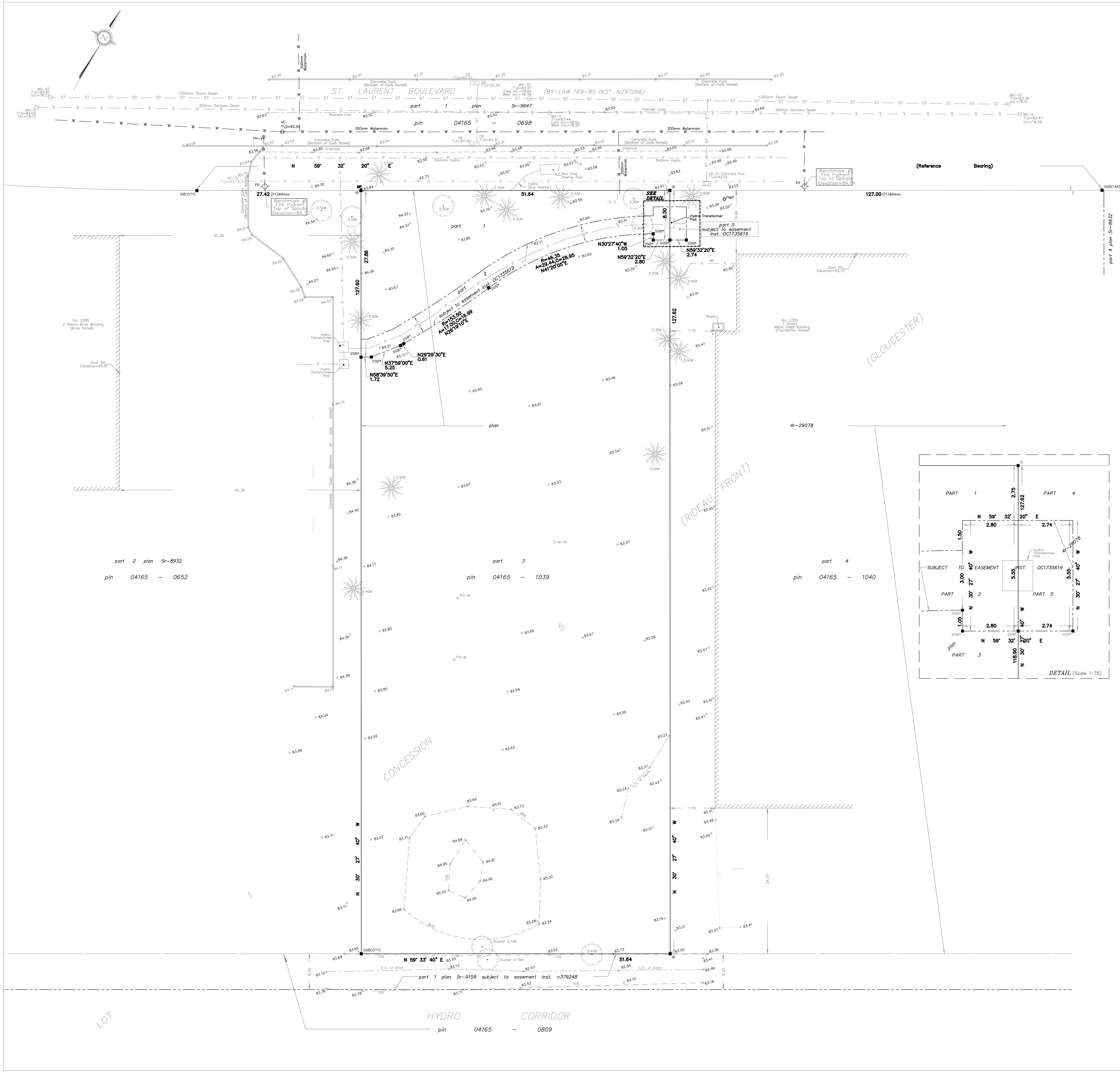
3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/$m^2$.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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

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

# Appendix G
## Topographic and Legal Survey




*TOPOGRAPHICAL PLAN OF SURVEY*

# PART OF LOT 1
# CONCESSION 5 (RIDEAU FRONT)
# Geogaphic Township of Nepean
# CITY OF OTTAWA

Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

Plan Amended September 7, 2017 to illustrate additional services.

Scale 1 : 250

10 7.5 5.0 2.5 0 5 10 Metres

## Metric

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

## Surveyor's Certificate

I CERTIFY THAT :

1. This survey and plan are correct and in accordance with the Surveys Act, the Surveyors Act and the Land Titles Act and the regulations made under them.
2. The survey was completed on the 1st day of August, 2017.

Date

Andrew J. Broxham
Ontario Land Surveyor

ASSOCIATION OF ONTARIO LAND SURVEYORS
*PLAN SUBMISSION FORM*
*2019959*

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR In accordance with Regulation 1026, Section 29 (3).

## Notes & Legend

| | | |
|---|---|---|
| | Denotes | Survey Monument Planted |
| | " | Survey Monument Found |
| SIB | " | Standard Iron Bar |
| SSIB | " | Short Standard Iron Bar |
| IB | " | Iron Bar |
| * | " | 0.3m Long Survey Monument |
| (WIT) | " | Witness |
| (AOG) | " | Annis, O'Sullivan, Vollebekk Ltd. |
| Meas. | " | Measured |
| (P1) | " | Plan 4R-29078 |
| MH-ST | " | Maintenance Hole (Storm Sewer) |
| MH-S | " | Maintenance Hole (Sanitary) |
| MH-B | " | Maintenance Hole (Bell) |
| ST | " | Underground Storm Sewer |
| S | " | Underground Sanitary Sewer |
| W | " | Underground Water |
| P | " | Underground Power |
| B | " | Underground Bell |
| LS | " | Light Standard |
| CB | " | Catch Basin |
| FH | " | Fire Hydrant |
| VC | " | Valve Chamber- Watermain |
| T/G | " | Top of Grate |
| FH-V | " | Fire Hydrant Valve |
| TB-B | " | Bell Terminal Box |
| | " | Deciduous Tree |
| | " | Coniferous Tree |
| BF | " | Board Fence |
| BOS | " | Bottom of Slope |
| TOS | " | Top of Slope |
| PO-M | " | Metal Pole |
| FMIP | " | Fire Main Indicator Post |
| Ø | " | Diameter |
| +65.00 | " | Location of Elevations |
| C/L | " | Centreline |
| M-W | " | Monitoring Well |
| MP | " | Metal Fence Post |

ALL FOUND SURVEY MONUMENTS ARE (AOG) UNLESS OTHERWISE NOTED.

ALL BEARINGS AND DISTANCES ARE PER (P1) UNLESS OTHERWISE NOTED.

Bearings are grid bearings, derived from the Southerly Limit of St. Laurent Boulevard, shown to be N59°32'20"E on Plan 4R-29078 and are referred to the Central Meridian of MTM Zone 9 ( 76°30' West Longitude ) NAD-83 (original).

SITE AREA = 6589.8 m²

## ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum.
2. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.

## UTILITY NOTES

1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. Only visible surface utilities were located.
3. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.
4. Location of underground buried services, pipe diameters and inverts are derived from City of Ottawa Engineering Plan No. 2304, (sheet 4 of 8) and City of Ottawa Utility Sheets M-19-17 (rev. date August 2017) and M-19-22 (rev. date August 2017).



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

Job No.19465-17 Graebeck PtLt1 C5 RF GL T F | AE