

Site Servicing & Stormwater Management Report Haven Baptist Church – 4000 Strandherd Drive

Client:

Haven Baptist Church

Project Number:

OTT-22029363-A0

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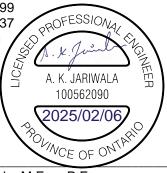
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Alam Ansari, M.Sc., P. Eng. Director of Operations, Eastern Ontario Infrastructure Services

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1 Introduction

EXP Services Inc. (EXP) was retained by Havens Baptist Chruch. to provide Site Servicing and Stormwater Management report for the proposed addition to the existing Church building and parking lot located at 4000 Standherd Drive, Ottawa, ON.

The site is 0.537 hectares in area and is bound by Strandherd Drive on the south-east and Harthill Way on the north-west.

Development proposal for the subject site includes ~244 m² of additional floor space to the existing church building and expanding the existing parking lot. This site servicing and stormwater management report will address the existing servicing adequacy for the proposed addition as well as stormwater management quality and quantity control strategy as per the criteria set by the City of Ottawa.

Refer to Figure 1 in Appendix A for the site location.

2 Existing Conditions

The subject property currently have a church building with ~447m² area and an existing parking lot, with some landscaping and vegetation around it. The topography of the site is fairly flat. The stormwater drainage in existing condition is achieved by sheet drainage towards Strandherd Drive and Harthill Way.

Existing municipal and private services within and near the subject property is listed below. This information was achieved from as-built drawings received by the City of Ottawa. Municipal infrastructure along Standherd Drive was recently upgraded by the City of Ottawa and as-built drawings are not available as of the date of this report. Therefore, the information listed below for Strandherd Drive municipal infrastructure is based on the latest IFC drawings received from the City of Ottawa, included in **Appendix F**.

Within the Property (As per as-built drawing prepared by Oliver Mangione McCalla & Associates Ltd., dated October 1996):

150mm PVC Sanitary Service (Confirmed by CCTV Inspection, Refer to Appendix E).

25mm Copper Type K Water Service.

150mm Storm Service (Confirmed by CCTV Inspection, Refer to Appendix E).

Within Strandherd Drive (As per IFC drawing prepared by Parsons and Novatech, dated 26th June, 2020):

1200mm dia. Concrete 100-D Storm Sewer.

250mm dia. PVC Sanitary Sewer.

406mm Dia. PVC Watermain.

Within Harthill Way (As per as-built drawing prepared by Oliver Mangione McCalla & Associates Ltd., dated October 1996 and as-built drawing prepared by IBI Group, dated 1st February, 2010):

525mm dia. Storm Sewer draining towards Halley Street.

250mm dia. Storm Sewer.

2100mm dia. Storm Sewer draining towards Opal Lane.



250mm dia. Sanitary Sewer collecting sanitary flows from the subject site and draining towards Halley Street.

150mm dia. Watermain.

Further information regarding the existing services can be found on the as-built drawings as well as the Servicing and Grading Plan included in **Appendix F**.

3 References

Various documents were referred to in preparing the current report including:

- Sewer Design Guidelines, Second Edition, Document SDG002, October 2012, City of Ottawa (Guidelines) including:
 - Technical Bulletin ISDTB-2012-4 (20 June 2012)
 - Technical Bulletin ISDTB-2014-01 (05 February 2014)
 - Technical Bulletin PIEDTB-2016-01 (September 6, 2016)
 - Technical Bulletin ISDTB-2018-01 (21 March 2018)
 - Technical Bulletin ISDTB-2018-04 (27 June 2018)
 - Technical Bulletin ISDTB-2019-02 (08 July 2019)
- Ottawa Design Guidelines Water Distribution, July 2010 (WDG001), including:
 - Technical Bulletin ISDTB-2014-02 (May 27, 2014)
 - Technical Bulletin ISTB-2018-02 (21 March 2018)
- Ontario Ministry of Transportation (MTO) Drainage Manual, 1995-1997
- Stormwater Management Planning and Design Manual, Ontario Ministry of the Environment and Climate Change, March 2003 (SMPDM).
- Design Guidelines for Drinking-Water Systems, Ontario Ministry of the Environment and Climate Change, 2008 (GDWS).
- Fire Underwriters Survey, Water Supply for Public Fire Protection (FUS), 2020
- Ontario Building Code 2012, Ministry of Municipal Affairs and Housing

4 Watermain Design

4.1 Required Fire Flow

The fire flow demand calculations were prepared based on the Fire Underwriters Survey (FUS, 2020) criteria. The proposed as well as existing building's type of construction is classified as wood frame. The building will not have a sprinkler system and the combustibility content of the building will be limited combustible. There are no exposures noted within 30m distance from the existing and proposed church building. The required fire flow was determined to be 133.3 L/s (8000 L/min). Refer to **Appendix B** for detailed fire flow demand calculations and the architect's confirmation email regarding type of construction.



4.2 Watermain Design

There is an existing municipal 150mm diameter watermain on Harthill Way. The existing church building is being serviced by the existing watermain on Harthill Way via. 25mm copper water service connection. The proposed building addition will be serviced by the same water service lateral as the existing building.

The total domestic water demands for the existing and proposed buildings were calculated as per the City of Ottawa Water Design Guidelines (July 2010). The institutional average consumption rate of 28,000 L/gross ha/day was used. The institutional peak factors were 1.5 and 1.8 for the max. day and peak hour demands respectively. Refer to **Appendix B** for detailed calculations. With the gross site area of 0.537ha, the domestic demands for the existing and proposed addition were calculated as follows:

Institutional Water Demand

Average daily demand = 0.17 L/s

Maximum daily demand = 0.26 L/s

Maximum hourly daily demand = 0.47 L/s

4.3 Pressure Check

The boundary conditions provided by the City of Ottawa indicates that the minimum and maximum pressure in the existing municipal 150mm diameter watermain at the connection point on Harthill Way is 72.4 psi (499.33 kPa) and 86.5 psi (596.45 kPa), respectively. With the existing 25mm copper water service, the anticipated residual pressure at the building FFE during average day, max day and peak hour demands will be 85.4 psi, 70.9 psi and 69.3 psi, respectively. Residual pressure at the building is anticipated to be higher than 80 psi, therefore pressure reducing measures will be required.

In addition to the domestic demands, the subject site will be serviced for fire demands via the existing 400mm dia. and 200mm dia. watermains on Strandherd Drive. The residual pressure of 75.6 psi (520.9 kPa) was indicated by the city during max day + fire flow demand of 133.6 L/s.

Based on the available pressures in the existing watermain along Harthill Way, the existing 25mm water supply will have adequate capacity to meet the domestic demands. Based on the available pressures in the existing watermain along Strandherd Drive, the existing church building and proposed addition can be serviced for fire demands without issues. Refer to **Appendix B** for detailed calculations.

4.4 Review of Hydrant Spacing

A review of the hydrant spacing was completed to ensure compliance with Appendix I of Technical Bulletin ISTB-2018-02. As per Section 3 of Appendix I all hydrants within 150 meters were reviewed to assess the total possible contribution of flow from these hydrants. For each hydrant, the distance to the proposed building was determined to arrive at the contribution of fire flow. A review of the available fire hydrant within 150m distance along the fire route from the building was carried out which is summarized in the table below.



Table 4-1: Summary of SWM Storage Requirements

Hydrant #	Location	City / Private	Color Code	Distance from the Building (m)	Fire Flow Contribution for Class AA Hydrant (L/min)
362014H204	Strandherd Drive	City	BLUE	70	5700
362014H174	Strandherd Drive	City	BLUE	97	3800
362013H031	Strandherd Drive	City	BLUE	120	3800
				Total:	13,300

Please refer to **Figure A2** in **Appendix A** for location of the above noted hydrants. As noted in the table above, there are 3 accessible hydrants available within 150m from the building to access the required fire flow of 8000 L/min. Therefore, no new hydrants are proposed.

5 Sanitary Sewer Design

5.1 Peak Design Flow

There is an existing 150mm dia. PVC sanitary service connected to 250mm dia. municipal sanitary sewer on Harthill Way, flowing from south to north eventually discharging into 300mm dia. municipal sanitary sewer on Halley Street. There are no capacity constraints noted by the City on these sanitary sewers. The anticipated peak sanitary flows from the existing and proposed institutional site have been calculated as per the City of Ottawa Sewer Design Guidelines (October 2012). The anticipated peak sanitary flows are calculated as follows:

Design Flows

Institutional Design Flow: 28,000 L/gross ha/day

Development Area: 0.537 hectares

Peak Factor: 1.5

Extraneous Flow: 0.33 L/s/ha

Peak Design Flow: =(28000L/ha/day)(0.537ha)(1.5)(1/86400)+(0.537ha)(0.33L/s/ha)

=0.44 L/s

The existing 150mm dia. PVC sanitary service at 1.0% slope has a full flow capacity of 14.7 L/sec and a full flow velocity of 1.21 m/s, which will be sufficient to service the existing church as well as the proposed addition. Refer to the sanitary sewer design sheet in **Appendix C** and the Site Servicing and Grading plan (dwg #C200) in **Appendix F** for further details.

6 Stormwater Management

6.1 Storm Design Criteria

The storm sewer system was designed in conformance with the City of Ottawa Sewer Design Guidelines (October 2012). The stormwater servicing design criteria for the proposed development are as follows:



- The sites allowable release rate shall be controlled post-to-pre with any flows exceeding the existing total release rate being stored on site.
- The pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less.
- A calculated time of concentration (Cannot be less than 10 minutes).
- No on-site quality control requirements as the proposed works drains into municipal minor system
 which is treated by an end-of-pipe stormwater manager facility on Strandherd Drive (KennedyBurnette Stormwater Management Facility).
- Maximum allowable surface ponding depth is 300 mm.
- Estimated storage volumes based on the Modified Rational Method.
- Average run-off coefficient of 0.20 for soft landscaping and 0.9 for hard surfaces.

6.2 Pre-Development Conditions

In existing condition, 0.537ha site at 4000 Stranherd Drive is occupied by a ~447m² church building with around 1830m² of asphalt parking and concrete surfaces surrounded by ~3057m² of soft landscaping and vegetation. In existing condition, stormwater from majority of the property sheet drains uncontrolled towards Strandherd Drive, identified as drainage area E1 (0.428ha). The soft landscaping along the north-west property line sheet drains uncontrolled towards the roadside ditch along Harthill Way identified as drainage area E2 (0.109ha). There is no existing stormwater infrastructure within the subject property. Stormwater drainage is entirely achieved by uncontrolled overland sheet drainage towards the municipal ROW.

Table D1 to D3 in **Appendix D** provides detailed calculation for pre-development average run-off coefficient, time of concentration and peak run-off rates during 2-year, 5-year and 100-year storm events. With average run-off coefficient of 0.58 and time of concentration of 10 mins, pre-dev runoff rates from drainage area E1 (towards Strandherd Drive) were calculated to be 51.99 L/sec, 70.53 L/sec and 151.08 L/sec during 2-year, 5-year and 100-year storm events, respectively. With average run-off coefficient of 0.22 and time of concentration of 10 mins, pre-dev runoff rates from drainage area E2 (towards Harthill Way) were calculated to be 5.55 L/sec, 7.53 L/sec and 16.13 L/sec during 2-year, 5-year and 100-year storm events, respectively.

6.3 Allowable Release Rate

Based on the stormwater management criteria identified by the City during pre-consultation meeting, the allowable release rates were calculated using a maximum average runoff coefficient of 0.50 or pre-dev, whichever is less. For drainage area E1 (towards Strandherd Drive), the allowable release rates based on average run-off coefficient of 0.50 were calculated as 44.86 L/sec, 60.85 L/sec and 130.36 L/sec during 2-year, 5-year and 100-year storm events, respectively. For drainage area E2 (towards Harthill Way), the allowable release rates will remain same as pre-development run-off rates noted in section 6.2 above.

Table D4 in **Appendix D** provides detailed calculation of allowable release rates.

6.4 Post-Development Conditions

In post-development condition, there will be an additional ~244m² of building added to the existing ~447m² church building. Additionally, the asphalt parking lot will be expanded to accommodate the additional parking spaces. The proposed development is aimed to make no grade changes to the existing hard surfaces. Therefore, the post-development stormwater management strategy is also based on the overland sheet drainage.



In post-development condition, the site is divided into three (3) drainage areas. Areas A1 and A2 draining towards Strandherd Drive ROW and area A3 draining towards Harthill Way roadside ditch. Table 6-1 provides summary of pre-development and post-development drainage areas contributing to Strandherd Drive and Harthill Way along with average run-off coefficient. Please note that in the post-development conditions, drainage area A3 remains same as pre-development conditions drainage area E2 as no changes have been proposed.

Table 6-1: Summary of Pre-Dev and Post-Dev Storm Catchments

Outlet		Pre-Dev			Post-Dev		
	Area ID	Area (ha)	Runoff Coeff.	Area ID	Area (ha)	Runoff Coeff.	
Strandherd Drive	E1	0.4202	0.58	A1, A2	0.427	0.76	
Harthill Way	E2	0.1170	0.22	A3	0.1101	0.24	

Post-development uncontrolled run-off towards Strandherd Drive was calculated as 69.11 L/sec, 93.76 L/sec and 193.52 L/sec during 2-year, 5-year and 100-year storm events, respectively. Post-dev run-off towards Strandherd Drive will be controlled to meet the allowable release rates, as explained in the following section.

Post-development discharge rates towards Harthill Way were calculated as 5.68 L/sec, 7.71 L/sec and 16.51 L/sec during 2-year, 5-year and 100-year storm events, respectively. Which are slightly higher than pre-development run-off rates of 5.55 L/sec, 7.53 L/sec and 16.13 L/sec, respectively. Therefore, no stormwater quantity control measures are proposed in drainage area A3.

6.4.1 Storage Requirements and Allocation

Drainage areas A1 and A2 contribute to post-development run-off towards Strandherd Drive. Drainage area A1 consist of pitched roof of the existing and proposed building, existing and new asphalt parking lot which will be directed overland towards the new stormwater storage trench to provide quantity control. Area A2 consist of pitched building roof and surrounding landscaped area. Area A2 will be directed to the new stormwater storage trench via proposed swale and culvert for quantity control as well.

Run-off from area A1 and A2 will be controlled at proposed storage trench along the southern property line. Using the modified rational method, the maximum required storage volume for drainage areas A1 and A2 was calculated to be 50.9 m³ during 100-year storm event (Refer to **Table D6 and D7** in **Appendix D**). The required storage volume will be achieved by the proposed storge trench. Which will consist of 0.95m deep storage layer filled with 50mm dia. clear stone (40% void). The proposed trench will have total available volume of 60.01 m³. During major storm events greater than 100-year storm events, stormwater form the trench will over flow towards the City ROW at the southern corner of the property.

Refer to Site Servicing and Grading drawing #C200 included in **Appendix F** for further details and stage storage volume **Table D11** included in **Appendix D**.

6.4.2 Flow Control Device Sizing

Flow attenuation will be achieved by a 150mm dia. Circular orifice plate mounted on 250mm dia. Outlet pipe from the catchbasin proposed at the bottom of trench. Another 250mm dia. PVC storm pipe is proposed at a higher elevation within the trench equipped with 200mm dia. orifice plate. Detailed orifice calculations are included in **Appendix D** (**Table D8, D9** and **D10**). The two proposed orifices will attenuate



the release rates from the subject property to 1200mm dia. storm sewer on Strandherd Drive during 2-year, 5-year and 100-year storm events. During the storm events greater than 100-year, the trench will overflow towards Strandherd Drive ROW.

