MORRISON HERSHFIELD

Site Servicing and Stormwater Management Design Brief

301 Palladium Drive

Ottawa, Ontario

Presented to:

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1 Introduction

1.1 Scope

Morrison Hershfield was retained by KWC Architects to prepare a revise to the previously approved site plan application **D07-12-15-0147**. The concept for the building has changed slightly, the main proposed use is now a dental practice. The report will rely on previously submitted Geotechnical report and all findings in the previously approved Servicing report. It is understood that at the time of the previous SPA there were no outstanding technical engineering comments. This repot will need to be read in conjunction with the previously approved Site Servicing report Rev 3, D07-12-15-0147, Erion Associates, November 2016, **Refer to Appendix E** for previously approved SPA.

1.2 Site Description and Proposed Development

This report describes the site servicing and stormwater management design and calculations pertaining to the development at 301 Palladium Drive.

The development at 301 Palladium Drive consists of approximately 853 m^2 of commercial space with a new parking lot and landscape features including trees, masonry walls. The site will transition from a vacant lot within the Kanata Business Park area to commercial development.

The existing site currently serves the predevelopment to 301 Palladium Dr, which contains a private road to the site entrance, existing sidewalk and barrier curb at the property's extents and existing grass/vegetation surrounding the site. An existing concrete retaining wall and riverstone, along with an asphalt pedestrian path exists at the north end of the development which will remain during construction..

Existing infrastructure in the vicinity of the site is described in **Section 1.5** below.

Design drawings for proposed site servicing, grading, and erosion control are provided in **Appendix A**.

The format of this report matches that of the development servicing study checklist found in Section 4 of the City of Ottawa's Servicing Study Guidelines for Development Applications. A completed copy of the checklist is provided in **Appendix H**.

1.2.1 Statement of Objectives and Servicing Criteria

The objective of this design brief is to demonstrate that the proposed design meets the servicing requirements for the proposed development, while adhering to the appropriate regulatory requirements.

1.2.2 Location Map and Plan

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

The proposed development at 301 Palladium Drive is located within Ward 23, represented by Councillor Allan Hubley.

Figure 1 - Key Plan

1.3 Background Documents

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

Documents reviewed in preparing this servicing brief include:

- Topographic Survey V18200, Fairhall Moffatt & Woodland, June 22, 2015
- 301 Palladium Dr Functional Servicing and Stormwater Management Report Rev 3, D07-12-15-0147, Erion Associates, November 2016
- Ottawa Sewer Design Guidelines, City of Ottawa, SDG002, October 2012. (City Standards)
- Technical Bulletin ISTB-2018-01 City of Ottawa, March 21, 2018. (ISTB-2018-01)
- Technical Bulletin ISTB-2018-03 City of Ottawa, June 27, 2018. (ISTB-2018-03)

- Ottawa Design Guidelines – Water Distribution City of Ottawa, July 2010. (Water Supply Guidelines)
- Technical Bulletin ISD-2010-2 City of Ottawa, December 15, 2010. (ISD-2010-2)
- Technical Bulletin ISDTB-2014-02 City of Ottawa, May 27, 2014. (ISDTB-2014-02)
- Technical Bulletin ISDTB-2018-02 City of Ottawa, March 21, 2018. (ISDTB-2018-02)
- NFPA 13 – Standard for the Installation of Sprinkler Systems National Fire Protection Association, 2016. (NFPA Standards)
- Geotechnical Investigation DST Consulting Engineers, IN-SO-021872 , October 2015. (Geotechnical Report)
- Geotechnical Investigation DST Consulting Engineers, IN-SO-021872 , March 17, 2016. (Geotechnical Report)

1.4 Consultation and Permits

1.4.1 Pre-Consultation meeting

A pre-consultation meeting with the City of Ottawa took place virtually in November 23 ,2021, to discuss requirements for this revision for the previous SPA. Refer to **Appendix F** for **Pre-Consultation Follow-up meeting notes.**

1.4.2 Adherence to Zoning and Related Requirements

The site is currently zoned IL5 – Light Industrial Zone.

1.5 Available Existing Infrastructure

Sewer and watermain mapping collected from the City of Ottawa, and related documentation pertaining to the development of 301 Palladium Drive, indicate that the following infrastructure exists in and surrounding the subject site.

Palladium Drive

- 375mm diameter concrete storm sewer
- 250mm diameter PVC sanitary sewer
- 300mm diameter DI watermain

Private Access Road (South)

- 300mm diameter concrete storm sewer
- 525mm diameter concrete storm sewer
- 400mm diameter concrete storm sewer
- 200mm diameter PVC sanitary sewer
- 200mm diameter unknown watermain

Private Access Road (East)

- 375mm diameter private unknown storm sewer
- 200mm diameter private unknown sanitary sewer
- 200mm diameter UCI watermain

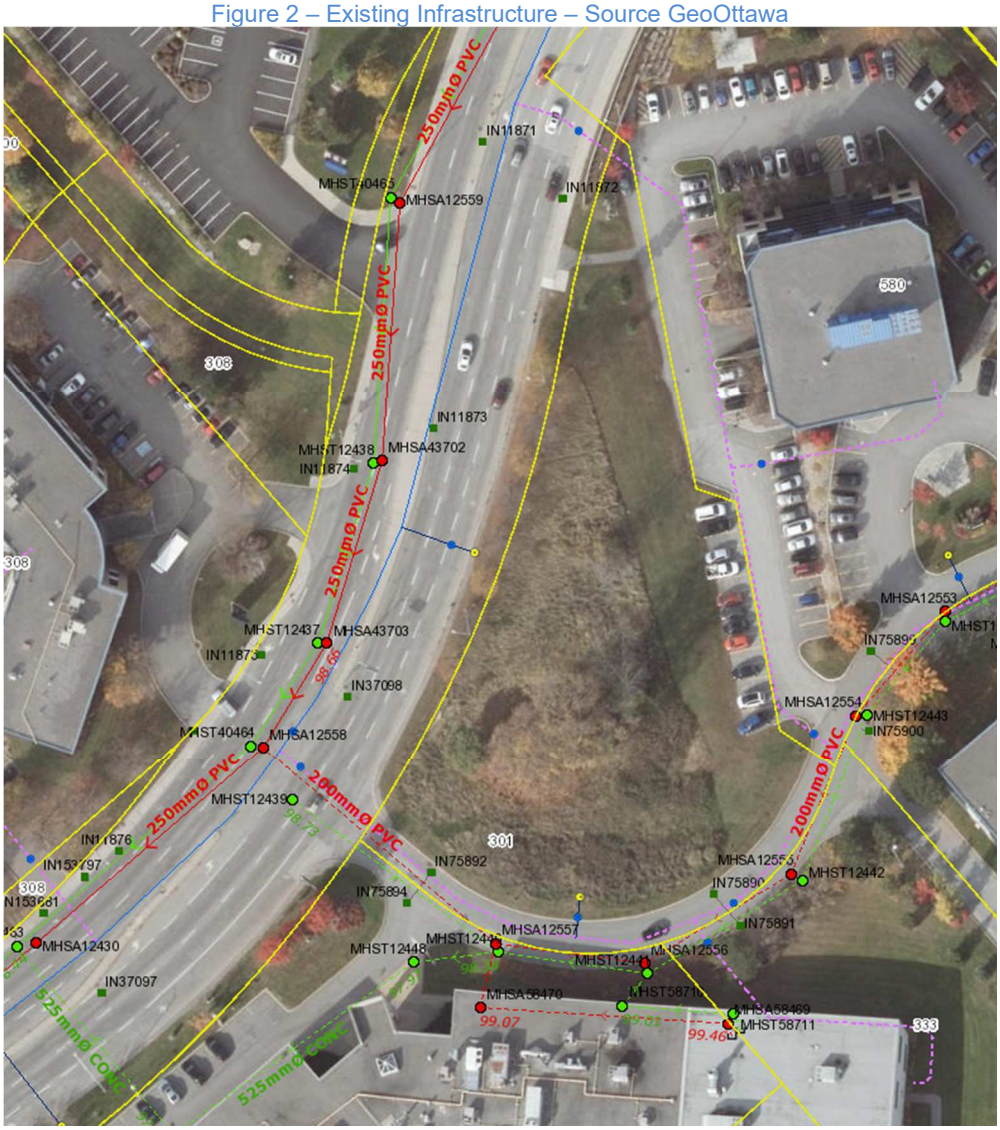
Terry Fox Drive

- 450mm diameter PVC storm sewer
- 525mm diameter concrete storm sewer

- 600mm diameter PE sanitary sewer
- 400mm diameter DI watermain

Corresponding structures and services can be found in **Figure 2.**

Figure 2 – Existing Infrastructure – Source GeoOttawa



Existing infrastructure and utilities are shown in detail on Plan C901 found in **Appendix A.**

2 Geotechnical Study

A Geotechnical Investigation was undertaken by DST Consulting Engineers and is documented as Report IN-SO-021872, October 2015. An amendment to the geotechnical report was issued on March 17, 2016.

A layer of sand, gravel and silty clay till was encountered beneath the clay deposits. Contained within the glacial till deposits exists grey silty clay to sandy silt with gravel, cobbles and boulders

Groundwater was measured in the monitoring wells that were installed during the geotechnical investigation. After data collection of groundwater levels, the long-term groundwater level should be expected at a 2.7 to 4.8m depth.

The proposed building slab elevation is set at 103.50m. The existing elevations around the proposed site range from 101.9 to 103.1m. The proposed site grades will need to be raised up to 1.5m in areas; the existing site conditions consists of a firm silty clay which can be prone to settlement by overstressed external loads.

Recommendations regarding the installation of water and sewer services provided in the geotechnical report will be incorporated into the contract specifications.

3 Water Services

3.1 Design Criteria

The water service is designed in accordance with the 2010 City of Ottawa Water Design Guidelines (including Technical Bulletins) as well as MOE Design Guidelines for Drinking Water Systems. The proposed development lies within the City of Ottawa 3W pressure zone as shown by the Pressure Zone map in **Appendix B**.

The required domestic water demand and pressure design parameters for the new building have been calculated based on the criteria summarized in **Table 1**:

Table 1– Summary of Water Demand Parameters

Design Parameter	Value
Average Daily Demand - Residential	350 L/person/day[1]
Average Daily Demand – Commercial	28000 L/gross ha/d[1]
Max. Daily Peaking Factor - Residential	2.5 x Average Daily[2]
Max. Daily Peaking Factor - Commercial	1.5 x Average Daily[2]
Max. Hourly Peaking Factor - Residential	2.2 x Maximum Daily[2]
Max. Hourly Peaking Factor - Commercial	1.8 x Average Daily[2]
Minimum Depth of Cover	2.4m from top of watermain to finished grade
Desired pressure range during normal operating conditions	350kPa and 480kPa
Min. pressure during normal operating conditions	275kPa
Max. pressure during normal operating conditions	552kPa
Min. pressure during maximum hourly demand	276kPa
Min. pressure during maximum daily demand + fire flow	140kPa

[1] Daily average based on Appendix 4-A from Water Supply Guidelines
[2] Residential Max. Daily and Max. Hourly peaking factors City of Ottawa Water Distribution Guidelines, 2010, Table 4.1

Required Fire Flows (RFF) were calculated for each building in accordance with the Fire Underwriters Survey method (1999 – as clarified by City Technical Bulletin ISTB 2018-02, 2018-03), and are summarized in **Table 2**:

Table 2– Required Fire Flow

Building	Required Fire Flow (L/min)	Required Fire Flow (L/sec)
Proposed Commercial Building	4237	70.6
Rounded to Nearest 1000 L/min	4000	66.7

Table 3 summarizes the water demand/fire flow for the development based on the Ottawa Design Guidelines (2010 - including Technical Bulletins):

Table 3– Summary of Water Demand Calculations

Design Parameter	Water Demand (L/s)
Average Daily Demand	0.16
Maximum Daily Demand	0.24
Maximum Hourly Demand	0.44
Fire Flow (for proposed commercial building)	70.63
Total Max Daily Demand + Fire Flow	70.87

Domestic and fire flow calculations are provided in **Appendix B**.

3.2 Adequacy of Supply for Domestic and Fire Flows

The buildings will be serviced from the existing 200mm diameter private access road watermain south of the proposed development. The minimum pressure in this watermain under the Max Day Demand + fire, Maximum Hourly, and Max day scenarios have been determined based on boundary conditions received from the City of Ottawa. A copy of the correspondence and boundary conditions is provided in **Appendix G.**

A 150mm diameter water service connection to the existing watermain on the private access road has been determined to meet applicable requirements.

A summary of the demands and performance of the proposed 200mm diameter water service is provided in **Table 4**.

Table 4– Summary of Water Servicing Design Parameters/Calculation Results

	Scenario			Source of Data
	Max Day + Fire	Max Hourly	Average Daily	
Flow Demand (L/s)	70.87	0.44	0.16	Calculated for 301 Palladium Drive
Boundary Condition: Available Pressure under Future Conditions (kPa)	544.69	544.00	544.00	Provided by City of Ottawa for 200mm Watermain[1]
Residual Pressure at Service Tee including pipe losses (150mm diameter pipe) (kPa)	526.43	543.99	544.00	Calculated for development
Minimum Allowable Pressure (kPa)	140	276	345	City of Ottawa Water Design Guidelines

The number of available fire hydrants within proximity of the buildings was analyzed in accordance with Technical Bulletin ISTB-2018-02 dated March 21, 2018, Appendix I. The following table demonstrates that the fire flow (calculated by the FUS method) can be provided by hydrants within 150m of the building.

Table 5 – Availability of Fire Flow from Hydrants

Building	**Required Fire Flow** (L/min)	**Fire Hydrant(s) within 75m**	**Fire Hydrant(s) within 150m**	**Combined Available Fire Flow** (L/min.)
Proposed Commercial	4237	2	3	28,500
[1]Refer to Fire Underwriters Survey Calculations in appendix B.				

Based on the boundary conditions provided by the City of Ottawa, sufficient supply is available for fire flow. A certified fire protection system specialist will need to be employed to design the building fire suppression system and confirm the actual fire flow demand.

3.3 Check of High Pressures

The site is within Pressure Zone Glen Cairn P.S and RES 3W, which operates at a maximum head of 131 m (City of Ottawa Water Master Plan, 2013 Table 2-2). At the finished basement elevation of 100.9 m, this results in a maximum static head of 62m, equivalent to a pressure of 607.9 kPa. This slightly exceeds the maximum pressure range indicated in **Table 1**. Furthermore, the residual pressure under average day conditions (**Table 4**) also exceeds the desired pressure range under normal operating conditions. It is therefore recommended that a pressure reducing valve (PRV) be installed within the water entry room.

3.4 Reliability Requirements

Because the average daily demand is equal to 0.10 m^3/d and does not exceed 50 m^3/d, a single service connection will be sufficient. A new valve will be required on the existing watermain between the two connections.

3.5 Summary and Conclusions

The proposed development will be serviced by a 150mm diameter water service connected to the existing 200mm diameter watermain south of the development in the private access road. A water meter and pressure reducing valve is proposed within the water entry room.

4 Sanitary Servicing

4.1 Background and Existing Infrastructure

The sanitary service design is in accordance with the 2012 Ottawa City Sewer Design Guidelines. The same approach in the previous approved application will be taken to service the site, refer to 301 Palladium Dr Functional Servicing and Stormwater Management Report Rev 3, D07-12-15-0147, Erion Associates, November 2016. The site will be serviced by the existing 200mm PVC sanitary sewer in the private access road south of the development.

4.2 Proposed Servicing and Calculations

The proposed development will require a new 200mm diameter PVC sanitary service. The new 200mm diameter PVC sanitary service will connect to an existing 1200mm sanitary manhole, connecting to the

existing 200mm diameter sanitary sewer in the private access road. The sanitary servicing design parameters are summarized in **Table 6**.

Table 6– Summarization of Sanitary Servicing Design Parameters

Design Parameter	Value
Gross Area	0.5 ha
Residential Average Flow	280 L/person/day
Residential Peaking Factor	4.5
Commercial Average Flow	28,000 L/ha/day
Commercial Peaking Factor	1.0
Infiltration and Inflow Allowance	0.33 L/ha/s
Sanitary Sewer Sizing Based on the Manning's Equation	$Q = \frac{1}{n}\pi A \mathrm{R}^{2/3} S^{1/2}$
Manning's Coefficient 'n'	0.013
Minimum Depth of Cover	2.5m from obvert of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
Note: As per Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012 incl. all Tech. Bulletins as of November 2019. Residential Peaking Factor based on Harmon's Equation.	

The proposed development will produce a sanitary flow of 0.2 L/s as calculated by the occupancy-based calculation. The proposed 200mm PVC service lateral (at 2.0% slope) has a maximum capacity of 46.0 L/s. This is sufficient for the calculated sanitary flow.

4.3 Capacity of Receiving Sewer

The servicing and stormwater management report for the development prepared by Erion Associates included an analysis of the local municipal sanitary sewers located across the frontage of the site. An extract from this report can be found in **Appendix G.** Based on the sanitary analysis, the controlling section of the private access road sanitary sewer is located between Node 1B and 1C with an available residual capacity of 54 L/s; detailed calculations are included in **Appendix C.**

4.4 Summary and Conclusions

The proposed development will be serviced by a 200mm diameter PVC sanitary service that has been determined to meet all required servicing constraints and associated design criteria/requirements.

Site servicing calculations and a summary of the estimated peak wastewater flow can be found in **Appendix C**.

5 Storm Servicing and Stormwater Management

5.1 Background

Stormwater flow patterns show existing drainage towards an existing parking area east of the development (collecting approximately 1/3 of the stormwater runoff within the property limits) and towards the private access road south of the development (collecting approximately 2/3 of water runoff).

The City of Ottawa's Sewer Design Guidelines require the 100-year post-development storm flow to be restricted to the 5-year pre-development runoff with an assumed pre-development coefficient no greater than 0.5.

For the proposed development, quantity control meeting the City of Ottawa requirements is proposed to be provided by on-site detention. Flow control is to be provided by underground Stormtech chambers with a design storage derived from the calculatedallowable release rate.

An existing 900mm trunk sewer located on Silver Seven Rd. currently receives water runoff from the existing site and will be the main sewer that collects water runoff from the new developed stormwater management system that is proposed.

Storm sewer infrastructure currently exists within the private road that spans south and east of the development. In 1989, the site was defined as phase "C" of the Kanata Business Park. The storm sewers within the project extents currently service phase "B" adjacent to the proposed site. The project site originally contained 0.68 hectares of undeveloped land. Due to the recent road realignment in 2002, the site was reduced to approximately 0.50 hectares. The storm infrastructure connects to the City sewers along Palladium Drive.

5.2 Storm Servicing Strategy including Analysis of Existing Infrastructure

The stormwater management design has been completed by restricting the 100-year post-development flow to the 5-year pre-development runoff (calculated at a pre-development runoff coefficient of 0.5).. The 100-year flow will be detained on site. The required storage volumes have been calculated using the Modified Rational Method.

5.3 Proposed Storm Servicing

Proposed storm servicing is indicated on Drawing C001 in **Appendix A**. The proposed pre-development and post-development catchment areas, runoff coefficients and catchment total areas are indicated on the Drainage Area Plans, also in **Appendix A**.

5.3.1 Design Criteria (Minor and Major Systems)

For the design of stormwater management (SWM), the City of Ottawa's criteria for a Commercial/ Institutional/ Industrial development in an existing area will be applied (Section 8.3.7.3 of the City of Ottawa Sewer Design Guidelines), except where modified as described in the following summary of the City's key SWM requirements:

- On-site SWM measures required to avoid impact on downstream system (i.e. existing storm sewers).
- Runoff to be controlled to the 5-year pre-development level.
- Pre-development flow to be calculated using the smaller of a runoff coefficient of 0.5 or the actual existing runoff coefficient. Use either a T_c of 20 minutes or calculated the pre-development T_c but not less than 10 minutes.
- All flow depths must be controlled on-site (i.e. no spill to adjacent properties or rights-of-way for flows up to the 100-year event).

Key drainage design requirements from the City of Ottawa Sewer Design Guidelines include:

- The minor system (underground storm sewers) is designed to capture the 5-year event (minimum). Inlet Control Devices should be utilized to minimize surcharging during the 100-year event.

- The minor system is designed to convey the 5-year event, with the hydraulic grade line (HGL) below the crown of the pipe (except where impacted by boundary conditions – in which case the HGL shall not exceed 0.3m below the underside of the footings during the 100-year event).

- For events greater than the 100 year return period, spillage should not be directed to neighbouring private property.

- The site grading ensures that the property being developed is higher than the spill elevation of the adjacent municipal ROW. This is considered especially critical if underground parking is being proposed. The grading ensures sufficient positive drainage away from the building, with a minimum slope from the building to the street of 2% and building openings a minimum of 0.3m above the 100-year ponding level. If reduced lot grading is considered for an increase in travel time and infiltration, the 2% minimum grade is still maintained for at least 4m from the building.

- The maximum water depth on streets (public, private and parking lots), static or dynamic, is 350 mm.

- Where underground storage is utilized, the design must ensure that backwater from the downstream system does not impact the required storage.

The stormwater design for the lands in question are subject to review by the Mississippi Valley Conservation Authority (MVCA).

5.3.2 Stormwater Quantity Control

5.3.2.1 Runoff Coefficient and Peak Flows

Table 7 indicates the runoff coefficient for each catchment. The 100-year runoff coefficients include a 25% increase (to a maximum of 1.0) as required by the City of Ottawa Sewer Design Guidelines Section 5.4.5.2.1.

Table 7– Pre-development Runoff Coefficients (development area)

	Pre-Development Runoff Coefficients	
Storm Event	**5-Year Storm**	**100-Year Storm**
Areas Description	**Existing**	**Existing**
Site Area (in ha)	0.46	0.46
Runoff Coefficient	0.35	0.43
Note 1: The existing private access road south of the development has been excluded in all stormwater calculations		

Intensity (i) is calculated using the formula:

$$i = \frac{A}{(T_d + C)^B}$$

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

Time of concentration is determined using the inlet time graph (Appendix 5D Ottawa City Sewer Design Guidelines) and the Federal Aviation Formula which results in a value of 15 minutes. With the pre and post-development runoff coefficients and rainfall intensity, the peak flows for each drainage area can be calculated using the Rational Method. The results (using actual runoff coefficients) are summarized in **Table 8**.

Table 8– Pre-Development Peak Flows

	Pre-Development Peak Flows (actual runoff coefficients)			
Return Period (Years)	**Intensity, I (mm/hr)**	**Area (ha)**	**Runoff Coefficient, R (Note 1)**	**Runoff Rate, Q (L/s)**
2	61.77	0.46	0.35	27.3
5	83.56	0.46	0.35	37.0
100	142.89	0.46	0.43	79.0
Note 1: For 100-year event, Runoff Coefficient is increased by 25% to a maximum of 1.0.				

To calculate the allowable release rate, the following criteria are applied:

Return Period	5	year
Maximum Runoff Coefficient	0.5	
Time of Concentration	10	Minutes

Table 9– Allowable Release Rate

Return Period (Years)	**Intensity, I (mm/hr)**	**Area (ha)**	**Runoff Coefficient, R**	**Runoff Rate, Q (L/s)**
5	83.56	0.46	0.50	53.4

The allowable release rate for the site has been calculated to be 53.4 L/s.

The project will result in the existing area being partially covered with impervious surfaces. The post-development runoff coefficients are indicated in **Table 10**:

Table 10– Overall Post-Development Runoff Coefficients

	Overall Post-Development Runoff Coefficients	
Storm Event	**5-Year Storm**	**100-Year Storm**
Areas Description	**Proposed Phase "C" KBP Site**	**Proposed Phase "C" KBP Site**
Project Area (in ha)	0.46	0.46
Weighted Runoff Coefficient	**0.74**	**0.86**

5.3.2.2 Stormwater Management Concept

- Uncontrolled Drainage Areas

The existing private road south of the development collects stormwater and is directed to an existing catch basin near the intersection at Palladium Drive. As such, this portion of the development will be uncontrolled. The runoff from the uncontrolled section is overland to the southwest, and approximately 380 m^2 of existing asphalt east and south of the proposed building will be unattenuated. In addition, the portion of the site that will remain undeveloped north of the site will be unattenuated and directed eastward to the existing asphalt parking and access route.

Table 11 provides a summary of the characteristics of the uncontrolled areas.

Table 11– Post-Development Uncontrolled Release

	Post-Development Uncontrolled Release	
Storm Event	**5-Year Storm**	**100-Year Storm**
Drainage area (ha)	0.04	0.04
Runoff Coefficient	0.59	0.72
Peak Flow (L/s)	6.9	14.5

The allowable release rate is therefore calculated to be **38.9 L/s**, by subtracting the peak flow from the uncontrolled areas from the pre-development allowable release rate that was calculated to be 53.4 L/s.

- Controlled Drainage Areas

The drainage from the controlled areas will all be captured and directed to a series of proposed catch basins.

The landscaped areas surrounding the proposed development will be captured via ditch inlets/ catch basins and directed to the minor stormwater system. A series of catch basins capture water runoff along the asphalt parking lot and access/egress routes which is ultimately directed to the underground minor stormwater system.

Stormwater will outlet from the proposed 250mm storm sewer to the existing 300mm sewer on the private access road and will be controlled to the allowable release rate using an inlet control device and underground storage. As indicated by the proposed storage calculations, the required storage for the proposed site is **89m³**. This will be achieved using a underground stormtech chambers.

The required storage is calculated using half the release rate as per the City of Ottawa requirements. A summary of the SWM results is provided in **Appendix D**.

- Summary

Design release rate is assumed to be half the maximum release rate due to proposed underground storage as per City requirements.

Table 12 summarizes the proposed release rates and confirms that the total release rate does not exceed the allowable release rate.

Table 12 – Post-Development Controlled Peak Flows

	Post-Development Controlled Peak Flows (L/s)
Allowable Release Rate	53.4
Release Rate from Uncontrolled Drainage Areas	14.5
Release Rate from Controlled Drainage Areas	38.9
Design Release Rate	**19.45**

5.3.2.3 Impact on Existing Stormwater Infrastructure

Overall runoff from the site to the storm sewers will be significantly reduced by the proposed development:

Table 13 – Pre-Development Peak Flows vs. Post-Development Controlled Peak Flows

	Pre-Development Peak Flow	Post-Development Controlled Peak Flow
Storm Event	**5-Year Storm**	**5-Year Storm**
Total runoff (L/s)	53.4	19.45

Design calculations for the new storm service are provided in **Appendix D**.

5.3.3 Storm Water Quality Control

- The water quality requirement for the site is a normal level of protection, 70% total suspended solids removal.
- The subject property is located within the Carp River Watershed Subwatershed Study area which identifies the site as a low groundwater recharge area. The infiltration target is 73mm/yr. Given the proposal is a revision to an existing approved Site Plan which did not require infiltration, MVCA recommends that infiltration measures be incorporate to the revised stormwater design to the extent feasible.

5.3.4 Minor and Major Systems

The minor storm servicing system consists of the sewers described above, and as indicated on the design drawings provided in **Appendix A**.

The major system consists of overland flow to Palladium Drive. To the extent possible, the site will be graded to accommodate unattenuated storm runoff. Proposed grades will be based off existing topography that surrounds the proposed site development, and elevations set forth for phase one construction.

5.3.5 Joint Use and Maintenance Agreement

There is an agreement in place dated June 15th, 2018, between the owner of 301 Palladium Dr. and abutting properties agreeing on joint use of existing sewers and accepting stormwater run-off from from 301 Palladium. Refer to **Appendix E** for the agreement.

5.3.6 100 Year Flood Levels and Major Flow Routing

The site is not within a 100-year floodplain.

5.3.7 Flow Control Device

A **HYDROVEX 125VHV-2** placed in **CBMH02** will be used to meet the design release rate. Refer to storm calculations in **Appendix A**.

5.3.8 Proposed Storage

A stormwater underground stormtech chamber **89 m^3** is proposed to capture the developed site. The chambers will be located within the asphalt parking area. The elevation of the chambers will be higher than the 100-year water level, discharging by gravity. For Details refer to **Appendix A**.

5.3.9 Total Suspended solids 70 % removal

To achieve this required a Oil Grit Separator has been sized for this site, a Stormceptor model EFO4 was selected achieving more than **70% TSS removal.** For Calculations and details refer to **Appendix A**.

5.3.10 Infiltration

The MVCA required an infiltration target of 73 mm/year, it was also acknowledged that this was a revision for an approved site plan and the infiltration requirements were new.

In-order to meet this new requirement, an open bottom underground storage system (Stormtech chambers) was proposed. The design of the Stormtech chambers is to be as per MECP requirements and the bottom of chambers will be minimum 1m above the high groundwater. The bottom of Chambers is **99.70**. Based on the geotechnical report prepared by DST Consulting Engineers, the current **groundwater** in the area is approximately **98.40 m** which meets the requirements for MECP.

The stormwater calculations shows that the site requires a total storage volume of **89 cubic meters,** the proposed storage will provide **98.30 cubic meters,** bottom of chambers will be at **99.93** whereas bottom of stone bedding will be at **99.70.** The volume in the bottom stone voids will be used for infiltration, stage analysis for the chambers shows that at elevation **99.93** a volume of **9.11** cubic meters of storage is available. For Volume vs Height analysis refer to **Appendix D.**

To calculate yearly infiltration, the geotechnical report mentions soil type to be silty clay, a low design infiltration rate for this soil type was taken **1mm/hr** to calculate the yearly infiltration volume.

Table 14 – Factors used for infiltration calculations

Bottom Stone water volume	9.11	m^3
Design infiltration rate	1	mm/hr
U/G System Area	99.69	m^2
Max hourly infiltrated volume	0.1	m^3
Site area	0.46	ha
Runoff coefficient	0.9	

Analysis done based on the drainage area and daily precipitation data (excluding winter months) to establish overflow volume based on measured historical data. The maximum potential infiltration was analyzed using information in Table 14 and precipitation norms for the area and the overflow was then subtracted. Below table shows a summary for each year, the **73 mm/yr** can be achieved through the proposed approach.

Table 15 – Analysis results for daily rainfall data per year

Year	Total rain (mm)	Runoff (m^3)	Infiltrated Volume (m^3/yr)	Yearly Infiltration mm/year
2016	614	2541	411	89.38
2017	925	3829	430	93.56
2018	659	2727	444	96.57
2019	627	2597	452	98.20
2020	586	2427	429	93.16

Refer to **Appendix E** for full analysis calculations.

5.4 Grading

The proposed grading plan is shown in Drawing C002 in **Appendix A**. The development will be tied into the existing grades on Palladium Drive, the private access road south of the development, and the existing asphalt parking area east of the development.

5.5 Erosion and Sediment Control

As described in the servicing guidelines, an erosion and sediment control plan is required for implementation during the construction phase. To minimize the migration of sediments, measures such as silt fencing and sediment capture devices for catch-basins and ditch inlets downstream of the site and around the building are to be installed to capture and retain sediment. Additionally, all stockpiles are to be covered.

During construction, all erosion control features shall be maintained and repaired as necessary and adjacent roadways kept free of construction debris and sediment this responsibility falls under the prevue of the Contractor.

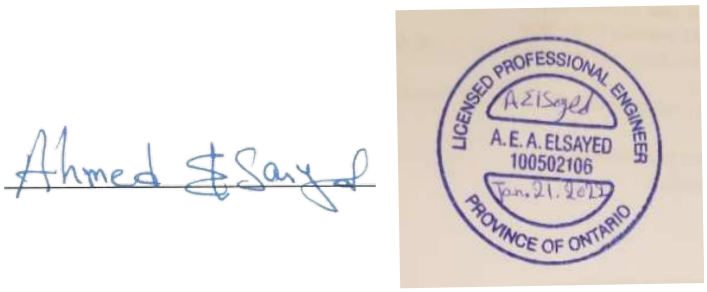
Refer to **Appendix A** for a copy of the proposed erosion and sediment control plan.

6 Conclusions

In conclusion the proposed development meets all required servicing constraints and associated design criteria/requirements as well as the additional City of Ottawa requirements identified in the pre-consultation phase. It is recommended that this report be submitted to the City of Ottawa in support of the application for site plan approval.

Sincerely,

Morrison Hershfield Limited



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Municipal Engineer-in-Training

7 Appendices

Appendix A Site Servicing, Grading and Erosion and Sediment Control, Drainage Area Plans
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Appendix F Regulatory Correspondence
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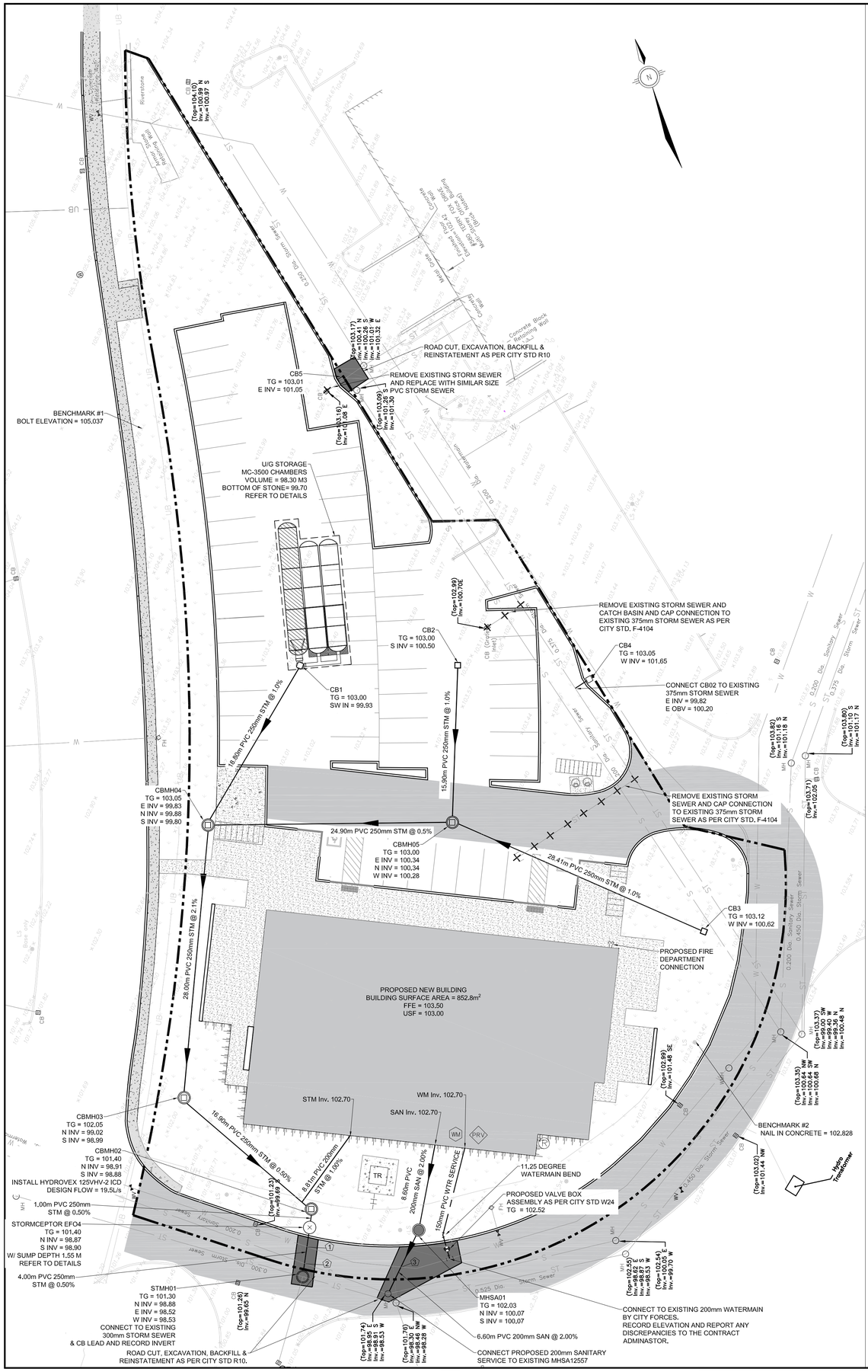
Appendix A

Site Servicing, Grading, Erosion and Sediment Control, Catchments Plans and Details



NOTES:

GENERAL

1. COORDINATES ARE IN MTM ZONE 9 (76°30' WEST LONGITUDE) NAD-83 (ORIGINAL)
2. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA PRIOR TO STARTING CONSTRUCTION
3. SERVICES ARE TO BE CONSTRUCTED TO 2.0m FROM FACE OF BUILDING.
4. REFER TO "FUNCTIONAL SITE SERVICING AND STORMWATER MANAGEMENT DESIGN BRIEF. "301 PALLADIUM DRIVE PREPARED BY MORRISON HERSHFIELD FOR SITE SERVICING REPORT
5. REFER TO GEOTECHNICAL INVESTIGATION REPORT (NO. IN-SO-021872 DATED OCTOBER 2015 WITH AMENDMENT DATED MARCH 2016) PREPARED BY DST CONSULTING ENGINEERS FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT SHALL REVIEW EXCAVATIONS PRIOR TO THE PLACEMENT OF GRANULAR MATERIAL.
6. CONTRACTOR TO VERIFY ALL EXISTING UTILITY ELEVATIONS AT CONNECTION AND CROSSING LOCATIONS PRIOR TO CONSTRUCTION AND ADVISE THE ENGINEER OF ANY DISCREPANCIES.
7. UNLESS DIRECTED OTHERWISE ANY DAMAGED ASPHALT OR CURB (REGARDLESS OF WHETHER WITHIN OR EXTERNAL TO THE SITE) SHALL BE REINSTATED IN ACCORDANCE WITH CITY STD. DET. R10 AND S1.
8. UNLESS DIRECTED OTHERWISE THE CONTRACTOR SHALL REINSTATE ALL SIGNS, LIGHTING AND OTHER STREET FURNITURE DISTURBED BY THE WORK.
9. THE CONTRACTOR SHALL DEVELOP AND IMPLEMENT TRAFFIC MANAGEMENT PLANS FOR WORK IN RIGHT OF WAY IN ACCORDANCE WITH OTM BOOK 7.
10. CLAY SEALS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD DETAIL S8 AND SHALL BE INSTALLED AT 50m INTERVALS IN ALL PIPE TRENCHES. CLAY SEAL TO EXTEND FULL TRENCH WIDTH AND FROM BOTTOM OF TRENCH EXCAVATION TO UNDERSIDE OF ROAD STRUCTURE. WITH A MINIMUM THICKNESS OF 1m ALONG PIPE.
11. LOCATE AND CAP ANY EXISTING STORM, SANITARY AND WATER SERVICES AT THE PROPERTY LINE. ABANDON EXISTING SERVICES WITHIN THE R.O.W, PER STANDARD CITY OF OTTAWA DETAIL S11.4. (TYPICAL)
12. SUBMIT SHOP DRAWINGS FOR APPROVAL FOR ALL PRECAST STRUCTURE, GRATES & COVERS, TRENCH DRAINS.

SEWERS

13. ALL STORM SEWERS, SANITARY SEWERS AND CATCH BASINS LEADS SHALL BE PVC DR 35 UNLESS OTHERWISE SPECIFIED.
14. REFER TO APPROPRIATE CITY STANDARD DETAILS FOR SEWER INSTALLATION.
22. ALL SEWER MATERIALS AND CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH THE 2021 EDITION OF THE CITY OF OTTAWA STANDARD SPECIFICATIONS AND STANDARD DRAWINGS. PVC PIPE TO BE CLASS 150 DR18 TO LATEST EDITION OF A.W.W.A. SPECIFICATION C900 AND CSA B137.3 LATEST AMENDMENT WITH GASKETED BELL AND SPIGOT COUPLINGS.
23. MAINTENANCE HOLES AND CATCH BASIN MAINTENANCE HOLES ON STORM SEWERS LESS THAN 900mm DIAMETER SHALL BE CONSTRUCTED WITH A 300mm SUMP. BENCHING SHALL BE INSTALLED IN MAINTENANCE HOLES ON STORM SEWERS 900mm AND ABOVE.
24. STORM SEWER MAINTENANCE HOLE COVERS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD DETAIL S24.1 ON FRAMES TO DETAIL S25 UNLESS OTHERWISE INDICATED.
25. CONTRACTOR SHALL MAINTAIN EXISTING SEWER FLOWS DURING CONSTRUCTION IN ACCORDANCE WITH CITY OF OTTAWA SPECIFICATIONS.
26. ALL MAINTENANCE HOLES, CATCHBASINS AND CLEANOUTS SHALL BE ADJUSTED TO POST-CONSTRUCTION GRADE.
27. CCTV INSPECTION OF ALL SEWERS SHALL BE COMPLETED AS PER CITY OF OTTAWA SPECIFICATIONS PRIOR TO THE INSTALLATION OF BASE COURSE ASPHALT.
36. BACKWATER VALVES SHALL BE INSTALLED ON NEW STORM AND SANITARY SERVICES AS PER CITY OF OTTAWA STANDARD DETAILS S14, S14.1, S14.2.

WATERMAINS

37. ALL WATERMAIN MATERIALS AND CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH THE 2021 EDITION OF THE CITY OF OTTAWA STANDARD SPECIFICATIONS AND STANDARD DRAWINGS. PVC PIPE TO BE CLASS 150 DR18 TO LATEST EDITION OF A.W.W.A. SPECIFICATION C900 AND CSA B137.3 LATEST AMENDMENT WITH GASKETED BELL AND SPIGOT COUPLINGS.
38. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A WATER PERMIT AS REQUIRED FROM THE CITY OF OTTAWA, AND COMPLYING WITH ALL CITY OF OTTAWA REQUIREMENTS, THE CITY MAY REQUIRE THAT CERTAIN ACTIVITIES (E.G. VALVE OPERATION, CONNECTION OF NEW WATER SERVICE TO EXISTING WATERMAIN, DISINFECTION) BE CARRIED OUT ONLY BY CITY FORCES.
39. ALL VALVES 300mm DIAMETER AND SMALLER SHALL INCLUDE A VALVE BOX AS PER W24.
40. THE NEW WATERMAIN IS TO BE INSTALLED WITH A MINIMUM OF 2.4m COVER (INCLUDING HYDRANT LEAD), WHERE 2.4m COVER IS NOT POSSIBLE, PROVIDE INSULATION IN ACCORDANCE WITH CITY OF OTTAWA STANDARD DETAILS W22 & W23.
41. THRUST RESTRAINT SHALL BE PROVIDED BY BOTH RESTRAINING/RETAINING RINGS AND THRUST BLOCKS AT ALL DEAD END CAPS, PLUGS, VALVES, BENDS AND REDUCERS AS PER CITY OF OTTAWA STANDARD DETAILS W25.3, W25.4, W25.5 AND W25.6. ALL TEMPORARY THRUST RESTRAINTS ARE THE RESPONSIBILITY OF THE CONTRACTOR.
42. TRACER WIRE SHALL BE PROVIDED FOR ALL NEW PVC WATERMAINS IN ACCORDANCE WITH THE SPECIFICATIONS AND CITY OF OTTAWA STANDARD DETAIL W36.
43. CATHODIC PROTECTION SHALL BE PROVIDED FOR ALL NEW WATERMAINS IN ACCORDANCE WITH THE SPECIFICATIONS AND CITY OF OTTAWA STANDARD DETAILS W39, W40, W41, W42 AND W47. CATHODIC PROTECTION OF EXISTING WATERMAINS SHALL ALSO BE PROVIDED AT CONNECTIONS BETWEEN EXISTING AND NEW WATERMAINS.
44. ADJUST ALL VALVE CHAMBERS, VALVE BOXES AND HYDRANTS TO FINISHED GRADE.

UTILITY NOTE

45. THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWING. AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM. THE CONTRACTOR WILL BE RESPONSIBLE FOR SUPPORTING AND PROTECTING ANY EXISTING UTILITIES, AS REQUIRED, IN ACCORDANCE WITH THE UTILITY OWNERS' REQUIREMENTS. CONTRACTOR IS REQUIRED TO OBTAIN LOCATES, IN ADVANCE OF EXCAVATION WORK, AND FORWARD COPIES OF THE LOCATES TO THE CONSULTANT AND THE OWNER PRIOR TO EXCAVATION.
46. ALL CROSSING OF EX. UTILITIES TO BE IN ACCORDANCE WITH CITY STD, DET. S10

PIPE CROSSING TABLE

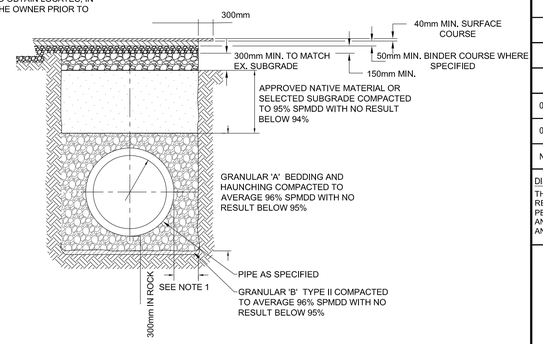
CROSSING	LOWER PIPE	HIGHER PIPE	CLEARANCE	SURFACE ELEVATION
1	200mmØ WM OBV=TBD	250mmØ STM INV=98.70	W25	101.30m
2	200mmØ SAN OBV=98.56	250mmØ STM INV=98.89	0.33m±	101.35m
3	200mmØ WM OBV=TBD	200mmØ SAN INV=99.98	W25	101.80m

SEWER STRUCTURE TABLE

NEW STRUCTURE	STRUCTURE TYPE	COVER TYPE
STMH01	1200mmØ OPSD 701.010	CITY STANDARD S 28.1
CBMH02	1200mmØ OPSD 701.010	CITY STANDARD S 28.1
CBMH03	1200mmØ OPSD 701.010	CITY STANDARD S 28.1
CBMH04	1200mmØ OPSD 701.010	CITY STANDARD S 28.1
CBMH05	1200mmØ OPSD 701.010	CITY STANDARD S 28.1
CB1	1200mmØ OPSD 701.010	CITY STANDARD S 19.1
CB2	1200mmØ OPSD 701.010	CITY STANDARD S 19.1
CB3	600mmx600mm OPSD 705.030	CITY STANDARD S 19.1
CB4	600mmx600mm OPSD 705.010	CITY STANDARD S 19.1
CB5	600mmx600mm OPSD 705.010	CITY STANDARD S 19.1
MHSA01	1200mmØ OPSD 701.010	CITY STANDARD S 24

PROPOSED WATER SERVICE TABLE

STATION	SURFACE ELEVATION	T/WM ELEVATION	COMMENTS
0+000	103.50	-	CONNECTION TO PROPOSED BUILDING
0+009.65	102.20	-	11.5 DEGREE BEND
0+011.15	102.52	-	200mmØ VALVE AND VALVE BOX
0+012.27	102.07	-	TEE CONNECTION TO EXISTING 200mm WATERMAIN ON PRIVATE ROAD



PIPE INSIDE DIAMETER (mm)	CLEARANCE (mm)
900 OR LESS	CONC 450 PVC 450
OVER 900	500

1.
2. FINAL BACKFILL - APPROVED NATIVE MATERIAL OR SELECT SUBGRADE
3. ALL DIMENSION ARE IN MILLIMETERS UNLESS SHOWN OTHERWISE.
4. WHEN NECESSARY POOR SOILS SHALL BE EXCAVATED TO CREATE A FOUNDATION THAT SHALL BE FILLED TO THE BOTTOM OF THE BEDDING WITH GRANULAR 'B'.
5. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER IS NOT PERMITTED ANYWHERE ON THIS SITE.
6. ALL EXISTING ASPHALT AND CONCRETE REMOVAL LIMITS TO BE SAWCUT.
7. 300 MM KEY TO BE SAWCUT AND REMOVED OR MILLED.
8. ROAD REINSTATEMENT ON THE CURB SIDE OF THE TRENCH EXCAVATION SHALL EXTEND TO THE CURB FACE.
9. TACK COAT SHALL BE APPLIED TO ALL MILLED SURFACES

LEGEND

- REMOVAL OF EXISTING STORM INFRASTRUCTURE
- PROPERTY LINE
- 102.23 — EXISTING GRADE BY FAIRHALL, MOFFATT AND WOODLAND
- RD 1 — ROOF DRAIN
- PROPOSED STORM MANHOLE
- PROPOSED CATCH BASIN MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED DITCH INLET
- PROPOSED SANITARY MANHOLE
- PROPOSED WATER SERVICE
- TR — PROPOSED TRANSFORMER
- WM — PROPOSED WATER METER
- R — PROPOSED REMOTE METER READOUT
- PRV — PRESSURE REDUCING VALVE
- NEW STORM SEWER SERVICE
- NEW SANITARY SEWER SERVICE
- NEW WATERMAIN SERVICE
- PROPOSED FIRE DEPARTMENT CONNECTION
- U/H — EXISTING U/G HYDRO
- H — PROPOSED U/G HYDRO
- EXISTING MANHOLE
- EXISTING CATCH BASIN
- WV — EXISTING WATER VALVE
- FH — EXISTING FIRE HYDRANT
- LS — EXISTING LIGHT STANDARD

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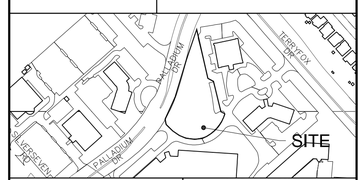

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Ottawa, Ontario K1Y 4R4

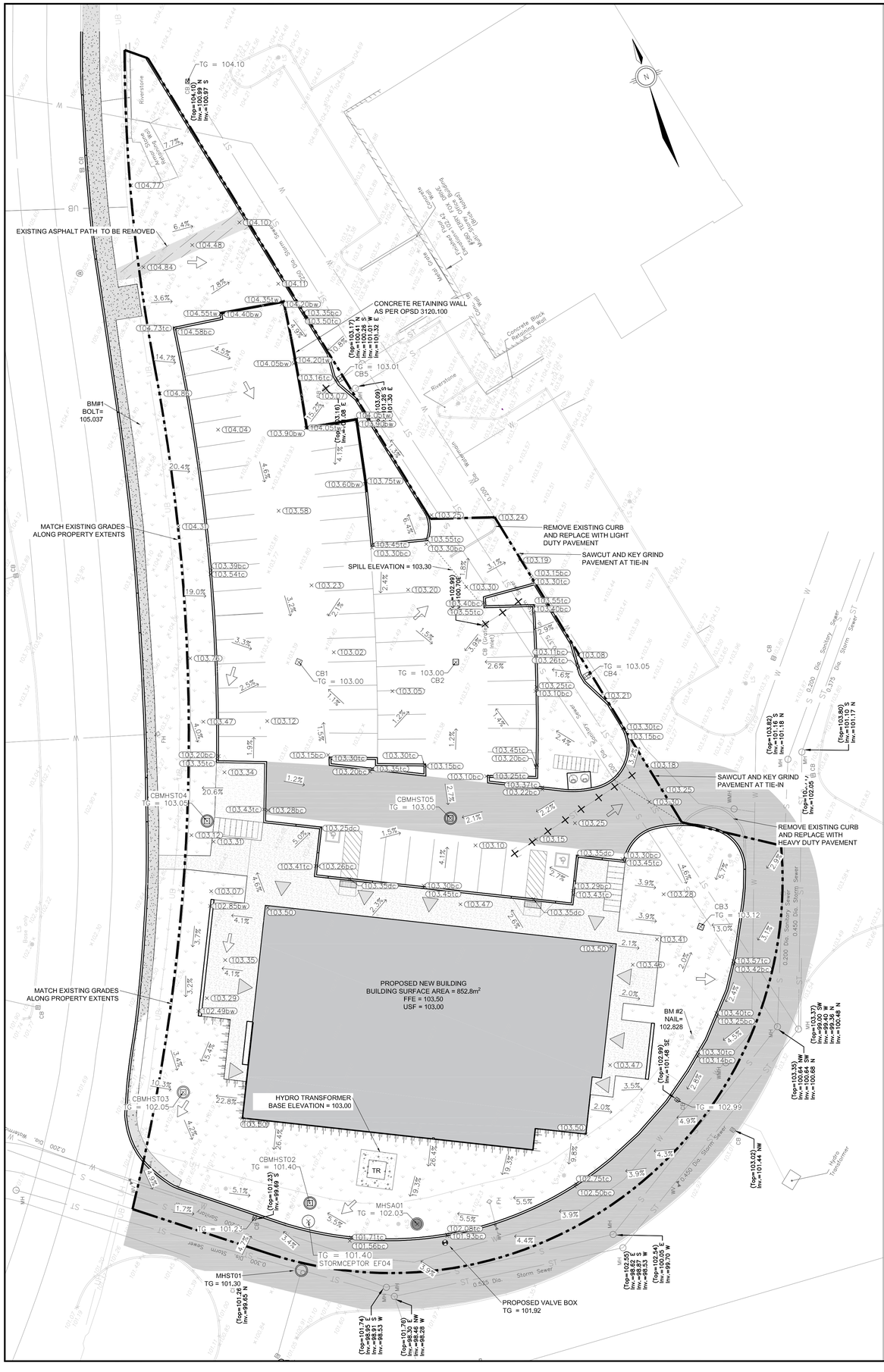
PROJECT

301 PALLADIUM DRIVE

DRAWING

SITE SERVICING PLAN

DESIGN	DATE	SCALE
DO	2021-12-21	1:250
DRAWN: DO	PROJECT NO.: 210390900	
CHECKED: AA	DRAWING NO: C001	VERSION
APPROVED: AA		



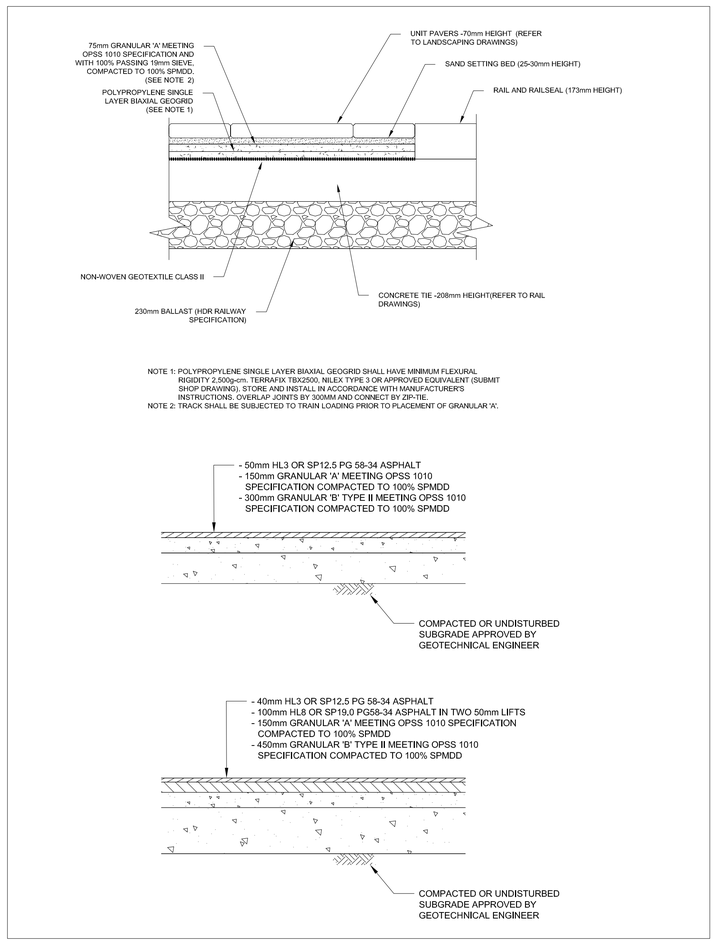
NOTES:

GRADING

1. ALL ELEVATIONS ARE GEODETIC.
2. REFER TO ARCHITECTURAL AND LANDSCAPE DRAWINGS FOR LAYOUT, DIMENSIONS AND SURFACE FINISHES.
3. REFER TO LANDSCAPE FOR GRADES IN PEDESTRIAN AND LANDSCAPED AREAS. GRADES WITHIN THESE AREAS ARE SHOWN HERE FOR CONTEXT ONLY AND SHALL NOT BE RELIED UPON.
4. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS.
5. ALL ELEVATIONS BY CURBS ARE EDGE OF PAVEMENT AND TOP OF CURB UNLESS OTHERWISE INDICATED.
6. REFER TO GEOTECHNICAL INVESTIGATION REPORT (NO. IN-SO-021872 DATED OCTOBER 2015 WITH AMENDMENT DATED MARCH 2016) PREPARED BY DST CONSULTING ENGINEERS FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT SHALL REVIEW EXCAVATIONS PRIOR TO THE PLACEMENT OF GRANULAR MATERIAL.
7. REFER TO TOPOGRAPHIC SURVEY PREPARED BY FAIRHALL, MOFFATT & WOODLAND LTD. DATED MAY 22, 2016.
8. REINSTATE ALL DISTURBED/DAMAGED AREAS TO THEIR ORIGINAL CONDITION OR BETTER.
9. PROVIDE POSITIVE DRAINAGE, MATCHING EXISTING OVERALL DRAINAGE PATTERN INDICATED.
10. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA AND/OR ONTARIO PROVINCIAL STANDARDS.
11. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED PAVED
12. ALL AREAS SHALL DRAIN AT A MINIMUM OF 1%. ANY DISCREPANCIES PREVENTING THIS SHALL BE REPORTED TO THE ENGINEER PRIOR TO CONTINUING WORK.
13. BLEND NEW EARTHWORK INTO EXISTING, PROVIDING VERTICAL CURVES OR ROUNDING AT ALL TOP AND BOTTOM OF SLOPES.
14. ALL CURBS CONSTRUCTED IN ROW SHALL BE CONCRETE BARRIER CURB STD. DETAIL SC1.1 UNLESS OTHERWISE INDICATED.
15. SAW CUT AND KEY GRIND ASPHALT AT ALL TIE-INS.
16. PROVIDE LINE PAINTING. (REINSTATEMENT OF EXISTING LINES WITHIN RIGHT-OF-WAY ONLY)
17. SNOW IS TO BE REMOVED FROM SITE.
18. CAST IRON TACTILE WALKING SURFACE INDICATORS SHALL BE IN ACCORDANCE WITH CITY APPROVED PRODUCTS LIST (CITY STD. SPECIAL PROVISION MS-22.15), AND INSTALLED IN ACCORDANCE WITH CITY STD. DET. SC7.3 AND CITY STD. SPECIAL PROVISION F-3512. SUBMIT SHOP DRAWINGS FOR EACH INSTALLATION.
19. WHERE FILL IS REQUIRED TO MEET THE SPECIFIED FINISHED GRADES IT SHALL BE SELECT SUBGRADE MATERIAL IN ACCORDANCE WITH OPSS.MUNI.1010 TO BE COMPACTED TO A MINIMUM 98% SPMDD.

UTILITY NOTE

20. THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWING, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM. THE CONTRACTOR WILL BE RESPONSIBLE FOR SUPPORTING AND PROTECTING ANY EXISTING UTILITIES, AS REQUIRED. IN ACCORDANCE WITH THE UTILITY OWNERS' REQUIREMENTS, CONTRACTOR IS REQUIRED TO OBTAIN LOCATES, IN ADVANCE OF EXCAVATION WORK, AND FORWARD COPIES OF THE LOCATES TO THE CONSULTANT AND THE OWNER PRIOR TO EXCAVATION. HAND EXCAVATION IS REQUIRED PER UTILITY OWNERS REQUIREMENTS.



