ERION ASSOCIATES
consulting civil engineers

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

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 EA 14-288

SITE SERVICEABILITY BRIEF

for

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

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'C' Stormwater Management Calculations

SITE SERVICES & STORMWATER MANAGEMENT
DESIGN BRIEF

October, 2015

EA 14-288

PROJECT: PROPOSED ONE STOREY COMMERCIAL BUILDING
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.
2. SITE DESCRIPTION
   2.1 Location: An irregular shaped 3-sided parcel having 101.69 m frontage on the east side of Palladium Drive approximately 60 m southwest of the southwest corner of Palladium Dr./Terry Fox Dr. intersection.
   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).
   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 fill 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 Kanata Business Park 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 infrastructure is all connected to the original sewer and water line on Palladium Dr.
   There are no connections from the subject site to existing private water and sanitary sewer mains.

2.6 Site Drainage

Currently, 65% of the site runoff is collected along the south boundary where it flows over the curb to catchbasins in the private road. The remaining 35% is collected by 2 catchbasins on the easterly side of the site along with adjacent access road and parking areas servicing Terry Fox Drive.

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 gross floor area of 700 sq. m plus exterior patio of 185 sq. m along with a parking area for 71 cars and perimeter landscaping is proposed over an area of 4321 sq. m. out of 4960 sq. m of the total site.

The difference between these two areas accounts for the fact that 639 sq. m has previously been developed as part of earlier phases in Kanata Business Park and cannot be altered or utilized any differently by the new development by reasons of topographic constraint in the north end and existing road access along the south boundary.

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 the existing topography to minimize site re-grading along with t routing of on-site storm sewer flow through chamber space created below the extensive outdoor patio areas that will serve two purposes: (a) collect and store water for landscape irrigation use during the growing season and (b) provide detention storage for all building roof and parking area runoff to allow release at a 1:5 yr. storm rate for all storms up to 1:100 yr. return frequency.

The design will reduce runoff from the proposed development area to the east boundary storm by 54% while controlling runoff to the south boundary storm sewer to within the capacity of the 300 dia. pipe for all storms up to 1:100 yr.

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 within 50 mm to the existing 200 mm dia. watermain along the private road.
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 16 m from the nearest building entry at the southeast corner. Calculations for Hydrant HP070 indicate that there is adequate capacity (residual pressure) to meet the fire flow demand of 5,000 L/min (83 L/sec) per the F.U.S. method.

5. WASTEWATER

A proposed 150 mm dia. pipe @ 2.5 % is sized to connect the building to the 200 dia. sanitary sewer on the private (common element) road at the south boundary. Calculations in Appendix 'B' are based on theoretical seating capacity for both a restaurant/tavern in unit CRU-1 and a coffee shop in CRU-2 as shown on Site Plan A 100 by K.W.C. Architects, Inc.

6. STORM DRAINAGE

The basis for design of storm drainage on the development portion of the site is to maximize the area for collection and control by detention and restricted release rate to existing storm sewer at the south boundary (88.5%) while minimizing the area to be discharged uncontrolled to the east boundary storm sewer (11.5%). With exception of the 2 small proposed paved site vehicle access locations, all of the easterly uncontrolled discharge will be landscaped areas that represent 5.8% of total site runoff. The remaining site runoff (94.2%) consists of all paved parking area plus building roof surface and the major landscaped area at the south end of the site.
Only a minor relocation of 2 existing manholes along the easterly boundary will be required to handle the 5.8% site area runoff while a new connection to the existing 300 mm dia. storm sewer at the south boundary will be required. This connection must be sized to accommodate unrestricted flow from a 1:5 yr. storm event as follows: (Ref. Dwg. SDA-3)

Drainage Area = 3822 m^2 (Areas A1 to A9)
A x C = 2824 (Areas A1 to A9)
Rainfall Intensity (I) = 104.2 (Tc = 10 min.)
(I) = 83.6 (Tc = 15 min.)
Q_5 = 2.78 x A xC x I
= 2.78 x 0.2824 x 104.2 = 81.8 L/s (Tc = 10 min)
= 2.78 x 0.2824 x 83.6 = 65.6 L/s (Tc = 15 min)

Based on the foregoing conservative calculation, a selction of 250 mm dia. @ 2.0% has been chosen for the connection of proposed MH ST 101 to the existing 300 mm dia. storm sewer between MH ST 12436 and MH ST 12435.