Controlled release rates from the orifices are estimated using the orifice equation as noted below:

QORIFICE = $C A (2 g H)^{0.5}$

Where:

C = Discharge Coefficient

A = Area of the Orifice

 $g = 9.81 \text{ m/sec}^2$

H = Head of water over Orifice

Refer to **Table D8**, **D9** and **D10** in **Appendix D** for detailed orifice calculations.

Therefore, the controlled release rates towards Strandherd Drive during 2-year, 5-year and 100-year storm events from drainage area A1 and A2 will be 40.00 L/sec, 56.80 L/sec and 116.0 L/sec, respectively. Which is well below the allowable release rates calculated in section 6.3 above.

Refer to Civil drawings in **Appendix F** and refer to **Appendix D** for the detailed stormwater management spreadsheet calculations.

6.4.3 Storm Servicing

Proposed stormwater storage trench will be serviced by a 375mm dia. PVC storm sewer installed at 1.5% slope, having a full flow capacity of 201.9 L/sec. The proposed storm sewer will be connected to the existing 1200mm dia. municipal storm sewer within Strandherd Drive ROW. Refer to **Table D12** in **Appendix D** for detailed storm sewer sizing calculations.

6.4.4 Quality Control

Rideau Valley Conservation Authority (RVCA) was contacted for the applicable quality control criteria for the proposed site. RVCA had noted that no quality control is required for this site. RVCA had deferred to the City of Ottawa for the quality control requirements. City of Ottawa had provided the quality control requirement of enhanced level (80% TSS removal) for the areas not discharging directly to the municipal minor system. In the proposed design, all the asphalt areas are proposed to discharge to the municipal minor system. There is a municipal stormwater management facility downstream of the subject property (Kennedy Burnette SWM Facility), which will provide the necessary quality control. Therefore, no additional on-site quality control measures are provided. Please refer to the email correspondence included in **Appendix E**.

6.4.5 ECA Requirement

Generally, an Environmental Compliance Approval (ECA) would be obtained from the Ministry of Environment, Conservation and Parks (MECP), formerly the Ministry of the Environment and Climate Change (MOECC), for any onsite private Sewage Works; however, an Approval Exemption under Ontario Regulation 525/98 can be applied. Under Section 3 of O'Reg 525/98, Section 53 (1) and (3) do not apply to the alteration, extension, replacement, or a change to a stormwater management facility that 1) is designed to service one lot or parcel of land, b) discharges into a storm sewer that is not a combined sewer, c) does not service industrial land or a structure located on industrial land, and finally d) is not located on



industrial land. The onsite Sewage Works would generally include the onsite stormwater works such as flow controls, associated stormwater detention, and treatment works.

Proposed stormwater management infrastructure complies with all of the above noted exemption requirements. Therefore, the proposed private stormwater management infrastructure would not require an ECA.

7 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;
- Siltsack 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;
- 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.

8 Conclusions

This report addresses the adequacy of the existing municipal services to service the existing church building and proposed addition at 4000 Strandherd Drive. Based on the analysis provided in this report, the conclusions are as follows:

- Existing and proposed Church building will be serviced by the existing 25mm dia. water service, which
 will adequately service the proposed development for the domestic demands. 400mm and 200 mm dia.
 municipal watermains along Strandherd Drive have sufficient pressure and flow to service the proposed
 development for fire flow demands.
- The proposed building will be serviced by the existing 150mm diameter sanitary sewer which has adequate capacity to service the existing and proposed church building.
- Stormwater Management quantity control criteria for the subject site will be achieved by a storage trench and a 150mm dia. circular orifice as well as a 200mm dia. circular orifice. Post-dev run-off rates during all storm events up to and including 100-year storm event will be matched with pre-dev run-off rates with max. runoff coefficient of 0.5.



- A 375mm dia. storm sewer is proposed to connect to the 1200mm dia. municipal storm sewer within the Strandherd Drive ROW for stormwater management.
- Temporary erosion and sediment control measures for the subject site have been identified.



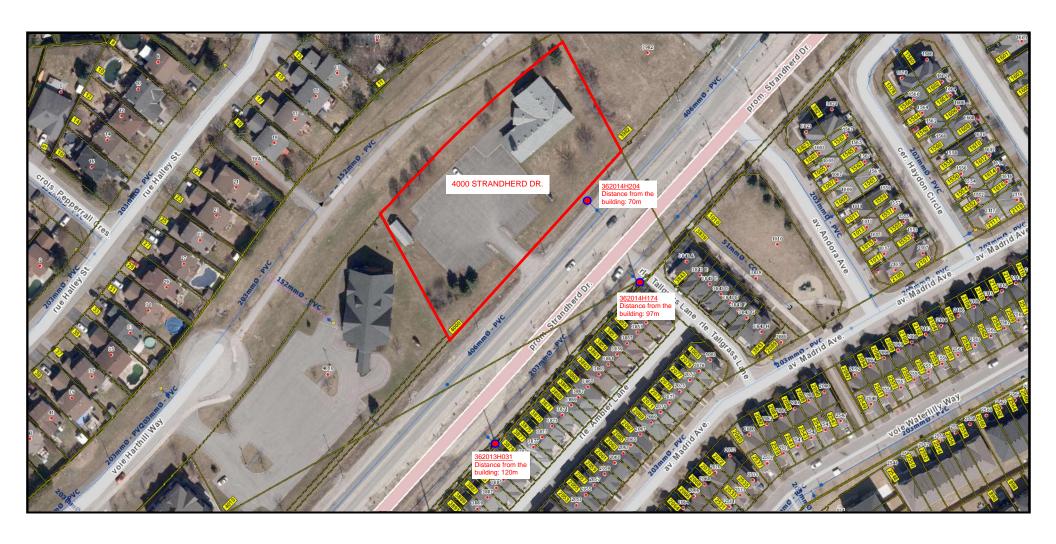
Appendix A – Figures

Figure A1: Site Location Plan

Figure A2: Hydrant Location Plan







Appendix B – Water Servicing

Table B1: Water Demand Chart

Table B2: Fireflow Requirements Based on Fire Underwriters Survey (FUS) 2020

Table B3: Estimated Water Pressure At Building



TABLE B1: Water Demand Chart

Location:4000 Strandherd DriveProject No:OTT-22029363-A0

Designed by: A. Jariwala
Checked By: A. Ansari
Date Revised: April 2023



Water Consumption

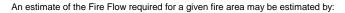
Institutional = <u>28,000</u> L/gross ha/day

Institutional Total Demands (L/sec)												
			Institu	utional			Total D	Demands	(L/sec)			
			Fac	king tors g Day)								
Location	Area (m²)	Avg Demand (L/day)	Max Day	Peak Hour	Max Day Demand (L/day)	Peak Hour Demand (L/day)	Avg Day (L/s)	Max Day (L/s)	Max Hour (L/s)			
4000 Strandherd Dr.	5,372	15,042	1.50	1.80	22,563	40,613	0.17	0.26	0.47			

TABLE B2: FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020

PROJECT: 4000 Strandherd

Building No: Existing + Proposed Addition



F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute

A = total floor area in m² (including all storeys, but excluding basements at least 50% below grade)

C = coefficient related to the type of construction



Task	Options	Multiplier	Input	Value Used	Fire Flow Total (L/min)
	Wood Frame	1.5			
Choose Building	Ordinary Construction	1			
Frame (C)	Non-combustible Construction	0.8	Wood Frame	1.5	
	Fire Resistive Construction	0.6			
	First Floor		730	720.0 2	
	Basement (At least 50% below	ow grade, not included)	0	730.0 m²	
Fire Flow (F)	F = 220 * C * SQRT(A)				8,916
Fire Flow (F)	Rounded to nearest 1,000				9,000

Reductions/Increases Due to Factors Effecting Burning

Task	Options		Multipli	er			In	put			Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
	Non-combustible		-25%										
Choose	Limited Combustible		-15%										
Combustibility of	Combustible		0%				Limited C	ombustible			-15%	-1,350	7,650
Building Contents	Free Burning		15%										
	Rapid Burning		25%										
	Adequate Sprinkler Conforms to NFPA13		-30%				No S _I	orinkler			0%	0	7,650
	No Sprinkler		0%										
Choose Reduction Due to Sprinkler	Standard Water Supply for Fire Department Hose Line and for Sprinkler System		-10%		N	ot Standa	ırd Water		0%	0	7,650		
System	Not Standard Water Supply or Unavailable		0%										
	Fully Supervised Sprinkler System		-10%			Not	· Fully Sur		0%	0	7,650		
	Not Fully Supervised or N/A		0%		Not Fully Supervised or N/A						070	ŭ	7,000
							E	xposed Wall	Length				
Choose Structure Exposure Distance	Exposures	Separ- ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Length (m)	No of Storeys	Length- Height Factor	Sub- Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	Side 1 (West)	59	5	30.1 to 45	Type V	12.1	2	24.2	6	0%			
	Side 2 (East)	93	5	30.1 to 45	Type V	0	0	0	6	0%	0%	0	7.650
	Front (South)	53	5	30.1 to 45	Type V	76	4	304	6	0%	076	U	7,000
	Back (North)	55 5 30.1 to 45		Type V					0%	1			
Obtain Required					•		Tota	al Required F	Fire Flow, Ro	unded to th	e Nearest 1	1,000 L/min =	8,000
Fire Flow	·									Total F	Required Fir	re Flow, L/s =	133.3

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type V Wood Frame Type IV-III (U) Mass Timber

Type IV-III (U) Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P) Mass Timber or Ordinary with Protected Openings
Type II-I (U) Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P) Noncombustible or Fire Resistive with Protected Openings

Conditons for Separation

 Separation Dist
 Condition

 0m to 3m
 1

 3.1m to 10m
 2

 10.1m to 20m
 3

 20.1m to 30m
 4

 > 30.1m
 5

TABLE B3
ESTIMATED WATER PRESSURE AT PROPOSED BUILDING

Description	From	То	Demand	Length	Pipe Dia (mm)	Dia (m)	-	Area (m2)	С	Vel		Loss			*Elev Diff (m)		re From (psi)	Pressu kPa		Pressure Drop (psi)
Avg Day Conditons																				
Exsiting 25mm water service	Main	Building	0.17	22 m	25	0.025	0.0002	0.000491	110	0.3547	0.01223	0.2727	94.20	94.70	-0.5	596.4	(86.5)	588.9	(85.4)	1.1
Max Day Conditons																				
Exsiting 25mm water service	Main	Building	0.26	22 m	25	0.025	0.0003	0.000491	110	0.532	0.02591	0.5778	94.20	94.70	-0.5	499.3	(72.4)	488.8	(70.9)	1.5
Peak Hour Conditons																				\vdash
Exsiting 25mm water service	Main	Building	0.47	22 m	25	0.025	0.0005	0.000491	110	0.9576	0.07695	1.7161	94.20	94.70	-0.5	499.3	(72.4)	477.6	(69.3)	3.2
Water Demand Info Average Demand = Max Day Demand = Peak Hr Deamand = Fireflow Requriement =	0.17 0.26 0.47 133.3	L/sec L/sec L/sec					ngths atermain to Villiams C F		riction L	oss in Pip	oe, C=		22 m 110							
Max Day Plus FF Demand = Boundary Conditon HGL (m) Approx Ground Elev (m) = Approx Bidg FF Elev (m) = Pressure (m) = Pressure (Pa) = Pressure (psi) =	Min HGL 145.1 94.20 94.70 50.9 499,329 72.4	Max HGL 155 94.20 94.70 60.8 596,448 86.5	Max Day 146.5 93.40 94.70 53.1 520,911 75.6	+ Fireflow	<u>'</u>	(From C	ity of Ottaw													

Appendix C – Sanitary Sewer Design Sheet

Table C1: Sanitary Sewer Calculation Sheet





TABLE C1 - SANITARY SEWER CALCULATION SHEET

	LOC	ATION				RESEDENTIAL AREAS AND POPULAITONS									INSTITUTIONAL INFILTRATION		ON					SEWER	DATA												
				Area			NUM	/IBER OF L				POPUL	LATION		Peak	ARE	A (ha)	Peak	ARE	A (ha)	Peak			Peak		A (ha)	INFILT	TOTAL			Slope	Length	Canacity	0/0	Full Velocity
Street	U/S MH	D/S MH	Desc	(ha)	Singles	Semis	Towns		2-Bed Apt.	3-Bed Apt.	4-Bed Apt.	INDIV	ACCU	Peak Factor	Flow (L/sec)	INDIV	ACCU	Flow (L/sec)	INDIV	ACCU	Factor (per	AREA (Ha)		Flow (L/sec)	INIDIA	ACCU	FLOW (L/s)	FLOW (L/s)	Dia (mm)	Dia (mm)	(%)	(m)	(L/sec)	(%)	Full Velocity (m/s)
Site	BLDG	EX. SANMH	1																			0.54			0.537	0.537	0.18	0.44	150	148.01	1.00	54.500	14.7	3%	1.21
	EX. SANMH	EX. SANMH																					0.5372	0.26114	ŀ	0.537	0.18	0.44	250	251.46	1.00	40.000	60.4	1%	1.21
																																1 '			
																																<u> </u>			
		.																														<u> </u>			.
	<u> </u>				<u> </u>													<u> </u>							0.537						<u> </u>				<u></u>
																									0.557		Designed	۸٠			Project:				
Residentia	l Avg. Daily Flow	v. g (L/p/day) =			280		Commerc	ial Peak Fa	actor =		1.5	(when are	ea >20%)		Peak Pop	ulation Flo	ow, (L/sec)	=	P*q*M/8	86.4		Unti Type	<u> </u>		Persons/	Unit	Designed	u.			r roject.				
	al Avg. Daily Flow		ıy) =		28,000							(when are	,				ow, (L/sec)		I*Ac			Singles	_		3.0		A. Jariwa	ala, M.Eng	ı.		4000 Stra	andherd			
or L/gro	ss ha/sec =				0.324										Residenti	al Peaking	Factor, M	=	1 + (14/(4	4+P^0.5)) *	K	Semi-Det	ached		2.7			, ,							
Institutian	al Avg. Daily Flow	w (L/s/ha) =			28,000		Institution	nal Peak Fa	actor =		1.5	(when are	ea >20%)		$A_c = Cum$	ulative Are	ea (hectare	s)				Townhor	nes		2.7		Checked	:			Location	:			
	ss ha/sec =				0.324						1.0	(when are	ea <20%)		P = Popul	lation (tho	usands)					Single Ap	t. Unit		1.4										
_	trial Flow (L/gro	ss ha/day) =			35,000																	2-bed Ap			2.1		A. Ansar	ri, M.Sc., P	P.Eng.		4000 Stra	andherd Dr	rive, Ottawa	i, ON	
	ss ha/sec =				0.40509		Residentia	al Correction	on Factor,	K =	0.80				Sewer Ca	pacity, Qc	ap (L/sec)	=	1/N S*/*	$R^{2/3}A_c$		3-bed Ap	t. Unit		3.1										
-	trial Flow (L/gro	ss ha/day) =			55,000		Manning	N =			0.013				(Manning	g's Equatio	n)					4-bed Ap	t. Unit		3.8		File Refe	rence:	•	•	Page No:		•	•	
or L/gro	ss ha/sec =				0.637		Peak extr	aneous flo	w, I (L/s/h	ia) =	0.33	(Total I/I)															2202936	3 - FUS Fi	ire Flow	Calcs.xlsx	1 of 1				