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LEGEND

- REMOVAL OF EXISTING STORM INFRASTRUCTURE
- PROPERTY LINE
- 102.23 — EXISTING GRADE BY FAIRHALL, MOFFATT AND WOODLAND
- 103.39 — PROPOSED GRADE
- TC = 104.447, BC = 104.418 — PROPOSED GRADE TOP & BOTTOM OF CURB
- T/W = 104.068, B/W = 104.054 — PROPOSED GRADE TOP & BOTTOM OF RETAINING WALL
- T/G = 103.000 — PROPOSED GRADE TOP OF GRATE
- RD 1 — ROOF DRAIN
- PROPOSED STORM MANHOLE
- PROPOSED CATCH BASIN MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED DITCH INLET
- PROPOSED SANITARY MANHOLE
- PROPOSED WATER SERVICE
- 7.9% — PROPOSED SURFACE GRADE
- PROPOSED OVERLAND FLOW DIRECTION
- P.C. CONCRETE RETAINING WALL
- DEPRESSED CURB PER SC2
- CONCRETE BARRIER CURB SC1.1
- TACTILE SURFACE INDICATOR
- CONCRETE SURFACE
- PAVERS
- HEAVY DUTY PAVEMENT
- PROPOSED RIVERSTONE AS PER OPSS 1004
- PROPOSED BIKE RACK (SEE LANDSCAPE FOR DETAILS)
- TR — PROPOSED TRANSFORMER

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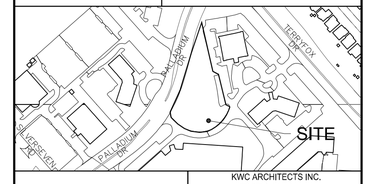

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PROJECT

301 PALLADIUM DRIVE

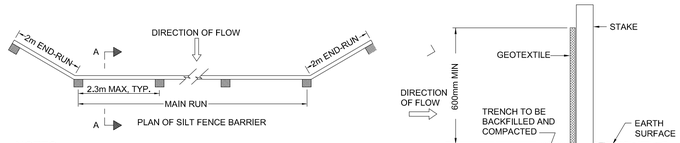
DRAWING

GRADING PLAN

DESIGN	DATE	SCALE
DO	2021-12-21	1:250
DRAWN: DO	PROJECT NO.: 210390900	
CHECKED: AA	DRAWING NO: C002	VERSION
APPROVED: AA		

EROSION AND SEDIMENT CONTROL NOTES:

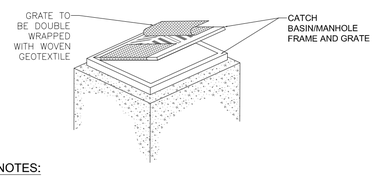
1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THIS INCLUDES LIMITING THE AMOUNT OF EXPOSED SOIL, USING FILTER CLOTH UNDER THE GRATES OF CATCHBASINS AND MANHOLES, AND INSTALLING SILT FENCES AND OTHER EFFECTIVE SEDIMENT TRAPS. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY TO BE PAID FOR AT THE CONTRACTOR'S EXPENSE.
2. EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE IMPLEMENTED PRIOR TO CONSTRUCTION AND REMAIN IN PLACE UNTIL VEGETATION IS ESTABLISHED AND APPROVAL IS GRANTED BY THE ENGINEER TO REMOVE MEASURES.
3. REGULAR INSPECTION AND MAINTENANCE OF THE EROSION AND SEDIMENT MEASURES SHALL BE UNDERTAKEN. THE IMPLEMENTATION AND ADJUSTMENT AND/OR CORRECTIVE MAINTENANCE OF THE EROSION AND SEDIMENT MEASURES IS AN INTEGRAL PART OF THE PLAN AND MUST BE PERFORMED.
4. CATCH BASIN AND MANHOLE SEDIMENT PROTECTION SHALL BE PROVIDED FOR ALL CATCH BASINS, CATCH BASIN MAINTENANCE HOLES, DITCH INLETS, AREA DRAINS, AND OPEN GRATE MAINTENANCE HOLES WITHIN THE WORK AREA, WITHIN 50m OF THE WORK AREA, OR WHICH RECEIVE RUN-OFF FROM THE WORK AREA. CATCH BASIN INLET PROTECTION IS REQUIRED BOTH FOR EXISTING STRUCTURES (INCLUDING STRUCTURES WHICH WILL BE REMOVED AS PART OF THE WORK) AND NEW STRUCTURES INSTALLED AS PART OF THE WORK. CATCH BASIN SEDIMENT PROTECTION SHALL INVOLVE BOTH (i) WRAPPING GRATE WITH FILTER CLOTH, AND (ii) SURROUNDING CATCH BASIN OR DRAIN WITH SEDIMENT CAPTURE FILTER SOCK. SEDIMENT CAPTURE FILTER SOCK SHALL BE STACKED (IN SOFT GROUND) OR HELD IN PLACE USING SANDBAGS (IN PAVED AREAS). CATCH BASIN SEDIMENT PROTECTION SHALL BE INSPECTED REGULARLY AND MAINTAINED AS NECESSARY. ANY VISIBLE ACCUMULATION OS SEDIMENT SHALL BE REMOVED AND DISPOSED OFF-SITE.
5. ALL SEDIMENT CONTROL MEASURES SHALL BE INSPECTED ON A REGULAR BASIS AND FOLLOWING STORM EVENTS FOR INTEGRITY AND FUNCTION BY THE CONTRACTOR. ANY REQUIRED REPAIRS TO EROSION AND SEDIMENT CONTROL MEASURES TO BE COMPLETED WITHIN 24 HOURS.
6. ALL SEDIMENT CONTROL MEASURES ARE TO BE MAINTAINED BY THE CONTRACTOR AS NECESSARY. SEDIMENTS REMOVED FROM THE CONTROL MEASURES (SILT FENCES, CATCHBASIN SEDIMENT CONTROLS, ETC.) SHALL BE DISPOSED OF IN ACCORDANCE WITH MOECC GUIDELINES.
7. IF NECESSARY, ADDITIONAL SEDIMENT CONTROL MEASURES MAY BE INSTALLED AS DIRECTED BY THE ENGINEER OR THE RIDEAU VALLEY CONSERVATION AUTHORITY.
8. ONCE NEW CATCH BASINS AND MANHOLES ARE INSTALLED, GEOTEXTILE FILTER FABRIC SHALL BE PLACED AS PER NOTE 4, AND SHALL REMAIN IN PLACE UNTIL THE COMPLETION OF CONSTRUCTION ACTIVITIES.
9. GEOTEXTILE FILTER FABRIC SHALL BE PLACED AS PER NOTE 4, AND SHALL REMAIN IN PLACE UNTIL THE COMPLETION OF CONSTRUCTION ACTIVITIES FOR EXISTING CATCH BASINS AT THE ROW.
10. CONTRACTOR IS RESPONSIBLE TO KEEP THE ROADS FREE AND CLEAN FROM MUD OR DEBRIS.
11. THE CONTRACTOR MUST PROTECT THE STORMWATER TANK FROM EROSION AND SEDIMENT DURING CONSTRUCTION.



NOTES:

1. WOVEN GEOTEXTILE TO HAVE A MINIMUM EQUIVALENT OPENING, SIZE OF 0.15mm AND A MAXIMUM EQUIVALENT OPENING SIZE OF 0.25mm.
2. WOVEN GEOTEXTILE TO HAVE A HORIZONTAL OVERLAP OF 100mm AT JOINTS.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

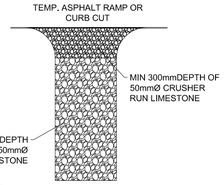
LIGHT DUTY SILT FENCE BARRIER
AS PER OPSD 219.110
N.T.S.



NOTES:

1. TO BE USED UNDER APPROPRIATE DRAINAGE CIRCUMSTANCES, DURING THE CONSTRUCTION PERIOD.
2. WOVEN GEOTEXTILE TO HAVE A MINIMUM EQUIVALENT OPENING, SIZE OF 0.15mm AND A MAXIMUM EQUIVALENT OPENING SIZE OF 0.25mm.
3. WOVEN GEOTEXTILE TO BE REPLACED PERIODICALLY WHEN ACCUMULATED SEDIMENTS INTERFERE WITH DRAINAGE.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

CATCH BASIN /MANHOLE PROTECTION DETAIL
N.T.S.



NOTES:

1. INSTALL AT ALL SITE ACCESS LOCATIONS.
2. TEMPORARY CONSTRUCTION ACCESS SHALL BE REMOVED ON COMPLETION OF THE WORK AND ALL DISTURBED AREAS SHALL BE RESTORED TO ORIGINAL OR BETTER CONDITION.

CATCH BASIN /MANHOLE PROTECTION DETAIL
N.T.S.

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HORIZONTAL
0m 7.5 15

LEGEND

- PROPERTY LINE
- SILT FENCE
- MUD MAT ENTRANCE
- FILTER CLOTH AROUND STRUCTURES

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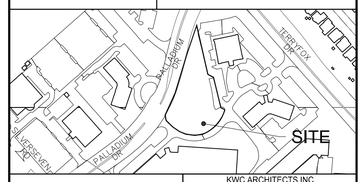


MORRISON HERSHFIELD
200 - 2932 Baseline Road
Ottawa, Ontario, K2H 1B1
Tel: (613) 739-2910

KWC ARCHITECTS INC.
201-383 Parkdale Avenue,
Ottawa, Ontario K1Y 4R4

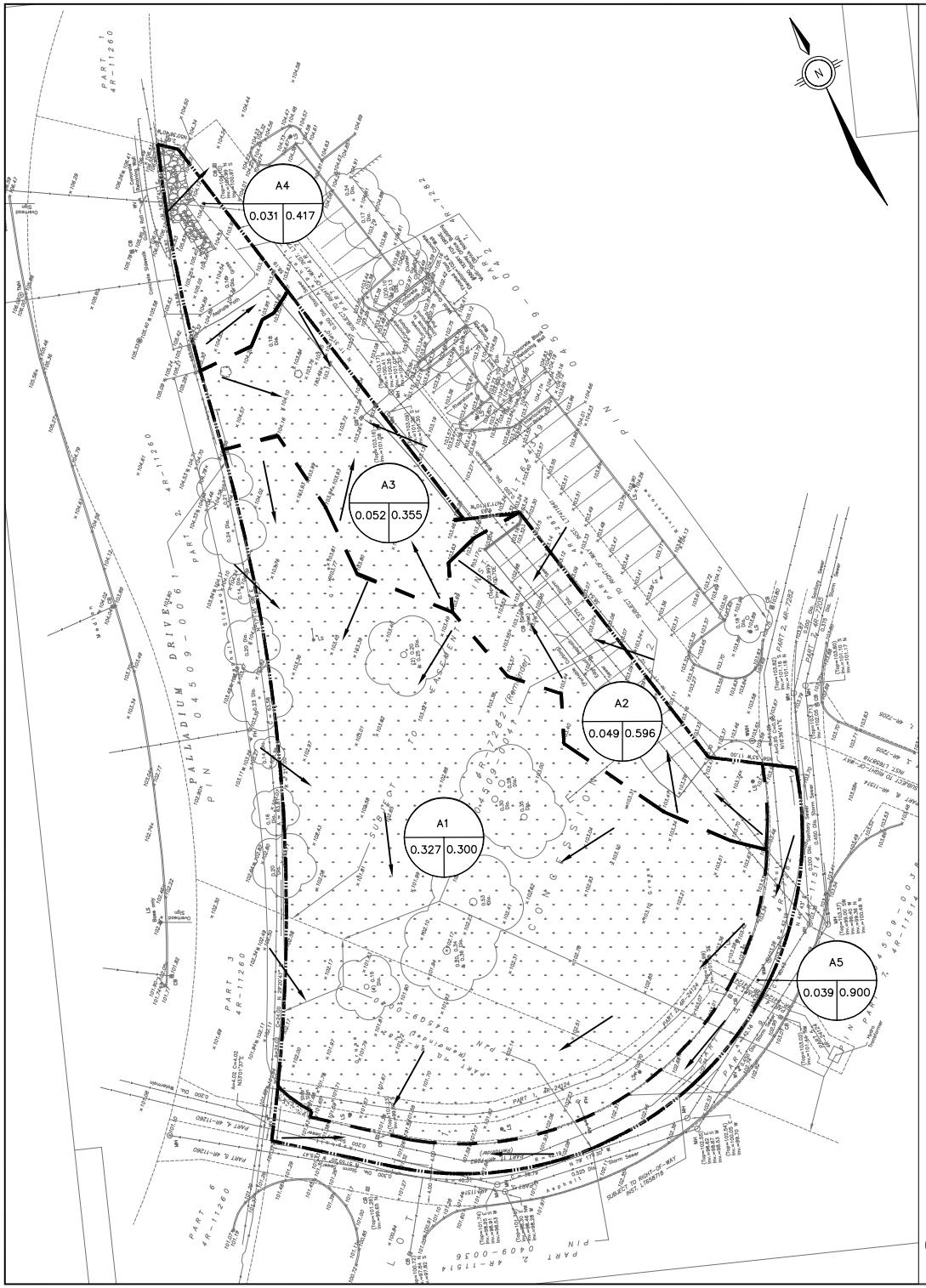
PROJECT

301 PALLADIUM DRIVE

DRAWING

EROSION AND SEDIMENT CONTROL PLAN

DESIGN: DO	DATE: 2021-12-21	SCALE: 1:250
DRAWN: DO	PROJECT NO.: 210390900	
CHECKED: AA	DRAWING NO: C003	VERSION:
APPROVED: AA		



EXISTING DRAINAGE AREA			
AREA I.D.	TOTAL AREA (m^2)	RUNOFF COEFFICIENT C_{5YEAR}	COMMENTS
1	3270	0.30	100% VEGETATED AREA
2	494	0.60	49% ASPHALT AREA 51% VEGETATED AREA
3	520	0.35	9% ASPHALT AREA 91% VEGETATED AREA
4	315	0.42	15% ASPHALT AREA 74% VEGETATED AREA 11% GRAVEL AND CONCRETE AREA
5	390	0.90	PREVIOUSLY DEVELOPED AREA; NOT INCLUDED IN DESIGN

SURFACE RUNOFF DISTRIBUTION				
LOCATION	TOTAL AREA (m^2)	A X C C_{5YEAR}	% TOTAL A X C C_{5YEAR}	DRAINAGE AREAS
EXISTING 250mm STORM SEWER (NORTHEAST OF SITE BOUNDARY)	100	75	3.8%	A4
EXISTING 375mm STORM SEWER (EAST OF SITE BOUNDARY)	1230	564	28.6%	A2 & A3 & A4
EXISTING 525mm STORM SEWER (SOUTH OF SITE BOUNDARY)	3660	1332	67.6%	A1 & A5
TOTAL SITE	4990	1971	100%	-

LEGEND

- EXISTING MANHOLE
- EXISTING CATCH BASIN
- EXISTING ELEVATION
- EXISTING CURB
- PROPERTY EXTENTS
- EXISTING ASPHALT
- EXISTING CONCRETE SIDEWALK
- EXISTING VEGETATED AREA
- EXISTING RIVER STONE
- EXISTING CONCRETE RETAINING WALL

CATCHMENT ID — A1 (0.327 | 0.300) — RUNOFF COEFFICIENT

DRAINAGE AREA (ha)

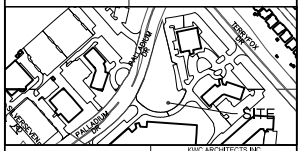
CATCHMENT EXTENTS

PROPERTY EXTENTS

DIRECTION OF SURFACE RUNOFF

No.	YYYY-MM-DD	ISSUED
01	2022-01-19	ISSUED FOR SITE PLAN APPROVAL
00	2021-12-21	ISSUED FOR CLIENT REVIEW

STAMP | PERMIT TO PRACTICE

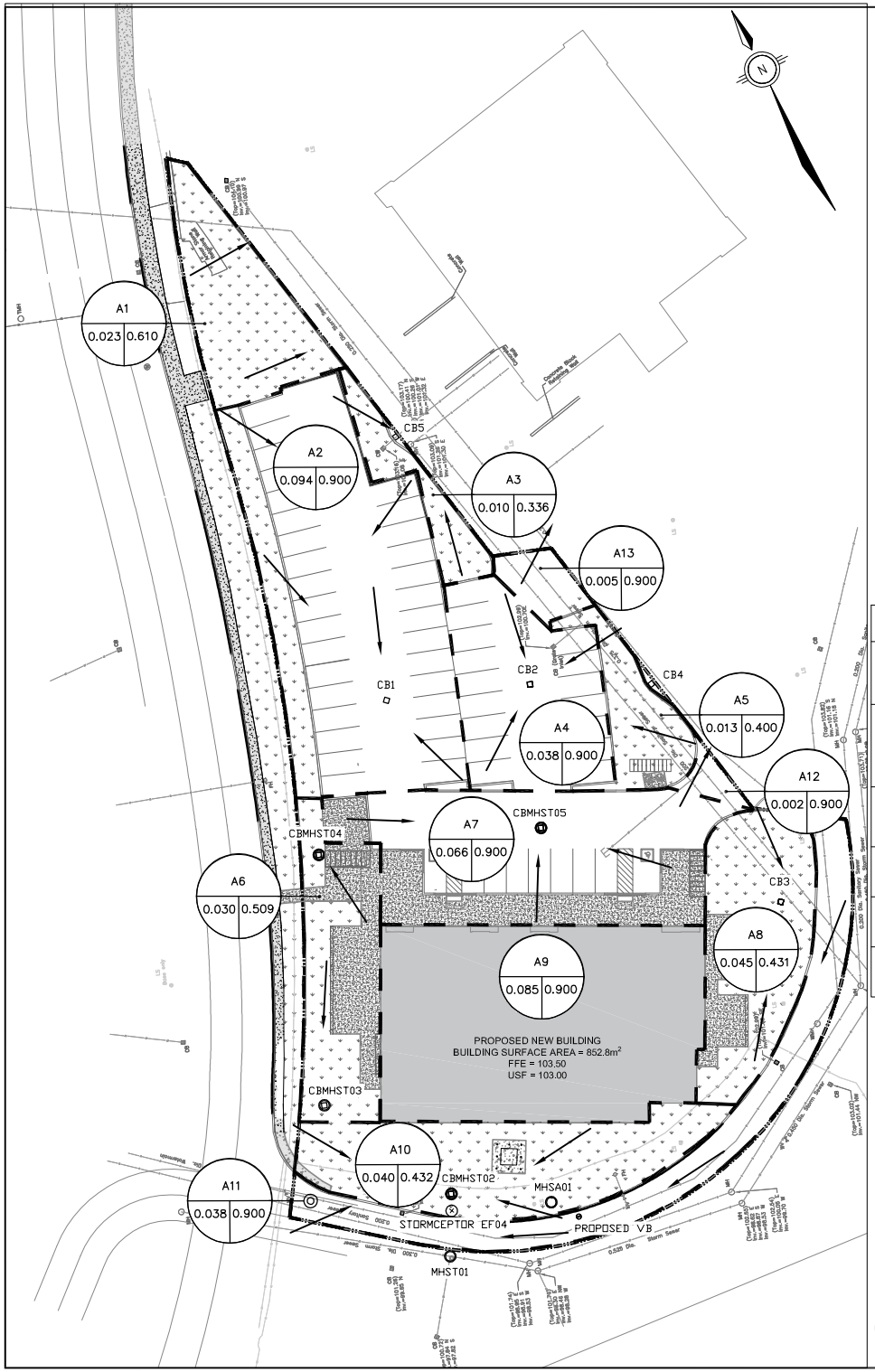


MORRISON HERSHFIELD
KWC ARCHITECTS INC.
301-1053 Fairside Avenue,
Ottawa, Ontario K1V 4H4

PROJECT
301 PALLADIUM DRIVE

DRAWING
EXISTING DRAINAGE AREA PLAN

DESIGN	DATE	SCALE
DD	2021-12-21	1:800
DRAWN: DD	PROJECT NO.: 210390900	
CHECKED: AA	DRAWING NO: C004	VERSION
APPROVED: AA		



1:800

HORIZONTAL

0m 15 30

PROPOSED CONTROLLED SURFACE RUNOFF DISTRIBUTION				
LOCATION	TOTAL AREA (m^2)	A X C C_{5YEAR}	A X C $C_{100YEAR}$	DRAINAGE AREAS
EXISTING 525mm STORM SEWER (SOUTH OF SITE BOUNDARY)	4120	3032	3543	A2 A4 A5 A6 A7 A8 A9 A10

PROPOSED UNCONTROLLED SURFACE RUNOFF DISTRIBUTION				
LOCATION	TOTAL AREA (m^2)	A X C C_{5YEAR}	% TOTAL A X C C_{5YEAR}	DRAINAGE AREAS
EXISTING 250mm STORM SEWER (NORTHEAST OF SITE BOUNDARY)	100	75	29%	A1
EXISTING 375mm STORM SEWER (EAST OF SITE BOUNDARY)	304	180	71%	A1 & A3 A12 & A13
TOTAL SITE	404	255	100%	-

NOTE: AREA DRAIN A11 PREVIOUSLY DEVELOPED AND NOT CONSIDERED IN CALCULATIONS

PROPOSED UNCONTROLLED DRAINAGE AREA			
AREA I.D.	TOTAL AREA (m^2)	RUNOFF COEFFICIENT C_{5YEAR}	COMMENTS
1	230	0.61	15% ASPHALT AREA 74% VEGETATED AREA 11% GRAVEL AND CONCRETE AREA
3	100	0.34	5% CONCRETE AREA 95% VEGETATED AREA
11	390	0.90	100% ASPHALT AREA
12	19	0.90	100% ASPHALT AREA
13	55	0.90	100% ASPHALT AREA

PROPOSED CONTROLLED DRAINAGE AREA			
AREA I.D.	TOTAL AREA (m^2)	RUNOFF COEFFICIENT C_{5YEAR}	COMMENTS
2	940	0.80	81% ASPHALT AREA 17% VEGETATED AREA 2% CONCRETE AREA
4	380	0.90	95% ASPHALT AREA 5% CONCRETE AREA
5	130	0.40	17% CONCRETE AREA 83% VEGETATED AREA
6	300	0.50	35% CONCRETE AREA 65% VEGETATED AREA
7	660	0.90	61% ASPHALT AREA 39% CONCRETE AREA
8	450	0.43	78% VEGETATED AREA 22% CONCRETE AREA
9	850	0.90	100% BUILDING AREA
10	405	0.43	15% ASPHALT AREA 74% VEGETATED AREA 11% GRAVEL AND CONCRETE AREA

LEGEND

- EXISTING MANHOLE
- EXISTING CATCH BASIN
- EXISTING ELEVATION
- EXISTING CURB
- PROPERTY EXTENTS
- EXISTING ASPHALT
- EXISTING CONCRETE SIDEWALK
- EXISTING VEGETATED AREA
- EXISTING RIVER STONE
- EXISTING CONCRETE RETAINING WALL
- PROPOSED ROOF DRAIN
- PROPOSED STORM MANHOLE
- PROPOSED STORM CATCH BASIN MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED DITCH INLET
- PROPOSED SANITARY MANHOLE

CATCHMENT ID — A1 — 0.327 | 0.300 — RUNOFF COEFFICIENT

DRAINAGE AREA

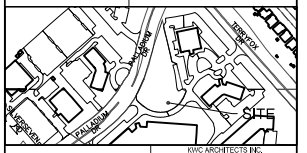
CATCHMENT EXTENTS

PROPERTY EXTENTS

DIRECTION OF SURFACE RUNOFF

No.	YYYY-MM-DD	ISSUED
01	2022-01-19	ISSUED FOR SITE PLAN APPROVAL
00	2021-12-21	ISSUED FOR CLIENT REVIEW

STAMP | PERMIT TO PRACTICE



MORRISON HERSHFIELD
KWC ARCHITECTS INC.
30-1053 Parkdale Avenue,
Ottawa, Ontario K1Y 4R4

PROJECT

301 PALLADIUM DRIVE

DRAWING

PROPOSED DRAINAGE AREA PLAN

DESIGN	DATE	SCALE
DO	2021-12-21	1:800
DRAWN: DO	PROJECT NO.: 210390900	
CHECKED: AA	DRAWING NO: C005	VERSION
APPROVED: AA		

Appendix B

Water Demand and FUS Calculations

1. 301 Palladium Drive - Water Demand Calculations

Project No.	210390900
Date	19-Jan-22
Prepared By:	D O'Neil
Checked By	A Elsayed

Commercial / Industrial / Institutional Area and Demand

As per City of Ottawa Water Distrubtion Guidelines, 2010, Table 4.2

Property Type	Amount	Units	Quantity	Average Flow Rate (L/min)
Other Commercial	28,000	L/gross ha/d	0.5	9.7
			Average I/C/I Daily Demand	9.7

Property Type	Commercial	
Max Daily Demand Peaking Factor (OWDG, Table 4.2)=	1.50	x avg. day
Max Hourly Demand Peaking Factor (OWDG, Table 4.2)=	1.80	x max day
Max Daily I/C/I Demand=	14.58	L/min
Max Hourly I/C/I Demand=	26.25	L/min

Total Average Daily Demand=	9.7	L/min
Total Maximum Daily Demand=	14.58	L/min
Total Maximum Hourly Demand=	26.25	L/min

2. 301 Palladium Drive - FUS Calculations

Project Name	Civil Servicing for Proposed Development at 301 Palladium Dr
Project Number	210390900
Site Address	301 Palladium Dr. Ottawa, Ontario
Completed By	Dillon O'Neil
Date	19-Jan-22

(Per Fire Underwriters Survey, Water Supply for Public Fire Protection, 1999)

1. Determine Estimated Fire Flow based on Building Floor Area

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

F= Required flow in litres / minute
A= Total floor area in m^2
C= Coefficient related to Construction
= 1.5 for wood frame construction
= 1.0 for ordinary construction
= 0.8 for non-combustible construction
= 0.6 for fire-resistive construction

C= 0.8

Floor Areas

Commercial Building

Floor	Area (m²)	Floor	Area (m²)
Basement	0	Ground floor	853
Total			853

Area excl. basement at least 50% below grade = 853 m^2

A= 853 m^2

F= 5139.7 L/min
Round to nearest 1000 L/m, F = 5000.0 L/min

Round to nearest 1000 L/m, F = 5000.0 L/min
5000.0 L/min Total

2. Adjust flow based on Fire hazard and contents

A	Non-combustible	-25%
B	Limited Combustible	-15%
C	Combustible	0%
D	Free Burning	15%
E	Rapid Burning	25%

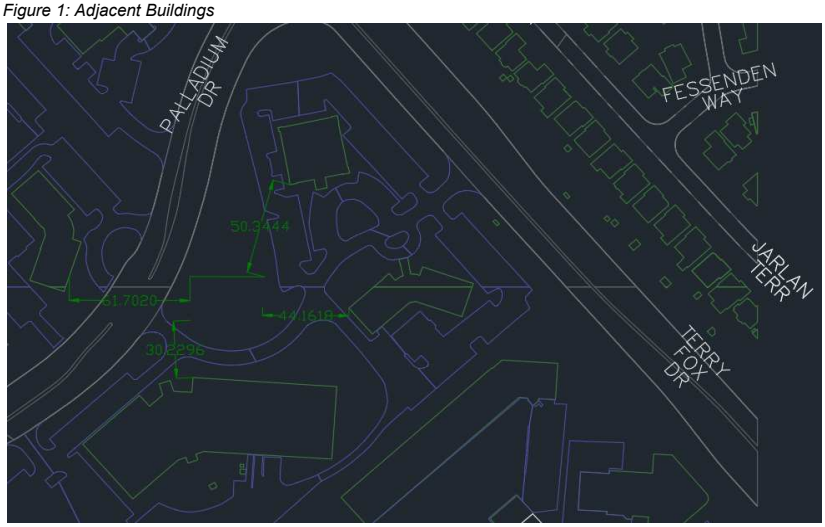
Type of Construction (A,B,C,D)	A	
Adjustment Factor	-25%	
Flow From 1.	5000.0 L/min	
Adjusted Flow	3750.0 L/min	
Minimum Flow (2000 L/min)	3750.0 L/min	
Flow	3750.0 L/min	
Total flow required for Building	3750.0 L/min	Total

3. Reduce flow from No. 2. based on automatic sprinkler protection

Flow from 2.		3750.0 L/min
Complete Automatic Sprinkler Protection (yes/no)	No	
Reduction		0%
Water supply is standard (yes/no)	No	
Additional Reduction		0%
Sprinkler System is fully supervised (yes/no)	No	
Additional Reduction		0%
Total Reduction		0%
Flow after Sprinkler Reduction		3750.0 L/min
Flow after Sprinkler Reduction		3750.0 L/min
Total		**3750.0 L/min**

4. Adjacent Structures / Fire Separation with other buildings

Figure 1: Adjacent Buildings



Exposure charge based on Table G5:

Commercial Building:

Side	Construction Type	Storeys	Length (m)	LH Factor
North	Block masonry, aluminum panels, windows/window wall	1	38	38
East	Block masonry, aluminum panels, windows/window wall	1	23	23
South	Block masonry, aluminum panels, windows/window wall	1	38	38
West	Block masonry, aluminum panels, windows/window wall	1	23	23

Commercial Building:

Side	Separation Distance (m)	Exposure Charge	LH Factor	
North	50	-	38	>45m
East	44	5%	23	
South	30	8%	38	
West	61	-	23	>45m

Cumulative Increase (Max 75%)	13%
Flow Increased for Adjacent Structures	4237.5 L/min
Maximum Permitted Flow (45 000 L/min)	4237.5 L/min
Minimum Permitted Flow (2 000 L/min)	4237.5 L/min
Required Fire Flow (rounded to nearest 1000 L/m)	4000.0 L/min
	66.67 L/s

Confirmation that required fire flow is available from hydrants within 150m of building:

Hydrant	Distance from building (m)	Class	Contribution to required fire flow (L/m)
1 (exisitng)	6	AA	5700
2 (existing)	22	AA	5700
3 (exisitng)	60	AA	5700
4 (existing)	90	AA	5700
5 (exisitng)	130	AA	5700
		Available Flow	28500 L/min
		Required Flow (FUS calc)	4237.5 L/min

3. 301 Palladium Drive - Water Demand Calculations

P_{Road}= 79.00 (psi) Dynamic pressure (existing boundary conditions)
P_{Road}= 544.686 (kPa)

Proposed Service off 200mm watermain at Private Road

Length

L= 12.9 (m)
42 (ft)

Size

d= 150 (mm)
6 (in)

Flow

Q = 0.067 (m3/s)
1061 (Usg/min)

Velocity

$$V = \frac{1.274Q}{d^2}$$

V= 3.79 (m/s)

Head Loss

$$P_d = \frac{4.52Q^{1.85}}{C^{1.85}d^{4.87}}$$

$$P = 0.434hSG$$

Pipe Diameter	C-Factor
150	100
200-250	110
300-600	120
600+	130

SG= specific gravity of water
= 1
C = 100
P_d= 0.0625662 (psi)
h= 0.144162 (ft/ft)
6.1013 (ft)

Pressure Loss

P_{ROAD}= 79.00 (psi)
P_L= 2.65 (psi)
$P_{AT\ METER}$= 76.35 (psi)
$P_{AT\ METER}$= 526.42892 (kPa)

Min Allowable Pressure (Max Hourly Demand) 140 (kpa) OK

Demand Scenario	Head (m)	Pressure (psi)
Maximum HGL	161.3	85.7
Peak Hour	156.5	78.9
Max Day plus Fire	156.6	79

Ground Elevation = 101.0 m

4. 301 Palladium Drive - Water Demand Calculations

P_{Road}= 78.90 (psi) Dynamic pressure
P_{Road}= 543.9966 (kpa)

Proposed Service off 200mm watermain at Private Road

Length

L= 12.9 (m)
42 (ft)

Size

d= 150 (mm)
6 (in)

Flow

Q = 0.0004 (m3/s)
7 (Usg/min)

Velocity

$$V = \frac{1.274Q}{d^2}$$

V= 0.02 (m/s)

Head Loss

$$P_d = \frac{4.52Q^{1.85}}{C^{1.85}d^{4.87}}$$

$$P = 0.434hSG$$

Pipe Diameter	C-Factor
150	100
200-250	110
300-600	120
600+	130

SG= specific gravity of water
= 1
C = 100
P_d= 5.688E-06 (psi)
h= 0.000013 (ft/ft)
0.0006 (ft)

Pressure Loss

P_{ROAD}= 78.90 (psi)
P_L= 0.00 (psi)
$P_{AT\ METER}$= 78.90 (psi)
$P_{AT\ METER}$= 543.99 (kpa)

Min Allowable Pressure (Max Hourly Demand) 276 (kpa) OK

Demand Scenario	Head (m)	Pressure (psi)
Maximum HGL	161.3	85.7
Peak Hour	156.5	78.9
Max Day plus Fire	156.6	79

Ground Elevation = 101.0 m

5. 301 Palladium Drive - Water Demand Calculations

Scenario: *Max Daily Demand*

P_{Road}= 78.90 (psi) Dynamic Pressure
P_{Road}= 544.00 (kpa)

Proposed Service off 200mm watermain at Private Road

Length

L= 12.9 (m)
42.3249 (ft)

Size

d= 150 (mm)
6 (in)

Flow

Q = 0.0002 (m3/s)
4 (USG/min)

Velocity

$$V = \frac{1.274Q}{d^2}$$

V= 0.01 (m/s)

Head Loss

$$P_d = \frac{4.52Q^{1.85}}{C^{1.85}d^{4.87}}$$

$$P = 0.434hSG$$

Pipe Diameter	C-Factor
150	100
200-250	110
300-600	120
600+	130

SG= specific gravity of water
= 1
C = 100
P_d= 1.92E-06 (psi)
h= 0.000004 (ft/ft)
0.0002 (ft)

Pressure Loss

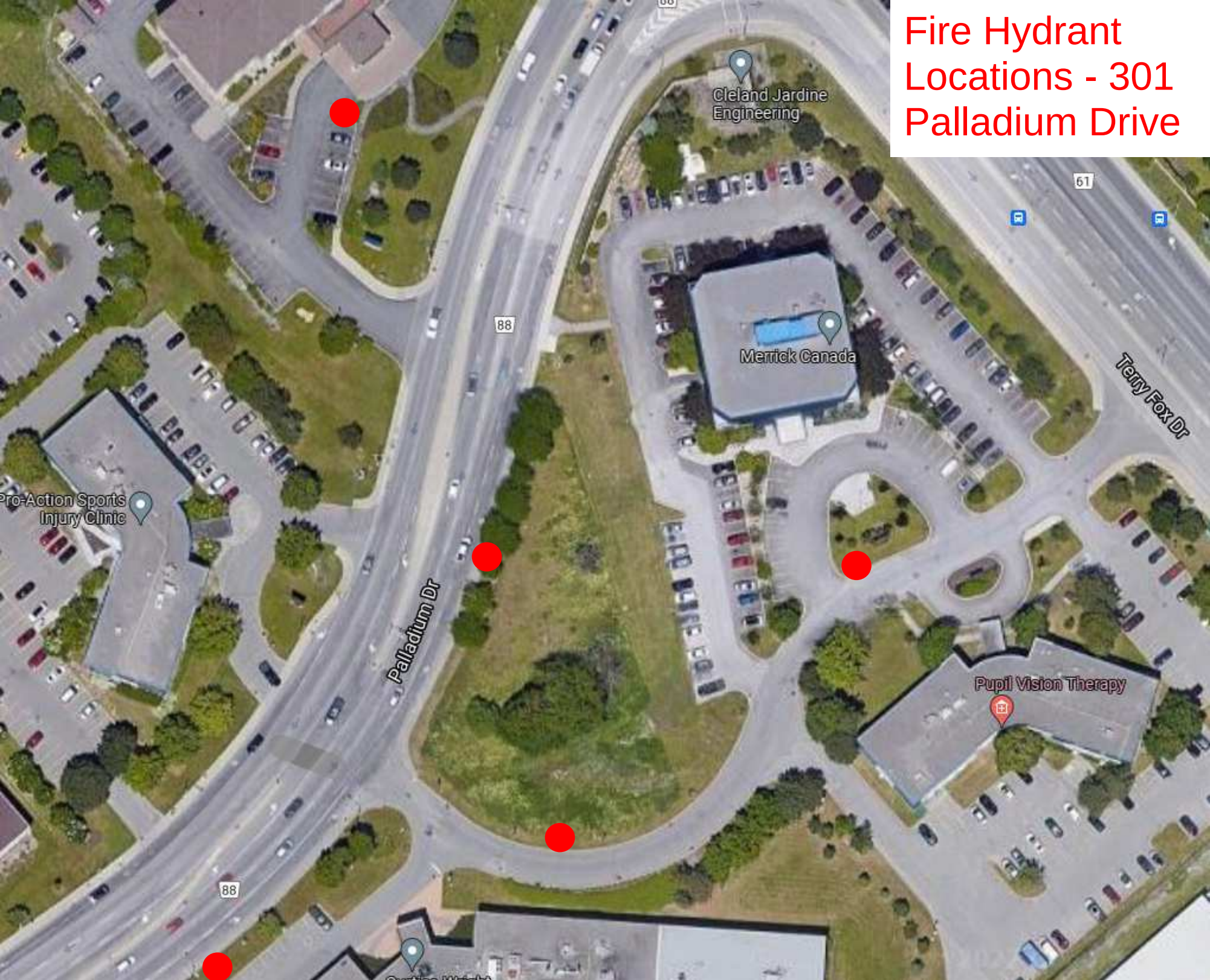
P_{ROAD}= 78.90 (psi)
P_L= 0.00008 (psi)
$P_{AT\ METER}$= 78.90 (psi)
$P_{AT\ METER}$= 544.00 (kpa)

Min Allowable Pressure (Max Daily Demand) 345 (kpa) OK

Demand Scenario	Head (m)	Pressure (psi)
Maximum HGL	161.3	85.7
Peak Hour	156.5	78.9
Max Day plus Fire	156.6	79

Ground Elevation = 101.0 m

Fire Hydrant Locations - 301 Palladium Drive



City of Ottawa - Water Distribution System Facilities & Feedermains

CARP
WELLS/RESERVOIRS/P.S

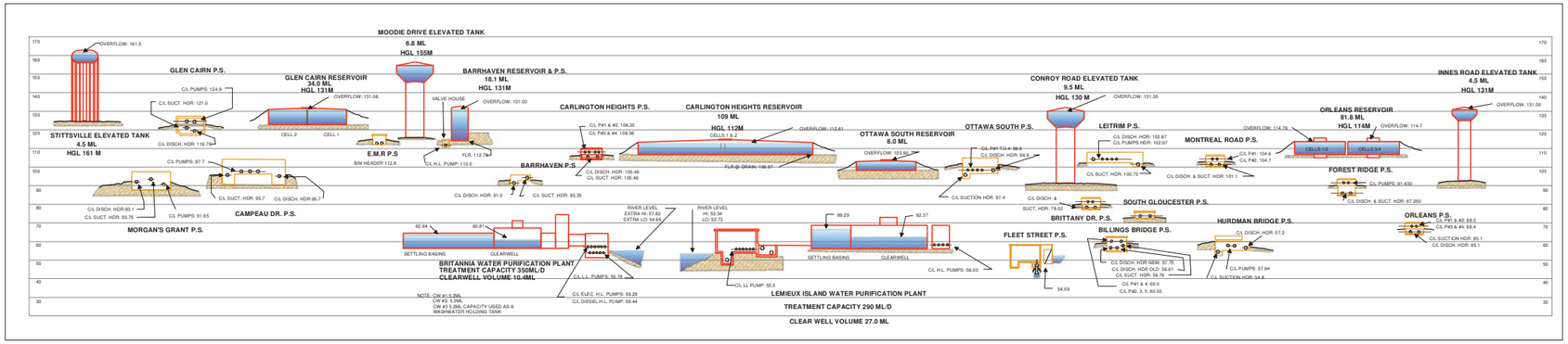
RICHMOND
WELLS

MUNSTER
WELLS/RESERVOIRS/P.S

VARS
WELLS/RESERVOIRS/TREATMENT PLANT & P.S

ORLEANS P.S.
FOREST RIDGE P.S
Ogilvie Rd. Backup P.S.
ORLEANS RES.
MONTREAL ROAD P.S.
BRITTANY DRIVE P.S.
FLEET STREET P.S.
LEMIEUX ISLAND PURIFICATION PLANT & P.S. & RES.
BRITANNIA PURIFICATION PLANT & P.S. & RES.
MORGAN'S GRANT P.S.
CAMPEAU DR. P.S.
ENERGY MINES & RESOURCES P.S.
GLEN CAIRN P.S. & RES
STITTSVILLE ELEVATED TANK
Abbott/Iber St. Backup P.S.
MOODIE ELEVATED TANK
BARRHAVEN P.S.
BARRHAVEN RES. & P.S.
Merivale Rd. Backup P.S.
OTTAWA SOUTH P.S & RES.
HURDMAN P.S.
Innes Rd Backup P.S.
Innes Rd/BearBrook Rd Backup P.S.
INNES RD ELEVATED TANK
BILLINGS BRIDGE P.S.
CONROY RD ELEVATED TANK
CARLINGTON HEIGHTS P.S. & RES.
SOUTH GLOUCESTER P.S. (INACTIVE)
LEITRIM P.S.
SHADOW RIDGE P.S. & WELLS
SHADOW RIDGE WELL

1E 1W 2C 2E 2W 3C 3W 4C BARR EMR ME MG MONT SHAD



Legend

Water System Structure

- Pump Station
- Backup Pump Station
- Water Treatment Plant
- Well
- Elevated Tank
- Reservoir

WATERMAINS

Priority, Internal Diameter

- Backbone 1524mm - 1981mm
- Backbone 1067mm - 1372mm
- Backbone 610mm - 914mm
- Backbone 406mm - 508mm
- Backbone 152mm - 305mm
- Distribution 1676mm - 1981mm
- Distribution 1067mm - 1372mm
- Distribution 610mm - 914mm
- Distribution 406mm - 508mm
- Distribution 305mm - 381mm

PRESSURE ZONES

1E, 1W, 2C, 2E, 2W, 3C, 3W, 4C, BARR, EMR, ME, MG, MONT, SHAD

N W E S

Ottawa

Infrastructure Services & Community Sustainability
Infrastructure Services

0 1,000 2,000 4,000 6,000
Meters

FIGURE 1-1

DRAWN BY: D. HESS DATE: 31 July 2013

Appendix C

Sanitary Flow Calculations

1. Sanitary Flow Estimate

301 Palladium Drive

Project No.	210390900
Date	2021-12-07
Prepared By:	D O'Neil
Checked By	A Elsayed

Residential Area and Population

As per City of Ottawa Sewer Design Guidelines, 2012, Table 4.2

Unit Type		Person Per Unit	No. of Units	Population
Single Family		3.4		0.0
Semi-detached		2.7		0.0
Duplex		2.3		0.0
Townhouse (row)		2.7		0.0
Apartments:				
	Bachelor	1.4		0.0
	1 Bedroom	1.4		0.0
	2 Bedroom	2.1		0.0
	2 Bedroom	3.1		0.0
	Average Apt	1.8		0.0
			Total Population	0.0

Residential Average Flow (*OSDG, Figure 4.3*)= 280 L/c/day

Average Residential Flow Rate= 0.0 L/s

Residential Peaking Factor (Harmon Equation)= 4.5

Peak Residential Flow Rate= 0 L/s

Commercial / Industrial / Institutional Area and Flow

As per City of Ottawa Sewer Design Guidelines, 2012, Figure 4.3)

Property Type	Average Flow (L/ha/d)	Area (ha)	Average Flow Rate (L/s)
Commercial	28,000	0.08528	0.028
Instuitional	28,000		0.000
Light Industrial	35,000		0.000
Heavy Industrial	55,000		0.000
		Total Average I/C/I Flow Rate	0.028

Total I/C/I Area (%) 0.171

Commercial Peaking Factor (*OSDG, Figure 4.3)*= 1.000

Commercial Peak Flow Rate= 0.028 L/s

Institutional Peaking Factor (*OSDG, Figure 4.3)*= 1.000

Institutional Peak Flow Rate= 0.000 L/s

Industrial Peaking Factor (*OSDG, Appendix 4-B)*=

Industrial Peak Flow Rate= 0.000 L/s

Peak I/C/I Flow Rate= 0.028 L/s

Peak Extraneous Flows (design event)

Total Site Area= 0.498 ha

Infiltration Allowance (*OSDG, Figure 4.3)*= 0.330 L/s/ha

Total Infiltration Flow= 0.164 L/s

Average Dry Weather Flow Rate=	0.0 L/s
Peak Dry Weather Flow Rate=	0.0 L/s
Peak Wet Weather Flow Rate=	0.2 L/s

2. Proposed Sanitary Sewer Design Sheet

301 Palladium Drive

Location			Maintenance Hole Elevations						Pipe						Notes
Building	From	To	Invert (upstream)	Invert source (upstream)	Invert (downstream)	Invert source (downstream)	Drop in downstream MH	Reason	Length (m)	Length source	Diameter (mm)	Slope (%)	Capacity (Full) (L/s)	Velocity (Full) (m/s)	
Existing Sanitary Sewers on the Private Access Road	*MHSA12555*	*MHSA12556*	100.67	SPA base map	100.14	SPA base map	-		28.0	SPA base map	200	1.89%	45	1.44	
Existing Sanitary Sewers on the Private Access Road	*MHSA12556*	*MHSA12557*	99.69	SPA base map	99.03	SPA base map	-		24.8	SPA base map	200	2.66%	54	1.70	
Existing Sanitary Sewers on the Private Access Road	*MHSA12557*	*MHSA12558*	98.58	SPA base map	97.60	SPA base map	-		50.5	SPA base map	200	1.94%	46	1.45	
Proposed Site Servicing Sanitary Sewer	*Proposed Building*	***MHSA01***	102.70	SPA base map	100.07	SPA base map	-		8.6	C001	200	2.00%	46	1.48	
Proposed Site Servicing Sanitary Sewer	***MHSA01***	*MHSA12557*	100.07	SPA base map	99.94	SPA base map	-		6.6	C001	200	2.00%	46	1.48	

Design Parameters

Note 1: Proposed maintenance holes are shown in **bold**.

Manning Roughness Coefficient, n = 0.013

Designed: **D. O'Neil**	Project: **Palladium Drive New Commercial Development** **Existing and Proposed Sanitary Servicing**		
Checked: **A. Elsayed**	Location: **301 Palladium Drive, Ottawa**		
Dwg Reference: **C001**	File Ref: **2.1E+08**	Date: **January 17, 2022**	Sheet No.: **1 of 1**

Appendix D

Storm Sewer Design Calculations

1. Existing Conditions & Release Rate

301 Palladium Drive

Project No.	210390900
Date	19-Jan-22
Prepared By:	Dillon O'Neil
Checked By	A Elsayed

Existing Drainage Area Characteristics

Drainage Area	Area, A (ha)	Runoff Coefficient, R
A1	0.33	0.30
A2	0.05	0.60
A3	0.05	0.35
A4	0.03	0.42
Total	0.46	0.35

Asphalt Area:	R = 0.90
Grassy Area:	R = 0.30
Building Area:	R = 0.90
Gravel Area	R = 0.70
Concrete Area:	R = 0.90

Note 1: Exisitng ground surface is a mix of grass and hard surfaces

Note 2: A5 existing drainage area not included (developed laneway south of site)

Existing Conditions

Q = RAIN where Q = runoff rate (L/s)
R = runoff coefficient
i = rainfall intensity (mm/hr)
A = drainage area (ha)
N = 2.78

and $i = \frac{A}{(T_d + C)^B}$

Existing drainage area with longest flow path = Existing Vegetated Area (A1)
Approx. length of longest flow path (remote point to point of entry) = 65m
Surface type = Grass
Approximate surface slope = >2%

Calculation of Time of Concentration, using the Airport Method (MTO Drainage Manual)

$T_c = 3.26 \times (1.1 - R) \times L^{0.5} / S_w^{0.3}$ *Federal Aviation Formula (Airport Method)*

Where: T_c = Time of Concentration (min)
R = Runoff Coefficent
S_w = Catchment Area Slope (%)
L = Catchment Area Length (m)

Drainage Area	Runoff Coefficent, R	Length, L (m)	Average Slope, S_w (%)	Time of Concentration, T_c
A1	0.3	70	3	15.2

T_d = Time of Concentration = 15 mins (minimum of 10 mins)

Return Period (Years)	A	B	C	Intensity, I (mm/hr)	Area (ha)	Runoff Coefficient, R (Note 1)	Runoff Rate, Q (L/s)
2	732.95	0.81	6.20	61.77	0.46	0.35	27.3
5	998.07	0.81	6.05	83.56	0.46	0.35	37.0
100	1735.69	0.82	6.01	142.89	0.46	0.43	79.0

Note 1: For 100-year event, Runoff Coefficient is increased by 25% to a maximum of 1.0.

Allowable Release Rate

Criteria for calculation of allowable release rate:

Return Period	5	year (to suit capacity of downstream sewers)
Maximum Runoff Coefficient	0.5	
Time of Concentration	10	minutes

Return Period (Years)	A	B	C	Intensity, I (mm/hr)	Area (ha)	Runoff Coefficient, R	Runoff Rate, Q (L/s)
5	998.07	0.81	6.05	83.56	0.46	0.50	53.4

Allowable release rate from site in 100-year storm is 53.4 L/s

2. Proposed Drainage Areas

301 Palladium Drive

Project No.	210390900
Date	19-Jan-22
Prepared By:	Dillon O'Neil
Checked By	A Elsayed

Summary of All Proposed Drainage Areas

Drainage Area	Total Area, A (ha)	Runoff Coefficient, R (5-year event)	Runoff Coefficient, R (100-year event, Note 2)
A2	0.094	0.800	1.00
A4	0.038	0.900	1.00
A5	0.013	0.400	0.50
A6	0.030	0.510	0.64
A7	0.066	0.900	1.00
A8	0.045	0.431	0.54
A9	0.085	0.900	1.00
A10	0.041	0.433	0.54
Total	0.4119	0.736	0.86

(Refer to Proposed Storm Drainage Area Plan C005)

Note 1: Building area assumed to be 90% impervious with roof drains

Note 2: Grass area and tree drip line/planter area are the only pervious areas assumed

Proposed Uncontrolled Drainage Area Characteristics

Drainage Area	Area, A (ha)	Runoff Coefficient, R (5-year event)	Runoff Coefficient, R (100-year event, Note 1)
A1	0.023	0.610	0.76
A3	0.010	0.336	0.42
A12	0.002	0.900	1.00
A13	0.005	0.900	1.00
Total	0.040	0.594	0.72

(Refer to Proposed Storm Drainage Area Plan)

Note 1: Drainage area A11 not included; proposed to remain undeveloped

Note 2: For 100-year event, Runoff Coefficient is increased by 25% to a maximum of 1.0.

Runoff coefficients used in calculations:

Asphalt Area:	R = 0.90
Grassy Area:	R = 0.30
Planter/Drip line	R = 0.30
Building Area:	R = 0.90
Recessed Floor Area	R = 0.90
Gravel Area	R = 0.70
Concrete Area:	R = 0.90

Proposed Uncontrolled Runoff

Q = RAIN where Q = runoff rate (L/s)
R = runoff coefficient
i = rainfall intensity (mm/hr)
A = drainage area (ha)
N = 2.78

and $i = \frac{A}{(T_d + C)^B}$

T_d = Time of Concentration = 10 (min)

Return Period (Years)	A	B	C	Intensity, I (mm/hr)	Area (ha)	Runoff Coefficient, R	Runoff Rate, Q (L/s)
2	732.95	0.81	6.20	76.8	0.04	0.59	5.1
5	998.07	0.81	6.05	104.2	0.04	0.59	6.9
100	1735.69	0.82	6.01	178.6	0.04	0.72	14.5

Remaining Allowable Release Rate

Total Allowable Release Rate 53.4 (L/s)
Uncontrolled Runoff (100 year) 14.5 (L/s)
Remaining Allowable Release Rate 38.9 (L/s)

Runoff from remaining drainage areas in 100-year event will be controlled to 38.9 L/s

3. Vortex ICD Sizing

301 Palladium Drive

Project No.	210390900
Date	2022-01-19
Prepared By:	Dillon O'Neil
Checked By	A Elsayed

ICD sizing

100-yr elevation	101.40	m
Cover elevation	101.40	m
Invert elevation	98.83	m
Outlet pipe dia	250	mm

Orifice Sizing:

100-yr depth	2.44	m (depth above centreline of orifice)
Design flow	19.5	l/s
Orifice area	4605	mm² (calculated by Orifice Equation: $Q=CA(2gh)^{0.5}$ where C=0.61)
Orifice diameter	77	mm (if less than 83mm then vortex ICD required)

MHST02				
DESIGN EVENT	**DIAMETER OF OUTLET PIPE**	**ICD**	**DESIGN FLOW (l/s)**	**UPSTREAM HEAD (m)**
1:100 YR	250	HYDROVEX 125VHV-2	19.5	2.44

HYDROVEX®

VHV Vertical Vortex Flow Regulator

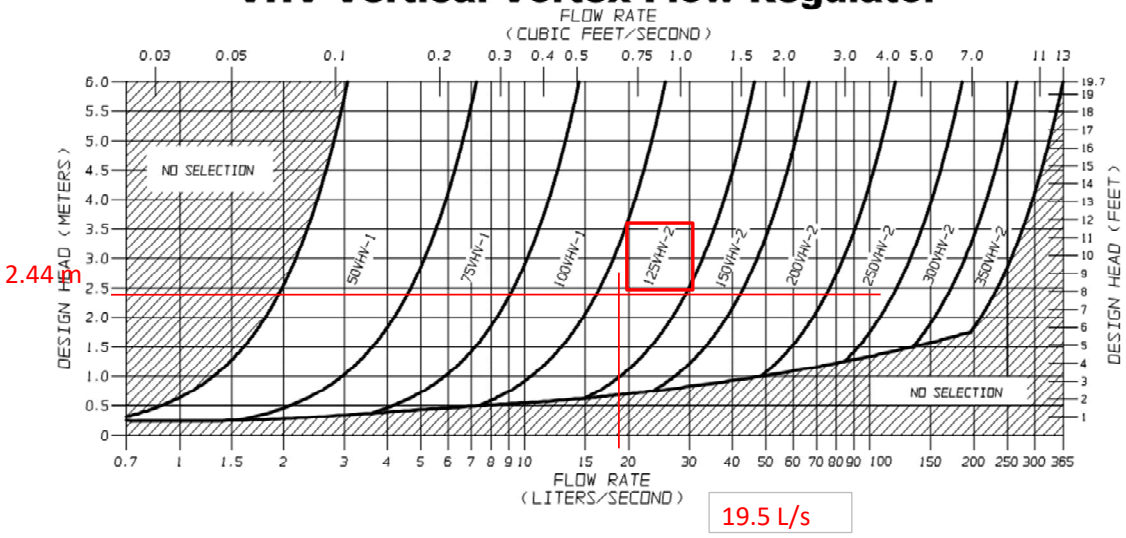


FIGURE 3 - VHV

JOHN MEUNIER

4. Proposed Storage

301 Palladium Drive

Project No.	210390900
Date	2022-01-19
Prepared By:	Dillon O'Neil
Checked By	A Elsayed

Proposed Controlled Drainage Area Characteristics

Drainage Area	Area, A (ha)	Runoff Coefficient, R (5-year event)	Runoff Coefficient, R (100-year event, Note 1)
A2	0.09	0.80	1.00
A4	0.04	0.90	1.00
A5	0.01	0.40	0.50
A6	0.03	0.51	0.64
A7	0.07	0.90	1.00
A8	0.05	0.43	0.54
A10	0.04	0.43	0.54
Total	0.33	0.69	0.83

(Refer to Proposed Storm Drainage Area Plan)

Note 1: For 100-year event, Runoff Coefficient is increased by 25% to a maximum of 1.0.

Allowable Release Rate from storage (100-year event) = 38.9 (L/s)

Average release rate during 100-year event = 19.5 (L/s) (Refer to attached calculation sheet)

140.07 (m3/h)

Orifice Sizing

Q = CA(2gH)^0.5

C = 0.61

Design Flow Rate = 19.5 (L/s)

Proposed 100-year tank depth = 1.45 (m)

Proposed 100-year head above centreline of orifice = 2.44 (m)

Orifice Area = 4605 (mm2)

Orifice diameter = 77 (mm) (if <83mm then vortex ICD required)

Refer to Sheet 5a for detailed orifice calculations

Release Rates during 5-year event

Water depth during 5-year event = 0.49 (m) (based on result of Req. Storage Vol. calc below)

Proposed 5-year head above centreline of orifice = 1.48 (m)

Maximum release rate during 5-year event = 38.91 (L/s) (based on design discharge)

Average release rate during 5-year event = 19.45 (L/s) (Refer to attached calculation sheet)

Required Storage Volume (using Modified Rational Method)

Q = RAIN

Q = runoff rate (L/s)

R = runoff coefficient

i = rainfall intensity (mm/hr)

A = drainage area (ha)

N = 2.78

$$i = \frac{A}{(T_d + C)^B}$$

where i = Rainfall Intensity (mm/hr)

T_d = Time of Concentration (min)

	5-Year Event				100-Year Event			
Time, Td (min)	Intensity (mm/hr)	Peak Flow (L/s)	Average Release Rate (L/s)	Storage Volume (m^3)	Intensity (mm/hr)	Peak Flow (L/s)	Average Release Rate (L/s)	Storage Volume (m^3)
5	141.18	88.8	19.45	20.8	242.70	182.0	19.45	48.8
10	104.19	65.5	19.45	27.6	178.56	133.9	19.45	68.7
15	83.56	52.5	19.45	29.8	142.89	107.1	19.45	78.9
20	70.25	44.2	19.45	29.7	119.95	89.9	19.45	84.6
25	60.90	38.3	19.45	28.3	103.85	77.9	19.45	87.6
30	53.93	33.9	19.45	26.0	91.87	68.9	19.45	89.0
40	44.18	27.8	19.45	20.0	75.15	56.3	19.45	88.5
50	37.65	23.7	19.45	12.7	63.95	48.0	19.45	85.5

minimum time = time of concentration

Storage volume used	29.8 m³	Storage volume used	89.0 m³

A storage tank with a minimum volume of 89 m³ is required.