Capacity of 250 dia. @ 2.0% = 87.7 L/sec: Vfull = 1.73 m/sec.
Capacity of 300 dia. @ 0.59% = 77.5 L/sec: Vfull = 1.06 m/sec. (Existing Private Sewer)

7. STORMWATER MANAGEMENT

Runoff from 88.5% of the site area will be controlled by routing the parking lot plus building roof runoff through concrete chambers below the patio areas at the southwest corner of the proposed building where it will be first retained for landscape irrigation water supply and then detained by a restrictive orifice in MH ST101 before being released to the private roadway storm sewer.

In calculating the size of detention storage, no allowance is made for available volume in the irrigation storage area: it is assumed to be full at the beginning of the 1:100 yr. storm event. Refer to Appendix 'C' for detailed calculations of maximum release rate, storage volume required and provided and sizing of the ICD orifice restriction in MH ST101.

Foundation drainage for the building must be connected immediately downstream of MH ST101.

The choice of routing storm runoff through the 2 storage chambers below the patio was made to seize the opportunities presented by a combination of site topography, grading design and building design.

It is intended that irrigation storage will be utilized to supply a trickle irrigation system to be installed in the landscaped area adjacent to the west and south walls of the proposed building. During winter, the irrigation storage will remain empty after flushing in late autumn.

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.

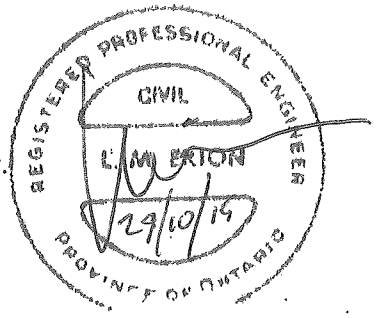
9.3 There is adequate capacity in the receiving private sanitary sewer system and downstream municipal system for the low demand from the proposed development which is at a significantly lower rate than was originally planned for this site in the Kanata Business Park.

9.4 Design of the storm drainage and S.W.M. system limits and reduces site runoff to the eastern boundary access while controlling nearly 95% of site runoff to the City Standard of a 1:5 yr. storm event before discharging into the existing storm sewer system.

9.5 Design of the S.W.M. system uses a unique arrangement for suppling irrigation water storage ahead of 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.

Design Brief prepared and submitted by

Lawrence Erion, P.Eng.



APPENDIX 'A'

WATER SUPPLY CALCULATIONS

5 pages

Water Analysis for 301 Palladium Drive

Boundary condition provided by City of Ottawa on Palladium Drive 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

Elevations

Proposed Building	Basement Floor	100.90 m
	Finished Floor	103.50 m
Road elevation at site hydrant		102.20 m

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

MXDY + Fire elevation	155.10 m	
Hydrant elevation	103.50 m	
Difference	51.60 m	
Pressure	505.9 kPa	(73.4 psi)

For fire flow of 83.3 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,

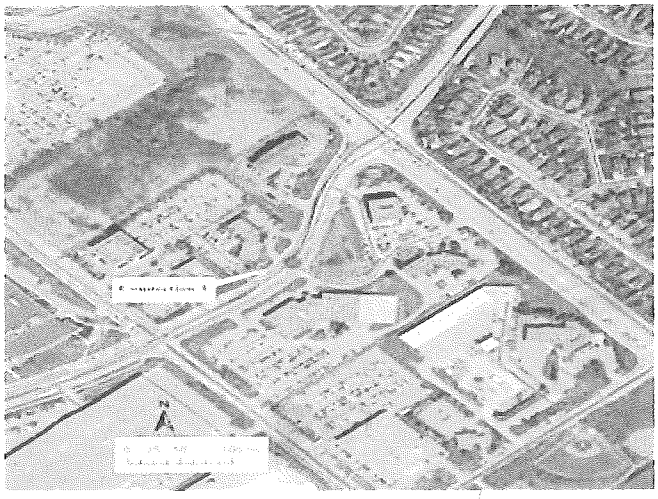
Please find below water distribution network boundary condition results for hydraulic analysis as requested for the 200mm dia. private watermain in the common element road block based on the provided anticipated water demand and fire flow demand requirements.

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

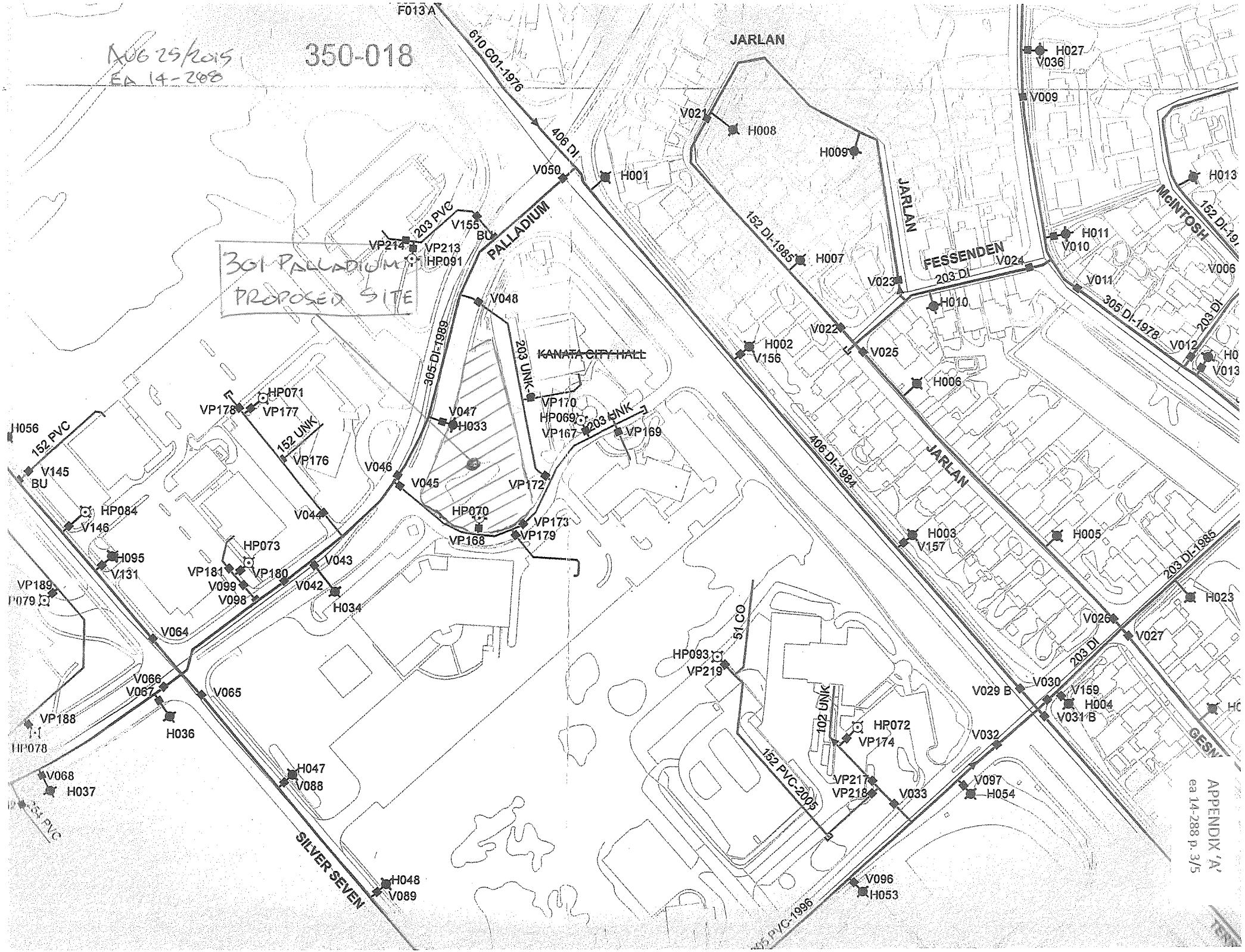
City of Ottawa Watermain Boundary Conditions:

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 29/2015
EA 14-288
350-018
301 PALLADIUM
PROPOSED SITE
F013 A
610 C01-1976
406 DI
JARLAN
H027
V036
V009
V021
H008
H009
V050
H001
PALLADIUM
203 PVC
V155
BU
VP214
VP213
HP091
152 DI-1985
H007
FESSENDEN
203 DI
V024
V023
H011
V010
McINTOSH
152 DI-19
H013
V006
V011
305 DI-1978
203 DI
V012
H010
V022
V025
H002
V156
H006
V048
305 DI-1989
203 UNK
KANATA CITY HALL
VP170
HP069
VP167
203 UNK
VP169
HP071
VP178
VP177
152 UNK
VP176
V047
H033
V046
V045
VP172
H056
152 PVC
V145
BU
HP084
V146
V044
HP070
VP168
VP173
VP179
H003
V157
H005
HP073
VP181
VP180
V043
V042
H034
H095
V131
V099
V098
VP189
HP079
V064
203 DI-1985
H023
V026
V027
51 CO
HP093
VP219
V066
V067
V065
V029 B
V030
V159
H004
V031 B
102 UNK
HP072
VP174
V032
VP188
H036
HP078
V068
H037
H047
V088
152 PVC-2005
VP217
VP218
V033
V097
H054
254 PVC
SILVER SEVEN
H048
V089
V096
H053
PVC-1996
APPENDIX 'A'
ea 14-288 p. 3/5

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 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'

APPENDIX 'B'

SANITARY SEWER SIZING

1 page

APPENDIX 'B'

October,2015 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)

APPENDIX 'C'

STORMWATER MANAGEMENT CALCULATIONS

2 pages

APPENDIX 'C'

October/2015

EA 14-288
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 = 4460 m^2
   Subtract previously developed areas (A4,A5,A6) = 639 m^2
   Area to be developed = 4960 – 639 = 4321 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
   Q_R = 2.78 x 0.4321 x 0.50 x 83.6 mm/hr. = 50.2 L/s

2. UNCONTROLLED RELEASE (POST-DEV)
   Areas A10 thru A15 incl. (A x C = 171.4)
   Q_5 (UNC) = 2.78 x 0.0174 x 83.6 = 4.0 L/s
   Q_{100} (UNC) = 2.78 x 0.0174 x 142.9 = 6.9 L/s

3. MAXIMUM CONTROLLED RELEASE (1:100 yr. storm)
   $Q_{100} = Q_R - Q_{UNC}$ = 50.2 – 6.9 = 43.3 L/s
   To be controlled by restrictive orifice in MH ST 101.
   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 = 3822 m^2 (A x C = 2824.4)
   Q_{100} = 2.78 x 0.28244 = I_{100} = 0.78518 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	140.2	43.3	96.9	0.6	58.1
15	142.9	112.2	43.3	68.9	0.9	62.0
20	120.0	94.2	43.3	51.9	1.2	62.3 <
25	103.9	81.6	43.3	38.3	1.5	57.5

Required Storage = 62.3 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 and therefore assumes that the irrigation storage area between ST 104 and ST 103 is filled to the top of overflow weir (ST 103) at elevation 100.85 at the beginning of the 1:100 yr. storm event.

Inside dimension of storm storage area = 4.85m x 14.75 m = 71.5 m^2
Maximum W.L. to overflow at ST 101 = 100.75 m
Volume = 99.85 – 99.75 = 0.1 x 71.5 x 1/3 = 2.38 m^3
+ 100.75 – 99.85 = 0.9 x 7.15 = 64.35 m^3
Total Storage Volume Provided 66.73 m^3 < 62.3 m^3 required

6. DETERMINE SIZE OF ICD at ST 101

Choose a plug-type circular orifice (sharp edged)to be installed in the downstream outlet of MH ST 101.

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

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

where Q_r = max. release rate = 0.0433 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 = 100.75 – 99.47 = 1.28 m.

$A = \frac{0.0433}{0.61\,(19.62 \times 1.28)^{0.5}} = 0.0141646\ m^2$

DIAMETER = $(4/\pi \times 0.0141646)^{0.5}$ = 0.134 m (134 mm)