Appendix D – Stormwater Management Design Sheet

Table D1: Calculation of Average Run-off Coefficient for Pre-Dev Conditions

Table D2: Calculation of Catchment Time of Concentration for Pre-Dev Conditions

Table D3: Calculation of Peak Runoff for Pre-Dev Conditions

Table D4: Calculation of Allowable Release Rate

Table D5: Average Runoff Coefficients for Post-Dev Conditions

Table D6: Summary of Post-Dev Peak Flows (Uncontrolled and Controlled)

Table D7: Storage Volumes for 2-year, 5-year and 100-year Storms (MRM)

Table D8: Flow Through ICD-1 (Orifice Equation)

Table D9: Flow Through ICD-2 (Orifice Equation)

Table D10: Total ICD Outflow Summary

Table D11: Stage Storage Volume for SWM Trench

Table D12: 5-year Storm Sewer Calculation Sheet



TABLE D1

CALCULATION OF AVERAGE RUNOFF COEFFICIENTS FOR PRE-DEVELOPMENT CONDTIONS

	Roof	Areas	Aspha	lt Areas	Concrete	/ Pavers	Grassed	l Areas		Total Area	
Area No.	C=	0.90	C=(0.90	C=0	0.90	C=0	.20	Sum AC	(m ²)	C _{AVG}
	Area (m²)	A * C	Area (m²) A * C		Area (m²)	A * C	Area (m²)	A * C		(111)	
E1	446	402	1831	1648		0	1924.080	384.816	2434.800	4201.840	0.58
E2	37	33	0	0	0	0	1133.260	226.652	259.952	1170.260	0.22
Site									2694.752	5372.100	0.50

TABLE D2

CALCULATION OF CATCHMENT TIME OF CONCENTRATION FOR PRE-DEVELOPMENT CONDITIONS

Catchment No.	Area (ha)	High Elev (m)	Low Elev (m)	Flow Path Length (m)	Indiv Slope	Avg. C	Time of Conc. Tc (mins)	Description
E1	0.4202	94.39	93.56	52.3	1.6	0.58	2.96	See Note 2
E2	0.1170	94.60	93.8	19.6	4.1	0.22	7.93	See Note 1

Notes

1) For Catchments with Runoff Coefficient less than C=0.40, Time of Concentration Based on Federal Aviation Formula (Airport Method), from MTO Drainage Manual Equation 8.16, where: T

2) For Catchments with Runoff Coefficient greater than C=0.40, Time of Concentration Based on Bransby Williams Equation, from MTO Drainage Manual Equation 8.15, where: Tc = 0.057*L

TABLE D3

CALCULATION OF PEAK RUNOFF FOR PRE-DEVELOPMENT CONDTIONS

	Outlet		Time of		Storm = 2 yr		9	itorm = 5 yr		9	Storm = 100	/r
Area No	Location	Area (ha)	Conc, Tc (min)	I ₂ (mm/hr)	Cavg	Q ₂ (L/sec)	I ₅ (mm/hr)	Cavg	Q ₅ (L/sec)	l ₁₀₀ (mm/hr)	Cavg	Q ₁₀₀ (L/sec)
E1	Strandherd	0.4202	10.00	76.81	0.58	51.99	104.19	0.58	70.53	178.56	0.72	151.08
E2	Harthill Way	0.1170	10.00	76.81	0.22	5.55	104.19	0.22	7.53	178.56	0.28	16.13
Total						57.54		78.06			167.21	

Notes

1) Intensity, I = 732.951/(Tc+6.199) 0.810 (2-year)

2) Intensity, I = 998.071/(Tc+6.053) 0.814 (5-year)

3) Intensity, I = 1735.688/(Tc+6.014) 0.820 (100-year)

4) Cavg for 100-year is increased by 25% to a maximum of 1.0

5) The standard minimium Time of Concentraion of 10 minutes was used, rather then the calaculted time, since calcualted time was less than 10 minutes.

TABLE D4

CALCULATION OF ALLOWABLE RELEASE RATE BASED ON C=0.5 OR PRE-DEV, WHICHEVER IS LESS

	Outlet		Time of		Storm = 2 yr		9	Storm = 5 yr		Storm = 100 yr			
Area No	Location	Area (ha)	Conc, Tc (min)	I ₂ (mm/hr)	Cavg	Q ₂ (L/sec)	I ₅ (mm/hr)	Cavg	Q ₅ (L/sec)	l ₁₀₀ (mm/hr)	Cavg	Q ₁₀₀ (L/sec)	
E1	Strandherd	0.4202	10.00	76.81	0.50	44.86	104.19	0.50	60.85	178.56	0.63	130.36	
E2	Harthill Way	0.1170	10.00	76.81	0.22	5.55	104.19	0.22	7.53	178.56	0.28	16.13	
Total						50.41			68.38			146.49	

<u>Notes</u>

1) Intensity, I = 732.951/(Tc+6.199) 0.810 (2-year)

2) Intensity, I = 998.071/(Tc+6.053) 0.814 (5-year)

3) Intensity, I = 1735.688/(Tc+6.014) 0.820 (100-year)

4) Cavg for 100-year is increased by 25% to a maximum of 1.0

5) The standard minimium Time of Concentraion of 10 minutes was used, rather then the calaculted time, since calcualted time was less than 10 minutes.

TABLE D5
AVERAGE RUNOFF COEFFICIENTS FOR POST-DEVELOPMENT CONDITIONS

		C _{ASPH/CONC} =	0.90	C _{ROOF} =	0.90	C _{SLA} =	0.20	C _{PP} =	0.40			
Area No.	Asphalt & Conc Areas (m²)	A * C _{ASPH}	Roof Areas (m²)	A * C _{ROOF}	Soft Landscaped Areas (m²)	A * C _{SLA}	Permeable Pavement Areas (m²)	А* С _{РР}	Sum AC	Total Area (m²)	C _{AVG} (see note)	Comment
A1	2440.7	2196.6	605.5	545.0	311	62.2		0.0	2803.8	3357	0.84	Ex. BLDG, Ex. & new parking lot
A2	139.000	125.1	218.7	196.8	555	111.1		0.0	433.0	913	0.47	New Bldg Roof and Landscaping
A3	28.40	25.6	37.2	33.5	1035	207.0		0.0	266.1	1101	0.24	Uncontrolled to Harthill Way
Totals	-	•							3503	5371	0.65	-

TABLE D6
SUMMARY OF POST-DEVELOPMENT PEAK FLOWS (Uncontrolled and Controlled)

CHIMAKT OF 1 031 DEVELOT MENT 1 EAKTEOWS (CINCOTTCO)															
		Time of Conc,		Storr	m = 2 yr			Storm :	= 5 yr			Sto	rm = 100 yr		
		Tc (min)			Q	Q_{CAP}			Q	Q _{CAP}			Q	Q _{CAP}	Comments
Area No	Area (ha)	re (min)	C_{AVG}	I ₅ (mm/hr)	(L/sec)	(L/sec)	C_{AVG}	I ₅ (mm/hr)	(L/sec)	(L/sec)	C_{AVG}	I ₅ (mm/hr)	(L/sec)	(L/sec)	
A1	0.3357	10	0.84	76.81	59.87	40.00	0.84	104.19	81.21	56.80	1.00	178.56	166.66	116.00	Controlled flow to Strandherd Dr.
A2	0.0913	10	0.47	76.81	9.25	40.00	0.47	104.19	12.54	30.80	0.59	178.56	26.87	110.00	Controlled flow to strandilerd br.
A3	0.1101	10	0.24	76.81	5.68	5.68	0.24	104.19	7.71	7.71	0.30	178.56	16.51	16.51	Uncontrolled flow to Harthill Way
Total to Harthill Way	0.5371				5.68	5.68			7.71	7.71			16.51	16.51	
Allowable to Harthill Way						5.55				7.53				16.13	
Total to Strandherd Dr.					69.11	40.00			93.76	56.80			193.52	116.00	
Allowable to Strandherd Dr.		•	•	•		44.86				60.85				130.36	

Notes

1) Intensity, I = 732.951/(Tc+6.199) 0.810 (2-year)

2) Intensity, I = 998.071/(Tc+6.053) 0.814 (5-year)

3) Intensity, I = 1735.688/(Tc+6.014) 0.820 (100-year)

4) Cavg for 100-year is increased by 25% to a maximum of 1.0

5) Time of Concentration, Tc =

10 mins

6) Controlled release rate is indicated by,

49.53

Table D7 Storage Volumes for 2-year, 5-Year and 100-Year Storms (MRM)

Table D		Jiorage v	, oranic.	, ,	cui, 5	rcar ana	100	u. 5to	13 (171111	•••,					
	Area No:	A1, A2													
	C _{AVG} =	0.76	(2-yr)												
	C _{AVG} =		(5-yr)												
	C _{AVG} =		(100-yr, M	ax 1 0)					Δct	ual Release	Rate (L/sec) =	116.00			
Tin	me Interval = 5.00 (mins) Percentage of Actual Rate (City of Ottawa requirement) = 100% (Set to 50% when U/G storage used)														
	ainage Area = 0.4270 (hectares) Release Rate Used for Estimation of 100-year Storage (L/sec) = 116.00														
Dia	mage / irea =	Nelease Nate Osea for Estimation of 100-year Storage (L/Sec) - 110.00													
													<u> </u>		
	F	Release Rate =	40.00	(L/sec)		Rele	ase Rate =	56.80	(L/sec)		Rele	ase Rate =	116.00	(L/sec)	
	Re	eturn Period =	2	(years)		Retur	n Period =	5	(years)		Retur	n Period =	100	(years)	
	IDF Pa	rameters, A =	733.0	, B =	0.810	IDF Paran	neters, A =	998.1	, B =	0.814	IDF Paran	neters, A =	1735.7	, B =	0.820
Duration		(I = A/(T _c +C)	, C =	6.199	(1	$= A/(T_c+C)$, C =	6.053	(1	$= A/(T_c+C)$, C =	6.014
(mins)	Rainfall	B. J. El.	Release	Storage	Chausas	Rainfall	Peak	Release	Storage	Chausas	Rainfall	Peak	Release	Storage	
	Intensity, I	Peak Flow	Rate	Rate	Storage (m ³)	Intensity, I	Flow	Rate	Rate	Storage	Intensity, I	Flow	Rate	Rate	Storage (m ³)
	(mm/hr)	(L/sec)	(L/sec)	(L/sec)	(m)	(mm/hr)	(L/sec)	(L/sec)	(L/sec)	(m ³)	(mm/hr)	(L/sec)	(L/sec)	(L/sec)	
0	167.2	150.5	40.0	110.5	0.0	230.5	207.4	56.8	150.6	0.0	398.6	448.4	116.0	332.4	0.0
5	103.6	93.2	40.0	53.2	16.0	141.2	127.0	56.8	70.2	21.1	242.7	273.0	116.0	157.0	47.1
10	76.8	69.1	40.0	29.1	17.5	104.2	93.8	56.8	37.0	22.2	178.6	200.8	116.0	84.8	50.9
15	61.8	55.6	40.0	15.6	14.0	83.6	75.2	56.8	18.4	16.5	142.9	160.7	116.0	44.7	40.3
20	52.0	46.8	40.0	6.8	8.2	70.3	63.2	56.8	6.4	7.7	120.0	134.9	116.0	18.9	22.7
25	45.2	40.6	40.0	0.6	1.0	60.9	54.8	56.8	-2.0	-3.0	103.8	116.8	116.0	0.8	1.2
30	40.0	36.0	40.0	-4.0	-7.1	53.9	48.5	56.8	-8.3	-14.9	91.9	103.3	116.0	-12.7	-22.8
35	36.1	32.4	40.0	-7.6	-15.9	48.5	43.7	56.8	-13.1	-27.6	82.6	92.9	116.0	-23.1	-48.5
40	32.9	29.6	40.0	-10.4	-25.0	44.2	39.8	56.8	-17.0	-40.9	75.1	84.5	116.0	-31.5	-75.5
45	30.2	27.2	40.0	-12.8	-34.5	40.6	36.6	56.8	-20.2	-54.7	69.1	77.7	116.0	-38.3	-103.5
50	28.0	25.2	40.0	-14.8	-44.3	37.7	33.9	56.8	-22.9	-68.8	64.0	71.9	116.0	-44.1	-132.2
55	26.2	23.5	40.0	-16.5	-54.3	35.1	31.6	56.8	-25.2	-83.1	59.6	67.1	116.0	-48.9	-161.5
60 65	24.6 23.2	22.1 20.8	40.0 40.0	-17.9 -19.2	-64.4 -74.8	32.9 31.0	29.6 27.9	56.8 56.8	-27.2 -28.9	-97.8 -112.6	55.9 52.6	62.9 59.2	116.0 116.0	-53.1 -56.8	-191.3 -221.5
70	21.9	19.7	40.0	-19.2	-74.8	29.4	26.4	56.8			49.8	56.0	116.0	-60.0	-252.0
75	20.8	18.7	40.0	-20.3	-85.2 -95.7	27.9	25.1	56.8	-30.4 -31.7	-127.6 -142.7	49.8	53.2	116.0	-62.8	-232.0
80	19.8	17.8	40.0	-21.3	-95.7	26.6	23.9	56.8	-31.7	-142.7	47.3	50.6	116.0	-65.4	-202.0
85	18.9	17.0	40.0	-23.0	-117.1	25.4	22.8	56.8	-34.0	-173.3	43.0	48.3	116.0	-67.7	-315.9
90	18.1	16.3	40.0	-23.7	-117.1	24.3	21.9	56.8	-34.9	-188.7	41.1	46.2	116.0	-69.8	-345.2
95	17.4	15.7	40.0	-24.3	-138.7	23.3	21.0	56.8	-35.8	-204.2	39.4	44.4	116.0	-71.6	-408.4
100	16.7	15.1	40.0	-24.9	-149.6	22.4	20.2	56.8	-36.6	-219.8	37.9	42.6	116.0	-73.4	-440.2
Max =					17.5					22.2					50.9

Notes

- 1) Peak flow is equal to the product of 2.78 x C x I x A
- 2) Rainfall Intensity, I = A/(Tc+C)^B
- 3) Release Rate = Min (Release Rate, Peak Flow)
- 4) Storage Rate = Peak Flow Release Rate
- 5) Storage = Duration x Storage Rate
- 6) Maximium Storage = Max Storage Over Duration
- 7) Parameters a,b,c are for City of Ottawa

City of Ottawa IDF Data (from SDG002)

TABLE D8 - Flow Through Inlet Control Device - 1 (Orifice Equation)

Elev (m)	Head Over Orifice (m)	Orifice Flow (I/s)
92.07	0.00	0.0
92.17	0.10	15.1
92.20	0.13	17.2
92.25	0.18	20.2
92.30	0.23	22.9
92.35	0.28	25.3
92.40	0.33	27.4
92.45	0.38	29.4
92.50	0.43	31.3
92.55	0.48	33.1
92.60	0.53	34.7
92.65	0.58	36.3
92.70	0.63	37.9
92.75	0.68	39.4
92.77	0.70	39.9
92.80	0.73	40.8
92.85	0.78	42.1
92.90	0.83	43.5
92.95	0.88	44.8
93.00	0.93	46.0
93.05	0.98	47.2
93.10	1.03	48.4
93.15	1.08	49.6
93.20	1.13	50.7
93.25	1.18	51.8
93.30	1.23	52.9
93.35	1.28	54.0