5. PROPOSED STORM SEWER CALCULATION SHEET

301 Palladium Drive

LOCATION					INDIVIDUAL							CUMULATIVE		DESIGN					PROPOSED SEWER											
Description	From	Top of Cover	To	Top of Cover	Asphalt Area	Lawn Areas	Bldg. Area	Gravel Area	Conc. Area	Total	R*A*N	Area	R*A*N	Time of Conc.	Storm Event Return Period	Rainfall Intensity	Peak Flow		Length	Size	Area	Grade	Minimum Slope	Full Capacity	Full Velocity	Time of Flow	Reserve Capacity	Q/Qfull	Upstream Invert	Downstream Invert	Notes
		(m)		(m)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)		(ha)		(min.)	(year)	(mm/hr)	(L/s)	(m^3/s)	(m)	(mm)	(m^2)	(%)	(%)	(L/s)	(m/s)	(min)	(L/s)	(%)	(m)	(m)	
A8	CB3	103.12	CBMH05	103.00	0.000	0.035	0.000	0.000	0.010	0.045	0.054	0.045	0.054	10.00	5.00	104.19	5.6	0.006	28.41	250	0.049	1.000	0.43	59.5	1.21	0.39	53.8	0.1	100.62	100.34	
A4 + A5	CB2	103.00	CBMH05	103.00	0.036	0.011	0.000	0.000	0.004	0.051	0.110	0.051	0.110	10.00	5.00	104.19	11.5	0.012	15.90	250	0.049	1.000	0.43	59.5	1.21	0.22	48.0	0.2	100.50	100.34	
A7	CBMH05	103.00	CBMH04	103.05	0.009	0.000	0.000	0.000	0.121	0.130	0.325	0.130	0.325	10.00	5.00	104.19	33.9	0.034	24.90	250	0.049	0.500	0.43	42.0	0.86	0.48	8.1	0.8	100.28	100.16	
A2	CB1	103.00	CBMH04	103.05	0.076	0.016	0.000	0.000	0.002	0.094	0.208	0.094	0.208	10.00	5.00	104.19	21.7	0.022	18.80	250	0.049	1.000	0.43	59.5	1.21	0.26	37.8	0.4	100.07	99.88	
A6	CBMH04	103.05	CBMH03	102.05	0.000	0.010	0.000	0.000	0.005	0.015	0.021	0.015	0.021	10.00	5.00	104.19	2.2	0.002	28.00	250	0.049	2.900	0.43	101.3	2.06	0.23	99.1	0.0	99.82	99.02	
A5	CBMH03	102.05	CBMH02	101.40	0.000	0.010	0.000	0.000	0.005	0.015	0.021	0.015	0.021	10.00	5.00	104.19	2.2	0.002	16.90	250	0.049	0.500	0.43	42.0	0.86	0.33	39.8	0.1	98.99	98.91	
A10	CBMH02	101.40	STORMCEPTOR EF04	101.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.00	250	0.049	0.500	0.43	42.0	0.86	0.02	-	-	98.88	98.87	
A10	STORMCEPTOR EF04	101.40	MHST01	101.30	0.000	0.029	0.000	0.007	0.004	0.041	0.045	0.041	0.045	10.00	5.00	104.19	4.7	0.005	4.00	250	0.049	0.500	0.43	42.0	0.86	0.08	37.4	0.1	98.90	98.88	
Connection within private access road	MHST01	101.3	MHST12440	101.76	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.08	300	0.071	0.600	0.34	74.9	1.06	0.16	-	-	98.52	98.46	

Q = RAIN, where

Q = Peak flow (L/s)
R = Runoff coefficient
A = Area (ha)
I = Rainfall intensity (mm/hr)
N = 2.78

Asphalt Area: R = 0.90
Grassy Area: R = 0.30
Building Area: R = 0.90
Gravel Area R = 0.50
Concrete Area: R = 0.90

Mannings Roughness Coefficient = 0.013

Prepared By: Dillon O'Neil

Checked by: Ahmed Elsayed

Date: January 19, 2022

Project No. 210390900

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

SiteASSIST™
FOR STORMTECH INSTRUCTIONS, DOWNLOAD THE INSTALLATION APP

301 PALLADIUM DR.
OTTAWA, ONTARIO

MC-3500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-3500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 75 mm (3").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-3500 CHAMBER SYSTEM

1. STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE WELL GRADED BETWEEN ¾" AND 2" (20-50 mm)..
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
10. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
11. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

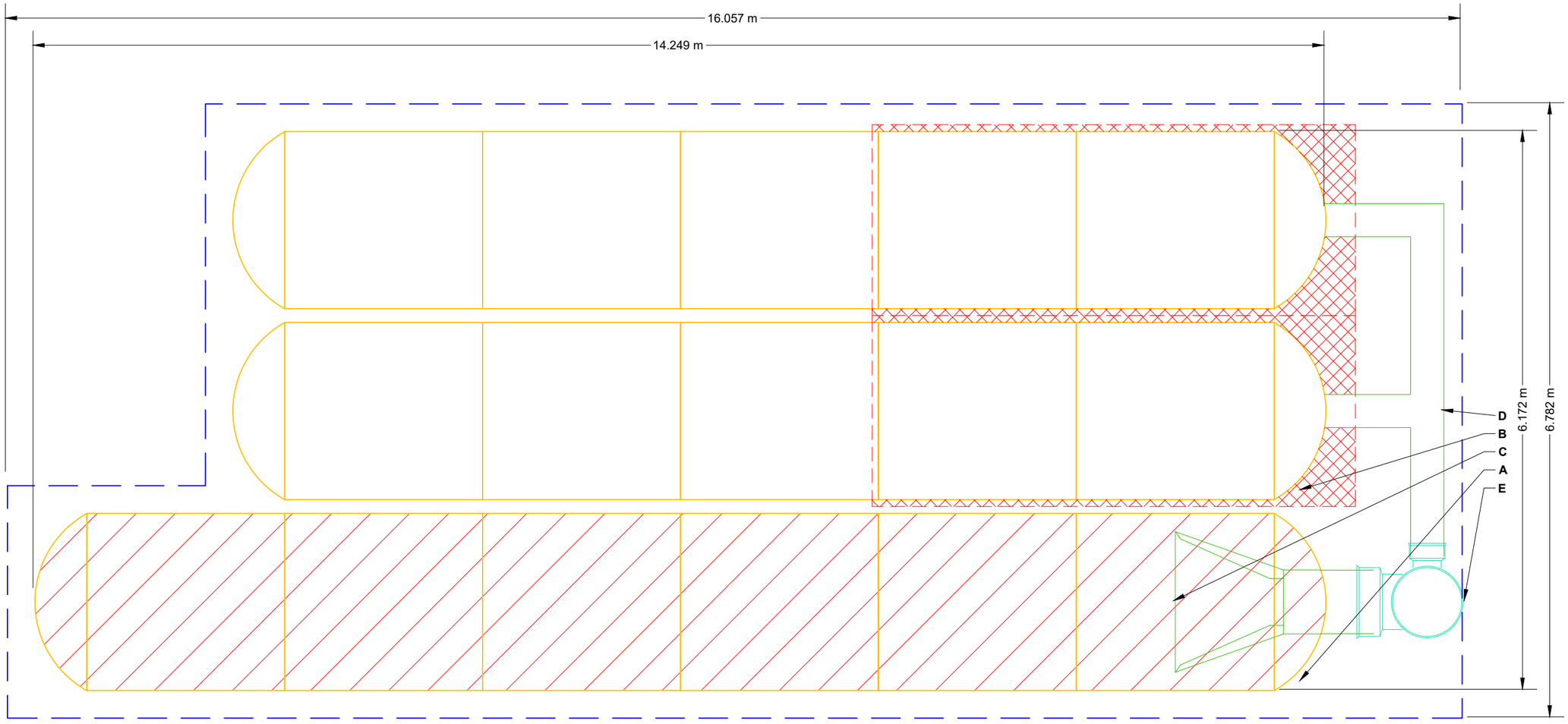
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT		PROPOSED ELEVATIONS	
16	STORMTECH MC-3500 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	103.510
6	STORMTECH MC-3500 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	101.681
305	STONE ABOVE (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	101.529
229	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	101.529
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	101.529
98.3	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	101.376
		TOP OF MC-3500 CHAMBER:	101.072
		300 mm x 300 mm TOP MANIFOLD INVERT:	100.598
		600 mm ISOLATOR ROW PLUS INVERT:	99.981
99.7	SYSTEM AREA (m^2)	BOTTOM OF MC-3500 CHAMBER:	99.929
45.7	SYSTEM PERIMETER (m)	BOTTOM OF STONE:	99.700

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	600 mm BOTTOM CORED END CAP, PART#: MC3500IEPP24BC / TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	52 mm	
PREFABRICATED END CAP	B	300 mm TOP CORED END CAP, PART#: MC3500IEPP12T / TYP OF ALL 300 mm TOP CONNECTIONS	671 mm	
FLAMP	C	INSTALL FLAMP ON 600 mm ACCESS PIPE / PART#: MC350024RAMP (TYP 2 PLACES)		
MANIFOLD	D	300 mm x 300 mm TOP MANIFOLD, ADS N-12	670 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	E	750 mm DIAMETER (610 mm SUMP MIN)		140 L/s IN



ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 5.334 m OF ADSPLUS175 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

301 PALLADIUM DR.
OTTAWA, ONTARIO
DATE:
DRAWN: AE
PROJECT #:
CHECKED: N/A

DESCRIPTION	DATE	DRW	CHK

StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

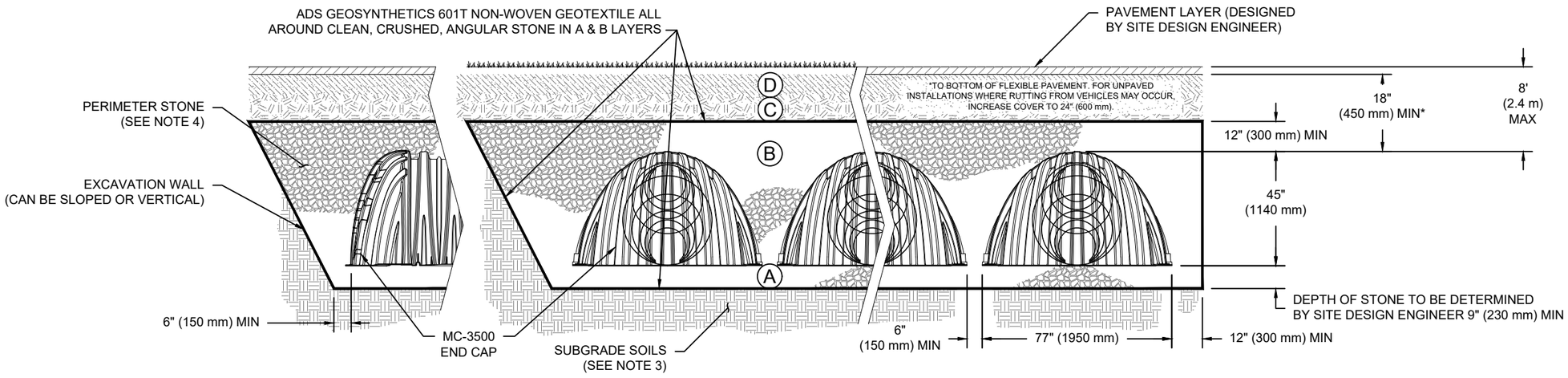
SCALE = 1 : 50

SHEET
2 OF 6

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
2. MC-3500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

301 PALLADIUM DR.
OTTAWA, ONTARIO
DATE: DRAWN: AE CHECKED: N/A
PROJECT #:

DATE	DRW	CHK	DESCRIPTION

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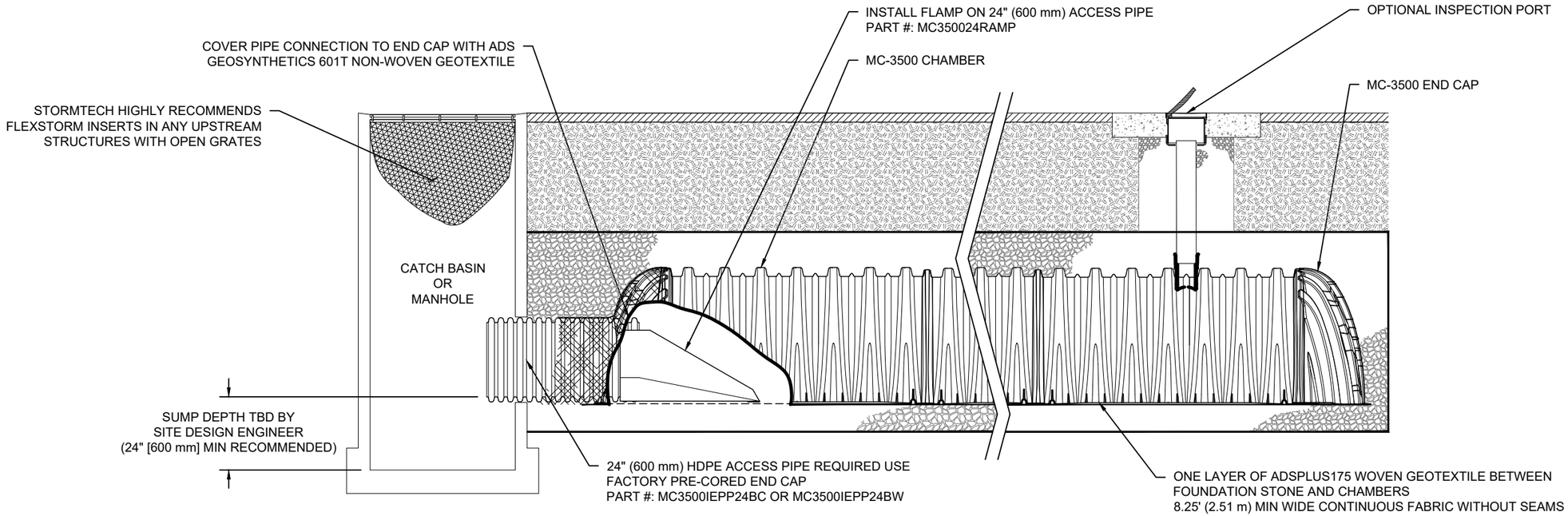
ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473



MC-3500 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

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MC-3500 TECHNICAL SPECIFICATION

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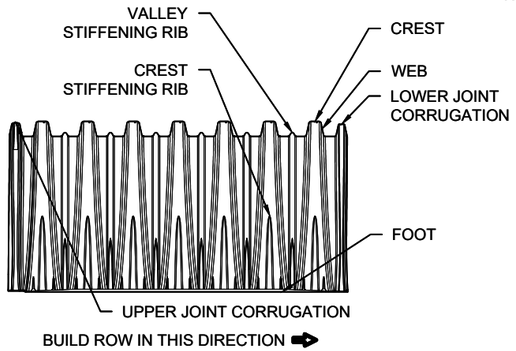
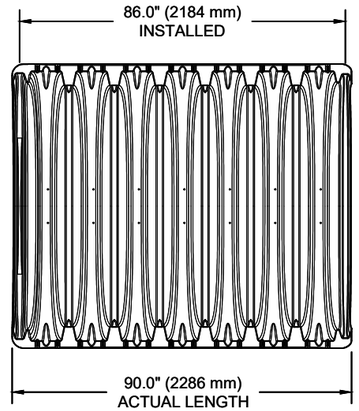
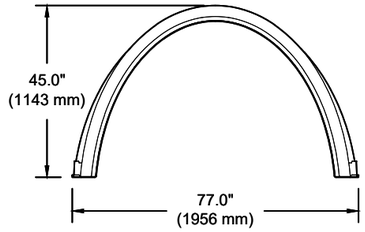
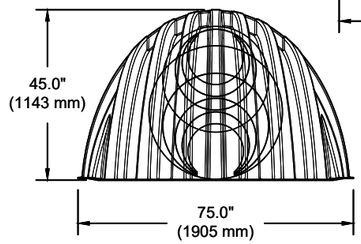
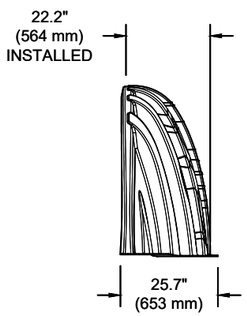










NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 86.0"	(1956 mm X 1143 mm X 2184 mm)
CHAMBER STORAGE	109.9 CUBIC FEET	(3.11 m³)
MINIMUM INSTALLED STORAGE*	175.0 CUBIC FEET	(4.96 m³)
WEIGHT	134 lbs.	(60.8 kg)

NOMINAL END CAP SPECIFICATIONS

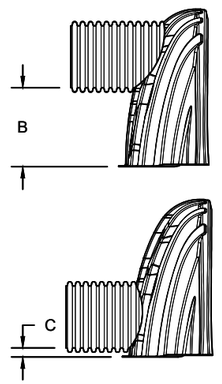
SIZE (W X H X INSTALLED LENGTH)	75.0" X 45.0" X 22.2"	(1905 mm X 1143 mm X 564 mm)
END CAP STORAGE	14.9 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	45.1 CUBIC FEET	(1.28 m³)
WEIGHT	49 lbs.	(22.2 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION, 6" SPACING BETWEEN CHAMBERS, 6" (152 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A WELDED CROWN PLATE END WITH "C"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC3500IEPP06T	6" (150 mm)	33.21" (844 mm)	---
MC3500IEPP06B		---	0.66" (17 mm)
MC3500IEPP08T	8" (200 mm)	31.16" (791 mm)	---
MC3500IEPP08B		---	0.81" (21 mm)
MC3500IEPP10T	10" (250 mm)	29.04" (738 mm)	---
MC3500IEPP10B		---	0.93" (24 mm)
MC3500IEPP12T	12" (300 mm)	26.36" (670 mm)	---
MC3500IEPP12B		---	1.35" (34 mm)
MC3500IEPP15T	15" (375 mm)	23.39" (594 mm)	---
MC3500IEPP15B		---	1.50" (38 mm)
MC3500IEPP18TC	18" (450 mm)	20.03" (509 mm)	---
MC3500IEPP18TW			
MC3500IEPP18BC		---	1.77" (45 mm)
MC3500IEPP18BW			
MC3500IEPP24TC	24" (600 mm)	14.48" (368 mm)	---
MC3500IEPP24TW			
MC3500IEPP24BC		---	2.06" (52 mm)
MC3500IEPP24BW			
MC3500IEPP30BC	30" (750 mm)	---	2.75" (70 mm)

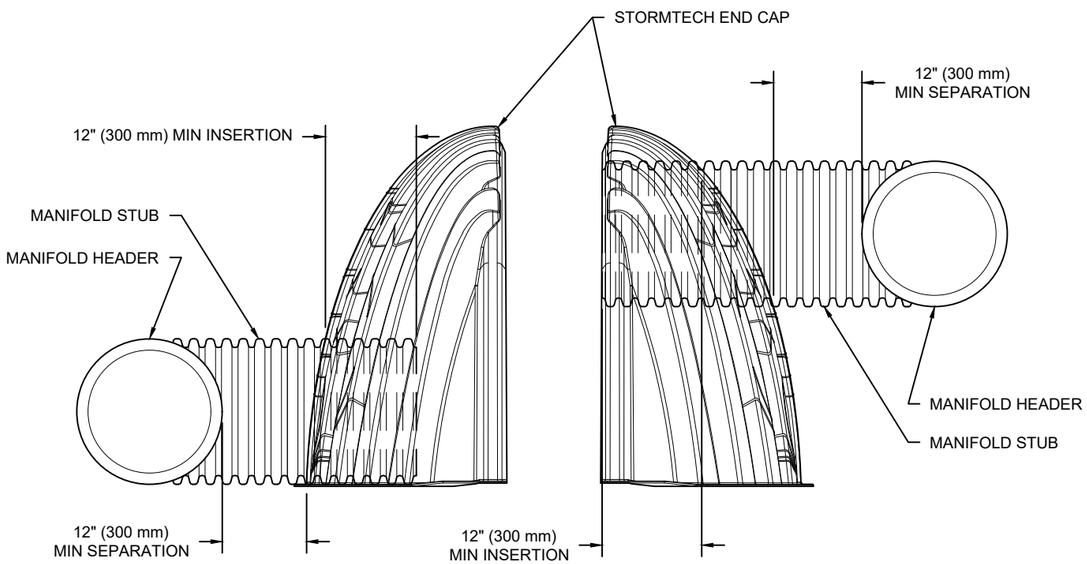
NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-3500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

MC-SERIES END CAP INSERTION DETAIL

NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

301 PALLADIUM DR.
OTTAWA, ONTARIO

DATE: | DRAWN: AE | PROJECT #: | CHECKED: N/A

DESCRIPTION	CHK	DRW	DATE

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Chamber System

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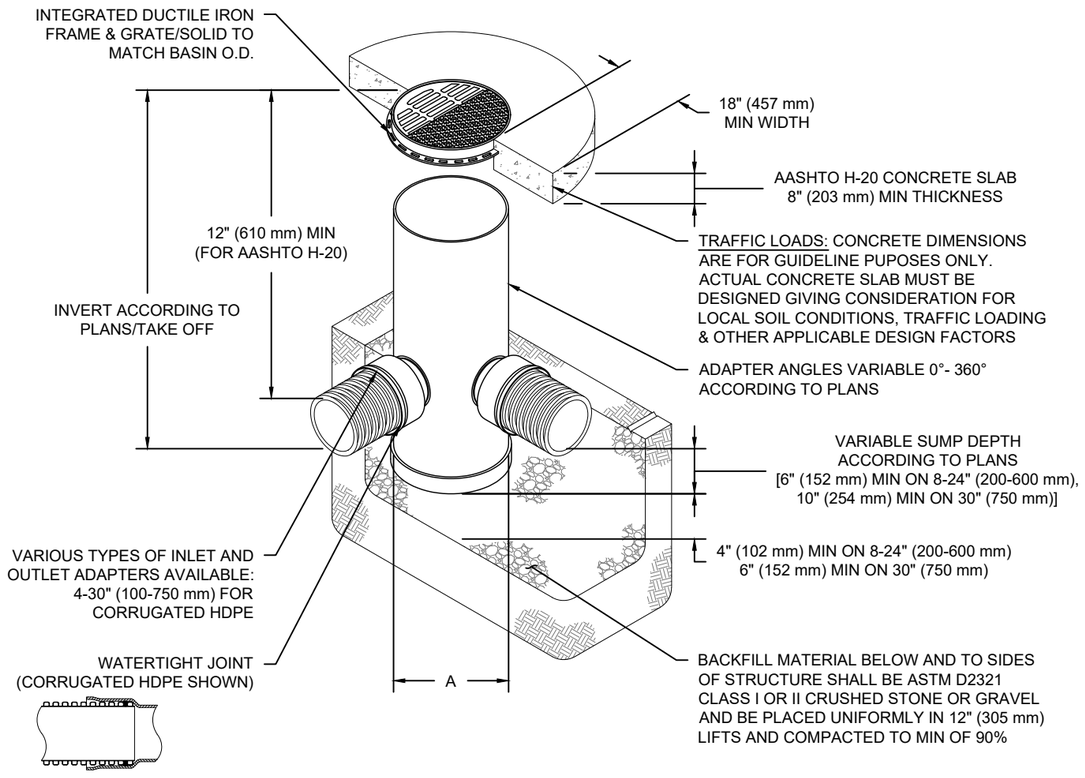
NYLOPLAST DRAIN BASIN

NTS



NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

301 PALLADIUM DR.
OTTAWA, ONTARIO

DATE: | DRAWN: AE
PROJECT #: | CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

Nyloplast®
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ADS.
4640 TRUEMAN BLVD
HILLIARD, OH 43026
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Project: **301 Palladium Dr.**

Chamber Model -	MC-3500	
Units -	**Metric**	Click Here for Imperial
Number of Chambers -	16	
Number of End Caps -	6	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	99.70	m
Amount of Stone Above Chambers -	305	mm
Amount of Stone Below Chambers -	229	mm
Amount of Stone Between Chambers -	152	mm

☑ Include Perimeter Stone in Calculations

99.7 sq.meters Min. Area - 82.718 sq.meters

Height of System *(mm)*	Incremental Single Chamber *(cubic meters)*	Incremental Single End Cap *(cubic meters)*	Incremental Chambers *(cubic meters)*	Incremental End Cap *(cubic meters)*	Incremental Stone *(cubic meters)*	Incremental Chamber, End Cap and Stone *(cubic meters)*	Cumulative System *(cubic meters)*	Elevation *(meters)*
1676	0.00	0.00	0.00	0.00	1.012	1.01	98.23	101.38
1651	0.00	0.00	0.00	0.00	1.012	1.01	97.22	101.35
1626	0.00	0.00	0.00	0.00	1.012	1.01	96.21	101.33
1600	0.00	0.00	0.00	0.00	1.012	1.01	95.20	101.30
1575	0.00	0.00	0.00	0.00	1.012	1.01	94.18	101.27
1549	0.00	0.00	0.00	0.00	1.012	1.01	93.17	101.25
1524	0.00	0.00	0.00	0.00	1.012	1.01	92.16	101.22
1499	0.00	0.00	0.00	0.00	1.012	1.01	91.15	101.20
1473	0.00	0.00	0.00	0.00	1.012	1.01	90.13	101.17
1448	0.00	0.00	0.00	0.00	1.012	1.01	89.12	101.15
1422	0.00	0.00	0.00	0.00	1.012	1.01	88.11	101.12
1397	0.00	0.00	0.00	0.00	1.012	1.01	87.10	101.10
1372	0.00	0.00	0.03	0.00	1.002	1.03	86.09	101.07
1346	0.01	0.00	0.09	0.00	0.976	1.07	85.06	101.05
1321	0.01	0.00	0.13	0.01	0.957	1.10	83.99	101.02
1295	0.01	0.00	0.18	0.01	0.936	1.13	82.89	101.00
1270	0.02	0.00	0.31	0.01	0.883	1.21	81.77	100.97
1245	0.03	0.00	0.47	0.01	0.820	1.30	80.56	100.94
1219	0.04	0.00	0.57	0.02	0.779	1.36	79.26	100.92
1194	0.04	0.00	0.64	0.02	0.746	1.41	77.90	100.89
1168	0.04	0.00	0.71	0.02	0.718	1.45	76.48	100.87
1143	0.05	0.00	0.77	0.03	0.692	1.49	75.03	100.84
1118	0.05	0.01	0.83	0.03	0.669	1.53	73.54	100.82
1092	0.05	0.01	0.88	0.03	0.648	1.56	72.01	100.79
1067	0.06	0.01	0.92	0.04	0.628	1.59	70.45	100.77
1041	0.06	0.01	0.97	0.04	0.610	1.62	68.86	100.74
1016	0.06	0.01	1.01	0.04	0.592	1.64	67.24	100.72
991	0.07	0.01	1.05	0.05	0.576	1.67	65.60	100.69
965	0.07	0.01	1.08	0.05	0.561	1.69	63.93	100.67
940	0.07	0.01	1.11	0.05	0.547	1.71	62.24	100.64
914	0.07	0.01	1.15	0.05	0.533	1.73	60.53	100.61
889	0.07	0.01	1.18	0.05	0.521	1.75	58.80	100.59
864	0.08	0.01	1.20	0.06	0.508	1.77	57.05	100.56
838	0.08	0.01	1.23	0.06	0.497	1.79	55.28	100.54
813	0.08	0.01	1.26	0.06	0.486	1.80	53.50	100.51
787	0.08	0.01	1.28	0.06	0.475	1.82	51.69	100.49
762	0.08	0.01	1.30	0.07	0.465	1.83	49.88	100.46
737	0.08	0.01	1.32	0.07	0.456	1.85	48.04	100.44
711	0.08	0.01	1.35	0.07	0.447	1.86	46.19	100.41
686	0.09	0.01	1.36	0.07	0.438	1.87	44.33	100.39
660	0.09	0.01	1.38	0.07	0.430	1.89	42.46	100.36
635	0.09	0.01	1.40	0.07	0.422	1.90	40.57	100.34
610	0.09	0.01	1.42	0.08	0.414	1.91	38.67	100.31
584	0.09	0.01	1.43	0.08	0.407	1.92	36.77	100.28
559	0.09	0.01	1.45	0.08	0.401	1.93	34.85	100.26
533	0.09	0.01	1.46	0.08	0.394	1.94	32.91	100.23
508	0.09	0.01	1.48	0.08	0.388	1.95	30.98	100.21
483	0.09	0.01	1.49	0.08	0.382	1.96	29.03	100.18
457	0.09	0.01	1.50	0.09	0.377	1.97	27.07	100.16
432	0.09	0.01	1.52	0.09	0.371	1.97	25.10	100.13
406	0.10	0.01	1.53	0.09	0.366	1.98	23.13	100.11
381	0.10	0.01	1.54	0.09	0.362	1.99	21.15	100.08
356	0.10	0.02	1.55	0.09	0.357	2.00	19.16	100.06
330	0.10	0.02	1.56	0.09	0.353	2.00	17.16	100.03
305	0.10	0.02	1.57	0.09	0.348	2.01	15.16	100.00
279	0.10	0.02	1.58	0.09	0.344	2.01	13.15	99.98
254	0.10	0.02	1.59	0.10	0.337	2.03	11.14	99.95
229	0.00	0.00	0.00	0.00	1.012	1.01	9.11	99.93
203	0.00	0.00	0.00	0.00	1.012	1.01	8.10	99.90
178	0.00	0.00	0.00	0.00	1.012	1.01	7.09	99.88
152	0.00	0.00	0.00	0.00	1.012	1.01	6.07	99.85
127	0.00	0.00	0.00	0.00	1.012	1.01	5.06	99.83
102	0.00	0.00	0.00	0.00	1.012	1.01	4.05	99.80
76	0.00	0.00	0.00	0.00	1.012	1.01	3.04	99.78
51	0.00	0.00	0.00	0.00	1.012	1.01	2.02	99.75
25	0.00	0.00	0.00	0.00	1.012	1.01	1.01	99.73

301 Palladium Drive

Infiltration Analysis

Date/Time (LST)	Year	Total Precip (mm)	Runoff Vol (m^3)	Stored Volume(m^3)	Infiltrated Vol (m^3)	Spill Vol (m^3)
5/1/2016 12:00	2016	0.2	0.8	0.8	0.1	0.0
5/1/2016 14:00	2016	0.7	2.9	3.5	0.1	0.0
5/1/2016 15:00	2016	0.2	0.8	4.3	0.1	0.0
5/1/2016 16:00	2016	0.2	0.8	5.0	0.1	0.0
5/1/2016 17:00	2016	0.6	2.5	7.4	0.1	0.0
5/1/2016 18:00	2016	1.1	4.6	9.1	0.1	2.7
5/1/2016 19:00	2016	0.3	1.2	9.1	0.1	1.1
5/1/2016 21:00	2016	0.2	0.8	9.1	0.1	0.6
5/8/2016 0:00	2016	1.3	5.4	5.4	0.1	0.0
5/8/2016 2:00	2016	2.2	9.1	9.1	0.1	5.2
5/8/2016 3:00	2016	2.5	10.4	9.1	0.1	10.3
5/8/2016 4:00	2016	2	8.3	9.1	0.1	8.2
5/8/2016 5:00	2016	1.7	7.0	9.1	0.1	6.9
5/8/2016 6:00	2016	0.5	2.1	9.1	0.1	2.0
5/13/2016 9:00	2016	1.6	6.6	6.6	0.1	0.0
5/13/2016 10:00	2016	3.6	14.9	9.1	0.1	12.3
5/13/2016 11:00	2016	0.2	0.8	9.1	0.1	0.7
5/13/2016 12:00	2016	0.2	0.8	9.1	0.1	0.7
5/15/2016 6:00	2016	0.2	0.8	5.8	0.1	0.0
5/21/2016 5:00	2016	0.2	0.8	0.8	0.1	0.0
5/27/2016 17:00	2016	0.2	0.8	0.8	0.1	0.0
5/28/2016 19:00	2016	4.8	19.9	9.1	0.1	10.8
5/31/2016 23:00	2016	0.2	0.8	2.4	0.1	0.0
6/2/2016 8:00	2016	1.3	5.4	5.4	0.1	0.0
6/2/2016 12:00	2016	0.3	1.2	6.2	0.1	0.0
6/5/2016 7:00	2016	3.5	14.5	9.1	0.1	5.4
6/5/2016 8:00	2016	3.2	13.2	9.1	0.1	13.1
6/5/2016 9:00	2016	1.8	7.5	9.1	0.1	7.4
6/5/2016 10:00	2016	10.4	43.1	9.1	0.1	43.0
6/5/2016 11:00	2016	10.3	42.6	9.1	0.1	42.5
6/5/2016 12:00	2016	4.5	18.6	9.1	0.1	18.5
6/5/2016 15:00	2016	0.9	3.7	9.1	0.1	3.4
6/7/2016 16:00	2016	2.1	8.7	9.1	0.1	3.8
6/7/2016 18:00	2016	0.2	0.8	9.1	0.1	0.6
6/11/2016 7:00	2016	0.3	1.2	1.9	0.1	0.0
6/11/2016 8:00	2016	2.9	12.0	9.1	0.1	4.7
6/11/2016 9:00	2016	2	8.3	9.1	0.1	8.2
6/11/2016 11:00	2016	0.4	1.7	9.1	0.1	1.5
6/12/2016 10:00	2016	0.2	0.8	7.6	0.1	0.0
6/27/2016 2:00	2016	1.5	6.2	6.2	0.1	0.0
6/27/2016 3:00	2016	3.1	12.8	9.1	0.1	9.8
6/27/2016 4:00	2016	1.9	7.9	9.1	0.1	7.8
6/27/2016 5:00	2016	5	20.7	9.1	0.1	20.6
6/28/2016 20:00	2016	0.4	1.7	6.9	0.1	0.0

6/28/2016 21:00	2016	1.8	7.5	9.1	0.1	5.1
6/28/2016 22:00	2016	0.2	0.8	9.1	0.1	0.7
7/1/2016 15:00	2016	3.7	15.3	9.1	0.1	8.8
7/1/2016 16:00	2016	0.3	1.2	9.1	0.1	1.1
7/1/2016 19:00	2016	5.5	22.8	9.1	0.1	22.5
7/1/2016 21:00	2016	1.4	5.8	9.1	0.1	5.6
7/1/2016 23:00	2016	0.8	3.3	9.1	0.1	3.1
7/2/2016 1:00	2016	0.3	1.2	9.1	0.1	1.0
7/2/2016 2:00	2016	0.2	0.8	9.1	0.1	0.7
7/8/2016 23:00	2016	0.4	1.7	1.7	0.1	0.0
7/9/2016 2:00	2016	5.6	23.2	9.1	0.1	15.4
7/9/2016 3:00	2016	2	8.3	9.1	0.1	8.2
7/9/2016 4:00	2016	0.2	0.8	9.1	0.1	0.7
7/9/2016 8:00	2016	0.7	2.9	9.1	0.1	2.5
7/9/2016 9:00	2016	2.1	8.7	9.1	0.1	8.6
7/9/2016 10:00	2016	26.2	108.5	9.1	0.1	108.4
7/9/2016 11:00	2016	7	29.0	9.1	0.1	28.9
7/9/2016 12:00	2016	0.9	3.7	9.1	0.1	3.6
7/9/2016 14:00	2016	0.4	1.7	9.1	0.1	1.5
7/9/2016 19:00	2016	5.1	21.1	9.1	0.1	20.6
7/9/2016 20:00	2016	0.5	2.1	9.1	0.1	2.0
7/9/2016 21:00	2016	0.2	0.8	9.1	0.1	0.7
7/9/2016 22:00	2016	0.6	2.5	9.1	0.1	2.4
7/9/2016 23:00	2016	0.7	2.9	9.1	0.1	2.8
7/10/2016 0:00	2016	1.1	4.6	9.1	0.1	4.5
7/10/2016 1:00	2016	0.2	0.8	9.1	0.1	0.7
7/10/2016 2:00	2016	0.3	1.2	9.1	0.1	1.1
7/10/2016 3:00	2016	0.2	0.8	9.1	0.1	0.7
7/13/2016 14:00	2016	0.5	2.1	2.9	0.1	0.0
7/13/2016 15:00	2016	4	16.6	9.1	0.1	10.3
7/13/2016 16:00	2016	0.7	2.9	9.1	0.1	2.8
7/14/2016 11:00	2016	0.8	3.3	9.1	0.1	1.4
7/14/2016 12:00	2016	1.3	5.4	9.1	0.1	5.3
7/14/2016 21:00	2016	1.7	7.0	9.1	0.1	6.1
7/14/2016 22:00	2016	1.3	5.4	9.1	0.1	5.3
7/15/2016 15:00	2016	0.9	3.7	9.1	0.1	2.0
7/15/2016 16:00	2016	3	12.4	9.1	0.1	12.3
7/15/2016 17:00	2016	0.2	0.8	9.1	0.1	0.7
7/15/2016 20:00	2016	0.2	0.8	9.1	0.1	0.5
7/18/2016 1:00	2016	3.6	14.9	9.1	0.1	9.6
7/25/2016 7:00	2016	2.8	11.6	9.1	0.1	2.5
7/25/2016 8:00	2016	0.2	0.8	9.1	0.1	0.7
7/25/2016 10:00	2016	0.2	0.8	9.1	0.1	0.6
7/27/2016 20:00	2016	8.1	33.5	9.1	0.1	27.8
8/12/2016 15:00	2016	2.8	11.6	9.1	0.1	2.5
8/12/2016 19:00	2016	0.6	2.5	9.1	0.1	2.1
8/13/2016 1:00	2016	3.3	13.7	9.1	0.1	13.1

8/13/2016 3:00	2016	0.2	0.8	9.1	0.1	0.6
8/13/2016 4:00	2016	0.5	2.1	9.1	0.1	2.0
8/13/2016 8:00	2016	1.2	5.0	9.1	0.1	4.6
8/13/2016 9:00	2016	2.1	8.7	9.1	0.1	8.6
8/13/2016 10:00	2016	4	16.6	9.1	0.1	16.5
8/13/2016 11:00	2016	0.7	2.9	9.1	0.1	2.8
8/13/2016 12:00	2016	8.3	34.4	9.1	0.1	34.3
8/13/2016 13:00	2016	0.2	0.8	9.1	0.1	0.7
8/13/2016 16:00	2016	20.1	83.2	9.1	0.1	82.9
8/13/2016 17:00	2016	16.2	67.1	9.1	0.1	67.0
8/13/2016 18:00	2016	16.4	67.9	9.1	0.1	67.8
8/13/2016 19:00	2016	0.7	2.9	9.1	0.1	2.8
8/13/2016 20:00	2016	0.5	2.1	9.1	0.1	2.0
8/13/2016 21:00	2016	0.3	1.2	9.1	0.1	1.1
8/13/2016 22:00	2016	0.3	1.2	9.1	0.1	1.1
8/14/2016 1:00	2016	1.7	7.0	9.1	0.1	6.7
8/14/2016 6:00	2016	0.5	2.1	9.1	0.1	1.6
8/16/2016 13:00	2016	0.5	2.1	5.7	0.1	0.0
8/16/2016 14:00	2016	4.6	19.0	9.1	0.1	15.5
8/16/2016 15:00	2016	6.9	28.6	9.1	0.1	28.5
8/16/2016 16:00	2016	9.8	40.6	9.1	0.1	40.5
8/16/2016 17:00	2016	4.7	19.5	9.1	0.1	19.4
8/16/2016 18:00	2016	1.8	7.5	9.1	0.1	7.4
8/16/2016 19:00	2016	0.8	3.3	9.1	0.1	3.2
8/16/2016 20:00	2016	1.2	5.0	9.1	0.1	4.9
8/16/2016 21:00	2016	0.5	2.1	9.1	0.1	2.0
8/16/2016 23:00	2016	0.5	2.1	9.1	0.1	1.9
8/17/2016 0:00	2016	1.2	5.0	9.1	0.1	4.9
8/17/2016 2:00	2016	0.5	2.1	9.1	0.1	1.9
8/18/2016 15:00	2016	0.3	1.2	6.7	0.1	0.0
8/19/2016 2:00	2016	0.2	0.8	6.4	0.1	0.0
8/21/2016 8:00	2016	4.2	17.4	9.1	0.1	9.3
8/21/2016 9:00	2016	6.6	27.3	9.1	0.1	27.2
8/21/2016 10:00	2016	4.1	17.0	9.1	0.1	16.9
8/21/2016 11:00	2016	0.3	1.2	9.1	0.1	1.1
8/21/2016 13:00	2016	1.3	5.4	9.1	0.1	5.2
8/21/2016 14:00	2016	0.2	0.8	9.1	0.1	0.7
8/25/2016 15:00	2016	2	8.3	8.3	0.1	0.0
8/28/2016 10:00	2016	0.3	1.2	2.8	0.1	0.0
8/28/2016 15:00	2016	2	8.3	9.1	0.1	1.5
9/7/2016 20:00	2016	2.5	10.4	9.1	0.1	1.2
9/7/2016 21:00	2016	11.3	46.8	9.1	0.1	46.7
9/8/2016 12:00	2016	0.3	1.2	8.9	0.1	0.0
9/8/2016 13:00	2016	2.9	12.0	9.1	0.1	11.7
9/10/2016 21:00	2016	0.7	2.9	6.4	0.1	0.0
9/10/2016 22:00	2016	1.3	5.4	9.1	0.1	2.6
9/11/2016 2:00	2016	0.5	2.1	9.1	0.1	1.7

9/11/2016 3:00	2016	0.7	2.9	9.1	0.1	2.8
9/11/2016 5:00	2016	0.2	0.8	9.1	0.1	0.6
9/17/2016 13:00	2016	2.1	8.7	8.7	0.1	0.0
9/17/2016 14:00	2016	3.9	16.1	9.1	0.1	15.6
9/17/2016 15:00	2016	0.8	3.3	9.1	0.1	3.2
9/17/2016 16:00	2016	0.6	2.5	9.1	0.1	2.4
9/17/2016 17:00	2016	0.5	2.1	9.1	0.1	2.0
9/17/2016 18:00	2016	1.5	6.2	9.1	0.1	6.1
9/17/2016 19:00	2016	0.6	2.5	9.1	0.1	2.4
9/17/2016 20:00	2016	7.4	30.6	9.1	0.1	30.5
9/17/2016 21:00	2016	0.2	0.8	9.1	0.1	0.7
9/17/2016 22:00	2016	5.1	21.1	9.1	0.1	21.0
9/17/2016 23:00	2016	21.7	89.8	9.1	0.1	89.7
9/22/2016 19:00	2016	3.1	12.8	9.1	0.1	3.7
9/22/2016 20:00	2016	3.3	13.7	9.1	0.1	13.6
9/22/2016 21:00	2016	0.2	0.8	9.1	0.1	0.7
9/22/2016 23:00	2016	0.2	0.8	9.1	0.1	0.6
9/23/2016 7:00	2016	1.2	5.0	9.1	0.1	4.2
9/24/2016 5:00	2016	0.2	0.8	7.7	0.1	0.0
9/26/2016 22:00	2016	0.2	0.8	2.1	0.1	0.0
9/27/2016 0:00	2016	0.2	0.8	2.7	0.1	0.0
10/2/2016 5:00	2016	0.2	0.8	0.8	0.1	0.0
10/2/2016 7:00	2016	0.2	0.8	1.5	0.1	0.0
10/2/2016 9:00	2016	0.7	2.9	4.2	0.1	0.0
10/2/2016 11:00	2016	0.2	0.8	4.8	0.1	0.0
10/2/2016 16:00	2016	0.2	0.8	5.1	0.1	0.0
10/2/2016 18:00	2016	0.3	1.2	6.2	0.1	0.0
10/2/2016 22:00	2016	0.5	2.1	7.8	0.1	0.0
10/8/2016 9:00	2016	1.2	5.0	5.0	0.1	0.0
10/8/2016 10:00	2016	0.5	2.1	6.9	0.1	0.0
10/8/2016 11:00	2016	1.2	5.0	9.1	0.1	2.7
10/8/2016 12:00	2016	0.6	2.5	9.1	0.1	2.4
10/8/2016 13:00	2016	0.2	0.8	9.1	0.1	0.7
10/10/2016 1:00	2016	0.2	0.8	6.3	0.1	0.0
10/13/2016 7:00	2016	1.2	5.0	5.0	0.1	0.0
10/13/2016 11:00	2016	0.2	0.8	5.4	0.1	0.0
10/16/2016 10:00	2016	1.4	5.8	5.8	0.1	0.0
10/16/2016 11:00	2016	0.7	2.9	8.6	0.1	0.0
10/16/2016 13:00	2016	4	16.6	9.1	0.1	15.8
10/16/2016 17:00	2016	0.5	2.1	9.1	0.1	1.7
10/17/2016 4:00	2016	0.2	0.8	8.8	0.1	0.0
10/17/2016 17:00	2016	0.3	1.2	8.8	0.1	0.0
10/18/2016 1:00	2016	7.1	29.4	9.1	0.1	28.3
10/18/2016 6:00	2016	0.3	1.2	9.1	0.1	0.7
10/20/2016 10:00	2016	0.2	0.8	4.8	0.1	0.0
10/20/2016 11:00	2016	0.9	3.7	8.4	0.1	0.0
10/20/2016 12:00	2016	0.4	1.7	9.1	0.1	0.8

10/20/2016 13:00	2016	0.2	0.8	9.1	0.1	0.7
10/20/2016 15:00	2016	0.8	3.3	9.1	0.1	3.1
10/20/2016 16:00	2016	0.9	3.7	9.1	0.1	3.6
10/20/2016 17:00	2016	0.7	2.9	9.1	0.1	2.8
10/20/2016 18:00	2016	1.1	4.6	9.1	0.1	4.5
10/20/2016 19:00	2016	3.1	12.8	9.1	0.1	12.7
10/20/2016 20:00	2016	2.6	10.8	9.1	0.1	10.7
10/20/2016 21:00	2016	1.7	7.0	9.1	0.1	6.9
10/20/2016 22:00	2016	1.4	5.8	9.1	0.1	5.7
10/20/2016 23:00	2016	0.7	2.9	9.1	0.1	2.8
10/21/2016 0:00	2016	1.6	6.6	9.1	0.1	6.5
10/21/2016 1:00	2016	0.9	3.7	9.1	0.1	3.6
10/21/2016 2:00	2016	0.2	0.8	9.1	0.1	0.7
10/21/2016 3:00	2016	0.3	1.2	9.1	0.1	1.1
10/21/2016 4:00	2016	0.2	0.8	9.1	0.1	0.7
10/21/2016 5:00	2016	1.5	6.2	9.1	0.1	6.1
10/21/2016 6:00	2016	1	4.1	9.1	0.1	4.0
10/21/2016 7:00	2016	0.6	2.5	9.1	0.1	2.4
10/21/2016 8:00	2016	1	4.1	9.1	0.1	4.0
10/21/2016 9:00	2016	2.1	8.7	9.1	0.1	8.6
10/21/2016 10:00	2016	1.4	5.8	9.1	0.1	5.7
10/21/2016 11:00	2016	2.8	11.6	9.1	0.1	11.5
10/21/2016 12:00	2016	2	8.3	9.1	0.1	8.2
10/21/2016 13:00	2016	1.2	5.0	9.1	0.1	4.9
10/21/2016 14:00	2016	0.5	2.1	9.1	0.1	2.0
10/21/2016 15:00	2016	1.2	5.0	9.1	0.1	4.9
10/21/2016 16:00	2016	1.9	7.9	9.1	0.1	7.8
10/21/2016 17:00	2016	0.2	0.8	9.1	0.1	0.7
10/21/2016 18:00	2016	0.5	2.1	9.1	0.1	2.0
10/21/2016 19:00	2016	1.3	5.4	9.1	0.1	5.3
10/21/2016 20:00	2016	1	4.1	9.1	0.1	4.0
10/21/2016 22:00	2016	1.3	5.4	9.1	0.1	5.2
10/21/2016 23:00	2016	0.3	1.2	9.1	0.1	1.1
10/22/2016 0:00	2016	0.2	0.8	9.1	0.1	0.7
10/22/2016 3:00	2016	0.6	2.5	9.1	0.1	2.2
10/22/2016 7:00	2016	0.7	2.9	9.1	0.1	2.5
10/22/2016 8:00	2016	0.5	2.1	9.1	0.1	2.0
10/22/2016 9:00	2016	0.2	0.8	9.1	0.1	0.7
10/22/2016 10:00	2016	0.3	1.2	9.1	0.1	1.1
10/22/2016 11:00	2016	0.3	1.2	9.1	0.1	1.1
10/22/2016 13:00	2016	0.7	2.9	9.1	0.1	2.7
10/22/2016 14:00	2016	1.4	5.8	9.1	0.1	5.7
10/22/2016 15:00	2016	1.3	5.4	9.1	0.1	5.3
10/22/2016 16:00	2016	0.3	1.2	9.1	0.1	1.1
10/22/2016 17:00	2016	0.6	2.5	9.1	0.1	2.4
10/22/2016 19:00	2016	0.2	0.8	9.1	0.1	0.6
10/22/2016 21:00	2016	0.2	0.8	9.1	0.1	0.6

10/27/2016 16:00	2016	0.3	1.2	1.2	0.1	0.0
10/27/2016 17:00	2016	0.6	2.5	3.6	0.1	0.0
10/27/2016 18:00	2016	0.6	2.5	6.0	0.1	0.0
10/27/2016 19:00	2016	1	4.1	9.1	0.1	0.9
10/27/2016 20:00	2016	2.5	10.4	9.1	0.1	10.3
10/27/2016 21:00	2016	0.5	2.1	9.1	0.1	2.0
10/27/2016 22:00	2016	0.7	2.9	9.1	0.1	2.8
10/27/2016 23:00	2016	1.1	4.6	9.1	0.1	4.5
10/28/2016 0:00	2016	1	4.1	9.1	0.1	4.0
10/28/2016 1:00	2016	1.2	5.0	9.1	0.1	4.9
10/28/2016 2:00	2016	1.7	7.0	9.1	0.1	6.9
10/28/2016 3:00	2016	0.7	2.9	9.1	0.1	2.8
10/28/2016 4:00	2016	0.8	3.3	9.1	0.1	3.2
10/28/2016 5:00	2016	0.8	3.3	9.1	0.1	3.2
10/28/2016 9:00	2016	0.2	0.8	9.1	0.1	0.4
10/29/2016 1:00	2016	0.7	2.9	9.1	0.1	1.3
10/29/2016 2:00	2016	0.2	0.8	9.1	0.1	0.7
10/29/2016 5:00	2016	0.5	2.1	9.1	0.1	1.8
10/29/2016 6:00	2016	6.1	25.3	9.1	0.1	25.2
10/29/2016 7:00	2016	0.7	2.9	9.1	0.1	2.8
10/29/2016 12:00	2016	0.2	0.8	9.1	0.1	0.3
10/29/2016 13:00	2016	0.6	2.5	9.1	0.1	2.4
10/29/2016 14:00	2016	0.2	0.8	9.1	0.1	0.7
11/3/2016 7:00	2016	0.8	3.3	3.3	0.1	0.0
11/3/2016 8:00	2016	1.9	7.9	9.1	0.1	2.0
11/3/2016 9:00	2016	1.5	6.2	9.1	0.1	6.1
11/3/2016 10:00	2016	0.2	0.8	9.1	0.1	0.7
11/3/2016 11:00	2016	0.4	1.7	9.1	0.1	1.6
11/3/2016 21:00	2016	0.7	2.9	9.1	0.1	1.9
11/3/2016 22:00	2016	0.2	0.8	9.1	0.1	0.7
11/16/2016 3:00	2016	0.6	2.5	2.5	0.1	0.0
11/16/2016 4:00	2016	0.5	2.1	4.5	0.1	0.0
11/16/2016 6:00	2016	0.7	2.9	7.2	0.1	0.0
11/16/2016 7:00	2016	0.4	1.7	8.7	0.1	0.0
11/16/2016 8:00	2016	0.2	0.8	9.1	0.1	0.3
11/16/2016 9:00	2016	0.2	0.8	9.1	0.1	0.7
11/20/2016 2:00	2016	0.3	1.2	1.5	0.1	0.0
11/20/2016 3:00	2016	0.4	1.7	3.0	0.1	0.0
11/20/2016 4:00	2016	0.8	3.3	6.2	0.1	0.0
11/20/2016 5:00	2016	0.7	2.9	9.0	0.1	0.0
11/20/2016 6:00	2016	1.3	5.4	9.1	0.1	5.2
11/20/2016 7:00	2016	1.1	4.6	9.1	0.1	4.5
11/20/2016 8:00	2016	1.1	4.6	9.1	0.1	4.5
11/20/2016 9:00	2016	0.9	3.7	9.1	0.1	3.6
11/20/2016 10:00	2016	0.7	2.9	9.1	0.1	2.8
11/20/2016 11:00	2016	0.3	1.2	9.1	0.1	1.1
11/20/2016 12:00	2016	0.2	0.8	9.1	0.1	0.7

11/20/2016 13:00	2016	0.5	2.1	9.1	0.1	2.0
11/20/2016 14:00	2016	0.5	2.1	9.1	0.1	2.0
11/20/2016 15:00	2016	0.6	2.5	9.1	0.1	2.4
11/20/2016 16:00	2016	0.3	1.2	9.1	0.1	1.1
11/20/2016 20:00	2016	0.2	0.8	9.1	0.1	0.4
11/20/2016 21:00	2016	0.3	1.2	9.1	0.1	1.1
11/20/2016 22:00	2016	0.2	0.8	9.1	0.1	0.7
11/20/2016 23:00	2016	0.2	0.8	9.1	0.1	0.7
11/21/2016 10:00	2016	0.2	0.8	8.8	0.1	0.0
11/21/2016 20:00	2016	0.5	2.1	9.1	0.1	0.8
11/21/2016 21:00	2016	0.2	0.8	9.1	0.1	0.7
11/21/2016 22:00	2016	0.4	1.7	9.1	0.1	1.6
11/21/2016 23:00	2016	0.6	2.5	9.1	0.1	2.4
11/24/2016 6:00	2016	0.2	0.8	4.5	0.1	0.0
11/24/2016 7:00	2016	1.1	4.6	8.9	0.1	0.0
11/24/2016 8:00	2016	0.7	2.9	9.1	0.1	2.6
11/24/2016 9:00	2016	0.6	2.5	9.1	0.1	2.4
11/24/2016 10:00	2016	0.6	2.5	9.1	0.1	2.4
11/24/2016 11:00	2016	0.8	3.3	9.1	0.1	3.2
11/24/2016 12:00	2016	0.7	2.9	9.1	0.1	2.8
11/24/2016 13:00	2016	0.6	2.5	9.1	0.1	2.4
11/24/2016 14:00	2016	0.2	0.8	9.1	0.1	0.7
11/24/2016 15:00	2016	0.2	0.8	9.1	0.1	0.7
11/24/2016 16:00	2016	0.2	0.8	9.1	0.1	0.7
11/25/2016 9:00	2016	0.2	0.8	8.2	0.1	0.0
11/25/2016 10:00	2016	0.2	0.8	9.0	0.1	0.0
11/25/2016 15:00	2016	0.2	0.8	9.1	0.1	0.2
11/25/2016 23:00	2016	0.2	0.8	9.1	0.1	0.0
11/26/2016 6:00	2016	0.2	0.8	9.1	0.1	0.1
11/29/2016 12:00	2016	0.3	1.2	2.6	0.1	0.0
11/29/2016 13:00	2016	0.8	3.3	5.8	0.1	0.0
11/29/2016 14:00	2016	0.4	1.7	7.3	0.1	0.0
11/30/2016 17:00	2016	0.4	1.7	6.3	0.1	0.0
11/30/2016 18:00	2016	0.5	2.1	8.3	0.1	0.0
11/30/2016 19:00	2016	0.3	1.2	9.1	0.1	0.3
11/30/2016 22:00	2016	0.2	0.8	9.1	0.1	0.5
11/30/2016 23:00	2016	0.5	2.1	9.1	0.1	2.0
12/1/2016 0:00	2016	6	24.8	9.1	0.1	24.7
12/1/2016 1:00	2016	7	29.0	9.1	0.1	28.9
12/1/2016 2:00	2016	6	24.8	9.1	0.1	24.7
12/1/2016 3:00	2016	2.7	11.2	9.1	0.1	11.1
12/1/2016 4:00	2016	0.6	2.5	9.1	0.1	2.4
12/1/2016 5:00	2016	0.9	3.7	9.1	0.1	3.6
12/1/2016 6:00	2016	0.3	1.2	9.1	0.1	1.1
12/1/2016 15:00	2016	0.3	1.2	9.1	0.1	0.3
12/1/2016 16:00	2016	0.6	2.5	9.1	0.1	2.4
12/1/2016 17:00	2016	0.2	0.8	9.1	0.1	0.7

12/5/2016 5:00	2016	1.7	7.0	7.8	0.1	0.0
12/5/2016 6:00	2016	1.1	4.6	9.1	0.1	3.1
12/5/2016 7:00	2016	1.4	5.8	9.1	0.1	5.7
12/5/2016 8:00	2016	0.3	1.2	9.1	0.1	1.1
12/5/2016 9:00	2016	0.6	2.5	9.1	0.1	2.4
12/5/2016 10:00	2016	0.2	0.8	9.1	0.1	0.7
12/5/2016 11:00	2016	0.3	1.2	9.1	0.1	1.1
12/5/2016 13:00	2016	0.2	0.8	9.1	0.1	0.6
12/5/2016 14:00	2016	0.3	1.2	9.1	0.1	1.1
12/6/2016 10:00	2016	0.2	0.8	7.9	0.1	0.0
12/7/2016 2:00	2016	0.2	0.8	7.2	0.1	0.0
12/7/2016 4:00	2016	0.2	0.8	7.8	0.1	0.0
12/7/2016 5:00	2016	0.6	2.5	9.1	0.1	1.1
12/7/2016 7:00	2016	0.2	0.8	9.1	0.1	0.6
12/7/2016 8:00	2016	0.3	1.2	9.1	0.1	1.1
12/7/2016 9:00	2016	0.2	0.8	9.1	0.1	0.7
12/8/2016 15:00	2016	0.2	0.8	6.9	0.1	0.0
12/8/2016 18:00	2016	0.2	0.8	7.5	0.1	0.0
12/8/2016 19:00	2016	0.4	1.7	9.0	0.1	0.0
12/8/2016 20:00	2016	0.7	2.9	9.1	0.1	2.7
12/9/2016 9:00	2016	0.2	0.8	8.6	0.1	0.0
12/11/2016 19:00	2016	0.3	1.2	4.1	0.1	0.0
12/11/2016 20:00	2016	0.2	0.8	4.8	0.1	0.0
12/11/2016 21:00	2016	0.2	0.8	5.6	0.1	0.0
12/11/2016 22:00	2016	0.5	2.1	7.5	0.1	0.0
12/11/2016 23:00	2016	0.5	2.1	9.1	0.1	0.4
12/12/2016 0:00	2016	0.6	2.5	9.1	0.1	2.4
12/12/2016 1:00	2016	0.8	3.3	9.1	0.1	3.2
12/12/2016 2:00	2016	0.9	3.7	9.1	0.1	3.6
12/12/2016 3:00	2016	1.3	5.4	9.1	0.1	5.3
12/12/2016 4:00	2016	1.1	4.6	9.1	0.1	4.5
12/12/2016 5:00	2016	0.5	2.1	9.1	0.1	2.0
12/12/2016 6:00	2016	0.5	2.1	9.1	0.1	2.0
12/12/2016 7:00	2016	0.2	0.8	9.1	0.1	0.7
12/12/2016 8:00	2016	0.6	2.5	9.1	0.1	2.4
12/12/2016 9:00	2016	0.3	1.2	9.1	0.1	1.1
12/12/2016 10:00	2016	0.2	0.8	9.1	0.1	0.7
12/12/2016 11:00	2016	0.2	0.8	9.1	0.1	0.7
12/12/2016 12:00	2016	0.3	1.2	9.1	0.1	1.1
12/12/2016 14:00	2016	0.2	0.8	9.1	0.1	0.6
12/12/2016 15:00	2016	0.4	1.7	9.1	0.1	1.6
12/12/2016 16:00	2016	0.7	2.9	9.1	0.1	2.8
12/12/2016 17:00	2016	0.2	0.8	9.1	0.1	0.7
12/14/2016 21:00	2016	1.5	6.2	9.1	0.1	1.0
12/14/2016 22:00	2016	0.5	2.1	9.1	0.1	2.0
12/14/2016 23:00	2016	0.2	0.8	9.1	0.1	0.7
12/15/2016 10:00	2016	0.2	0.8	8.8	0.1	0.0

12/17/2016 2:00	2016	0.2	0.8	5.7	0.1	0.0
12/17/2016 4:00	2016	0.2	0.8	6.3	0.1	0.0
12/17/2016 5:00	2016	0.6	2.5	8.7	0.1	0.0
12/17/2016 6:00	2016	0.5	2.1	9.1	0.1	1.6
12/17/2016 7:00	2016	0.6	2.5	9.1	0.1	2.4
12/17/2016 8:00	2016	0.8	3.3	9.1	0.1	3.2
12/17/2016 9:00	2016	1.1	4.6	9.1	0.1	4.5
12/17/2016 10:00	2016	0.8	3.3	9.1	0.1	3.2
12/17/2016 11:00	2016	0.6	2.5	9.1	0.1	2.4
12/17/2016 12:00	2016	0.2	0.8	9.1	0.1	0.7
12/17/2016 21:00	2016	0.2	0.8	9.0	0.1	0.0
12/17/2016 22:00	2016	0.3	1.2	9.1	0.1	1.1
12/17/2016 23:00	2016	0.2	0.8	9.1	0.1	0.7
12/18/2016 0:00	2016	0.2	0.8	9.1	0.1	0.7
12/18/2016 1:00	2016	0.8	3.3	9.1	0.1	3.2
12/18/2016 2:00	2016	0.9	3.7	9.1	0.1	3.6
12/18/2016 3:00	2016	0.9	3.7	9.1	0.1	3.6
12/18/2016 4:00	2016	1.3	5.4	9.1	0.1	5.3
12/18/2016 5:00	2016	2.1	8.7	9.1	0.1	8.6
12/18/2016 6:00	2016	0.4	1.7	9.1	0.1	1.6
12/18/2016 7:00	2016	1.2	5.0	9.1	0.1	4.9
12/18/2016 8:00	2016	0.2	0.8	9.1	0.1	0.7
12/18/2016 10:00	2016	0.5	2.1	9.1	0.1	1.9
12/18/2016 11:00	2016	0.2	0.8	9.1	0.1	0.7
12/19/2016 2:00	2016	0.2	0.8	8.4	0.1	0.0
12/22/2016 5:00	2016	0.3	1.2	2.2	0.1	0.0
12/22/2016 6:00	2016	1.2	5.0	7.1	0.1	0.0
12/22/2016 7:00	2016	0.7	2.9	9.1	0.1	0.8
12/22/2016 8:00	2016	1	4.1	9.1	0.1	4.0
12/22/2016 9:00	2016	1.2	5.0	9.1	0.1	4.9
12/22/2016 10:00	2016	0.2	0.8	9.1	0.1	0.7
12/22/2016 11:00	2016	0.2	0.8	9.1	0.1	0.7
12/24/2016 7:00	2016	0.2	0.8	5.6	0.1	0.0
12/24/2016 8:00	2016	1.1	4.6	9.1	0.1	0.9
12/24/2016 9:00	2016	0.6	2.5	9.1	0.1	2.4
12/24/2016 10:00	2016	0.8	3.3	9.1	0.1	3.2
12/24/2016 11:00	2016	0.3	1.2	9.1	0.1	1.1
12/26/2016 0:00	2016	0.2	0.8	6.2	0.1	0.0
12/26/2016 11:00	2016	0.3	1.2	6.4	0.1	0.0
12/26/2016 15:00	2016	2.2	9.1	9.1	0.1	6.0
12/26/2016 16:00	2016	1.8	7.5	9.1	0.1	7.4
12/26/2016 17:00	2016	1.4	5.8	9.1	0.1	5.7
12/26/2016 18:00	2016	0.3	1.2	9.1	0.1	1.1
12/26/2016 20:00	2016	1	4.1	9.1	0.1	3.9
12/26/2016 21:00	2016	3.3	13.7	9.1	0.1	13.6
12/26/2016 22:00	2016	2.6	10.8	9.1	0.1	10.7
12/26/2016 23:00	2016	3.8	15.7	9.1	0.1	15.6

12/27/2016 0:00	2016	0.2	0.8	9.1	0.1	0.7
12/27/2016 4:00	2016	0.3	1.2	9.1	0.1	0.8
12/27/2016 19:00	2016	0.2	0.8	8.4	0.1	0.0
12/28/2016 1:00	2016	0.2	0.8	8.7	0.1	0.0
12/29/2016 8:00	2016	0.3	1.2	6.8	0.1	0.0
12/29/2016 9:00	2016	0.7	2.9	9.1	0.1	0.5
12/29/2016 10:00	2016	0.5	2.1	9.1	0.1	2.0
12/29/2016 11:00	2016	0.6	2.5	9.1	0.1	2.4
12/29/2016 12:00	2016	0.6	2.5	9.1	0.1	2.4
12/29/2016 13:00	2016	1	4.1	9.1	0.1	4.0
12/29/2016 14:00	2016	0.7	2.9	9.1	0.1	2.8
12/29/2016 15:00	2016	0.8	3.3	9.1	0.1	3.2
12/29/2016 16:00	2016	0.7	2.9	9.1	0.1	2.8
12/29/2016 17:00	2016	0.7	2.9	9.1	0.1	2.8
12/29/2016 18:00	2016	0.3	1.2	9.1	0.1	1.1
12/29/2016 19:00	2016	0.4	1.7	9.1	0.1	1.6
12/30/2016 2:00	2016	0.2	0.8	9.1	0.1	0.1
12/31/2016 2:00	2016	0.2	0.8	7.5	0.1	0.0
12/31/2016 11:00	2016	0.4	1.7	8.3	0.1	0.0
12/31/2016 12:00	2016	0.5	2.1	9.1	0.1	1.2
12/31/2016 13:00	2016	1.1	4.6	9.1	0.1	4.5
12/31/2016 14:00	2016	0.2	0.8	9.1	0.1	0.7
12/31/2016 15:00	2016	0.2	0.8	9.1	0.1	0.7
12/31/2016 17:00	2016	0.3	1.2	9.1	0.1	1.0
12/31/2016 18:00	2016	0.5	2.1	9.1	0.1	2.0
12/31/2016 19:00	2016	0.5	2.1	9.1	0.1	2.0
12/31/2016 20:00	2016	0.8	3.3	9.1	0.1	3.2
12/31/2016 21:00	2016	0.8	3.3	9.1	0.1	3.2
12/31/2016 22:00	2016	0.9	3.7	9.1	0.1	3.6
12/31/2016 23:00	2016	0.6	2.5	9.1	0.1	2.4
5/1/2017 0:00	2017	1.6	6.6	6.6	0.1	0.0
5/1/2017 1:00	2017	1.2	5.0	9.1	0.1	2.4
5/1/2017 2:00	2017	0.7	2.9	9.1	0.1	2.8
5/1/2017 3:00	2017	0.7	2.9	9.1	0.1	2.8
5/1/2017 4:00	2017	0.8	3.3	9.1	0.1	3.2
5/1/2017 5:00	2017	2	8.3	9.1	0.1	8.2
5/1/2017 6:00	2017	4.7	19.5	9.1	0.1	19.4
5/1/2017 7:00	2017	4	16.6	9.1	0.1	16.5
5/1/2017 8:00	2017	4.5	18.6	9.1	0.1	18.5
5/1/2017 9:00	2017	6.1	25.3	9.1	0.1	25.2
5/1/2017 12:00	2017	0.8	3.3	9.1	0.1	3.0
5/1/2017 13:00	2017	1.3	5.4	9.1	0.1	5.3
5/1/2017 14:00	2017	1.9	7.9	9.1	0.1	7.8
5/1/2017 15:00	2017	6	24.8	9.1	0.1	24.7
5/1/2017 16:00	2017	1.6	6.6	9.1	0.1	6.5
5/1/2017 17:00	2017	1.6	6.6	9.1	0.1	6.5
5/1/2017 18:00	2017	8.8	36.4	9.1	0.1	36.3

