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DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

TECHNICAL MEMORANDUM

DATE: 2019-07-04 *EMAIL*

TO: **Richard Buchanan, CET**
Program Manager, Development Review

SUBJECT: **Zibi Ontario – Block 211, Servicing Brief**

OUR FILE: DSEL Project No. 19-1093

ATTACHMENTS:

- MSS Water Demand Calculation Sheet, prepared by DSEL – dated May 2018;
- Block 211 Water Demand Calculation Sheet, prepared by DSEL – dated June 2019;
- Block 211 EPANET Model Schematic, prepared by DSEL – dated June 2019;
- EPANET Model Output Files, prepared by DSEL – Dated June 2019;
- Block 211 Wastewater Discharge Calculation Sheet, prepared by DSEL – dated June 2019;
- Ultimate Sanitary Design Sheet, prepared by DSEL – dated June 2019;
- Block 211 Storm Sewer Design Sheet, prepared by DSEL – dated June 2019;
- Detailed Stormceptor Sizing Report – Zibi Ontario Block 211 – dated June 2019
- Zibi Ontario Master Plan, prepared by Fotenn Planning + Design – dated December 2016;
- Zibi Block 211 Site Plan, prepared by KPMB Architects – dated June 7, 2019.

Windmill DREAM Developments has retained DSEL to prepare an amendment to the Functional Servicing and Stormwater Management Report in support of their Site Plan Control (SPC) application for Block 211 of the Zibi Ontario lands. The development of Block 211 was contemplated in the Master Servicing Plan, prepared by DSEL and dated June 2018 (***MSS***), refer to the Master Plan drawing in the ***Drawings/Figures*** folder of the attachments. The ***MSS*** contemplated approximately ***1,301 m²*** of retail space and ***7,803 m²*** of office space for Block 211. The proposed Block 211 development results in an increase footprint to Block 211 then contemplated in the ***MSS*** including of ***1,140 m²*** of retail space and ***15,164 m²*** of office space.

This document is an addendum to the previously approved Functional Servicing and Stormwater Management Report – Phase 1, prepared by DSEL and dated August 2018 (***Approved FSR***). Phase 1 included Blocks 205A & 208 with a mix of residential, office and retail space. It is proposed to service Block 211 through extending sanitary and water infrastructure designed as part of Phase 1. To support the construction of Block 211, a new storm outlet, discharging to the east side of Chaudière Island, is required. Phase 1 infrastructure is proposed to be constructed in Spring and Summer 2019, prior to construction of Block 211. Block 207 is expected to proceed closely with Block 211, submitted under a separate application, and has thus been included in the calculations of water demand and wastewater discharge.

<u>Water Servicing</u>

Water servicing for Block 211 will require the extension of the watermain east of Booth Street. Based on watermain layout contemplated in the ***MSS***, a looped 200 mm watermain within Chaudière East Private and a 250 mm watermain within Zaida Eddy Private, is proposed to service Block 211, as well as, the future phases on the east side of Chaudière Island.

The City of Ottawa was contacted to obtain boundary conditions for the future connections of Phase 1 works at Booth Street and the Canadian War Museum and the Booth Street and Wellington Street intersection. The boundary conditions, the contemplated and the proposed water demands are summarized in ***Table 1,*** below:

Table 1
Water Demand – MSS and Proposed Phase 1, Block 207 & Block 211

<table>
<tr><th>Design Parameter</th><th>MSS Demand (Block 205A, 207, 208, 211) (L/min)</th><th>Anticipated Demand[1] Phase 1 (L/min)</th><th>Anticipated Demand[1] Phase 1, Block 207, Block 211 (L/min)</th><th colspan="2">Boundary Condition[2] ($m\ H_2O$ / kPa) Connection @ Booth Street and War Museum</th><th colspan="2">Boundary Condition[2] ($m\ H_2O$ / kPa) Connection @ Booth Street and Wellington Street</th></tr>
<tr><td>Average Daily Demand</td><td>117.2</td><td>32.8</td><td>117.4</td><td>61.3</td><td>601.4</td><td>59.8</td><td>586.8</td></tr>
<tr><td>Max Day + Fire Flow</td><td>243.0 + 12,000 = 12,243.0</td><td>128.7 + 16,000 = 16,128.7</td><td>255.6 + 19,000 = 19,255.6</td><td>49.1</td><td>481.7</td><td>51.6</td><td>506.4</td></tr>
<tr><td>Peak Hour</td><td>504.5</td><td>198.5</td><td>426.9</td><td>53.6</td><td>525.8</td><td>52.1</td><td>511.3</td></tr>
<tr><td colspan="8">1) Water demand calculation per Water Supply Guidelines. See detailed calculations included in Attachments.
2) Boundary conditions supplied by the City of Ottawa</td></tr>
</table>

The combined Phase 1, Block 207 and Block 211, water demand results in less than a ***0.1%*** change in water demands when compared to the contemplated water demand in the ***MSS*** for ***Blocks 205A, 207, 208 & 211*** (refer to ***Appendix B,*** folder in the attachments for water demand calculations).

Fire demands for Block 211 was calculated using the *City of Ottawa Technical Bulletin ISTB-2018-02*, and resulted in a fire flow of ***19,000 L/min***.

The hydraulic model, per the ***Approved FSR,*** was updated to confirm adequate pressure and fire flow to service Block 211, and is summarized in ***Table 2,*** below:

Table 2
EPANET Results

Node ID	Pressure (kPa)		
	Average Day	Max Day + Fire Flow	Peak Hour
Block 211	605.5	266.6	522.2
Hydrant 4	603.4	259.4	520.1

Pressures during the fire flow scenario are above the minimum required per the ***City of Ottawa Water Supply Guideline (2010)***. Pressure during the Average Day scenario pressures exceed the recommended pressures**,** thus, pressure reducing valves may be required, to be confirmed through the mechanical design of the proposed building. Hydrants have been located in accordance with the ***MSS***.

Sanitary Servicing

Block 211 is proposed to be serviced by a connection to the 250 mm sanitary sewer within Ziada Eddy Private, which will be constructed in Phase 1. The Phase 1 sanitary sewers were sized to convey the flow from Block 211, in accordance with the ***Approved FSR***.

As indicated in the ***Approved FSR***, it is proposed to construct a temporary pumping station within the footprint of the existing Building 535 to service the first phases of development. Refer to drawing ***SSP-1*** for pump station.

Sanitary flows from Block 211 will be directed to the temporary pumping station, which will then convey flows through twin 200 mm forcemains which run south, down Booth Street. The pump station design report, prepared by Hatch, and dated November 2018, indicates that the temporary pumping station is designed to pump a peak wet weather flow of ***13 L/s***. Refer to the ***Approved FSR*** for further detail on the interim pump station.

Table 3, below, summarizes the anticipated wastewater discharge from the proposed Phase 1, Block 207 and Block 211 development.

Table 3
Summary of Anticipated Wastewater Discharge

Design Parameter	MSS Flow (L/s)	Phase 1 Flow (L/s)	Phase 1, Block 207 & Block 211 (L/s)
Average Dry Weather Flow Rate	22.6	0.7	2.1
Peak Dry Weather Flow Rate	51.7	1.8	4.5
Peak Wet Weather Flow Rate	53.6	2.2	4.9

As shown in ***Table 3,*** above, it is anticipated that Block 207 and Block 211 will result in an increase in sanitary discharge from the originally proposed Phase 1 development, however, the temporary pumping station has sufficient capacity to convey the proposed sanitary flows from the Block 207 and Block 211 development and the anticipated increase in sanitary flow still results in less flow than what was contemplated in the ***MSS***.

It is recommended that the flow within the pumping station be monitored to confirm the actual available capacity to support future phases of the proposed development.

Due to the tandem construction of Zaida Eddy Private and Block 211, it is proposed that a portion of the ultimate sanitary sewer within Zaida Eddy Private be constructed in conjunction with Block 211. To ensure adequate sizing of the ultimate infrastructure, a design sheet for the ultimate development was prepared, refer to the ***Appendix C*** folder, in the attachments, for sizing calculations.

Stormwater Management

Stormwater runoff from the proposed Block 211 development will discharge through a service connection to the 375 mm storm sewer within Zaida Eddy Private, which ultimately outlets to a new outlet at the east edge of Chaudière Island. An Oil-Grit-Separator (***OGS***) is proposed to be installed at this connection point, in accordance with the ***MSS,*** which will provide ***80% TSS Removal*** prior to discharging to the Ottawa River. Refer to the ***Appendix D*** folder, in the attachments***,*** for the manufacturer report on the ***OGS***.

The proposed storm services directing flow to the new outlet have been sized for the 5-year storm event, refer to the storm sewer design sheet in ***Appendix D*** for sizing calculations.

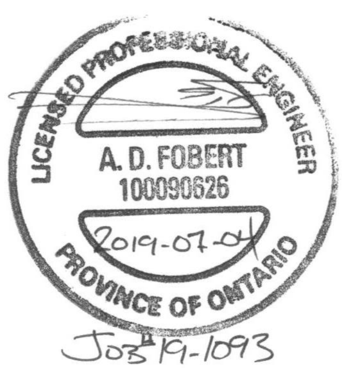
Quantity controls are not required per the approved ***MSS***.

Required Permits / Approvals

The proposed development is subject to the site plan control approval process. The City of Ottawa must approve the engineering design drawings and reports prior to the issuance of site plan control.

An amendment to the previously issued Environmental Compliance Approval (ECA #1505-B96UCV) is required to reflect the new storm sewers; increase in service area to the interim pump station; and off-site sanitary infrastructure.

Yours truly,
David Schaeffer Engineering Ltd.



Per: Adam D. Fobert, P.Eng.

Yours truly,
David Schaeffer Engineering Ltd.

Per: Steven L. Merrick, P.Eng.

Z:\Projects\19-1093_Windmill_Zibi-Block-211\B_Design\B3_Reports\B3-2_Servicing (DSEL)\SPA-Amendment-Subm1\2019-07-03_1093_memo-slm.docx

APPENDIX A

Pre-Consultation

Steve Merrick

From: Thom Seto <tseto@kpmbarchitects.com>
Sent: Thursday, May 30, 2019 5:33 PM
To: Steve Merrick
Cc: Adam Fobert; Scott Bentley; 'Paul Black'; Guenter Goetz; Goran Milosevic; Mark Jaffar
Subject: RE: Zibi SPA Set - 2019 05 23 - FUS

Hi Steve,

Please see my comments in red below.

Thanks, Thom

Thom Seto

KPMB Architects
tseto@kpmbarchitects.com
351 King Street East, Suite 1200, Toronto, Ontario M5A 0L6
tel. 416-977-5104
www.kpmb.com

From: Steve Merrick <SMerrick@dsel.ca>
Sent: May 24, 2019 8:52 AM
To: Thom Seto <tseto@kpmbarchitects.com>
Cc: Adam Fobert <AFobert@dsel.ca>; Scott Bentley <scott.bentley@zibi.ca>; 'Paul Black' <black@fotenn.com>
Subject: RE: Zibi SPA Set - 2019 05 23 - FUS

Hi Thom,

Can we get a CAD copy of the latest site plan?