 $Q_{ORIFICE} = C A (2 g H)^{0.5}$

Size (mm) = 150.00 C/L Orifice Elev = 92.07 Max. Ponding Elev= 93.35

C = Discharge Coeff = 0.61 A = Orifice Area (mm²) = 17,663 A = Orifice Area (m²) = 0.0177

Max head over Orifice = 1.28

TABLE D9 - Flow Through Inlet Control Device - 2 (Orifice Equation)

Elev (m)	Head Over Orifice (m)	Orifice Flow (I/s)
92.82	0.00	0.0
92.85	0.03	14.7
92.90	0.08	24.0
92.95	0.13	30.6
93.00	0.18	36.0
93.05	0.23	40.7
93.10	0.28	44.9
93.15	0.33	48.7
93.20	0.38	52.3
93.25	0.43	55.6
93.30	0.48	58.8
93.35	0.53	61.8
0.5		

 $Q_{ORIFICE} = C A (2 g H)^{0.5}$ Size (mm) = 200.00 C/L Orifice Elev = 92.82 Max. Ponding Elev= 93.35

C = Discharge Coeff = 0.61 A = Orifice Area (mm²) =31,400 $A = Orifice Area (m^2) =$ 0.0314

Max head over Orifice = 0.53

TABLE D10 - Total ICD Ouflow Summary

Elev (m)	Outflow From Orifice #1	Outflow From Orifice #2	Total Orifice Flow (I/s)
92.07	0.00	0.00	0.0
92.17	15.09	0.00	15.1
92.20	17.21	0.00	17.2
92.25	20.25	0.00	20.2
92.30	22.89	0.00	22.9
92.35	25.25	0.00	25.3
92.40	27.42	0.00	27.4
92.45	29.42	0.00	29.4
92.50	31.29	0.00	31.3
92.55	33.06	0.00	33.1
92.60	34.74	0.00	34.7
92.65	36.35	0.00	36.3
92.70	37.88	0.00	37.9
92.75	39.35	0.00	39.4
92.77	39.93	0.00	39.9
92.80	40.77	0.00	40.8
92.85	42.15	14.70	56.8
92.90	43.48	24.00	67.5
92.95	44.77	30.59	75.4
93.00	46.02	36.00	82.0
93.05	47.24	40.69	87.9
93.10	48.43	44.89	93.3
93.15	49.60	48.74	98.3
93.20	50.73	52.30	103.0
93.25	51.84	55.63	107.5
93.30	52.93	58.78	111.7
93.35	53.99	61.77	115.8

TABLE D11
STAGE STORAGE VOLUME FOR SWM TRENCH

Trench Layer	Contour Elevation (m)	Contour Area (m²)	Depth (m)	Incremental Volume (m ³)	Pipe Storage	Cumulative Volume (m ³)	
	92.45	26.95	N/A	N/A	0.00	0.00	
	92.50	115.48	0.05	2.31	0.00	2.31	
	92.55	139.68	0.05	2.79	0.00	5.10	
	92.60	139.81	0.05	2.80	0.00	7.90	
	92.65	139.95	0.05	2.80	0.00	10.70	
	92.70	140.08	0.05	2.80	0.00	13.50	
	92.75	140.21	0.05	2.80	0.00	16.30	
	92.77	140.28	0.02	1.12	0.00	17.43	2-Yr Elev
Storage Layer	92.80	140.34	0.03	1.68	0.00	19.11	
(c/w 50mm	92.85	140.47	0.05	2.81	0.00	21.92	5-Yr Elev
Clear Stone,	92.90	140.61	0.05	2.81	0.00	24.73	
void ratio 0.4)	92.95	140.74	0.05	2.81	0.00	27.55	
void ratio 0.4)	93.00	140.87	0.05	2.82	0.00	30.36	
	93.05	141.00	0.05	2.82	0.00	33.18	
	93.10	141.14	0.05	2.82	0.00	36.01	
	93.15	141.27	0.05	2.83	0.00	38.83	
	93.20	141.40	0.05	2.83	0.00	41.66	
	93.25	141.54	0.05	2.83	0.00	44.49	
	93.30	141.67	0.05	2.83	0.00	47.32	
	93.35	141.80	0.05	2.84	0.00	50.16	100-Yr Elev
	93.40	162.58	0.05	8.13	1.72	60.01	

Table D12 5-YEAR STORM SEWER CALCULATION SHEET

Return Period Storm =

(5-years, 100-years)

Default Inlet Time= Manning Coefficient = 10

0.013

(minutes)

(dimensionless)

	LOCATION			AREA (he	ctares)			FLOW (UNRESTRIC	TED - RATIO	ONAL METHO	D)							SEWER DATA	1				
					5 A		115				Lad's Elas	D.1	_	D':- ()	D':- ()					Velocit	y (m/s)	Time in	Hydrauli	ic Ratios
Location	From Node	To Node	Area No.	Area (ha)	∑ Area (ha)	Average R	Indiv. 2.78*A*R	Accum. 2.78*A*R	Tc (mins)	I (mm/h)	Indiv. Flow (L/sec)	Return Period	(L/sec)	Dia (mm) Actual	Nominal	Туре	Slope (%)	Length (m)	Capacity (L/sec)	Vf	Va	Pipe, Tt (min)	Qa/Qf	Va/Vf
	STMMH 101	1200mm dia. STM	A1, A2	0.42703	0.427	0.76	0.90	0.90	10.00	104.19	93.76	5.00	93.8	366.42	375	PVC	1.50	35.31	201.9	1.94	1.37	0.43	0.46	0.71

Definitions: Q = 2.78*AIR, where	Notes: Ottawa Rainfall Intensity Values:	a = 9	<u>5yr</u> 998.071	<u>100yr</u> 1735.688	Designed: Aaditya Jariwala, M.Eng, P.Eng	Project: 4000 Strandherd Drive	
Q = Peak Flow in Litres per second (L/s) A = Watershed Area (hectares) I = Rainfall Intensity (mm/h)	From Sewer Desing Guidelines, 2004		0.814 6.053	0.820 6.014	Checked: Alam Ansari, PEng.	Location: Ottawa, Ontario	
R = Runoff Coefficients (dimensionless)					Dwg Reference: C200		Sheet No: 1 of 1

Appendix E – Additional Information

- 4000 Strandherd Water Boundary Conditions
- Engineering Pre-Consultation Meeting Notes from City
- Pre-Consultation Applicant's Study and Plan Identification List
- Responses from the Architect for FUS 2020 Fire flow calculations
- Quality Control Criteria Responses from RVCA and the City
- CCTV Inspection Reports for Existing SAN and STM Laterals



Boundary Conditions 4000 Strandherd Drive

Provided Information

Scenario	De	mand
Scenario	L/min	L/s
Average Daily Demand	10	0.17
Maximum Daily Demand	16	0.26
Peak Hour	28	0.47
Fire Flow Demand #1	7,998	133.30

Location



Results

Connection 1 - Harthill Way

Pressure Zone 3SW

Demand Scenario	Head (m)	Pressure (psi)
Maximum HGL ¹	155.0	86.4
Peak Hour ¹	145.1	72.4
Max Day plus Fire Flow ²	146.5	75.5
¹ Ground Elevation =	94.2	m

¹ Ground Elevation = 94.2 m ² Ground Elevation = 93.4 m

Notes

- 1. As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:
 - a. If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
 - b. Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

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. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

Please see the engineering comments for the SPC application at 4000 Strandherd Drive below:

List of Reports and Plans (Site Plan Control):

- 1. Site Servicing Plan
- 2. Grading Plan
- 3. Erosion and Sediment Control Plan
- 4. Storm Drainage / Ponding Plan
- 5. Stormwater Management and Site Servicing Report
- 6. Geotechnical Investigation Report

Please note the following information regarding the engineering design submissions for the above noted site:

- 1. The Servicing Study Guidelines for Development Applications are available at the following address:
 - https://ottawa.ca/en/city-hall/planning-and-development/how-developproperty/development-application-review-process-2/guide-preparing-studies-and-plans
- 2. Servicing and site works shall be in accordance with the following documents:
 - Ottawa Sewer Design Guidelines (October 2012) and all the Technical Bulletins including, Technical Bulletin PIEDTB-2016-01 and ISTB-2018-01
 - Ottawa Design Guidelines Water Distribution (2010) and Technical Bulletins ISD-2010-2, ISDTB-2014-02 and ISTB-2018-02
 - Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
 - City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
 - City of Ottawa Environmental Noise Control Guidelines (January, 2016)
 - City of Ottawa Park and Pathway Development Manual (2012)
 - City of Ottawa Accessibility Design Standards (2012)
 - Ottawa Standard Tender Documents (latest version)
 - Ontario Provincial Standards for Roads & Public Works (2013)
- 3. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x 44455
- 4. The Stormwater Management Criteria, for the subject site, is to be based on the following:
 - The sites allowable release rate shall be controlled post-to-pre with any flows exceeding the existing total release rate being stored on site.
 - The pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less (§ 8.3.7.3).
 - Flows to the storm sewer in excess of the allowable release rate must be detained on site for storms up to the 1:100-year return. No surface ponding is permitted for events up to and including the 5-year event.

- Ensure no overland flow for all storms up to and including the 100-year event.
- The 2-yr storm or 5-yr storm event using the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.
- A calculated time of concentration (Cannot be less than 10 minutes).
- Quality control requirements provided by Rideau Valley Conservation Authority (RVCA).

5. Deep Services:



- i. A plan view of the approximate services may be seen above. Services should ideally be grouped in a common trench to minimize the number of road cuts. The sizing of available future services is:
 - a. Connections (Existing):
 - i. 150 mm dia. STM PVC service
 - ii. 150 mm dia. SAN PVC service
 - iii. 100 mm dia. WM PVC service
- ii. If any existing services are being abandoned, contact the City of Ottawa Project Manager for new connection locations.

- iii. Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.
- iv. Provide information on the monitoring manhole requirements should be in an accessible location on private property near the property line (ie. Not in a parking area).
- v. Provide information on the type of connection permitted

Sewer connections to be made above the spring line of the sewer main as per:

- a. Std Dwg S11.1 for flexible main sewers connections made using approved tee or wye fittings.
- b. Std Dwg S11 (For rigid main sewers) lateral must be less than 50% the diameter of the sewer main,
- c. Std Dwg S11.2 (for rigid main sewers using bell end insert method) for larger diameter laterals where manufactured inserts are not available; lateral must be less that 50% the diameter of the sewer main,
- d. Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewer main. Connect obvert to obvert with the outlet pipe unless pipes are a similar size.
- e. No submerged outlet connections.
- Required Fire Flow shall be calculated per the Fire Underwriters Survey (FUS) 2020 "Water Supply for Public Fire Protection" and be confirmed that there is adequate water supply and fire hydrant coverage for the final structure.
- 7. 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 and the expected loads required by the proposed development. Please provide 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.
 - Hydrant location and spacing to meet City's Water Design guidelines.
 - Water supply redundancy will be required for more than 50 m3/day water demand.
- 8. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.
- 9. MECP ECA Requirements (Standard) –

All development applications should be considered for an Environmental Compliance Approval (ECA) by the Ministry of the Environment, Conservation, and Parks (MECP);

- Consultant determines if an approval for sewage works under Section 53 of OWRA is required. Consultant then determines what type of application is required and the City's project manager confirms. (If the consultant is not clear if an ECA is required, they will work with the City to determine what is required. If the consultant, it is still unclear or there is a difference of opinion only then will the City PM approach the MECP.
- The project will be either transfer of review (standard), transfer of review (additional), direct submission, or exempt as per O. Reg. 525/98.
- Standard Works ToR Draft ECA's are sent to the local MECP office (moeccottawasewage@ontario.ca) for information only
- Additional ToR draft ECAs require a project summary/design brief and require a response from the local MECP (10 business day window)
- Site plan Approval, or Draft Approval, is required before an application is sent to the MECP

10. General/ additional comments:

• Only one watermain connection per site. However, looping would be required if proposed demand is 50m3/day or greater.



APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

Legend: **S** indicates that the study or plan is required with application submission. **A** indicates that the study or plan may be required to satisfy a condition of approval/draft approval.

For information and guidance on preparing required studies and plans refer here:

S/A	ENGINEERING		
S	Site Servicing Plan	Site Servicing Study / Assessment of Adequacy of Public Services	
s	3. Grade Control and Drainage Plan	4. Geotechnical Study / Slope Stability Study	S
	5. Composite Utility Plan	6. Groundwater Impact Study	
	7. Servicing Options Report	8. Wellhead Protection Study	
	9. Transportation Impact Assessment (TIA)	10.Erosion and Sediment Control Plan / Brief	S
S	11.Storm water Management Report / Brief	12.Hydro geological and Terrain Analysis	
	13.Hydraulic Water main Analysis	14.Noise / Vibration Study	
	15.Roadway Modification Functional Design	16.Confederation Line Proximity Study	

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

S/A	ENVIRON	IMENTAL	S/A
S	34.Phase 1 Environmental Site Assessment	35.Impact Assessment of Adjacent Waste Disposal/Former Landfill Site	
	36.Phase 2 Environmental Site Assessment (depends on the outcome of Phase 1)	37.Assessment of Landform Features	
	38.Record of Site Condition	39.Mineral Resource Impact Assessment	
	40.Tree Conservation Report	41.Environmental Impact Statement / Impact Assessment of Endangered Species	
	42.Mine Hazard Study / Abandoned Pit or Quarry Study	43.Integrated Environmental Review (Draft, as part of Planning Rationale)	
S/A	ADDITIONAL REQUIREMENTS		S/A
s	44. Applicant's Public Consultation Strategy (may be provided as part of the Planning Rationale)	45.Site Lighting Plan	S
Α	46. Site Lighting Certification Letter	47.	

Meeting Date: November 7, 2022	Application Type: Site Plan Control
File Lead (Assigned Planner): Craig Hamilton	Infrastructure Approvals Project Manager: Tyler Cassidy

Site Address (Municipal Address): 4000 Strandherd Dr *Preliminary Assessment: 1 2 3 4 5 5
*One (1) indicates that considerable major revisions are required before a planning application is submitted, while five (5) suggests that

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

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, the Planning, Real Estate and Economic Development Department 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 preconsult with the Planning, Real Estate and Economic Development Department.

Aaditya Jariwala

From: Angelo Spadola <angelomspadola@gmail.com>

Sent: Tuesday, April 25, 2023 2:31 PM

To: Aaditya Jariwala **Subject:** Re: 4000 Stranherd



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Aaditya,

Can you please clarify the following items:

Aaditya,

Here are my answers,

- 1. Is there a basement under the existing church? No
- 2. Will there be a basement under the proposed building? No
- 3. What is the construction material for the existing building and proposed addition? Existing is Wood Frame, Proposed Wood Frame.
- 4. Is the existing building sprinklered? Will the proposed addition be sprinklered? No Sprinklers required
- 5. Will there be any fire walls? No Fire Walls

Regards



Virus-free.www.avast.com

On Tue, Apr 25, 2023 at 1:23 PM Aaditya Jariwala < Aaditya.Jariwala@exp.com > wrote:

Hi Angelo,

Can you please clarify the following items:

- 1. Is there a basement under the existing church?
- 2. Will there be a basement under the proposed building?
- 3. What is the construction material for the existing building and proposed addition?
- 4. Is the existing building sprinklered? Will the proposed addition be sprinklered?
- 5. Will there be any fire walls?

I'm trying to request the water boundary conditions from the City and these information will be useful.