5/1/2017 19:00	2017	5.4	22.4	9.1	0.1	22.3
5/1/2017 20:00	2017	4.4	18.2	9.1	0.1	18.1
5/2/2017 2:00	2017	0.2	0.8	9.1	0.1	0.2
5/2/2017 13:00	2017	0.2	0.8	8.8	0.1	0.0
5/2/2017 14:00	2017	0.2	0.8	9.1	0.1	0.5
5/2/2017 16:00	2017	1	4.1	9.1	0.1	3.9
5/2/2017 20:00	2017	0.2	0.8	9.1	0.1	0.4
5/4/2017 21:00	2017	0.5	2.1	6.3	0.1	0.0
5/4/2017 22:00	2017	0.6	2.5	8.7	0.1	0.0
5/4/2017 23:00	2017	0.5	2.1	9.1	0.1	1.5
5/5/2017 0:00	2017	0.9	3.7	9.1	0.1	3.6
5/5/2017 1:00	2017	0.6	2.5	9.1	0.1	2.4
5/5/2017 2:00	2017	0.2	0.8	9.1	0.1	0.7
5/5/2017 3:00	2017	0.7	2.9	9.1	0.1	2.8
5/5/2017 4:00	2017	0.7	2.9	9.1	0.1	2.8
5/5/2017 5:00	2017	1.2	5.0	9.1	0.1	4.9
5/5/2017 6:00	2017	1.7	7.0	9.1	0.1	6.9
5/5/2017 7:00	2017	1.4	5.8	9.1	0.1	5.7
5/5/2017 8:00	2017	1.8	7.5	9.1	0.1	7.4
5/5/2017 9:00	2017	2	8.3	9.1	0.1	8.2
5/5/2017 10:00	2017	1.3	5.4	9.1	0.1	5.3
5/5/2017 11:00	2017	1.1	4.6	9.1	0.1	4.5
5/5/2017 12:00	2017	2.1	8.7	9.1	0.1	8.6
5/5/2017 13:00	2017	2.9	12.0	9.1	0.1	11.9
5/5/2017 14:00	2017	2.6	10.8	9.1	0.1	10.7
5/5/2017 15:00	2017	2.5	10.4	9.1	0.1	10.3
5/5/2017 16:00	2017	2.3	9.5	9.1	0.1	9.4
5/5/2017 17:00	2017	1.9	7.9	9.1	0.1	7.8
5/5/2017 18:00	2017	4.9	20.3	9.1	0.1	20.2
5/5/2017 19:00	2017	2.7	11.2	9.1	0.1	11.1
5/5/2017 20:00	2017	3.5	14.5	9.1	0.1	14.4
5/5/2017 21:00	2017	1.6	6.6	9.1	0.1	6.5
5/5/2017 22:00	2017	0.4	1.7	9.1	0.1	1.6
5/5/2017 23:00	2017	0.3	1.2	9.1	0.1	1.1
5/6/2017 0:00	2017	0.4	1.7	9.1	0.1	1.6
5/6/2017 1:00	2017	0.8	3.3	9.1	0.1	3.2
5/6/2017 2:00	2017	0.5	2.1	9.1	0.1	2.0
5/6/2017 4:00	2017	2.1	8.7	9.1	0.1	8.5
5/6/2017 5:00	2017	2.6	10.8	9.1	0.1	10.7
5/6/2017 6:00	2017	0.6	2.5	9.1	0.1	2.4
5/6/2017 7:00	2017	0.2	0.8	9.1	0.1	0.7
5/6/2017 10:00	2017	0.2	0.8	9.1	0.1	0.5
5/6/2017 11:00	2017	0.9	3.7	9.1	0.1	3.6
5/6/2017 13:00	2017	2.2	9.1	9.1	0.1	8.9
5/6/2017 14:00	2017	1.3	5.4	9.1	0.1	5.3
5/6/2017 15:00	2017	1.5	6.2	9.1	0.1	6.1
5/6/2017 16:00	2017	1.4	5.8	9.1	0.1	5.7

5/6/2017 17:00	2017	0.7	2.9	9.1	0.1	2.8
5/6/2017 18:00	2017	1.1	4.6	9.1	0.1	4.5
5/6/2017 19:00	2017	0.2	0.8	9.1	0.1	0.7
5/6/2017 23:00	2017	0.2	0.8	9.1	0.1	0.4
5/7/2017 0:00	2017	0.2	0.8	9.1	0.1	0.7
5/7/2017 2:00	2017	0.5	2.1	9.1	0.1	1.9
5/7/2017 3:00	2017	0.2	0.8	9.1	0.1	0.7
5/7/2017 4:00	2017	0.5	2.1	9.1	0.1	2.0
5/7/2017 5:00	2017	0.3	1.2	9.1	0.1	1.1
5/7/2017 6:00	2017	0.2	0.8	9.1	0.1	0.7
5/7/2017 7:00	2017	0.3	1.2	9.1	0.1	1.1
5/7/2017 8:00	2017	0.7	2.9	9.1	0.1	2.8
5/7/2017 9:00	2017	0.2	0.8	9.1	0.1	0.7
5/7/2017 15:00	2017	0.2	0.8	9.1	0.1	0.2
5/8/2017 12:00	2017	0.3	1.2	8.3	0.1	0.0
5/8/2017 15:00	2017	0.3	1.2	9.1	0.1	0.1
5/13/2017 12:00	2017	0.2	0.8	0.8	0.1	0.0
5/14/2017 10:00	2017	1.8	7.5	7.5	0.1	0.0
5/14/2017 11:00	2017	0.6	2.5	9.1	0.1	0.7
5/18/2017 20:00	2017	1	4.1	4.1	0.1	0.0
5/21/2017 22:00	2017	0.8	3.3	3.3	0.1	0.0
5/21/2017 23:00	2017	0.3	1.2	4.5	0.1	0.0
5/22/2017 0:00	2017	2.2	9.1	9.1	0.1	4.4
5/22/2017 1:00	2017	2.6	10.8	9.1	0.1	10.7
5/22/2017 2:00	2017	1.7	7.0	9.1	0.1	6.9
5/22/2017 3:00	2017	0.5	2.1	9.1	0.1	2.0
5/22/2017 4:00	2017	4.3	17.8	9.1	0.1	17.7
5/22/2017 5:00	2017	0.3	1.2	9.1	0.1	1.1
5/22/2017 6:00	2017	0.2	0.8	9.1	0.1	0.7
5/22/2017 14:00	2017	1	4.1	9.1	0.1	3.3
5/25/2017 16:00	2017	0.8	3.3	5.0	0.1	0.0
5/25/2017 17:00	2017	2.1	8.7	9.1	0.1	4.5
5/25/2017 18:00	2017	4.9	20.3	9.1	0.1	20.2
5/25/2017 19:00	2017	1.8	7.5	9.1	0.1	7.4
5/25/2017 20:00	2017	0.6	2.5	9.1	0.1	2.4
5/25/2017 21:00	2017	0.2	0.8	9.1	0.1	0.7
5/26/2017 0:00	2017	0.2	0.8	9.1	0.1	0.5
5/26/2017 2:00	2017	0.3	1.2	9.1	0.1	1.0
5/26/2017 3:00	2017	0.2	0.8	9.1	0.1	0.7
5/26/2017 7:00	2017	0.2	0.8	9.1	0.1	0.4
5/26/2017 9:00	2017	0.2	0.8	9.1	0.1	0.6
5/26/2017 14:00	2017	0.5	2.1	9.1	0.1	1.6
5/26/2017 16:00	2017	0.2	0.8	9.1	0.1	0.6
5/29/2017 8:00	2017	1.9	7.9	9.1	0.1	1.5
5/29/2017 9:00	2017	4.9	20.3	9.1	0.1	20.2
5/29/2017 10:00	2017	3.4	14.1	9.1	0.1	14.0
5/29/2017 11:00	2017	6.4	26.5	9.1	0.1	26.4

5/29/2017 12:00	2017	6.2	25.7	9.1	0.1	25.6
5/29/2017 13:00	2017	3.3	13.7	9.1	0.1	13.6
5/29/2017 14:00	2017	0.3	1.2	9.1	0.1	1.1
5/29/2017 15:00	2017	0.6	2.5	9.1	0.1	2.4
5/30/2017 18:00	2017	3.9	16.1	9.1	0.1	13.5
5/30/2017 22:00	2017	0.2	0.8	9.1	0.1	0.4
5/31/2017 3:00	2017	0.7	2.9	9.1	0.1	2.4
5/31/2017 20:00	2017	0.5	2.1	9.1	0.1	0.4
6/1/2017 17:00	2017	0.3	1.2	8.3	0.1	0.0
6/4/2017 15:00	2017	0.4	1.7	2.9	0.1	0.0
6/5/2017 19:00	2017	0.2	0.8	1.0	0.1	0.0
6/5/2017 20:00	2017	0.3	1.2	2.1	0.1	0.0
6/5/2017 22:00	2017	1.2	5.0	6.9	0.1	0.0
6/5/2017 23:00	2017	1.8	7.5	9.1	0.1	5.1
6/6/2017 0:00	2017	1.3	5.4	9.1	0.1	5.3
6/6/2017 1:00	2017	2.9	12.0	9.1	0.1	11.9
6/6/2017 2:00	2017	1.7	7.0	9.1	0.1	6.9
6/6/2017 3:00	2017	5	20.7	9.1	0.1	20.6
6/6/2017 4:00	2017	0.2	0.8	9.1	0.1	0.7
6/6/2017 5:00	2017	0.6	2.5	9.1	0.1	2.4
6/6/2017 6:00	2017	0.3	1.2	9.1	0.1	1.1
6/6/2017 9:00	2017	0.2	0.8	9.1	0.1	0.5
6/6/2017 10:00	2017	2.1	8.7	9.1	0.1	8.6
6/6/2017 11:00	2017	1.8	7.5	9.1	0.1	7.4
6/6/2017 12:00	2017	1.5	6.2	9.1	0.1	6.1
6/6/2017 13:00	2017	1	4.1	9.1	0.1	4.0
6/6/2017 14:00	2017	0.3	1.2	9.1	0.1	1.1
6/6/2017 15:00	2017	1.7	7.0	9.1	0.1	6.9
6/6/2017 16:00	2017	1.7	7.0	9.1	0.1	6.9
6/6/2017 17:00	2017	0.2	0.8	9.1	0.1	0.7
6/15/2017 22:00	2017	0.8	3.3	3.3	0.1	0.0
6/15/2017 23:00	2017	3.8	15.7	9.1	0.1	9.8
6/16/2017 0:00	2017	5.6	23.2	9.1	0.1	23.1
6/16/2017 1:00	2017	3.1	12.8	9.1	0.1	12.7
6/16/2017 2:00	2017	0.8	3.3	9.1	0.1	3.2
6/16/2017 3:00	2017	1.1	4.6	9.1	0.1	4.5
6/16/2017 4:00	2017	1.2	5.0	9.1	0.1	4.9
6/16/2017 5:00	2017	0.2	0.8	9.1	0.1	0.7
6/20/2017 5:00	2017	2.4	9.9	9.1	0.1	0.8
6/20/2017 6:00	2017	0.2	0.8	9.1	0.1	0.7
6/21/2017 1:00	2017	0.6	2.5	9.1	0.1	0.6
6/21/2017 2:00	2017	0.6	2.5	9.1	0.1	2.4
6/21/2017 3:00	2017	0.3	1.2	9.1	0.1	1.1
6/21/2017 4:00	2017	0.5	2.1	9.1	0.1	2.0
6/22/2017 23:00	2017	7	29.0	9.1	0.1	24.7
6/23/2017 0:00	2017	0.3	1.2	9.1	0.1	1.1
6/23/2017 1:00	2017	2	8.3	9.1	0.1	8.2

6/23/2017 2:00	2017	1.4	5.8	9.1	0.1	5.7
6/23/2017 3:00	2017	1.5	6.2	9.1	0.1	6.1
6/23/2017 7:00	2017	0.3	1.2	9.1	0.1	0.8
6/23/2017 8:00	2017	1.1	4.6	9.1	0.1	4.5
6/23/2017 9:00	2017	0.5	2.1	9.1	0.1	2.0
6/25/2017 11:00	2017	3.6	14.9	9.1	0.1	9.9
6/25/2017 12:00	2017	4.4	18.2	9.1	0.1	18.1
6/25/2017 14:00	2017	2.8	11.6	9.1	0.1	11.4
6/25/2017 15:00	2017	21.9	90.7	9.1	0.1	90.6
6/25/2017 16:00	2017	1.4	5.8	9.1	0.1	5.7
6/25/2017 17:00	2017	8.7	36.0	9.1	0.1	35.9
6/25/2017 23:00	2017	0.2	0.8	9.1	0.1	0.2
6/26/2017 22:00	2017	0.8	3.3	9.1	0.1	1.0
6/27/2017 13:00	2017	1.2	5.0	9.1	0.1	3.5
6/28/2017 5:00	2017	0.2	0.8	8.3	0.1	0.0
6/28/2017 18:00	2017	2.5	10.4	9.1	0.1	8.3
6/29/2017 10:00	2017	2.3	9.5	9.1	0.1	7.9
6/29/2017 11:00	2017	1.4	5.8	9.1	0.1	5.7
6/29/2017 12:00	2017	0.8	3.3	9.1	0.1	3.2
6/29/2017 13:00	2017	1.5	6.2	9.1	0.1	6.1
6/29/2017 14:00	2017	0.4	1.7	9.1	0.1	1.6
6/29/2017 15:00	2017	1.7	7.0	9.1	0.1	6.9
6/29/2017 16:00	2017	2.3	9.5	9.1	0.1	9.4
6/29/2017 17:00	2017	1.4	5.8	9.1	0.1	5.7
6/29/2017 18:00	2017	1.2	5.0	9.1	0.1	4.9
6/29/2017 19:00	2017	4.4	18.2	9.1	0.1	18.1
6/29/2017 20:00	2017	2.5	10.4	9.1	0.1	10.3
6/29/2017 21:00	2017	0.5	2.1	9.1	0.1	2.0
6/30/2017 1:00	2017	3.5	14.5	9.1	0.1	14.1
6/30/2017 12:00	2017	0.6	2.5	9.1	0.1	1.4
6/30/2017 13:00	2017	1.4	5.8	9.1	0.1	5.7
6/30/2017 14:00	2017	0.8	3.3	9.1	0.1	3.2
6/30/2017 16:00	2017	0.3	1.2	9.1	0.1	1.0
7/1/2017 5:00	2017	0.2	0.8	8.6	0.1	0.0
7/1/2017 6:00	2017	0.5	2.1	9.1	0.1	1.5
7/1/2017 7:00	2017	2	8.3	9.1	0.1	8.2
7/1/2017 8:00	2017	16.9	70.0	9.1	0.1	69.9
7/1/2017 9:00	2017	4.8	19.9	9.1	0.1	19.8
7/1/2017 10:00	2017	1.4	5.8	9.1	0.1	5.7
7/1/2017 20:00	2017	7.2	29.8	9.1	0.1	28.8
7/1/2017 21:00	2017	0.3	1.2	9.1	0.1	1.1
7/2/2017 15:00	2017	9.7	40.2	9.1	0.1	38.4
7/2/2017 16:00	2017	0.2	0.8	9.1	0.1	0.7
7/2/2017 21:00	2017	16.7	69.1	9.1	0.1	68.6
7/2/2017 22:00	2017	0.4	1.7	9.1	0.1	1.6
7/7/2017 16:00	2017	0.8	3.3	3.3	0.1	0.0
7/7/2017 17:00	2017	1.9	7.9	9.1	0.1	2.0

7/8/2017 3:00	2017	10.6	43.9	9.1	0.1	42.9
7/8/2017 4:00	2017	6.6	27.3	9.1	0.1	27.2
7/8/2017 6:00	2017	0.8	3.3	9.1	0.1	3.1
7/9/2017 14:00	2017	0.6	2.5	8.4	0.1	0.0
7/9/2017 19:00	2017	5	20.7	9.1	0.1	19.5
7/9/2017 22:00	2017	1	4.1	9.1	0.1	3.8
7/10/2017 2:00	2017	0.3	1.2	9.1	0.1	0.8
7/10/2017 3:00	2017	1.1	4.6	9.1	0.1	4.5
7/10/2017 4:00	2017	0.3	1.2	9.1	0.1	1.1
7/10/2017 12:00	2017	0.3	1.2	9.1	0.1	0.4
7/10/2017 16:00	2017	0.2	0.8	9.1	0.1	0.4
7/11/2017 14:00	2017	0.3	1.2	8.2	0.1	0.0
7/11/2017 15:00	2017	13.3	55.1	9.1	0.1	54.0
7/11/2017 18:00	2017	0.2	0.8	9.1	0.1	0.5
7/12/2017 21:00	2017	0.2	0.8	7.2	0.1	0.0
7/12/2017 23:00	2017	0.2	0.8	7.9	0.1	0.0
7/13/2017 2:00	2017	0.3	1.2	8.8	0.1	0.0
7/13/2017 3:00	2017	2.4	9.9	9.1	0.1	9.5
7/13/2017 4:00	2017	3	12.4	9.1	0.1	12.3
7/13/2017 5:00	2017	1.5	6.2	9.1	0.1	6.1
7/13/2017 6:00	2017	0.2	0.8	9.1	0.1	0.7
7/14/2017 21:00	2017	3.9	16.1	9.1	0.1	12.3
7/14/2017 22:00	2017	7.3	30.2	9.1	0.1	30.1
7/14/2017 23:00	2017	0.8	3.3	9.1	0.1	3.2
7/15/2017 0:00	2017	0.5	2.1	9.1	0.1	2.0
7/15/2017 1:00	2017	1.3	5.4	9.1	0.1	5.3
7/15/2017 3:00	2017	0.2	0.8	9.1	0.1	0.6
7/15/2017 4:00	2017	0.2	0.8	9.1	0.1	0.7
7/15/2017 5:00	2017	0.5	2.1	9.1	0.1	2.0
7/16/2017 22:00	2017	0.2	0.8	5.9	0.1	0.0
7/17/2017 5:00	2017	0.4	1.7	6.8	0.1	0.0
7/24/2017 5:00	2017	4.3	17.8	9.1	0.1	8.7
7/24/2017 6:00	2017	5	20.7	9.1	0.1	20.6
7/24/2017 7:00	2017	5	20.7	9.1	0.1	20.6
7/24/2017 8:00	2017	2.6	10.8	9.1	0.1	10.7
7/24/2017 9:00	2017	2.7	11.2	9.1	0.1	11.1
7/24/2017 10:00	2017	3.9	16.1	9.1	0.1	16.0
7/24/2017 11:00	2017	4.7	19.5	9.1	0.1	19.4
7/24/2017 12:00	2017	5.7	23.6	9.1	0.1	23.5
7/24/2017 13:00	2017	1.3	5.4	9.1	0.1	5.3
7/24/2017 14:00	2017	0.9	3.7	9.1	0.1	3.6
7/24/2017 15:00	2017	0.3	1.2	9.1	0.1	1.1
7/24/2017 17:00	2017	2.8	11.6	9.1	0.1	11.4
7/24/2017 18:00	2017	3.7	15.3	9.1	0.1	15.2
7/24/2017 19:00	2017	6.5	26.9	9.1	0.1	26.8
7/24/2017 20:00	2017	3.9	16.1	9.1	0.1	16.0
7/24/2017 21:00	2017	2.3	9.5	9.1	0.1	9.4

7/24/2017 22:00	2017	1.3	5.4	9.1	0.1	5.3
7/24/2017 23:00	2017	0.3	1.2	9.1	0.1	1.1
7/25/2017 2:00	2017	0.8	3.3	9.1	0.1	3.0
7/25/2017 3:00	2017	0.8	3.3	9.1	0.1	3.2
8/4/2017 4:00	2017	1.1	4.6	4.6	0.1	0.0
8/4/2017 5:00	2017	1.3	5.4	9.1	0.1	0.7
8/4/2017 7:00	2017	0.5	2.1	9.1	0.1	1.9
8/4/2017 8:00	2017	1.8	7.5	9.1	0.1	7.4
8/4/2017 22:00	2017	1	4.1	9.1	0.1	2.7
8/5/2017 4:00	2017	0.3	1.2	9.1	0.1	0.6
8/5/2017 16:00	2017	1	4.1	9.1	0.1	2.9
8/12/2017 1:00	2017	1.2	5.0	5.0	0.1	0.0
8/12/2017 2:00	2017	0.3	1.2	6.1	0.1	0.0
8/12/2017 4:00	2017	0.8	3.3	9.1	0.1	0.1
8/12/2017 13:00	2017	1.4	5.8	9.1	0.1	4.9
8/12/2017 15:00	2017	15.2	62.9	9.1	0.1	62.7
8/13/2017 1:00	2017	0.2	0.8	8.9	0.1	0.0
8/17/2017 15:00	2017	0.2	0.8	0.8	0.1	0.0
8/18/2017 0:00	2017	1.5	6.2	6.2	0.1	0.0
8/18/2017 1:00	2017	0.3	1.2	7.4	0.1	0.0
8/18/2017 2:00	2017	3	12.4	9.1	0.1	10.6
8/18/2017 3:00	2017	6.3	26.1	9.1	0.1	26.0
8/18/2017 4:00	2017	4.9	20.3	9.1	0.1	20.2
8/18/2017 5:00	2017	2.5	10.4	9.1	0.1	10.3
8/18/2017 6:00	2017	5.1	21.1	9.1	0.1	21.0
8/18/2017 9:00	2017	0.2	0.8	9.1	0.1	0.5
8/18/2017 15:00	2017	2.7	11.2	9.1	0.1	10.6
8/19/2017 0:00	2017	0.2	0.8	9.0	0.1	0.0
8/22/2017 9:00	2017	10.5	43.5	9.1	0.1	35.3
8/22/2017 13:00	2017	5.5	22.8	9.1	0.1	22.4
8/22/2017 16:00	2017	16.7	69.1	9.1	0.1	68.8
8/22/2017 17:00	2017	0.6	2.5	9.1	0.1	2.4
8/31/2017 0:00	2017	0.3	1.2	1.2	0.1	0.0
9/2/2017 15:00	2017	0.2	0.8	0.8	0.1	0.0
9/3/2017 4:00	2017	0.6	2.5	2.5	0.1	0.0
9/3/2017 5:00	2017	1	4.1	6.5	0.1	0.0
9/3/2017 6:00	2017	1.6	6.6	9.1	0.1	3.9
9/3/2017 7:00	2017	0.3	1.2	9.1	0.1	1.1
9/3/2017 10:00	2017	1.1	4.6	9.1	0.1	4.3
9/3/2017 11:00	2017	0.6	2.5	9.1	0.1	2.4
9/3/2017 12:00	2017	0.5	2.1	9.1	0.1	2.0
9/3/2017 13:00	2017	0.2	0.8	9.1	0.1	0.7
9/3/2017 15:00	2017	0.2	0.8	9.1	0.1	0.6
9/3/2017 16:00	2017	1.2	5.0	9.1	0.1	4.9
9/3/2017 17:00	2017	0.2	0.8	9.1	0.1	0.7
9/3/2017 18:00	2017	0.3	1.2	9.1	0.1	1.1
9/3/2017 20:00	2017	0.2	0.8	9.1	0.1	0.6

9/4/2017 10:00	2017	0.7	2.9	9.1	0.1	1.5
9/4/2017 15:00	2017	0.4	1.7	9.1	0.1	1.2
9/4/2017 16:00	2017	2.6	10.8	9.1	0.1	10.7
9/4/2017 17:00	2017	0.3	1.2	9.1	0.1	1.1
9/4/2017 18:00	2017	2.4	9.9	9.1	0.1	9.8
9/4/2017 19:00	2017	6.7	27.7	9.1	0.1	27.6
9/4/2017 20:00	2017	0.6	2.5	9.1	0.1	2.4
9/4/2017 22:00	2017	1.8	7.5	9.1	0.1	7.3
9/4/2017 23:00	2017	1.4	5.8	9.1	0.1	5.7
9/5/2017 1:00	2017	5	20.7	9.1	0.1	20.5
9/5/2017 2:00	2017	1.4	5.8	9.1	0.1	5.7
9/7/2017 13:00	2017	2.4	9.9	9.1	0.1	4.1
9/7/2017 14:00	2017	1	4.1	9.1	0.1	4.0
9/7/2017 15:00	2017	0.6	2.5	9.1	0.1	2.4
9/7/2017 16:00	2017	0.6	2.5	9.1	0.1	2.4
9/7/2017 18:00	2017	0.6	2.5	9.1	0.1	2.3
9/7/2017 19:00	2017	2	8.3	9.1	0.1	8.2
9/7/2017 20:00	2017	0.6	2.5	9.1	0.1	2.4
9/7/2017 21:00	2017	0.5	2.1	9.1	0.1	2.0
9/8/2017 12:00	2017	0.3	1.2	8.9	0.1	0.0
9/8/2017 14:00	2017	0.3	1.2	9.1	0.1	0.8
9/8/2017 17:00	2017	0.3	1.2	9.1	0.1	0.9
9/27/2017 15:00	2017	10.5	43.5	9.1	0.1	34.4
10/4/2017 16:00	2017	2.8	11.6	9.1	0.1	2.5
10/4/2017 17:00	2017	1	4.1	9.1	0.1	4.0
10/4/2017 18:00	2017	2.1	8.7	9.1	0.1	8.6
10/4/2017 19:00	2017	2	8.3	9.1	0.1	8.2
10/7/2017 10:00	2017	1.3	5.4	8.2	0.1	0.0
10/7/2017 11:00	2017	0.8	3.3	9.1	0.1	2.3
10/7/2017 12:00	2017	0.7	2.9	9.1	0.1	2.8
10/8/2017 5:00	2017	1.3	5.4	9.1	0.1	3.7
10/8/2017 6:00	2017	1.1	4.6	9.1	0.1	4.5
10/8/2017 7:00	2017	2.5	10.4	9.1	0.1	10.3
10/8/2017 8:00	2017	1.3	5.4	9.1	0.1	5.3
10/9/2017 8:00	2017	0.2	0.8	7.5	0.1	0.0
10/9/2017 9:00	2017	0.8	3.3	9.1	0.1	1.6
10/9/2017 10:00	2017	0.5	2.1	9.1	0.1	2.0
10/9/2017 11:00	2017	2	8.3	9.1	0.1	8.2
10/9/2017 12:00	2017	1.6	6.6	9.1	0.1	6.5
10/9/2017 13:00	2017	1.6	6.6	9.1	0.1	6.5
10/10/2017 3:00	2017	0.2	0.8	8.5	0.1	0.0
10/14/2017 1:00	2017	0.2	0.8	0.8	0.1	0.0
10/15/2017 1:00	2017	1.5	6.2	6.2	0.1	0.0
10/15/2017 2:00	2017	3	12.4	9.1	0.1	9.4
10/15/2017 3:00	2017	1.8	7.5	9.1	0.1	7.4
10/15/2017 4:00	2017	0.8	3.3	9.1	0.1	3.2
10/15/2017 5:00	2017	0.3	1.2	9.1	0.1	1.1

10/15/2017 6:00	2017	0.4	1.7	9.1	0.1	1.6
10/15/2017 7:00	2017	1.2	5.0	9.1	0.1	4.9
10/15/2017 8:00	2017	3.6	14.9	9.1	0.1	14.8
10/15/2017 9:00	2017	0.4	1.7	9.1	0.1	1.6
10/15/2017 14:00	2017	1.6	6.6	9.1	0.1	6.1
10/15/2017 18:00	2017	4.5	18.6	9.1	0.1	18.2
10/24/2017 5:00	2017	0.4	1.7	1.7	0.1	0.0
10/24/2017 6:00	2017	0.4	1.7	3.2	0.1	0.0
10/24/2017 7:00	2017	2.2	9.1	9.1	0.1	3.1
10/24/2017 8:00	2017	4.5	18.6	9.1	0.1	18.5
10/24/2017 9:00	2017	2.7	11.2	9.1	0.1	11.1
10/24/2017 10:00	2017	1.4	5.8	9.1	0.1	5.7
10/24/2017 11:00	2017	0.5	2.1	9.1	0.1	2.0
10/24/2017 21:00	2017	0.6	2.5	9.1	0.1	1.5
10/28/2017 16:00	2017	0.2	0.8	0.9	0.1	0.0
10/28/2017 17:00	2017	0.7	2.9	3.7	0.1	0.0
10/28/2017 18:00	2017	0.5	2.1	5.6	0.1	0.0
10/28/2017 19:00	2017	0.5	2.1	7.6	0.1	0.0
10/28/2017 20:00	2017	0.8	3.3	9.1	0.1	1.7
10/28/2017 21:00	2017	1.1	4.6	9.1	0.1	4.5
10/28/2017 23:00	2017	1.7	7.0	9.1	0.1	6.8
10/29/2017 0:00	2017	1.9	7.9	9.1	0.1	7.8
10/29/2017 1:00	2017	1.5	6.2	9.1	0.1	6.1
10/29/2017 2:00	2017	0.8	3.3	9.1	0.1	3.2
10/29/2017 4:00	2017	0.5	2.1	9.1	0.1	1.9
10/29/2017 6:00	2017	0.2	0.8	9.1	0.1	0.6
10/29/2017 7:00	2017	0.2	0.8	9.1	0.1	0.7
10/29/2017 8:00	2017	0.3	1.2	9.1	0.1	1.1
10/29/2017 9:00	2017	0.8	3.3	9.1	0.1	3.2
10/29/2017 10:00	2017	2.3	9.5	9.1	0.1	9.4
10/29/2017 11:00	2017	2.5	10.4	9.1	0.1	10.3
10/29/2017 12:00	2017	2.9	12.0	9.1	0.1	11.9
10/29/2017 13:00	2017	1	4.1	9.1	0.1	4.0
10/29/2017 14:00	2017	1.7	7.0	9.1	0.1	6.9
10/29/2017 15:00	2017	1	4.1	9.1	0.1	4.0
10/29/2017 16:00	2017	1.4	5.8	9.1	0.1	5.7
10/29/2017 17:00	2017	1.1	4.6	9.1	0.1	4.5
10/29/2017 18:00	2017	0.6	2.5	9.1	0.1	2.4
10/29/2017 19:00	2017	0.5	2.1	9.1	0.1	2.0
10/29/2017 20:00	2017	1.4	5.8	9.1	0.1	5.7
10/29/2017 21:00	2017	2.5	10.4	9.1	0.1	10.3
10/29/2017 22:00	2017	3.3	13.7	9.1	0.1	13.6
10/29/2017 23:00	2017	2.9	12.0	9.1	0.1	11.9
10/30/2017 0:00	2017	7	29.0	9.1	0.1	28.9
10/30/2017 1:00	2017	6	24.8	9.1	0.1	24.7
10/30/2017 2:00	2017	5.8	24.0	9.1	0.1	23.9
10/30/2017 3:00	2017	8.8	36.4	9.1	0.1	36.3

10/30/2017 4:00	2017	12	49.7	9.1	0.1	49.6
10/30/2017 5:00	2017	17.6	72.9	9.1	0.1	72.8
10/30/2017 6:00	2017	8.5	35.2	9.1	0.1	35.1
10/30/2017 7:00	2017	3.6	14.9	9.1	0.1	14.8
10/30/2017 8:00	2017	2	8.3	9.1	0.1	8.2
10/30/2017 9:00	2017	2	8.3	9.1	0.1	8.2
10/30/2017 10:00	2017	1.8	7.5	9.1	0.1	7.4
10/30/2017 11:00	2017	0.3	1.2	9.1	0.1	1.1
10/30/2017 12:00	2017	0.2	0.8	9.1	0.1	0.7
11/1/2017 10:00	2017	0.3	1.2	5.8	0.1	0.0
11/1/2017 11:00	2017	0.2	0.8	6.5	0.1	0.0
11/1/2017 13:00	2017	0.3	1.2	7.5	0.1	0.0
11/1/2017 14:00	2017	0.2	0.8	8.3	0.1	0.0
11/1/2017 17:00	2017	0.6	2.5	9.1	0.1	1.3
11/1/2017 18:00	2017	0.9	3.7	9.1	0.1	3.6
11/1/2017 19:00	2017	1.5	6.2	9.1	0.1	6.1
11/1/2017 20:00	2017	0.6	2.5	9.1	0.1	2.4
11/1/2017 21:00	2017	0.5	2.1	9.1	0.1	2.0
11/1/2017 22:00	2017	0.5	2.1	9.1	0.1	2.0
11/1/2017 23:00	2017	0.6	2.5	9.1	0.1	2.4
11/2/2017 0:00	2017	0.4	1.7	9.1	0.1	1.6
11/2/2017 3:00	2017	0.2	0.8	9.1	0.1	0.5
11/2/2017 4:00	2017	1.4	5.8	9.1	0.1	5.7
11/2/2017 5:00	2017	1.4	5.8	9.1	0.1	5.7
11/2/2017 6:00	2017	2	8.3	9.1	0.1	8.2
11/2/2017 7:00	2017	2.3	9.5	9.1	0.1	9.4
11/2/2017 8:00	2017	1.6	6.6	9.1	0.1	6.5
11/2/2017 9:00	2017	0.5	2.1	9.1	0.1	2.0
11/2/2017 10:00	2017	0.6	2.5	9.1	0.1	2.4
11/2/2017 11:00	2017	0.2	0.8	9.1	0.1	0.7
11/2/2017 12:00	2017	0.3	1.2	9.1	0.1	1.1
11/2/2017 14:00	2017	0.4	1.7	9.1	0.1	1.5
11/2/2017 15:00	2017	0.7	2.9	9.1	0.1	2.8
11/2/2017 16:00	2017	1.8	7.5	9.1	0.1	7.4
11/2/2017 17:00	2017	0.7	2.9	9.1	0.1	2.8
11/2/2017 18:00	2017	0.4	1.7	9.1	0.1	1.6
11/2/2017 19:00	2017	0.8	3.3	9.1	0.1	3.2
11/2/2017 20:00	2017	0.4	1.7	9.1	0.1	1.6
11/2/2017 22:00	2017	0.2	0.8	9.1	0.1	0.6
11/2/2017 23:00	2017	8.3	34.4	9.1	0.1	34.3
11/3/2017 0:00	2017	3.6	14.9	9.1	0.1	14.8
11/3/2017 1:00	2017	2.2	9.1	9.1	0.1	9.0
11/3/2017 2:00	2017	2.1	8.7	9.1	0.1	8.6
11/3/2017 3:00	2017	1.8	7.5	9.1	0.1	7.4
11/3/2017 4:00	2017	1.9	7.9	9.1	0.1	7.8
11/5/2017 4:00	2017	0.2	0.8	5.2	0.1	0.0
11/5/2017 5:00	2017	0.2	0.8	5.9	0.1	0.0

11/5/2017 6:00	2017	0.2	0.8	6.6	0.1	0.0
11/5/2017 8:00	2017	0.3	1.2	7.7	0.1	0.0
11/5/2017 9:00	2017	0.9	3.7	9.1	0.1	2.2
11/5/2017 10:00	2017	0.4	1.7	9.1	0.1	1.6
11/5/2017 11:00	2017	0.2	0.8	9.1	0.1	0.7
11/5/2017 12:00	2017	0.6	2.5	9.1	0.1	2.4
11/5/2017 13:00	2017	0.9	3.7	9.1	0.1	3.6
11/5/2017 14:00	2017	1.2	5.0	9.1	0.1	4.9
11/5/2017 15:00	2017	3.6	14.9	9.1	0.1	14.8
11/5/2017 16:00	2017	1.2	5.0	9.1	0.1	4.9
11/5/2017 17:00	2017	0.2	0.8	9.1	0.1	0.7
11/5/2017 18:00	2017	0.2	0.8	9.1	0.1	0.7
11/5/2017 20:00	2017	0.2	0.8	9.1	0.1	0.6
11/5/2017 21:00	2017	0.2	0.8	9.1	0.1	0.7
11/5/2017 22:00	2017	1	4.1	9.1	0.1	4.0
11/5/2017 23:00	2017	1.9	7.9	9.1	0.1	7.8
11/6/2017 0:00	2017	0.3	1.2	9.1	0.1	1.1
11/6/2017 1:00	2017	1.1	4.6	9.1	0.1	4.5
11/6/2017 3:00	2017	0.3	1.2	9.1	0.1	1.0
11/6/2017 5:00	2017	0.3	1.2	9.1	0.1	1.0
11/9/2017 20:00	2017	1.7	7.0	7.5	0.1	0.0
11/9/2017 21:00	2017	0.6	2.5	9.1	0.1	0.7
11/9/2017 22:00	2017	0.7	2.9	9.1	0.1	2.8
11/16/2017 3:00	2017	0.3	1.2	1.2	0.1	0.0
11/16/2017 10:00	2017	0.2	0.8	1.4	0.1	0.0
11/16/2017 13:00	2017	0.5	2.1	3.1	0.1	0.0
11/16/2017 14:00	2017	0.2	0.8	3.9	0.1	0.0
11/16/2017 15:00	2017	0.2	0.8	4.6	0.1	0.0
11/16/2017 16:00	2017	0.3	1.2	5.7	0.1	0.0
11/16/2017 17:00	2017	0.3	1.2	6.9	0.1	0.0
11/18/2017 12:00	2017	0.3	1.2	3.8	0.1	0.0
11/18/2017 23:00	2017	0.2	0.8	3.6	0.1	0.0
11/19/2017 0:00	2017	0.2	0.8	4.3	0.1	0.0
11/19/2017 1:00	2017	0.3	1.2	5.4	0.1	0.0
11/19/2017 2:00	2017	0.6	2.5	7.8	0.1	0.0
11/19/2017 3:00	2017	0.7	2.9	9.1	0.1	1.5
11/19/2017 5:00	2017	0.2	0.8	9.1	0.1	0.6
11/19/2017 6:00	2017	0.2	0.8	9.1	0.1	0.7
11/19/2017 7:00	2017	0.3	1.2	9.1	0.1	1.1
11/19/2017 8:00	2017	0.7	2.9	9.1	0.1	2.8
11/19/2017 9:00	2017	0.3	1.2	9.1	0.1	1.1
11/19/2017 14:00	2017	0.6	2.5	9.1	0.1	2.0
11/21/2017 10:00	2017	0.5	2.1	6.8	0.1	0.0
11/21/2017 11:00	2017	0.9	3.7	9.1	0.1	1.3
11/22/2017 0:00	2017	0.7	2.9	9.1	0.1	1.6
11/22/2017 1:00	2017	1.1	4.6	9.1	0.1	4.5
11/22/2017 2:00	2017	0.3	1.2	9.1	0.1	1.1

11/22/2017 3:00	2017	0.2	0.8	9.1	0.1	0.7
11/22/2017 4:00	2017	0.2	0.8	9.1	0.1	0.7
11/22/2017 5:00	2017	0.2	0.8	9.1	0.1	0.7
11/25/2017 8:00	2017	0.7	2.9	4.5	0.1	0.0
11/25/2017 9:00	2017	0.6	2.5	6.9	0.1	0.0
11/25/2017 10:00	2017	1.6	6.6	9.1	0.1	4.3
11/25/2017 11:00	2017	1.2	5.0	9.1	0.1	4.9
11/25/2017 12:00	2017	0.6	2.5	9.1	0.1	2.4
11/25/2017 13:00	2017	0.3	1.2	9.1	0.1	1.1
11/25/2017 20:00	2017	0.4	1.7	9.1	0.1	1.0
11/25/2017 23:00	2017	0.2	0.8	9.1	0.1	0.5
11/26/2017 4:00	2017	0.2	0.8	9.1	0.1	0.3
11/26/2017 18:00	2017	0.5	2.1	9.1	0.1	0.7
11/26/2017 19:00	2017	1.1	4.6	9.1	0.1	4.5
11/26/2017 20:00	2017	0.6	2.5	9.1	0.1	2.4
11/26/2017 21:00	2017	0.2	0.8	9.1	0.1	0.7
11/29/2017 2:00	2017	0.3	1.2	5.1	0.1	0.0
11/29/2017 4:00	2017	0.2	0.8	5.7	0.1	0.0
11/30/2017 17:00	2017	0.7	2.9	4.9	0.1	0.0
11/30/2017 18:00	2017	0.9	3.7	8.5	0.1	0.0
11/30/2017 19:00	2017	1.2	5.0	9.1	0.1	4.3
11/30/2017 20:00	2017	1.6	6.6	9.1	0.1	6.5
11/30/2017 21:00	2017	0.2	0.8	9.1	0.1	0.7
12/5/2017 7:00	2017	0.6	2.5	2.5	0.1	0.0
12/5/2017 8:00	2017	0.2	0.8	3.2	0.1	0.0
12/5/2017 9:00	2017	0.3	1.2	4.4	0.1	0.0
12/5/2017 10:00	2017	1.3	5.4	9.1	0.1	0.5
12/5/2017 11:00	2017	1	4.1	9.1	0.1	4.0
12/5/2017 12:00	2017	0.6	2.5	9.1	0.1	2.4
12/5/2017 17:00	2017	0.2	0.8	9.1	0.1	0.3
12/5/2017 21:00	2017	0.3	1.2	9.1	0.1	0.8
12/9/2017 21:00	2017	0.2	0.8	0.8	0.1	0.0
12/9/2017 22:00	2017	0.5	2.1	2.8	0.1	0.0
12/9/2017 23:00	2017	0.2	0.8	3.5	0.1	0.0
12/10/2017 0:00	2017	0.6	2.5	5.9	0.1	0.0
12/10/2017 1:00	2017	0.6	2.5	8.3	0.1	0.0
12/10/2017 2:00	2017	0.3	1.2	9.1	0.1	0.3
12/10/2017 4:00	2017	0.2	0.8	9.1	0.1	0.6
12/18/2017 18:00	2017	0.3	1.2	1.2	0.1	0.0
12/18/2017 19:00	2017	0.5	2.1	3.2	0.1	0.0
12/18/2017 20:00	2017	0.5	2.1	5.2	0.1	0.0
12/18/2017 21:00	2017	0.3	1.2	6.3	0.1	0.0
12/19/2017 3:00	2017	0.3	1.2	7.0	0.1	0.0
12/19/2017 4:00	2017	0.7	2.9	9.1	0.1	0.7
12/19/2017 5:00	2017	1.3	5.4	9.1	0.1	5.3
12/19/2017 6:00	2017	2.2	9.1	9.1	0.1	9.0
12/19/2017 7:00	2017	1.2	5.0	9.1	0.1	4.9

12/19/2017 8:00	2017	0.3	1.2	9.1	0.1	1.1
12/19/2017 15:00	2017	0.2	0.8	9.1	0.1	0.1
12/19/2017 16:00	2017	0.5	2.1	9.1	0.1	2.0
12/20/2017 6:00	2017	0.3	1.2	9.0	0.1	0.0
12/22/2017 12:00	2017	0.2	0.8	4.4	0.1	0.0
12/22/2017 14:00	2017	0.2	0.8	5.0	0.1	0.0
12/22/2017 20:00	2017	0.2	0.8	5.3	0.1	0.0
12/23/2017 12:00	2017	0.6	2.5	6.1	0.1	0.0
12/23/2017 13:00	2017	0.7	2.9	8.9	0.1	0.0
12/23/2017 14:00	2017	1.3	5.4	9.1	0.1	5.1
12/23/2017 15:00	2017	1.6	6.6	9.1	0.1	6.5
12/23/2017 16:00	2017	1	4.1	9.1	0.1	4.0
12/23/2017 17:00	2017	0.8	3.3	9.1	0.1	3.2
12/24/2017 11:00	2017	0.2	0.8	8.1	0.1	0.0
12/25/2017 3:00	2017	0.2	0.8	7.4	0.1	0.0
12/25/2017 4:00	2017	0.8	3.3	9.1	0.1	1.5
12/25/2017 5:00	2017	0.7	2.9	9.1	0.1	2.8
12/25/2017 6:00	2017	0.5	2.1	9.1	0.1	2.0
12/25/2017 7:00	2017	0.5	2.1	9.1	0.1	2.0
12/25/2017 8:00	2017	0.3	1.2	9.1	0.1	1.1
12/25/2017 9:00	2017	0.2	0.8	9.1	0.1	0.7
12/25/2017 10:00	2017	0.2	0.8	9.1	0.1	0.7
12/30/2017 12:00	2017	0.2	0.8	0.8	0.1	0.0
5/3/2018 7:00	2018	1.2	5.0	5.0	0.1	0.0
5/3/2018 8:00	2018	1	4.1	9.0	0.1	0.0
5/3/2018 11:00	2018	0.6	2.5	9.1	0.1	2.1
5/3/2018 13:00	2018	1.8	7.5	9.1	0.1	7.3
5/3/2018 15:00	2018	0.3	1.2	9.1	0.1	1.0
5/3/2018 16:00	2018	0.3	1.2	9.1	0.1	1.1
5/3/2018 17:00	2018	0.3	1.2	9.1	0.1	1.1
5/4/2018 12:00	2018	0.4	1.7	8.9	0.1	0.0
5/4/2018 13:00	2018	0.5	2.1	9.1	0.1	1.7
5/4/2018 14:00	2018	1.1	4.6	9.1	0.1	4.5
5/4/2018 15:00	2018	1.7	7.0	9.1	0.1	6.9
5/10/2018 8:00	2018	1.8	7.5	7.5	0.1	0.0
5/10/2018 9:00	2018	0.3	1.2	8.6	0.1	0.0
5/10/2018 11:00	2018	1.6	6.6	9.1	0.1	5.9
5/10/2018 15:00	2018	0.2	0.8	9.1	0.1	0.4
5/19/2018 13:00	2018	1	4.1	4.1	0.1	0.0
5/19/2018 14:00	2018	3.8	15.7	9.1	0.1	10.7
5/19/2018 15:00	2018	1.4	5.8	9.1	0.1	5.7
5/19/2018 16:00	2018	0.2	0.8	9.1	0.1	0.7
5/19/2018 18:00	2018	0.5	2.1	9.1	0.1	1.9
5/19/2018 19:00	2018	0.5	2.1	9.1	0.1	2.0
5/20/2018 0:00	2018	0.3	1.2	9.1	0.1	0.7
5/20/2018 1:00	2018	1	4.1	9.1	0.1	4.0
5/20/2018 2:00	2018	7	29.0	9.1	0.1	28.9

5/20/2018 3:00	2018	3.5	14.5	9.1	0.1	14.4
5/20/2018 4:00	2018	1.5	6.2	9.1	0.1	6.1
5/20/2018 5:00	2018	0.5	2.1	9.1	0.1	2.0
5/22/2018 11:00	2018	0.2	0.8	4.6	0.1	0.0
5/22/2018 12:00	2018	1.6	6.6	9.1	0.1	2.0
5/22/2018 17:00	2018	0.5	2.1	9.1	0.1	1.6
5/22/2018 18:00	2018	0.2	0.8	9.1	0.1	0.7
5/25/2018 17:00	2018	1.5	6.2	8.2	0.1	0.0
5/25/2018 18:00	2018	2.4	9.9	9.1	0.1	9.0
5/26/2018 6:00	2018	0.2	0.8	8.7	0.1	0.0
5/26/2018 9:00	2018	0.5	2.1	9.1	0.1	1.4
5/26/2018 10:00	2018	0.5	2.1	9.1	0.1	2.0
5/28/2018 4:00	2018	0.7	2.9	7.8	0.1	0.0
5/31/2018 13:00	2018	0.3	1.2	1.2	0.1	0.0
5/31/2018 14:00	2018	1	4.1	5.3	0.1	0.0
5/31/2018 16:00	2018	0.2	0.8	5.9	0.1	0.0
6/3/2018 20:00	2018	2.5	10.4	9.1	0.1	1.2
6/3/2018 21:00	2018	5.1	21.1	9.1	0.1	21.0
6/3/2018 22:00	2018	5.2	21.5	9.1	0.1	21.4
6/3/2018 23:00	2018	1.7	7.0	9.1	0.1	6.9
6/4/2018 0:00	2018	2.7	11.2	9.1	0.1	11.1
6/4/2018 1:00	2018	4.3	17.8	9.1	0.1	17.7
6/4/2018 2:00	2018	5	20.7	9.1	0.1	20.6
6/4/2018 3:00	2018	2.1	8.7	9.1	0.1	8.6
6/4/2018 4:00	2018	2.7	11.2	9.1	0.1	11.1
6/4/2018 5:00	2018	0.7	2.9	9.1	0.1	2.8
6/4/2018 6:00	2018	0.3	1.2	9.1	0.1	1.1
6/4/2018 7:00	2018	0.5	2.1	9.1	0.1	2.0
6/4/2018 8:00	2018	0.5	2.1	9.1	0.1	2.0
6/4/2018 9:00	2018	3.9	16.1	9.1	0.1	16.0
6/4/2018 10:00	2018	1.3	5.4	9.1	0.1	5.3
6/4/2018 11:00	2018	0.2	0.8	9.1	0.1	0.7
6/4/2018 13:00	2018	1	4.1	9.1	0.1	3.9
6/4/2018 14:00	2018	12.5	51.8	9.1	0.1	51.7
6/4/2018 15:00	2018	0.3	1.2	9.1	0.1	1.1
6/5/2018 0:00	2018	0.5	2.1	9.1	0.1	1.2
6/5/2018 11:00	2018	0.2	0.8	8.8	0.1	0.0
6/5/2018 13:00	2018	0.6	2.5	9.1	0.1	2.0
6/5/2018 14:00	2018	0.2	0.8	9.1	0.1	0.7
6/5/2018 16:00	2018	0.3	1.2	9.1	0.1	1.0
6/6/2018 7:00	2018	0.4	1.7	9.1	0.1	0.2
6/6/2018 11:00	2018	0.5	2.1	9.1	0.1	1.7
6/6/2018 12:00	2018	1.5	6.2	9.1	0.1	6.1
6/13/2018 9:00	2018	0.6	2.5	2.5	0.1	0.0
6/13/2018 10:00	2018	8.1	33.5	9.1	0.1	26.8
6/13/2018 17:00	2018	0.5	2.1	9.1	0.1	1.4
6/13/2018 18:00	2018	1.9	7.9	9.1	0.1	7.8

6/14/2018 2:00	2018	0.3	1.2	9.1	0.1	0.4
6/14/2018 18:00	2018	1.3	5.4	9.1	0.1	3.8
6/14/2018 19:00	2018	0.5	2.1	9.1	0.1	2.0
6/14/2018 20:00	2018	0.3	1.2	9.1	0.1	1.1
6/14/2018 21:00	2018	0.3	1.2	9.1	0.1	1.1
6/18/2018 9:00	2018	1.3	5.4	6.1	0.1	0.0
6/18/2018 18:00	2018	0.5	2.1	7.3	0.1	0.0
6/19/2018 5:00	2018	0.2	0.8	7.0	0.1	0.0
6/23/2018 17:00	2018	0.3	1.2	1.2	0.1	0.0
6/23/2018 18:00	2018	1.1	4.6	5.7	0.1	0.0
6/23/2018 19:00	2018	0.5	2.1	7.7	0.1	0.0
6/24/2018 0:00	2018	0.3	1.2	8.4	0.1	0.0
6/27/2018 23:00	2018	0.3	1.2	1.2	0.1	0.0
6/28/2018 0:00	2018	0.3	1.2	2.4	0.1	0.0
6/28/2018 1:00	2018	0.2	0.8	3.1	0.1	0.0
6/28/2018 2:00	2018	0.5	2.1	5.1	0.1	0.0
6/28/2018 9:00	2018	0.2	0.8	5.2	0.1	0.0
7/14/2018 2:00	2018	0.8	3.3	3.3	0.1	0.0
7/14/2018 3:00	2018	0.2	0.8	4.0	0.1	0.0
7/14/2018 4:00	2018	1.6	6.6	9.1	0.1	1.5
7/14/2018 5:00	2018	1.7	7.0	9.1	0.1	6.9
7/14/2018 6:00	2018	0.3	1.2	9.1	0.1	1.1
7/17/2018 1:00	2018	0.9	3.7	6.2	0.1	0.0
7/17/2018 4:00	2018	0.5	2.1	7.9	0.1	0.0
7/22/2018 10:00	2018	1.4	5.8	5.8	0.1	0.0
7/22/2018 11:00	2018	0.3	1.2	6.9	0.1	0.0
7/22/2018 12:00	2018	1.6	6.6	9.1	0.1	4.4
7/22/2018 21:00	2018	7.8	32.3	9.1	0.1	31.4
7/22/2018 22:00	2018	1.2	5.0	9.1	0.1	4.9
7/23/2018 16:00	2018	0.3	1.2	8.6	0.1	0.0
7/23/2018 17:00	2018	12.5	51.8	9.1	0.1	51.1
7/23/2018 18:00	2018	4.2	17.4	9.1	0.1	17.3
7/23/2018 19:00	2018	2.7	11.2	9.1	0.1	11.1
7/23/2018 20:00	2018	3	12.4	9.1	0.1	12.3
7/23/2018 21:00	2018	8.5	35.2	9.1	0.1	35.1
7/24/2018 0:00	2018	1.2	5.0	9.1	0.1	4.7
7/24/2018 7:00	2018	0.5	2.1	9.1	0.1	1.4
7/24/2018 8:00	2018	0.4	1.7	9.1	0.1	1.6
7/24/2018 15:00	2018	0.5	2.1	9.1	0.1	1.4
7/24/2018 16:00	2018	1.4	5.8	9.1	0.1	5.7
7/24/2018 17:00	2018	0.9	3.7	9.1	0.1	3.6
7/24/2018 18:00	2018	1.1	4.6	9.1	0.1	4.5
7/24/2018 19:00	2018	0.5	2.1	9.1	0.1	2.0
7/24/2018 20:00	2018	0.3	1.2	9.1	0.1	1.1
7/24/2018 21:00	2018	0.3	1.2	9.1	0.1	1.1
7/24/2018 22:00	2018	1.1	4.6	9.1	0.1	4.5
7/24/2018 23:00	2018	0.2	0.8	9.1	0.1	0.7

7/25/2018 0:00	2018	2.3	9.5	9.1	0.1	9.4
7/25/2018 1:00	2018	0.2	0.8	9.1	0.1	0.7
7/25/2018 3:00	2018	3.1	12.8	9.1	0.1	12.6
7/25/2018 4:00	2018	7.8	32.3	9.1	0.1	32.2
7/25/2018 5:00	2018	24.4	101.0	9.1	0.1	100.9
7/25/2018 6:00	2018	27.8	115.1	9.1	0.1	115.0
7/25/2018 7:00	2018	8.7	36.0	9.1	0.1	35.9
7/25/2018 8:00	2018	0.8	3.3	9.1	0.1	3.2
7/25/2018 9:00	2018	1.3	5.4	9.1	0.1	5.3
7/25/2018 10:00	2018	0.8	3.3	9.1	0.1	3.2
7/25/2018 11:00	2018	1.3	5.4	9.1	0.1	5.3
7/25/2018 12:00	2018	4.5	18.6	9.1	0.1	18.5
7/25/2018 13:00	2018	1.7	7.0	9.1	0.1	6.9
7/25/2018 14:00	2018	0.8	3.3	9.1	0.1	3.2
7/26/2018 20:00	2018	1.7	7.0	9.1	0.1	4.0
7/26/2018 22:00	2018	0.3	1.2	9.1	0.1	1.0
7/27/2018 15:00	2018	4.8	19.9	9.1	0.1	18.2
7/28/2018 20:00	2018	0.6	2.5	8.7	0.1	0.0
7/28/2018 23:00	2018	0.2	0.8	9.1	0.1	0.1
7/29/2018 18:00	2018	1.8	7.5	9.1	0.1	5.6
8/1/2018 17:00	2018	0.6	2.5	4.5	0.1	0.0
8/6/2018 4:00	2018	0.4	1.7	1.7	0.1	0.0
8/6/2018 5:00	2018	1.5	6.2	7.8	0.1	0.0
8/6/2018 20:00	2018	20.9	86.5	9.1	0.1	83.7
8/6/2018 21:00	2018	0.5	2.1	9.1	0.1	2.0
8/7/2018 5:00	2018	0.3	1.2	9.1	0.1	0.4
8/7/2018 6:00	2018	7.6	31.5	9.1	0.1	31.4
8/7/2018 7:00	2018	0.3	1.2	9.1	0.1	1.1
8/8/2018 16:00	2018	0.2	0.8	6.6	0.1	0.0
8/8/2018 17:00	2018	0.2	0.8	7.4	0.1	0.0
8/9/2018 4:00	2018	0.5	2.1	8.3	0.1	0.0
8/15/2018 10:00	2018	0.9	3.7	3.7	0.1	0.0
8/17/2018 15:00	2018	0.3	1.2	1.2	0.1	0.0
8/21/2018 16:00	2018	2.7	11.2	9.1	0.1	2.1
8/21/2018 17:00	2018	2.8	11.6	9.1	0.1	11.5
8/21/2018 21:00	2018	1.3	5.4	9.1	0.1	5.0
8/21/2018 22:00	2018	7.5	31.1	9.1	0.1	31.0
8/22/2018 2:00	2018	0.3	1.2	9.1	0.1	0.8
8/22/2018 5:00	2018	4.9	20.3	9.1	0.1	20.0
8/22/2018 6:00	2018	13.9	57.5	9.1	0.1	57.4
8/26/2018 6:00	2018	0.2	0.8	0.8	0.1	0.0
8/26/2018 11:00	2018	0.4	1.7	2.0	0.1	0.0
8/26/2018 15:00	2018	0.7	2.9	4.5	0.1	0.0
9/2/2018 13:00	2018	3.5	14.5	9.1	0.1	5.4
9/2/2018 16:00	2018	0.5	2.1	9.1	0.1	1.8
9/3/2018 8:00	2018	0.2	0.8	8.3	0.1	0.0
9/5/2018 16:00	2018	1.1	4.6	7.3	0.1	0.0

9/5/2018 18:00	2018	1	4.1	9.1	0.1	2.1
9/6/2018 7:00	2018	0.2	0.8	8.6	0.1	0.0
9/7/2018 1:00	2018	0.2	0.8	7.7	0.1	0.0
9/10/2018 16:00	2018	0.5	2.1	2.1	0.1	0.0
9/10/2018 17:00	2018	0.7	2.9	4.9	0.1	0.0
9/10/2018 18:00	2018	0.5	2.1	6.8	0.1	0.0
9/10/2018 19:00	2018	0.5	2.1	8.8	0.1	0.0
9/10/2018 20:00	2018	0.3	1.2	9.1	0.1	0.8
9/10/2018 21:00	2018	0.3	1.2	9.1	0.1	1.1
9/10/2018 23:00	2018	0.5	2.1	9.1	0.1	1.9
9/11/2018 1:00	2018	0.2	0.8	9.1	0.1	0.6
9/11/2018 2:00	2018	0.3	1.2	9.1	0.1	1.1
9/11/2018 3:00	2018	0.2	0.8	9.1	0.1	0.7
9/11/2018 4:00	2018	0.3	1.2	9.1	0.1	1.1
9/11/2018 5:00	2018	0.6	2.5	9.1	0.1	2.4
9/11/2018 6:00	2018	0.5	2.1	9.1	0.1	2.0
9/11/2018 7:00	2018	0.2	0.8	9.1	0.1	0.7
9/20/2018 8:00	2018	0.5	2.1	2.1	0.1	0.0
9/21/2018 4:00	2018	2.7	11.2	9.1	0.1	2.1
9/21/2018 5:00	2018	10	41.4	9.1	0.1	41.3
9/21/2018 6:00	2018	0.5	2.1	9.1	0.1	2.0
9/21/2018 8:00	2018	1.9	7.9	9.1	0.1	7.7
9/21/2018 9:00	2018	2.5	10.4	9.1	0.1	10.3
9/21/2018 17:00	2018	8.7	36.0	9.1	0.1	35.2
9/21/2018 18:00	2018	15.8	65.4	9.1	0.1	65.3
9/23/2018 0:00	2018	0.2	0.8	6.9	0.1	0.0
9/25/2018 5:00	2018	1.9	7.9	9.1	0.1	0.4
9/25/2018 6:00	2018	2.1	8.7	9.1	0.1	8.6
9/25/2018 7:00	2018	1.7	7.0	9.1	0.1	6.9
9/25/2018 8:00	2018	0.7	2.9	9.1	0.1	2.8
9/25/2018 9:00	2018	0.8	3.3	9.1	0.1	3.2
9/25/2018 11:00	2018	0.3	1.2	9.1	0.1	1.0
9/25/2018 12:00	2018	0.6	2.5	9.1	0.1	2.4
9/25/2018 13:00	2018	0.8	3.3	9.1	0.1	3.2
9/25/2018 14:00	2018	0.2	0.8	9.1	0.1	0.7
9/25/2018 15:00	2018	0.2	0.8	9.1	0.1	0.7
9/25/2018 19:00	2018	0.2	0.8	9.1	0.1	0.4
9/26/2018 3:00	2018	0.9	3.7	9.1	0.1	2.9
9/26/2018 4:00	2018	0.3	1.2	9.1	0.1	1.1
9/26/2018 9:00	2018	0.3	1.2	9.1	0.1	0.7
9/26/2018 13:00	2018	7.1	29.4	9.1	0.1	29.0
9/28/2018 20:00	2018	0.2	0.8	4.5	0.1	0.0
9/28/2018 21:00	2018	0.4	1.7	6.0	0.1	0.0
9/28/2018 22:00	2018	0.4	1.7	7.6	0.1	0.0
9/29/2018 0:00	2018	0.8	3.3	9.1	0.1	1.6
9/29/2018 1:00	2018	0.3	1.2	9.1	0.1	1.1
9/29/2018 2:00	2018	0.2	0.8	9.1	0.1	0.7