I just have a few questions on the site plan which I hope you could answer to allow us to complete our water demand and fire flow calculations for Block 211.

- Confirm sq.ft of office space proposed (16304.60m^2 per the attached) 16304.60 m^2 is the NRGFA for both the office levels & the ground floor retail (which alone is 1140.14 m^2). The total office area would then be 16304.60 m^2 - 1140.14 m^2 = 15164.46 m^2.

ZONING TABLE – ZIBI Block 211	
Current Zoning	MD5[2172] S332-h
Site Area	2,575m²
Proposed Retail GFA	1,140m²
Proposed Office GFA	15,164m²

- Confirmation that Block 211 will employ a fully supervised sprinkler system Yes, fully supervised sprinkler system.
- The ISO class for the for each Block style. The ISO class is Construction Class 3 (Non-Combustible) for the entire building.

I have included the ISO Guide in which sections 1, 2 and 3 on pages 3 to 10 provides definitions to clarify as well as the section from the City's technical bulletin. Note that ISO refers only to fire-resistive for fire ratings not less than 1-hour.

A. *Determine the type of construction.*

- Coefficient *C* in the FUS method is equivalent to coefficient *F* in the ISO method:

Correspondence between FUS and ISO construction coefficients

FUS type of construction	ISO class of construction	Coefficient *C*
Fire-resistive construction	Class 6 (fire resistive)	0.6
	Class 5 (modified fire resistive)	0.6
Non-combustible construction	Class 4 (masonry non-combustible)	0.8
	Class 3 (non-combustible)	0.8
Ordinary construction	Class 2 (joisted masonry)	1.0
Wood frame construction	Class 1 (frame)	1.5

However, the FUS definition of fire-resistive construction is more restrictive than those of ISO construction classes 5 and 6 (modified fire resistive and fire resistive). FUS requires structural members and floors in buildings of fire-resistive construction to have a fire-resistance rating of 3 hours or longer.

- With the exception of fire-resistive construction that is defined differently by FUS and ISO, practitioners can refer to the definitions of the ISO construction classes (and the supporting definitions of the types of materials and assemblies that make up the ISO construction classes) found in the current ISO guide [4] (see Annex i) to help select coefficient *C*.
- To identify the most appropriate type of construction for buildings of mixed construction, the rules included in the current ISO guide [4] can be followed (see Annex i). For a building to be assigned a given classification, the rules require ⅔ (67%) or more of the total wall area and ⅔ (67%) or more of the total floor and roof area of the building to be constructed according to the given construction class or a higher class.
- New residential developments (less than 4 storeys) are predominantly of wood frame construction ($C = 1.5$) or ordinary construction ($C = 1.0$) if exterior walls are of brick or masonry. Residential buildings with exterior walls of brick or masonry veneer and those with less than ⅔ (67%) of their exterior walls made of brick or masonry are considered wood frame construction ($C = 1.5$).

Feel free to forward the above requested information to any others in the consultant team for their input. If you need any more information please let me know.

Thank you,

Steve Merrick, P.Eng.
Project Manager / Intermediate Designer

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120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 561
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email: smerrick@DSEL.ca

From: Thom Seto [mailto:tseto@kpmbarchitects.com]
Sent: Thursday, May 23, 2019 7:03 PM
To: 'Paul Black' <black@fotenn.com>
Cc: Goran Milosevic <gmilosevic@kpmbarchitects.com>; Mark Jaffar <mjaffar@kpmbarchitects.com>; Luigi LaRocca <llarocca@kpmbarchitects.com>; 'Eric Cornish (ecornish@mbii.com)' <ecornish@mbii.com>; 'James Hannaford' <jhannaford@tmptoronto.com>; 'Guenter Goetz' <GGoetz@adamson-associates.com>; 'Jana Lyskova' <JLyskova@adamson-associates.com>; 'GDunn@adamson-associates.com' <GDunn@adamson-associates.com>; 'rodney.wilts@zibi.ca' <rodney.wilts@zibi.ca>; 'ashley.graham@zibi.ca' <ashley.graham@zibi.ca>; 'scott.demark@zibi.ca' <scott.demark@zibi.ca>; 'scott.bentley@zibi.ca' <scott.bentley@zibi.ca>; 'JGiannone@dream.ca' <JGiannone@dream.ca>; 'lush@csw.ca' <lush@csw.ca>; 'card@csw.ca' <card@csw.ca>; 'schellenberg@csw.ca' <schellenberg@csw.ca>; 'Sam Waterman' <SWaterman@tmptoronto.com>; Negar Behzad <nbehzad@kpmbarchitects.com>; Arslan Abbas <aabbas@kpmbarchitects.com>; Bruce Kuwabara <bkuwabara@kpmbarchitects.com>; 'Graham FitzGerald' <gfitzgerald@rjc.ca>; 'Redden, Chris' <Chris.Redden@parsons.com>; 'Ron Jack (ronald.jack@parsons.com)' <ronald.jack@parsons.com>; 'Mark Baker (Mark.Baker@parsons.com)' <Mark.Baker@parsons.com>; Steve Merrick <SMerrick@dsel.ca>; Adam Fobert <AFobert@dsel.ca>
Subject: Zibi SPA Set - 2019 05 23

Hi Paul,

Attached is the SPA set for your review & comments.

I’ve revised the NRGFA areas for all of the levels & have updated sheets A002 & A003 (the Zoning Table) to reflect this.

The landscape plan will need to be updated on sheet A003.

I’ve also placed this document in the FTP KPMB folder “Draft SPA Set 23 May 2019” for your reference.

Thanks, Thom

Thom Seto

KPMB Architects
tseto@kpmbarchitects.com
351 King Street East, Suite 1200, Toronto, Ontario M5A 0L6
tel. 416-977-5104
www.kpmb.com

Boundary Condition for Zibi Ontario - Block 211

Steve Merrick

From: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Sent: Thursday, June 6, 2019 12:18 PM
To: Steve Merrick
Subject: Zibi Ontario - Block 211 - Boundary Condition Request
Attachments: image006.emz; image011.emz; Zibi Ontario - Block 211 June 2019.pdf

Hi Steve

The following are boundary conditions, HGL, for hydraulic analysis at Zibi Ontario (zone 1W) assumed to be connected to the 406mm on Booth (connection 1) and 406mm on Wellington (connection 2). See attached PDF for locations.

The water demands provided include demands for Phase 1, Phase 2 and Block 211 (205A, 207, 208, 211)

Minimum HGL = 107.5m, same at both connections

Maximum HGL = 115.2m, same at both connections. The maximum pressure is estimated to be greater than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

MaxDay + Fireflow (317 L/s) = 103.0m, Booth St connection

MaxDay + Fireflow (317 L/s) = 107.0m, Wellington connection

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.

Richard Buchanan, CET

Coordinator, Front Ending Agreements and Brownfields Programs
Planning Services, Development Review Branch
Planning, Infrastructure and Economic Development Department
City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 27801
ottawa.ca/planning / ottawa.ca/urbanisme

From: Steve Merrick <SMerrick@dsel.ca>
Sent: June 05, 2019 9:34 AM
To: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Subject: Zibi Ontario - Block 211 - Boundary Condition Request

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Hi Richard,

Hope all is well, I wanted to reach out to obtain boundary conditions for the above noted site.

1. Location of Service / Street Number: **3 Booth Street**

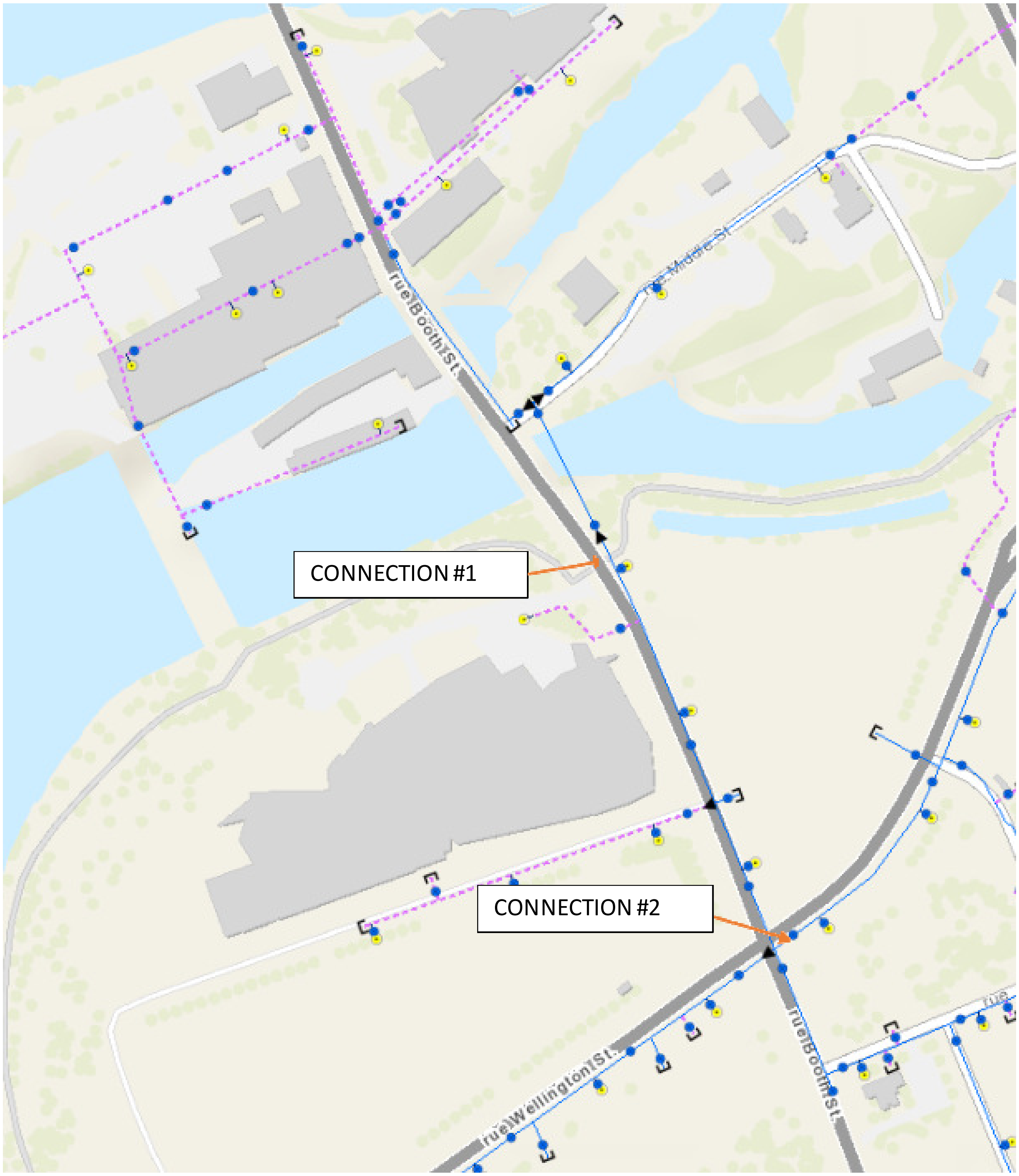
2. Type of development: **The proposed next phase of development on Chaudiere Island east of Booth Street, known as Block 211. The proposed development is a 9 storey building consisting of 1140m^2 of retail space and 15164m^2 of office space and 2 levels of underground parking**

3. Proposed Connection points:
   - **Connection 1 to existing 406mm watermain with Booth Street North of War Museum**
   - **Connection 2 to existin 406mm watermain within Wellington Street @ Booth Street**

     Please see the diagram below for reference.