Thanks,



Aaditya Jariwala, M.Eng

EXP | Engineering Designer
t:+1.613.688.1899, 63240 | m:+1.613.816.5961 | e: aaditya.jariwala@exp.com
2650 Queensview Drive
Suite 100
Ottawa, ON K2B 8H6
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--

Angelo M Spadola Architect 200-1645 Russell Road Ottawa, On. K1G 4G5 Tel: 613. 228. 7190

fax: 613. 228. 8690

angelomspadola@gmail.com

Aaditya Jariwala

From: Eric Lalande <eric.lalande@rvca.ca>
Sent: Thursday, March 23, 2023 11:36 AM

To: Aaditya Jariwala
Cc: Alam Ansari

Subject: RE: Quality Control Requirements for 4000 Stranherd Drive



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Hi Aaditya,

The City now handles the review of quality control requirements. While the RVCA would not have triggered requirements, I defer you to the City as part of your site plan application.

Cheers,

Eric Lalande, MCIP, RPP Planner, RVCA 613-692-3571 x1137

From: Aaditya Jariwala <Aaditya.Jariwala@exp.com>

Sent: Thursday, March 23, 2023 10:05 AM **To:** Eric Lalande <eric.lalande@rvca.ca> **Cc:** Alam Ansari <alam.ansari@exp.com>

Subject: Quality Control Requirements for 4000 Stranherd Drive

Hello Eric,

We are applying for a Site Plan Control application with the City of Ottawa for above noted address. The development includes addition of a small building to the existing building only. Can you please provide quality control requirements for this development?

Let me know if you need further information.

Regards,



Aaditya Jariwala, M.Eng

EXP | Engineering Designer

t:+1.613.688.1899, 63240 | m:+1.613.816.5961 | e: <u>aaditya.jariwala@exp.com</u>

2650 Queensview Drive

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Ottawa, ON K2B 8H6 CANADA

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Aaditya Jariwala

From: Cassidy, Tyler <tyler.cassidy@ottawa.ca>
Sent: Wednesday, October 25, 2023 3:42 PM

To: Aaditya Jariwala

Cc: Angelo Spadola; Alam Ansari; Scott Alain **Subject:** RE: 4000 Strandherd - SWM Requirements



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Hi Aaditya,

Thank you for reaching out for me for clarification, I'm hoping the information I provide will be of use to you. The comment in question was meant to elicit a response or paragraph in the report regarding the quality control for the site. Fortunately, quality control for this site, to the tune of 80% TSS removal, can be provided by an end-of-pipe facility that lies just downstream the site, the Kennedy-Burnette Stormwater Management Facility. You can determine this by following the municipal storm system downstream to the facility (and by confirming that the site's stormwater flows are entering the municipal minor system – note that previously your proposal was not outletting to the municipal minor system, therefore other quality control measures should have been investigated).

In short, what is being requested is that your consultancy add a section to the report stating how the enhanced quality control criteria is being satisfied.

I trust the above is sufficient to satisfy your inquiry.

Thank you,

Tyler Cassidy, P.Eng

Infrastructure Project Manager,

Planning, Real Estate and Economic Development Department / Direction générale de la planification, des biens immobiliers et du développement économique - South 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 12977, Tyler.Cassidy@ottawa.ca

From: Aaditya Jariwala <Aaditya.Jariwala@exp.com>

Sent: October 23, 2023 4:50 PM

To: Cassidy, Tyler <tyler.cassidy@ottawa.ca>

Cc: Angelo Spadola <angelomspadola@gmail.com>; Alam Ansari <alam.ansari@exp.com>; Scott Alain

<alain@fotenn.com>

Subject: RE: 4000 Strandherd - SWM Requirements

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Hello Tyler,

We received the engineering comments for our first pre-consultation submission for the above noted site address. There is a comments regarding quality control (80% TSS Removal). Does that apply to the entire site? As noted previously, this is a community based development with minimal upgrades to the existing condition with no storm services on site. Can you please advise if the quality control requirement can be deferred for this development?

Appreciate your prompt response.

Thanks,

Aaditya Jariwala, M.Eng, P.Eng.

EXP | Engineering Designer

t: +1.613.688.1899, 63240 | m: +1.613.816.5961 | e: aaditya.jariwala@exp.com

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From: Cassidy, Tyler <tyler.cassidy@ottawa.ca>

Sent: Friday, March 17, 2023 12:01 PM To: Scott Alain <alain@fotenn.com>

Cc: Aaditya Jariwala <Aaditya.Jariwala@exp.com>; Angelo Spadola <angelomspadola@gmail.com>

Subject: RE: 4000 Strandherd - SWM Requirements

You don't often get email from tyler.cassidy@ottawa.ca. Learn why this is important



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Hi Scott,

In the interest of moving this community based proposal forward and recognizing the community benefits of such a project, I support your suggestion of recognizing the exiting conditions on site and scoping the stormwater management to the area of new development only. Please have your civil consultant provide a pre-post stormwater management analysis which only includes the area(s) of development. If you are making any minor changes to the grading or to the existing hard surfacing (extra parking, removal of soft landscaping), please do include these areas in the analysis. Note that the other criteria for stormwater management that have been provided in the pre-application consultation meeting notes will still apply.

I welcome you to invite your Civil Consultant to reach out to me during detailed design prior to first submission to ensure we are properly capturing the areas of development.

I'm always available for a discussion if any questions arise.

Thank you,

Tyler Cassidy, P.Eng

Infrastructure Project Manager.

Planning, Real Estate and Economic Development Department / Direction générale de la planification, des biens immobiliers et du développement économique - South 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 12977, Tyler.Cassidy@ottawa.ca

From: Scott Alain <alain@fotenn.com>

Sent: March 14, 2023 2:17 PM

To: Cassidy, Tyler <tyler.cassidy@ottawa.ca>

Cc: Aaditya Jariwala < Aaditya Jariwala@exp.com >; Angelo Spadola < angelomspadola@gmail.com >

Subject: 4000 Strandherd - SWM Requirements

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Hi Tyler,

As we prepare our submission for the above-noted file I wanted to touch base with you regarding your pre-consultation notes. In the meeting notes, you have identified stormwater management requirements for the property which would require regrading of almost the entire site, installing infrastructure such as storm sewers, catchbasins, manholes, Inlet Control Devices and possibly an underground storage tank.

Given that the proposal intends to basically maintain the entirety of the parking lot as an existing condition and otherwise intends to build an addition to an already established building, I am wondering if there is a way to scope the requirements down – we are not proposing any new hardscaping. I have also attached a copy of the Site Plan for your reference.

Considering the scale of works necessary to pull out the entire parking lot and then re-establish it in the same manner as it exists currently in order to establish an addition on another segment of the lands, it challenges the viability of proceeding with this project.

Please let me know your thoughts on whether it is possible to recognize an existing condition on the site and scope the SWM requirements to the new construction only.

Happy to chat on this further. I have copied Aaditya Jariwala from EXP here who is better equipped than I to discuss any technical design matters relating to SWM.

Thank you,

Scott Alain, RPP, MCIP (he/him)

Senior Planner

FOTENN

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514.738.9762



INTEGRATED SEWER SOLUTIONS

4000 Strandherd Ottawa, Ontario

DRAIN CCTV INSPECTION REPORT

Report ID

119067

Sewer Use

Sanitary & Storm

Completion Date

August 08, 2022

Inspected Length

44.20 meters

THE WAY IS CLEAR™

- Watermain Swabbing
- Hydro Vacuum Excavation
- CCTV Inspection of Sewers
- Plumbing & Drain Services
- Structural Rehabilitation of Manholes
 - Cured-in-Place-Pipe Lining & Spot Repairs
- Grouting, Test & Seal Joints, Manholes & Services
- Lateral Sewer Inspection & Locates From Main
- Sewer Cleaning, Flushing & Pumping

Table of contents



	P	age
1.	Index of pipes	2
2.	Internal condition grade	3
3.	Operational performance grade	4
4.	Pipe summary and condition details	5
5.	Vision Report© Legend	14

1. Index of pipes



2 items

Inspected length: 44.20 Total length: 0.00

Pipe	Start/End	Direction	Road	Date	Inspected	Total	Page
Accesible Toilet Flange	Toilet Flange> End	Direction of flow	4000 Strandherd	08/08/2022 11:18 AM	30.2		5
Cleanout by Water Meter	Cleanout> End	Direction of flow	4000 Strandherd	08/08/2022 11:03 AM	14		12

2. Internal condition grade



2 items

1 - Acceptable structural condition (2 of 2 items)

Total	Peak	Pipe	Start/End	Direction	Road	Page
0	0	Accesible Toilet Flange	Toilet Flange> End	Direction of flow	4000 Strandherd	5
0	0	Cleanout by Water Meter	Cleanout> End	Direction of flow	4000 Strandherd	12

3. Operational performance grade



2 items

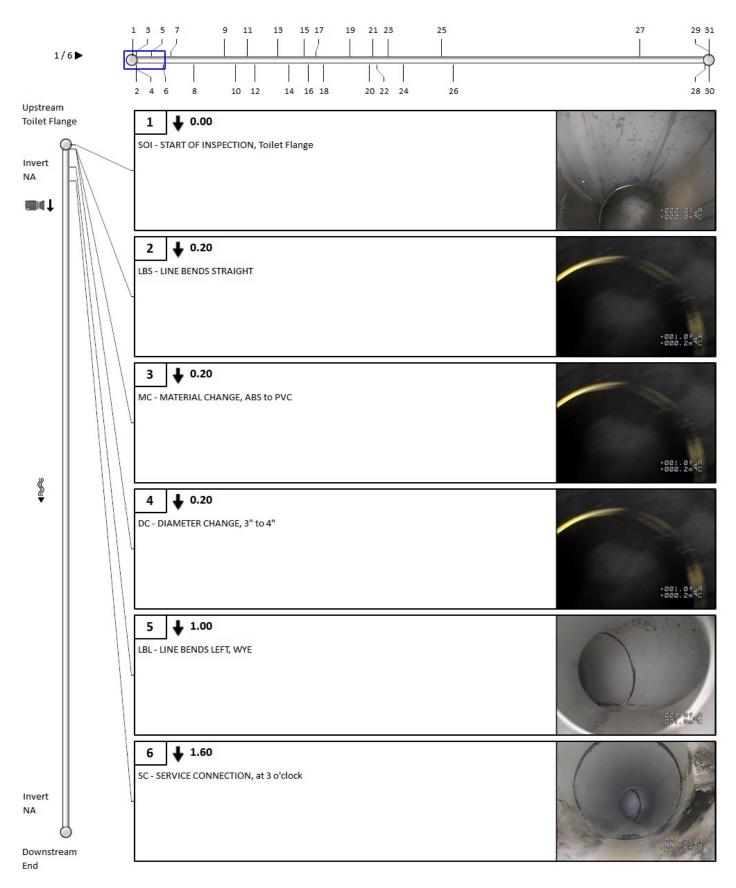
Grade: 1 (2 of 2 items)

Total	Peak	ICG	Pipe	Start/End	Direction	Road	Page
0	0	1	Accesible Toilet Flange	Toilet Flange> End	Direction of flow	4000 Strandherd	5
0	0	1	Cleanout by Water Meter	Cleanout> End	Direction of flow	4000 Strandherd	12

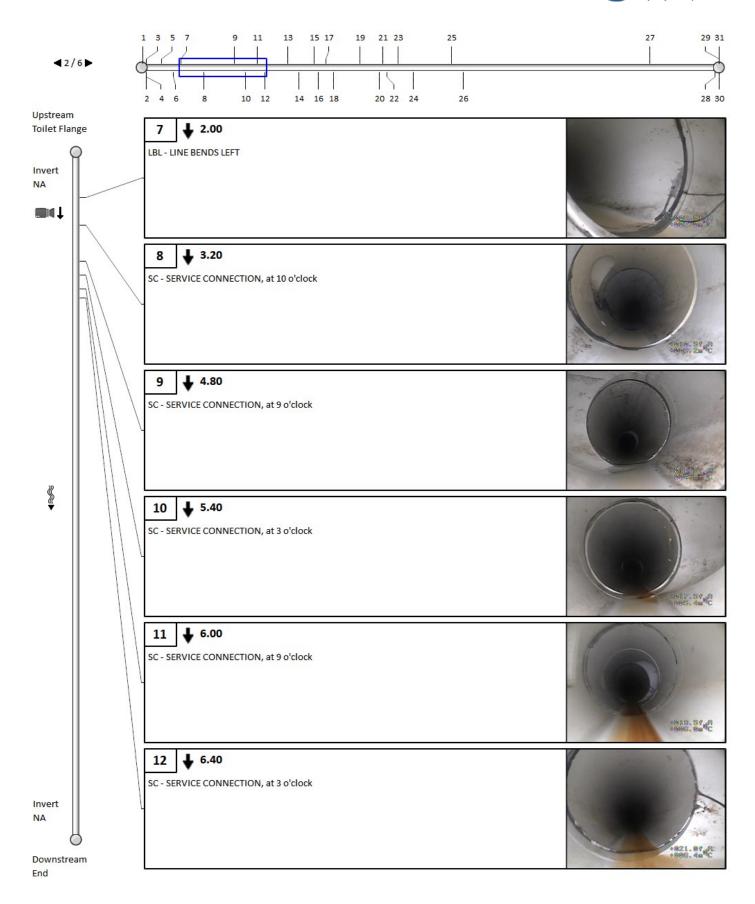


Pipe identification			
Pipe: Accesible Toilet Flange Direction of flow: Toilet Flange> End	Direction of inspection: Toilet Flange> End Direction: Direction of flow		
Pipe location			
Road: 4000 Strandherd Crossroad: Drainage Area: City: Ottawa Location:	UPSTREAM DOWNSTREAM Easting (X): Easting (X): Northing (Y): Northing (Y): Elevation (Z): Elevation (Z):		
Owner: Angelo Spadola Road segment:	GPS Accuracy: Corrdinate System: Vertical Datum:		
Pipe characteristics			
Category: Sanitary Shape: Material: ABS	Size: 3 Width: Total length:		
Lining: Type: Lateral Invert (upstream): Depth (upstream): Cover level (upstream):	Pipe unit length: Year laid: Invert (downstream): Depth (downstream): Cover level (downstream):		
Additional details			
Inspection standard: WRC 3rd edition Date: 08/08/2022 11:18 AM Project Number: Contractor project #: Client: COD - 4000 Strandherd 119067 Purpose: Weather: Operator: AVR Analyst:	Survey Abandoned: Inspected length: 30.2 Pre-cleaning: Blocked flow: Regular CCTV: Reinspect with ZOOM: Medium #: Start position: End position:		
Internal Condition	Operational Performance		
Grade: 1 Total: 0 Peak: 0	Grade: 1 Total: 0 Peak: 0		
Comments			
Other information			
Date: August-08-2022 Work Order#: Start of Location: Accesible Toilet Flange End of Location: 30.2m Location: Information 6:	Information 7: Information 8: Information 9: Information 10: PI5 (MAMR): 0 PI6 (MAMR): 0		