9/29/2018 12:00	2018	0.3	1.2	9.1	0.1	0.2
9/29/2018 17:00	2018	0.2	0.8	9.1	0.1	0.3
9/30/2018 23:00	2018	0.2	0.8	6.9	0.1	0.0
10/2/2018 0:00	2018	0.8	3.3	7.8	0.1	0.0
10/2/2018 1:00	2018	1	4.1	9.1	0.1	2.7
10/2/2018 2:00	2018	0.5	2.1	9.1	0.1	2.0
10/2/2018 3:00	2018	0.7	2.9	9.1	0.1	2.8
10/2/2018 4:00	2018	1	4.1	9.1	0.1	4.0
10/2/2018 5:00	2018	0.6	2.5	9.1	0.1	2.4
10/2/2018 6:00	2018	0.9	3.7	9.1	0.1	3.6
10/2/2018 7:00	2018	1.3	5.4	9.1	0.1	5.3
10/2/2018 17:00	2018	0.2	0.8	8.9	0.1	0.0
10/2/2018 18:00	2018	0.7	2.9	9.1	0.1	2.6
10/2/2018 19:00	2018	0.2	0.8	9.1	0.1	0.7
10/2/2018 20:00	2018	0.4	1.7	9.1	0.1	1.6
10/2/2018 23:00	2018	0.2	0.8	9.1	0.1	0.5
10/4/2018 7:00	2018	5.9	24.4	9.1	0.1	21.2
10/4/2018 8:00	2018	0.2	0.8	9.1	0.1	0.7
10/8/2018 16:00	2018	0.6	2.5	2.5	0.1	0.0
10/8/2018 19:00	2018	0.5	2.1	4.3	0.1	0.0
10/8/2018 22:00	2018	1.3	5.4	9.1	0.1	0.2
10/9/2018 14:00	2018	0.2	0.8	8.3	0.1	0.0
10/11/2018 2:00	2018	0.5	2.1	6.8	0.1	0.0
10/11/2018 4:00	2018	1.7	7.0	9.1	0.1	4.6
10/11/2018 5:00	2018	0.7	2.9	9.1	0.1	2.8
10/11/2018 6:00	2018	0.2	0.8	9.1	0.1	0.7
10/11/2018 7:00	2018	0.4	1.7	9.1	0.1	1.6
10/11/2018 9:00	2018	0.3	1.2	9.1	0.1	1.0
10/13/2018 3:00	2018	0.2	0.8	5.8	0.1	0.0
10/15/2018 11:00	2018	0.8	3.3	3.5	0.1	0.0
10/15/2018 12:00	2018	1.5	6.2	9.1	0.1	0.5
10/15/2018 13:00	2018	0.5	2.1	9.1	0.1	2.0
10/15/2018 15:00	2018	0.4	1.7	9.1	0.1	1.5
10/16/2018 1:00	2018	0.2	0.8	8.9	0.1	0.0
10/17/2018 16:00	2018	0.2	0.8	5.9	0.1	0.0
10/17/2018 22:00	2018	0.2	0.8	6.1	0.1	0.0
10/20/2018 4:00	2018	0.9	3.7	4.5	0.1	0.0
10/21/2018 1:00	2018	0.2	0.8	3.2	0.1	0.0
10/27/2018 19:00	2018	0.2	0.8	0.8	0.1	0.0
10/27/2018 20:00	2018	0.6	2.5	3.2	0.1	0.0
10/27/2018 21:00	2018	1.2	5.0	8.1	0.1	0.0
10/27/2018 22:00	2018	4	16.6	9.1	0.1	15.4
10/27/2018 23:00	2018	1.1	4.6	9.1	0.1	4.5
10/28/2018 0:00	2018	0.9	3.7	9.1	0.1	3.6
10/28/2018 1:00	2018	0.6	2.5	9.1	0.1	2.4
10/28/2018 2:00	2018	0.2	0.8	9.1	0.1	0.7
10/28/2018 3:00	2018	0.2	0.8	9.1	0.1	0.7

10/28/2018 4:00	2018	0.5	2.1	9.1	0.1	2.0
10/28/2018 5:00	2018	0.4	1.7	9.1	0.1	1.6
10/28/2018 6:00	2018	0.2	0.8	9.1	0.1	0.7
10/28/2018 7:00	2018	0.5	2.1	9.1	0.1	2.0
10/28/2018 8:00	2018	0.3	1.2	9.1	0.1	1.1
10/28/2018 9:00	2018	0.8	3.3	9.1	0.1	3.2
10/28/2018 10:00	2018	1.4	5.8	9.1	0.1	5.7
10/28/2018 11:00	2018	0.6	2.5	9.1	0.1	2.4
10/28/2018 12:00	2018	0.3	1.2	9.1	0.1	1.1
10/29/2018 7:00	2018	0.2	0.8	8.0	0.1	0.0
10/29/2018 15:00	2018	0.2	0.8	8.1	0.1	0.0
10/31/2018 6:00	2018	0.6	2.5	6.7	0.1	0.0
10/31/2018 7:00	2018	0.5	2.1	8.6	0.1	0.0
10/31/2018 8:00	2018	1	4.1	9.1	0.1	3.6
10/31/2018 9:00	2018	1.7	7.0	9.1	0.1	6.9
10/31/2018 10:00	2018	2.4	9.9	9.1	0.1	9.8
10/31/2018 11:00	2018	1.2	5.0	9.1	0.1	4.9
10/31/2018 12:00	2018	0.2	0.8	9.1	0.1	0.7
10/31/2018 13:00	2018	1.7	7.0	9.1	0.1	6.9
10/31/2018 14:00	2018	1.1	4.6	9.1	0.1	4.5
10/31/2018 15:00	2018	1.2	5.0	9.1	0.1	4.9
10/31/2018 16:00	2018	0.2	0.8	9.1	0.1	0.7
10/31/2018 17:00	2018	0.5	2.1	9.1	0.1	2.0
11/1/2018 20:00	2018	0.3	1.2	7.7	0.1	0.0
11/1/2018 21:00	2018	0.3	1.2	8.8	0.1	0.0
11/1/2018 22:00	2018	0.7	2.9	9.1	0.1	2.5
11/1/2018 23:00	2018	1.6	6.6	9.1	0.1	6.5
11/2/2018 0:00	2018	3.1	12.8	9.1	0.1	12.7
11/2/2018 1:00	2018	2.9	12.0	9.1	0.1	11.9
11/2/2018 2:00	2018	2.2	9.1	9.1	0.1	9.0
11/2/2018 3:00	2018	0.7	2.9	9.1	0.1	2.8
11/2/2018 4:00	2018	1.2	5.0	9.1	0.1	4.9
11/2/2018 5:00	2018	1.9	7.9	9.1	0.1	7.8
11/2/2018 11:00	2018	0.2	0.8	9.1	0.1	0.2
11/2/2018 12:00	2018	0.2	0.8	9.1	0.1	0.7
11/2/2018 14:00	2018	0.3	1.2	9.1	0.1	1.0
11/2/2018 16:00	2018	0.3	1.2	9.1	0.1	1.0
11/2/2018 19:00	2018	0.2	0.8	9.1	0.1	0.5
11/3/2018 0:00	2018	0.2	0.8	9.1	0.1	0.3
11/3/2018 2:00	2018	0.2	0.8	9.1	0.1	0.6
11/3/2018 10:00	2018	0.2	0.8	9.1	0.1	0.0
11/3/2018 11:00	2018	1.2	5.0	9.1	0.1	4.9
11/3/2018 12:00	2018	0.5	2.1	9.1	0.1	2.0
11/3/2018 13:00	2018	0.2	0.8	9.1	0.1	0.7
11/5/2018 13:00	2018	0.2	0.8	5.2	0.1	0.0
11/5/2018 14:00	2018	0.4	1.7	6.7	0.1	0.0
11/6/2018 8:00	2018	0.5	2.1	7.0	0.1	0.0

11/6/2018 9:00	2018	2.8	11.6	9.1	0.1	9.4
11/6/2018 10:00	2018	2	8.3	9.1	0.1	8.2
11/6/2018 11:00	2018	1.1	4.6	9.1	0.1	4.5
11/6/2018 12:00	2018	0.2	0.8	9.1	0.1	0.7
11/6/2018 13:00	2018	0.8	3.3	9.1	0.1	3.2
11/6/2018 14:00	2018	0.4	1.7	9.1	0.1	1.6
11/6/2018 15:00	2018	0.2	0.8	9.1	0.1	0.7
11/9/2018 15:00	2018	0.6	2.5	4.4	0.1	0.0
11/9/2018 16:00	2018	0.2	0.8	5.1	0.1	0.0
11/9/2018 17:00	2018	0.3	1.2	6.3	0.1	0.0
11/9/2018 18:00	2018	0.7	2.9	9.1	0.1	0.0
11/9/2018 20:00	2018	2	8.3	9.1	0.1	8.1
11/9/2018 21:00	2018	0.6	2.5	9.1	0.1	2.4
11/9/2018 22:00	2018	0.9	3.7	9.1	0.1	3.6
11/9/2018 23:00	2018	3.1	12.8	9.1	0.1	12.7
11/10/2018 0:00	2018	0.9	3.7	9.1	0.1	3.6
11/10/2018 2:00	2018	0.2	0.8	9.1	0.1	0.6
11/12/2018 5:00	2018	0.2	0.8	4.9	0.1	0.0
11/12/2018 6:00	2018	0.2	0.8	5.6	0.1	0.0
11/13/2018 1:00	2018	1.5	6.2	9.1	0.1	0.8
11/13/2018 2:00	2018	1.4	5.8	9.1	0.1	5.7
11/13/2018 3:00	2018	0.9	3.7	9.1	0.1	3.6
11/13/2018 4:00	2018	0.9	3.7	9.1	0.1	3.6
11/13/2018 5:00	2018	0.5	2.1	9.1	0.1	2.0
11/13/2018 6:00	2018	0.8	3.3	9.1	0.1	3.2
11/13/2018 7:00	2018	0.7	2.9	9.1	0.1	2.8
11/13/2018 8:00	2018	0.4	1.7	9.1	0.1	1.6
11/13/2018 9:00	2018	0.9	3.7	9.1	0.1	3.6
11/13/2018 11:00	2018	0.2	0.8	9.1	0.1	0.6
11/13/2018 12:00	2018	0.2	0.8	9.1	0.1	0.7
11/13/2018 13:00	2018	0.3	1.2	9.1	0.1	1.1
11/13/2018 15:00	2018	0.2	0.8	9.1	0.1	0.6
11/14/2018 7:00	2018	0.2	0.8	8.3	0.1	0.0
11/16/2018 0:00	2018	0.5	2.1	6.3	0.1	0.0
11/16/2018 1:00	2018	1.2	5.0	9.1	0.1	2.1
11/16/2018 2:00	2018	1.1	4.6	9.1	0.1	4.5
11/16/2018 3:00	2018	0.7	2.9	9.1	0.1	2.8
11/16/2018 4:00	2018	1	4.1	9.1	0.1	4.0
11/16/2018 5:00	2018	1.2	5.0	9.1	0.1	4.9
11/16/2018 6:00	2018	0.9	3.7	9.1	0.1	3.6
11/16/2018 7:00	2018	0.3	1.2	9.1	0.1	1.1
11/16/2018 8:00	2018	0.5	2.1	9.1	0.1	2.0
11/16/2018 9:00	2018	0.3	1.2	9.1	0.1	1.1
11/16/2018 10:00	2018	0.5	2.1	9.1	0.1	2.0
11/16/2018 11:00	2018	0.2	0.8	9.1	0.1	0.7
11/16/2018 13:00	2018	0.2	0.8	9.1	0.1	0.6
11/16/2018 14:00	2018	0.3	1.2	9.1	0.1	1.1

11/16/2018 15:00	2018	0.5	2.1	9.1	0.1	2.0
11/16/2018 16:00	2018	0.7	2.9	9.1	0.1	2.8
11/16/2018 17:00	2018	0.5	2.1	9.1	0.1	2.0
11/16/2018 19:00	2018	0.2	0.8	9.1	0.1	0.6
11/17/2018 2:00	2018	0.2	0.8	9.1	0.1	0.1
11/17/2018 6:00	2018	0.3	1.2	9.1	0.1	0.8
11/17/2018 10:00	2018	0.6	2.5	9.1	0.1	2.1
11/17/2018 11:00	2018	0.2	0.8	9.1	0.1	0.7
11/18/2018 10:00	2018	0.2	0.8	7.6	0.1	0.0
11/19/2018 4:00	2018	0.7	2.9	8.7	0.1	0.0
11/19/2018 20:00	2018	0.2	0.8	8.0	0.1	0.0
11/19/2018 21:00	2018	0.2	0.8	8.7	0.1	0.0
11/19/2018 22:00	2018	0.2	0.8	9.1	0.1	0.3
11/20/2018 4:00	2018	0.2	0.8	9.1	0.1	0.2
11/20/2018 6:00	2018	0.2	0.8	9.1	0.1	0.6
11/20/2018 7:00	2018	0.3	1.2	9.1	0.1	1.1
11/20/2018 8:00	2018	0.3	1.2	9.1	0.1	1.1
11/20/2018 9:00	2018	0.5	2.1	9.1	0.1	2.0
11/20/2018 10:00	2018	0.2	0.8	9.1	0.1	0.7
11/20/2018 11:00	2018	0.5	2.1	9.1	0.1	2.0
11/20/2018 12:00	2018	0.5	2.1	9.1	0.1	2.0
11/21/2018 4:00	2018	0.2	0.8	8.3	0.1	0.0
11/21/2018 5:00	2018	0.2	0.8	9.1	0.1	0.0
11/21/2018 6:00	2018	0.2	0.8	9.1	0.1	0.7
11/21/2018 7:00	2018	0.2	0.8	9.1	0.1	0.7
11/23/2018 10:00	2018	0.2	0.8	4.9	0.1	0.0
11/25/2018 2:00	2018	1.5	6.2	7.1	0.1	0.0
11/25/2018 3:00	2018	2.4	9.9	9.1	0.1	7.8
11/25/2018 4:00	2018	1.5	6.2	9.1	0.1	6.1
11/25/2018 5:00	2018	0.9	3.7	9.1	0.1	3.6
11/25/2018 6:00	2018	0.8	3.3	9.1	0.1	3.2
11/25/2018 7:00	2018	1.7	7.0	9.1	0.1	6.9
11/25/2018 11:00	2018	0.2	0.8	9.1	0.1	0.4
11/26/2018 11:00	2018	0.6	2.5	9.1	0.1	0.1
11/26/2018 12:00	2018	0.6	2.5	9.1	0.1	2.4
11/26/2018 15:00	2018	0.6	2.5	9.1	0.1	2.2
11/26/2018 16:00	2018	1.3	5.4	9.1	0.1	5.3
11/26/2018 17:00	2018	2.4	9.9	9.1	0.1	9.8
11/26/2018 18:00	2018	2	8.3	9.1	0.1	8.2
11/26/2018 19:00	2018	2	8.3	9.1	0.1	8.2
11/26/2018 20:00	2018	1.1	4.6	9.1	0.1	4.5
11/26/2018 21:00	2018	0.2	0.8	9.1	0.1	0.7
11/26/2018 22:00	2018	0.2	0.8	9.1	0.1	0.7
11/26/2018 23:00	2018	0.4	1.7	9.1	0.1	1.6
11/27/2018 0:00	2018	0.7	2.9	9.1	0.1	2.8
11/27/2018 1:00	2018	0.8	3.3	9.1	0.1	3.2
11/27/2018 2:00	2018	0.5	2.1	9.1	0.1	2.0

11/27/2018 3:00	2018	0.6	2.5	9.1	0.1	2.4
11/27/2018 4:00	2018	0.2	0.8	9.1	0.1	0.7
11/27/2018 5:00	2018	0.2	0.8	9.1	0.1	0.7
11/27/2018 6:00	2018	0.2	0.8	9.1	0.1	0.7
11/27/2018 7:00	2018	0.3	1.2	9.1	0.1	1.1
11/27/2018 8:00	2018	0.5	2.1	9.1	0.1	2.0
11/27/2018 9:00	2018	0.2	0.8	9.1	0.1	0.7
11/27/2018 10:00	2018	0.5	2.1	9.1	0.1	2.0
11/27/2018 11:00	2018	0.7	2.9	9.1	0.1	2.8
11/27/2018 12:00	2018	0.9	3.7	9.1	0.1	3.6
11/27/2018 13:00	2018	0.3	1.2	9.1	0.1	1.1
11/27/2018 14:00	2018	0.2	0.8	9.1	0.1	0.7
11/27/2018 17:00	2018	0.2	0.8	9.1	0.1	0.5
11/27/2018 18:00	2018	0.6	2.5	9.1	0.1	2.4
11/27/2018 19:00	2018	0.2	0.8	9.1	0.1	0.7
11/27/2018 20:00	2018	0.3	1.2	9.1	0.1	1.1
11/27/2018 21:00	2018	0.2	0.8	9.1	0.1	0.7
11/27/2018 23:00	2018	0.2	0.8	9.1	0.1	0.6
11/28/2018 1:00	2018	0.4	1.7	9.1	0.1	1.5
11/28/2018 2:00	2018	0.3	1.2	9.1	0.1	1.1
11/28/2018 3:00	2018	0.2	0.8	9.1	0.1	0.7
11/28/2018 4:00	2018	0.6	2.5	9.1	0.1	2.4
11/28/2018 5:00	2018	0.4	1.7	9.1	0.1	1.6
11/28/2018 22:00	2018	0.3	1.2	8.7	0.1	0.0
11/29/2018 3:00	2018	0.2	0.8	9.0	0.1	0.0
12/2/2018 2:00	2018	0.4	1.7	3.6	0.1	0.0
12/2/2018 3:00	2018	0.5	2.1	5.5	0.1	0.0
12/2/2018 4:00	2018	0.8	3.3	8.7	0.1	0.0
12/2/2018 10:00	2018	0.2	0.8	9.0	0.1	0.0
12/2/2018 11:00	2018	0.6	2.5	9.1	0.1	2.3
12/2/2018 12:00	2018	4.7	19.5	9.1	0.1	19.4
12/2/2018 13:00	2018	1.7	7.0	9.1	0.1	6.9
12/2/2018 14:00	2018	0.7	2.9	9.1	0.1	2.8
12/2/2018 16:00	2018	0.2	0.8	9.1	0.1	0.6
12/2/2018 18:00	2018	0.2	0.8	9.1	0.1	0.6
12/2/2018 19:00	2018	0.2	0.8	9.1	0.1	0.7
12/3/2018 1:00	2018	1.7	7.0	9.1	0.1	6.4
12/3/2018 5:00	2018	0.2	0.8	9.1	0.1	0.4
12/3/2018 7:00	2018	0.9	3.7	9.1	0.1	3.5
12/3/2018 8:00	2018	0.9	3.7	9.1	0.1	3.6
12/3/2018 9:00	2018	0.6	2.5	9.1	0.1	2.4
12/3/2018 10:00	2018	0.3	1.2	9.1	0.1	1.1
12/3/2018 11:00	2018	0.3	1.2	9.1	0.1	1.1
12/4/2018 1:00	2018	0.2	0.8	8.5	0.1	0.0
12/5/2018 13:00	2018	0.2	0.8	5.8	0.1	0.0
12/5/2018 14:00	2018	0.3	1.2	6.9	0.1	0.0
12/5/2018 15:00	2018	0.3	1.2	8.1	0.1	0.0

12/5/2018 16:00	2018	0.2	0.8	8.8	0.1	0.0
12/5/2018 17:00	2018	0.2	0.8	9.1	0.1	0.4
12/6/2018 7:00	2018	0.2	0.8	8.5	0.1	0.0
12/6/2018 9:00	2018	0.2	0.8	9.1	0.1	0.1
12/8/2018 4:00	2018	0.2	0.8	5.7	0.1	0.0
12/8/2018 20:00	2018	0.2	0.8	4.9	0.1	0.0
12/8/2018 21:00	2018	0.2	0.8	5.6	0.1	0.0
12/11/2018 9:00	2018	0.2	0.8	0.8	0.1	0.0
12/11/2018 10:00	2018	0.6	2.5	3.2	0.1	0.0
12/11/2018 11:00	2018	0.2	0.8	3.9	0.1	0.0
12/11/2018 13:00	2018	0.2	0.8	4.6	0.1	0.0
12/11/2018 18:00	2018	0.2	0.8	4.9	0.1	0.0
12/11/2018 21:00	2018	0.2	0.8	5.4	0.1	0.0
12/14/2018 12:00	2018	0.3	1.2	1.2	0.1	0.0
12/14/2018 13:00	2018	1.5	6.2	7.4	0.1	0.0
12/14/2018 14:00	2018	1.4	5.8	9.1	0.1	3.9
12/14/2018 15:00	2018	1	4.1	9.1	0.1	4.0
12/14/2018 16:00	2018	1.6	6.6	9.1	0.1	6.5
12/14/2018 17:00	2018	0.3	1.2	9.1	0.1	1.1
12/14/2018 18:00	2018	0.9	3.7	9.1	0.1	3.6
12/14/2018 19:00	2018	0.9	3.7	9.1	0.1	3.6
12/14/2018 20:00	2018	0.9	3.7	9.1	0.1	3.6
12/14/2018 21:00	2018	0.2	0.8	9.1	0.1	0.7
12/14/2018 23:00	2018	0.3	1.2	9.1	0.1	1.0
12/15/2018 0:00	2018	0.5	2.1	9.1	0.1	2.0
12/15/2018 1:00	2018	0.3	1.2	9.1	0.1	1.1
12/17/2018 18:00	2018	0.2	0.8	3.5	0.1	0.0
12/21/2018 1:00	2018	1	4.1	4.1	0.1	0.0
12/21/2018 2:00	2018	0.9	3.7	7.8	0.1	0.0
12/21/2018 3:00	2018	1.5	6.2	9.1	0.1	4.8
12/21/2018 4:00	2018	4	16.6	9.1	0.1	16.5
12/21/2018 5:00	2018	5.1	21.1	9.1	0.1	21.0
12/21/2018 6:00	2018	5.1	21.1	9.1	0.1	21.0
12/21/2018 7:00	2018	2.2	9.1	9.1	0.1	9.0
12/21/2018 8:00	2018	1.2	5.0	9.1	0.1	4.9
12/21/2018 9:00	2018	0.3	1.2	9.1	0.1	1.1
12/21/2018 13:00	2018	0.2	0.8	9.1	0.1	0.4
12/21/2018 15:00	2018	0.3	1.2	9.1	0.1	1.0
12/21/2018 16:00	2018	0.2	0.8	9.1	0.1	0.7
12/21/2018 18:00	2018	1.9	7.9	9.1	0.1	7.7
12/21/2018 19:00	2018	7.3	30.2	9.1	0.1	30.1
12/21/2018 20:00	2018	3.7	15.3	9.1	0.1	15.2
12/21/2018 21:00	2018	4	16.6	9.1	0.1	16.5
12/21/2018 23:00	2018	0.3	1.2	9.1	0.1	1.0
12/22/2018 0:00	2018	1.4	5.8	9.1	0.1	5.7
12/22/2018 1:00	2018	2.7	11.2	9.1	0.1	11.1
12/22/2018 2:00	2018	0.6	2.5	9.1	0.1	2.4

12/22/2018 3:00	2018	1.9	7.9	9.1	0.1	7.8
12/22/2018 4:00	2018	1.1	4.6	9.1	0.1	4.5
12/22/2018 5:00	2018	1.2	5.0	9.1	0.1	4.9
12/22/2018 6:00	2018	0.5	2.1	9.1	0.1	2.0
12/22/2018 7:00	2018	0.6	2.5	9.1	0.1	2.4
12/22/2018 19:00	2018	0.2	0.8	8.7	0.1	0.0
12/24/2018 10:00	2018	0.2	0.8	5.7	0.1	0.0
12/24/2018 11:00	2018	0.2	0.8	6.4	0.1	0.0
12/24/2018 16:00	2018	0.2	0.8	6.7	0.1	0.0
12/26/2018 14:00	2018	0.2	0.8	3.0	0.1	0.0
12/26/2018 15:00	2018	0.2	0.8	3.7	0.1	0.0
12/26/2018 17:00	2018	0.2	0.8	4.3	0.1	0.0
12/28/2018 2:00	2018	0.3	1.2	2.3	0.1	0.0
12/28/2018 3:00	2018	1.6	6.6	8.8	0.1	0.0
12/28/2018 4:00	2018	1.2	5.0	9.1	0.1	4.6
12/28/2018 14:00	2018	0.2	0.8	8.9	0.1	0.0
12/28/2018 18:00	2018	0.2	0.8	9.1	0.1	0.3
12/28/2018 19:00	2018	0.2	0.8	9.1	0.1	0.7
12/28/2018 20:00	2018	0.2	0.8	9.1	0.1	0.7
12/28/2018 21:00	2018	0.2	0.8	9.1	0.1	0.7
12/28/2018 22:00	2018	0.9	3.7	9.1	0.1	3.6
12/28/2018 23:00	2018	0.3	1.2	9.1	0.1	1.1
12/29/2018 2:00	2018	0.6	2.5	9.1	0.1	2.2
12/29/2018 3:00	2018	2.9	12.0	9.1	0.1	11.9
12/29/2018 4:00	2018	1.2	5.0	9.1	0.1	4.9
12/30/2018 12:00	2018	0.2	0.8	6.7	0.1	0.0
12/31/2018 21:00	2018	0.6	2.5	5.9	0.1	0.0
12/31/2018 22:00	2018	1.8	7.5	9.1	0.1	4.2
12/31/2018 23:00	2018	0.3	1.2	9.1	0.1	1.1
5/1/2019 12:00	2019	0.4	1.7	1.7	0.1	0.0
5/1/2019 13:00	2019	0.7	2.9	4.5	0.1	0.0
5/1/2019 18:00	2019	1.2	5.0	8.9	0.1	0.0
5/1/2019 19:00	2019	2.2	9.1	9.1	0.1	8.8
5/1/2019 21:00	2019	0.2	0.8	9.1	0.1	0.6
5/1/2019 22:00	2019	0.2	0.8	9.1	0.1	0.7
5/1/2019 23:00	2019	0.8	3.3	9.1	0.1	3.2
5/2/2019 0:00	2019	0.5	2.1	9.1	0.1	2.0
5/2/2019 1:00	2019	1	4.1	9.1	0.1	4.0
5/2/2019 2:00	2019	0.8	3.3	9.1	0.1	3.2
5/2/2019 3:00	2019	0.6	2.5	9.1	0.1	2.4
5/2/2019 4:00	2019	0.2	0.8	9.1	0.1	0.7
5/3/2019 5:00	2019	0.3	1.2	7.9	0.1	0.0
5/3/2019 6:00	2019	0.3	1.2	9.0	0.1	0.0
5/3/2019 7:00	2019	1.1	4.6	9.1	0.1	4.3
5/3/2019 8:00	2019	1.4	5.8	9.1	0.1	5.7
5/3/2019 9:00	2019	0.7	2.9	9.1	0.1	2.8
5/9/2019 20:00	2019	0.6	2.5	2.5	0.1	0.0

5/9/2019 21:00	2019	0.5	2.1	4.5	0.1	0.0
5/9/2019 22:00	2019	3.9	16.1	9.1	0.1	11.4
5/9/2019 23:00	2019	0.5	2.1	9.1	0.1	2.0
5/10/2019 0:00	2019	0.3	1.2	9.1	0.1	1.1
5/10/2019 2:00	2019	2.2	9.1	9.1	0.1	8.9
5/10/2019 3:00	2019	7.1	29.4	9.1	0.1	29.3
5/10/2019 4:00	2019	5.3	21.9	9.1	0.1	21.8
5/10/2019 5:00	2019	1	4.1	9.1	0.1	4.0
5/10/2019 8:00	2019	0.3	1.2	9.1	0.1	0.9
5/10/2019 9:00	2019	4.2	17.4	9.1	0.1	17.3
5/10/2019 10:00	2019	4.3	17.8	9.1	0.1	17.7
5/10/2019 11:00	2019	0.4	1.7	9.1	0.1	1.6
5/10/2019 13:00	2019	0.3	1.2	9.1	0.1	1.0
5/10/2019 14:00	2019	0.4	1.7	9.1	0.1	1.6
5/13/2019 21:00	2019	1.1	4.6	5.8	0.1	0.0
5/13/2019 22:00	2019	1.1	4.6	9.1	0.1	1.1
5/13/2019 23:00	2019	2.1	8.7	9.1	0.1	8.6
5/14/2019 0:00	2019	1.9	7.9	9.1	0.1	7.8
5/14/2019 1:00	2019	1.1	4.6	9.1	0.1	4.5
5/14/2019 2:00	2019	1	4.1	9.1	0.1	4.0
5/14/2019 3:00	2019	1.5	6.2	9.1	0.1	6.1
5/14/2019 4:00	2019	1	4.1	9.1	0.1	4.0
5/14/2019 6:00	2019	0.5	2.1	9.1	0.1	1.9
5/14/2019 7:00	2019	0.5	2.1	9.1	0.1	2.0
5/14/2019 8:00	2019	0.5	2.1	9.1	0.1	2.0
5/14/2019 11:00	2019	0.2	0.8	9.1	0.1	0.5
5/15/2019 17:00	2019	0.2	0.8	6.9	0.1	0.0
5/16/2019 23:00	2019	0.5	2.1	6.0	0.1	0.0
5/17/2019 0:00	2019	0.7	2.9	8.8	0.1	0.0
5/17/2019 1:00	2019	1.3	5.4	9.1	0.1	5.0
5/17/2019 2:00	2019	0.7	2.9	9.1	0.1	2.8
5/17/2019 4:00	2019	0.3	1.2	9.1	0.1	1.0
5/19/2019 5:00	2019	2.6	10.8	9.1	0.1	5.9
5/19/2019 6:00	2019	1.8	7.5	9.1	0.1	7.4
5/19/2019 16:00	2019	4.1	17.0	9.1	0.1	16.0
5/19/2019 17:00	2019	3.7	15.3	9.1	0.1	15.2
5/19/2019 22:00	2019	1.4	5.8	9.1	0.1	5.3
5/19/2019 23:00	2019	1.4	5.8	9.1	0.1	5.7
5/23/2019 16:00	2019	4	16.6	9.1	0.1	7.7
5/23/2019 17:00	2019	5.8	24.0	9.1	0.1	23.9
5/23/2019 21:00	2019	0.2	0.8	9.1	0.1	0.4
5/25/2019 12:00	2019	0.8	3.3	8.5	0.1	0.0
5/25/2019 13:00	2019	1.4	5.8	9.1	0.1	5.1
5/25/2019 18:00	2019	0.5	2.1	9.1	0.1	1.6
5/25/2019 19:00	2019	1	4.1	9.1	0.1	4.0
5/26/2019 3:00	2019	0.2	0.8	9.1	0.1	0.0
5/28/2019 9:00	2019	1.3	5.4	9.1	0.1	0.0

5/28/2019 10:00	2019	1.4	5.8	9.1	0.1	5.7
5/28/2019 11:00	2019	0.3	1.2	9.1	0.1	1.1
5/28/2019 12:00	2019	0.3	1.2	9.1	0.1	1.1
5/28/2019 13:00	2019	0.3	1.2	9.1	0.1	1.1
5/30/2019 21:00	2019	2	8.3	9.1	0.1	2.7
5/31/2019 5:00	2019	0.2	0.8	9.1	0.1	0.0
6/2/2019 8:00	2019	0.3	1.2	5.3	0.1	0.0
6/2/2019 9:00	2019	1.6	6.6	9.1	0.1	2.7
6/2/2019 10:00	2019	0.4	1.7	9.1	0.1	1.6
6/2/2019 11:00	2019	0.2	0.8	9.1	0.1	0.7
6/2/2019 12:00	2019	0.2	0.8	9.1	0.1	0.7
6/3/2019 9:00	2019	0.4	1.7	8.7	0.1	0.0
6/3/2019 10:00	2019	0.3	1.2	9.1	0.1	0.7
6/3/2019 15:00	2019	0.2	0.8	9.1	0.1	0.3
6/6/2019 1:00	2019	0.2	0.8	4.2	0.1	0.0
6/9/2019 1:00	2019	0.2	0.8	0.8	0.1	0.0
6/10/2019 19:00	2019	8.2	33.9	9.1	0.1	24.8
6/10/2019 20:00	2019	1.9	7.9	9.1	0.1	7.8
6/10/2019 21:00	2019	1	4.1	9.1	0.1	4.0
6/10/2019 22:00	2019	0.6	2.5	9.1	0.1	2.4
6/10/2019 23:00	2019	1.6	6.6	9.1	0.1	6.5
6/11/2019 0:00	2019	1.3	5.4	9.1	0.1	5.3
6/11/2019 1:00	2019	4.8	19.9	9.1	0.1	19.8
6/11/2019 2:00	2019	1.3	5.4	9.1	0.1	5.3
6/11/2019 3:00	2019	1.9	7.9	9.1	0.1	7.8
6/11/2019 4:00	2019	1.1	4.6	9.1	0.1	4.5
6/11/2019 5:00	2019	0.3	1.2	9.1	0.1	1.1
6/13/2019 17:00	2019	0.8	3.3	6.4	0.1	0.0
6/13/2019 18:00	2019	4.5	18.6	9.1	0.1	15.9
6/13/2019 19:00	2019	1.9	7.9	9.1	0.1	7.8
6/13/2019 20:00	2019	1.2	5.0	9.1	0.1	4.9
6/13/2019 21:00	2019	2.5	10.4	9.1	0.1	10.3
6/13/2019 22:00	2019	1.3	5.4	9.1	0.1	5.3
6/13/2019 23:00	2019	0.7	2.9	9.1	0.1	2.8
6/14/2019 3:00	2019	0.2	0.8	9.1	0.1	0.4
6/14/2019 4:00	2019	0.6	2.5	9.1	0.1	2.4
6/14/2019 8:00	2019	0.2	0.8	9.1	0.1	0.4
6/14/2019 12:00	2019	0.6	2.5	9.1	0.1	2.1
6/14/2019 13:00	2019	0.2	0.8	9.1	0.1	0.7
6/14/2019 14:00	2019	0.7	2.9	9.1	0.1	2.8
6/14/2019 16:00	2019	0.3	1.2	9.1	0.1	1.0
6/15/2019 3:00	2019	0.3	1.2	9.1	0.1	0.1
6/15/2019 4:00	2019	0.2	0.8	9.1	0.1	0.7
6/15/2019 8:00	2019	0.2	0.8	9.1	0.1	0.4
6/15/2019 9:00	2019	1.2	5.0	9.1	0.1	4.9
6/15/2019 10:00	2019	0.7	2.9	9.1	0.1	2.8
6/15/2019 11:00	2019	0.7	2.9	9.1	0.1	2.8

6/15/2019 12:00	2019	0.2	0.8	9.1	0.1	0.7
6/15/2019 15:00	2019	2.1	8.7	9.1	0.1	8.4
6/15/2019 16:00	2019	1.4	5.8	9.1	0.1	5.7
6/15/2019 17:00	2019	1.4	5.8	9.1	0.1	5.7
6/15/2019 18:00	2019	3.4	14.1	9.1	0.1	14.0
6/15/2019 19:00	2019	0.6	2.5	9.1	0.1	2.4
6/19/2019 16:00	2019	5.5	22.8	9.1	0.1	13.7
6/20/2019 12:00	2019	1	4.1	9.1	0.1	2.1
6/20/2019 13:00	2019	0.9	3.7	9.1	0.1	3.6
6/20/2019 14:00	2019	0.2	0.8	9.1	0.1	0.7
6/25/2019 5:00	2019	0.9	3.7	3.7	0.1	0.0
6/25/2019 6:00	2019	4.6	19.0	9.1	0.1	13.6
6/25/2019 8:00	2019	0.3	1.2	9.1	0.1	1.0
6/26/2019 9:00	2019	1.1	4.6	9.1	0.1	2.1
6/27/2019 21:00	2019	3.1	12.8	9.1	0.1	9.2
6/27/2019 22:00	2019	0.5	2.1	9.1	0.1	2.0
6/28/2019 14:00	2019	4.4	18.2	9.1	0.1	16.6
6/28/2019 15:00	2019	19.6	81.1	9.1	0.1	81.0
6/28/2019 16:00	2019	3.2	13.2	9.1	0.1	13.1
6/29/2019 18:00	2019	0.7	2.9	9.1	0.1	0.3
6/29/2019 19:00	2019	2.6	10.8	9.1	0.1	10.7
6/30/2019 5:00	2019	0.5	2.1	9.1	0.1	1.1
7/5/2019 18:00	2019	14.9	61.7	9.1	0.1	52.6
7/11/2019 4:00	2019	0.7	2.9	2.9	0.1	0.0
7/11/2019 16:00	2019	11.4	47.2	9.1	0.1	39.8
7/11/2019 17:00	2019	1.9	7.9	9.1	0.1	7.8
7/11/2019 18:00	2019	0.6	2.5	9.1	0.1	2.4
7/20/2019 17:00	2019	1.3	5.4	5.4	0.1	0.0
7/30/2019 12:00	2019	0.7	2.9	2.9	0.1	0.0
7/30/2019 13:00	2019	1.1	4.6	7.4	0.1	0.0
7/30/2019 22:00	2019	11.1	46.0	9.1	0.1	43.3
7/30/2019 23:00	2019	0.8	3.3	9.1	0.1	3.2
8/3/2019 12:00	2019	0.2	0.8	1.5	0.1	0.0
8/6/2019 13:00	2019	2.4	9.9	9.1	0.1	0.8
8/6/2019 14:00	2019	2.9	12.0	9.1	0.1	11.9
8/6/2019 15:00	2019	0.8	3.3	9.1	0.1	3.2
8/7/2019 17:00	2019	0.7	2.9	9.1	0.1	0.3
8/7/2019 18:00	2019	0.9	3.7	9.1	0.1	3.6
8/8/2019 15:00	2019	1.3	5.4	9.1	0.1	3.3
8/8/2019 16:00	2019	2.5	10.4	9.1	0.1	10.3
8/9/2019 3:00	2019	0.2	0.8	8.8	0.1	0.0
8/10/2019 15:00	2019	0.4	1.7	6.9	0.1	0.0
8/12/2019 16:00	2019	4.4	18.2	9.1	0.1	11.1
8/12/2019 17:00	2019	0.3	1.2	9.1	0.1	1.1
8/17/2019 5:00	2019	2.1	8.7	8.7	0.1	0.0
8/17/2019 13:00	2019	2.2	9.1	9.1	0.1	7.9
8/17/2019 14:00	2019	0.6	2.5	9.1	0.1	2.4

8/17/2019 16:00	2019	0.2	0.8	9.1	0.1	0.6
8/18/2019 15:00	2019	1.1	4.6	9.1	0.1	2.3
8/18/2019 16:00	2019	1.9	7.9	9.1	0.1	7.8
8/19/2019 7:00	2019	0.2	0.8	8.4	0.1	0.0
8/21/2019 7:00	2019	0.4	1.7	5.3	0.1	0.0
8/28/2019 3:00	2019	0.5	2.1	2.1	0.1	0.0
8/28/2019 4:00	2019	3	12.4	9.1	0.1	5.3
8/28/2019 5:00	2019	3.4	14.1	9.1	0.1	14.0
8/28/2019 6:00	2019	1.9	7.9	9.1	0.1	7.8
8/28/2019 8:00	2019	9.7	40.2	9.1	0.1	40.0
8/28/2019 9:00	2019	10.6	43.9	9.1	0.1	43.8
8/28/2019 10:00	2019	0.4	1.7	9.1	0.1	1.6
8/28/2019 11:00	2019	0.4	1.7	9.1	0.1	1.6
8/30/2019 4:00	2019	6.6	27.3	9.1	0.1	23.2
8/30/2019 5:00	2019	0.9	3.7	9.1	0.1	3.6
8/30/2019 6:00	2019	0.7	2.9	9.1	0.1	2.8
9/2/2019 0:00	2019	0.6	2.5	5.0	0.1	0.0
9/2/2019 1:00	2019	0.9	3.7	8.6	0.1	0.0
9/2/2019 2:00	2019	0.8	3.3	9.1	0.1	2.7
9/2/2019 3:00	2019	0.2	0.8	9.1	0.1	0.7
9/2/2019 20:00	2019	0.3	1.2	8.7	0.1	0.0
9/2/2019 22:00	2019	0.2	0.8	9.1	0.1	0.2
9/3/2019 23:00	2019	0.8	3.3	9.1	0.1	0.8
9/4/2019 0:00	2019	1.5	6.2	9.1	0.1	6.1
9/4/2019 2:00	2019	9.5	39.3	9.1	0.1	39.1
9/4/2019 3:00	2019	1.2	5.0	9.1	0.1	4.9
9/6/2019 15:00	2019	0.3	1.2	4.4	0.1	0.0
9/6/2019 16:00	2019	0.2	0.8	5.1	0.1	0.0
9/6/2019 22:00	2019	3.5	14.5	9.1	0.1	9.9
9/6/2019 23:00	2019	4.6	19.0	9.1	0.1	18.9
9/7/2019 0:00	2019	0.8	3.3	9.1	0.1	3.2
9/7/2019 1:00	2019	0.2	0.8	9.1	0.1	0.7
9/7/2019 2:00	2019	0.2	0.8	9.1	0.1	0.7
9/7/2019 10:00	2019	0.2	0.8	9.1	0.1	0.0
9/10/2019 16:00	2019	0.3	1.2	2.6	0.1	0.0
9/10/2019 17:00	2019	0.5	2.1	4.5	0.1	0.0
9/10/2019 18:00	2019	0.8	3.3	7.8	0.1	0.0
9/10/2019 19:00	2019	0.6	2.5	9.1	0.1	1.0
9/11/2019 0:00	2019	0.7	2.9	9.1	0.1	2.4
9/11/2019 1:00	2019	1.2	5.0	9.1	0.1	4.9
9/11/2019 2:00	2019	0.2	0.8	9.1	0.1	0.7
9/14/2019 1:00	2019	5.1	21.1	9.1	0.1	14.0
9/14/2019 2:00	2019	3.4	14.1	9.1	0.1	14.0
9/23/2019 4:00	2019	0.3	1.2	1.2	0.1	0.0
9/23/2019 5:00	2019	1.6	6.6	7.8	0.1	0.0
9/23/2019 6:00	2019	2.4	9.9	9.1	0.1	8.5
9/23/2019 7:00	2019	3.3	13.7	9.1	0.1	13.6

9/23/2019 8:00	2019	0.7	2.9	9.1	0.1	2.8
9/24/2019 2:00	2019	0.2	0.8	8.1	0.1	0.0
9/24/2019 3:00	2019	0.7	2.9	9.1	0.1	1.8
9/25/2019 7:00	2019	0.2	0.8	7.1	0.1	0.0
9/26/2019 7:00	2019	0.6	2.5	7.2	0.1	0.0
9/26/2019 8:00	2019	0.8	3.3	9.1	0.1	1.3
9/26/2019 9:00	2019	0.6	2.5	9.1	0.1	2.4
9/26/2019 10:00	2019	1.8	7.5	9.1	0.1	7.4
9/26/2019 11:00	2019	0.5	2.1	9.1	0.1	2.0
9/26/2019 12:00	2019	0.2	0.8	9.1	0.1	0.7
9/26/2019 17:00	2019	0.2	0.8	9.1	0.1	0.3
9/27/2019 23:00	2019	1.7	7.0	9.1	0.1	4.0
9/28/2019 0:00	2019	0.3	1.2	9.1	0.1	1.1
9/28/2019 6:00	2019	0.2	0.8	9.1	0.1	0.2
9/28/2019 7:00	2019	1.3	5.4	9.1	0.1	5.3
9/28/2019 8:00	2019	2.9	12.0	9.1	0.1	11.9
9/28/2019 9:00	2019	1	4.1	9.1	0.1	4.0
9/28/2019 10:00	2019	0.8	3.3	9.1	0.1	3.2
9/28/2019 13:00	2019	0.4	1.7	9.1	0.1	1.4
9/28/2019 14:00	2019	0.3	1.2	9.1	0.1	1.1
9/29/2019 4:00	2019	0.2	0.8	8.5	0.1	0.0
9/30/2019 22:00	2019	0.3	1.2	5.6	0.1	0.0
9/30/2019 23:00	2019	2.5	10.4	9.1	0.1	6.7
10/1/2019 0:00	2019	0.4	1.7	9.1	0.1	1.6
10/1/2019 3:00	2019	0.5	2.1	9.1	0.1	1.8
10/1/2019 5:00	2019	0.7	2.9	9.1	0.1	2.7
10/1/2019 6:00	2019	1.4	5.8	9.1	0.1	5.7
10/1/2019 12:00	2019	17.8	73.7	9.1	0.1	73.1
10/1/2019 21:00	2019	0.3	1.2	9.1	0.1	0.3
10/2/2019 0:00	2019	0.2	0.8	9.1	0.1	0.5
10/3/2019 20:00	2019	0.2	0.8	5.6	0.1	0.0
10/3/2019 21:00	2019	1.5	6.2	9.1	0.1	2.6
10/3/2019 22:00	2019	0.6	2.5	9.1	0.1	2.4
10/3/2019 23:00	2019	0.3	1.2	9.1	0.1	1.1
10/4/2019 0:00	2019	0.2	0.8	9.1	0.1	0.7
10/4/2019 1:00	2019	0.3	1.2	9.1	0.1	1.1
10/4/2019 2:00	2019	0.2	0.8	9.1	0.1	0.7
10/6/2019 8:00	2019	0.3	1.2	5.0	0.1	0.0
10/6/2019 9:00	2019	0.2	0.8	5.7	0.1	0.0
10/12/2019 14:00	2019	0.3	1.2	1.2	0.1	0.0
10/12/2019 17:00	2019	0.5	2.1	3.0	0.1	0.0
10/12/2019 18:00	2019	0.9	3.7	6.6	0.1	0.0
10/12/2019 21:00	2019	0.3	1.2	7.6	0.1	0.0
10/14/2019 10:00	2019	0.3	1.2	5.1	0.1	0.0
10/16/2019 16:00	2019	1.2	5.0	5.0	0.1	0.0
10/16/2019 17:00	2019	2	8.3	9.1	0.1	4.0
10/16/2019 18:00	2019	1.6	6.6	9.1	0.1	6.5

10/16/2019 19:00	2019	1.9	7.9	9.1	0.1	7.8
10/16/2019 20:00	2019	4.1	17.0	9.1	0.1	16.9
10/16/2019 21:00	2019	4	16.6	9.1	0.1	16.5
10/16/2019 22:00	2019	1.1	4.6	9.1	0.1	4.5
10/16/2019 23:00	2019	0.9	3.7	9.1	0.1	3.6
10/17/2019 0:00	2019	0.6	2.5	9.1	0.1	2.4
10/17/2019 1:00	2019	1.5	6.2	9.1	0.1	6.1
10/17/2019 2:00	2019	1.8	7.5	9.1	0.1	7.4
10/17/2019 3:00	2019	0.8	3.3	9.1	0.1	3.2
10/17/2019 4:00	2019	1.5	6.2	9.1	0.1	6.1
10/17/2019 5:00	2019	2	8.3	9.1	0.1	8.2
10/17/2019 6:00	2019	1.6	6.6	9.1	0.1	6.5
10/17/2019 7:00	2019	0.5	2.1	9.1	0.1	2.0
10/17/2019 8:00	2019	0.2	0.8	9.1	0.1	0.7
10/17/2019 10:00	2019	0.3	1.2	9.1	0.1	1.0
10/17/2019 12:00	2019	0.3	1.2	9.1	0.1	1.0
10/17/2019 13:00	2019	0.7	2.9	9.1	0.1	2.8
10/17/2019 14:00	2019	1.2	5.0	9.1	0.1	4.9
10/17/2019 19:00	2019	0.2	0.8	9.1	0.1	0.3
10/22/2019 12:00	2019	1.1	4.6	4.6	0.1	0.0
10/22/2019 14:00	2019	0.4	1.7	6.0	0.1	0.0
10/22/2019 15:00	2019	0.3	1.2	7.2	0.1	0.0
10/22/2019 16:00	2019	3.4	14.1	9.1	0.1	12.0
10/22/2019 17:00	2019	6.8	28.2	9.1	0.1	28.1
10/22/2019 18:00	2019	5.8	24.0	9.1	0.1	23.9
10/22/2019 19:00	2019	2.9	12.0	9.1	0.1	11.9
10/22/2019 20:00	2019	2.4	9.9	9.1	0.1	9.8
10/22/2019 21:00	2019	0.5	2.1	9.1	0.1	2.0
10/22/2019 22:00	2019	0.6	2.5	9.1	0.1	2.4
10/27/2019 4:00	2019	1.7	7.0	7.0	0.1	0.0
10/27/2019 5:00	2019	1	4.1	9.1	0.1	2.0
10/27/2019 6:00	2019	3	12.4	9.1	0.1	12.3
10/27/2019 7:00	2019	8.6	35.6	9.1	0.1	35.5
10/27/2019 8:00	2019	6.5	26.9	9.1	0.1	26.8
10/27/2019 9:00	2019	3	12.4	9.1	0.1	12.3
10/27/2019 10:00	2019	2.6	10.8	9.1	0.1	10.7
10/27/2019 11:00	2019	1	4.1	9.1	0.1	4.0
10/27/2019 12:00	2019	0.3	1.2	9.1	0.1	1.1
10/27/2019 13:00	2019	0.7	2.9	9.1	0.1	2.8
10/27/2019 14:00	2019	1.5	6.2	9.1	0.1	6.1
10/27/2019 15:00	2019	0.6	2.5	9.1	0.1	2.4
10/27/2019 16:00	2019	0.8	3.3	9.1	0.1	3.2
10/27/2019 17:00	2019	0.7	2.9	9.1	0.1	2.8
10/27/2019 18:00	2019	0.2	0.8	9.1	0.1	0.7
10/30/2019 12:00	2019	0.5	2.1	4.6	0.1	0.0
10/30/2019 16:00	2019	0.2	0.8	5.0	0.1	0.0
10/30/2019 17:00	2019	0.3	1.2	6.2	0.1	0.0

10/30/2019 18:00	2019	0.5	2.1	8.1	0.1	0.0
10/30/2019 19:00	2019	0.3	1.2	9.1	0.1	0.2
10/30/2019 20:00	2019	0.3	1.2	9.1	0.1	1.1
10/30/2019 21:00	2019	1	4.1	9.1	0.1	4.0
10/30/2019 22:00	2019	0.2	0.8	9.1	0.1	0.7
10/30/2019 23:00	2019	0.3	1.2	9.1	0.1	1.1
10/31/2019 0:00	2019	1.1	4.6	9.1	0.1	4.5
10/31/2019 1:00	2019	0.5	2.1	9.1	0.1	2.0
10/31/2019 2:00	2019	0.5	2.1	9.1	0.1	2.0
10/31/2019 3:00	2019	0.5	2.1	9.1	0.1	2.0
10/31/2019 5:00	2019	0.2	0.8	9.1	0.1	0.6
10/31/2019 6:00	2019	1.1	4.6	9.1	0.1	4.5
10/31/2019 7:00	2019	0.5	2.1	9.1	0.1	2.0
10/31/2019 8:00	2019	0.3	1.2	9.1	0.1	1.1
10/31/2019 12:00	2019	0.3	1.2	9.1	0.1	0.8
10/31/2019 13:00	2019	2.3	9.5	9.1	0.1	9.4
10/31/2019 14:00	2019	2.2	9.1	9.1	0.1	9.0
10/31/2019 15:00	2019	2.1	8.7	9.1	0.1	8.6
10/31/2019 16:00	2019	2.7	11.2	9.1	0.1	11.1
10/31/2019 17:00	2019	1.6	6.6	9.1	0.1	6.5
10/31/2019 18:00	2019	3.8	15.7	9.1	0.1	15.6
10/31/2019 19:00	2019	1.1	4.6	9.1	0.1	4.5
10/31/2019 20:00	2019	1.2	5.0	9.1	0.1	4.9
10/31/2019 21:00	2019	0.3	1.2	9.1	0.1	1.1
10/31/2019 22:00	2019	2	8.3	9.1	0.1	8.2
10/31/2019 23:00	2019	8.7	36.0	9.1	0.1	35.9
11/1/2019 0:00	2019	6.1	25.3	9.1	0.1	25.2
11/1/2019 1:00	2019	0.7	2.9	9.1	0.1	2.8
11/1/2019 2:00	2019	0.2	0.8	9.1	0.1	0.7
11/1/2019 5:00	2019	0.3	1.2	9.1	0.1	0.9
11/2/2019 13:00	2019	0.3	1.2	7.2	0.1	0.0
11/2/2019 14:00	2019	0.5	2.1	9.1	0.1	0.0
11/2/2019 15:00	2019	1	4.1	9.1	0.1	4.0
11/2/2019 16:00	2019	0.5	2.1	9.1	0.1	2.0
11/2/2019 17:00	2019	0.6	2.5	9.1	0.1	2.4
11/2/2019 18:00	2019	0.5	2.1	9.1	0.1	2.0
11/2/2019 19:00	2019	1.3	5.4	9.1	0.1	5.3
11/2/2019 20:00	2019	0.7	2.9	9.1	0.1	2.8
11/2/2019 21:00	2019	0.2	0.8	9.1	0.1	0.7
11/3/2019 10:00	2019	0.3	1.2	9.1	0.1	0.0
11/3/2019 16:00	2019	0.2	0.8	9.1	0.1	0.2
11/3/2019 18:00	2019	0.3	1.2	9.1	0.1	1.0
11/4/2019 12:00	2019	0.2	0.8	8.1	0.1	0.0
11/7/2019 4:00	2019	0.3	1.2	3.0	0.1	0.0
11/7/2019 5:00	2019	0.6	2.5	5.4	0.1	0.0
11/7/2019 6:00	2019	0.3	1.2	6.5	0.1	0.0
11/7/2019 7:00	2019	0.3	1.2	7.7	0.1	0.0

11/7/2019 8:00	2019	0.8	3.3	9.1	0.1	1.8
11/7/2019 9:00	2019	0.3	1.2	9.1	0.1	1.1
11/7/2019 11:00	2019	0.3	1.2	9.1	0.1	1.0
11/7/2019 12:00	2019	0.2	0.8	9.1	0.1	0.7
11/7/2019 13:00	2019	0.2	0.8	9.1	0.1	0.7
11/7/2019 23:00	2019	0.2	0.8	8.9	0.1	0.0
11/9/2019 18:00	2019	0.3	1.2	5.9	0.1	0.0
11/11/2019 4:00	2019	0.2	0.8	3.3	0.1	0.0
11/11/2019 17:00	2019	0.7	2.9	4.9	0.1	0.0
11/11/2019 18:00	2019	0.3	1.2	6.1	0.1	0.0
11/11/2019 19:00	2019	0.6	2.5	8.5	0.1	0.0
11/11/2019 20:00	2019	0.8	3.3	9.1	0.1	2.6
11/11/2019 21:00	2019	0.8	3.3	9.1	0.1	3.2
11/11/2019 22:00	2019	0.7	2.9	9.1	0.1	2.8
11/11/2019 23:00	2019	0.9	3.7	9.1	0.1	3.6
11/12/2019 0:00	2019	0.6	2.5	9.1	0.1	2.4
11/12/2019 1:00	2019	0.6	2.5	9.1	0.1	2.4
11/12/2019 2:00	2019	0.3	1.2	9.1	0.1	1.1
11/12/2019 3:00	2019	0.2	0.8	9.1	0.1	0.7
11/12/2019 4:00	2019	0.5	2.1	9.1	0.1	2.0
11/12/2019 5:00	2019	0.3	1.2	9.1	0.1	1.1
11/12/2019 6:00	2019	0.2	0.8	9.1	0.1	0.7
11/13/2019 2:00	2019	0.2	0.8	7.9	0.1	0.0
11/15/2019 14:00	2019	0.3	1.2	3.2	0.1	0.0
11/21/2019 21:00	2019	1.8	7.5	7.5	0.1	0.0
11/22/2019 0:00	2019	0.2	0.8	8.0	0.1	0.0
11/22/2019 3:00	2019	0.6	2.5	9.1	0.1	1.1
11/22/2019 10:00	2019	0.3	1.2	9.1	0.1	0.5
11/27/2019 10:00	2019	0.2	0.8	0.8	0.1	0.0
11/27/2019 11:00	2019	0.8	3.3	4.0	0.1	0.0
11/27/2019 12:00	2019	1	4.1	8.1	0.1	0.0
11/27/2019 13:00	2019	0.3	1.2	9.1	0.1	0.1
11/27/2019 15:00	2019	0.6	2.5	9.1	0.1	2.3
11/27/2019 16:00	2019	2.9	12.0	9.1	0.1	11.9
11/27/2019 17:00	2019	3.9	16.1	9.1	0.1	16.0
11/27/2019 18:00	2019	0.3	1.2	9.1	0.1	1.1
11/27/2019 20:00	2019	0.2	0.8	9.1	0.1	0.6
11/27/2019 21:00	2019	2.1	8.7	9.1	0.1	8.6
11/27/2019 22:00	2019	2.4	9.9	9.1	0.1	9.8
11/27/2019 23:00	2019	1.7	7.0	9.1	0.1	6.9
11/28/2019 0:00	2019	1.4	5.8	9.1	0.1	5.7
11/28/2019 1:00	2019	0.4	1.7	9.1	0.1	1.6
11/28/2019 2:00	2019	0.3	1.2	9.1	0.1	1.1
12/4/2019 12:00	2019	0.2	0.8	0.8	0.1	0.0
12/4/2019 13:00	2019	0.2	0.8	1.6	0.1	0.0
12/4/2019 16:00	2019	0.2	0.8	2.1	0.1	0.0
12/4/2019 18:00	2019	0.2	0.8	2.7	0.1	0.0

12/4/2019 19:00	2019	0.2	0.8	3.4	0.1	0.0
12/4/2019 20:00	2019	0.8	3.3	6.7	0.1	0.0
12/4/2019 23:00	2019	0.2	0.8	7.2	0.1	0.0
12/5/2019 6:00	2019	0.2	0.8	7.3	0.1	0.0
12/6/2019 7:00	2019	0.2	0.8	5.6	0.1	0.0
12/6/2019 8:00	2019	0.2	0.8	6.4	0.1	0.0
12/6/2019 9:00	2019	0.2	0.8	7.1	0.1	0.0
12/6/2019 10:00	2019	0.2	0.8	7.8	0.1	0.0
12/9/2019 9:00	2019	1.2	5.0	5.7	0.1	0.0
12/9/2019 10:00	2019	0.2	0.8	6.5	0.1	0.0
12/9/2019 15:00	2019	0.5	2.1	8.0	0.1	0.0
12/9/2019 16:00	2019	1.7	7.0	9.1	0.1	5.9
12/9/2019 17:00	2019	1.3	5.4	9.1	0.1	5.3
12/9/2019 18:00	2019	1.5	6.2	9.1	0.1	6.1
12/9/2019 19:00	2019	0.7	2.9	9.1	0.1	2.8
12/9/2019 21:00	2019	0.2	0.8	9.1	0.1	0.6
12/10/2019 3:00	2019	0.3	1.2	9.1	0.1	0.6
12/10/2019 6:00	2019	0.3	1.2	9.1	0.1	0.9
12/14/2019 6:00	2019	0.2	0.8	0.8	0.1	0.0
12/14/2019 8:00	2019	0.6	2.5	3.1	0.1	0.0
12/14/2019 9:00	2019	2.1	8.7	9.1	0.1	2.6
12/14/2019 10:00	2019	0.6	2.5	9.1	0.1	2.4
12/14/2019 11:00	2019	0.5	2.1	9.1	0.1	2.0
12/14/2019 12:00	2019	0.4	1.7	9.1	0.1	1.6
12/14/2019 13:00	2019	0.2	0.8	9.1	0.1	0.7
12/14/2019 14:00	2019	0.2	0.8	9.1	0.1	0.7
12/14/2019 15:00	2019	0.3	1.2	9.1	0.1	1.1
12/14/2019 16:00	2019	0.5	2.1	9.1	0.1	2.0
12/14/2019 17:00	2019	1.4	5.8	9.1	0.1	5.7
12/14/2019 18:00	2019	3.3	13.7	9.1	0.1	13.6
12/14/2019 19:00	2019	1.8	7.5	9.1	0.1	7.4
12/14/2019 20:00	2019	1.7	7.0	9.1	0.1	6.9
12/14/2019 21:00	2019	1.9	7.9	9.1	0.1	7.8
12/14/2019 22:00	2019	0.2	0.8	9.1	0.1	0.7
12/14/2019 23:00	2019	0.4	1.7	9.1	0.1	1.6
12/15/2019 0:00	2019	1.9	7.9	9.1	0.1	7.8
12/15/2019 1:00	2019	1.9	7.9	9.1	0.1	7.8
12/15/2019 2:00	2019	0.2	0.8	9.1	0.1	0.7
12/17/2019 17:00	2019	0.3	1.2	4.1	0.1	0.0
12/17/2019 18:00	2019	0.3	1.2	5.2	0.1	0.0
12/17/2019 23:00	2019	0.4	1.7	6.4	0.1	0.0
12/18/2019 5:00	2019	0.2	0.8	6.6	0.1	0.0
12/26/2019 21:00	2019	0.2	0.8	0.8	0.1	0.0
12/27/2019 13:00	2019	0.3	1.2	1.2	0.1	0.0
12/27/2019 15:00	2019	0.8	3.3	4.4	0.1	0.0
12/27/2019 16:00	2019	0.4	1.7	5.9	0.1	0.0
12/28/2019 8:00	2019	0.2	0.8	5.1	0.1	0.0