4. Please provide pressures for the following water demand scenarios required for the proposed development. The water demands below include demands for Phase 1, Phase 2 and Block 211 (205A, 207, 208, 211)

	L/min
Avg. Daily	117.4
Max Day + FUS 1	255.6 + 19,000 = 19255.6
Peak Hour	426.9



Steve Merrick, P.Eng.
Project Manager / Intermediate Designer

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'

APPENDIX B

Water Supply

Windmill
Zibi - Ontario
Proposed Conditions (MSS)

Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

Phase	Block	Type	Unit	Rate	No. of Units	Avg Day L/min	Max Day L/min	Peak Hour L/min
1	208	Office	75	L/p/d	287	15.0	22.4	40.4
1	208	Retail	5	$L/m^2/d$	445	1.5	2.3	4.2
1	205.5A	Res	474.6	L/unit/d	71	23.4	58.5	128.7
1	205.5A	Retail	5	$L/m^2/d$	1825	6.3	9.5	17.1
1	207	Office	75	L/p/d	385	20.1	30.1	54.2
1	207	Retail	5	$L/m^2/d$	597	2.1	3.1	5.6
1	206	Res	474.6	L/unit/d	198	65.3	163.1	358.9
1	206	Office	75	L/p/d	395	20.6	30.8	55.5
1	206	Retail	5	$L/m^2/d$	612	2.1	3.2	5.7
1	204A	Office	75	L/p/d	1049	54.6	136.6	300.5
1	204A	Retail	5	$L/m^2/d$	1626	5.6	8.5	15.2
2	211	Office	75	L/p/d	839	43.7	109.3	240.4
2	211	Retail	5	$L/m^2/d$	1301	4.5	6.8	12.2
3	209	Office	75	L/p/d	965	50.3	75.4	135.7
3	209	Retail	5	$L/m^2/d$	1496	5.2	13.0	28.6
3	210A&B	Office	75	L/p/d	495	25.8	38.7	69.6
3	210A&B	Retail	5	$L/m^2/d$	767	2.7	4.0	7.2
4	205B	Res	474.6	L/unit/d	67	22.1	55.2	121.5
4	205B	Office	75	L/p/d	163	8.5	12.8	23.0
4	205B	Retail	5	$L/m^2/d$	253	0.9	1.3	2.4
4	204B	Res	474.6	L/unit/d	115	37.9	94.8	208.5
4	204B	Retail	75	L/p/d	264	13.8	20.7	37.2
4	204B	Office	5	$L/m^2/d$	410	1.4	2.1	3.8
5	201	Res	474.6	L/unit/d	170	56.0	140.1	308.2
5	201	Office	75	L/p/d	182	9.5	14.2	25.5
5	201	Retail	5	$L/m^2/d$	281	1.0	1.5	2.6
5	202	Res	474.6	L/unit/d	90	29.7	74.2	163.1
5	202	Office	75	L/p/d	107	5.6	8.4	15.1
5	202	Retail	5	$L/m^2/d$	166	0.6	0.9	1.6
5	203	Res	474.6	L/unit/d	180	59.3	148.3	326.3
5	203	Retail	75	L/p/d	306	16.0	23.9	43.1
5	203	Retail	5	$L/m^2/d$	475	1.6	2.5	4.5
6	212	Office	75	L/p/d	1804	94.0	140.9	253.7
6	212	Retail	5	$L/m^2/d$	2796	9.7	14.6	26.2
7	213	Res	474.6	L/unit/d	200	65.9	164.8	362.5
7	213	Office	75	L/p/d	150	7.8	11.7	21.1
7	213	Retail	5	$L/m^2/d$	233	0.8	1.2	2.2
8	214	Office	75	L/p/d	587	30.6	45.9	82.6
8	214	Retail	5	$L/m^2/d$	910	3.2	4.7	8.5
8	215	Office	75	L/p/d	587	30.6	45.9	82.6
8	215	Retail	5	$L/m^2/d$	910	3.2	7.9	17.4
EO	1	Office	75	L/p/d	12	0.6	0.9	1.7
					Total	**858.9**	**1754.6**	**3624.5**

Notes:
* Development stats per Windmill schedule dated 2016-02-01 and additional information received via email 2016-02-08.
* Office unit rate per Ontario Building Code 8.2.1.3.B.
* Residential Unit rate assuming 65% one bedroom (1.4p/unit), 30% two bedroom (2.1 p/unit), 5% three bedroom (3.0p/unit)
* Special Event area washrooms only per Windmill email 2016-02-08.
* Energy Ottawa maximum employees to work at Chaudiere Office provided by EO via letter dated March 1, 2016

		Max Day PF	Peak Hour PF
Estimated Total Residential Population	1844	2.5	5.5

Windmill
Zibi - Ontario
Block 211

Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

Phase	Block	Type	Unit Rate		No. of Units	Avg Day L/min	Max Day L/min	Peak Hour L/min
1A	208	Office	75	L/9.3m^2/d	975	5.5	8.2	14.8
1A	208	Retail	2.5	L/m^2/d	736	1.3	1.9	3.5
1	208	Restaurant	125	L/seat/d	8	0.7	1.0	1.9
1A	205A	Res	474.6	L/unit/d	71	23.4	114.7	173.2
1A	205A	Retail	2.5	L/m^2/d	754	1.3	2.0	3.5
2	207	Office	75	L/9.3m^2/d	5028	28.2	42.2	76.0
2	207	Retail	2.5	L/m^2/d	644	1.1	1.7	3.0
2	207	Restaurant	125	L/seat/d	300	26.0	39.1	70.3
3	211	Office	75	L/9.3m^2/d	5028	28.2	42.2	76.0
3	211	Retail	2.5	L/m^2/d	644	1.1	1.7	3.0
EO	1	Office	75	L/p/d	12	0.6	0.9	1.7
					Total	**117.4**	**255.6**	**426.9**

Notes:
* Development stats per Windmill schedule dated 2016-02-01 and additional information received via email 2016-02-08.
* Office unit rate per Ontario Building Code 8.2.1.3.B. Assuming 1 employee per 9.3m^2 of floor space.
* Residential Unit rate assuming 65% one bedroom (1.4p/unit), 30% two bedroom (2.1 p/unit), 5% three bedroom (3.0p/unit)
* Number of Residential units estimated as 850gfa / unit per Windmill development stats dated 2016-02-01.
* Windmill estimated maximum number of employees occupying Albert Island
* Energy Ottawa maximum employees to work at Chaudiere Office provided by EO via letter dated March 1, 2016

		Max Day PF	Peak Hour PF
Estimated Total Residential Population	128	4.9	7.4

Windmill
Zibi - Ontario
FUS Calculations - Block 211

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$F = 220C\sqrt{A}$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	16304.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	22472.9	L/min	
	22000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Combustible	0%
Fire Flow	**22000.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered - Supervised	-50%
Reduction	**-11000 L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC
N	Non-Combustible	>45m		0	0	0%
S	Non-Combustible	10.1m-20m	65	8	520	15%
E	Non-Combustible	10.1m-20m	34	1	34	13%
W	Non-Combustible	20.1m-30m	50	6	300	10%
		% Increase				**38%** *value not to exceed 75%*

Increase	**8360.0 L/min**

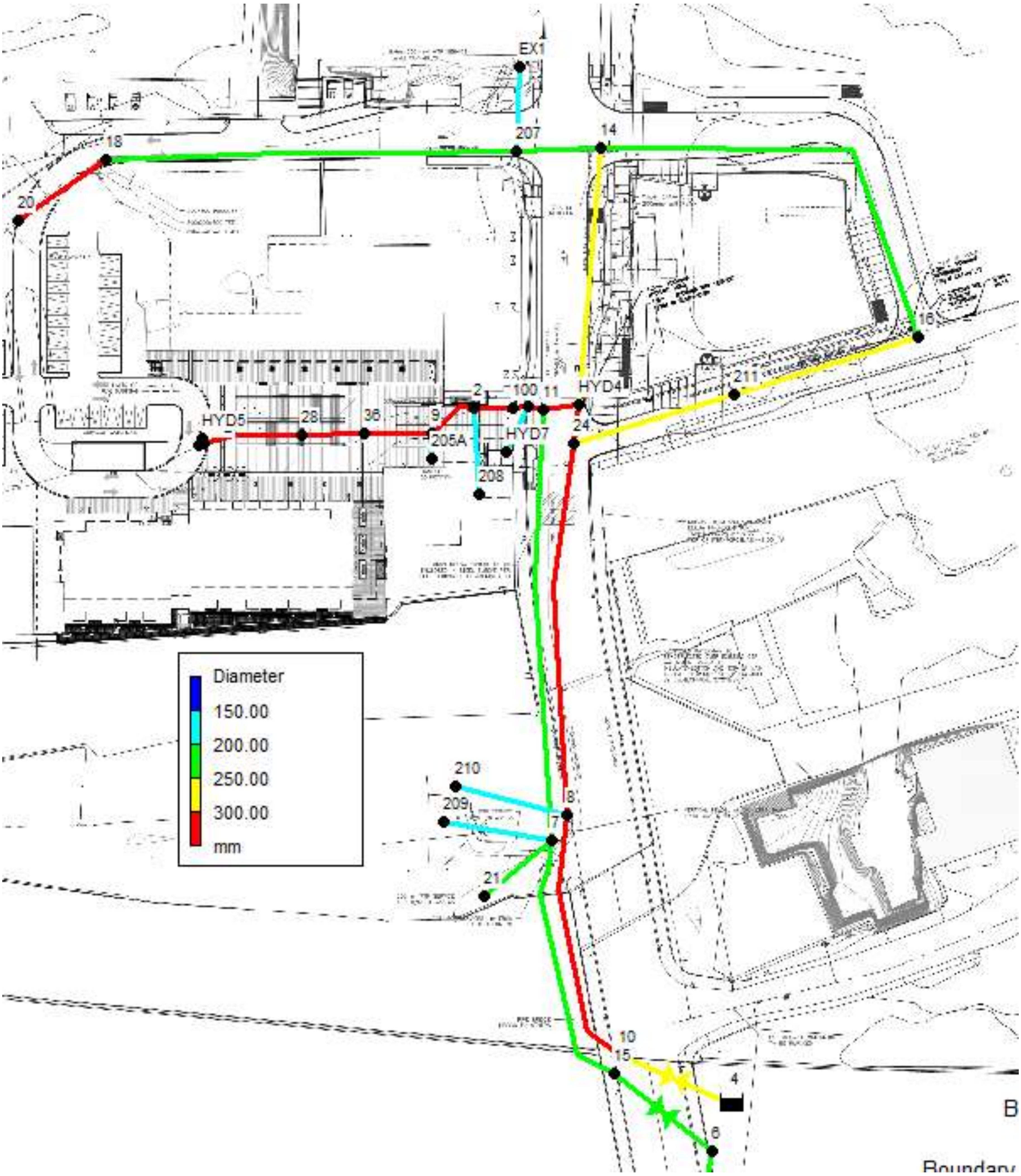
Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	19360.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	19000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by KPMB Architects
-Calculations based on Fire Underwriters Survey - Part II
- Number of stories for Block 213 estimated based on Master Plan

EPANET MODEL SCHEMATIC



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**********************************************************************
*                           E P A N E T                              *
*                   Hydraulic and Water Quality                      *
*                   Analysis for Pipe Networks                       *
*                         Version 2.0                                *
**********************************************************************
```

Input File: 2019-06-20_717_slm.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	5	6	270	200
2	15	7	130	200
3	10	8	130	300
4	7	209	15	150
5	7	11	190	200
6	8	24	98	300
7	HYD4	11	17	300
8	11	3	17	300
9	HYD7	3	3	150
10	100	3	39	300
11	HYD4	14	76	250
13	14	207	48.45	200
14	207	EX1	8.57	150
18	20	18	24.2	300
19	21	7	1.5	200
20	8	210	1.5	150
21	207	18	67.72	200
22	211	24	8.9	250
23	24	HYD4	4.2	300
26	205B	30	1.9	300
27	30	HYD5	0.65	150
28	30	28	27.55	300
29	28	36	16.4	300
31	36	9	17.8	300
32	9	2	42.7	300
33	2	100	9.5	300
39	9	205A	15	150
40	2	208	15	150
17	211	16	75	250
24	14	16	108	200
15	4	10	#N/A	250 Valve
16	6	15	#N/A	200 Valve

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality
HYD7	0.00	114.91	60.76	0.00
3	0.00	114.91	60.81	0.00
6	0.00	115.20	61.30	0.00
7	0.00	114.91	60.91	0.00
8	0.00	114.91	60.91	0.00
209	0.00	114.91	60.61	0.00
11	0.00	114.91	61.51	0.00
HYD4	0.00	114.91	61.51	0.00
100	0.00	114.91	60.56	0.00
14	0.00	114.91	63.60	0.00
207	55.30	114.91	61.52	0.00
EX1	0.60	114.91	63.51	0.00
18	0.00	114.91	60.76	0.00
20	0.00	114.91	60.54	0.00
21	0.00	114.91	60.91	0.00
210	0.00	114.91	60.61	0.00
211	29.30	114.91	61.72	0.00
24	0.00	114.91	61.51	0.00
28	0.00	114.91	60.15	0.00

205B	0.00	114.91	60.87	0.00	
30	0.00	114.91	60.87	0.00	
HYD5	0.00	114.91	60.54	0.00	
9	0.00	114.91	60.76	0.00	
2	0.00	114.91	60.56	0.00	
36	0.00	114.91	60.33	0.00	
205A	24.70	114.91	60.57	0.00	
208	7.40	114.91	61.07	0.00	
10	0.00	114.91	60.91	0.00	
15	0.00	114.91	60.64	0.00	
16	0.00	114.91	63.91	0.00	
4	-78.65	115.20	0.00	0.00	Reservoir
5	-38.66	115.20	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
1	38.66	0.02	0.01	Open
2	38.66	0.02	0.01	Open
3	78.65	0.02	0.00	Open
4	0.00	0.00	0.00	Open
5	38.66	0.02	0.01	Open
6	78.65	0.02	0.00	Open
7	-6.55	0.00	0.00	Open
8	32.11	0.01	0.00	Open
9	0.00	0.00	0.00	Open

Page 3
Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
10	-32.11	0.01	0.00	Open
11	41.43	0.01	0.00	Open
13	55.90	0.03	0.01	Open
14	0.60	0.00	0.00	Open
18	0.00	0.00	0.00	Open
19	0.00	0.00	0.00	Open
20	0.00	0.00	0.00	Open
21	0.00	0.00	0.00	Open
22	-43.77	0.01	0.00	Open
23	34.87	0.01	0.00	Open
26	0.00	0.00	0.00	Open
27	0.00	0.00	0.00	Open
28	0.00	0.00	0.00	Open
29	0.00	0.00	0.00	Open
31	0.00	0.00	0.00	Open
32	-24.71	0.01	0.00	Open
33	-32.11	0.01	0.00	Open
39	24.70	0.02	0.02	Open
40	7.40	0.01	0.00	Open
17	14.47	0.00	0.00	Open
24	-14.47	0.01	0.00	Open
15	78.65	0.03	0.29	Open Valve
16	38.66	0.02	0.29	Open Valve

```
**********************************************************************
*                           E P A N E T                              *
*                   Hydraulic and Water Quality                      *
*                   Analysis for Pipe Networks                       *
*                         Version 2.0                                *
**********************************************************************
```

Input File: 2019-06-20_717_slm.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	5	6	270	200
2	15	7	130	200
3	10	8	130	300
4	7	209	15	150
5	7	11	190	200
6	8	24	98	300
7	HYD4	11	17	300
8	11	3	17	300
9	HYD7	3	3	150
10	100	3	39	300
11	HYD4	14	76	250
13	14	207	48.45	200
14	207	EX1	8.57	150
18	20	18	24.2	300
19	21	7	1.5	200
20	8	210	1.5	150
21	207	18	67.72	200
22	211	24	8.9	250
23	24	HYD4	4.2	300
26	205B	30	1.9	300
27	30	HYD5	0.65	150
28	30	28	27.55	300
29	28	36	16.4	300
31	36	9	17.8	300
32	9	2	42.7	300
33	2	100	9.5	300
39	9	205A	15	150
40	2	208	15	150
17	211	16	75	250
24	14	16	108	200
15	4	10	#N/A	250 Valve
16	6	15	#N/A	200 Valve

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality
HYD7	0.00	79.91	25.76	0.00
3	0.00	79.91	25.81	0.00
6	0.00	88.69	34.79	0.00
7	0.00	83.44	29.44	0.00
8	0.00	85.45	31.45	0.00
209	0.00	83.44	29.14	0.00
11	0.00	79.91	26.51	0.00
HYD4	19000.00	79.84	26.44	0.00
100	0.00	79.91	25.56	0.00
14	0.00	79.91	28.60	0.00
207	83.00	79.91	26.52	0.00
EX1	0.90	79.91	28.51	0.00
18	0.00	79.91	25.76	0.00
20	0.00	79.91	25.54	0.00
21	0.00	83.44	29.44	0.00
210	0.00	85.45	31.15	0.00
211	43.90	80.37	27.18	0.00
24	0.00	80.40	27.00	0.00
28	0.00	79.91	25.15	0.00

205B	0.00	79.91	25.87	0.00	
30	0.00	79.91	25.87	0.00	
HYD5	0.00	79.91	25.54	0.00	
9	0.00	79.91	25.76	0.00	
2	0.00	79.91	25.56	0.00	
36	0.00	79.91	25.33	0.00	
205A	116.60	79.91	25.57	0.00	
208	11.20	79.91	26.07	0.00	
10	0.00	95.58	41.58	0.00	
15	0.00	86.48	32.21	0.00	
16	0.00	80.29	29.29	0.00	
4	-16219.40	103.00	0.00	0.00	Reservoir
5	-3036.20	107.00	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
1	3036.20	1.61	67.80	Open
2	3036.20	1.61	23.36	Open
3	16219.40	3.82	77.96	Open
4	0.00	0.00	0.00	Open
5	3036.20	1.61	18.57	Open
6	16219.40	3.82	51.57	Open
7	-2908.40	0.69	4.49	Open
8	127.80	0.03	0.01	Open
9	0.00	0.00	0.00	Open

Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
10	-127.80	0.03	0.01	Open
11	-1027.07	0.35	0.89	Open
13	83.90	0.04	0.03	Open
14	0.90	0.00	0.00	Open
18	0.00	0.00	0.00	Open
19	0.00	0.00	0.00	Open
20	0.00	0.00	0.00	Open
21	0.00	0.00	0.00	Open
22	-1154.87	0.39	2.59	Open
23	15064.53	3.55	132.81	Open
26	0.00	0.00	0.00	Open
27	0.00	0.00	0.00	Open
28	0.00	0.00	0.00	Open
29	0.00	0.00	0.00	Open
31	0.00	0.00	0.00	Open
32	-116.60	0.03	0.01	Open
33	-127.80	0.03	0.01	Open
39	116.60	0.11	0.29	Open
40	11.20	0.01	0.00	Open
17	1110.97	0.38	1.05	Open
24	-1110.97	0.59	3.60	Open
15	16219.40	5.51	7.42	Open Valve
16	3036.20	1.61	2.21	Open Valve

```
**********************************************************************
*                           E P A N E T                              *
*                   Hydraulic and Water Quality                      *
*                   Analysis for Pipe Networks                       *
*                         Version 2.0                                *
**********************************************************************
```

Input File: 2019-06-20_717_slm.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	5	6	270	200
2	15	7	130	200
3	10	8	130	300
4	7	209	15	150
5	7	11	190	200
6	8	24	98	300
7	HYD4	11	17	300
8	11	3	17	300
9	HYD7	3	3	150
10	100	3	39	300
11	HYD4	14	76	250
13	14	207	48.45	200
14	207	EX1	8.57	150
18	20	18	24.2	300
19	21	7	1.5	200
20	8	210	1.5	150
21	207	18	67.72	200
22	211	24	8.9	250
23	24	HYD4	4.2	300
26	205B	30	1.9	300
27	30	HYD5	0.65	150
28	30	28	27.55	300
29	28	36	16.4	300
31	36	9	17.8	300
32	9	2	42.7	300
33	2	100	9.5	300
39	9	205A	15	150
40	2	208	15	150
17	211	16	75	250
24	14	16	108	200
15	4	10	#N/A	250 Valve
16	6	15	#N/A	200 Valve

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality
HYD7	0.00	106.42	52.27	0.00
3	0.00	106.42	52.32	0.00
6	0.00	107.46	53.56	0.00
7	0.00	106.43	52.43	0.00
8	0.00	106.42	52.42	0.00
209	0.00	106.43	52.13	0.00
11	0.00	106.42	53.02	0.00
HYD4	0.00	106.42	53.02	0.00
100	0.00	106.42	52.07	0.00
14	0.00	106.42	55.11	0.00
207	149.40	106.42	53.03	0.00
EX1	1.70	106.42	55.02	0.00
18	0.00	106.42	52.27	0.00
20	0.00	106.42	52.05	0.00
21	0.00	106.43	52.43	0.00
210	0.00	106.42	52.12	0.00
211	79.00	106.42	53.23	0.00
24	0.00	106.42	53.02	0.00
28	0.00	106.42	51.66	0.00

205B	0.00	106.42	52.38	0.00	
30	0.00	106.42	52.38	0.00	
HYD5	0.00	106.42	52.05	0.00	
9	0.00	106.42	52.27	0.00	
2	0.00	106.42	52.07	0.00	
36	0.00	106.42	51.84	0.00	
205A	176.70	106.41	52.07	0.00	
208	20.10	106.42	52.58	0.00	
10	0.00	106.43	52.43	0.00	
15	0.00	106.44	52.17	0.00	
16	0.00	106.42	55.42	0.00	
4	-289.78	107.50	0.00	0.00	Reservoir
5	-137.13	107.50	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
1	137.13	0.07	0.16	Open
2	137.13	0.07	0.07	Open
3	289.78	0.07	0.04	Open
4	0.00	0.00	0.00	Open
5	137.13	0.07	0.06	Open
6	289.77	0.07	0.03	Open
7	59.67	0.01	0.00	Open
8	196.80	0.05	0.03	Open
9	0.00	0.00	0.00	Open

Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
10	-196.80	0.05	0.02	Open
11	111.39	0.04	0.01	Open
13	151.10	0.08	0.08	Open
14	1.70	0.00	0.00	Open
18	0.00	0.00	0.00	Open
19	0.00	0.00	0.00	Open
20	0.00	0.00	0.00	Open
21	0.00	0.00	0.00	Open
22	-118.72	0.04	0.03	Open
23	171.06	0.04	0.02	Open
26	0.00	0.00	0.00	Open
27	0.00	0.00	0.00	Open
28	0.00	0.00	0.00	Open
29	0.00	0.00	0.00	Open
31	0.00	0.00	0.00	Open
32	-176.70	0.04	0.01	Open
33	-196.80	0.05	0.02	Open
39	176.70	0.17	0.64	Open
40	20.10	0.02	0.01	Open
17	39.72	0.01	0.00	Open
24	-39.72	0.02	0.01	Open
15	289.78	0.10	1.07	Open Valve
16	137.13	0.07	1.02	Open Valve

APPENDIX C

Wastewater Collection

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2012

Site Area	1.234 **ha**		**Peak Flow**
		Extraneous Flow Allowances	0.4

Phase	Block	Type	Unit Rate		No. of Units	Average Flow (L/s)	Peaking Factor (-)	Peak Flow (L/s)
1	208	Office	75	L/p/d	105	0.1	1.5	0.1
1	208	Retail	5	$L/m^2/d$	736	0.1	1.5	0.1
1	205A	Res	474.6	L/unit/d	71	0.4	3.6	1.4
1	205A	Retail	5	$L/m^2/d$	754	0.1	1.5	0.1
2	207	Office	75	L/p/d	544	0.5	1.5	0.7
2	207	Retail	5	$L/m^2/d$	644	0.1	1.5	0.1
2	207	Restaurant	125	L/seat/d	300	0.4	1.5	0.7
3	211	Office	75	$L/9.3m^2/d$	5028	0.5	2.5	1.2
3	211	Retail	2.5	$L/m^2/d$	644	0.0	3.5	0.1
1	EX1	Office	75	L/p/d	12	0.01	1.50	0.02
					Total	**2.1**		**4.5**
					Total Wetweather Flow Estimate			**4.9**

Notes:

* Development stats per Windmill schedule dated 2016-02-01 and additional information received via email 2016-02-08.
* Office unit rate per Ontario Building Code 8.2.1.3.B. assuming $9.3m^2/p$
* Residential Unit rate assuming 70% one bedroom (1.4p/unit), 30% two bedroom (2.1 p/unit)
* Retail unit rate per City of Ottawa sewer design guidelines and assumes a 12 hour commercial operation

		P.F.
Estimated Total Residential Population	128	3.6

SANITARY SEWER CALCULATION SHEET

Ottawa

Manning's n=0.013

LOCATION			AREA AND POPULATION							COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW* (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
Chaudiere West																											
Block 208			3.00			3.00					0.00		0.00		0.00	0.8	3.00	3.00	0.99	1.79							
Block 205a					121		121	3.6	1.40		0.00		0.00		0.00	0.3	0.00			1.70							
Block 207											0.00		0.00		0.00	1.1	0.00			1.10							
Block 206					337		337	3.4	3.76		0.00		0.00		0.00	1.1	0.00			4.86							
Block 204a											0.00		0.00		0.00	3.0	0.00			3.00							
Block 205b					114		114	3.6	1.32		0.00		0.00		0.00	0.4	0.00			1.72							
Block 204b					196		196	3.5	2.24		0.00		0.00		0.00	0.8	0.00			3.04							
Block 201					289		289	3.5	3.25		0.00		0.00		0.00	0.5	0.00			3.75							
Block 202					153		153	3.6	1.76		0.00		0.00		0.00	0.3	0.00			2.06							
Block 203					306		306	3.5	3.43		0.00		0.00		0.00	0.9	0.00			4.33							
Block 209											0.00		0.00		0.00	2.8	0.00			2.80							
Block 210											0.00		0.00		0.00	1.4	0.00			1.40							
Total to Zaida Eddy Private						3.00	1516									13.4	3.00										
Zaida Eddy Private																											
	102	101				3.00	1516	3.1	15.43		0.00		0.00		0.00	13.4	0.00	3.00	0.99	29.82	18.3	250	0.38	36.66	0.81	0.75	0.83
Block 213			0.28		340	3.28	1856	3.1	18.58		0.00		0.00		0.00	0.4	0.28	3.28									
Block 211	101	100	0.47			3.75	1856	3.1	18.58		0.00		0.00		0.00	17.5	0.47	3.75	1.24	37.32	14.8	250	0.60	46.06	0.81	0.94	1.04
	100	401A				3.75	1856	3.1	18.58		0.00		0.00		0.00	17.5	0.00	3.75	1.24	37.32	75.9	300	0.23	46.38	0.80	0.66	0.73
Block 212			0.55			4.30	1856				0.00		0.00		0.00	5.2	0.55	4.30									
Block 214						4.30	1856				0.00		0.00		0.00	1.7	0.00	4.30		0.00							
Block 215						4.30	1856				0.00		0.00		0.00	1.7	0.00	4.30		0.00							
	401A	402A				4.30	1856	3.1	18.58		0.00		0.00		0.00	26.1	0.00	4.30	1.42	46.10	61.5	300	0.44	64.14	0.72	0.91	0.99
	402A	SAN PS				4.30	1856	3.1	18.58		0.00		0.00		0.00	26.1	0.00	4.30	1.42	46.10	5.8	300	0.35	57.21	0.81	0.81	0.90

* Constant Inflow used for Office/Retail/Restaurant Space, refer to Sanitary Design Sheet prepared for the Master Servicing Study (DSEL Project# 14-717) dated June 2018

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha					
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph				
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =		0.330	L/s/ha	
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =		0.600	m/s	
Max Res. Peak Factor =	4.00				Manning's n =	(Conc)	0.013	(Pvc)	0.013
Commercial/Inst./Park Peak Factor =	1.50				Townhouse coeff=		2.7		
Institutional =	0.32	l/s/Ha			Single house coeff=		3.4		

Designed:	PROJECT:		
Checked:	LOCATION: City of Ottawa		
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No.	File Ref:	Date: 24 Jun 2019	Sheet No 1 of 1

APPENDIX D

Stormwater Management

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Arterial Roads Return Frequency = 10 years

Manning 0.013

AREA (Ha)

Location	From Node (LOCATION)	To Node (LOCATION)	2 YEAR AREA (Ha)	2 YEAR R	2 YEAR Indiv. 2.78 AC	2 YEAR Accum. 2.78 AC	5 YEAR AREA (Ha)	5 YEAR R	5 YEAR Indiv. 2.78 AC	5 YEAR Accum. 2.78 AC	10 YEAR AREA (Ha)	10 YEAR R	10 YEAR Indiv. 2.78 AC	10 YEAR Accum. 2.78 AC	100 YEAR AREA (Ha)	100 YEAR R	100 YEAR Indiv. 2.78 AC	100 YEAR Accum. 2.78 AC
Chaudiere East Private																		
	402	403			0.00	0.00	0.06	0.90	0.15	0.15			0.00	0.00			0.00	0.00
To Zaida Eddy Private - 03, Pipe 403 - 404						0.00				0.15				0.00				0.00
Zaida Eddy Private																		
	401	403			0.00	0.00	0.32	0.90	0.80	0.80			0.00	0.00			0.00	0.00
Contribution From Chaudiere East Private, Pipe 402 - 403						0.00				0.15				0.00				0.00
	403	404			0.00	0.00	0.22	0.90	0.55	1.50			0.00	0.00			0.00	0.00
	404	HW 2			0.00	0.00			0.00	1.50			0.00	0.00			0.00	0.00

FLOW / **SEWER DATA**

Location	From Node	To Node	Time of Conc. (min)	Intensity 2 Year (mm/h)	Intensity 5 Year (mm/h)	Intensity 10 Year (mm/h)	Intensity 100 Year (mm/h)	Peak Flow Q (l/s)	DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min)	RATIO Q/Q full
Chaudiere East Private																	
	402	403	10.00	76.81	104.19	122.14	178.56	16	300	300	PVC	1.18	41.6	105.0439	1.4861	0.4660	0.149
To Zaida Eddy Private - 03, Pipe 403 - 404			10.47														
Zaida Eddy Private																	
	401	403	10.00	76.81	104.19	122.14	178.56	83	375	300	PVC	2.00	47.0	247.9543	2.2450	0.3486	0.336
Contribution From Chaudiere East Private, Pipe 402 - 403			10.47														
	403	404	10.47	75.06	101.79	119.32	174.41	153	450	450	CONC	0.45	93.6	191.2550	1.2025	1.2966	0.799
	404	HW 2	11.76	70.64	95.72	112.17	163.91	144	450	450	CONC	0.42	29.4	184.7699	1.1618	0.4211	0.778

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: SLM	PROJECT: **Zibi Ontario - Block 211**		
Checked: ADF	LOCATION: **City of Ottawa**		
Dwg. Reference: SWM-1	File Ref: 19-1093	Date: 24 Jun 2019	Sheet No. SHEET 1 OF 1

Detailed Stormceptor Sizing Report – Zibi Ontario Block 211

Project Information & Location			
Project Name	Zibi Ontario Block 211	**Project Number**	-
City	Ottawa	**State/ Province**	Ontario
Country	Canada	**Date**	6/20/2019
Designer Information		**EOR Information (optional)**	
Name	Brandon O'Leary	**Name**	Steve Merrick
Company	Forterra	**Company**	David Schaeffer Engineering Ltd.
Phone #	905-630-0359	**Phone #**	613-222-7816
Email	brandon.oleary@forterrabp.com	**Email**	smerrick@dsel.ca

Stormwater Treatment Recommendation

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

Site Name	Zibi Ontario Block 211
Recommended Stormceptor Model	EFO6
TSS Removal (%) Provided	81
Particle Size Distribution (PSD)	Fine Distribution
Rainfall Station	OTTAWA MACDONALD-CARTIER INT'L A

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

EFO Sizing Summary

EFO Model	% TSS Removal Provided	% Runoff Volume Captured Provided	Standard EFO Hydrocarbon Storage Capacity
EFO4	71	86	265 L (70 gal)
EFO6	81	95	610 L (160 gal)
EFO8	85	99	1070 L (280 gal)
EFO10	89	100	1670 L (440 gal)
EFO12	90	100	2475 L (655 gal)
Parallel Units / MAX	Custom	Custom	Custom

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

OVERVIEW

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

Design Methodology

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

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

Hydrology Analysis

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

Rainfall Station

State/Province	Ontario	**Total Number of Rainfall Events**	4093
Rainfall Station Name	OTTAWA MACDONALD-CARTIER INT'L A	**Total Rainfall (mm)**	20978.1
Station ID #	6000	**Average Annual Rainfall (mm)**	567.0
Coordinates	45°19'N, 75°40'W	**Total Evaporation (mm)**	1972.4
Elevation (ft)	370	**Total Infiltration (mm)**	0.0
Years of Rainfall Data	37	**Total Rainfall that is Runoff (mm)**	19005.7

Notes

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

ONLINE APPLICATION

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

FLOW ENTRANCE OPTIONS

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

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

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

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

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

Drainage Area	
Total Area (ha)	0.60
Imperviousness %	100

Up Stream Storage	
Storage (ha-m)	**Discharge (cms)**
0.000	0.000

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

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

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

Particle Size Distribution (PSD)

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

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

Site Name	Zibi Ontario Block 211

Site Details

Drainage Area	
Total Area (ha)	0.60
Imperviousness %	100
Oil Spill Capture Volume (L)	

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

Surface Characteristics	
Width (m)	155.00
Slope %	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Evaporation	
Daily Evaporation Rate (mm/day)	2.54

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

Maintenance Frequency	
Maintenance Frequency (months) >	12

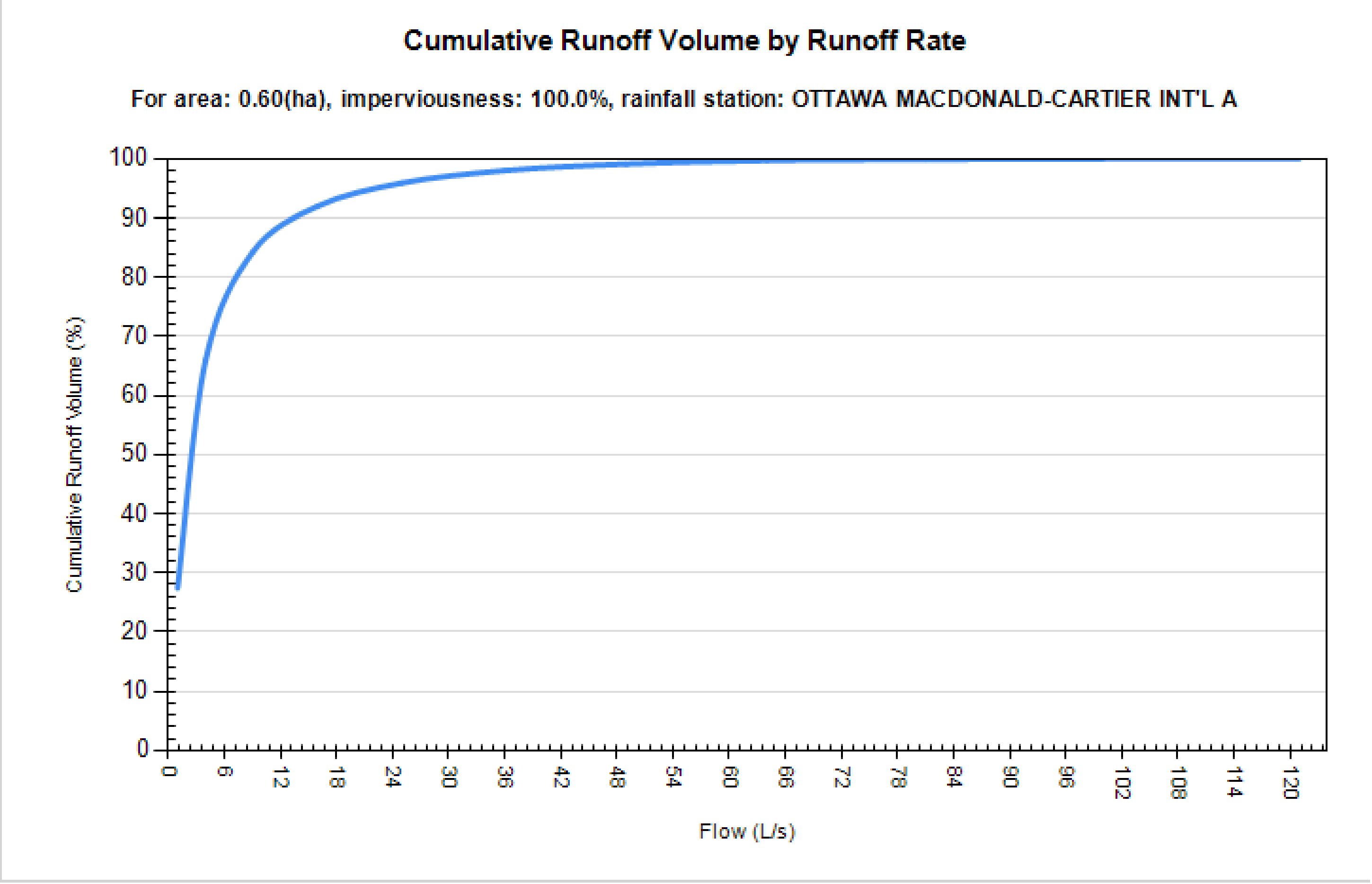
Winter Months	
Winter Infiltration	0

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

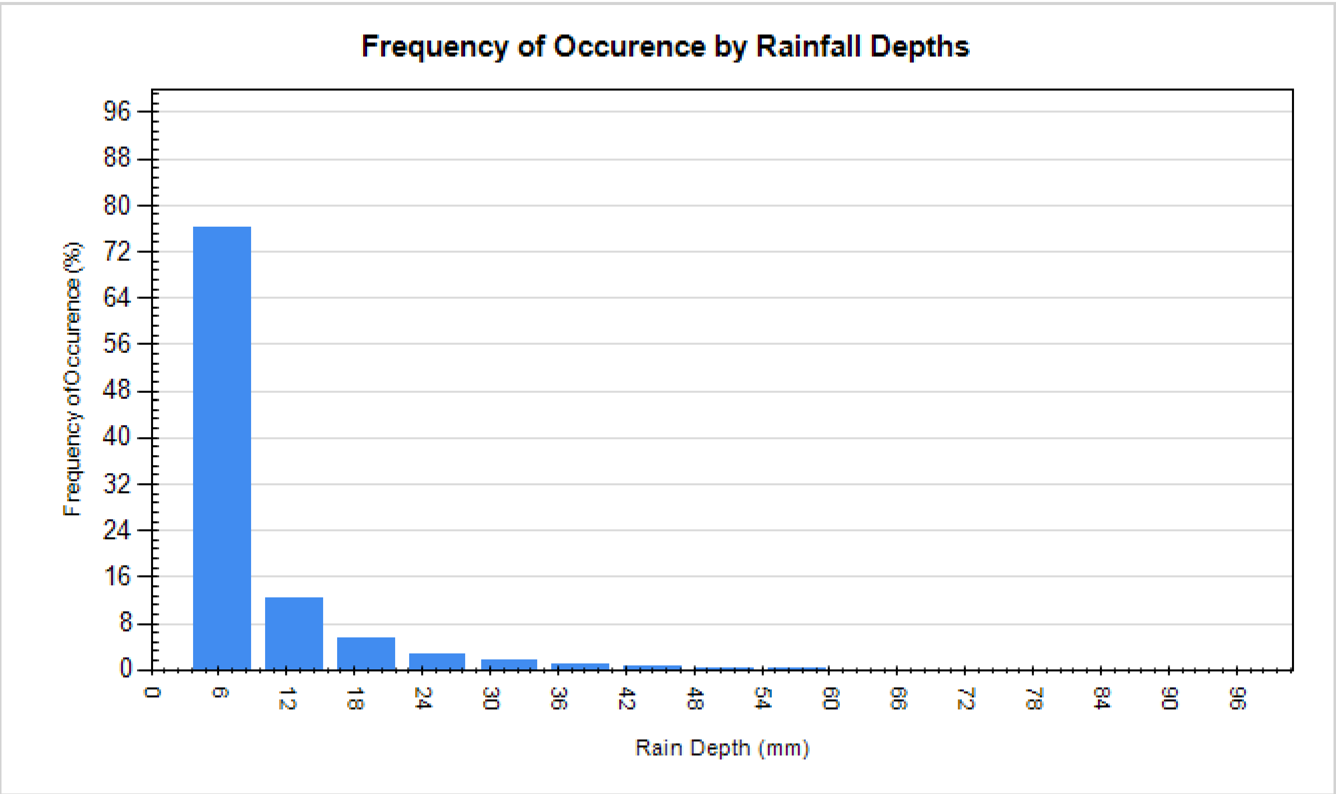
Buildup/Wash-off Parameters	
Target Event Mean Conc. (EMC) mg/L	125
Exponential Buildup Power	0.40
Exponential Washoff Exponent	0.20

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

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (L/s)	Runoff Volume (m³)	Volume Over (m³)	Cumulative Runoff Volume (%)
1	31444	83273	27.4
4	75717	39000	66.0
9	96617	18104	84.2
16	105522	9190	92.0
25	110047	4665	95.9
36	112409	2302	98.0
49	113663	1048	99.1
64	114364	347	99.7
81	114590	121	99.9
100	114676	35	100.0
121	114708	3	100.0



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



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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS

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

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

1.2.2 For ALL projects, the following reference standards apply:

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

1.3 SHOP DRAWINGS

1.3.1 Shop drawings shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail the precast concrete components and OGS internal components prior to shipment, including the sequence for installation.

1.3.2 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record. Any and all changes to project cost estimates, bonding amounts, plan check fees for revision of approved documents, or design impacts due to regulatory requirements as a result of a product substitution shall be coordinated by the Contractor with the Engineer of Record.

1.4 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

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

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

PART 2 – PRODUCTS

2.1 GENERAL

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

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

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

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

2.2 PRECAST CONCRETE SECTIONS

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

2.3 GASKETS

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

2.4 JOINTS

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

2.5 FRAMES AND COVERS

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

2.6 PRECAST CONCRETE

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

2.7 FIBERGLASS

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

2.8 <u>OGS POLLUTANT STORAGE</u>

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

2.9 <u>LADDERS</u>

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

2.10 <u>INSPECTION</u>

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

PART 3 – PERFORMANCE & DESIGN

3.1 <u>GENERAL</u>

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 <u>HYDROLOGY AND RUNOFF VOLUME</u>

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

3.3 <u>ANNUAL (TSS) SEDIMIMENT LOAD AND STORAGE CAPACITY</u>

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

Annual sediment volume calculations shall be performed using the projected average annual treated runoff volume, a typical sediment bulk density of 1602 kg/m^3 (100 lbs/ft^3) and an assumed Event Mean

Concentration (EMC) of 125 mg/L TSS in the runoff, or as otherwise determined by the Engineer of Record.

Example calculation for a 1.3-hectares parking lot site:

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

Annual Runoff Volume:

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

Annual Sediment Mass and Sediment Volume Load Calculation:

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

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

Table 1 – Annual Mass Sediment Loading by Land Use

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

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

3.4 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in Table 2, Section 3.5, and based on third-party performance testing conducted in accordance with the Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** Sizing shall be determined using historical rainfall data (as specified in Section 3.2) and a sediment removal performance curve derived from the actual third-party verified laboratory testing data. The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 3.3.

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

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

- Canadian ETV or ISO 14034 ETV Verification Statement which verifies third-party performance testing conducted in accordance with the **Procedure for Laboratory Testing of Oil-Grit Separators,** including the Light Liquid Re-entrainment Simulation Testing.
- Equal or better sediment (TSS) removal of the PSD specified in Table 2 at equivalent surface loading rates, as compared to the OGS device specified herein.
- Equal or better Light Liquid Re-entrainment Simulation Test results (using low-density polyethylene beads as a surrogate for light liquids such as oil and fuel) at equivalent

surface loading rates, as compared to the OGS device specified herein. However, an alternative OGS device shall not be allowed as a substitute if the Light Liquid Re-entrainment Simulation Test was performed with screening components within the OGS device that are effective at retaining the low-density polyethylene beads, but would not be expected to retain light liquids such as oil and fuel.

- Equal or greater sediment storage capacity, as compared to the OGS device specified herein.
- Supporting documentation shall be signed and sealed by a local registered Professional Engineer. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

3.5 PARTICLE SIZE DISTRIBUTION (PSD) FOR SIZING

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

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

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

3.6 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

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

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

3.7 DESIGN ACCOUNTING FOR BYPASS

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

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

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

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

3.8 <u>LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING</u>

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

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

3.9 <u>PETROLEUM HYDROCARBONS AND FLOATABLES STORAGE CAPACITY</u>

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

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

3.10 <u>SURFACE LOADING RATE SCALING OF DIFFERENT MODEL SIZES</u>

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

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

PART 4 – INSPECTION & MAINTENANCE

The OGS manufacturer shall provide an Owner's Manual upon request.

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

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

4.3 Inspection and pollutant removal from below the OGS's insert shall be conducted as a periodic maintenance practice using a standard maintenance truck and vacuum apparatus, and shall be easily conducted from finished grade through a Frame and Cover of at least 22-inches (560 mm) in diameter, and through an access opening to the OGS device's sump with a minimum 16-inches diameter (406 mm).

4.4 No confined space for sediment removal or inspection of internal components shall be required for normal operation, annual inspection or maintenance activity.

PART 5 – EXECUTION

5.1 <u>PRECAST CONCRETE INSTALLATION</u>

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

5.2 <u>EXCAVATION</u>

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

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

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

5.3 BACKFILLING

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

5.4 OGS WATER QUALITY DEVICE CONSTRUCTION SEQUENCE

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

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

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

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

5.5 DROP PIPE AND OIL INSPECTION PIPE

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

5.6 INLET AND OUTLET PIPES

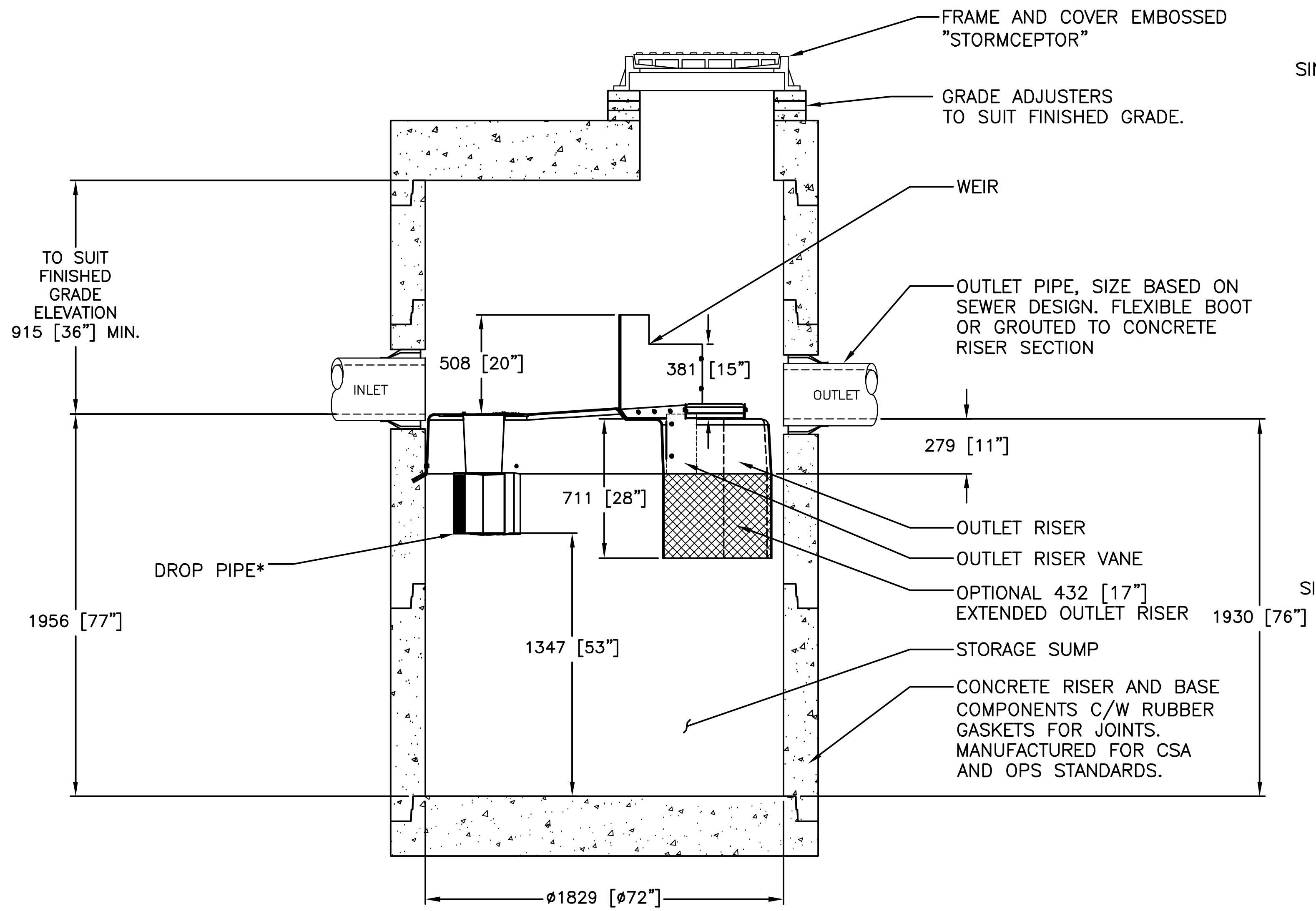
Inlet and outlet pipes shall be securely set using grout or approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight. Non-secure inlets and outlets will result in improper performance.

5.7 FRAME AND COVER OR FRAME AND GRATE INSTALLATION

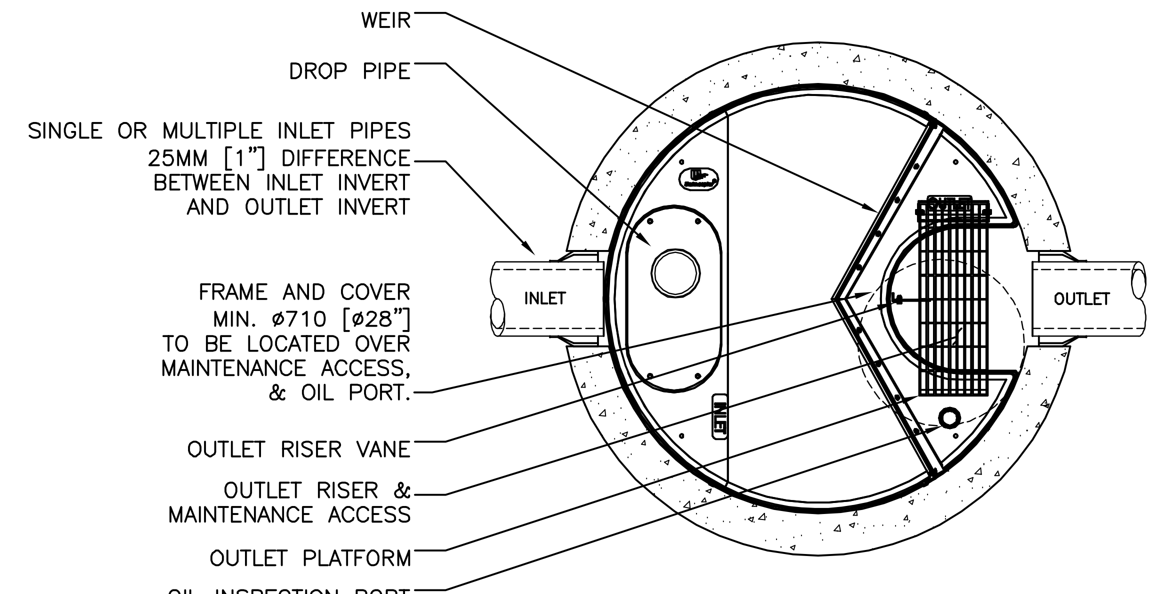
Precast concrete adjustment units shall be installed to set the frame and cover/grate at the required elevation. The adjustment units shall be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover/grate should be set in a full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

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

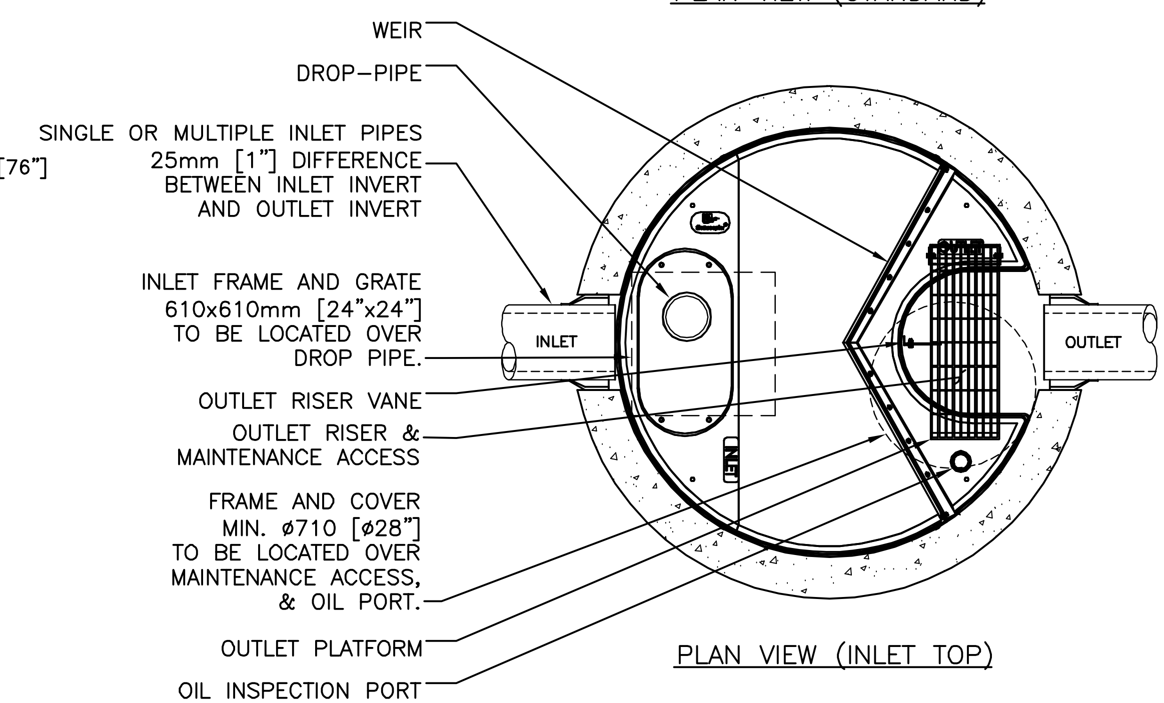
DRAWING NOT TO BE USED FOR CONSTRUCTION



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

GENERAL NOTES:

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

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

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

INSTALLATION NOTES

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

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

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

* PER ENGINEER OF RECORD

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

Stormceptor® EF

SCALE = NTS

imbrium

7037 RIDGE ROAD, SUITE 350, HANOVER, MD 21076
USA 888-279-8826 CA 800-565-4801 INTL +1-416-960-9900

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

I:\IMBRIUM\PRODUCTS\STORMCEPTOR EF\40 DRAWINGS & DETAILS\STANDARD DETAILS\EFO STANDARD DETAILS\EFO6-DETAIL.DWG 10/18/2018 9:53 AM

DRAWINGS / FIGURES

PROPERTY LINE

PROPOSED BUILDING

PARK/PUBLIC SPACE

WATER

OTTAWA

Block	Phase	Block Area (acres)	Block GFA (ft^2)	Number of Units	Average Unit Size (ft^2)
Block 201	5	0.38	134,000	170	661
Block 202	5	0.38	73,800	90	678
Block 203	5	0.53	155,500	180	760
Block 204A	1A	0.38	125,000	0	0
Block 204B	4	0.35	125,000	115	813
Block 205A	1A	0.59	87,729	71	959
Block 205B	4	0.45	87,000	67	1,008
Block 206	1B	0.61	196,715	198	756
Block 207	1B	0.28	45,930	0	0
Block 208	1A	0.28	34,245	0	0
Block 209	3	0.53	115,000	0	0
Block 210A	3	1.13	9,500	0	0
Block 210B	3	0.24	49,500	0	0
Block 211	2	1.50	100,000	0	0
Block 212	2/6	0.95	215,000	0	0
Block 213	7	0.33	142,500	200	623
Block 214	8	-	-	-	-
Block 215	8	-	-	-	-
Block 301	1A	2.00	0	0	0

GATINEAU

Block	Phase	Block Area (acres)	Block GFA (ft^2)	Number of Units	Average Unit Size (ft^2)
Block 1	6	0.49	148,000	145	801
Block 2-3	1	0.78	46,929	0	0
Block 4	6	0.84	101,000	101	881
PWGSC	1		78,975	0	0
Block 5	2	0.20	11,000	0	0
Block 6	2	0.18	7,300	0	0
Block 7	3	1.06	116,000	100	792
Block 8	1	0.73	135,000	135	889
Block 9	2	0.11	15,000	15	900
Block 10	2	0.33	104,000	104	1,000
Block 11	1	0.74	74,645	82	779
Block 12	1	0.26	15,000	15	1,000
Block 13	1	0.74	73,698	70	810
Block 14	4	0.56	143,700	0	0
Block 15	4	0.64	108,800	128	813
Block 16	5	0.36	68,000	0	0
Block 17	5	0.60	171,000	0	0
Block 18	5	0.59	208,000	230	814
Block 19	4	0.30	69,800	75	816
Block 20	4	0.65	71,300	79	792
Block 21	5	0.25	59,000	73	727
Block 22	5	0.54	56,000	69	730
Block 23	5	0.41	113,000	140	726
Block 24	2	0.85	115,000	0	0
Block 25	2	0.81	87,538	0	0
Block 26	6	1.39	58,000	65	803

NOTES

FOTENN
PLANNING+DESIGN

ZIBI MASTER PLAN, OTTAWA
WINDMILL DEVELOPMENTS

SITE PLAN

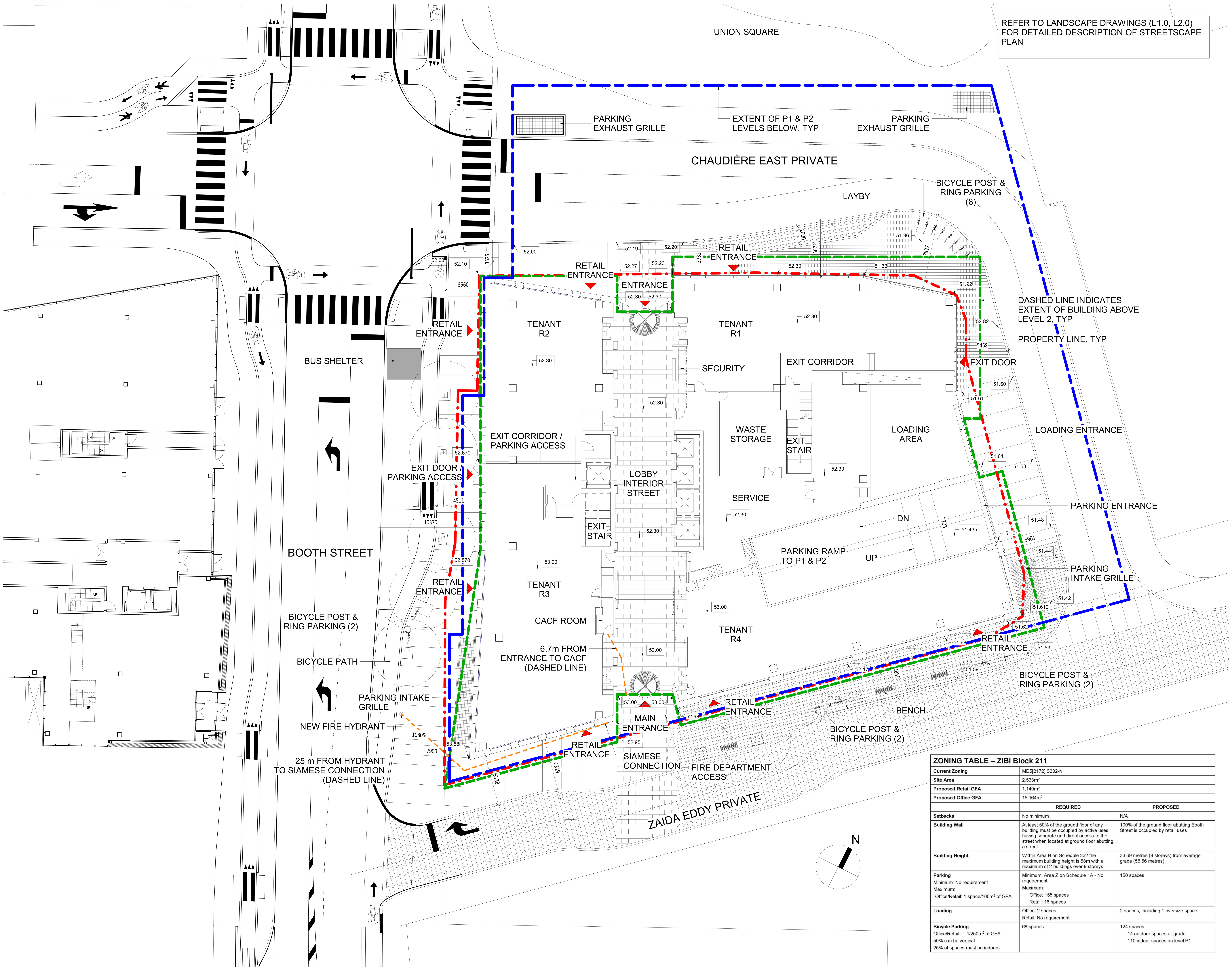
zibi
Windmill | dream

CREATED BY: MB

REVIEWED BY: PB

DATE: 13/12/2016

REVISION NO. 01



ZONING TABLE – ZIBI Block 211

Current Zoning	MD5[2172] S332-h	
Site Area	2,533m^2	
Proposed Retail GFA	1,140m^2	
Proposed Office GFA	15,164m^2	
	REQUIRED	**PROPOSED**
Setbacks	No minimum	N/A
Building Wall	At least 50% of the ground floor of any building must be occupied by active uses having separate and direct access to the street when located at ground floor abutting a street	100% of the ground floor abutting Booth Street is occupied by retail uses
Building Height	Within Area B on Schedule 332 the maximum building height is 68m with a maximum of 2 buildings over 9 storeys	33.69 metres (8 storeys) from average grade (56.56 metres)
Parking Minimum: No requirement Maximum: Office/Retail: 1 space/100m^2 of GFA	Minimum: Area Z on Schedule 1A - No requirement Maximum: Office: 155 spaces Retail: 16 spaces	150 spaces
Loading	Office: 2 spaces Retail: No requirement	2 spaces, including 1 oversize space
Bicycle Parking Office/Retail: 1/250m^2 of GFA 50% can be vertical 25% of spaces must be indoors	68 spaces	124 spaces 14 outdoor spaces at-grade 110 indoor spaces on level P1

PLOT DATE: 2019-06-26 10:16:41 AM

PROJECT

ZIBI

dream theia

CLIENT

KEY PLAN

NO.	ISSUED	DATE
1	SITE PLAN CONTROL APPLICATION	07 JUN 2019

REVISIONS

DRAWING STATUS

Discrepancies must be reported immediately to the Architect before proceeding. Only figured dimensons are to be used. Contractors must check all dimensions on site. This drawing is protected by copyright.

ALL DIMENSIONS ARE SHOWN IN METRIC.

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STAMP

ONTARIO ASSOCIATION OF ARCHITECTS
BRUCE KUWABARA
LICENCE
3860

DRAWING TITLE

SITE PLAN

DRAWN	CHECKED
Author	Checker
SCALE @ A0 1 : 125	DATE 06/07/19

GRAPHIC SCALE

PROJECT NO. *ZIBI BLOCK 211*

DRAWING NO. **A003**

REVISION NO.