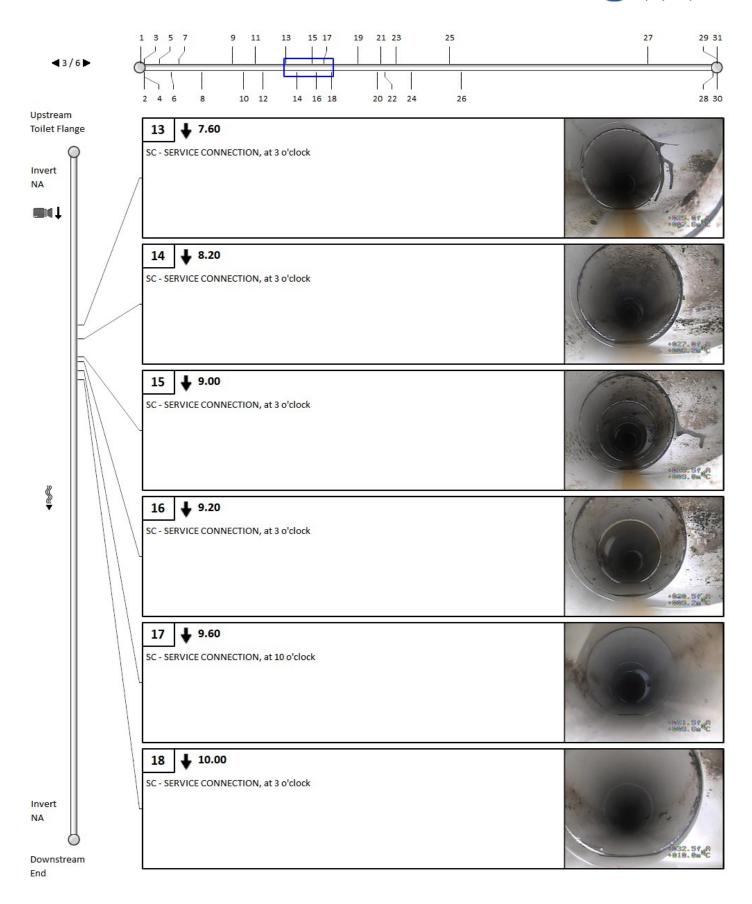




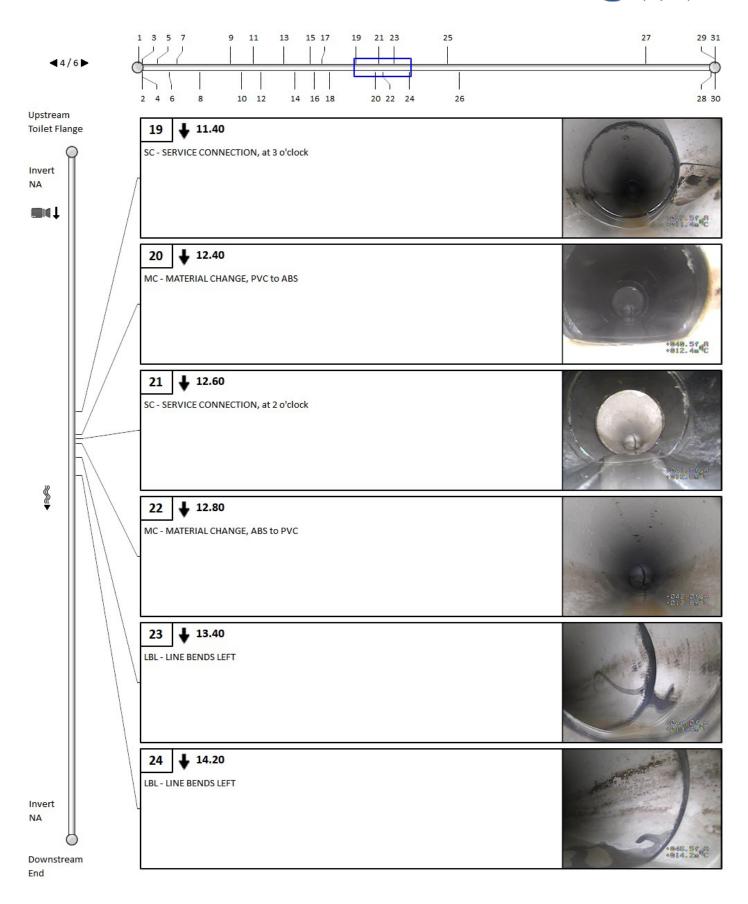




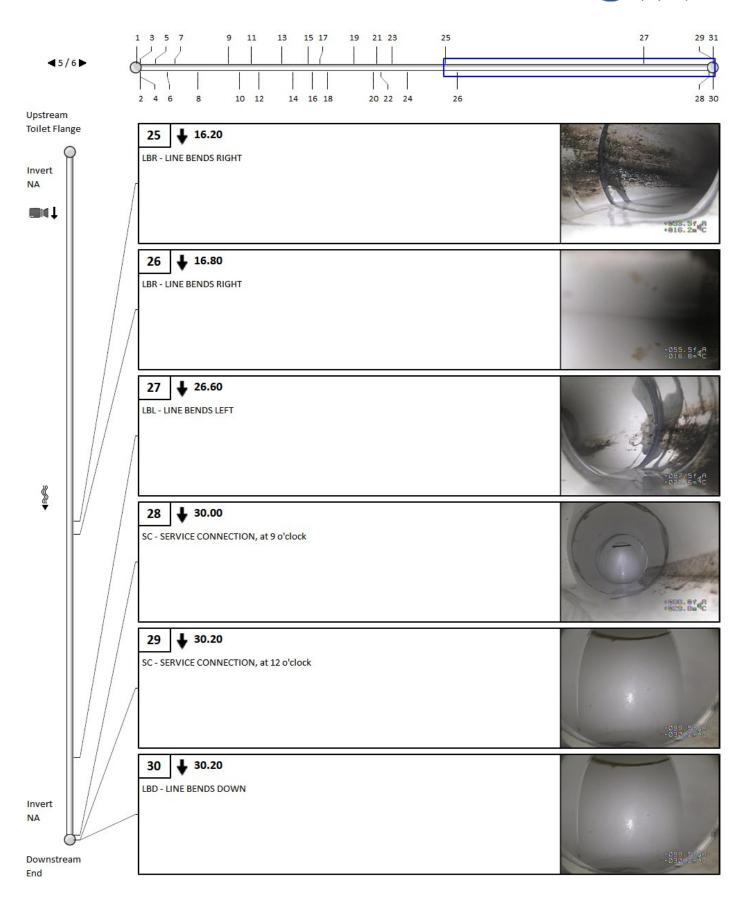




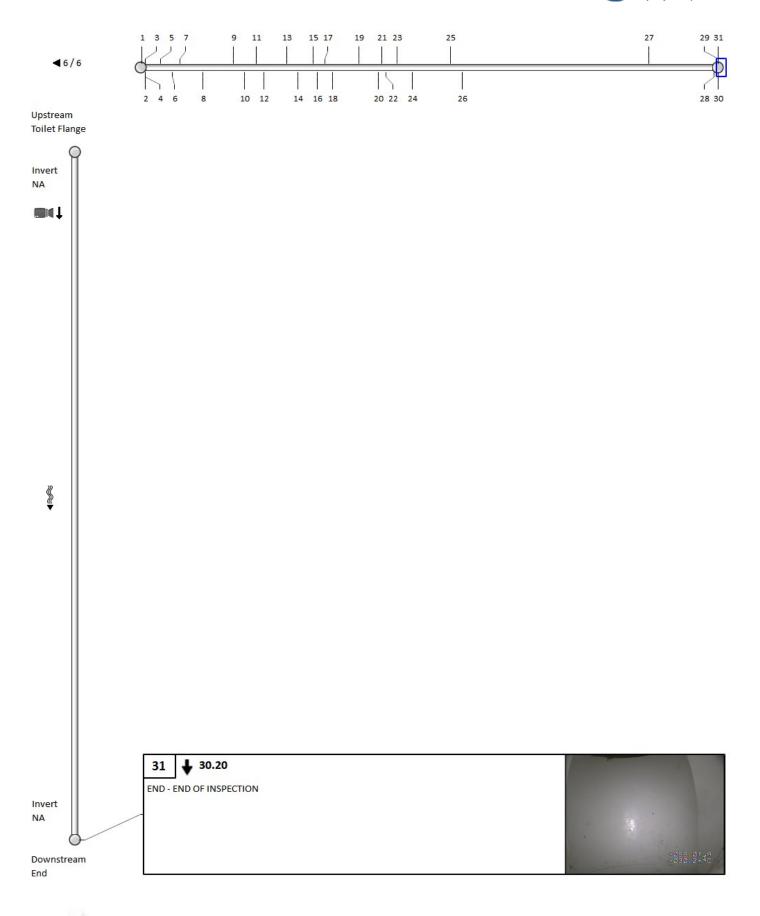














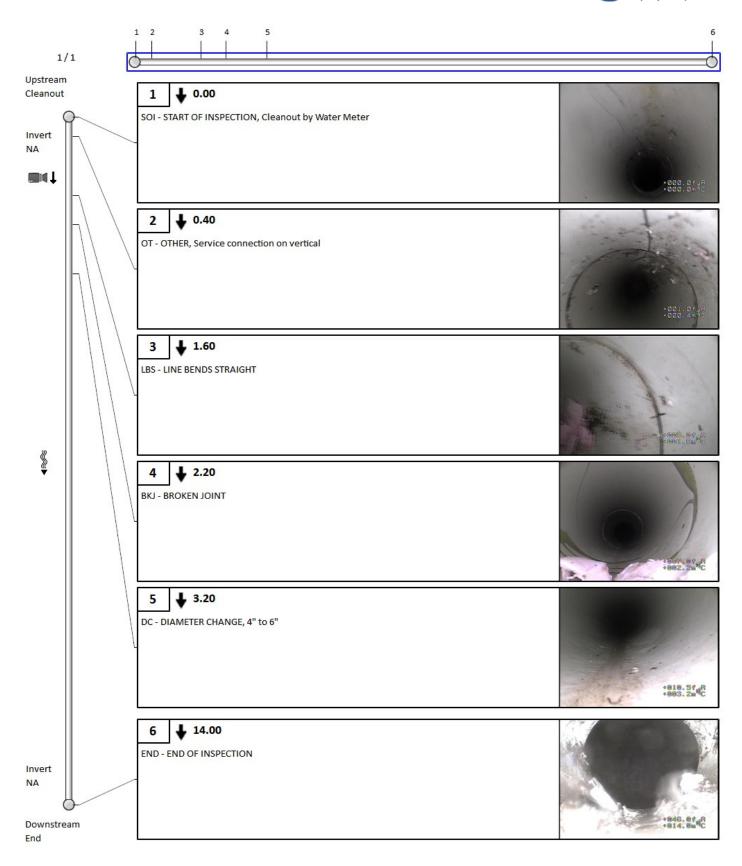
Pipe identification

Pipe identification			
Pipe: Cleanout by Water Meter Direction of flow: Cleanout> End	Direction of inspection: Cleanout> End Direction: Direction of flow		
Pipe location			
Road: 4000 Strandherd Crossroad: Drainage Area: City: Ottawa Location:	UPSTREAM DOWNSTREAM Easting (X): Easting (X): Northing (Y): Northing (Y): Elevation (Z): Elevation (Z):		
Owner: Angelo Spadola Road segment:	GPS Accuracy: Corrdinate System: Vertical Datum:		
Pipe characteristics			
Category: Storm Shape:	Size: 4 Width:		
Material: Polyvinyl chloride Lining:	Vidin: Total length: Pipe unit length:		
Type: Lateral Invert (upstream): Depth (upstream): Cover level (upstream):	Year laid: Invert (downstream): Depth (downstream): Cover level (downstream):		
Additional details			
Inspection standard: WRC 3rd edition Date: 08/08/2022 11:03 AM Project Number: Contractor project #: Client: COD - 4000 Strandherd 119067 Purpose: Weather: Operator: AVR Analyst:	Survey Abandoned: Inspected length: 14 Pre-cleaning: Blocked flow: Regular CCTV: Reinspect with ZOOM: Medium #: Start position: End position:		
Internal Condition	Operational Performance		
Grade: 1 Total: 0 Peak: 0	Grade: 1 Total: 0 Peak: 0		
Comments			
Other information			
Date: August-08-2022 Work Order#: 119067 Start of Location: Cleanout End of Location: 14.0m Location: Sunday School Room	Information 7: Information 8: Information 9: Information 10: PI5 (MAMR): 0		

Information 6:

PI6 (MAMR):





PAGE SEWER LATERAL LOCATE FORM CLEAN WATER WORKS INC. 2 OF 2 COD LOCATE PERFORMED BY: AUR CLIENT: DATE: Strandherd 4000 LOCATION: MAY BE USED FOR EXCAVATION? ☐ YES **☑** NO **LEGEND Building Line** --BL--Street Line --SL--Fence Line --FL--Road Edge --RE--Sanitary Service --SAN--Manhole MH Catch Basin CB A Accessi 6/2 Sidewalk --SW--Pole 0 Pedestal X Gas Main --GM--**NOT TO SCALE** Gas Service --GS--This is a locate for the Sanitary and Storm pipes only. Locates for other private and public utilities are required II Hydrant Water/Sewer MH prior to any excavation (Ontario One Call 1-800-400-2255). 0 **COMMENTS:** San, tary Sower

CLEAN WATER WORKS INC. PAGE OF 2 **SEWER LATERAL LOCATE FORM** CLIENT: COD LOCATE PERFORMED BY: AUR DATE: Aug 8 LOCATION: 4000 Strandherd MAY BE USED FOR EXCAVATION? **⋈** NO ☐ YES **LEGEND Building Line** --BL--Street Line --SL--Fence Line --FL--Road Edge --RE--Sanitary Service --SAN--Manhole МН Catch Basin Sidewalk --SW--Pole 0 Pedestal Х **NOT TO SCALE** Gas Main --GM--Gas Service --GS--This is a locate for the Sanitary and Storm pipes only. Locates for other private and public utilities are required II Hydrant prior to any excavation (Ontario One Call 1-800-400-2255). Water/Sewer MH 0

COMMENTS:

Storm Sever

Vision Report© Legend

	The numbers sequentially identify each observation. They allow you to find complete descriptions
44 (46) 49 54 60	and related photos throughout the pages. Note that when the pipe contains too many
	observations, the Vision© report hides the least important observations to optimize the display*.
60	A number with neither a square nor circle indicates a general observation.
	A circled number indicates a structural anomaly. The color of the circle indicates the severity of
46 38 46 11 25	the anomaly on a scale of 1 to 5, 5 being the most severe: green=1, blue=2, magenta=3, orange=4
	and red=5.
	A number in a square indicates an operation and maintenance anomaly. The color of the square
44 44 44 44	indicates the severity of the anomaly on a scale of 1 to 5, 5 being the most severe: green=1,
	blue=2, magenta=3, orange=4 and red=5.
∢ 3/31 ▶	Indicates the current page number of the inspection report.
	The blue square indicates a section of the pipe; this section is covered in detail on the current
	page of the report.
	The green line indicates the inspected part of the pipe. The remaining white line indicates the
	uninspected part of the pipe.
H	Indicates the hold points on the camera during an inspection.
H	Indicates the hold points on the camera during the reverse inspection.
	Indicates that a reverse inspection was carried out, however the camera did not reach the initial
N M	inspection hold point. (the hold point of the initial inspection)
	Indicates that a reverse inspection was carried out and that it has joined (has arrived at) the initial
M	inspection hold point.
401-059B	Identifies the start manhole number. Note that this manhole is not necessarily the upstream
P P	manhole of the pipe.
H	Identifies the end manhole number. Note that this manhole is not necessarily the downstream
401-631	manhole of the pipe.
	A downward arrow indicates that the inspection was carried out in the direction of the current,
₩ •	whereas an upward arrow indicates an inspection against the current.
₩ ou ₩	Note that the manhole located on the upper left of the page is always the start manhole, but not
	necessarily the upstream manhole of the pipe.
	This camera followed by a downward arrow is located on the upper left of the vertical pipe; it
	indicates that an inspection was done from this manhole.
	When the second camera appears on the bottom left page it means that a reverse inspection was
	carried out. Information about the reverse inspection is included in the report, thereby combining
	both inspections.
	The measurement shown under the word <invert> indicates the measurements between the</invert>
Invert	frame and the pipe captured during the inspection. This measurement is available at the top left
3,40	for the start manhole and the bottom left for the end manhole. If the invert was not measured
	during the inspection, an <na> mark will be displayed.</na>
1 4	The downward bold arrow to the right of the observation number indicates that this observation was
⊢	captured during the initial inspection.
AMH - R	
14 😚	The blank arrow pointing upwards and located to the right of the observation number indicates that
MSA - I	this observation was taken during the reverse inspection period, thereby confirming that this report
	combined both inspections.
18.40 m	Located to the right of the observation number is a number identifying the observation distance in
	relation to the start of the pipe.
SRV - Armature visib	eA full description of the observation code according to the protocol used.