12/29/2019 20:00	2019	0.6	2.5	4.0	0.1	0.0
12/30/2019 8:00	2019	0.2	0.8	3.7	0.1	0.0
12/30/2019 9:00	2019	1	4.1	7.7	0.1	0.0
12/30/2019 10:00	2019	1.4	5.8	9.1	0.1	4.3
12/30/2019 11:00	2019	1	4.1	9.1	0.1	4.0
12/30/2019 12:00	2019	1.5	6.2	9.1	0.1	6.1
12/30/2019 13:00	2019	1.6	6.6	9.1	0.1	6.5
12/30/2019 14:00	2019	0.6	2.5	9.1	0.1	2.4
12/30/2019 15:00	2019	0.6	2.5	9.1	0.1	2.4
12/30/2019 16:00	2019	0.6	2.5	9.1	0.1	2.4
12/30/2019 17:00	2019	0.2	0.8	9.1	0.1	0.7
12/30/2019 18:00	2019	0.5	2.1	9.1	0.1	2.0
12/30/2019 19:00	2019	0.5	2.1	9.1	0.1	2.0
12/30/2019 20:00	2019	0.4	1.7	9.1	0.1	1.6
12/30/2019 21:00	2019	0.9	3.7	9.1	0.1	3.6
12/30/2019 22:00	2019	0.8	3.3	9.1	0.1	3.2
12/30/2019 23:00	2019	0.4	1.7	9.1	0.1	1.6
12/31/2019 0:00	2019	0.8	3.3	9.1	0.1	3.2
12/31/2019 1:00	2019	0.6	2.5	9.1	0.1	2.4
12/31/2019 2:00	2019	0.3	1.2	9.1	0.1	1.1
12/31/2019 3:00	2019	0.5	2.1	9.1	0.1	2.0
12/31/2019 4:00	2019	0.3	1.2	9.1	0.1	1.1
12/31/2019 5:00	2019	0.5	2.1	9.1	0.1	2.0
12/31/2019 6:00	2019	0.4	1.7	9.1	0.1	1.6
12/31/2019 7:00	2019	0.6	2.5	9.1	0.1	2.4
12/31/2019 8:00	2019	0.3	1.2	9.1	0.1	1.1
12/31/2019 9:00	2019	0.2	0.8	9.1	0.1	0.7
12/31/2019 11:00	2019	0.9	3.7	9.1	0.1	3.5
12/31/2019 12:00	2019	1.2	5.0	9.1	0.1	4.9
12/31/2019 13:00	2019	0.7	2.9	9.1	0.1	2.8
12/31/2019 14:00	2019	0.3	1.2	9.1	0.1	1.1
12/31/2019 15:00	2019	0.2	0.8	9.1	0.1	0.7
12/31/2019 16:00	2019	0.2	0.8	9.1	0.1	0.7
12/31/2019 17:00	2019	0.7	2.9	9.1	0.1	2.8
12/31/2019 18:00	2019	0.6	2.5	9.1	0.1	2.4
12/31/2019 21:00	2019	0.2	0.8	9.1	0.1	0.5
5/1/2020 0:00	2020	1.1	4.6	4.6	0.1	0.0
5/1/2020 1:00	2020	2	8.3	9.1	0.1	3.6
5/1/2020 2:00	2020	1.4	5.8	9.1	0.1	5.7
5/1/2020 3:00	2020	1.3	5.4	9.1	0.1	5.3
5/1/2020 4:00	2020	0.2	0.8	9.1	0.1	0.7
5/1/2020 7:00	2020	0.2	0.8	9.1	0.1	0.5
5/1/2020 8:00	2020	0.2	0.8	9.1	0.1	0.7
5/3/2020 1:00	2020	0.4	1.7	6.7	0.1	0.0
5/15/2020 12:00	2020	0.6	2.5	2.5	0.1	0.0
5/15/2020 13:00	2020	3.2	13.2	9.1	0.1	6.5
5/15/2020 14:00	2020	9.1	37.7	9.1	0.1	37.6

5/15/2020 15:00	2020	5.1	21.1	9.1	0.1	21.0
5/15/2020 16:00	2020	0.3	1.2	9.1	0.1	1.1
5/25/2020 3:00	2020	0.7	2.9	2.9	0.1	0.0
5/25/2020 4:00	2020	1.1	4.6	7.4	0.1	0.0
5/25/2020 5:00	2020	1	4.1	9.1	0.1	2.3
5/29/2020 22:00	2020	0.8	3.3	3.3	0.1	0.0
5/29/2020 23:00	2020	17.4	72.0	9.1	0.1	66.1
5/30/2020 1:00	2020	0.3	1.2	9.1	0.1	1.0
5/30/2020 16:00	2020	0.2	0.8	8.4	0.1	0.0
5/30/2020 17:00	2020	2.8	11.6	9.1	0.1	10.8
5/30/2020 18:00	2020	5.3	21.9	9.1	0.1	21.8
6/9/2020 7:00	2020	0.4	1.7	1.7	0.1	0.0
6/10/2020 12:00	2020	0.2	0.8	0.8	0.1	0.0
6/11/2020 1:00	2020	0.7	2.9	2.9	0.1	0.0
6/11/2020 2:00	2020	0.5	2.1	4.9	0.1	0.0
6/11/2020 3:00	2020	0.4	1.7	6.4	0.1	0.0
6/11/2020 4:00	2020	0.2	0.8	7.2	0.1	0.0
6/13/2020 1:00	2020	0.3	1.2	3.9	0.1	0.0
6/13/2020 2:00	2020	0.7	2.9	6.7	0.1	0.0
6/13/2020 3:00	2020	0.2	0.8	7.4	0.1	0.0
6/22/2020 15:00	2020	4	16.6	9.1	0.1	7.5
6/22/2020 17:00	2020	0.8	3.3	9.1	0.1	3.1
6/22/2020 18:00	2020	0.2	0.8	9.1	0.1	0.7
6/23/2020 22:00	2020	2.1	8.7	9.1	0.1	5.9
6/24/2020 1:00	2020	0.7	2.9	9.1	0.1	2.6
6/24/2020 2:00	2020	0.2	0.8	9.1	0.1	0.7
6/28/2020 15:00	2020	2.7	11.2	9.1	0.1	2.1
6/28/2020 19:00	2020	1	4.1	9.1	0.1	3.7
7/8/2020 0:00	2020	0.8	3.3	3.3	0.1	0.0
7/8/2020 3:00	2020	0.4	1.7	4.7	0.1	0.0
7/9/2020 19:00	2020	0.8	3.3	4.0	0.1	0.0
7/9/2020 20:00	2020	0.2	0.8	4.7	0.1	0.0
7/11/2020 3:00	2020	0.4	1.7	3.3	0.1	0.0
7/11/2020 4:00	2020	0.8	3.3	6.5	0.1	0.0
7/11/2020 5:00	2020	1.1	4.6	9.1	0.1	1.8
7/11/2020 8:00	2020	1.2	5.0	9.1	0.1	4.7
7/11/2020 11:00	2020	0.6	2.5	9.1	0.1	2.2
7/11/2020 12:00	2020	0.8	3.3	9.1	0.1	3.2
7/11/2020 13:00	2020	0.6	2.5	9.1	0.1	2.4
7/11/2020 20:00	2020	0.5	2.1	9.1	0.1	1.4
7/11/2020 21:00	2020	0.3	1.2	9.1	0.1	1.1
7/12/2020 6:00	2020	0.3	1.2	9.1	0.1	0.3
7/17/2020 4:00	2020	3.3	13.7	9.1	0.1	4.6
7/17/2020 5:00	2020	0.6	2.5	9.1	0.1	2.4
7/17/2020 7:00	2020	0.3	1.2	9.1	0.1	1.0
7/19/2020 5:00	2020	10.8	44.7	9.1	0.1	40.1
7/19/2020 6:00	2020	9.7	40.2	9.1	0.1	40.1

7/19/2020 15:00	2020	1.3	5.4	9.1	0.1	4.5
7/19/2020 16:00	2020	0.2	0.8	9.1	0.1	0.7
7/19/2020 23:00	2020	0.6	2.5	9.1	0.1	1.8
7/20/2020 0:00	2020	4.2	17.4	9.1	0.1	17.3
7/22/2020 18:00	2020	0.3	1.2	3.8	0.1	0.0
7/22/2020 19:00	2020	0.2	0.8	4.5	0.1	0.0
7/22/2020 20:00	2020	2.1	8.7	9.1	0.1	4.0
7/22/2020 21:00	2020	0.9	3.7	9.1	0.1	3.6
7/27/2020 8:00	2020	0.7	2.9	2.9	0.1	0.0
7/27/2020 12:00	2020	0.2	0.8	3.3	0.1	0.0
7/29/2020 6:00	2020	3.1	12.8	9.1	0.1	3.7
7/29/2020 7:00	2020	0.7	2.9	9.1	0.1	2.8
7/29/2020 9:00	2020	1.8	7.5	9.1	0.1	7.3
7/29/2020 17:00	2020	3.2	13.2	9.1	0.1	12.5
7/29/2020 19:00	2020	0.2	0.8	9.1	0.1	0.6
7/30/2020 3:00	2020	0.2	0.8	9.1	0.1	0.0
7/30/2020 12:00	2020	0.6	2.5	9.1	0.1	1.6
7/30/2020 14:00	2020	1.8	7.5	9.1	0.1	7.3
7/30/2020 15:00	2020	10.9	45.1	9.1	0.1	45.0
7/30/2020 16:00	2020	0.4	1.7	9.1	0.1	1.6
8/2/2020 9:00	2020	2.4	9.9	9.1	0.1	3.5
8/2/2020 10:00	2020	1.4	5.8	9.1	0.1	5.7
8/2/2020 11:00	2020	0.2	0.8	9.1	0.1	0.7
8/2/2020 12:00	2020	4	16.6	9.1	0.1	16.5
8/2/2020 13:00	2020	7.9	32.7	9.1	0.1	32.6
8/2/2020 16:00	2020	11.6	48.0	9.1	0.1	47.7
8/2/2020 17:00	2020	8.2	33.9	9.1	0.1	33.8
8/2/2020 20:00	2020	0.3	1.2	9.1	0.1	0.9
8/3/2020 3:00	2020	0.6	2.5	9.1	0.1	1.8
8/4/2020 2:00	2020	0.2	0.8	7.6	0.1	0.0
8/4/2020 4:00	2020	0.2	0.8	8.3	0.1	0.0
8/4/2020 5:00	2020	0.9	3.7	9.1	0.1	2.8
8/4/2020 10:00	2020	0.3	1.2	9.1	0.1	0.7
8/4/2020 14:00	2020	0.7	2.9	9.1	0.1	2.5
8/4/2020 15:00	2020	2.7	11.2	9.1	0.1	11.1
8/4/2020 16:00	2020	3	12.4	9.1	0.1	12.3
8/4/2020 17:00	2020	14.2	58.8	9.1	0.1	58.7
8/4/2020 18:00	2020	0.7	2.9	9.1	0.1	2.8
8/4/2020 22:00	2020	0.3	1.2	9.1	0.1	0.8
8/4/2020 23:00	2020	0.2	0.8	9.1	0.1	0.7
8/5/2020 1:00	2020	0.2	0.8	9.1	0.1	0.6
8/5/2020 8:00	2020	0.2	0.8	9.1	0.1	0.1
8/5/2020 10:00	2020	0.8	3.3	9.1	0.1	3.1
8/9/2020 13:00	2020	0.4	1.7	1.7	0.1	0.0
8/9/2020 18:00	2020	0.4	1.7	2.8	0.1	0.0
8/9/2020 19:00	2020	0.3	1.2	4.0	0.1	0.0
8/10/2020 15:00	2020	0.9	3.7	5.7	0.1	0.0

8/11/2020 15:00	2020	6.8	28.2	9.1	0.1	22.3
8/11/2020 17:00	2020	0.5	2.1	9.1	0.1	1.9
8/11/2020 18:00	2020	0.3	1.2	9.1	0.1	1.1
8/16/2020 15:00	2020	9	37.3	9.1	0.1	28.2
8/16/2020 16:00	2020	3	12.4	9.1	0.1	12.3
8/16/2020 17:00	2020	0.9	3.7	9.1	0.1	3.6
8/16/2020 18:00	2020	9.1	37.7	9.1	0.1	37.6
8/16/2020 19:00	2020	0.4	1.7	9.1	0.1	1.6
8/16/2020 21:00	2020	0.2	0.8	9.1	0.1	0.6
8/17/2020 0:00	2020	3.4	14.1	9.1	0.1	13.8
8/17/2020 1:00	2020	0.5	2.1	9.1	0.1	2.0
8/17/2020 3:00	2020	0.8	3.3	9.1	0.1	3.1
8/17/2020 4:00	2020	1	4.1	9.1	0.1	4.0
8/17/2020 5:00	2020	17.7	73.3	9.1	0.1	73.2
8/17/2020 18:00	2020	8.2	33.9	9.1	0.1	32.7
8/18/2020 3:00	2020	0.2	0.8	9.0	0.1	0.0
8/18/2020 14:00	2020	2.5	10.4	9.1	0.1	9.2
8/20/2020 14:00	2020	0.2	0.8	5.2	0.1	0.0
8/21/2020 0:00	2020	0.2	0.8	5.0	0.1	0.0
8/21/2020 2:00	2020	0.8	3.3	8.1	0.1	0.0
8/23/2020 4:00	2020	0.3	1.2	4.4	0.1	0.0
8/23/2020 5:00	2020	0.4	1.7	5.9	0.1	0.0
8/23/2020 20:00	2020	7.5	31.1	9.1	0.1	26.4
8/23/2020 21:00	2020	3.1	12.8	9.1	0.1	12.7
8/24/2020 1:00	2020	8.1	33.5	9.1	0.1	33.1
8/24/2020 2:00	2020	5.5	22.8	9.1	0.1	22.7
8/24/2020 3:00	2020	0.4	1.7	9.1	0.1	1.6
8/24/2020 5:00	2020	0.5	2.1	9.1	0.1	1.9
8/24/2020 6:00	2020	0.3	1.2	9.1	0.1	1.1
8/24/2020 7:00	2020	0.2	0.8	9.1	0.1	0.7
8/25/2020 2:00	2020	0.7	2.9	9.1	0.1	1.0
8/26/2020 4:00	2020	0.2	0.8	7.3	0.1	0.0
8/27/2020 8:00	2020	1.3	5.4	9.1	0.1	0.8
8/27/2020 9:00	2020	1.6	6.6	9.1	0.1	6.5
8/27/2020 10:00	2020	0.9	3.7	9.1	0.1	3.6
8/27/2020 11:00	2020	0.2	0.8	9.1	0.1	0.7
8/29/2020 3:00	2020	0.7	2.9	8.0	0.1	0.0
8/29/2020 4:00	2020	1.7	7.0	9.1	0.1	5.8
8/29/2020 5:00	2020	5.4	22.4	9.1	0.1	22.3
8/29/2020 6:00	2020	4.5	18.6	9.1	0.1	18.5
8/29/2020 7:00	2020	3.5	14.5	9.1	0.1	14.4
8/29/2020 8:00	2020	7.2	29.8	9.1	0.1	29.7
8/29/2020 11:00	2020	1.3	5.4	9.1	0.1	5.1
8/29/2020 12:00	2020	0.4	1.7	9.1	0.1	1.6
8/29/2020 13:00	2020	0.7	2.9	9.1	0.1	2.8
8/29/2020 16:00	2020	0.2	0.8	9.1	0.1	0.5
8/29/2020 17:00	2020	2.5	10.4	9.1	0.1	10.3

8/29/2020 18:00	2020	0.3	1.2	9.1	0.1	1.1
8/30/2020 18:00	2020	1.5	6.2	9.1	0.1	3.8
9/2/2020 17:00	2020	7.2	29.8	9.1	0.1	22.7
9/2/2020 18:00	2020	0.6	2.5	9.1	0.1	2.4
9/3/2020 22:00	2020	1.5	6.2	9.1	0.1	3.4
9/3/2020 23:00	2020	0.2	0.8	9.1	0.1	0.7
9/4/2020 15:00	2020	0.2	0.8	8.3	0.1	0.0
9/4/2020 17:00	2020	0.6	2.5	9.1	0.1	1.5
9/5/2020 15:00	2020	0.7	2.9	9.1	0.1	0.7
9/5/2020 17:00	2020	0.9	3.7	9.1	0.1	3.5
9/5/2020 22:00	2020	0.5	2.1	9.1	0.1	1.6
9/7/2020 11:00	2020	0.2	0.8	6.2	0.1	0.0
9/7/2020 18:00	2020	0.3	1.2	6.8	0.1	0.0
9/8/2020 16:00	2020	0.3	1.2	5.8	0.1	0.0
9/8/2020 17:00	2020	0.2	0.8	6.6	0.1	0.0
9/9/2020 4:00	2020	0.8	3.3	8.8	0.1	0.0
9/9/2020 5:00	2020	1.1	4.6	9.1	0.1	4.1
9/9/2020 7:00	2020	0.8	3.3	9.1	0.1	3.1
9/9/2020 16:00	2020	0.6	2.5	9.1	0.1	1.6
9/9/2020 17:00	2020	2.7	11.2	9.1	0.1	11.1
9/12/2020 5:00	2020	0.2	0.8	4.0	0.1	0.0
9/13/2020 7:00	2020	1.2	5.0	6.3	0.1	0.0
9/13/2020 9:00	2020	0.2	0.8	7.0	0.1	0.0
9/13/2020 10:00	2020	0.3	1.2	8.1	0.1	0.0
9/13/2020 11:00	2020	0.5	2.1	9.1	0.1	1.0
9/13/2020 12:00	2020	3	12.4	9.1	0.1	12.3
9/13/2020 13:00	2020	1.1	4.6	9.1	0.1	4.5
9/15/2020 2:00	2020	0.2	0.8	6.2	0.1	0.0
9/29/2020 5:00	2020	0.6	2.5	2.5	0.1	0.0
9/29/2020 6:00	2020	6.8	28.2	9.1	0.1	21.4
9/29/2020 7:00	2020	0.9	3.7	9.1	0.1	3.6
9/29/2020 8:00	2020	0.3	1.2	9.1	0.1	1.1
9/29/2020 21:00	2020	0.2	0.8	8.6	0.1	0.0
9/29/2020 22:00	2020	0.5	2.1	9.1	0.1	1.5
9/30/2020 1:00	2020	0.4	1.7	9.1	0.1	1.4
9/30/2020 2:00	2020	1.4	5.8	9.1	0.1	5.7
9/30/2020 3:00	2020	2.5	10.4	9.1	0.1	10.3
9/30/2020 4:00	2020	1.3	5.4	9.1	0.1	5.3
9/30/2020 5:00	2020	2.1	8.7	9.1	0.1	8.6
9/30/2020 6:00	2020	2.6	10.8	9.1	0.1	10.7
9/30/2020 7:00	2020	1.2	5.0	9.1	0.1	4.9
9/30/2020 10:00	2020	0.9	3.7	9.1	0.1	3.4
9/30/2020 11:00	2020	0.3	1.2	9.1	0.1	1.1
9/30/2020 15:00	2020	1.6	6.6	9.1	0.1	6.2
10/1/2020 15:00	2020	0.2	0.8	7.5	0.1	0.0
10/1/2020 16:00	2020	0.2	0.8	8.3	0.1	0.0
10/2/2020 10:00	2020	2.2	9.1	9.1	0.1	6.5

10/2/2020 11:00	2020	4.8	19.9	9.1	0.1	19.8
10/2/2020 12:00	2020	1.1	4.6	9.1	0.1	4.5
10/2/2020 13:00	2020	0.5	2.1	9.1	0.1	2.0
10/4/2020 16:00	2020	0.6	2.5	6.5	0.1	0.0
10/4/2020 18:00	2020	0.3	1.2	7.6	0.1	0.0
10/5/2020 4:00	2020	0.2	0.8	7.4	0.1	0.0
10/5/2020 7:00	2020	1.8	7.5	9.1	0.1	5.4
10/5/2020 8:00	2020	0.2	0.8	9.1	0.1	0.7
10/7/2020 7:00	2020	2.6	10.8	9.1	0.1	6.1
10/7/2020 8:00	2020	0.6	2.5	9.1	0.1	2.4
10/7/2020 9:00	2020	0.7	2.9	9.1	0.1	2.8
10/7/2020 10:00	2020	13.9	57.5	9.1	0.1	57.4
10/7/2020 13:00	2020	1.5	6.2	9.1	0.1	5.9
10/7/2020 17:00	2020	0.2	0.8	9.1	0.1	0.4
10/9/2020 4:00	2020	0.2	0.8	6.4	0.1	0.0
10/13/2020 2:00	2020	0.3	1.2	1.2	0.1	0.0
10/13/2020 3:00	2020	3.9	16.1	9.1	0.1	8.2
10/13/2020 4:00	2020	1.7	7.0	9.1	0.1	6.9
10/13/2020 5:00	2020	0.4	1.7	9.1	0.1	1.6
10/13/2020 6:00	2020	1.1	4.6	9.1	0.1	4.5
10/13/2020 7:00	2020	0.6	2.5	9.1	0.1	2.4
10/13/2020 8:00	2020	0.6	2.5	9.1	0.1	2.4
10/13/2020 9:00	2020	0.8	3.3	9.1	0.1	3.2
10/13/2020 10:00	2020	0.3	1.2	9.1	0.1	1.1
10/13/2020 11:00	2020	1.1	4.6	9.1	0.1	4.5
10/13/2020 12:00	2020	1.1	4.6	9.1	0.1	4.5
10/13/2020 14:00	2020	0.3	1.2	9.1	0.1	1.0
10/13/2020 15:00	2020	1.2	5.0	9.1	0.1	4.9
10/13/2020 17:00	2020	0.2	0.8	9.1	0.1	0.6
10/15/2020 14:00	2020	0.8	3.3	7.9	0.1	0.0
10/15/2020 15:00	2020	0.6	2.5	9.1	0.1	1.2
10/15/2020 16:00	2020	1	4.1	9.1	0.1	4.0
10/15/2020 17:00	2020	0.8	3.3	9.1	0.1	3.2
10/15/2020 18:00	2020	0.5	2.1	9.1	0.1	2.0
10/15/2020 21:00	2020	0.3	1.2	9.1	0.1	0.9
10/15/2020 22:00	2020	0.3	1.2	9.1	0.1	1.1
10/16/2020 1:00	2020	0.3	1.2	9.1	0.1	0.9
10/16/2020 2:00	2020	0.2	0.8	9.1	0.1	0.7
10/16/2020 3:00	2020	0.5	2.1	9.1	0.1	2.0
10/16/2020 4:00	2020	0.9	3.7	9.1	0.1	3.6
10/16/2020 5:00	2020	1.5	6.2	9.1	0.1	6.1
10/16/2020 6:00	2020	0.8	3.3	9.1	0.1	3.2
10/17/2020 6:00	2020	0.2	0.8	7.5	0.1	0.0
10/19/2020 7:00	2020	0.2	0.8	3.5	0.1	0.0
10/19/2020 12:00	2020	0.2	0.8	3.8	0.1	0.0
10/19/2020 13:00	2020	0.3	1.2	5.0	0.1	0.0
10/19/2020 14:00	2020	0.2	0.8	5.7	0.1	0.0

10/19/2020 17:00	2020	0.2	0.8	6.2	0.1	0.0
10/19/2020 21:00	2020	0.5	2.1	7.9	0.1	0.0
10/19/2020 22:00	2020	0.9	3.7	9.1	0.1	2.4
10/19/2020 23:00	2020	1.7	7.0	9.1	0.1	6.9
10/20/2020 0:00	2020	1.5	6.2	9.1	0.1	6.1
10/20/2020 1:00	2020	2.8	11.6	9.1	0.1	11.5
10/20/2020 2:00	2020	0.2	0.8	9.1	0.1	0.7
10/20/2020 3:00	2020	1.4	5.8	9.1	0.1	5.7
10/20/2020 4:00	2020	1.2	5.0	9.1	0.1	4.9
10/20/2020 5:00	2020	0.9	3.7	9.1	0.1	3.6
10/20/2020 6:00	2020	0.6	2.5	9.1	0.1	2.4
10/20/2020 8:00	2020	0.3	1.2	9.1	0.1	1.0
10/21/2020 5:00	2020	0.3	1.2	8.3	0.1	0.0
10/21/2020 6:00	2020	2.1	8.7	9.1	0.1	7.7
10/21/2020 7:00	2020	2.2	9.1	9.1	0.1	9.0
10/21/2020 8:00	2020	2.1	8.7	9.1	0.1	8.6
10/21/2020 18:00	2020	0.3	1.2	9.1	0.1	0.2
10/23/2020 23:00	2020	1	4.1	8.0	0.1	0.0
10/24/2020 3:00	2020	1.6	6.6	9.1	0.1	5.1
10/24/2020 4:00	2020	0.4	1.7	9.1	0.1	1.6
10/26/2020 8:00	2020	0.4	1.7	5.6	0.1	0.0
10/26/2020 9:00	2020	1.7	7.0	9.1	0.1	3.4
10/26/2020 10:00	2020	1	4.1	9.1	0.1	4.0
10/26/2020 11:00	2020	1.2	5.0	9.1	0.1	4.9
10/26/2020 12:00	2020	1.2	5.0	9.1	0.1	4.9
10/26/2020 13:00	2020	0.2	0.8	9.1	0.1	0.7
10/26/2020 17:00	2020	0.2	0.8	9.1	0.1	0.4
10/28/2020 6:00	2020	0.2	0.8	6.2	0.1	0.0
11/1/2020 14:00	2020	0.3	1.2	1.2	0.1	0.0
11/1/2020 15:00	2020	0.9	3.7	4.9	0.1	0.0
11/1/2020 16:00	2020	0.7	2.9	7.7	0.1	0.0
11/2/2020 18:00	2020	0.2	0.8	5.9	0.1	0.0
11/2/2020 19:00	2020	0.5	2.1	7.9	0.1	0.0
11/2/2020 21:00	2020	0.9	3.7	9.1	0.1	2.3
11/2/2020 22:00	2020	1	4.1	9.1	0.1	4.0
11/2/2020 23:00	2020	0.2	0.8	9.1	0.1	0.7
11/3/2020 6:00	2020	0.2	0.8	9.1	0.1	0.1
11/6/2020 8:00	2020	0.2	0.8	2.6	0.1	0.0
11/9/2020 9:00	2020	0.3	1.2	1.2	0.1	0.0
11/11/2020 7:00	2020	0.3	1.2	1.2	0.1	0.0
11/15/2020 15:00	2020	0.7	2.9	2.9	0.1	0.0
11/15/2020 16:00	2020	0.5	2.1	4.9	0.1	0.0
11/15/2020 18:00	2020	0.3	1.2	5.9	0.1	0.0
11/15/2020 19:00	2020	1	4.1	9.1	0.1	0.8
11/17/2020 0:00	2020	0.3	1.2	7.5	0.1	0.0
11/22/2020 17:00	2020	0.5	2.1	2.1	0.1	0.0
11/22/2020 18:00	2020	1.1	4.6	6.5	0.1	0.0

11/22/2020 19:00	2020	0.7	2.9	9.1	0.1	0.2
11/22/2020 20:00	2020	1.7	7.0	9.1	0.1	6.9
11/22/2020 21:00	2020	1.3	5.4	9.1	0.1	5.3
11/22/2020 22:00	2020	1.9	7.9	9.1	0.1	7.8
11/22/2020 23:00	2020	2.2	9.1	9.1	0.1	9.0
11/23/2020 0:00	2020	1.6	6.6	9.1	0.1	6.5
11/23/2020 1:00	2020	1.5	6.2	9.1	0.1	6.1
11/23/2020 2:00	2020	1	4.1	9.1	0.1	4.0
11/23/2020 3:00	2020	0.2	0.8	9.1	0.1	0.7
11/23/2020 4:00	2020	1	4.1	9.1	0.1	4.0
11/23/2020 5:00	2020	1	4.1	9.1	0.1	4.0
11/23/2020 6:00	2020	0.5	2.1	9.1	0.1	2.0
11/23/2020 11:00	2020	1.5	6.2	9.1	0.1	5.7
11/25/2020 5:00	2020	0.6	2.5	7.4	0.1	0.0
11/25/2020 6:00	2020	1.1	4.6	9.1	0.1	2.8
11/25/2020 7:00	2020	1.3	5.4	9.1	0.1	5.3
11/25/2020 8:00	2020	1.3	5.4	9.1	0.1	5.3
11/25/2020 9:00	2020	1.3	5.4	9.1	0.1	5.3
11/25/2020 10:00	2020	1.9	7.9	9.1	0.1	7.8
11/25/2020 11:00	2020	0.6	2.5	9.1	0.1	2.4
11/25/2020 12:00	2020	0.2	0.8	9.1	0.1	0.7
11/25/2020 13:00	2020	0.2	0.8	9.1	0.1	0.7
11/26/2020 1:00	2020	0.3	1.2	9.1	0.1	0.0
11/26/2020 2:00	2020	0.4	1.7	9.1	0.1	1.6
11/26/2020 3:00	2020	0.3	1.2	9.1	0.1	1.1
11/26/2020 4:00	2020	0.2	0.8	9.1	0.1	0.7
11/26/2020 5:00	2020	0.2	0.8	9.1	0.1	0.7
11/26/2020 6:00	2020	0.5	2.1	9.1	0.1	2.0
11/26/2020 7:00	2020	0.7	2.9	9.1	0.1	2.8
11/26/2020 8:00	2020	0.2	0.8	9.1	0.1	0.7
11/26/2020 10:00	2020	0.2	0.8	9.1	0.1	0.6
11/26/2020 12:00	2020	0.2	0.8	9.1	0.1	0.6
11/26/2020 20:00	2020	0.3	1.2	9.1	0.1	0.4
11/30/2020 14:00	2020	1.1	4.6	4.7	0.1	0.0
11/30/2020 15:00	2020	2.1	8.7	9.1	0.1	4.2
11/30/2020 16:00	2020	3.2	13.2	9.1	0.1	13.1
11/30/2020 17:00	2020	2.2	9.1	9.1	0.1	9.0
11/30/2020 18:00	2020	1.5	6.2	9.1	0.1	6.1
11/30/2020 19:00	2020	1.1	4.6	9.1	0.1	4.5
11/30/2020 20:00	2020	0.5	2.1	9.1	0.1	2.0
11/30/2020 21:00	2020	0.5	2.1	9.1	0.1	2.0
11/30/2020 23:00	2020	0.6	2.5	9.1	0.1	2.3
12/1/2020 10:00	2020	0.5	2.1	9.1	0.1	1.0
12/1/2020 11:00	2020	1.1	4.6	9.1	0.1	4.5
12/1/2020 12:00	2020	0.6	2.5	9.1	0.1	2.4
12/1/2020 15:00	2020	0.6	2.5	9.1	0.1	2.2
12/1/2020 16:00	2020	0.2	0.8	9.1	0.1	0.7

12/2/2020 2:00	2020	0.8	3.3	9.1	0.1	2.3
12/2/2020 3:00	2020	0.2	0.8	9.1	0.1	0.7
12/2/2020 8:00	2020	0.2	0.8	9.1	0.1	0.3
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12/2/2020 16:00	2020	0.2	0.8	9.1	0.1	0.4
12/3/2020 9:00	2020	0.2	0.8	8.2	0.1	0.0
12/4/2020 4:00	2020	0.9	3.7	9.1	0.1	1.0
12/4/2020 5:00	2020	0.2	0.8	9.1	0.1	0.7
12/4/2020 6:00	2020	0.2	0.8	9.1	0.1	0.7
12/4/2020 7:00	2020	0.2	0.8	9.1	0.1	0.7
12/4/2020 13:00	2020	0.5	2.1	9.1	0.1	1.5
12/4/2020 14:00	2020	1	4.1	9.1	0.1	4.0
12/4/2020 15:00	2020	0.6	2.5	9.1	0.1	2.4
12/4/2020 16:00	2020	1	4.1	9.1	0.1	4.0
12/4/2020 17:00	2020	0.5	2.1	9.1	0.1	2.0
12/9/2020 4:00	2020	0.3	1.2	1.2	0.1	0.0
12/9/2020 5:00	2020	0.4	1.7	2.8	0.1	0.0
12/9/2020 6:00	2020	0.5	2.1	4.8	0.1	0.0
12/9/2020 7:00	2020	0.3	1.2	5.9	0.1	0.0
12/9/2020 8:00	2020	0.7	2.9	8.7	0.1	0.0
12/9/2020 9:00	2020	1	4.1	9.1	0.1	3.6
12/9/2020 10:00	2020	0.3	1.2	9.1	0.1	1.1
12/9/2020 12:00	2020	0.2	0.8	9.1	0.1	0.6
12/12/2020 12:00	2020	0.6	2.5	4.4	0.1	0.0
12/12/2020 14:00	2020	0.3	1.2	5.5	0.1	0.0
12/12/2020 15:00	2020	0.9	3.7	9.1	0.1	0.0
12/12/2020 16:00	2020	0.5	2.1	9.1	0.1	1.9
12/12/2020 19:00	2020	0.2	0.8	9.1	0.1	0.5
12/12/2020 20:00	2020	1.1	4.6	9.1	0.1	4.5
12/12/2020 21:00	2020	0.2	0.8	9.1	0.1	0.7
12/12/2020 23:00	2020	0.3	1.2	9.1	0.1	1.0
12/13/2020 6:00	2020	0.2	0.8	9.1	0.1	0.1
12/14/2020 14:00	2020	0.2	0.8	6.7	0.1	0.0
12/14/2020 16:00	2020	0.2	0.8	7.4	0.1	0.0
12/15/2020 11:00	2020	0.2	0.8	6.3	0.1	0.0
12/20/2020 10:00	2020	0.6	2.5	2.5	0.1	0.0
12/20/2020 11:00	2020	0.6	2.5	4.9	0.1	0.0
12/20/2020 12:00	2020	0.3	1.2	6.0	0.1	0.0
12/20/2020 13:00	2020	0.2	0.8	6.7	0.1	0.0
12/20/2020 14:00	2020	0.3	1.2	7.9	0.1	0.0
12/20/2020 15:00	2020	0.3	1.2	9.0	0.1	0.0
12/20/2020 16:00	2020	0.3	1.2	9.1	0.1	1.1
12/21/2020 1:00	2020	0.2	0.8	9.0	0.1	0.0
12/21/2020 3:00	2020	0.3	1.2	9.1	0.1	1.0
12/22/2020 1:00	2020	0.3	1.2	8.2	0.1	0.0
12/22/2020 18:00	2020	0.2	0.8	7.3	0.1	0.0
12/23/2020 12:00	2020	0.3	1.2	6.7	0.1	0.0

12/24/2020 13:00	2020	0.3	1.2	5.5	0.1	0.0
12/24/2020 14:00	2020	0.8	3.3	8.7	0.1	0.0
12/24/2020 16:00	2020	0.7	2.9	9.1	0.1	2.3
12/24/2020 18:00	2020	0.5	2.1	9.1	0.1	1.9
12/24/2020 19:00	2020	1.8	7.5	9.1	0.1	7.4
12/24/2020 20:00	2020	2.4	9.9	9.1	0.1	9.8
12/24/2020 21:00	2020	1.4	5.8	9.1	0.1	5.7
12/24/2020 22:00	2020	3.1	12.8	9.1	0.1	12.7
12/24/2020 23:00	2020	3.5	14.5	9.1	0.1	14.4
12/25/2020 0:00	2020	2.9	12.0	9.1	0.1	11.9
12/25/2020 1:00	2020	4.1	17.0	9.1	0.1	16.9
12/25/2020 2:00	2020	3.1	12.8	9.1	0.1	12.7
12/25/2020 3:00	2020	3.9	16.1	9.1	0.1	16.0
12/25/2020 4:00	2020	6.8	28.2	9.1	0.1	28.1
12/25/2020 5:00	2020	4.1	17.0	9.1	0.1	16.9
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12/25/2020 7:00	2020	1.5	6.2	9.1	0.1	6.1
12/25/2020 8:00	2020	1.1	4.6	9.1	0.1	4.5
12/25/2020 14:00	2020	0.5	2.1	9.1	0.1	1.5
12/25/2020 15:00	2020	1	4.1	9.1	0.1	4.0
12/25/2020 16:00	2020	0.2	0.8	9.1	0.1	0.7
12/26/2020 6:00	2020	0.3	1.2	9.0	0.1	0.0
12/26/2020 7:00	2020	0.3	1.2	9.1	0.1	1.0
12/26/2020 22:00	2020	0.2	0.8	8.4	0.1	0.0
12/28/2020 7:00	2020	0.7	2.9	8.1	0.1	0.0
12/28/2020 8:00	2020	0.4	1.7	9.1	0.1	0.5
12/28/2020 9:00	2020	0.3	1.2	9.1	0.1	1.1
12/28/2020 11:00	2020	0.2	0.8	9.1	0.1	0.6
12/28/2020 16:00	2020	0.3	1.2	9.1	0.1	0.7
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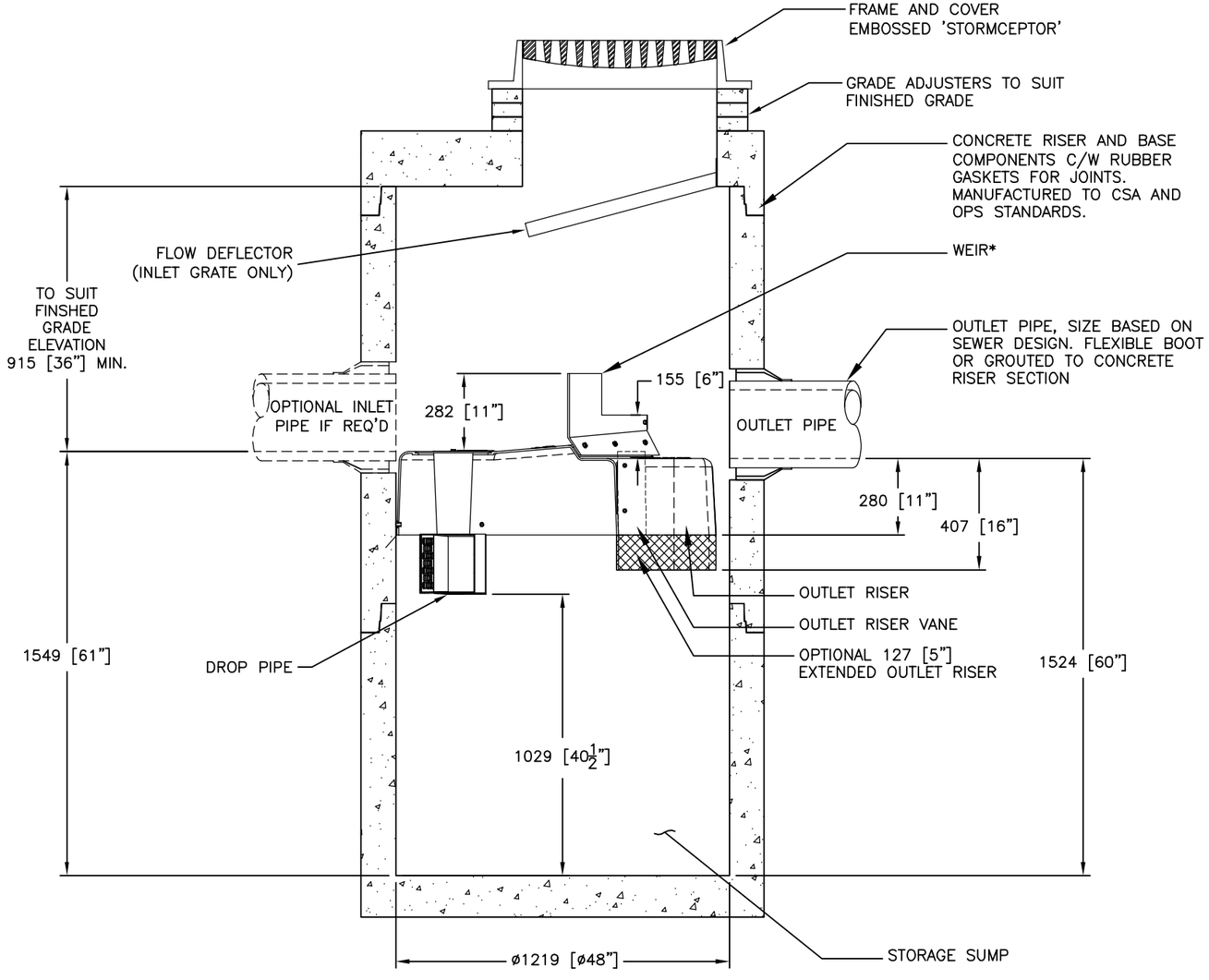
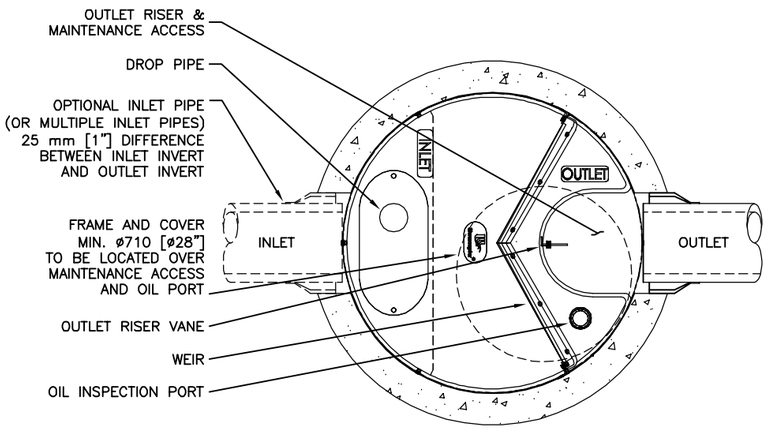
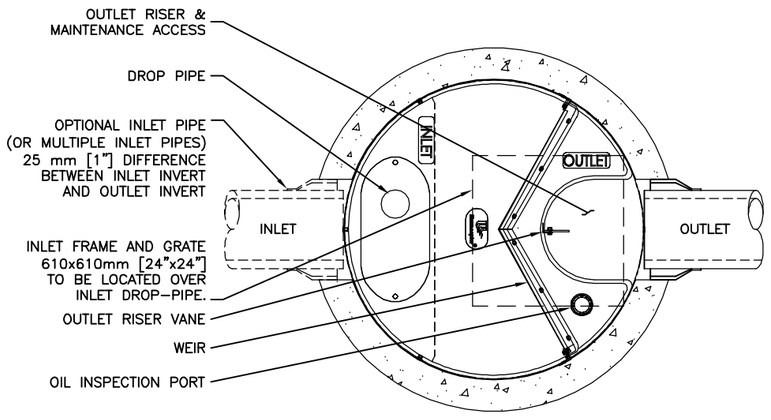
12/30/2020 19:00	2020	0.2	0.8	9.1	0.1	0.6
12/30/2020 21:00	2020	0.4	1.7	9.1	0.1	1.5
12/30/2020 22:00	2020	0.3	1.2	9.1	0.1	1.1
12/30/2020 23:00	2020	0.3	1.2	9.1	0.1	1.1



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

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).

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 EF4 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO4 (OIL CAPTURE CONFIGURATION). WEIR HEIGHT IS 150 mm (6 INCH) FOR EF04.

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

INSTALLATION NOTES

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

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EFO4				
STRUCTURE ID					*
HYDROCARBON STORAGE REQ'D (L)					*
WATER QUALITY FLOW RATE (L/s)					*
PEAK FLOW RATE (L/s)					*
RETURN PERIOD OF PEAK FLOW (yrs)					*
DRAINAGE AREA (HA)					*
DRAINAGE AREA IMPERVIOUSNESS (%)					*
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

MARK	DATE	REVISION DESCRIPTION	BY
####	####	####	####
####	####	####	####
1	6/8/18	UPDATES	JSK
0	5/26/17	INITIAL RELEASE	JSK

Stormceptor® EF

SCALE = NTS

imbrium®
407 FAIRVIEW DRIVE, WHITBY, ON, L1N 9A9
TF 800-565-4501 CA 416-800-9000 INTL +1-416-800-9000

DATE: 10/13/2017

DESIGNED:	DRAWN:
JSK	JSK
CHECKED:	APPROVED:
BSF	SP
PROJECT No.:	SEQUENCE No.:
EFO4	*

SHEET: 1 OF 1

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 OGS POLLUTANT STORAGE

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 LADDERS

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

2.10 INSPECTION

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 GENERAL

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

3.2 HYDROLOGY AND RUNOFF VOLUME

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 ANNUAL (TSS) SEDIMIMENT LOAD AND STORAGE CAPACITY

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 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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

3.8.1 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 PETROLEUM HYDROCARBONS AND FLOATABLES STORAGE CAPACITY

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 SURFACE LOADING RATE SCALING OF DIFFERENT MODEL SIZES

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 PRECAST CONCRETE INSTALLATION

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 EXCAVATION

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.

Stormceptor® FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

01/19/2022

Province:	Ontario
City:	Ottawa
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20
Site Name:	
Drainage Area (ha):	0.50
Runoff Coefficient 'c':	0.90
Particle Size Distribution:	Fine
Target TSS Removal (%):	70.0
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	15.26
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	301 Palladium
Project Number:	210390900
Designer Name:	Ahmed Elsayed
Designer Company:	Morrison Hershfield
Designer Email:	aelsayed@morrisonhershfield.com
Designer Phone:	613-739-2910
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	78
EFO6	88
EFO8	93
EFO10	96
EFO12	98

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 78

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

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

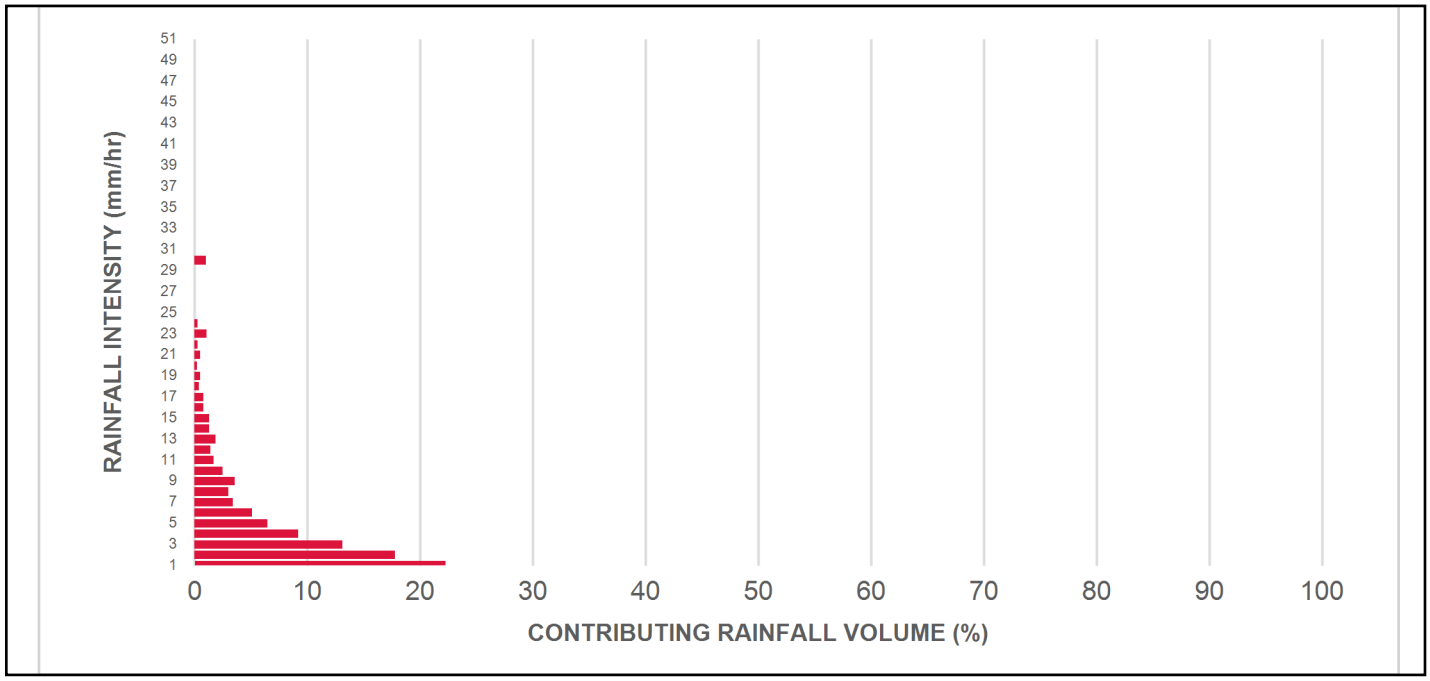
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

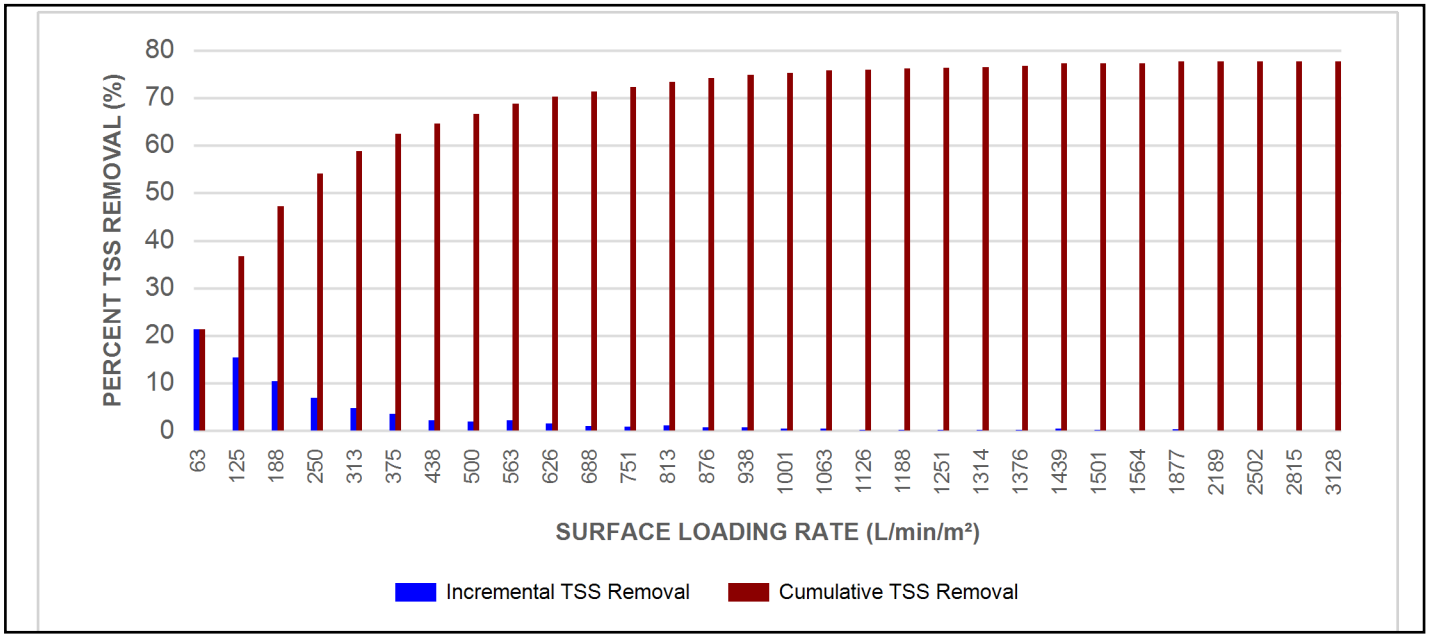
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	22.3	22.3	1.25	75.0	63.0	96	21.4	21.4
2	17.8	40.0	2.50	150.0	125.0	87	15.4	36.7
3	13.1	53.1	3.75	225.0	188.0	80	10.4	47.2
4	9.2	62.4	5.00	300.0	250.0	75	6.9	54.1
5	6.5	68.9	6.26	375.0	313.0	72	4.7	58.8
6	5.1	74.0	7.51	450.0	375.0	70	3.5	62.4
7	3.4	77.3	8.76	525.0	438.0	67	2.3	64.6
8	3.0	80.3	10.01	600.0	500.0	64	1.9	66.6
9	3.6	84.0	11.26	676.0	563.0	62	2.3	68.8
10	2.5	86.5	12.51	751.0	626.0	60	1.5	70.3
11	1.7	88.2	13.76	826.0	688.0	59	1.0	71.3
12	1.4	89.6	15.01	901.0	751.0	59	0.9	72.2
13	1.9	91.5	16.26	976.0	813.0	59	1.1	73.3
14	1.3	92.8	17.51	1051.0	876.0	58	0.8	74.1
15	1.3	94.1	18.77	1126.0	938.0	58	0.7	74.8
16	0.8	94.9	20.02	1201.0	1001.0	57	0.4	75.2
17	0.8	95.7	21.27	1276.0	1063.0	56	0.5	75.7
18	0.4	96.1	22.52	1351.0	1126.0	55	0.2	75.9
19	0.5	96.6	23.77	1426.0	1188.0	53	0.2	76.2
20	0.2	96.8	25.02	1501.0	1251.0	52	0.1	76.3
21	0.5	97.3	26.27	1576.0	1314.0	51	0.3	76.5
22	0.3	97.6	27.52	1651.0	1376.0	49	0.1	76.7
23	1.1	98.7	28.77	1726.0	1439.0	48	0.5	77.2
24	0.3	99.0	30.02	1801.0	1501.0	45	0.1	77.3
25	0.0	99.0	31.28	1877.0	1564.0	44	0.0	77.3
30	1.0	100.0	37.53	2252.0	1877.0	36	0.4	77.7
35	0.0	100.0	43.79	2627.0	2189.0	31	0.0	77.7
40	0.0	100.0	50.04	3002.0	2502.0	27	0.0	77.7
45	0.0	100.0	56.30	3378.0	2815.0	24	0.0	77.7
50	0.0	100.0	62.55	3753.0	3128.0	22	0.0	77.7
Estimated Net Annual Sediment (TSS) Load Reduction =								**78 %**

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

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

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

SCOUR PREVENTION AND ONLINE CONFIGURATION

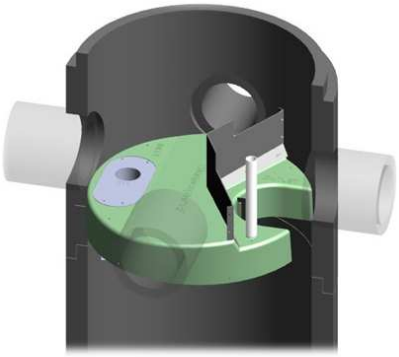
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

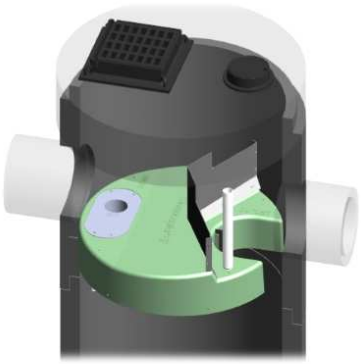
DESIGN FLEXIBILITY

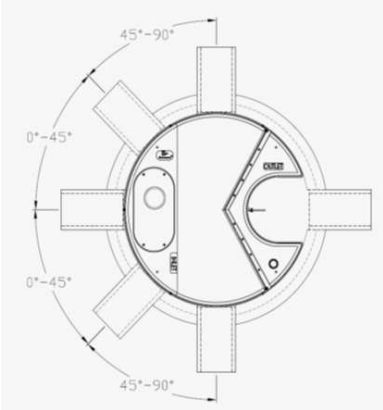
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend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

OIL CAPTURE AND RETENTION

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







INLET-TO-OUTLET DROP

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

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

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

HEAD LOSS

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

Pollutant Capacity

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

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

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

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

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

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

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

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing shall be determined using historical rainfall data 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 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

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

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m2 to 2600 L/min/m2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

Appendix E

Topographic Survey

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

TOPOGRAPHIC SURVEY OF
PART OF LOT 1
CONCESSION 2
GEOGRAPHIC TOWNSHIP OF MARCH
Now CITY OF OTTAWA

SCALE 1 : 200

0 5 10 20 metres

FAIRHALL, MOFFATT & WOODLAND LIMITED
ONTARIO LAND SURVEYORS

ELEVATION NOTES

1. ELEVATIONS SHOWN HEREON ARE REFERRED TO GEODETIC DATUM.
2. ELEVATIONS FOR MANHOLE COVERS AND CATCH BASINS HAVE TO BE INDEPENDENTLY CONFIRMED BEFORE THEY CAN BE ACCEPTED FOR FINAL DESIGN OR CONSTRUCTION PURPOSES.
3. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE JOB BENCHMARK HAS NOT BEEN ALTERED OR DISTURBED AND THAT ITS RELATIVE ELEVATION AND DESCRIPTION AGREE WITH THE INFORMATION SHOWN ON THIS DRAWING.

NOTES

1. BEARINGS HEREON ARE GRID BEARINGS AND ARE DERIVED FROM NCC HORIZONTAL CONTROL 019781001 (N 5015760.708, E 349221.408) AND 019781211 (N 5017695.124, E 349387.227) AND ARE REFERRED TO THE CENTRAL MERIDIAN 76°30'W LONGITUDE, ZONE 9 OF THE 3° M.T.M. ONTARIO COORDINATE SYSTEM (NAD83 ORIGINAL).
2. BOUNDARY SHOWN IS PER PLAN BY FAIRHALL, MOFFATT & WOODLAND LIMITED, O.L.S. DATED OCT. 18, 2011 (REF. 183 – 2 – MARCH).
2. THE SURVEY REPRESENTED BY THIS PLAN WAS COMPLETED ON JUNE 09, 2015.

UTILITY NOTES

1. THIS DRAWING CANNOT BE ACCEPTED AS ACKNOWLEDGING ALL OF THE UNDERGROUND UTILITIES AND IT WILL BE THE RESPONSIBILITY OF THE USER TO CONTACT THE RESPECTIVE UTILITY AUTHORITIES FOR CONFIRMATION OR LOCATION.
2. UNDERGROUND UTILITIES, AS REPORTED ON THIS DRAWING, ARE NOT BASED ON AN ACTUAL 'FIELD LOCATE' BY THE RESPECTIVE UTILITY AGENCIES BUT HAVE BEEN COMPILED FROM DATA OBTAINED FROM THE FOLLOWING SOURCE:
   a) CITY OF OTTAWA PUBLIC UTILITY REGISTRY
3. BEFORE ANY WORK INVOLVING PROBING, EXCAVATING, ETC., A FIELD LOCATION OF UNDERGROUND PLANT BY THE PERTINENT UTILITY AUTHORITY IS MANDATORY.

LEGEND

(NCC)	– NATIONAL CAPITAL COMMISSION		– CONIFEROUS TREE
DIA.	– DIAMETER		– DECIDUOUS TREE
INV.	– INVERT		– SHRUB
PIN	– PROPERTY IDENTIFIER NUMBER	—W—	– WATERMAIN
CB	– CATCH BASIN	—UH—	– UNDERGROUND HYDRO
MH	– MANHOLE	—UB—	– UNDERGROUND BELL
WMH	– WATER MANHOLE	—ST—	– STORM SEWER
TMH	– TRAFFIC WATER MANHOLE	—S—	– SANITARY SEWER
LS	– STEEL LAMP STANDARD		– CURB
FH	– FIRE HYDRANT		
WV	– WATER VALVE		
	– MONITORING WELL		
	– CONCRETE LAMP STANDARD		
	– GUY WIRE AND ANCHOR		
	– BOLLARD		
	– SIGN		

THIS IS NOT A VALID COPY UNLESS EMBOSSED WITH SEAL

Fairhall Moffatt & Woodland LIMITED OTTAWA
ONTARIO LAND SURVEYORS
Surveying and Land Information Services
100–600 TERRY FOX DRIVE, KANATA, ONTARIO K2L 4B6
TEL: (613) 591–2580 FAX: (613) 591–1495
www.fmw.on.ca

JOB No. V18200
E 351234, N 5018003
REFERENCE No. 183 (a) – 2 – MARCH
S:\JOBS\V18200\DWGS 2015–06–22
TP182V.DWG (nj)

Appendix F

MECP, RVCA and City of Ottawa Specific Requirements Correspondence

December 8, 2021

Pre-Consultation Follow-up Meeting Notes

Site Address: 301 Palladium Drive
Location: Virtual - Microsoft Teams
Meeting Date: November 23, 2021

Attendees: Colette Gorni – Planner, City of Ottawa
Santosh Kuruvilla – Project Manager (Infrastructure), City of Ottawa
Patrick McMahon – Project Manager (Transportation), City of Ottawa
Mark Richardson – Planning Forester, City of Ottawa
Jeff Goettling – Planner (Parks), City of Ottawa
Jeffrey Ren – Co-op Student, City of Ottawa
Erica Ogden – MVCA
Robert Webster – Applicant
Michael Wright – Applicant
Ralph Wiesbrock – KWC Architecture
Ahmed Elsayed – Morrison Hershfield
Gino Aiello – GJA Landscape Architecture

Regrets: Sami Rehman – Planner (Environmental), City of Ottawa

Applicant's Comments:

1. To applicant is proposing to revise the previously approved site plan for 301 Palladium Drive; the concept for the building has changed slightly, as have the architectural expression and building footprint
2. Outdoor terrace areas have been added; garbage disposal has been changed to earth bins closer to the building; and the stormwater cistern that was previous proposed has been removed
3. The main proposed use is now a dental practice; a small coffee shop may also be proposed
4. The applicants intend to rely on previously submitted Geotechnical Reports and TCRs; civil servicing for the site and landscaping have changed and new studies and plans will be submitted

Planning

1. Please note that there are a number of uses that are prohibited in the IL5 subzone – see Section 204(5) of the Zoning By-law.
    a. It is noted that one of these prohibited uses, "personal service business", is identified as a use in the site statistics chart on the provided concept plan.

   b. A dentist office is considered a “medical facility” in the Zoning By-law, which is a permitted use on the site.

   c. A restaurant is permitted subject to a number of conditions (i.e. cannot exceed 300 square metres of gross floor area) – see Section 203(a)-(d).

2. Refer to Section 110(3) of the Zoning By-law for provisions related to outdoor garbage/recycling areas contained within or accessed through a parking lot. Please note the following provisions apply:

   a. located at least 9.0 metres from a lot line abutting a public street;

   b. located at least 3.0 metres from any other lot line; and

   c. screened from view by an opaque screen with a minimum height of 2.0 metres.

   d. where an in-ground refuse container is provided, the screening requirement of Section (3)(c) above may be achieved with soft landscaping. (By-law 2020-299)

3. Please provide parking at the rates specified for Area C in Section 101 of the Zoning By-law:

   a. Restaurant - Fast Food - 10 per 100 m^2 of gross floor area

   b. Medical Facility - 4 per 100 m^2 of gross floor area

4. Please note that the Shared Parking Provisions (Section 104) may be applicable to the proposed development depending on the number and type of tenants in building.

5. Please consider locating the bicycle parking spaces closer to the building entrances.

6. A Site Plan Control Revision - Standard application will be needed to permit the proposed development

7. Fees and forms for the above mentioned applications can be found here

8. Please note that development application fees may have changed by the time an application has been submitted, please consult the City’s website for the most up to date fees

9. Application fees are not required to be paid at the time of submission. Upon receipt of the application, the assigned planner will provide a file number and instructions for payment via email. However, the expectation is that the fees will be paid prior to the end of the initial circulation period; comments may be withheld if not received. For more information, the online application submission procedures can also be found here.

10. You are encouraged to contact the Ward Councillor, Councillor Allan Hubley, at Allan.Hubley@ottawa.ca about the proposal.

Please contact Colette Gorni, Planner, at Colette.Gorni@ottawa.ca if you have any questions or require additional information relating to the comments above.