 $^{{}^*}$ Any hidden observations are readily accessible from the database as well as in other CTSpec report templates.

^{**} CTSpec inc. reserves the right to modify, eliminate or add to the product features described in this pamphlet without notice.

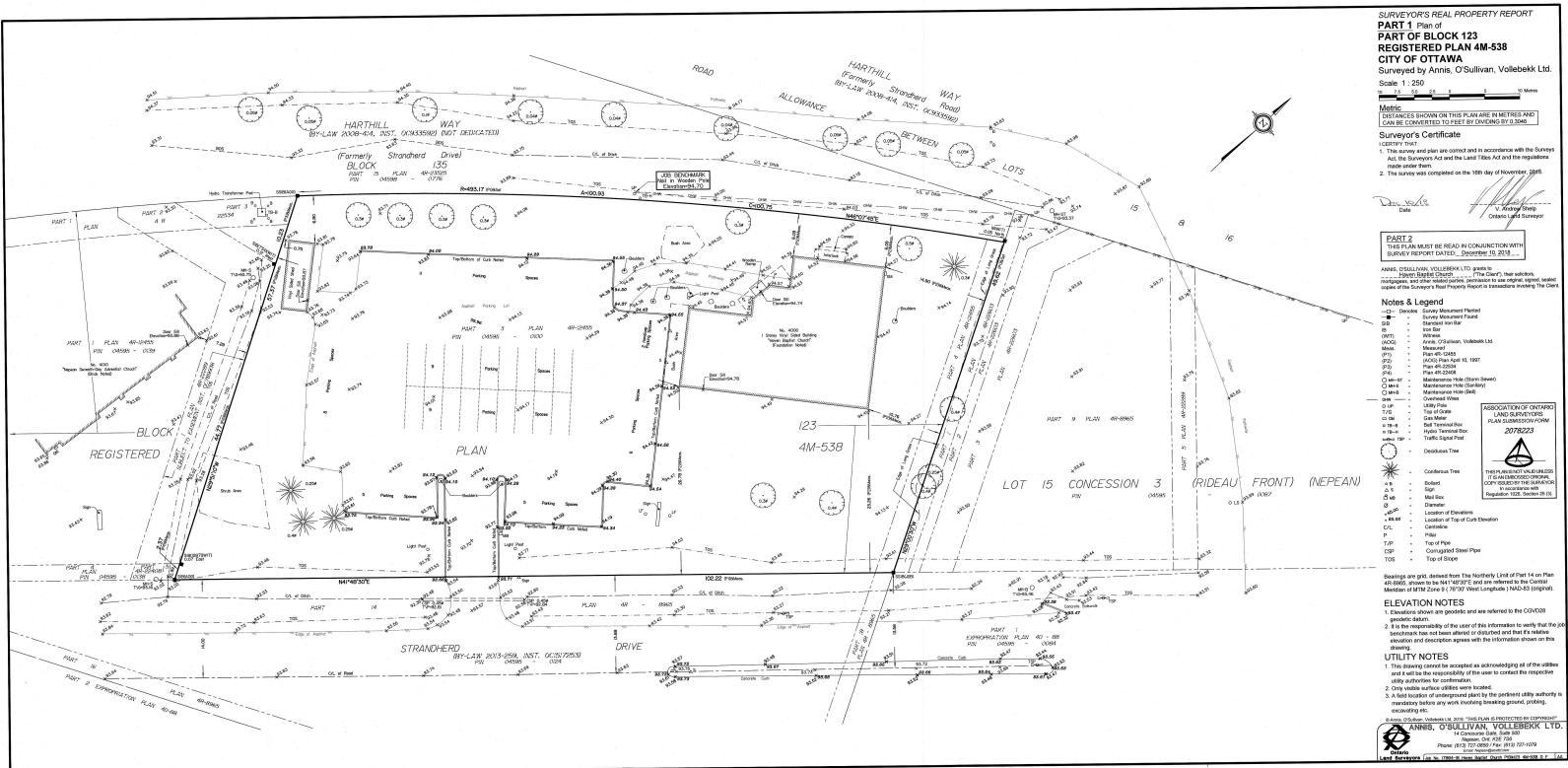
 $[\]hbox{@ 2012 CTSpec}$ inc. All rights reserved.

EXP Services Inc. Havens Baptist Church 4000 Strandherd Drive, Ottawa, ON OTT-22029363-A0 February 5, 2025

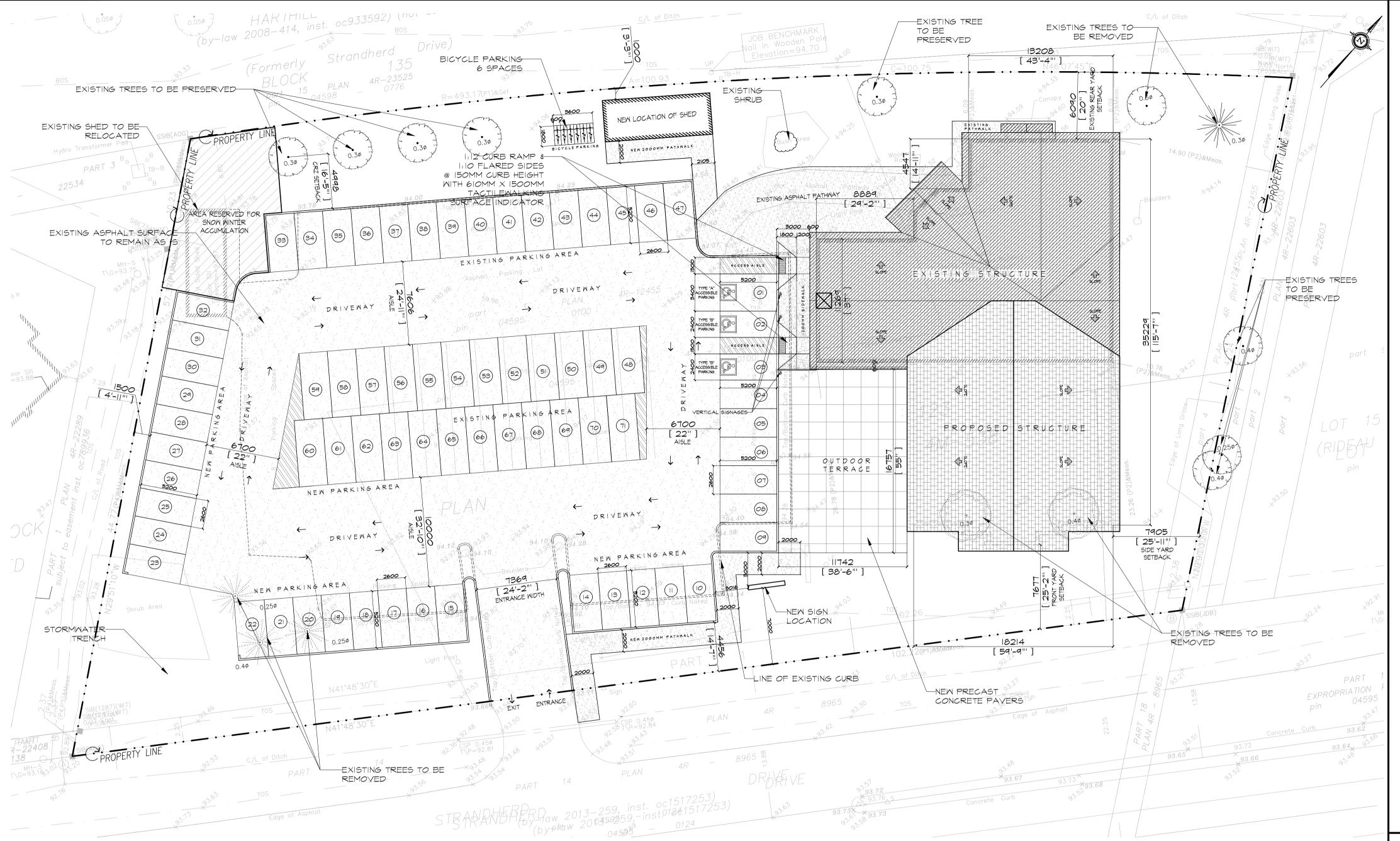
Appendix F – Drawings

- Topographical Survey (Reduced Size 11x17)
- Architectural Plans (Reduced Size 11x17)
- Background Drawings from City (Reduced Size 11x17)
- Civil Drawings (Included Separately)

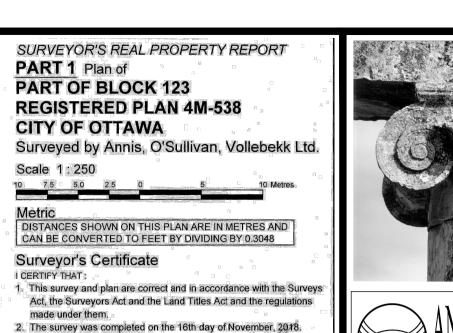




41.17884-18 Haven Baptist Charch PIBK123 4M-538 D F.dwg







Ontario Land Surveyor

2078223

THIS PLAN IS NOT VALID UNLESS

200-1645 RUSSELL ROAD OTTAWA, ONTARIO

THIS PLAN MUST BE READ IN CONJUNCTION WITH SURVEY REPORT DATED: December 10, 2018

ANNIS, O'SULLIVAN, VOLLEBEKK LTD, grants to
Haven Baptist Church ("The Client"), their solicitors,
mortgagees, and other related parties, permission to use original, signed, sealed
copies of the Surveyor's Real Property Report in transactions involving The Client.

Notes & Legend Annis, O'Sullivan, Vollebekk Ltd (P1) (P2) (P3) (P4) O MH-ST O MH-B Plan 4R-12455 (AOG) Plan April 10, 1997 Plan 4R-22408 Maintenance Hole (Storm Sewer Maintenance Hole (Sanitary Maintenance Hole (Bell) Overhead Wires ASSOCIATION OF ONTARIO Top of Grate LAND SURVEYORS □ GM Gas Meter **Bell Terminal Box**

□ TB-B o TB-H Hydro Terminal Box Traffic Signal Post □O< TSP

IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR In accordance with Regulation 1026, Section 29 (3). Mail Box Diameter Location of Elevations Location of Top of Curb Elevation Top of Pipe

Top of Slope

Corrugated Steel Pipe

Bearings are grid, derived from The Northerly Limit of Part 14 on Plan 4R-8965, shown to be N41°48'30"E and are referred to the Central Meridian of MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

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

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.

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,

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.

14 Concourse Gate, Suite 500

Nepean, Ont. K2F 750 nd Surveyors Job No. 17884-18 Haven Baptist Church PtBlkl23 4M-538 D F AA

(AOG) Plan December 10, 2018 Centreline

Distances shown on this plan are ground distances and can be converted to grid distances by multiplying by the combined scale factor of 0.999927.

Bearings are grid, derived from Can-Net 2016 Real Time Network GPS

observations on reference points A and B, shown hereon, having a pearing of N41°48'30"E and are referenced to Specified Control Points 01919791338 and 01919871649, MTM Zone 9 (76°30' West Longitude

ordinates are derived from Can-Net 2016 Real Time Network GPS

1919871649, MTM Zone 9 (76°30' West Longitude) NAD-83 (original)

Caution: Coordinates cannot, in themselves, be used to re-establish corne

 Northing
 5006055.96
 Easting
 346140.91

 Northing
 5007189.87
 Easting
 372435.05

 Northing
 5014207.48
 Easting
 363124.30

 Northing
 5014283.67
 Easting
 363192.44

PLAN 4R-36532 Received and deposited November 28th, 2024 Krystal Power

Representative for the Land Registrar for the Land Titles Division of Ottawa-carleton (No.4)

 PART
 BLOCK
 PLAN
 PIN
 AREA (Sq.m.)

 1
 PART OF 123
 4M-538
 PART OF 04595-0100
 229.8
 PLAN OF SURVEY OF PART OF BLOCK 123 REGISTERED PLAN 4M-538 CITY OF OTTAWA

SCHEDULE

Surveyed by Annis, O'Sullivan, Vollebekk Ltd. The intended plot size of this plan is 762 mm in width by 610 mm in height

when plotted at a scale of 1:250. Metric
DISTANCES AND COORDINATES SHOWN ON THIS PLAN
ARE IN METRES AND CAN BE CONVERTED TO FEET BY
DIVIDING BY 0.3048.

 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 5th day of November, 2024.

E.H. Herweyer

nis plan relates to AOLS Plan Submission form number: V-90406

or boundaries shown on this plan.

ANNIS, O'SULLIVAN, VOLLEBEKK LTI 14 Concourse Gate, Suite 500 Nepean, Ont. K2E 7S6 Phone: (613) 727-0850 / Fax: (613) 727-1079 Email: Nepean⊛aovltd.com DATE: Ontario
Land Surveyors Job No. 24837-24 Hoven Church Pt Blk 123 PL 538 R



1 PRESENTATION & APPROVAL	2022 04 01
2 ISSUED FOR CLIENTS APPROVAL	2022 04 05
3 ISSUED FOR CLIENTS APPROVAL	2022 04 12
4 ISSUED TO CIVIL ENGINEER	2022 04 27
5 ISSUED FOR CLIENTS APPROVAL	2022 04 29
6 ISSUED FOR CLIENTS FINAL APPROVAL	2022 05 06
7 APPROVED DESIGN DRAWINGS	2022 05 10
8 ISSUED FOR CONSULTANT CO-ORDINATION DRWG.	2022 06 03
9 ISSUED TO CONSTRUCTION MANAGER	2022 06 27

10 ISSUED FOR BUILDING PERMIT 2022 07 15 2022 08 25 11 ISSUED FOR CITY COMMENTS 12 ISSUED FOR CITY COMMENTS 2023 02 03 2023 03 08 13 ISSUED FOR SITE PLAN APPROVAL 14 ISSUED FOR SITE PLAN APPROVAL (PHASE 3 2023 10 31 PRE-CONSULTATION) 15 ISSUED FOR SITE PLAN APPROVAL (PHASE 3 FINAL 2023 12 06 SUBMISSION)

16 ISSUED FOR SITE PLAN APPROVAL (PHASE 3 FINAL 2024 03 28 17 REISSUED FOR BUILDING PERMIT APPLICATION AND 2024 05 09

18 ISSUED FOR SITE PLAN APPROVAL (PHASE 3 FINAL 2025 01 29 SUBMISSION)

THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ARCHITECT FOR HIS WRITTEN PERMISSIO

BEFORE PROCEEDING WITH THE WORK. NOT FOR CONSTRUCTION UNLESS SIGNED BY THE ARCHITECT.

NOT TO BE SCALED OR REPRODUCED

WITHOUT WRITTEN PERMISSION.

CONSULTANTS:

GENERAL NOTES:

STRUCTURAL ENGINEERS: DALY ENGINEERING INC. Structural Design & Engineering

G1-300 Lett Street, Ottawa Ontario, K1R 0R8 Telephone: 705-816-5554 Email: info@dalyengineering.ca

MECHANICAL & ELECTRICAL: **B.A. DESIGN LIMITED**

1470 Lagan Way, Unit 2, Ottawa Ontario K1V 3S6 CIVIL & GEOTECH. INVESTIGATION.:

EXP SERVICES INC. 100 - 2650 Queensview Drive Ottawa Ontario

PLANNING & LANDSCAPE ARCHITECTURE: **FOTENN PLANNING + DESIGN** 396 Cooper Street, Suite 300, Ottawa Ontario

HAVEN BAPTIST CHURCH

4000 Strandherd Drive, Nepean, Ontario

SITE PLAN W/ SITE SURVEY PROJECT DATA

K2J 4R8

April 2022

PROJ. #: AMS/BC-22/06

DRAWN BY: EF. / VR.

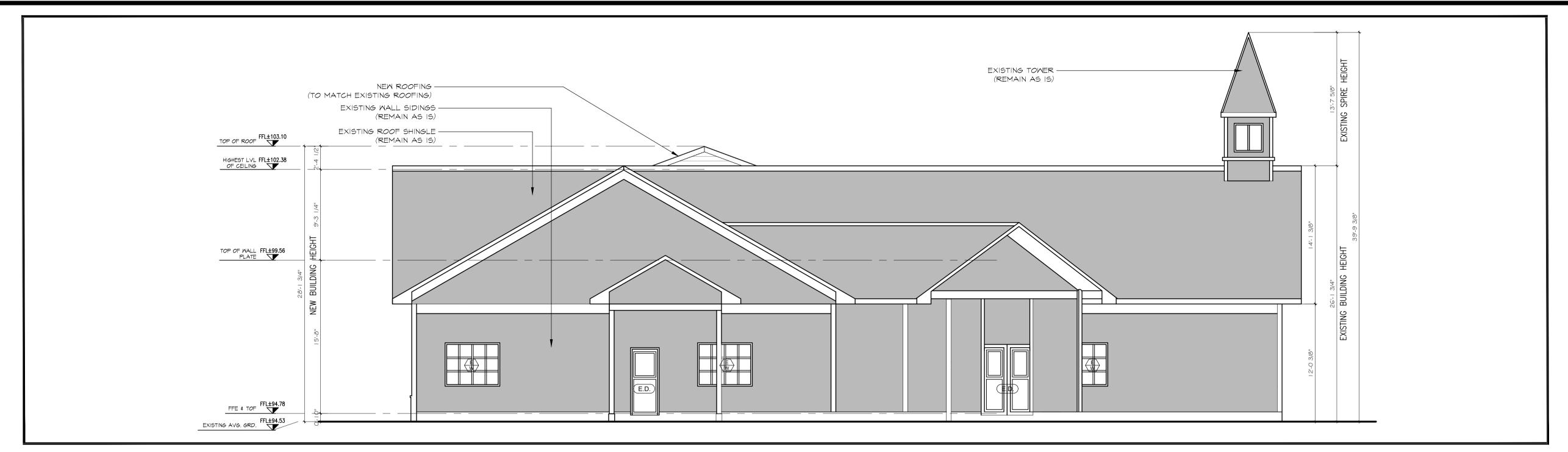
AMS **CHECKED BY:**

SHEET NUMBER:

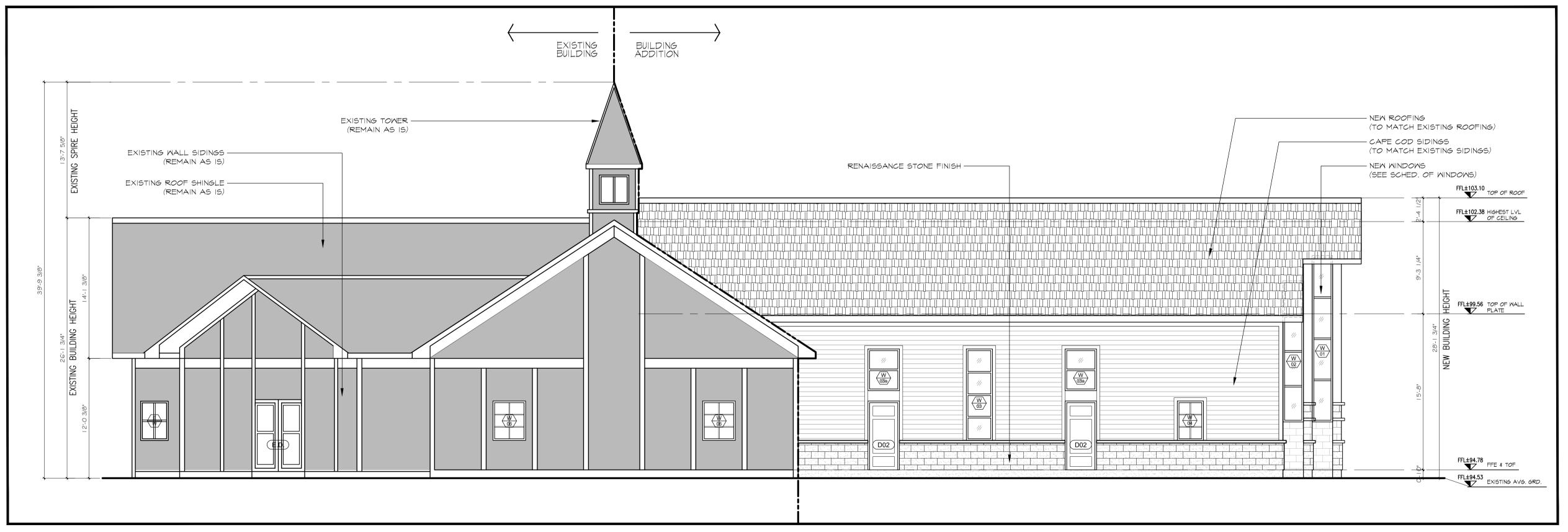
REV. NO.

SCALE:





O1 NORTH ELEVATION
A2.0 SCALE: 3/16" = 0'-0"



ANGELO MATTIA SPADOLA A R C H I T E C T

200-1645 RUSSELL ROAD OTTAWA, ONTARIO K1G 4G5 T: 613.228.7190 F: 613.228.8690 ANGELOMSPADOLA@GMAIL.COM

1 PRESENTATION & APPROVAL	2022 04 01
2 ISSUED FOR CLIENTS APPROVAL	2022 04 05
3 ISSUED FOR CLIENTS APPROVAL	2022 04 12
4 ISSUED TO CIVIL ENGINEER	2022 04 27
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6 ISSUED FOR CLIENTS FINAL APPROVAL	2022 05 06
7 APPROVED DESIGN DRAWINGS	2022 05 10
8 ISSUED FOR CONSULTANT CO-ORDINATION DRWG.	2022 06 03
9 ISSUED TO CONSTRUCTION MANAGER	2022 06 27
10 ISSUED FOR BUILDING PERMIT	2022 07 15
11 ISSUED FOR CITY COMMENTS	2022 08 25
12 ISSUED FOR CITY COMMENTS	2023 02 03
13 ISSUED FOR SITE PLAN APPROVAL	2023 03 08
14 ISSUED FOR SITE PLAN APPROVAL (PHASE 3 PRE-CONSULTATION)	2023 10 31
15 ISSUED FOR SITE PLAN APPROVAL (PHASE 3 FINAL	2023 12 06

GENERAL NOTES:

SUBMISSION)

- THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ARCHITECT FOR HIS WRITTEN PERMISSION BEFORE PROCEEDING WITH THE WORK.
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CONSULTANTS:

STRUCTURAL ENGINEERS:

DALY ENGINEERING INC.
Structural Design & Engineering
G1-300 Lett Street, Ottawa Ontario, K1R 0R8
Telephone: 705-816-5554 Email: info@dalyengineering.ca

MECHANICAL & ELECTRICAL: **B.A. DESIGN LIMITED**1470 Lagan Way, Unit 2, Ottawa Ontario

CIVIL & GEOTECH. INVESTIGATION.:

EXP SERVICES INC.

100 - 2650 Queensview Drive Ottawa Ontario

PLANNING & LANDSCAPE ARCHITECTURE:

FOTENN PLANNING + DESIGN
396 Cooper Street, Suite 300, Ottawa Ontario

HAVEN BAPTIST CHURCH

4000 Strandherd Drive , Nepean , Ontario

K2J 4R8

NORTH ELEVATION WEST ELEVATION

DATE:	April 2022
SCALE:	3/16"=1'-0"
PROJ. #:	AMS/BC-22/06
DRAWN BY:	EF. / VR.

SHEET NUMBER:

REV. NO. 05 DATE: 2022.05.10

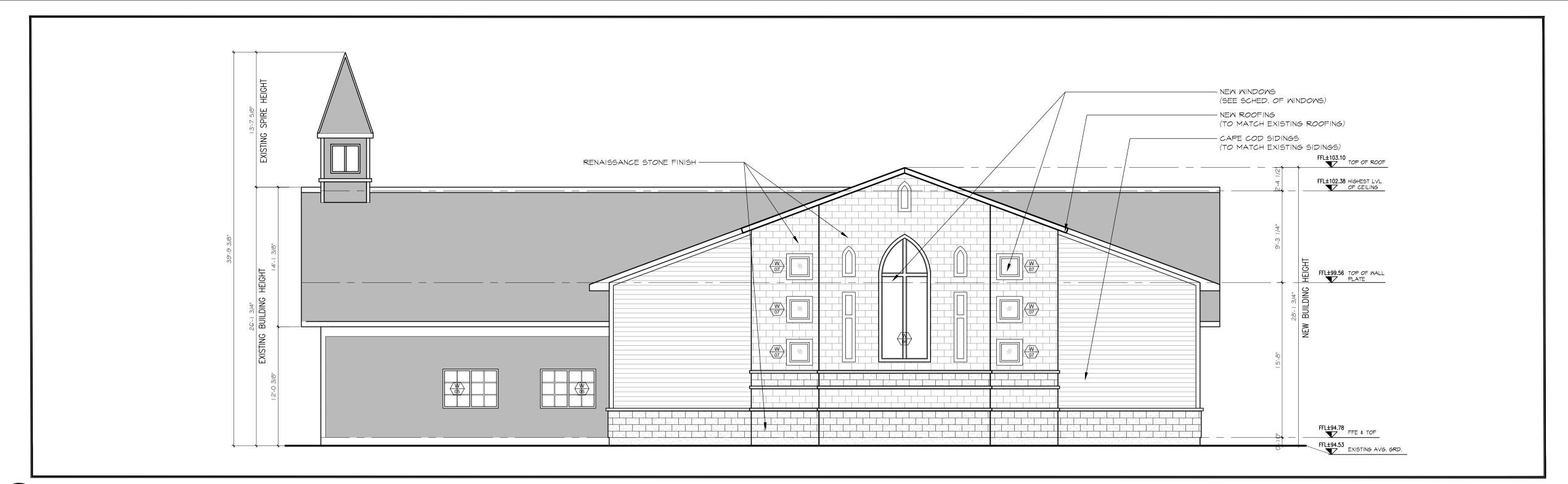
CHECKED BY:



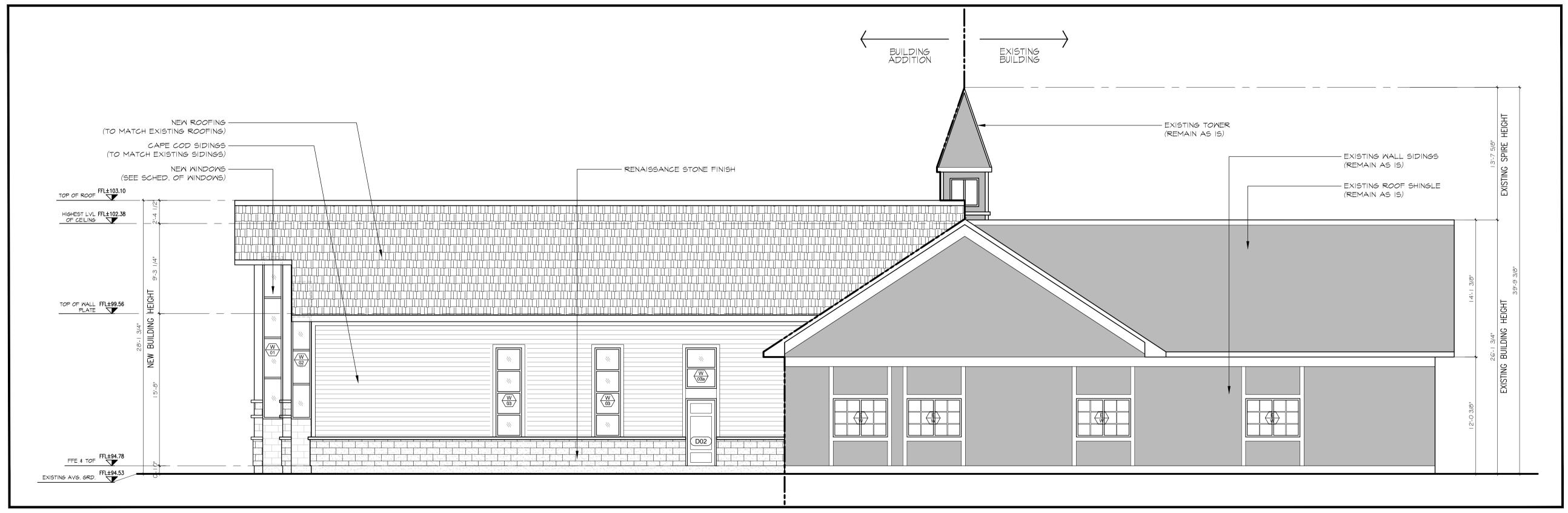
02 WEST ELEVATION A2.0 SCALE: 3/16" = 0'-0"

2022-08-25 10:00 am

AMS



O1 SOUTH ELEVATION
A2.1 SCALE: 3/16" = 0'-0"



02 EAST ELEVATION A2.1 SCALE: 3/16" = 0'-0"



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15 ISSUED FOR SITE PLAN APPROVAL (PHASE 3 FINAL SUBMISSION)	2023 12 06

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G1-300 Lett Street, Ottawa Ontario, K1R 0R8

Telephone: 705-816-5554 Email: info@dalyengineering.ca MECHANICAL & ELECTRICAL: **B.A. DESIGN LIMITED**

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EXP SERVICES INC. 100 - 2650 Queensview Drive Ottawa Ontario

PLANNING & LANDSCAPE ARCHITECTURE: **FOTENN PLANNING + DESIGN**

HAVEN BAPTIST CHURCH

4000 Strandherd Drive,

Nepean , Ontario

SOUTH ELEVATION EAST ELEVATION

DATE:	April 2022
SCALE:	3/16"=1'-0"
PROJ. #:	AMS/BC-22/06

DRAWN BY: EF. / VR.

CHECKED BY: AMS

REV. NO. 05 DATE: 2022.05.10

K2J 4R8