Urban Design

1. A design brief is required. A terms of reference is attached.

Engineering

1. The Servicing Study Guidelines for Development Applications are available at the following link: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans
2. Record drawings and utility plans are available for purchase from the City's Information Centre. Contact the City's Information Centre by email at informationcentre@ottawa.ca or by phone at (613) 580-2424 x44455
3. Stormwater quantity control criteria – control the 100-year flow to 5-year. The release rate is to be computed using of C=0.5 and the Tc computed but no less than 10 minutes.
4. Private sanitary sewer is available on private street to make service connection.
5. Private watermain is available on private street to make service connection.
6. Stormwater quality control – Consult with the Conservation Authority (MVCA) for their requirements. Include the correspondence with MVCA in the stormwater/site servicing report.
7. Please note that as per Technical Bulletin PIEDTB-2016-01 section 8.3.11.1 (p.12 of 14) there shall be no surface ponding on private parking areas during the 2-year storm rainfall event. Depending on the SWM strategy proposed underground or additional underground storage may be required to satisfy this requirement.
8. Please note that the minimum orifice dia. for a plug style ICD is 83mm and the minimum flow rate from a vortex ICD is 6 L/s in order to reduce the likelihood of plugging.
9. Please provide an Existing Conditions/Removals Plan as part of the engineering drawing set. Any existing services are to be removed or abandoned in accordance with City standards.
10. As per the City of Ottawa Slope Stability Guidelines for Development Applications an engineering report is required for any retaining walls proposed

1.0 m or greater in height within the subject site that addresses the global stability of the wall and provides structural details. A Retaining Wall Stability Analysis Report and Retaining Wall Structural Details are required to be provided from a Professional Engineer licensed in the Province of Ontario that demonstrates the proposed retaining wall structure has been assessed for global instability as per City standards. Please ensure the analysis and required documentation are provided as part of the submission to address this comment.

11. Emergency routes will need to be satisfactory to Fire Services. Please show fire routes on the site plan. For information regarding fire route provisions, please consult with Kevin Heiss at kevin.heiss@ottawa.ca.
12. Clearly show and label the property lines on all sides of the property.
13. Clearly show and label all the easements (if any) on the property, on all plans.
14. When calculating the post development composite runoff coefficient (C), please provide a drawing showing the individual drainage area and its runoff coefficient.
15. When using the modified rational method to calculate the storage requirements for the site, the underground storage should not be included in the overall available storage. The modified rational method assumes that the restricted flow rate is constant throughout the storm which, in this case, underestimates the storage requirement prior to the 1:100-year head elevation being reached. Alternately, if you wish to include the underground storage, you may use an assumed average release rate equal to 50% of the peak allowable rate. Otherwise, disregard the underground storage as available storage or provide modeling to support the design.
16. Engineering plans are to be submitted on standard A1 size (594mm x 841mm) sheets.
17. Phase 1 ESA and Phase 2 ESA must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.
18. Provide the following information for water main boundary conditions:
    a. Location map with water service connection location(s).
    b. Average daily demand (l/s).
    c. Maximum daily demand (l/s).
    d. Maximum hourly demand (l/s).
    e. Fire flow demand (provide detailed fire flow calculations based on Fire Underwriters survey (FUS) Water Supply for Public Fire Protection).

Exposure separation distances shall be defined on a figure to support the FUS calculation and required fire flow (RFF).

f. Hydrant capacity shall be assessed to demonstrate the RFF can be achieved. Please identify which hydrants are being considered to meet the RFF on a fire hydrant coverage plan as part of the boundary conditions request.

19. If you are proposing any exterior light fixtures, all must be included and approved as part of the site plan approval. Therefore, the lights must be clearly identified by make, model and part number. All external light fixtures must meet the criteria for full cut-off classification as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and must result in minimal light spillage onto adjacent properties (as a guideline, 0.5 fc is normally the maximum allowable spillage). In order to satisfy these criteria, the applicant must provide certification from an acceptable professional engineer. The location of all exterior fixtures, a table showing the fixture types (including make, model, part number), and the mounting heights must be included on a plan.

20. As per Ottawa Sewer Design Guideline section 4.4.4.7, a monitoring maintenance hole shall be required just inside the property line for all non-residential and multi residential buildings connections from a private sewer to a public sewer. See the sewer use By-law 2003-514(14) monitoring devices for details.

Please contact Infrastructure Project Manager Santosh Kuruvilla at Santosh.Kuruvilla@ottawa.ca if you have any questions or require additional information relating to the comments above.

Forestry

Planning Forester - TCR requirements:

1. A Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City
2. An approved TCR is a requirement of Site Plan approval.
3. The TCR may be combined with the LP provided all information is supplied
4. As of January 1 2021, any removal of privately-owned trees 10cm or larger in diameter, or publicly (City) owned trees of any diameter requires a tree permit issued under the Tree Protection Bylaw (Bylaw 2020 – 340); the permit will be based on an approved TCR and made available at or near plan approval.
5. The Planning Forester from Planning and Growth Management as well as foresters from Forestry Services will review the submitted TCR

6. If tree removal is required, both municipal and privately-owned trees will be addressed in a single permit issued through the Planning Forester
7. Compensation may be required for the removal of city-owned trees – if so, it will need to be paid prior to the release of the tree permit
8. The TCR must list all trees on site, as well as off-site trees if the CRZ extends into the developed area, by species, diameter and health condition
9. Please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)
10. The TCR must list all trees on adjacent sites if they have a critical root zone that extends onto the development site
11. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained
12. All retained trees must be shown and all retained trees within the area impacted by the development process must be protected as per City guidelines available at Tree Protection Specification or by searching Ottawa.ca
13. The location of tree protection fencing must be shown on a plan
14. Show the critical root zone of the retained trees
15. If excavation will occur within the critical root zone, please show the limits of excavation
16. The City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
17. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca or on City of Ottawa

Please contact Planning Forester Mark Richardson at Mark.Richardson@ottawa.ca if you have any questions or require additional information relating to the comments above.

Forestry Services - LP tree planting requirements:

18. Minimum Setbacks:
    a. Maintain 1.5m from sidewalk or MUP/cycle track.
    b. Maintain 2.5m from curb
    c. Coniferous species require a minimum 4.5m setback from curb, sidewalk or MUP/cycle track/pathway.

d. Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing.

e. Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

19. Tree specifications:

a. Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.

b. Maximize the use of large deciduous species wherever possible to maximize future canopy coverage

c. Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and include watering and warranty as described in the specification (can be provided by Forestry Services).

d. Plant native trees whenever possible

e. No root barriers, dead-man anchor systems, or planters are permitted.

f. No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

20. Hard surface planting:

a. Curb style planter is highly recommended

b. No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.

c. Trees are to be planted at grade

21. Soil Volume

a. Please ensure adequate soil volumes are met:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

**Please note that these soil volumes are not applicable in cases with Sensitive Marine Clay.*

22. Sensitive Marine Clay

    a. Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines

Please contact Adam Palmer, Forester, at Adam.Palmer@ottawa.ca if you have any questions or require additional information relating to the comments above.

Parks

1. Cash-in-lieu of Parkland is to be provided at a rate of 2% of the gross land area being developed, as per the Parkland Dedication By-law 2009-05. The applicant will also be required to pay the $565 appraisal fee.

Please contact Jeff Goetlling, Parks Planner, at Jeff.Goettling@ottawa.ca if you have any questions or require additional information relating to the comments above.

Transportation

1. Follow Traffic Impact Assessment Guidelines
    a. Please submit a screening form.
    b. If a TIA is triggered, the application will not be deemed complete until the submission of the draft step 1-4.
2. While not required, consider a noise review or extra sound insulation for the patio.
3. Upgrade sidewalk along the site frontage.
4. On site plan:
    a. Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
    b. Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions).
5. As the proposed site is commercial/institutional/industrial and for general public use, AODA legislation applies.
6. Palladium Drive has a protected right of way of 37.5m along the development's frontage. Show this on the plan and measure all setbacks from this line.

Please contact Patrick McMahon, Transportation Project Manager, at Patrick.McMahon@ottawa.ca if you have any questions or require additional information relating to the comments above.

MVCA

1. The subject property is not regulated by MVCA under Ontario Regulation 153/06.
2. The water quality requirement for the site is a normal level of protection, 70% total suspended solids removal.
3. The subject property is located within the Carp River Watershed Subwatershed Study area which identifies the site as a low groundwater recharge area. The infiltration target is 73mm/yr. Given the proposal is a revision to an existing approved Site Plan which did not require infiltration, MVCA recommends that infiltration measures be incorporate to the revised stormwater design to the extent feasible.

Please contact the MVCA's Planner, Erica Ogden, at eogden@mvc.on.ca if you have any questions or require additional information relating to the comments above.

Environmental Planning

1. No comments.

Please contact Sami Rehman, Environmental Planner, at Sami.Rehman@ottawa.ca if you have any questions or require additional information relating to the comments above.

Next Steps

Please refer to the links to Guide to preparing studies and plans and fees for further information. Additional information is available related to building permits, development charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

Please do not hesitate to Colette Gorni, at Colette.Gorni@ottawa.ca if you have any questions.

Boundary Conditions
301 Palladium Drive

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	12	0.20
Maximum Daily Demand	18	0.30
Peak Hour	32	0.54
Fire Flow Demand #1	4,236	70.60

Location

Results

Connection 1 – Palladium Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	161.3	85.7
Peak Hour	156.5	78.9
Max Day plus Fire 1	156.6	79.0

Ground Elevation = 101.0 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.

Lawrence Erion

From: "Fraser, Mark" <Mark.Fraser@ottawa.ca>
Date: August-27-15 2:42 PM
To: <erion@sympatico.ca>
Cc: "Bob Webster" <rwebster@rogers.com>; "Ralph Wiesbrock" <rwiesbrock@kwc-arch.com>
Attach: image001.jpg; image003.jpg; 301 PALLADIUM 14-290 AUG 24 2015-SSG-1.pdf; scan0006.pdf; Boundary Conditions at 301 palladium dr.docx
Subject: RE: 301 Palladium - Request for Boundary Conditions EA 14-288

Hi Lawrence,

Please find below water distribution network boundary condition results for hydraulic analysis as requested for the 200mm dia. private watermain in the common element road block based on the provided anticipated water demand and fire flow demand requirements.

Water Demand and Fire Flow Requirements:

Proposed Development Location: 301 Palladium Drive
Average Daily Demand = 0.2 L/s
Max Daily Demand = 0.3 L/s
Peak Hour Demand = 0.54 L/s
Fire Flow = 83 L/s

City of Ottawa Watermain Boundary Conditions:

Specified Service Connection Point: 200mm dia. Private Watermain in the Common Element Road Block
Max HGL = 162.9m
PKHR = 155.0m
MXDY+Fire =155.1 m

Please refer to City of Ottawa, *Ottawa Design Guidelines – Water Distribution*, First Edition, July 2010, WDG001 Clause 4.2.2 for watermain pressure and demand objectives.

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

ERION ASSOCIATES
consulting civil engineers

D07-12-15-0147

SITE SERVICING & STORMWATER MANAGEMENT

DESIGN BRIEF

PROPOSED ONE STOREY COMMERCIAL BUILDING

at

301 PALLADIUM DRIVE, KANATA,ON,K2K 2A3

by

301 PALLADIUM LTD.
4015 CARLING AVE, SUITE 201
KANATA, ONTARIO
K2K 2A3

Prepared by
ERION ASSOCIATES
PROJECT EA 14-288
OCTOBER, 2015
REV. APRIL, 2016
REV. NOVEMBER, 2016

Submitted in support of an application for Site Plan Approval to the City of Ottawa, Planning and Growth Management Department.

Reference Drawings

SITE SERVICES & GRADING PLAN	SSG-1
PROFILES & SEDIMENT CONTROL	PRSC-2
STORM DRAINAGE AREA PLAN	SDA-3

1 beckwith st.east, perth, ontario k7h1b2
613-267-1693

October, 2015
Rev. April, 2016

EA 14-288

SITE SERVICEABILITY BRIEF

for

PROPOSED ONE STOREY COMMERCIAL BUILDING
301 PALLADIUM DR., KANATA (OTTAWA) ONTARIO

TABLE OF CONTENTS

SITE SERVICES & STORMWATER MANAGEMENT
DESIGN BRIEF

October, 2015
Rev. April, 2016

EA 14-288

PROJECT: PROPOSED ONE STOREY COMMERCIAL BUILDING (CITANT PALLADIUM)
LOCATION: 301 PALLADIUM DRIVE, KANATA, OTTAWA, K2K 2A3

1. GENERAL
   This report outlines design considerations and calculations to supply water, wastewater and storm drainage connections to existing private infrastructure that connects to City infrastructure located on Palladium Drive, together with on-site stormwater collection and management systems for development of a vacant parcel of land that is part of Kanata Corporate Business Park and was originally planned for a 4 storey office building.
2. SITE DESCRIPTION
   2.1 Location: An irregular shaped 3-sided parcel having 101.69 m frontage on the east side of Palladium Drive from approximately 60 m southwest of the southwest corner of Palladium Dr./Terry Fox Dr. intersection to the intersection of a private road at 190 m from Terry Fox Dr.
   2.2 Site Area: 0.496 ha.
   2.3 Adjacent Lands: West boundary fronts on Palladium Dr.
   South boundary along the centre line of a private road (no name)
   Easterly boundary adjacent to #580 Terry Fox Drive, a multi-level office complex with a shared access lane (former Kanata City Hall).
   2.4 Site Conditions:
   2.4.1 Topography
   This site is the vacant remainder of a previous commercial/industrial plan (1990). Existing elevations and surface features are shown in detail on a Topographical Survey Plan by Fairhall, Moffat and Woodland, O.L.S. (survey completed June 9, 2015). together with City topo mapping (FIGURE 2)of the surrounding area (2004)
   2.4.2 Geotechnical
   A geotechnical investigation report (October, 2015) by D.S.T. Consulting Engineers Inc. indicates that the site is underlain by sandy, gravelly fill (avg. 1.25 m thick) above stiff to firm silty clay above glacial till with inferred bedrock between 3.6 and 5.5 m below the surface. Based on the above, no bedrock excavation is anticipated for on-site services trenching excavation and/or building construction.
   2.5 Existing Infrastructure
   In 1989/1990 this site was defined as Phase 'C' of the KCBP and complete sewer and water infrastructure was installed along the private roadway and along the east side of the site to service the building of Phase 'B' (580 Terry Fox Dr.) as well as proposed future Phase 'C' with an identical multi-level building. The site area for Phase 'C' was 0.68 ha but was later severely reduced by 0.19 ha to the present total area of 0.49 ha. This was due to a large road widening and realignment on Palladium Drive in 2002/03 by R.M.O.C. as part of the widening and reconstruction of Terry Fox Dr., including the Palladium Dr. intersection.

   The existing Private Road infrastructure is all connected to the original City sewer and water lines on Palladium Dr.
   There are presently no connections from the subject site to existing private water and sanitary sewer mains.

2.6 Site Drainage

Currently, 66% of the site runoff is collected along the south boundary where it flows over the curb to catchbasins in the private road. The remaining 34% is collected by 2 catchbasins on the easterly side of the site along with adjacent access road and parking areas also servicing 580 Terry Fox Dr.

2.7 Wire Utilities

Underground Hydro is located on an easement within the site close to the private roadway along the south boundary.

Street lighting with underground hydro is also located within the site along the south boundary.

These underground facilities will remain within the site and will not require relocation.

Underground Bell is present along the west boundary on Palladium Dr. close to the property line. Underground Rogers Cable is located along the far side of Palladium Dr.

2.8 Natural Gas

A 100 mm gas line is located along the far side of Palladium Drive. No information is available at the present time on the possibility that a gas line is present along the private access corridor, but none is known to exist within the presently vacant site

3. PROPOSED DEVELOPMENT

The proposed development of a single storey commercial building having a footprint of 599 sq. m plus exterior patio of 185 sq. m along with a parking area for 70 cars and perimeter landscaping is proposed over an area of 4570 sq. m. out of 4960 sq. m of the total site.

It is proposed to connect the building to existing watermain and sanitary sewer at the south boundary. Stormwater runoff from the development area of the site will be directed to the east boundary storm sewer (5.8%) via 2 existing uncontrolled catchbasins with minor relocation and 94.2% to the existing south boundary storm sewer after being controlled to a maximum release rate equivalent to a 5 year storm event.

The design takes advantage of existing topography to minimize site re-grading along with the routing of on-site storm sewer flow through chamber space created below the extensive outdoor patio areas that will serve to provide detention storage for all building roof and parking area runoff and allow release at a 1:5 yr. storm rate for all storms up to 1:100 yr. return frequency.

The design will reduce existing uncontrolled runoff from the proposed development area to the east boundary storm sewer by 35% while controlling runoff to a 5 yr. level into the south boundary private storm sewer within the capacity of the existing 300 dia. pipe.

4. WATER SUPPLY

The proposed site located in Pressure District 3W is completely surrounded by a looped watermain system adjacent to the 3 sides. It is proposed to connect the building with a 150 mm to the existing 200 mm dia. watermain along the private road. This will allow for a sprinkler system to be installed in the building.

From the calculations in Appendix 'A', it is noted that the building will require a pressure reducing valve (PRV) to reduce static pressure in the building below 552 kPa (80 psi).

Fire Hydrant HO23 on Palladium Dr. is 25 m from the building entry at the northwest corner while Hydrant HP070 is located 76 m from the main building entry at the southeast corner.

Calculations for both hydrants indicate that there is adequate capacity (residual pressure) to meet the fire flow shown in summary of demand flow as follows:

Avg. Daily Demand (Commercial)	0.2 L/sec.
Avg. Day	0.3 L/sec.
Max. Hour	0.54 L/sec.
Fire Flow Demand (per F.U.S.)	67 L/sec.

5. WASTEWATER

This site is part of Kanata Business Park that has a 200 mm dia. private sanitary sewer system that connects to the City system on Palladium Dr. (250 dia.) at elevation 97.6 m ± (invert). The 250 dia. City sewer then drains to the intersection of Silver Seven Dr. where it drops from inv. 94.8 to a 375 dia. pipe (invert 92.0) before travelling northerly approximately 1.2 km to the Signature Ridge pumping station inlet (600 dia. invert 87.5)

With proposed basement floor set at 100.90, the building is therefore (100.9 – 92.4) = 8.5 m higher than the upper end of the gravity sewer at Silver Seven Dr. where the ground elevation is 97.2 (3.7 m below basement).

Referring to Dwg. 8909-SAN 1 by Novetech titled 'SANITARY DRAINAGE AREA' depicting the same Private Road sanitary sewer configuration as exists today, the design flow in the 200 dia. downstream sewer connecting to the City sewer can be summarized from the design data listed as follows:

Total Equivalent Population	= 391 persons
Total Average Daily Flow	= 2.03 L/s
Total Drainage Area	= 3.91 ha.
Therefore, total peak hour flow	= 2.03 x 1.5 = 3.05 L/s
plus infiltration allowance = 3.91 ha. x 0.28 L/s/ha.	= 1.09 L/s
	4.14 L/s

Capacity of existing 200 dia. @ 1.9% = 47 L/s (V_F = 1.4 m/s)

The 1989 design proposed a total of 5 commercial buildings that included a building on the subject site identical to the adjacent 4 storey office (580 Terry Fox Dr.). To date, 3 separate buildings have been constructed to fill 4 original sites with only the current 0.5 ha. site remaining vacant.

With reference to Appendix 'B', the proposed building will be connected to the existing private sewer with a 200 dia. lateral service direct to an existing sanitary manhole that will permit monitoring of flow from the proposed building.

6. STORM DRAINAGE

The original design of Kanata Corporate Business Park is depicted on Dwg. 8909-STM 1 STORM DRAINAGE AREA by NOVATECH(Rev. 1, June 1, 1989 Issued for M.O.E. approval). The drawing indicates that a total area of 4.52 ha., including the subject site, and a 'C' value of 0.65 was the basis for design of the private system that is connected to City sewer on Palladium Dr. approximately 50 m south-westerly from the intersection of Palladium Dr. and Private Road. Alignment of Private Road storm sewers were constructed as shown on the original plan as were the first two buildings. The third building site (0.5 ha.) is the vacant site property and proposed buildings 4 and 5 were combined into a single larger building (#333 Palladium Dr.). The downstream portion of the private system was shortened to accommodate the change but is connected to the 675 mm dia. City sewer on Palladium Dr. at the originally specified location.

Measuring from City topo mapping (2004),(FIGURE 1 App. 'E'), it appears that the current area of KCBP is actually 3.8 ha. after taking account 0.4 ha. of road widening along the entire Palladium Dr. frontage resulting in 4.2 ha. for the original area. Additionally, a further 0.95 ha. of this drainage catchment has been constructed along the southerly boundary of the KCBP to outlet directly to the trunk storm sewer along Silver Seven Rd. This results in a reduced catchment area of only 3.8 – 0.95 = 2.85 ha. to be served by the existing Private Road storm sewer system (37% less than the original design area of 4.52 ha).

The proposed design will collect surface and roof runoff from 89% of the total site development into an on-site storm sewer system for discharge to a 300 dia. sewer on the Private Road at the southwest boundary . 11% of site runoff will remain tributary to the existing 375 dia. pipe along the easterly boundary. This represents a 35% reduction in runoff to the easterly boundary sewer (Ref. Dwg. SDA-1, Runoff Distribution Tables).

Post-development storm sewer design using the Rational Method formula is detailed on the attached Hydraulic Design Sheet using data summarized in tabular form on Dwg. SDA-3 for a 1:5 yr. storm return frequency. This site is tributary to the Carp River and the route is summarized as follows:

LOCATION OF CONNECTION	DISTANCE (m)	PIPE DIA. (mm)	INVERT (m)	SURFACE (m)
ST 101 (PRIVATE ROAD)		300 (PRIV.)	98.6	101.3
	14			
MH ST 12440 (PRIVATE ROAD)		525 (PRIV.)	98.28	100.7
	103			
MH ST 40463 (PALLADIUM DR.		675 (CITY)	96.4	99.5 ±
	112			
MH ST 12249 (SILVER SEVEN DR.)		750 (CITY) 900 1050	95.5	97.2
	327			
MH ST 40454 (MAPLE GROVE RD.)		1200 (CITY)	94.25	96.9
	250±			
CARP RIVER @ MAPLE GROVE RD.		OPEN CHANNEL		94.5 (1:100 YR. FLOOD)

This site is located at a high elevation in relation to the City storm sewer system that discharges to an open channel before entering the Carp River. With basement elevation at 100.9, it is 3.8 m above the top of City storm sewer at point of connection on Palladium Dr. and 5.4 m above sewer obvert at pipe outlet to the open channel. Any potential surcharging in the Silver Seven Rd. trunk sewer cannot exceed elevation 97.2 (3.7 m below basement floor) at the intersection with Palladium Dr. when it will flow overland to the Carp River.

7. STORMWATER MANAGEMENT

89% of site runoff will be controlled by routing parking lot plus building roof runoff through a concrete chamber below the patio area at the southwest corner of the proposed building where it will be detained by a restrictive orifice in MH ST102 before being released to the private roadway storm sewer. The maximum release rate is set at 33.5 L/s (1:100 Yr. storm) which is less than the inlet capacity of a single catchbasin.
Refer to Appendix 'D' for detailed calculations of maximum release rate, storage volume required and provided and sizing of the ICD orifice restriction in MH ST102.
Foundation drainage for the building must be connected immediately downstream of MH ST102.
The choice of routing storm runoff through a storage chamber below the patio was made to seize the opportunity presented by a combination of site topography, grading design, landscaping and building design.

8. SEDIMENT CONTROL

Construction of this project will involve minor cutting and filling to permit surface runoff from the parking area to be directed south to the storm sewer collection system without escape to the east boundary access lane where a profile low point occurs directly opposite the ramp down to underground parking at 580 Terry Fox Dr. However, there will be total disturbance of the existing ground to remove topsoil and excavate for granular base as well as for relatively shallow trenching for sewer and water piping.
It is most important that a silt fence be maintained as shown and specified on the drawing during the entire construction period with vehicle access limited at all times to one of the two alternative locations shown on the plan. Street cleaning and flushing will also be required at regular intervals as needed.
Refer to Dwg. PRSC-2 for a text of all B.M.P. requirements to control and capture sediment transport during construction.

9. SUMMARY

9.1 There is adequate capacity and pressure in the surrounding private water distribution system to provide the expected demand and fire protection for the proposed commercial development.

9.2 A pressure reducing valve (PRV) will be required in the building to restrict interior system pressures below 80 psi.

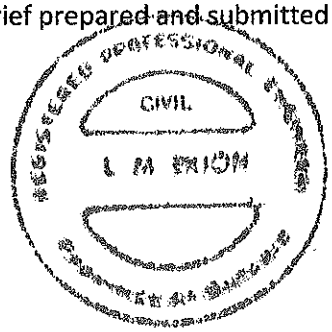
9.3 There is adequate capacity in the receiving private sanitary sewer system and downstream municipal system for the low demand from the proposed development which is at a lower intensity than was originally planned for this site in the Kanata Corporate Business Park.

9.4 Design of the storm drainage and S.W.M. system reduces site runoff to the eastern boundary access while controlling nearly 89% of site runoff to the City standard of 1:5 yr. storm event before discharging into the existing private storm sewer system that was designed to include this site as part of a larger area of drainage catchment than exists today.

9.5 Design of the S.W.M. system uses an arrangement for detention storage to utilize the space below an outside patio structure that would otherwise require filling with compacted granular material to support the patio deck.

9.6 Due to the position of this site in relation to surrounding topography and elevation of the downstream City sewer and road systems, it is a virtual certainty that this site will not be subject to flooding from downstream sewer surcharging or from the Carp River during major storm events beyond the 100 year level.

Design Brief prepared and submitted by



Lawrence Erion, P.Eng.

OCTOBER, 2015
(REV. APRIL, 2016)

EA 14-288

APPENDIX 'A'

WATER SUPPLY CALCULATIONS

6 pages

April/2016
301 Palladium Dr.
Appendix 'A' EA 14-288

Water Analysis for 301 Palladium Dr.

Boundary condition provided by City of Ottawa on Palladium Dr. adjacent to site

Max HGL	162.9 m
PXHR	155.0 m
MXDY + Fire*	155.1 m

* based on required fire flow 83.3 L/s (Rev. to 67.0 L/s/see P. 6 of 6 App. 'A')

Elevations

Proposed Building Basement Floor	100.90 m
Finished Floor	103.50 m
Road elevation at site hydrant	104.0 HP 069 (PRIVATE RD.)
	103.4 H 033 (PALLADIUM DR.)

Maximum Pressure at Building

Max HGL elevation	162.90 m	
Basement Floor	100.90 m	
Difference	62.00 m	
Pressure	607.9 kPa	(88.2 psi)

Pressure Reducing Valve (PVR) required as max. pressure exceeds 552 kPa (80 psi)

Minimum Pressure at Building

PKHR elevation	155.00 m	
Finished Floor	103.50 m	
Difference	51.50 m	
Pressure	504.9 kPa	(73.2 psi)

Minimum pressure exceeds minimum required value of 276 kPa (40 psi)

Fire Flow at Site Hydrant(s)

	HP 069	H 033
MXDY + Fire elevation	155.10 m	155.10 m
Hydrant elevation	104.0 m	103.4 m
Difference	51.10 m	51.7 m
Pressure	500.8 kPa	506.7 kPa
	72.6 psi	73.4 psi

For fire flow of 83.3 L/s (or 67.0 L/s) residual pressure at hydrant exceeds minimum requirement of 140 kPa (20 psi)

Lawrence Erion

From: "Fraser, Mark" <Mark.Fraser@ottawa.ca>
Date: August-27-15 2:42 PM
To: <erion@sympatico.ca>
Cc: "Bob Webster" <rwebster@rogers.com>; "Ralph Wiesbrock" <rwiesbrock@kwc-arch.com>
Attach: image001.jpg; image003.jpg; 301 PALLADIUM 14-290 AUG 24 2015-SSG-1.pdf; scan0006.pdf; Boundary Conditions at 301 palladium dr.docx
Subject: RE: 301 Palladium - Request for Boundary Conditions EA 14-288

Hi Lawrence,

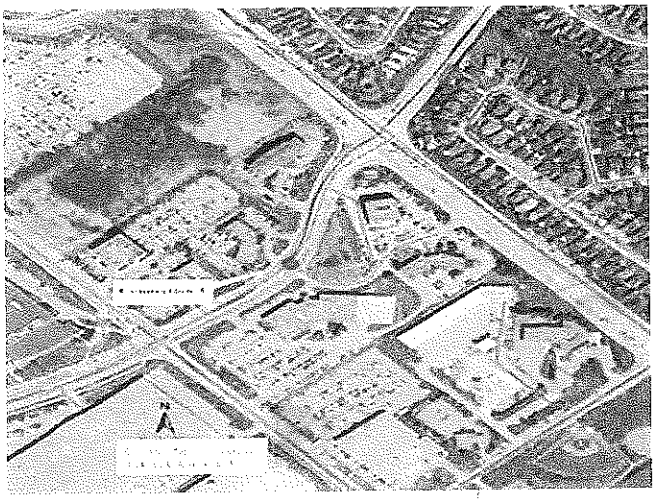
Please find below water distribution network boundary condition results for hydraulic analysis as requested for the 200mm dia. private watermain in the common element road block based on the provided anticipated water demand and fire flow demand requirements.

Water Demand and Fire Flow Requirements:

Proposed Development Location: 301 Palladium Drive
Average Daily Demand = 0.2 L/s
Max Daily Demand = 0.3 L/s
Peak Hour Demand = 0.54 L/s
Fire Flow = 83 L/s

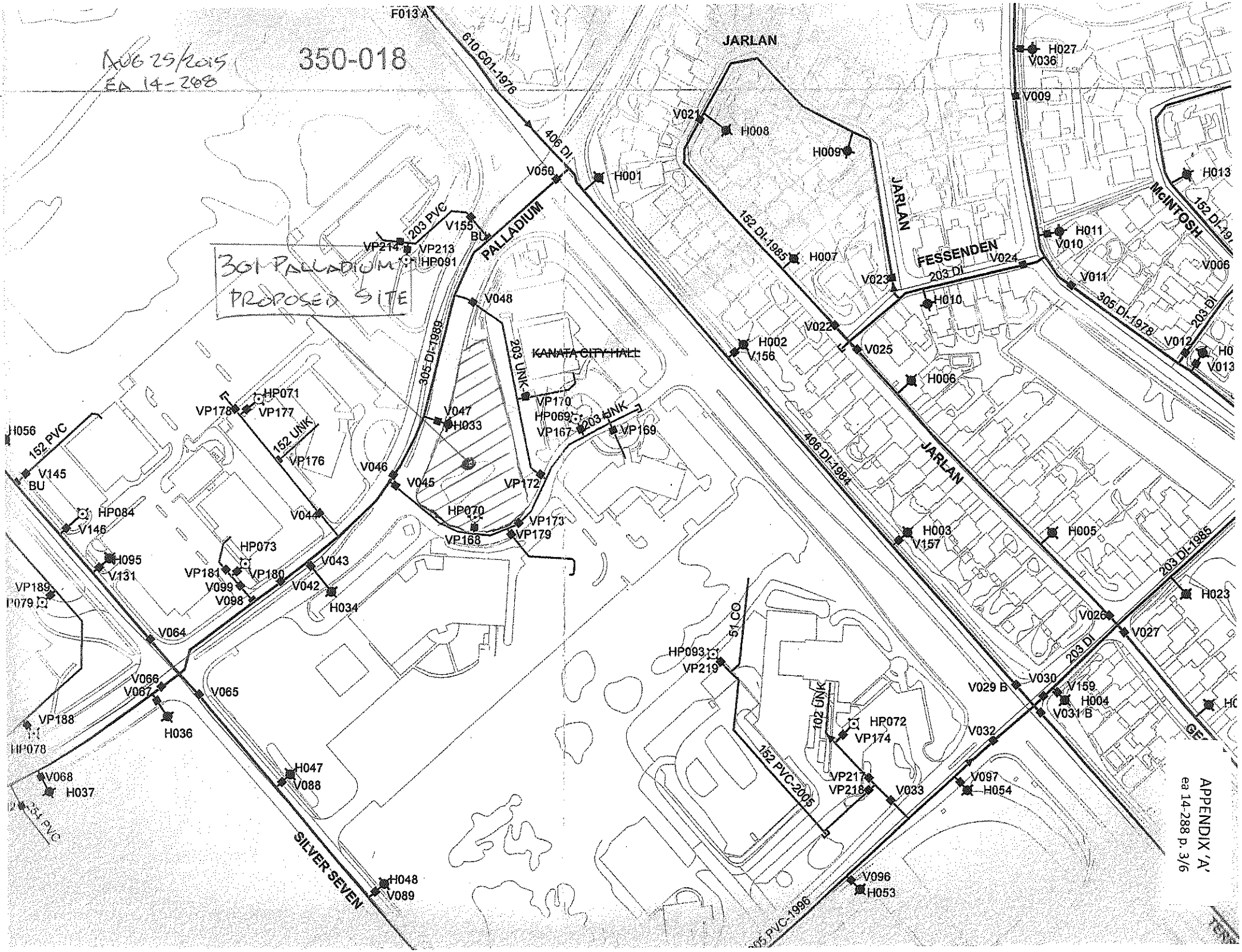
City of Ottawa Watermain Boundary Conditions:

Specified Service Connection Point: 200mm dia. Private Watermain in the Common Element Road Block
Max HGL = 162.9m
PKHR = 155.0m
MXDY+Fire =155.1 m



Please refer to City of Ottawa, *Ottawa Design Guidelines – Water Distribution*, First Edition, July 2010, WDG001 Clause 4.2.2 for watermain pressure and demand objectives.

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


Aug 25/2015
EA 14-288
350-018
301 PALLADIUM
PROPOSED SITE
F013 A
610 C01-1976
406 DI
JARLAN
PALLADIUM
203 PVC
152 DI-1985
305 DI-1989
203 UNK
KANATA CITY HALL
406 DI-1984
152 PVC
152 UNK
203 DI
305 DI-1978
152 DI-191
McINTOSH
FESSENDEN
51 CO
102 UNK
152 PVC-2005
SILVER SEVEN
305 PVC-1996
APPENDIX 'A'
ea 14-288 p. 3/6

Lawrence Erion

From: "Lawrence Erion" <erion@sympatico.ca>
Date: August-25-15 4:13 PM
To: "Fraser, Mark" <Mark.Fraser@ottawa.ca>
Cc: "Bob Webster" <rwebster@rogers.com>; "Ralph Wiesbrock" <rwiesbrock@kwc-arch.com>
Attach: 301 PALLADIUM 14-290 AUG 24 2015-SSG-1.pdf; scan0006.pdf
Subject: Re: 301 Palladium - Request for Boundary Conditions EA 14-288

Hello Mark
The following information is offered in support of my request per your earlier e-mail.

1. Avg. Daily Demand
   Type – "Other Commercial" @ 28000 L/ha/day
   0.5 ha. x 28,000/86,400 = 0.16 L/sec
   Rounded to 0.2 L/sec
2. Max Day = 1.5 x 0.2 = 0.3 L/sec
3. Max Hour = 1.8 x 0.3 = 0.54 L/sec

4. Fire Flow Demand (per F.U.S. 1999)

   A. Type of Const. = Non-combustible
   B. Ground Floor Area = 700 sq. m.
   C. 1 Storey
   D. $F = 220 \times C \times A^{0.5}$ where C = 0.8
   $= 220 \times 0.8 \times 700^{0.5}$
   = 4656 L/min Rounded to 5,000 L/min
   E. Occupancy charge:
   Limited Combustible = – 15% x 5000 = - 750 L/min
   F. Non- sprinklered
   G. Exposure Increase
   N. side > 45 m 0%
   E. side > 45 m 0%
   S. side 25 30 m +10%
   W.side > 45 m 0%
Total Exposure charge = +10% x 5000 = +500
   H. Fire Flow Demand = 5000 –750 + 500 = 4,750 L/min
   Rounded to 5,000 L/min
   83 L/sec

5. A PDF of my preliminary site services plan is attached to show the proposed location of the water service connection.
6. A PDF of part of water network dwg. 350-017 is attached showing the site location in Pressure District 3W.

Lawrence Erion

From: "Fraser, Mark" <Mark.Fraser@ottawa.ca>
Date: August-25-15 11:35 AM
To: <erion@sympatico.ca>
Subject: RE: 301 Palladium - Request for Boundary Conditions

Hi Lawrence,

To request City of Ottawa water distribution network boundary conditions for 301 Palladium Drive please provide the following information:

Average Daily Demand (L/s)
Max Daily Demand (L/s)
Peak Hour Demand (L/s)
Fire Flow (L/s)

- Fire flow demand requirements shall be based on Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection 1999 as per the *Ottawa Design Guidelines – Water Distribution*, First Edition, Document WDG001, July 2010, City of Ottawa Clause 4.2.11.
- Please provide a copy of the fire flow demand requirement calculations and water demand calculations (PDF format).
- Please provide a watermain service connection location on a map (PDF).
- City of Ottawa Pressure Zone.

Once you have provided this information to the City of Ottawa it takes approximately 5 business days to receive boundary conditions for the subject site.

If you have any questions please feel free to contact me.

Regards,

Mark Fraser, P. Eng.
Junior Infrastructure Engineer, Suburban Services

PLANNING

City of Ottawa | Ville d'Ottawa
Planning and Growth Management Department
110 Laurier Avenue West. 4th Floor, Ottawa ON, K1P 1J1
Tel:613.580.2424 ext. 27791
Fax: 613-580-2576
Mail: Code 01-14
Email: Mark.Fraser@ottawa.ca

-----Original Message-----
From: Hall, James
Sent: August 25, 2015 11:26 AM
To: 'erion@sympatico.ca'

April/2016
301 Palladium Dr.
Appendix 'A'

EA 14-288

REVISED FIRE FLOW DEMAND (Per F.U.S. 1999)

A. Type of Construction – Non-Combustible (C = 0.8)

B. Ground Floor Area = 600 sq. m.

C. 1 Storey

D. $F = 220 \times 0.8 \times 600^{0.5} = 4311$ L/min
Rounded to 5,000 L/min.

F. SPRINKLERED Reduction 30% = - 1,500 L/min.

G. Exposure Increase
N. side > 45 m 0%
E. side > 45 m 0%
S. side 25 m +10%
W. side > 45 m 0%
Total Exposure Charge = 500 L/min

H. FIRE FLOW DEMAND = 5,000 – 1,500 + 500
= 4,000 L/min (67 L/sec)

APPENDIX 'B'

SANITARY SEWER SIZING

1 page

APPENDIX 'B'

October,2015
Rev. April/2016

EA 14-288

301 PALLADIUM DRIVE
PROPOSED COMMERCIAL BUILDING

SANITARY SEWER CONNECTION SIZING

1. Peak Flow per O.S.D.G., (Appendix 4-A.6)

Restaurant 300 seats indoors + 80 patio = 380 seats
Coffee Shop 50 seats
Total Seats = 430
Daily Volume = 430 seats x 124 L/d per seat
+ 430 seats x 35 L/d (kitchen & toilet)
Total 430 seats x 160 = 68,800 L/d Avg.

Peaking Factor 1.5
Peak Flow = $\frac{68,800 \times 1.5}{60 \times 60 \times 16 \text{ hrs.}}$ = 1.79 L/sec
Plus infiltration allowance = 0.43 ha @ 0.28 L/s = 0.12 L/sec
Total Peak Flow = 1.91 L/sec

2.Pipe Capacity @ 65% FULL per O.B.C. (Table 7.4.10,3C)

Select 150 mm dia. @ 2.5% = 300 I.G.P.M. (22.7 L/sec)
Use 200 mm dia. @ 2.5% (MIN. 200 dia. for commercial site per O.D.S.G. regardless of need).

APPENDIX 'C'

Storm Sewer Hydraulic Design Sheets

2 pages

Pg 2 - Rev May/2016

STORM SEWER HYDRAULIC DESIGN SHEET

Page 1 of 1 Checking Date:

Site location (City) 301 PALLADIUM DR, OTTAWA n= 0.013 Reviewer:

Ref# D07-12-15-0147 / DWG *SDA-3 **Design Storm: The** 5 **Year Storm Event**

Rational Formula: Q = 2.78*CIA
Where: Q: peak flow (L/s)
C: runoff coefficient
I: rainfall intensity (mm/h)
A: area (ha)

Concentration time: tc = ti + tf (minute)
Where: ti: inlet time before pipe (minute)
tf: time of flow in pipe (minute)
tf = L/(60V) (minute)

Manning Equation:
Qcap. = (D/1000)^2.667*(S/100)^0.5/(3.211*n)*1000 (L/s)
D: pipe size (mm)
S: slope (grade) of pipe (%)
n: roughness coefficient

			Runoff							Pipe						
Street	From	TO	Area		Section	Accum.			peak Flow	Length	Slope	N. D.	Qcap.	V		
Name			A	C	AC	AC	tc	"I"	Q	L	S	D	(full)	(full)	tf	Q/Qcap.
AREA ID	MH/CB	MH/CB	(ha)		(ha)	(ha)	(Min.)	mm/hr	(L/s)	(m)	%	(mm)	(L/s)	(m/s)	(Min.)	
A6	CB1	ST107	.0391	0.90	.0352	.1052	10.0	104.2	10.2	22	1.0	250	62.0	1.22	0.3	0.17
A7	ST107	ST106	.0679	0.90	.0612	.0964	10.3	102.6	27.5	14	1.0	250	62.0	1.22	0.2	0.44
A8	ST106		.0952	0.90	.0857											
A9		ST105	.0155	0.35	.0038	.1859	10.5	101.6	52.5	13	2.0	250	87.7	1.73	0.1	0.60
	ST105	ST104	—			.1859	10.6	101.1	52.2	6	2.0	250	87.7	1.73	0.1	0.59
A1	ST109		.0614	0.90	.0553											
A2			.0097	0.90	.0087											
A3		ST103	.0094	0.90	.0085	.2584	10.7	100.6	72.3	26m MIN TANK					1.0	
	ST103	ST102	—			.2589	11.7	96.0	69.0	5	2.0	250	87.7	1.73	0.1	0.77
A4	ST102		.0291	0.30	.0087											
A5		ST101	.0505	0.20	.0101	.2772	11.8	95.6	73.6	10.4	2.5	250	93.8	1.95	0.1	0.78
PRIVATE DRAIN	ST 12436	ST 12455	.0231	0.90	.0208	.298	11.9	94.2	78.0		0.59	300	78.0	1.07		1.00

APPENDIX 'C'
ea 14-288 p.1/2

Rev Nov/20K

Post-Development Runoff Summary								
Area No.	Impervious Area (m^2)	$A*C_{impervious}$	Pervious Area (m^2)	$A*C_{pervious}$	Sum AC	Total Area (m^2)	C_{AVG}	$C_{AVG\ (100yr)}$
A1X	78.4	70.6	206.4	51.6	122.2	284.8	0.43	0.50
A4	42.5	38.3	248.6	49.7	88.0	291.1	0.30	0.36
ALL	OTHER	AREAS	ARE	EITHER	C=0.90	IMPERVIOUS		
				OR	C=0.25	PERVIOUS		
REFER TO		DWG.	SDA-3	/ POST	DEV.	DRAINAGE	DATA	

SITE LOCATION : 301 PALLADIUM DR, OTTAWA

Reference D07-12-15-0147 / DWG SDA-3.

REGISTERED PROFESSIONAL ENGINEER
CIVIL
L M ERION
PROVINCE OF ONTARIO

OCTOBER, 2015
Rev. April, 2016
Rev. November, 2016

EA 14-288

APPENDIX 'D'

STORMWATER MANAGEMENT CALCULATIONS

2 pages

APPENDIX 'D'

October/2015 EA 14-288
Rev. March/2016 (Rev. Nov.2016) P.1 of 2

301 PALLADIUM DRIVE
PROPOSED COMMERCIAL BUILDING

STORMWATER MANAGEMENT CALCULATIONS

Ref: Site Services & Grading Plan (SSG-1)
Storm Drainage Area Plan (SDA-3)

1. DEVELOPMENT SITE RUNOFF RELEASE RATE (MAXIMUM)
Total site area = 4960 m^2
Subtract previously developed area = 390 m^2 (South ½ Private Road)
Area to be developed = 4960 – 390 = 4570 m^2
Dev. area release based on Rational Method formula with C = 0.50 applied to rainfall intensity for time of concentration Tc = 15 minutes (1:5 yr)
Q_R = 2.78 x 0.4570 x 0.50 x 83.6 mm/hr. = 53.1 L/s

2. UNCONTROLLED RELEASE (POST-DEV)
Area A1X,A10, thru A15 incl. (A x C = 327.6/5 yr:382.6/100 yr.)
Q_5 (UNC) = 2.78 x 0.03276 x 83.6 = 7.6 L/s
Q_{100} (UNC) = 2.78 x 0.03826 x 178.6 = 19.0 L/s

3. MAXIMUM CONTROLLED RELEASE (1:100 yr. storm)
$Q_{100} = Q_R - Q_{100}$ (UNC) = 53.1 – 19.0 = 34.1 L/s
To be controlled by restrictive orifice in MH ST 102.
Capacity of existing private sewer at point of connection: 300 dia. @0.59% = 77.5 L/sec

4. REQUIRED STORAGE (1:100 YR.)
Post Dev. area to be controlled = A1 to A9 = 3779 m^2 (A x C = 3093.7)
Q_{100} = 2.78 x 0.30937 x I_{100} = 0.86005 x I_{100}

Tc (min)	I_{100} (L/s)	Q_{100} (L/s)	- Q_R (L/s)	= Q_{STOR} (L/s)	x $T/1000$ (sec/1000)	= V_{STOR} (m^2)
10	178.6	153.6	34.1	119.5	0.6	71.7
15	142.9	122.9	34.1	88.8	0.9	79.9
20	120.0	103.2	34.1	69.1	1.2	82.9
25	103.9	89.4	34.1	55.3	1.5	83.0 >
30	91.9	79.0	34.1	44.9	1.8	80.8

Required Storage = 83.0 m^3

5. STORAGE PROVIDED (1:100 yr.)

All detention storage to be provided within the SWM storage area described in detail on Dwg. SSG-1 below the outdoor patio.

Area of storm storage tank = 4.80 x (18.1 + 18.8) = 179.0 m^3
Maximum W.L. to overflow at ST 101 Elev. = 100.60 m
Volume (100.30 – 100.10) = 0.20/2 x 4.9 x 18.1 = 8.87
(100.10 – 100.00) = 0.10/3 x 4.9 x 18.8 = 3.07
(100.60 – 100.30) = 0.30 x 4.9 x 18.1 = 26.61
(100.60 – 100.10) = 0.50 x 4.9 x 18.8 = 46.06 m^3
Total Storage Volume Provided 84.61 m^3 rounded to 84.6 m^3
> 83.0 m^3 required

6. DETERMINE SIZE OF ICD at ST 102

Choose a plug-type circular orifice (sharp edged)to be installed in the downstream outlet of MH ST 102.

$Q_r = CA(2gh)^{0.5}$

$$A = \frac{Q^r}{C \times (2gh)^{0.5}}$$

where Q_r = max. release rate = 0.0341 m^3/sec
A = area of circular orifice (m^2)
C = 0.61
g = 9.81 m/s/s
h = head above centre of orifice to overflow = 100.60 – 99.72 = 0.88 m.

$$A = \frac{0.0341}{0.61\ (19.62 \times 0.88)^{0.5}} = 0.013453\ m^2$$

DIAMETER = $(4/\pi \times 0.013453)^{0.5}$ = 0.1309 m (131 mm)

APPENDIX 'E'

Dwg. ASP-1 by KWC

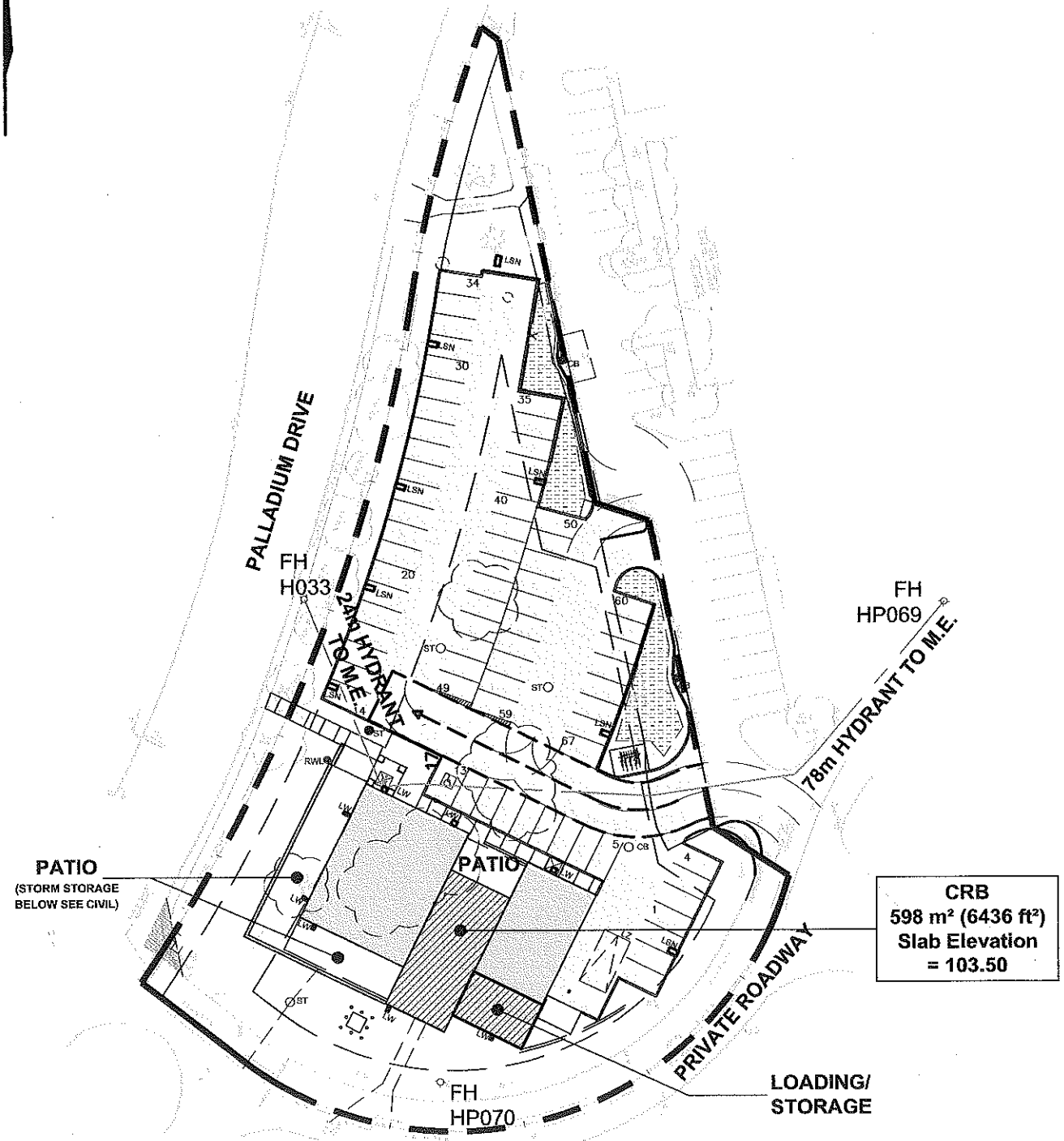
Dwg. ASP-2 by KWC

FIG. 1 – City topo map (2004)

SCALE 1:750 0 10 20 40

LEGEND

Indicates area of proposed basement



kwc

title
SITE PLAN

project **Citant Palladuim**

scale 1 : 750

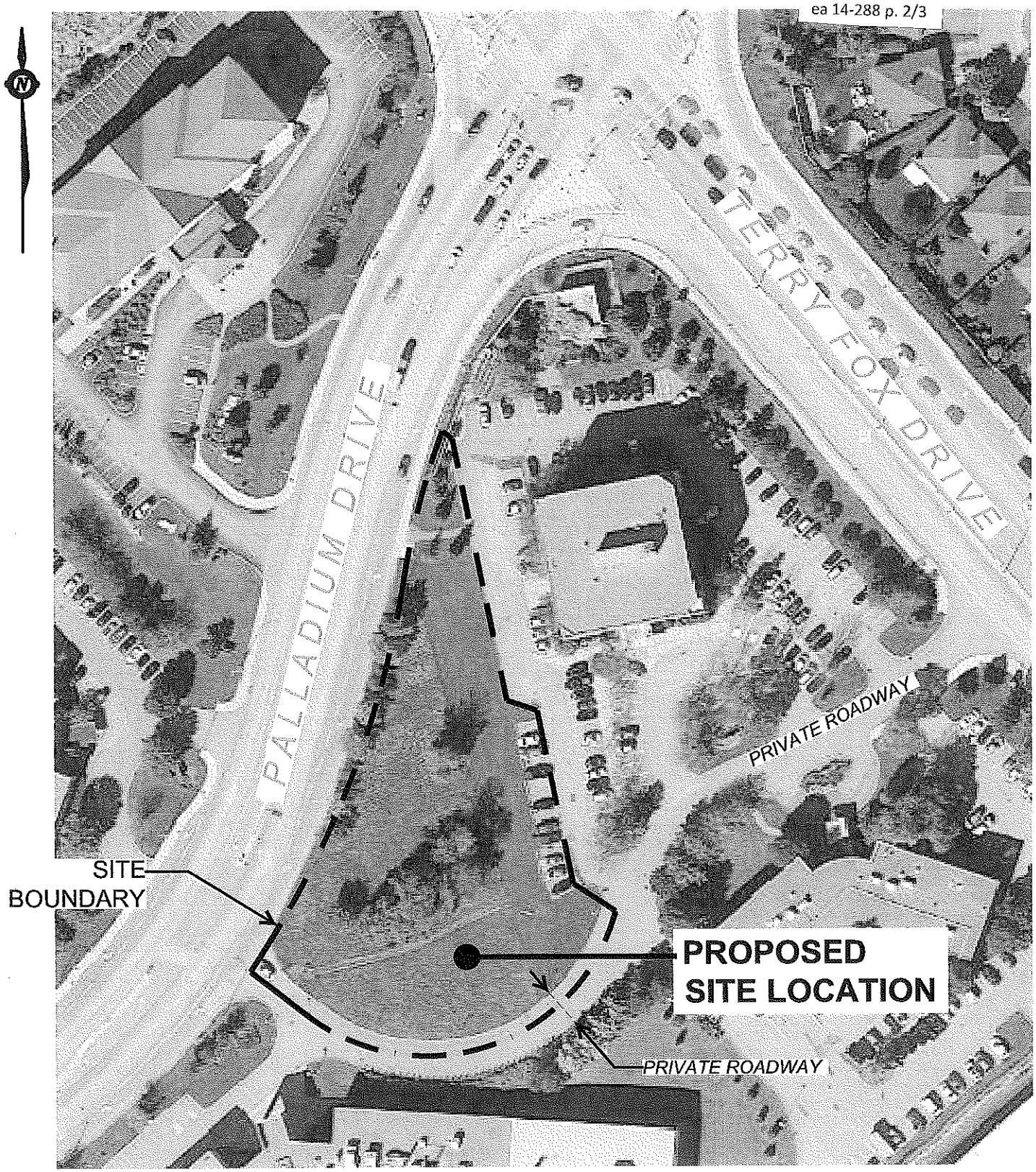
date 2016-03-31

drawn CD

project 1523

drawing no. **ASP-1**

rev.



kwc

title
PRE-DEVELOPMENT PLAN

project
Citant Palladuim

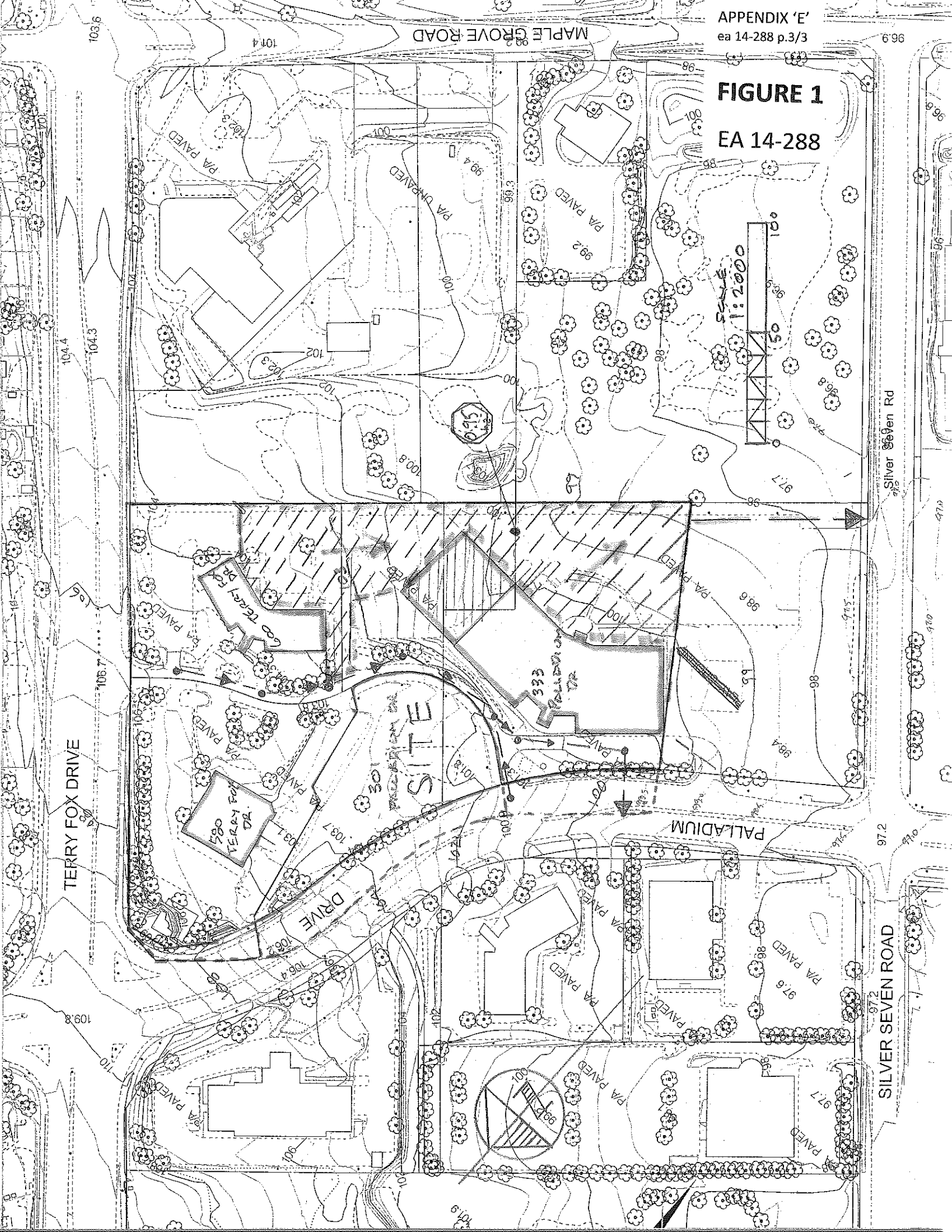
scale	NTS
date	2016-03-31
drawn	CD
project	1523

drawing no.
ASP-2

rev.

FIGURE 1

EA 14-288



301 PALLADIUM DR

PIN: 045090040
045090041

LEGAL DESCRIPTION / DESCRIPTION OFFICIELLE

PIN	LEGAL DESCRIPTION / DESCRIPTION OFFICIELLE
045090040	CON 2 PT LOT 1 RP 4R-7282;PARTS 4 5 10 & 11 LESS;4R-11260 PARTS 2 3 & 4
045090041	CON 2 PT LOT 1 RP 4R-7282;PARTS 4 5 10 & 11 LESS;4R-11260 PARTS 2 3 & 4

PROPERTY DIMENSIONS / DIMENSIONS DE LA PROPRIÉTÉ

	045090040	045090041
FRONTAGE - ft / FAÇADE - pi:	0.00	0.00
DEPTH - ft / PRONFONDEUR - pi:	0.00	0.00
PROPERTY AREA - acre / SUPERFICIE - acre:	1.2300	1.2300

SERVICES / SERVICES

PIN	WASTE COLLECTION PICK-UP DAY AND ZONE / JOUR ET ZONE DE LA COLLECTE DES ORDURES
045090040	WEDNESDAY - Cal. B Zone 1
045090041	

WARD INFORMATION / INFORMATIONS WARD

PIN	WARD NUMBER / NUMÉRO DU QUARTIER	WARD NAME / NOM DU QUARTIER	COUNCILLOR NAME / NOM DU CONSEILLER - (ÈRE)
045090040	23	KANATA SOUTH	Allan Hubley
045090041			

TRANSMITTAL

July 9, 2018
Revision 2: December 03, 2018

Response to City of Ottawa Letter of May 11, 2017:
"Site Plan Control and Zoning By-law Amendment,
Third Submission Comments – 301 Palladium Drive"
File Number: D07-12-15-0174 (Site Plan) & D02-02-15-0070 (Zoning By-Law)

TO: Stream Shen
Planner
Development Review West
Planning, Infrastructure and Economic Development Department
City of Ottawa

FROM: Michael Wright
Principal Planner
Wright Consulting Services

301 Palladium SPA-Zoning Application
July 9, 2018 - Response Documents and Drawing Document Attachment List

Response to:

Re: Planning

1.1 Planning Rationale, Revised June 2018

Re: Site Plan, Landscape Plan

1.2 Site Plan, Landscape Plan Response Summary June 2018

Re: Engineering

2.1 Engineering Response and Attachments

2.2 Attachment: Fire Route Documentation

2.3 Acknowledgement and approval (Re: Item 14) and acknowledgement and acceptance agreement (Re: Item 18) letter with 580 Terry Fox ownership.

2.4 Re: Item 15, Correspondence confirming that clay seals are not required.

Re: Drawing Revised Drawing Documents

A100: Site Plan Rev.R5, 2017-03-10

L1: Landscape Plan, Rev. 6, 2017-03-10

GP-3, Grading Plan, Rev. 10, 2017-03-10

PRSC-2, Profiles and Sediment Control, Rev. 10, 2017-03-10

SDA-4, Storm Drainage Area Plan, Rev. 9, 2017-03-10

SSP-1, Site Services Plan, Rev. 10, 2017-03-10

Attachment 1.1

Planning Rationale of
Wright Consulting Services
As Authored By:

Michael Wright
Principal Planner

October 2015
Revised May 2016
Revised March 2017
Revised October 2017
Revised June 2018
Revised December 2018
City of Ottawa File No. D07-12-15-0174
And File No. D02-02-15-0070

Prepared for:

Citant Group

301 Palladium Drive

Table of Contents

Section 1.0 Project Overview

The proposal is to erect a building on-site which has access via a private road as a common element to all the properties.

The site is 4950.14 square metres in size and is broken down into three components:

(a) Building area: 670 square metres;
(b) Hard Surface Area including driveways and parking lot: 2007 square metres;
(c) Landscape area: 1905 square metres.

There will be a commercial building on the site with a maximum height of 11.3 metres. The proposed use is a multi-use facility as described in Section 203(2) (Light Industrial Zone) of Zoning By-law No. 2008-250, as amended [a variety of complementary uses occupying small individual sites or in groupings as part of a small plaza]. More detail on the proposed uses is found in Section 2.4 of this Report as well as shown the Site Plan (Drawing No. A1 by KWC Architects Inc.). In addition, Appendix 6 (Proposed Zoning By-law Amendment) attached hereto describes in detail the proposed zoning by-law amendment.

To clarify the location, shape and size of the subject property being used for the proposed building and use, the following drawings are found in Appendix 1 herein:

1. Existing Site Conditions Photo as of 2016;
2. Surveyor's Real Property Report (No. 42500);
3. Plan 4R-7282 (Property);
4. Plan 4R-11260 (Palladium Drive);
5. Figure 1 (EA 14-288 showing property divisions);
6. Photo and List showing Land Uses Surrounding Property;
7. Land Transfer; and
8. MOECC Exemption.

Rather than quote verbatim the various documents in this text, they are attached as Appendices to the Planning Rationale. The pertinent sub clauses or items are found in the text and discussed herein.

Section 2.0 Review of Affected Land Use Documents and Compliance Issues

2.1 Provincial Policy Statement (2014) (Appendix 2)

Section 1.3.1 of the PPS asks that the City promote economic development by "providing opportunities for a diversified economic base and maintaining a range of suitable sites for employment uses which support a wide range of economic activities and ancillary uses" [1.3.1 (b)]. Section 1.3.2 asks that conversion of lands within employment areas to non-employment uses only be done after a review of the existing land use fabric. In this instance, the subject lands are designated as Employment Area and the proposed use is a permitted use in both the Official Plan and the Zoning By-law [2008-250]. These lands are not being removed from the abovementioned land use category and respects the aforementioned subsections of the PPS.

2.2 The Planning Act (Appendix 3)

Section 3(5) of the Planning Act (Appendix 3) asks that a decision of Council shall be consistent with the policy statements issued under subsection (1). In this respect, Council is to embrace the policy of its Official Plan regarding planning matters, and in this instance, Sections 2.2 and Section 3.6.5 – Employment Area and Enterprise Area.

2.3 City of Ottawa Official Plan (Appendix 4)

The Official Plan (Appendix 4) designates the subject site as Employment Area as depicted on Schedule 'B' of the Official Plan. This designation allows a wide range of land uses dedicated located to offices, manufacturing, warehousing, distribution, research and development facilities and utilities. Complementary uses such as service commercial uses are appropriate as they can be in the Employment Area to meet the day-to-day needs of the employees and reduce the need to travel outside the Employment Area to obtain such needs. In this instance, the proposed use is a restaurant which is a permitted use in the "Employment Areas" land use designation.

Section 2.2.2 (Managing Growth within the Urban Area) was reviewed to determine whether the proposal met the "tests" of this subsection. Section 2.2.2.2 applies in that the employment intensification was met by utilizing a vacant parcel of land (see item c). It was suggested that the lands in question will convert employment lands to another land use. This is not the case. The proposed use is a permitted use. It is the intention to provide a use which is necessary (no other uses of this type are found nearby) and indeed is complementary to the existing uses found in the immediate area (see Drawing No. 6 in Appendix 1). The subject parcel of land is a remnant which originally was part of a development strategy to create two office towers on the site (see Drawing No. 4 – Plan 4R-11260). With the construction of Palladium Drive, the remaining parcel of land was too small to accommodate what can be described as a typical employment use. The remainder of the policy in Section 2.2.2 do not apply in this instance.

It should be noted "Employment Areas" (Section 3.6.5) normally provide large parcels of land for the various uses found in the subject lands. This parcel of land is a small remnant parcel of land (1.23 acres) as a large portion of the original lands were expropriated for Palladium Drive as can be seen on R-Plan No. 4R-11260. In addition, the lands were to be used for a second office tower which mimicked the original tower found on 580 Terry Fox Drive (old City of Kanata headquarters). The removal of a portion of these lands for the construction of Palladium Drive forecluded this activity from occurring on the subject lands. Section 3.6.5.2(c) states that the zoning by-law will "permit a variety of ancillary uses such as.....restaurant located on small lots. "The purpose of the complementary-type uses is to serve the employees of Employment Areas" which is what this proposal does to fulfill this criterion.

The "Introduction component" of the aforementioned land use category discussed how these "Areas" are to function by exhibiting characteristics such as potential jobs, devotion of at least 50% of the lands for employment, no negative impact on residential uses, ease of accessibility from the community, among others. The proposed use will comply with the attributes by creating jobs, does not affect the 50% ratio, is easily accessed by Palladium Drive by the neighbouring community and will provide a use which is complementary to the office park.

The Official Plan provides direction in determining the zoning by-law which will describe the Employment Area. A further review of Items a. to k. of Section 3.6.5.2 provides direction in the following manner:

a. Permit a variety of uses such as storage, office, and other employment-generating uses;
b. Not applicable;
c. Permit a variety of ancillary uses such coffee shop, restaurant, and office in groups of a small plaza or on small lots. The proposed use will occupy a small parcel of land. This type of complementary-type use is to serve the employees of the Employment Area, the public and passing traffic such as those who use Palladium Drive.
d. Not applicable;
e. Not applicable;
f. Not applicable;
g. Not applicable;
h. Not applicable;
i. Not applicable;
j. Not applicable; and
k. Not applicable.

The 2016 Ottawa Employment Land Review indicates the employment density for the City is 39.2 employees per net hectare to determine land demand and growth (see Table 11, page 45). This is a forecast of thee developed land demand for the period to 2031. The Report also found that there is a vacant supply of 994 net hectares in the Urban Area (see Table 13, Page 46). A review of the lands on the northerly and southerly sides of Palladium Drive show that much of the land is dedicated to office buildings, a hotel and other uses not necessarily reflecting the original concept of what is an Employment Area (see attached air photo). This demonstrates that most of the Employment Lands in this area are occupied except for this site and a few sites on the perimeter. In discussion with the potential occupant, a restaurant, it was stated that there would be approximately 65 staff members (2/3 full-time) which would translate to 85 employees per net hectare when considering Table 11 of the Report.

The writer has visited several other "employment areas" to determine what has happened in fulfilling the City's targets. Areas such as Kanata North, Colonnade Road and South Nepean were reviewed to determine what has happened over the past number of years. It was found that: a) occupancy of existing buildings has declined; b) there is still a substantive amount of vacant employment area lands found in the Merivale Road corridor and South Nepean lands which have never been built; and c) recent land use activities in the Employment Area lands have departed from "traditional" Employment Area land uses.

It was found that some of these lands are being occupied by a recreation facility (soccer field), car dealership, ground floor retail and upper floor residential (low rise 4-storey dwellings), among others due to a lack of demand for such lands for Employment Area activities. This indicates that the 2016 Report is accurate in that the vacancy rate exceeds demand.

The proposal is to construct a building which can house a restaurant, a take-out restaurant and office as defined in the City's Zoning By-law. This building is located on a small parcel of land and will serve primarily the "Employment Area" occupants as well as clientele in the immediate area. Due to the small size of the land, the odd shape of the land parcel, the proximity to other uses in the Palladium sector which require such an use, this demonstrates that the proposal meets the tests of the official plan and will enhance the "Employment Area" straddling Palladium Drive.

2.4 City of Ottawa Zoning By-law No. 2008-250

The City's Zoning By-law (Appendix 5) at present zones the property as IL5 H (22) and IL5 306 H (30). These Zones essentially limit the uses to industrial uses and accessory uses such among others. This zone recognizes that the subject lands were intended for future development in areas designated as Employment Area.

The Light Industrial Zone allows "a variety of complementary uses such as recreational uses, and service commercial uses (e.g. convenience store, restaurant) occupying small sites on individual pads to serve the employees of the Employment Area, the public in the immediate vicinity, and passing traffic;" [Purpose 2 of the IL – Light Industrial Zone].

The proposed use complies with this purpose of the subject Zone. Section 203 (2)(d) states that a "restaurant" is a permitted use with the stipulation that said use be limited to 300 square metres of gross floor area. This will necessitate an amendment to the Zoning By-law as the proposed square footage will exceed that limitation. In addition, Section 203 (5) asks that a full-service restaurant in an IL5 subzone be in a building containing one of the permitted uses listed in Section 203 (1). This will also require an amendment to the Zoning By-law as it is a stand-alone use occupying much of the building. This is discussed in greater detail in Appendix 6 attached herein.

2.5 Supporting Studies and Analyses

Studies, drawings, and reports have been undertaken to assess the site and determine whether there are limitations to its future development. These studies are being submitted as separate documents. The studies are as follows:

a) Site Plan	KWC Architects Inc.
b) Site Services and Composite Plan	Erion Associates
c) Storm Drainage Area Plan	Erion Associates
d) Profiles and Sediment Control	Erion Associates
e) Tree Conservation Report	IFS Associates
f) Landscape Plan	IFS Associates
g) R-Plan	Fairhall & Moffatt
h) Geotechnical Report	DST Consulting Engineers

3.0 Professional Opinion

Having visited the site and the surrounding properties as well as reviewing the abovementioned studies and Site Plan, the writer undertook to review the various land use documents to ensure that the proposal met and satisfied the policy contained therein.

It is the writer's opinion that the proposal meets the tests and policy found in the City's land use documents (official plan, zoning by-law, and employment report) and should be approved as submitted.

Respectfully Submitted
Per:
WRIGHT CONSULTING SERVICES

Michael Wright
Principal Planner

Appendix 1
Site Plans

1. Existing Site Conditions as of 2016
2. Surveyor's Real Property Report (No. 42500)
3. Plan 4R-7282 (Property)
4. Plan 4R-11260 (Palladium Drive)
5. Figure 1 (EA 14-288) showing property divisions
6. Photo and List of Surrounding Land Uses
7. Land Transfer
8. MOECC Exemption

Appendix 2
Provincial Policy Statement

Section 1.3 Employment
Section 1.3.2 Employment Areas

Appendix 3
The Planning Act

Section 3.5 Policy Statements and provincial plans

Appendix 4
City of Ottawa Official Plan

Section 2.2 Managing Growth
Section 3.6.5 Employment Area and Enterprise Area
Schedule A Urban Policy Plan
Ottawa Employment Land Review (Draft) April 20, 2016)

Appendix 5
City of Ottawa Zoning By-law No. 2008-250

Section 54	**Definition of Restaurant**
Section 203-204	**IL – Light Industrial Zone**
Map	**Zoning of Subject Property**

Appendix 6
Proposed Zoning By-law Amendment

The proposed amendment would address two (2) matters as presently found in Section 203 of the Zoning By-law. Section 203 (2) allows "complementary uses" such as service commercial (restaurant among others) occupying small sites on individual pads or groupings as part of a small plaza. The zoning by-law does limit such uses by stating the following: "each use not exceeding 300 square metres of gross floor area" [203 (2)(c)]. In addition, OPA No. 180 modified Section 3.6.5 by limiting the gross floor area at 750m2. In this instance, the gross floor area will be 670 square metres as shown on the Site Plan.

A review of Table 203 – IL Zone Provisions finds that the proposed development meets all the zone provisions except for the front yard setback requirement 7.5 metres. The proposed front yard setback will be 6.8 metres. With respect to item (i), landscaping has been provided along Palladium Drive with a minimum of 3.0 metres. Landscaping has also bee provided along the various lot lines (see Site Plan) and meets the provision of "No minimum" as found in Item (i)(iii). The only break in the landscaping is the access points to and from the private roadway.

The property is zoned IL5 and is split into two IL5 subzones. There is a variance for height [IL5 H(22) and IL5(306) H(30). The "306" permits an additional land use – recreational and athletic use. The height of the building is 11.3 metres which complies with both subzones. Section 204 (5)(b) asks that the full-service restaurant must be in a building containing one of the permitted uses listed in Section 203(1). A variance from this provision is required as the proposed restaurant is a stand-alone land use.

Section 204 (5)(c) of the IL5 subzone asks Section 203(3)(d) not apply and that the front yard and corner side yard setbacks be at least 12 metres. The front yard facing Palladium Drive is 6.8 metres. The corner side yard abuts a private roadway; thus, this provision does not apply in this instance. The minimum setback from the private roadway is 9.135 metres. Normally, the corner side yard is defined as "that yard abutting a public street". This is not the situation in this instance.

To conclude, the zoning amendment will address the following:

1. Waive Section 204(5)(b) in requiring the restaurant to be contained within a building having one of the permitted uses found in Section 203(1); and
2. Amend Section 204(5)(c) to allow a minimum front yard setback of 6.8 metres.

All other zoning provisions, whether they are found in Table 203 or Section 204(5) have been met.

Appendix 7
Response to Development Review
Transportation Engineering

The Memorandum dated June 6, 2016 contained a section which discusses Section 4.3.11 of the Official Plan and Section 4.2.1 of the Pedestrian Plan. It was put forth by Staff that the developer/proponent should be responsible for replacement of the existing asphalt sidewalk along Palladium Drive.
A review of Section 4.3.11 asks that new development is linked to the existing network. This block of land does have links to Palladium Drive via a private roadway as well as a sidewalk at the northern tip of the project lands. Thus, this policy plays no role in the development of these lands.

Section 4.2.1 discusses the fact that new communities promote pedestrian travel. Such was done in the earlier development of this industrial area. Sidewalks are in place along Palladium Drive. Most of the businesses and buildings along Palladium Drive are auto-dependent and pedestrian travel is minimal. Thus, this policy plays no role in the development of the subject lands.

As to Section 41(7) of The Planning Act, sub section (4) says that a municipality **may** (writer's emphasis) require the owner of the land to provide the facility found in item (7)(a)(4). The operative word is may and thus is not mandatory.

To summarize, approval and development of this property is not contingent upon providing a new sidewalk which is already in the City's infrastructure.

Zoning Standards for IL5 Subzone

	Required	Proposed
Zoning Category	IL5 H(22) IL5 (306) H(30)	------
Min. Lot Area	2000m2	4950m2
Min. Front Yard Setback	12.0 m	6.8 m
Min. Interior Side Yard Setback	7.5 m	Not Applicable
Min. Rear Yard Setback	7.5 m	9.135 m
Max. Bldg. Ht.	22m & 30m	11.3 m.
Min. Width of Landscaping	no minimum	variable
Min. Parking Rate N76 restaurant full service Area C – Sch. 1	10/100m2 of GFA (670m2 GFA)	67
Bicycle Parking	1/250m2 of GFA	3
Loading Space	1	1
Disabled Parking Rate	1	1
Gross Floor Area (max.)	300m2	670m2
Permitted Use Restaurant	accessory use	stand-alone use

Attachment 1.2

Re: Landscape Plan revision for 201 Palladium....

Gino Aiello <gino@gjala.com>

Fri 2017-08-18 10:09 AM

To: Robert G. Webster <rwebster@rogers.com>;

Cc: Peter Clare <peter.clare@citantgroup.com>; Peter Clare <peterclare@sympatico.ca>; Michael Wright <gmwright47@outlook.com>;

1 attachments (5 MB)

Citant 301 Palladium February 9 2017 SPC.pdf;

ST refers to Storm manholes as per civil - not plants - they are mostly in the parking lot and gravel areas.....!
ST107....ST 106.....
This file should still be good

Gino J. Aiello landscape architect
gino@gjala.com
613 852 1343

Attachment 2.1

301 Palladium SPA/Zoning/September 29, 2017

Rev. 2: December 3, 2018

Letter for Re-Submission in Response to Third Submission, City of Ottawa Letter of May 11, 2017

Planning

Planning Rationale……1. to 5……..Michael W.

Site Plan

1. Curb line construction is shown moved to within property boundary and noted (Note 7.)
2. Front Yard Setback is noted on plan dimensioning and revised to 6.8 M from the previously noted 12.0 M

Landscape Plan

1. The ST denotation is not shown on the Plant List Schedule as it refers to a Storm Water manhole access location.

Engineering

1. Engineering documents are sealed and signed as noted.
2. Fire Route Form has been completed, forwarded to Allan Evans and attached to this submission.
3. Revised Approval stamp has been placed on all drawings.
4. Rationale for Time of Concentration issue is an addendum to this Response Summary (attached).
5. A detailed head loss calculation from the water service connection at the main to the building is not warranted at this stage since the static pressure is above 80 psi and must be reduced by a PRV. The 150 dia. Water source is grossly oversized for domestic flow purposes and is sized for fire flow demand with minimum pressure at the building of 73 psi (740 psi).
6. Full pipe capacity and higher for a 5 yr. storm is always permitted by MOE for a 1:5 yr. event using the conservative application of Rational Method as is the case here where the initial Tc + 10 min. was utilized.
7. Access to storm water storage tank access has been relocated to the exterior. Please refer to Site Services Plan SSP-1.
8. The recommendation is appreciated but we believe that the design as prepared is the best option for this project. The Owners are taking full responsibility of the design.
9. A 200 diam. Overflow pipe has been added between the tank wall and MH ST 102, although the theoretical debris blockage scenario is extremely unlikely.
10. The building foundation walls will be designed for internal hydrostatic pressures.
11. Separate grading and servicing plans are attached with this submission.
12. And 13. A sanitary MH has been added at the bend as requested. The connection to the private MH SA 12557 will remain as only the second connection to the MH and is set 0.6 m+/- above the main sewer outlet. An additional MH to receive the service is unwarranted.
14. Attached.

15. Copy of email from DST Consulting Engineers Inc. dated Nov.23/16 is attached. Clay seals not required.
16. Note regarding no on-site snow storage added to A100 Site Plan and Grading Plan.
17. Attached.
18. Armour stone terrace is added and shown and noted on the Landscape Plan.
19. Note added to plan re: storm service blanking.
20. Note: Mud Mat requirement note is added to Drwg. PRSC-2 under "2. Site Access During Construction" notes.
21. Roof drain outlet location shown on Section X-X.

Time of Concentration (Tc) Issue

In response to Outstanding Comments (Item 4) of the email from the City dated Nov16/18, in which the City suggests that the Time of Concentration (Tc) of 15 min. used to set the maximum release rate must be justified in light of the fact that the private storm system originally designed used the Kanata standard of Tc = 20 min. The following calculations are therefore made using Tc = 20 min. from the original Kanata Downfall Intensity/Duration Curves along with the original site area at the time of design of the private system.

Current total site area	= 0.496 ha.
Subtract ½ private road	= 0.039 ha.
	0.457 ha. net.
Original Site Area	= 0.68 ha.
Subtract ½ private road	0.039
	0.641 ha.

1. From the Kanata R/D curve for 1:5 yr., T_{20}, I = 68.5 hr.
   Using the original site area, maximum total site release $Q_R = 2.78 \times 0.641 \times 0.50 \times 68.5 = 61.L/s$

2. Uncontrolled release (Post-Dev.)
   As before except Tc = 20 min. (Kanata R/D)
   $Q_{5(UNC)} = 2.78 \times 0.03276 \times 68.5 = 6.2$ L/s
   $Q_{100\ (UNC)} = 2.78 \times 0.3826 \times 112.5 = 12.0$ L/s

3. Maximum Controlled Release (1:100 yr.)
   $Q_{100} = Q_R - Q_{100\ (UNC)} = 61.0 - 12.0 = 49.0$ L/s
   This compares to 34.1 L/s as designed using Tc = 15 min. with current City runoff I.D. curves.

   Once again, the discussion in Section 6 and Figure 1 of the Design Brief indicates that actual development of the entire K.B.P. contributes only 66% of the original design area to the private system which can therefore be considered as oversized for a 5 year storm.
   With the proposed release of 34.1 L/s (controlled) plus 19.0 (uncontrolled) resulting in 53.1 L/s total site release for the 100 yr. storm compared to 61.0 L/s of total release for a 5 yr. storm on original site area using Tc = 20 min., it is obvious the design using Tc = 15 min. is conservatively low. Additionally, the direct connection of 100 yr. controlled flow (34.1 L/s) to the 300 dia. pipe on Private Rd. having a capacity of 77.5 L/s represents only 44% of the receiving pipe capacity which also receives storm flow from only one existing roadway catchbasin.
   The use of Tc = 15 min. for the proposed design is justified and will not be revised.

Attachment 2.2

From: **Chu, Richard** richard.chu@ottawa.ca
Subject: 301 Palladium Fire Route Application
Date: October 19, 2017 at 12:56 PM
To: rwebster@rogers.com
Cc: Therkelsen, Jennifer Jennifer.Therkelsen@ottawa.ca

Good Afternoon Robert,

My name is Richard Chu, I work for the City of Ottawa under the By-law & Regulatory Services branch. I will be assisting Jennifer Therkelsen with your fire route application.

I have reviewed your Fire Route Designation Application form. I would ask that you send me a copy of your site plans with the proposed fire route sign locations and the proposed fire route I have attached a copy of the Fire Route By-law 2003-499 to this email which indicate the specific requirements and spacing of each sign which can be found at the very bottom of the document. Once the signs have been erected please contact us me for a site inspection.

Thank you,

Richard

traffic_parking_bylaw_en-1-1.pdf

ROBERT WEBSTER
Consultant

06 October 2017

TRANSMITTAL

TO:
Jennifer Therkelsen
Co-ordinator By-Law Enforcement
Emergency and Protective Services
City of Ottawa

RE: Application for Fire Route Designation

Site Plan Control and By-law Amendment for 301 Palladium
File No: D07-12-15-0174 & D02-02-15-0070

Sincerely,

Robert Webster
B.Arch., Architect (Retired), FRAIC
rwebster@rogers.com

339 Riverdale Avenue * Ottawa * Ontario * K1S 1R6

APPLICATION FOR A FIRE ROUTE DESIGNATION

Property Location

301 Palladium Drive Ottawa

Municipal or Lot No. *Street* *City*

Mixed Use Commercial Building

Occupancy Classification or Use of Building(s)

301 Palladium

Identifying Name of Building(s)/Condominium/Shopping Centre

Reason for Application

☒ Fire Chief's Orders ☒ Property Owner/Agent's request

Identification

Details	Applicant/Agent	Property Owner
Name	Robert Webster	301 Palladium Ltd.
Street	339 Riverdale Ave.	4015 Carling Avenue
Apt. No.		Suite 101
City	Ottawa	Kanata (Ottawa)
Postal Code	K1S 1R6	K2K 2A3
Phone (Business)	613-799-1777	613-592-9540
Fax		

All of the statements and representations contained in the attached documents filed in support of this application shall be deemed part of this application for all purposes. Fire route plan details must comply with the specific requirements of the Ontario Building Code and the Fire Route Plan Requirements document provided by the City of Ottawa.

Declaration

I, the undersigned Robert Webster am the, ☒ authorized agent of the property named in the above application, and I certify the truth of all statements or representations contained herein. I, understand that the designation of the proposed fire route shall not be deemed a waiver of any of the provisions of any City of Ottawa by-law or Provincial legislation, notwithstanding including in or omitted from the plans or other material filed in support of or in connection with the above application.

Signature of Owner or Authorized Agent

Sworn before me in the City of Ottawa in the Province of Ontario, this 5th day of October 2017.

Notary Public/Commissioner for Oaths

Attachment 2.3

THIS AGREEMENT made in duplicate this 15th day of ~~April~~ June, 2018.

BETWEEN: **1457722 ONTARIO INC.**

hereinafter called "580 Terry Fox Drive"

AND: **301 PALLADIUM LTD.**

hereinafter called "301 Palladium Drive"

WHEREAS, 580 Terry Fox Drive and 301 Palladium Drive are abutting properties;

AND WHEREAS storm drainage facilities were originally designed for the land in a single ownership;

AND WHEREAS certain aspects of storm drainage, such as site catchment drains are shared between 580 Terry Fox Drive and 301 Palladium Drive;

AND WHEREAS the City of Ottawa in its comments dated May 11, 2017, and, in particular its engineering comments, has requested a written consent in accordance with paragraphs 14 and 17 of the said engineering comments;

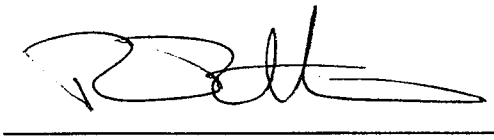
NOW THEREFORE this Agreement witnesses as follows:

1. 580 Terry Fox Drive acknowledges and approves off-site works proposed on their property as illustrated on the plan of post-development drainage and the two supporting tables, forming part of drawing No. SDA-4, revision No. 9, entitled Storm Drainage Area Plan for a Proposed Commercial Building at 301 Palladium Drive, Ottawa prepared by Erion Associates and sealed by L. M. Erion on 3/10/17.

2. 580 Terry Fox Drive acknowledges and accepts stormwater run-off from 301 Palladium Drive land illustrated on the plan of post-development drainage and the two supporting tables, forming part of drawing No. SDA-4, revision No. 9, entitled Storm Drainage Area Plan for a Proposed Commercial Building at 301 Palladium Drive, Ottawa, prepared Erion Associates and sealed by L. M. Erion on 3/10/17.

3. Both 580 Terry Fox Drive and 301 Palladium Drive acknowledge and agree that a Joint Use and Maintenance Agreement will be a condition of site plan approval.

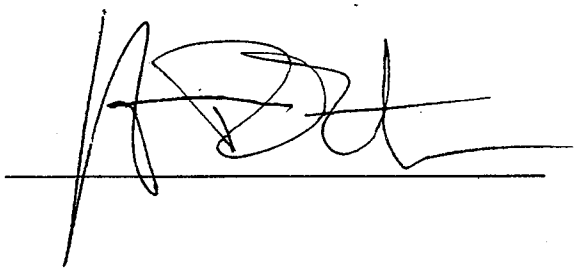
In witness whereof the parties hereto have executed this Agreement.



1457722 ONTARIO INC.

Per_____

I have the authority to bind the Corporation



301 PALLADIUM LTD.

Per_____

I have the authority to bind the Corporation

Attachment 2.4

Lawrence Erion

From: "George Thomas" <gthomas@dstgroup.com>
Date: November-23-16 9:54 AM
To: "Lawrence Erion" <erion@sympatico.ca>
Cc: "Andrew Boyd" <aboyd@ifsassociates.ca>; "Peter Clare" <peter.clare@citantgroup.com>; "gmichael wright" <gmwright@sympatico.ca>; <rwiesbrock@kwc-arch.com>; "Gino Aiello" <gino@gjala.com>; "Bob Webster" <rwebster@rogers.com>; "Andrew Naoum" <anaoum@dstgroup.com>
Subject: Re: 301 Palladium Drive 14-288

Hi Lawrence.

The general site stratigraphy consists of a surficial topsoil layer overlying sand, sand and gravel fill underlain by native silty clay, till mantling inferred bedrock. The presence of bedrock was proven in one (1) borehole. The groundwater level ranges from 2.7 to 4.8 m below the existing grade level (Elev. 101.0 to 98.4 m).

Base on the above, with a 2 m sewer invert, the clay seals is not required.

Thank you.

Regards,

George Thomas, P. Eng.
Director Infrastructure and Engineering
DST Consulting Engineers Inc.
2150 Thurston Drive Suite 203
Ottawa Ontario K1G 5T9
T. 613 748 1415 Ext. 224
C. 613 720 6276
F. 613 748 1356
Sent from my iPhone

On Nov 23, 2016, at 7:00 AM, Lawrence Erion <erion@sympatico.ca> wrote:

> Hello George
>
> Attached are copies of SSG-1 (Rev. 8) PRSC (Rev. 8) that show plan and profile of all sewers and watermains requested.
> As you can see, the sewers are all small diameter and no deeper than 2 m invert below existing grade.
> The only reason the City demanded clay seals was due to your recommendation in the original soils investigation report.
> Please advise ASAP of your recommendation based on the current design that involves only 70 m total length of shallow 250 dia. storm and less than 20 m of 200 dia. sanitary service connection.
>
> Regards
> Lawrence
> **From:** George Thomas
> **Sent:** Tuesday, November 22, 2016 4:53 PM
> **To:** Lawrence Erion
> **Cc:** Andrew Boyd ; Peter Clare ; gmichael wright ; rwiesbrock@kwc-arch.com ; Gino Aiello ; Bob Webster

DST Consulting Engineers Inc.
2150 Thurston Drive, Suite 203
Ottawa, Ontario, Canada, K1G 5T9
Tel: (613) 748-1415
Fax: (613) 748-1356
E-mail: ottawa@dstgroup.com

301 Palladium Ltd. c/o Citant Group Ltd.
4015 Carling Avenue, Suite 201
Ottawa, ON
K2K 2A3

March 17, 2016

Attention: Mr. Peter Clare RQS

Subject: Geotechnical Investigation Program for 301 Palladium Drive, Ottawa Ontario
Report Amendment #1

DST File No.: IN-SO-021872

1. INTRODUCTION

Based on your e-mail dated February 16, 2016, regarding the City of Ottawa comments, DST Consulting Engineers Inc. (DST) has prepared the following supplemental letter subsequent to the completion of the final report, titled, "Geotechnical Investigation Report - 301 Palladium Drive Ottawa Ontario", DST File No.: IN-SO-021872, dated October 2015. DST's responses to the City of Ottawa comments are provided below.

Question 1:

Please note that DST Consulting Engineers Inc. is required to submit a letter to the City of Ottawa signing off on the Grading Plan prepared by Erion Associates to verify that DST Consulting Engineers Inc. has reviewed the proposed grading and accepts that the grading is in conformance with the recommendations of the Geotechnical Investigation Report.

DST has reviewed all the drawings submitted by Erion Associates related to the grading and servicing plan for the proposed commercial building at 301 Palladium Drive. Based on our records, DST has completed the geotechnical investigation program using the following drawings:

- "Site Services and Grading Plan (Composite), Proposed Commercial Building, 301 Palladium Drive, Kanata, Ontario", Drawing No. SSG-1, dated Sept. 2015. Date of last revision: October 19, 2015, prepared by Erion Associates; and,
- "Site Services and Grading Plan (Composite), Proposed Commercial Building, 301 Palladium Drive, Kanata, Ontario", Drawing No. SSG-1 (Project No. EA 14-288), dated Sept. 2015. Date of last revision: March 7, 2016, prepared by Erion Associates.

Based on DST's review of both drawings, the grading and servicing shown in the drawing of March 7, 2016, is in conformance with the recommendations of the Geotechnical Investigation Report.

Question 2:

Please indicate if a temporary MOECC permit to take water (PTTW) is required based on the groundwater monitoring conducted. As per the *City of Ottawa Geotechnical Guidelines, September 2007*, Section 3.3.4, where excavations are required to construct buildings, the need for a PTTW from the MOECCC is expected to be discussed. The report should clearly indicate if a PTTW is required so the application process can be completed as the application process is understood to take 4 to 5 months.

The Groundwater levels were measured in the standpipe piezometers installed in Boreholes BHs 1, 4, 5 and 6 on October 21, 2015 (26 days following completion of drilling), and the measurements varied between 98.4 m and 100.9 m below grade. It is anticipated that excavations will extend below the groundwater level in some areas of the site. However, the ground water level was found to be within a low permeability layer (silty clay), and, thus, groundwater control during construction may be achieved by conventional sump pump techniques; however, the groundwater levels may fluctuate seasonally and in response to climatic conditions. If the groundwater levels remain at the same approximate elevations, there is no need to apply for a temporary MOECC permit to take water (PTTW) and the possible dewatering will be most likely within the 50,000 litres per day.

Question 3:

Please provide a tree planting restrictions section in the report as silty clay deposits were determined to be present on the site. Silty clay is highly sensitive to water depletion by trees of high water demand during periods of dry weather

The site is underlain by marine clay. Therefore, the planting of trees should be in accordance with the City of Ottawa document titled, "Trees and Foundation Strategy in Areas of Sensitive Marine Clay in the City of Ottawa". Trees that do not meet the requirements outlined in this document should be equipped with a tree barrier root system.

Question 4:

A seismic Site Classification is required to be identified as per the Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa, September 20, Section 3.3.3 Seismic Design and Seismic Liquefaction.

The subsurface soil and bedrock conditions at the site were examined in relation to Table 4.1.8.4.A. of the 2010 Ontario Building Code (OBC). The site is underlain by very loose to compact fill, firm to hard clay-silty, loose to very dense till mantling limestone bedrock. Based on the subsurface conditions and the calculated average N-value, shear strength and estimated shear wave velocity of the layers. The site has been classified as Class D for seismic site response.

In accordance with the 2010 National Building Code of Canada (NBCC) hazard calculation, the peak ground acceleration (PGA) is expected to be equal to 0.316 g at this site. A copy of the seismic hazard calculation for this site corresponding to 2% probability of exceedance in 50 years (approximately 1 in 2400 years) is included in Appendix A. The subsurface soils are not considered to have a potential to liquefy during a seismic event.

Question 5:

Please provide discussion in the report regarding the borehole configuration shown on the Borehole Location Plan.

It is indicated in section 4 (Scope of Services), of the Geotechnical Investigation Report - 301 Palladium Drive Ottawa Ontario", DST File No.: IN-SO-021872, dated October, DST has completed the following scope of work to meet the project requirements:

Fieldwork:

- Placement of three (3) boreholes within the proposed building footprint (BH2, BH3 and BH4) and advanced to auger refusal depths on inferred bedrock and termination depth of 4.3 to 8.9 m. Bedrock was confirmed in Borehole BH3 by coring a 4.2 m length of bedrock. These boreholes provide information the geotechnical information for the building foundation and excavation works.
- Placement of three (3) boreholes (BH1, BH5 and BH6) within the proposed exterior of the building and parking lot area. The boreholes were advanced to depths ranging from 3.6 to 4.8 m. These boreholes provide the geotechnical information for the pavement design and excavation works.
- Installation of standpipe piezometer in four (4) boreholes for the monitoring of the groundwater levels. Locations of the advanced boreholes are shown in Appendix B of the report.

Question 6:

Please provide the applicable thresholds for conductivity, chloride, sulphate and pH as per the Canadian Standards Association, or other satisfactory bodies in the report.

In addition to section 7 of the final geotechnical investigation report prepared by DST, DST has included the applicable thresholds for conductivity, chloride, sulphate and pH in table 1 shown below.

Table 1 Additional Requirements for Concrete Subjected to Sulphate Attack

S-1	Very Severe	> 2.0	HS or HSb
S-2	Severe	0.20 – 2.0	HS or HSb
S-3	Moderate	0.10 – 0.20	MS, MSb, LH, HS, or HSb

*Information from Table 3 of CSA Standards A23.1-04

Yours truly,
DST CONSULTING ENGINEERS, INC

George Thomas, P. Eng.
Senior Principal

2010 National Building Code Seismic Hazard Calculation

INFORMATION: Eastern Canada English (613) 995-5548 français (613) 995-0600 Facsimile (613) 992-8836
Western Canada English (250) 363-6500 Facsimile (250) 363-6565

Requested by: , DST Consulting Engineers

February 22, 2016

Site Coordinates: 45.3003 North 75.9081 West

User File Reference: 301 Palladium Drive

National Building Code ground motions:
2% probability of exceedance in 50 years (0.000404 per annum)

Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	PGA (g)
0.619	0.299	0.134	0.045	0.316

Notes. Spectral and peak hazard values are determined for firm ground (NBCC 2010 soil class C - average shear wave velocity 360-750 m/s). Median (50th percentile) values are given in units of g. 5% damped spectral acceleration (Sa(T), where T is the period in seconds) and peak ground acceleration (PGA) values are tabulated. Only 2 significant figures are to be used. ***These values have been interpolated from a 10 km spaced grid of points. Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the calculated values.***

Ground motions for other probabilities:

Probability of exceedance per annum	0.010	0.0021	0.001
Probability of exceedance in 50 years	40%	10%	5%
Sa(0.2)	0.085	0.240	0.376
Sa(0.5)	0.042	0.119	0.181
Sa(1.0)	0.017	0.054	0.085
Sa(2.0)	0.0060	0.017	0.027
PGA	0.036	0.118	0.195

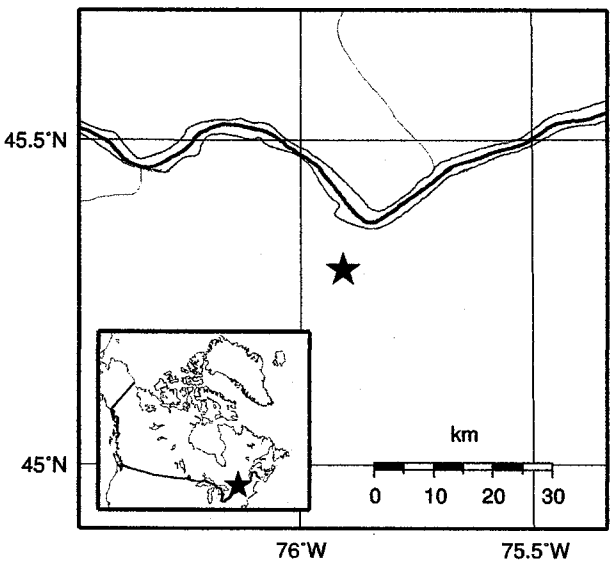
References

National Building Code of Canada 2010 NRCC no. 53301; sections 4.1.8, 9.20.1.2, 9.23.10.2, 9.31.6.2, and 6.2.1.3
Appendix C: Climatic Information for Building Design in Canada - table in Appendix C starting on page C-11 of Division B, volume 2

User's Guide - NBC 2010, Structural Commentaries NRCC no. 53543 (in preparation)
Commentary J: Design for Seismic Effects

Geological Survey of Canada Open File xxxx
Fourth generation seismic hazard maps of Canada: Maps and grid values to be used with the 2010 National Building Code of Canada (in preparation)

See the websites *www.EarthquakesCanada.ca* and *www.nationalcodes.ca* for more information

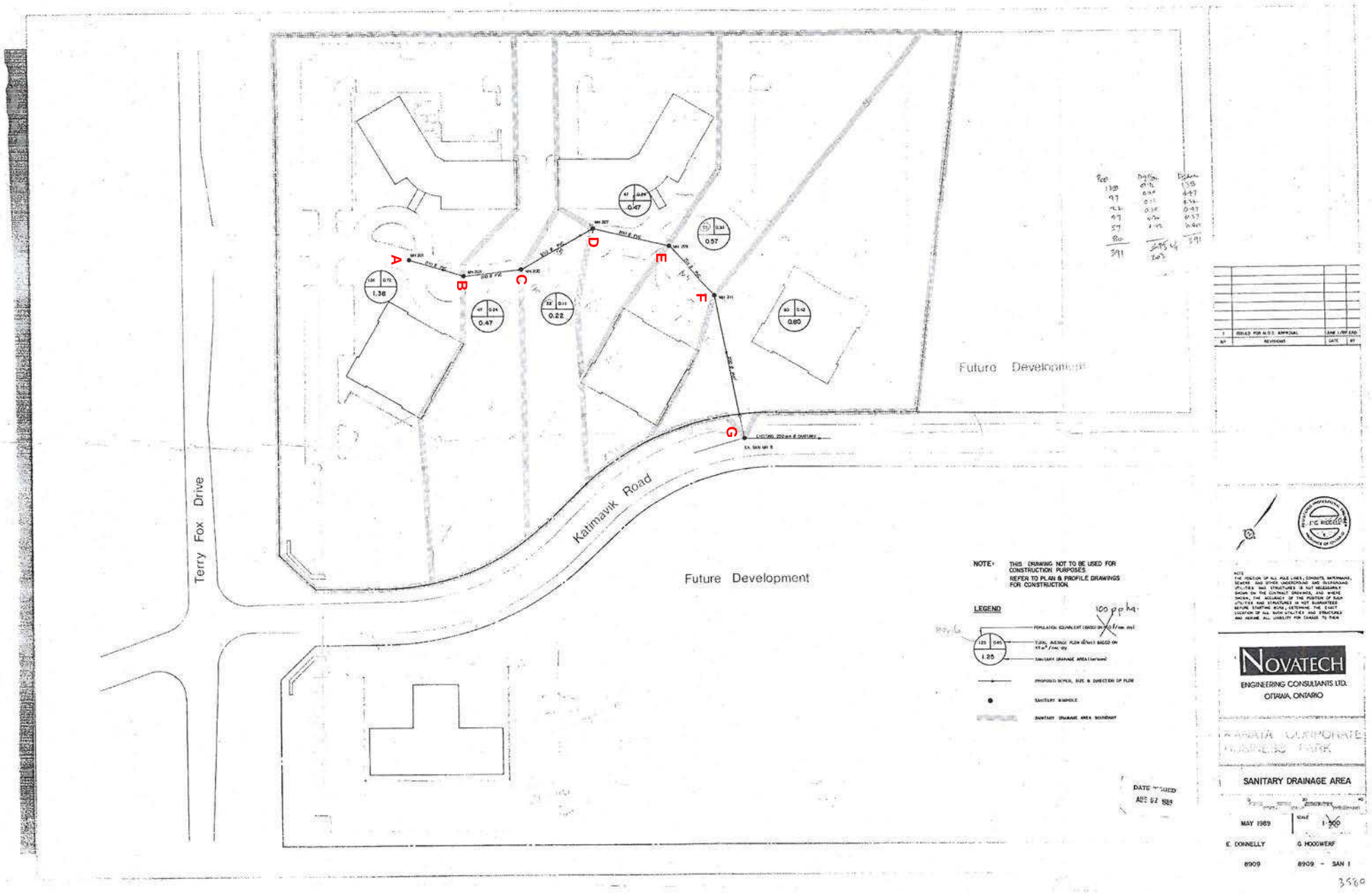


Aussi disponible en français

Natural Resources Canada
Ressources naturelles Canada
Canada

Appendix G

Non-regulatory Correspondence



NOTE: THIS DRAWING NOT TO BE USED FOR CONSTRUCTION PURPOSES
REFER TO PLAN & PROFILE DRAWINGS FOR CONSTRUCTION

LEGEND

100 ppl/ha

POPULATION EQUIVALENT (BASED ON 3.4 l/cap/day)

PEAK AVERAGE FLOW (l/sec) BASED ON 45 m³/ha/day

SANITARY DRAINAGE AREA (hectares)

PROPOSED SEWER, SIZE & DIRECTION OF FLOW

SANITARY MANHOLE

SANITARY DRAINAGE AREA BOUNDARY

DATE ISSUED
AUG 02 1989

1	ISSUED FOR M.O.E. APPROVAL	JUNE 1/89
NO.	REVISIONS	DATE

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

P.G. RIDDELL
PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

NOVATECH
ENGINEERING CONSULTANTS LTD.
OTTAWA, ONTARIO

KANATA CORPORATE BUSINESS PARK

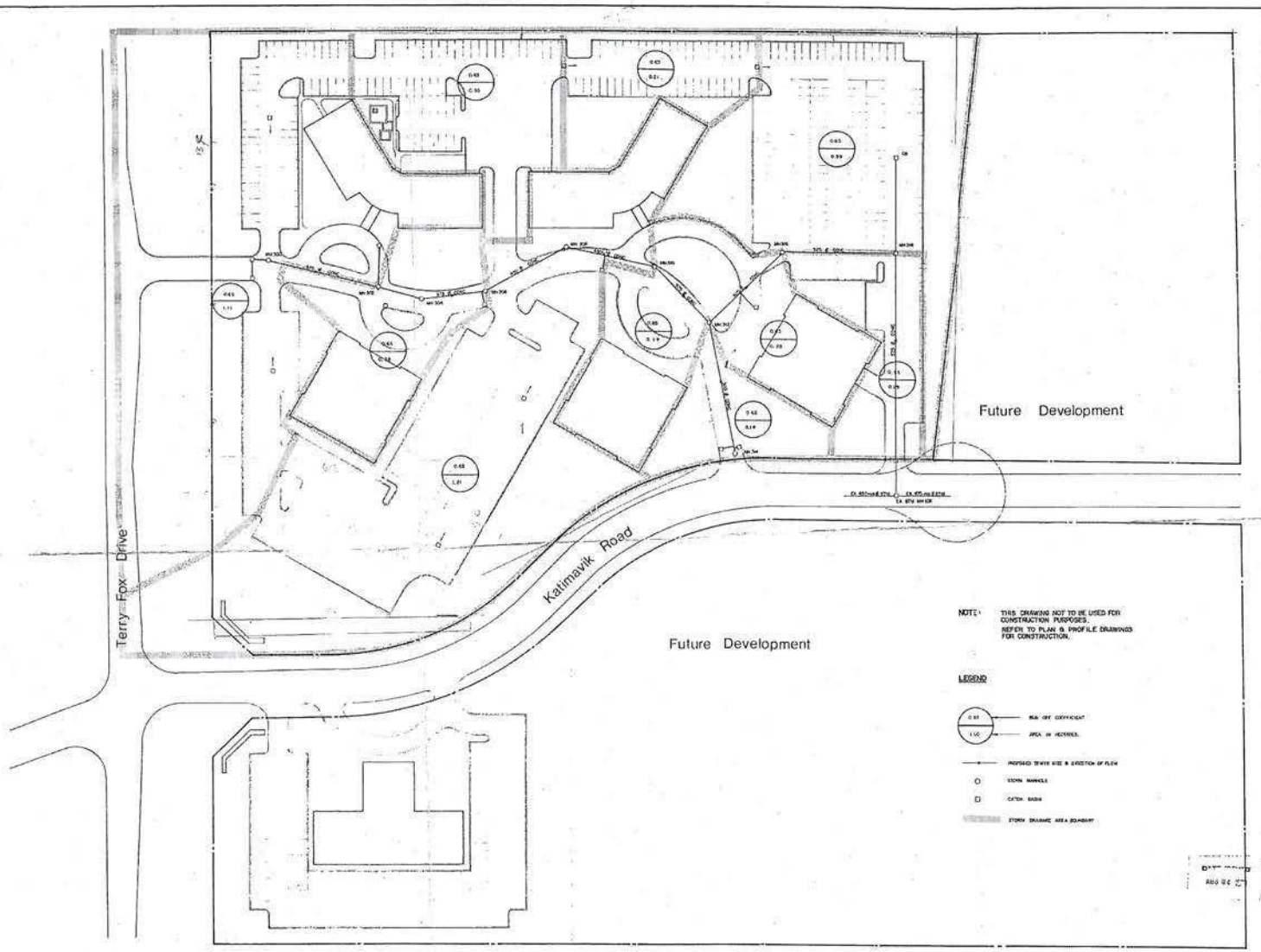
SANITARY DRAINAGE AREA

MAY 1989 | SCALE 1:500

E. DONNELLY | G. HOOGWERF

8909 | 8909 - SAN 1

3560



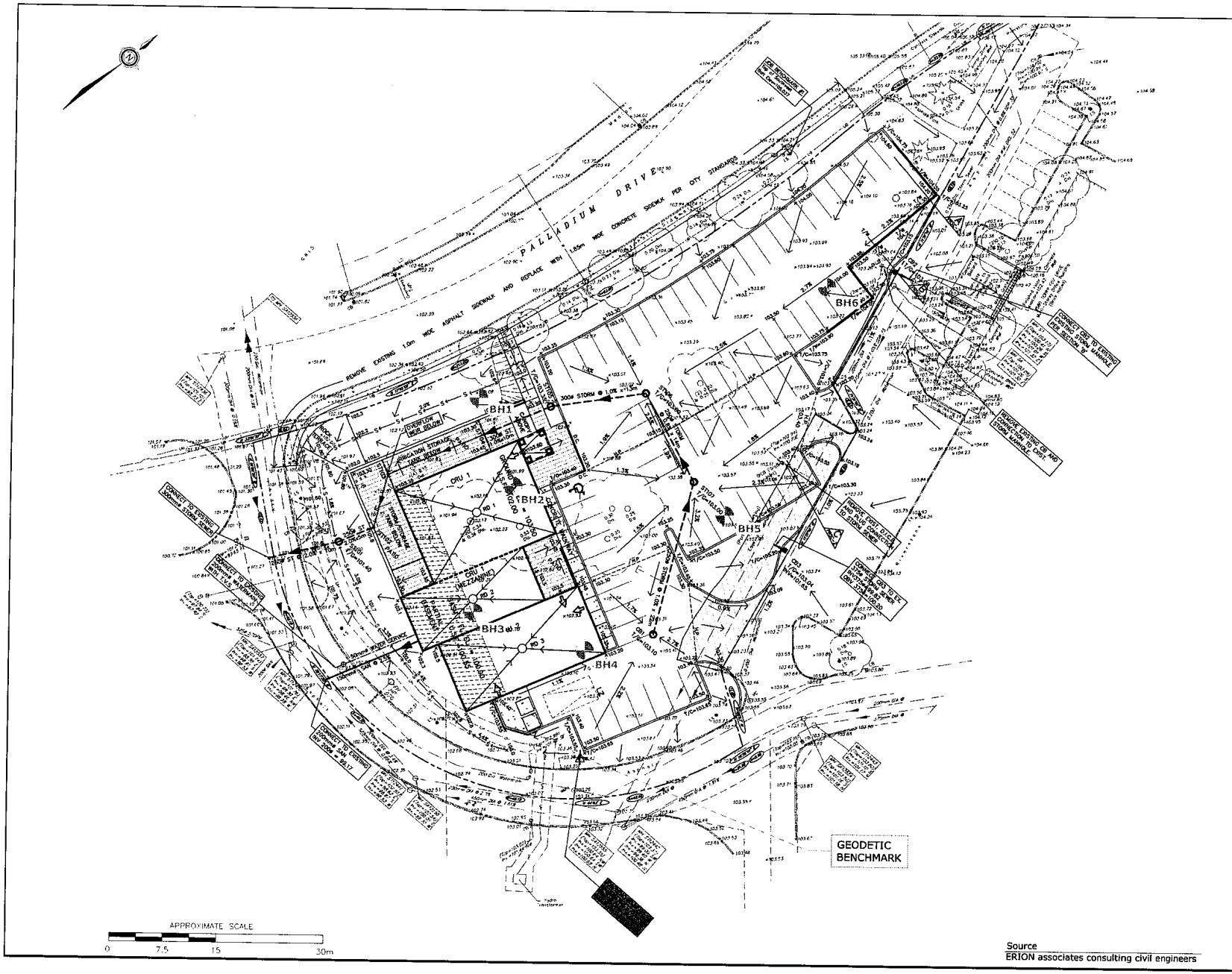
NO	REVISION	DATE	BY
1	ISSUED FOR SITE APPROVAL	4 MAY 89	GMH

NOVATECH
ENGINEERING CONSULTANTS LTD.
OTTAWA, ONTARIO

PROJECT
KANATA CORPORATE BUSINESS PARK

DRAWING
STORM DRAINAGE AREA

DATE: MAY 1989	SCALE: 1:500
DESIGN BY: E. DONNELLY	DRAWN BY: G. HODGKINS
PROJECT NUMBER: 8909	SHEET NUMBER: 8909—STM 1



Source
ERION associates consulting civil engineers

DST
consulting engineers
2150 THURSTON DRIVE, SUITE 203
OTTAWA, ONTARIO, K1G 5T9
TEL (613) 748-1415 FAX (613) 748-1356
www.dstgroup.com

LEGEND:

APPROXIMATE BOREHOLE LOCATIONS

BH6

GEODETIC ELEVATION

NOTE:
1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE ASSOCIATED TECHNICAL REPORT.

REV	DATE	ISSUE	APPROVAL
0	29/10/15	ORIGINAL	G.T.

PROJECT TITLE

GEOTECHNICAL INVESTIGATION – PROPOSED COMMERCIAL DEVELOPMENT 301 PALLADIUM DRIVE OTTAWA, ON

DRAWING TITLE

BOREHOLE LOCATION PLAN

DESIGNED BY A.A.	SCALE AS SHOWN
DRAWN BY R.P.	DATE October 2015
PROJECT MANAGER A.A.	PROJECT NO.: IN-SO-021872
Figure No.: FIGURE 2	

McKEE ENGINEERING

R.J. McKEE ENGINEERING LTD
1785 Woodward Drive
Ottawa, ON K2C 0P9
CANADA
Tel.: (613) 723-9585
Fax: (613) 723-9584
www.mckeeottawa.ca

April 26, 2016

File No: 16108

Email: rwiesbrock@kwc-arch.com

KWC Architects Inc.
383 Parkdale Avenue, Suite 201,
Ottawa, Ontario K1Y 4R4

Attention: Ralph Wiesbrock

Reference: 301 Palladium Drive Site Lighting

Dear Sir :

This is to confirm the new site lighting package we have prepared for this project:

a) Is designed using only fixtures that meet the criteria for Full Cut-Off (Sharp cut-off) Classification, as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and;

b) Results in minimal light spillage onto adjacent properties, with less than 0.5 fc spillage based on our calculations.

Yours truly

McKEE ENGINEERING LTD.

Brian Thornhil, P.Eng., LEED®AP
Vice-President– Electrical

IFS ASSOCIATES
P.O. Box 13593, Ottawa, ON K2K 1X6
Telephone: (613) 839-0101
Fax: (613) 839-0114
Website: www.ifsassociates.ca
Urban Forestry & Forest Management Consulting

February 18, 2016

Gino J. Aiello, Landscape Architect
50 Camelot Drive
Ottawa, ON
K2G 5X8

Re: Tree Conservation Report – 301 Palladium Drive

Dear Gino,

This report details a pre-construction Tree Conservation Report (TCR) for the above-noted property in Ottawa. The need for this TCR is related to the future re-development of the site. Such reports are required for all site plan control applications for properties on which a tree of 10 centimetres in diameter or greater is present. Once this TCR is approved by the City of Ottawa a permit to remove the designated trees will be issued. No tree removal should occur prior to the permit being obtained.

The inventory in this report details the assessment and retention/removal status of all individual trees now present on or adjacent to the subject property. Four spruce on private property and five maturing honey-locust on City of Ottawa property will remain in place. Four ash trees dying of Emerald ash borer *(Agrilus planipennis)*-EAB and single healthy trees of white elm, basswood and crab apple will be removed as a result of the proposed work. Each of these trees is located on private property.

No trees on adjacent private or City property will be impacted by the proposed re-development which includes the addition of a commercial building and surrounding parking. Changes to the surrounding landscape are also planned.

None of the trees to be removed are of a condition or size which would allow them to be successfully transplanted out of the way of construction.

TREE SPECIES, SIZE, CONDITION AND STATUS

Table 1 on page 2 details the species, condition, size (diameter) and preservation status of trees present on the subject and adjacent city property. Each tree is referenced by the numbers plotted on the accompanying tree plan prepared by Gino J. Aiello, Landscape Architect.

Table 1. Species, condition, diameter and status of trees at 301 Palladium Drive.

Tree No.	Tree Species	Condition (VP→E)	D.B.H (cm)	Tree Condition Notes & **Preservation Status** (to be removed, relocated or retained)
1	Colorado green spruce *(Picea pungens)*	Poor	14	Maturing; heavy salt spray damage to lower crown ; **to be retained**
2	Colorado green spruce	Good	17	Maturing; moderate damage to lower crown facing parking due to snow piling; **to be retained**
3	White spruce *(Picea glauca)*	Good	4	Juvenile; recently planted; **to be relocated**
4	White spruce	Good	4	Juvenile; recently planted; **to be relocated**
5	Honey-locust *(Gleditsia triacanthos)*	Good	24	Maturing; City-owned; dense crown; growing against lamp post; sprouting on lower stem; **to be retained**
6	Honey-locust	Good	26	Maturing; dense, symmetrical crown; **to be retained**
7	Honey-locust	Fair	14	Maturing; upright, stunted form (possibly 'Skyline'); **to be retained**
8	Honey-locust	Good	21	Maturing; dense, symmetrical crown; **to be retained**
9	Honey-locust	Good	23	Maturing; dense, broad, symmetrical crown; **to be retained**
10	Honey-locust	Good	15	Maturing; upright, stunted form (possibly 'Skyline'); **to be retained**
11	Honey-locust	Fair	18	Maturing; thin crown with dieback; growing against lamp post; multiple ground hog holes beneath root plate-may explain health, possibly undermining stability; **to be retained**
12	Honey-locust	Good	12	Maturing; dense, broad, symmetrical crown; **to be retained**
13	Crab apple *(Malus spp.)*	Good	35	Mature; multi-stemmed from grade; dense crown; **to be removed**
14	Basswood *(Tilia americana)*	Good	30 avg.	Mature; five stemmed from grade-all divergent; **to be removed**
15	White elm *(Ulmus americana)*	Good	56	Mature; no outward signs of Dutch elm disease (*Ophiostoma novo-ulmi*); **to be removed**
16	Ash (*Fraxinus* spp.)	Poor	36	Mature; advanced EAB infestation; **to be removed**

Table 1. Continued

17	Ash	Poor	33	Mature; advanced EAB infestation; **to be removed**
18	Ash	Poor	32	Mature; advanced EAB infestation; **to be removed**
19	Ash	Poor	25 avg.	Mature; advanced EAB infestation; **to be removed**

Pictures 1, 2, 3 and 4 on pages 4 and 5 show all trees detailed in Table 1.

TREE PRESERVATION AND PROTECTION MEASURES

Preservation and protection measures intended to mitigate damage during construction will be applied for the trees to be retained. The following measures are required by the City of Ottawa to ensure the survival of retained trees during and after construction:

1. Erect a fence at the critical root zone (CRZ[1]) of trees;
2. Do not place any material or equipment within the CRZ of the tree;
3. Do not attach any signs, notices or posters to any tree;
4. Do not raise or lower the existing grade within the CRZ without approval;
5. Tunnel or bore when digging within the CRZ of a tree;
6. Do not damage the root system, trunk or branches of any tree;
7. Ensure that exhaust fumes from all equipment are NOT directed towards any tree's canopy.

[1] The critical root zone (CRZ) is established as being 10 centimetres from the trunk of a tree for every centimetre of trunk Diameter at breast height (DBH). The CRZ is calculated as DBH x 10 cm.

Please do not hesitate to contact me if you have any questions concerning this Tree Conservation Report.

Yours,

Andrew Boyd

Andrew K. Boyd, B.Sc.F., R.P.F.
Consulting Urban Forester

Picture 1. Spruce trees 1 through 4 at 301 Palladium Drive.


Picture 2. Honey-locust trees 5 through 12 at 301 Palladium Drive.

Picture 3. Trees 13, 14 and 15 at 301 Pallidum Drive.

Picture 4. Ash trees 16 through 19 at 301 Pallidum Drive.

Appendix H

Site Servicing Checklist

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

N/A ☐ Executive Summary (for larger reports only).

☒ Date and revision number of the report.

☒ Location map and plan showing municipal address, boundary, and layout of proposed development.

☒ Plan showing the site and location of all existing services.

☒ Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.

☒ Summary of Pre-consultation Meetings with City and other approval agencies.

☒ Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.

☒ Statement of objectives and servicing criteria.

☒ Identification of existing and proposed infrastructure available in the immediate area.

N/A ☐ Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).

☒ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.

☒ Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.

☒ Proposed phasing of the development, if applicable.

☒ Reference to geotechnical studies and recommendations concerning servicing.

☒ All preliminary and formal site plan submissions should have the following information:

- Metric scale
- North arrow (including construction North)
- Key plan
- Name and contact information of applicant and property owner
- Property limits including bearings and dimensions
- Existing and proposed structures and parking areas
- Easements, road widening and rights-of-way
- Adjacent street names

4.2 Development Servicing Report: Water

☒ Confirm consistency with Master Servicing Study, if available

☒ Availability of public infrastructure to service proposed development

☒ Identification of system constraints

☒ Identify boundary conditions

☒ Confirmation of adequate domestic supply and pressure

☒ Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.

☒ Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.

N/A ☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design

☒ Address reliability requirements such as appropriate location of shut-off valves

N/A ☐ Check on the necessity of a pressure zone boundary modification.

☒ Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range

☒ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.

N/A ☐ Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.

☒ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.

☒ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

4.3 Development Servicing Report: Wastewater

☒ Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).

☒ Confirm consistency with Master Servicing Study and/or justifications for deviations.

☒ Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.

☒ Description of existing sanitary sewer available for discharge of wastewater from proposed development.

☒ Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)

☒ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.

☒ Description of proposed sewer network including sewers, pumping stations, and forcemains.

N/A ☐ Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).

N/A ☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.

N/A ☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.

N/A ☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.

☒ Special considerations such as contamination, corrosive environment etc.

4.4 Development Servicing Report: Stormwater Checklist

☒ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)

☒ Analysis of available capacity in existing public infrastructure.

☒ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.

☒ Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.

☒ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.

☒ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.

N/A ☐ Set-back from private sewage disposal systems.

N/A ☐ Watercourse and hazard lands setbacks.

☒ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.

N/A ☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.

	☒	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).
N/A	☐	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.
	☒	Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.
N/A	☐	Any proposed diversion of drainage catchment areas from one outlet to another.
	☒	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.
N/A	☐	If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.
N/A	☐	Identification of potential impacts to receiving watercourses
N/A	☐	Identification of municipal drains and related approval requirements.
	☒	Descriptions of how the conveyance and storage capacity will be achieved for the development.
	☒	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.
N/A	☐	Inclusion of hydraulic analysis including hydraulic grade line elevations.
	☒	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.
N/A	☐	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.
N/A	☐	Identification of fill constraints related to floodplain and geotechnical investigation.

4.5 Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

N/A ☐ Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.

N/A ☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.

N/A ☐ Changes to Municipal Drains.

☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

4.6 Conclusion Checklist

☒ Clearly stated conclusions and recommendations

☐ Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.

☒ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario