CAPITAL ENGINEERING GROUP LTD

Municipal / Environmental / Land Development

SERVICING AND STORMWATER MANAGEMENT REPORT
AGES DRIVE INDUSTRIAL BUILDINGS
899 AND 903 AGES DRIVE, CITY OF OTTAWA
Revised February 22, 2019

EXISTING CONDITIONS

This site is located along the north side of Ages Drive, south of the Walkley Canadian Pacific Railway tracks and north of Swansea Crescent, within the Hawthorne Road Industrial Park in the south central area of the City of Ottawa. The site is rectangular in shape with a frontage of approximately 250 m along Ages Drive and a depth of 73 m. The total site area is roughly 1.89 hectares.

The property is zoned General Industrial and is currently vacant.

The existing municipal infrastructure along Ages Drive includes a 300 mm watermain, a 250 mm sanitary sewer and a 675 mm storm sewer. The storm sewer continues easterly along Ages Drive and outlets to the Mather Award Drain just west of Hawthorne Road. The Mather Drain is a tributary to Green's Creek which flows northeasterly through the east end of the City of Ottawa and discharges to the Ottawa River.

Current site drainage is generally in the northeasterly direction towards the adjacent railway ditch.

Other utilities including hydro and telephone are also available along Ages Drive. Gas is expected to be extended to the area in the near future

PROPOSED DEVELOPMENT

The property owners propose to construct two one-storey industrial buildings, to accommodate warehouse and office spaces for multiple tenants. The development includes access entries and paved parking in front of each building on the west and east sides of the property. A common loading area with direct access to Ages Drive near the midpoint of the lot will also be built. Each building will have separate recessed loading docks with access from the common loading area

The building foot prints are approximately 4,430 m^2 each and will both be equipped with sprinkler systems.

BUILDING SERVICES

Water, sanitary and storm (roof and weeping tile outlet) services will be extended to the mechanical room at the back of each building. The new services will have separate connections to the municipal infrastructure on Ages Drive. The services will include:

110 Dossetter Way, Ottawa, Ontario K1G 4S5
Tel: (613) 739-0776 Fax: (613) 739-7302

- 200 mm diameter PVC pressure pipe water services, with a valve and box at the property line.

- 150 mm diameter PVC sanitary pipes, with a monitoring manhole near the outlet

- 250 mm diameter PVC storm pipes, with a monitoring manhole at the outlet

Two private fire hydrants will also be installed adjacent to the parking areas for each building. The new hydrants will have separate connections to the watermain and will be located within 45 m of the Siamese connections, in order to meet the Building Code requirements for sprinklered buildings.

The building services are shown on the Servicing Plan, Drawing 18-30, G1

The average and peak sewage flows can be estimated using the City of Ottawa Sewer Design Guidelines (Section 4.4.1.3) for General Industrial Zone, as follows:

Site Area per building	0.95 Ha (50 % of total site area)
Flow per Hectare	35,000 Liters per day
Peaking factor (Appendix 4-B)	6.75

Average daily flow	33,250 L per day
Average flow rate based on 12 hour daily operation	0.77 L/s
Peak flow rate	5.2 L/s

Adding the infiltration allowance of 0.33 L/s per hectare will results in average and peak flow rates for each building of 1.08 L/s and 5.51 L/s respectively.

The capacities of the proposed sanitary services (150 mm @ 3.0 %) and the existing municipal sewer along Ages Drive (250 mm @ 0.4 %) are 27.4 L/s and 39.1 L/s respectively. They are both adequate to accommodate the projected peak flows of 5.51 L/s and 11.02 L/s (5.51 x 2) from the two buildings.

The average and peak domestic water demands for each building are assumed to be equivalent to the sewage flows of 0.77 L/s and 5.2 L/s respectively. The existing 300 mm municipal watermain along Ages Drive has adequate capacity to accommodate the projected peak domestic water demand of 10.4 L/s (624 L/minute). The fire flow calculations in the following section show a residual pressure of 53 psi under maximum day plus fire flow demand of 9,130 L/minute, which far exceeds the domestic demand.

Meter sizing will be based on the fixture unit value as detailed in the Water Data Card, to be submitted separately.

FIRE FLOW

Spatial fire flow coverage will be provided by the existing municipal fire hydrants along Ages Drive, plus the new private hydrants mentioned above.

The required fire flow is calculated using the Fire Underwriters Survey guidelines. The following calculations are carried out for the east building (903 Ages Drive) as it has a higher exposure factor. The results apply to both buildings.

$F = 220\ C\ A^{0.5}$

Where F is the required fire flow in liters per minute
C = 0.8 for non-combustible construction
A is the floor area of the building = 4,431 m^2

F1 = 11,715 L/minute (round up to 12,000)

Apply 40 % reduction for automatic sprinkler system – Subtract 4,800 L/minute
Increase by 15 % for exposure (5 % each on the east, west and south sides)
– Add 1,800 L/minute

F2 = 12,000 – 4,800 + 1,800 = 9,000

Required Fire Flow 9,000 Liters per minute

The calculated fire flow of 9,000 liters per minute is equivalent to the maximum flow rate required by the Ontario Building Code.

The Hydraulic Grade line in the water network in this area, under Maximum Day demand plus fire flow of 9,000 L/minute (150 L/s) is 121.5 m. Please refer to the attached Boundary Conditions provided by the City.

The ground elevation at the buildings are 83.90 m and 83.25 m. This results in residual pressures of 37.6 m (53 psi) and 38.25 m (54 psi), which exceed the Building Code requirements.

Detailed design of the sprinkler systems will be carried out by the mechanical consultant and system supplier who will ensure that NFPA and Building Code requirements are met.

POST DEVELOPMENT GRADING AND DRAINAGE

The post development grading and drainage design is indicated on the Grading, Drainage and SWM Plan prepared by Capital Engineering Group Ltd (Drawing 18-30, G2).

The landscaped setbacks along the west, north and east property lines will sheet drain directly to the adjacent railway ditch. The front setbacks will sheet drain towards Ages Drive.

Drainage from the paved surfaces will be directed to storm sewer networks made up of CB's and MH's, interconnected with 250 mm diameter PVC pipes. The parking areas in front of each building will be collected independently with separate outlets to the storm sewer on Ages Drive. The loading area, including the loading docks will be combined into one storm network and directed to the shared roof outlet at the access driveway.

Flow control devices (ICD's) and water quality units will be installed upstream of the outlets to provide quantity and quality controls to meet the required SWM criteria. Flow from the loading dock of the east building (903 Ages) will not be subject to quantity control.

All the roof drains will be equipped with flow control weirs, and the outlets will be connected downstream of the water quality unit.

STORMWATER MANAGEMENT

Criteria

The City of Ottawa and Rideau Valley Conservation Authority require that post development runoff from this site be subject to SWM quantity and quality control. We have pre-consulted with both agencies, and the following is an outline of the required criteria (see attached).

- Post development runoff to be based on the 5 year storm event,
- Runoff coefficient equivalent to pre-development conditions or 0.5, whichever is less.
- Calculated time of concentration, not to be less than 10 minutes
- Flows in excess of the 5 year release rate, up to the 100 year storm event, to be retained on site
- Enhanced level quality control (80 % TSS removal).

Quantity Control

The 5 year peak flow is calculated using the Rational Method, as follows:

$Q = 2.78\ CIA$

Where C is the runoff coefficient
This site is currently undeveloped with silty clay soil conditions and an average slope of less than 5 %. The Ottawa Sewer Design Guidelines (Table 5.7) recommends a C value of 0.3. This value is less than 0.5 and will governs in this case.

I is the rainfall intensity for a given time of concentration (Tc), using the City's IDF information. The estimated Tc for this site, based on a lot width of 73 m and average slope of 1 %, is roughly 20 minutes. This exceeds the 10 minute minimum and will be used in our SWM calculations.
The rainfall intensities are I_5 = 70 mm/hr and I_{100} = 120 mm/hr

A is the drainage area in hectares = 1.89 hectares

$Q_5 = 2.78 \times 1.89 \times 0.30 \times 70 = 110.3$ L/s
$Q_{100} = 2.78 \times 1.89 \times 0.375 \times 120 = 236.4$ L/s

Unrestricted drainage

The landscaped setbacks around the perimeter of the site plus the loading dock of the east building (903 Ages Drive) will not be subject to flow controls.

Loading dock	630 m^2	$C_5 = 0.90$ ($C_{100} = 1.0$)
Landscaping	2,520 m^2	$C_5 = 0.30$ ($C_{100} = 0.375$)
	3,150 m^2	

Combined $C_5 = 0.42$, $C_{100} = 0.50$
$Q_5 = 26.0$ L/s, $Q_{100} = 52.5$ L/s

Balance of allowable outflow rate

110.3 – 52.5 = 57.8 L/s

On Site Stormwater Retention

The drainage areas subject to SWM are broken down as follows:

Roof (899 Ages)		4,430 m^2	$C_5 = 0.90$ ($C_{100} = 1.0$)
Roof (903 Ages)		4,430 m^2	$C_5 = 0.90$ ($C_{100} = 1.0$)
Loading Area (asphalt)		3,750 m^2	$C_5 = 0.90$ (1.0)
East Parking			
	Asphalt and concrete	1,320 m^2	$C_5 = 0.90$ (1.0)
	Landscaping	410 m^2	$C_5 = 0.30$ (0.375)
	Total	1,730 m^2	$C_5 = 0.76$ (0.85)
West Parking (asphalt and concrete)		1,410 m^2	$C_5 = 0.90$ (1.0)
Total area subject to SWM		**15,750 m^2**	

The attached spreadsheet provides detailed calculations of the required storage during major storm events. The maximum retention volumes during the 5 and 100 year storm events are:

Drainage Area	Outflow Rate	5 Year Retention	100 Year Retention
Roof (899)	11.4 L/s	90 m^3	211 m^3
Roof (903)	11.4 L/s	90 m^3	211 m^3

Loading Area	12.2 L/s	69 m^3	167 m^3
East Parking	11.4 L/s	17 m^3	47 m^3
West Parking	11.4 L/s	16 m^3	44 m^3
	57.8 L/s		

On site retention is accommodated as follows:

Roof storage (each roof)

Available ponding area	4,210 m^2
Ponding depth at the drains	0.15 m
Storage Capacity	**211 m^3**

Loading Area

Ponding area	2,200 m^2
Maximum ponding depth	0.3 m
Storage capacity	**220 m^3**

East Parking

Ponding area	850 m^2
Maximum ponding depth	0.2 m
Storage capacity	**48 m^3**

West Parking

Ponding area	780 m^2
Maximum ponding depth	0.2 m
Storage capacity	**52 m^3**

The roof drains will be equipped with adjustable flow control weirs to limit the outflow to 1.9 L/s (30 usgpm) per drain or 11.4 L/s per roof. The roofs will also have emergency overflow (scuppers), as detailed on the architectural drawings.

The surface outflow from each drainage area will be limited to the specified rate by installing properly sized inlet control devices (ICD's) in the outlet manholes, as indicated on drawing G2. The hydraulic heads during the 100 year storm event are also indicated on the drawing.

QUALITY CONTROL

Hydro International/AquaQ FD-4HC water quality units (or equivalent) will be installed upstream of the surface storm outlets to provide quality control of the runoff. The units are sized to provide net annual TSS removal efficiency exceeding the 80 % threshold. Please refer to the attached sizing calculations and standard details provided by the supplier.

SEDIMENT AND EROSION CONTROL

Erosion and sediment control measures will be put in place prior to construction to minimize off site silt runoff. The measures will conform to MOE Guideline B-6, "Guidelines for Evaluating Construction Activities Impacting on Water Resources". Please refer to the Erosion and Sediment Control Plan (Drawing 18-30, G3).

All erosion and sediment control installations will remain in place until pavement and landscaping works are completed.

REVIEW BY OTHER AGENCIES

The engineering drawings and this report will be circulated to the Rideau Valley Conservation Authority as part of the site plan application process.
This site is located in an industrial zone and will require Environmental Compliance Approval from the Ministry of Environment, for on-site SWM. Copies of the drawings and documents will be provided to the local MOE office prior to submission of the ECA application.

SUMMARY / CONCLUSIONS

The proposed site services are designed in accordance with the City of Ottawa design guidelines.

Fire flow coverage for the proposed buildings meets the requirements of the Ontario Building Code.

On-site stormwater management has been implemented for the site, in accordance with directions provided by the City of Ottawa Infrastructure Approvals Branch and the RVCA. The SWM criteria is summarized as follows

- Post development runoff is restricted to the 5 year storm event, with a runoff coefficient equivalent to predevelopment conditions of C = 0.30.
- Flows in excess of the 5 year release rate, up to the 100 year storm event, to be retained on site
- Enhanced level quality control (80 % TSS removal).

Prepared by
Capital Engineering Group Ltd.

Andy Naoum, P.Eng
Senior Consultant

Andy Naoum

From: Baker, Adam <adam.baker@ottawa.ca>
Sent: November 26, 2018 12:42 PM
To: 'Andy Naoum'
Subject: RE: Ages Drive Industrial Buildings - 899 and 903 Ages Drive
Attachments: 899- 903 Ages Drive Nov 2018.pdf

Please see attached water boundary conditions:

The following are boundary conditions, HGL, for hydraulic analysis at 899-903 Ages Drive (zone 2C) assumed to be connected to the 305mm on Ages (see attached PDF for location).

Minimum HGL = 124.0m

Maximum HGL = 130.8m

MaxDay + FireFlow (150L/s) = 121.5m

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

Disclaimer: The boundary condition information is based on current operation of the city water distribution system The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

Thank you,

Adam Baker, EIT
Engineering Intern
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 26552, Adam.Baker@ottawa.ca

From: Baker, Adam
Sent: Friday, November 23, 2018 9:47 AM
To: 'Andy Naoum' <cegl@rogers.com>
Subject: RE: Ages Drive Industrial Buildings - 899 and 903 Ages Drive

Hi Andy,

I've sent your request to our water modelling group. I'll send you the results as soon as I receive them.

Thanks,

Adam Baker, EIT
Engineering Intern
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 26552, Adam.Baker@ottawa.ca

From: Andy Naoum <cegl@rogers.com>
Sent: Thursday, November 22, 2018 12:45 PM
To: Baker, Adam <adam.baker@ottawa.ca>
Subject: Ages Drive Industrial Buildings - 899 and 903 Ages Drive

Hi Adam,

Can I get the water boundary conditions for this site please?

Domestic Demand for each building

Average	1.4 L/s
Max. Day	2.1 L/s
Peak Hourly	3.78 L/s

Calculated Fire Flow 150 L/s (see attached)

I have also attached a site map for reference.

Thanks,
Andy Naoum, P.Eng.
Capital Engineering Group Ltd.
(613) 739-0776

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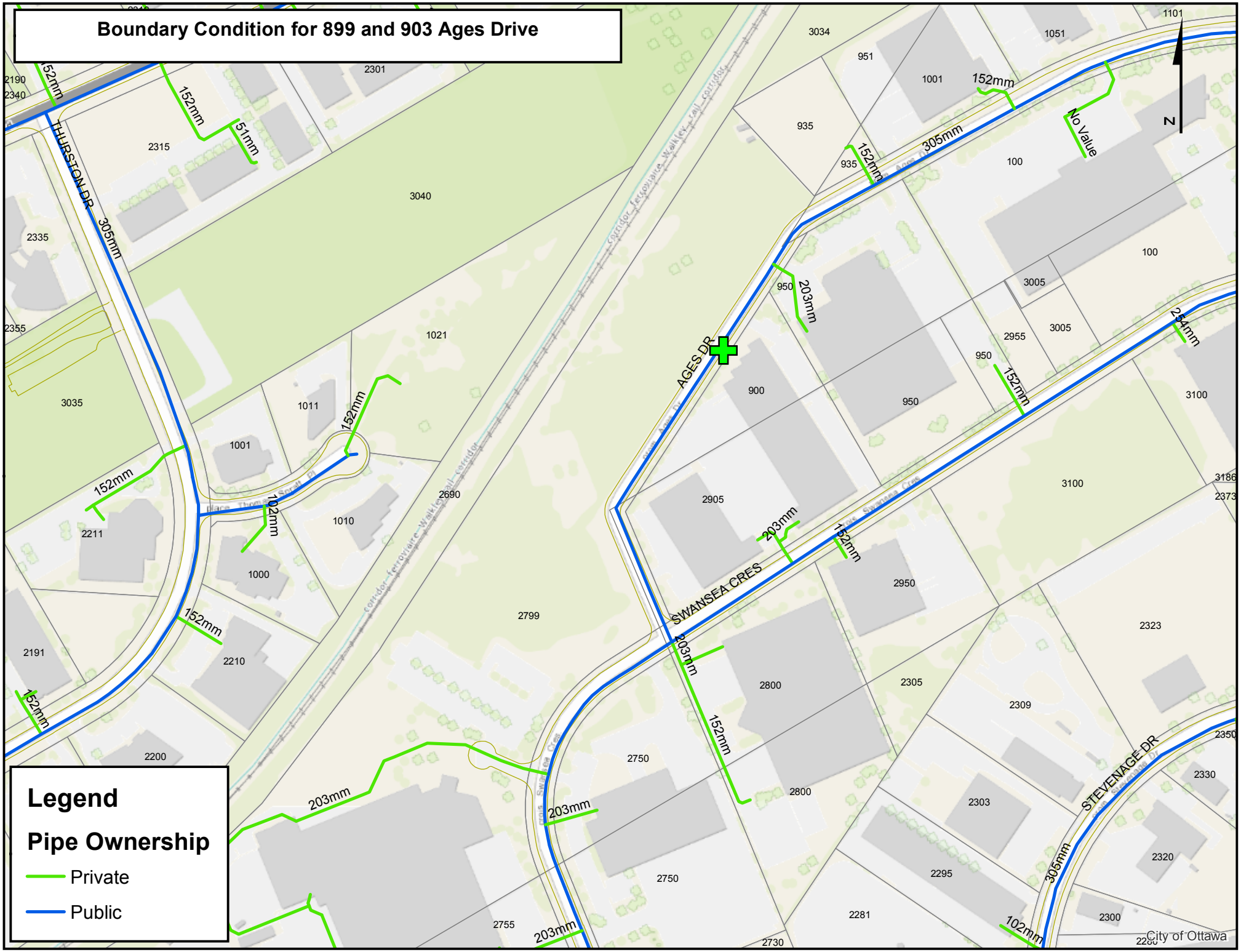
Boundary Condition for 899 and 903 Ages Drive
THURSTON DR
AGES DR
SWANSEA CRES
STEVENAGE DR
152mm
305mm
51mm
203mm
102mm
No Value
254mm
N
Legend
Pipe Ownership
Private
Public
City of Ottawa

From: Gervais, Melanie <Melanie.Gervais@ottawa.ca>
Sent: August 16, 2018 10:09 AM
To: Dave Mungall <dave.mungall@pnrarch.com>
Subject: 899, 901, 903 Ages Drive - Pre-consult

Hi Dave,

As a follow up to the pre-consult held on August 9th, please find attached the list of required plans and studies. The required Site Plan application will be a New – Manager Approval, with Public Consultation ($21,508.66 plus engineering review fees plus Conservation Authority fee).

Planning:

The property is zoned IG3 which permits light industrial uses. Please include a zoning chart on the Site Plan lists all the zoning requirements in one column and what's proposed in another column.

Please ensure that the accessible parking respects our Accessibility Design Standards, link.

Concerning the CN rail corridor, as discussed at the meeting please find attached their proximity guidelines. Please contact them in advance of finalizing your plans as their required setback may affect site layout. You can contact CN rail at proximity@cn.ca

The Landscape Plan must be stamped by a Landscape Architect and should provide trees and shrubs along the street frontage to break up the large building wall and to screen the parking/paved areas.

Please ensure you do a title search to obtain the easement documents. These documents will clarify if you are allowed to install a parking lot over the easement.

The RVCA should be contacted before preparing your engineering reports, please contact Jamie Batchelor Jamie.Batchelor@rvca.ca

As per the parkland dedication by-law, the parkland requirement is calculated as 2% of the gross land area of the site being developed (for commercial and industrial uses). The City is exempt from the parkland dedication and therefore it would not have been paid previously. https://ottawa.ca/en/parkland-dedication-law-no-2009-95. More information can be found below from our Park Planner.

Please send me examples for the type on building façade, I will provide these to our Urban Design Planner who may provide suggestions.

Transportation:

1. You need to follow the new TIA guidelines, please submit the Screening (Step 1) to Wally Dubyk, Transportation Project Manager, (Wally.Dubyk@ottawa.ca). Steps 1 to 4 have to be completed in order to deemed a Site Plan application complete. https://ottawa.ca/en/transportation-impact-assessment-guidelines

2. Sidewalk: Ages is a local road and according to the Official Plan a sidewalk is required on one side. The concrete sidewalk is to meet City standards and be 2.0 metres in width and to

be continuous along property frontage and depressed through the proposed access (see attached sidewalk spec).

Engineering:

Please contact Jamie Batchelor at the RVCA regarding stormwater quality controls required for this site. jamie.batchelor@rvca.ca

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

1. The Servicing Study Guidelines for Development Applications are available at the following address: http://ottawa.ca/en/development-application-review-process-0/servicing-study-guidelines-development-applications

2. Servicing and site works shall be in accordance with the following documents:

   - Ottawa Sewer Design Guidelines (October 2012)
   - Ottawa Design Guidelines – Water Distribution (2010)
   - Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
   - City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
   - City of Ottawa Environmental Noise Control Guidelines (January, 2016)
   - City of Ottawa Park and Pathway Development Manual (2012)
   - City of Ottawa Accessibility Design Standards (2012)
   - Ottawa Standard Tender Documents (latest version)
   - Ontario Provincial Standards for Roads & Public Works (2013)

3. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455).

4. The Stormwater Management Criteria, for the subject site, is to be based on the following:

   i. The 5-yr storm event using the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.

ii. The pre-development runoff coefficient or a maximum equivalent ‘C’ of 0.5, whichever is less (§ 8.3.7.3).

iii. A calculated time of concentration (Cannot be less than 10 minutes).

iv. Flows to the storm sewer in excess of the 5-year storm release rate, up to and including the 100-year storm event, must be detained on site.

5. Deep Services (Storm, Sanitary & Water Supply)

i. i. The services available on this frontage of Ages Drive are:

a. 675mm Concrete STM

b. 250mm PVC SAN

c. 305mm DI WTR

ii. Connections to trunk sewers and easement sewers are typically not permitted.

iii. Sewer connections to be made above the springline of the sewermain as per:

a. Std Dwg S11.1 for flexible main sewers – connections made using approved tee or wye fittings.

b. Std Dwg S11 (For rigid main sewers) – lateral must be less that 50% the diameter of the sewermain,

c. Std Dwg S11.2 (for rigid main sewers using bell end insert method) – for larger diameter laterals where manufactured inserts are not available; lateral must be less that 50% the diameter of the sewermain,

d. Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.

e. No submerged outlet connections.

6. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:

i. Location of service

ii. Type of development and the amount of fire flow required (as per FUS, 1999).

iii. Average daily demand: ___ l/s.

iv. Maximum daily demand: ___l/s.

v. Maximum hourly daily demand: ___ l/s.

7. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.

Should you have any questions or require additional information on the engineering, please contact Adam Baker directly at (613) 580-2424 x26552 or Adam.Baker@ottawa.ca.

Planning Forester:

A permit will be required .
Ensure that sufficient soil volume is available for the size of the planted trees at maturity.

Below are the 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; an approved TCR is a requirement of Site Plan or Plan of Subdivision approval
2. any removal of privately-owned trees 10cm or larger in diameter requires a tree permit issued under the Urban Tree Conservation Bylaw; the permit is based on the approved TCR
3. the removal of City-owned trees will require the permission of Forestry Services who will also review the submitted TCR
4. in this case, the TCR may be combined with the EIS, if one is required
5. the TCR must list all trees on site by species, diameter and health condition.
6. the TCR must address all trees with a critical root zone that extends into the developable area.
7. If trees are to be removed, the TCR must clearly show where they are, and document the reason they can not be retained
8. 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 listed on Ottawa.ca
9. Trees with a trunk that crosses/touches a property line are considered co-owned by both property owners; permission from the adjoining property owner must be obtained prior to the removal of co-owned trees
10. 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.
11. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca

Environmental:

The Tree Conservation Report will need to address butternut trees (presence and/or absence) and if present, the butternut health assessment (BHA) will need to be completed. The BHA can only be done while the leaves are on the tree, which means it will need to be completed between end of May and mid September.

Park Comments:

To be included as a separate section titled “Parkland Dedication” in the Planning Rationale:

Please provide an explanation of how the proposed development will address the Parkland Dedication requirements, as per the City of Ottawa Parkland Dedication By-law No 2009-95.

To be included:

- Gross area of commercial/industrial blocks proposed,
- The total area of Parkland Dedication (in hectares) that is required to be transferred to the City.
- Please also indicate that Cash-in-lieu-of-Parkland is being proposed.

If the Parkland Dedication for the site has already been satisfied previously, please indicate

- under what application number it has occurred,
- the number and type of units included in the calculation,
- the gross area of apartment blocks included in the calculation,
- the gross area of commercial/industrial blocks included in the calculation,
- the gross area and type of other development blocks included in the calculation, and
- the total area of Parkland Dedication (in hectares) that had been transferred to the City (whether in land conveyance or Cash-in-lieu-of-Parkland).

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If you have any questions on the information above do not hesitate to contact me.

Regards,

Mélanie Gervais *MCIP, RPP*
Planner / Urbaniste
Development Review /
Examen des demandes d'aménagement
Planning, Infrastructure and Economic Development Department /
Services de la planification, de l'infrastructure et du développement économique
City of / Ville d'Ottawa
110, avenue Laurier Avenue West / Ouest,
4th Floor / 4ième étage
Ottawa, ON K1P 1J1
Tel. : 613-580-2424 ext. 24025
Fax / Télécopieur : 613-580-2576
E-mail / Courriel : Melanie.Gervais@ottawa.ca
Mail Code: 01-14

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Andy Naoum

From: Eric Lalande <eric.lalande@rvca.ca>
Sent: November 20, 2018 4:27 PM
To: 'Andy Naoum'; Jamie Batchelor
Subject: RE: 899 - 903 Ages Drive

Hi Andy,

I took a look into this one (Jamie is off ill today)

The RVCA would be looking for 80% TSS removal as far as water quality. The site does not appear to have any downstream water quality protection prior to outletting to the drain which is less than 1km away.

Best management practices are further encouraged on site, including LID where/if possible.

Let me know if you require anything else at this time.

Thanks,

Eric Lalande, MCIP, RPP
Planner, Rideau Valley Conservation Authority
613-692-3571 x1137

From: Andy Naoum <cegl@rogers.com>
Sent: Wednesday, October 31, 2018 3:28 PM
To: Eric Lalande <eric.lalande@rvca.ca>; Jamie Batchelor <jamie.batchelor@rvca.ca>
Subject: 899 - 903 Ages Drive

Hi Eric / Jamie,

Can you please confirm the water quality criteria for this site?

The site is located along the north side of Ages Road (north of Swansea Crescent intersection). The property was severed from the City owned lot at 2799 Swansea Cresc..

Drainage from the site will be connected to the existing storm sewers on Ages Drive, which outlet to the Mather Award Drain just west of Hawthorne Road.

See attached site plan.

Thanks,
Andy Naoum, P.Eng.
Capital Engineering Group Ltd.
(613) 739-0776

STORMWATER MANAGEMENT CALCULATIONS
AGES DRIVE INDUSTRIAL BUILDINGS
899 AND 903 AGES DRIVE
Revised February 22, 2019

ON SITE RETENTION FOR 5 YEAR STORM	AREA	RUNOFF	2.78 CA	DURATION	INTENSITY	PEAK FLOW	OUTFLOW	RETENTION	STORED
ROOF STORAGE EACH ROOF	(ha)	COEFF.		(min)	(mm/hr)	(L/s)	RATE(L/s)	RATE(L/s)	VOLUME(m3)
	0.443	0.90	1.11	5	141	156.48	11.40	145	43.52
	0.443	0.90	1.11	10	104	115.49	11.40	104	62.45
	0.443	0.90	1.11	15	84	92.61	11.40	81	73.09
	0.443	0.90	1.11	20	70	77.87	11.40	66	79.76
	0.443	0.90	1.11	25	61	67.50	11.40	56	84.14
	0.443	0.90	1.11	30	54	59.77	11.40	48	87.07
	0.443	0.90	1.11	60	33	36.51	11.40	25	**90.41**
	0.443	0.90	1.11	70	29	32.56	11.40	21	88.85

ON SITE RETENTION FOR 100 YEAR STORM	AREA	RUNOFF	2.78 CA	DURATION	INTENSITY	PEAK FLOW	OUTFLOW	RETENTION	STORED
ROOF STORAGE - EACH ROOF	(ha)	COEFF.		(min)	(mm/hr)	(L/s)	RATE(L/s)	RATE(L/s)	VOLUME(m3)
	0.443	1.00	1.23	5	243	298.90	11.40	287	86.25
	0.443	1.00	1.23	10	179	219.90	11.40	209	125.10
	0.443	1.00	1.23	15	143	175.98	11.40	165	148.12
	0.443	1.00	1.23	20	120	147.72	11.40	136	163.59
	0.443	1.00	1.23	25	104	127.89	11.40	116	174.74
	0.443	1.00	1.23	30	92	113.14	11.40	102	183.13
	0.443	1.00	1.23	60	56	68.84	11.40	57	206.77
	0.443	1.00	1.23	90	41	50.63	11.40	39	**211.84**
	0.443	1.00	1.23	100	38	46.68	11.40	35	211.67

ON SITE RETENTION FOR 5 YEAR STORM	AREA	RUNOFF	2.78 CA	DURATION	INTENSITY	PEAK FLOW	OUTFLOW	RETENTION	STORED
SURFACE STORAGE - LOADING AREA	(ha)	COEFF.		(min)	(mm/hr)	(L/s)	RATE(L/s)	RATE(L/s)	VOLUME(m3)
	0.375	0.90	0.94	5	141	132.46	12.20	120	36.08
	0.375	0.90	0.94	10	104	97.76	12.20	86	51.34
	0.375	0.90	0.94	15	84	78.40	12.20	66	59.58
	0.375	0.90	0.94	20	70	65.91	12.20	54	64.46
	0.375	0.90	0.94	25	61	57.14	12.20	45	67.40
	0.375	0.90	0.94	30	54	50.60	12.20	38	**69.12**
	0.375	0.90	0.94	60	33	30.91	12.20	19	67.35

ON SITE RETENTION FOR 100 YEAR STORM	AREA	RUNOFF	2.78 CA	DURATION	INTENSITY	PEAK FLOW	OUTFLOW	RETENTION	STORED
SURFACE STORAGE - LOADING AREA	(ha)	COEFF.		(min)	(mm/hr)	(L/s)	RATE(L/s)	RATE(L/s)	VOLUME(m3)
	0.375	1.00	1.04	5	243	253.02	12.20	241	72.25
	0.375	1.00	1.04	10	179	186.15	12.20	174	104.37
	0.375	1.00	1.04	15	143	148.97	12.20	137	123.09
	0.375	1.00	1.04	20	120	125.05	12.20	113	135.42
	0.375	1.00	1.04	25	104	108.26	12.20	96	144.09
	0.375	1.00	1.04	30	92	95.77	12.20	84	150.43
	0.375	1.00	1.04	60	56	58.27	12.20	46	165.85
	0.375	1.00	1.04	70	50	51.91	12.20	40	**166.76**
	0.375	1.00	1.04	80	45	46.90	12.20	35	166.57

STORMWATER MANAGEMENT CALCULATIONS
AGES DRIVE INDUSTRIAL BUILDINGS
CONT'D

ON SITE RETENTION FOR 5 YEAR STORM	AREA	RUNOFF	2.78 CA	DURATION	INTENSITY	PEAK FLOW	OUTFLOW	RETENTION	STORED
SURFACE STORAGE - EAST PARKING	(ha)	COEFF.		(min)	(mm/hr)	(L/s)	RATE(L/s)	RATE(L/s)	VOLUME(m3)
	0.173	0.76	0.37	5	141	51.60	11.40	40	12.06
	0.173	0.76	0.37	10	104	38.08	11.40	27	16.01
	0.173	0.76	0.37	15	84	30.54	11.40	19	**17.23**
	0.173	0.76	0.37	20	70	25.68	11.40	14	17.13
	0.173	0.76	0.37	25	61	22.26	11.40	11	16.29
	0.173	0.76	0.37	30	54	19.71	11.40	8	14.96
	0.173	0.76	0.37	60	33	12.04	11.40	1	2.31

ON SITE RETENTION FOR 100 YEAR STORM	AREA	RUNOFF	2.78 CA	DURATION	INTENSITY	PEAK FLOW	OUTFLOW	RETENTION	STORED
SURFACE STORAGE - EAST PARKING	(ha)	COEFF.		(min)	(mm/hr)	(L/s)	RATE(L/s)	RATE(L/s)	VOLUME(m3)
	0.173	0.85	0.41	5	243	99.22	11.40	88	26.35
	0.173	0.85	0.41	10	179	72.99	11.40	62	36.96
	0.173	0.85	0.41	15	143	58.41	11.40	47	42.31
	0.173	0.85	0.41	20	120	49.04	11.40	38	45.16
	0.173	0.85	0.41	25	104	42.45	11.40	31	46.58
	0.173	0.85	0.41	30	92	37.56	11.40	26	**47.08**
	0.173	0.85	0.41	60	56	22.85	11.40	11	41.22

ON SITE RETENTION FOR 5 YEAR STORM	AREA	RUNOFF	2.78 CA	DURATION	INTENSITY	PEAK FLOW	OUTFLOW	RETENTION	STORED
SURFACE STORAGE - WEST PARKING	(ha)	COEFF.		(min)	(mm/hr)	(L/s)	RATE(L/s)	RATE(L/s)	VOLUME(m3)
	0.141	0.90	0.35	5	141	49.81	11.40	38	11.52
	0.141	0.90	0.35	10	104	36.76	11.40	25	15.21
	0.141	0.90	0.35	15	84	29.48	11.40	18	**16.27**
	0.141	0.90	0.35	20	70	24.78	11.40	13	16.06
	0.141	0.90	0.35	25	61	21.48	11.40	10	15.12
	0.141	0.90	0.35	30	54	19.02	11.40	8	13.72
	0.141	0.90	0.35	60	33	11.62	11.40	0	0.80

ON SITE RETENTION FOR 100 YEAR STORM	AREA	RUNOFF	2.78 CA	DURATION	INTENSITY	PEAK FLOW	OUTFLOW	RETENTION	STORED
SURFACE STORAGE - WEST PARKING	(ha)	COEFF.		(min)	(mm/hr)	(L/s)	RATE(L/s)	RATE(L/s)	VOLUME(m3)
	0.141	1.00	0.39	5	243	95.14	11.40	84	25.12
	0.141	1.00	0.39	10	179	69.99	11.40	59	35.15
	0.141	1.00	0.39	15	143	56.01	11.40	45	40.15
	0.141	1.00	0.39	20	120	47.02	11.40	36	42.74
	0.141	1.00	0.39	25	104	40.71	11.40	29	43.96
	0.141	1.00	0.39	30	92	36.01	11.40	25	**44.30**
	0.141	1.00	0.39	60	56	21.91	11.40	11	37.83

November 23, 2018

Aqua Q OGS Sizing Summary

Project Information			
Project Name:	Ages Drive Industrial Buildings	**Consulting Engineer:**	Capital Engineering Group Ltd.
Location:	Ottawa, ON	**Sizing Completed By:**	C. Neath

Recommended OGS Unit	
Recommended Model:	**FD-4HC, supplied by Aqua Q (First Defence HC, 1200mm diameter)**
TSS Removal Percentage:	**92.8 %**
Total Site Volume Treated:	**100.0 %**

Site Information	
Area:	0.17 Ha
% Impervious:	75.0%
Rational C:	0.75
Rainfall Station:	Ottawa
Particle Size Dist'n:	Fine PSD

Recommended OGS Unit Information	
Peak Flow Capacity:	510 L/s
Max. Pipe Diameter	600 mm
Std. Sediment Storage	0.54 m³
Std. Oil Storage:	723 L

Elevations and Configuration	
Inlet Pipe Diameter:	300 mm
Outlet Pipe Diameter:	300 mm
All inlet/outlet diameters are acceptable	
Rim Elevation (m):	82.750
Inlet Pipe Elevation (m):	80.290
Outlet Pipe Elevation (m):	80.290
Drop Across Unit (mm):	0
Drop from inlet to outlet is acceptable.	

AQUA Q Contacts	
Engineering:	Cody Neath, P.Eng (cody.neath@aquaq.ca)
Sales Rep.:	Mike Paquette (michael.paquette@aquaq.ca)

Estimated Annual Removal Efficiency

Intensity	Fraction of Rainfall	FD-4HC Removal Efficiency	Weighted Net Annual Efficiency
mm/hr	(%)	(%)	(%)
0.50	9.3%	99.9%	9.3%
1.00	10.7%	99.9%	10.7%
1.50	10.3%	99.8%	10.3%
2.00	7.8%	99.7%	7.8%
3.00	16.4%	99.6%	16.3%
4.00	9.1%	99.5%	9.0%
5.00	7.8%	99.3%	7.8%
6.00	5.1%	99.2%	5.1%
7.00	3.0%	99.1%	3.0%
8.00	3.5%	98.9%	3.4%
9.00	2.3%	98.8%	2.3%
10.00	1.2%	98.7%	1.2%
11.00	1.5%	98.5%	1.4%
12.00	2.3%	98.4%	2.2%
15.00	3.5%	98.0%	3.4%
20.00	6.1%	97.3%	5.9%
25.00	0.0%	96.7%	0.0%
30.00	0.0%	96.0%	0.0%
100.00	0.0%	87.4%	0.0%
Net Annual Treatment			99.3%
60 Minute Rainfall Adjustment			-6.5%
Total Net Annual Removal Efficiency			92.8%
Total Runoff Volume Treated:			100.0%

Notes:

Removal efficiencies are based on NJDEP Test Protocols and independently verified.

60 minute rainfall adjustment factor applied for use of 60 minute time step data with Tc < 30 min. Additional information available upon request.

Design engineer responsible for ensuring compliance with applicable regulations. Aqua Q supplied units have numerous certifications, copies of which can be provided upon request.

November 23, 2018

Aqua Q OGS Sizing Summary

Project Information			
Project Name:	Ages Drive Industrial Buildings	**Consulting Engineer:**	Capital Engineering Group Ltd.
Location:	Ottawa, ON	**Sizing Completed By:**	C. Neath

Recommended OGS Unit	
Recommended Model:	**FD-4HC, supplied by Aqua Q (First Defence HC, 1200mm diameter)**
TSS Removal Percentage:	**92.8 %**
Total Site Volume Treated:	**100.0 %**

Site Information	
Area:	0.14 Ha
% Impervious:	100.0%
Rational C:	0.90
Rainfall Station:	Ottawa
Particle Size Dist'n:	Fine PSD

Recommended OGS Unit Information	
Peak Flow Capacity:	510 L/s
Max. Pipe Diameter	600 mm
Std. Sediment Storage	0.54 m³
Std. Oil Storage:	723 L

Elevations and Configuration	
Inlet Pipe Diameter:	300 mm
Outlet Pipe Diameter:	300 mm
All inlet/outlet diameters are acceptable	
Rim Elevation (m):	83.750
Inlet Pipe Elevation (m):	81.000
Outlet Pipe Elevation (m):	81.000
Drop Across Unit (mm):	0
Drop from inlet to outlet is acceptable.	

AQUA Q Contacts	
Engineering:	Cody Neath, P.Eng (cody.neath@aquaq.ca)
Sales Rep.:	Mike Paquette (michael.paquette@aquaq.ca)

Estimated Annual Removal Efficiency

Intensity	Fraction of Rainfall	FD-4HC Removal Efficiency	Weighted Net Annual Efficiency
mm/hr	(%)	(%)	(%)
0.50	9.3%	99.9%	9.3%
1.00	10.7%	99.9%	10.7%
1.50	10.3%	99.8%	10.3%
2.00	7.8%	99.7%	7.8%
3.00	16.4%	99.6%	16.3%
4.00	9.1%	99.5%	9.0%
5.00	7.8%	99.3%	7.8%
6.00	5.1%	99.2%	5.1%
7.00	3.0%	99.1%	3.0%
8.00	3.5%	98.9%	3.4%
9.00	2.3%	98.8%	2.3%
10.00	1.2%	98.7%	1.2%
11.00	1.5%	98.5%	1.4%
12.00	2.3%	98.4%	2.2%
15.00	3.5%	98.0%	3.4%
20.00	6.1%	97.4%	6.0%
25.00	0.0%	96.7%	0.0%
30.00	0.0%	96.1%	0.0%
100.00	0.0%	87.5%	0.0%
Net Annual Treatment			99.3%
60 Minute Rainfall Adjustment			-6.5%
Total Net Annual Removal Efficiency			92.8%
Total Runoff Volume Treated:			100.0%

Notes:

Removal efficiencies are based on NJDEP Test Protocols and independently verified.

60 minute rainfall adjustment factor applied for use of 60 minute time step data with Tc < 30 min. Additional information available upon request.

Design engineer responsible for ensuring compliance with applicable regulations. Aqua Q supplied units have numerous certifications, copies of which can be provided upon request.

November 23, 2018

Aqua Q OGS Sizing Summary

Project Information			
Project Name:	Ages Drive Industrial Buildings	**Consulting Engineer:**	Capital Engineering Group Ltd.
Location:	Ottawa, ON	**Sizing Completed By:**	C. Neath

Recommended OGS Unit	
Recommended Model:	**FD-4HC, supplied by Aqua Q (First Defence HC, 1200mm diameter)**
TSS Removal Percentage:	**91.7 %**
Total Site Volume Treated:	**100.0 %**

Site Information	
Area:	0.38 Ha
% Impervious:	100.0%
Rational C:	0.90
Rainfall Station:	Ottawa
Particle Size Dist'n:	Fine PSD

Recommended OGS Unit Information	
Peak Flow Capacity:	510 L/s
Max. Pipe Diameter	600 mm
Std. Sediment Storage	0.54 m³
Std. Oil Storage:	723 L

Elevations and Configuration	
Inlet Pipe Diameter:	300 mm
Outlet Pipe Diameter:	300 mm
All inlet/outlet diameters are acceptable	
Rim Elevation (m):	82.900
Inlet Pipe Elevation (m):	80.740
Outlet Pipe Elevation (m):	80.700
Drop Across Unit (mm):	40
Drop from inlet to outlet is acceptable.	

AQUA Q Contacts	
Engineering:	Cody Neath, P.Eng (cody.neath@aquaq.ca)
Sales Rep.:	Mike Paquette (michael.paquette@aquaq.ca)

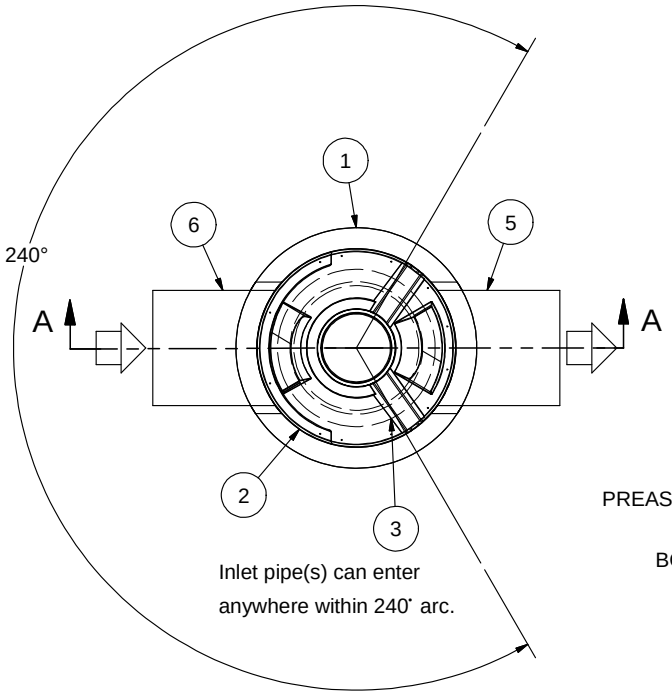
Estimated Annual Removal Efficiency			
Intensity	Fraction of Rainfall	FD-4HC Removal Efficiency	Weighted Net Annual Efficiency
mm/hr	(%)	(%)	(%)
0.50	9.3%	99.8%	9.3%
1.00	10.7%	99.6%	10.7%
1.50	10.3%	99.5%	10.3%
2.00	7.8%	99.3%	7.8%
3.00	16.4%	98.9%	16.2%
4.00	9.1%	98.6%	9.0%
5.00	7.8%	98.2%	7.7%
6.00	5.1%	97.8%	5.0%
7.00	3.0%	97.5%	2.9%
8.00	3.5%	97.1%	3.4%
9.00	2.3%	96.8%	2.2%
10.00	1.2%	96.4%	1.2%
11.00	1.5%	96.1%	1.4%
12.00	2.3%	95.7%	2.2%
15.00	3.5%	94.7%	3.3%
20.00	6.1%	93.0%	5.7%
25.00	0.0%	91.3%	0.0%
30.00	0.0%	89.7%	0.0%
100.00	0.0%	0.0%	0.0%
Net Annual Treatment			98.2%
60 Minute Rainfall Adjustment			-6.5%
Total Net Annual Removal Efficiency			91.7%
Total Runoff Volume Treated:			100.0%

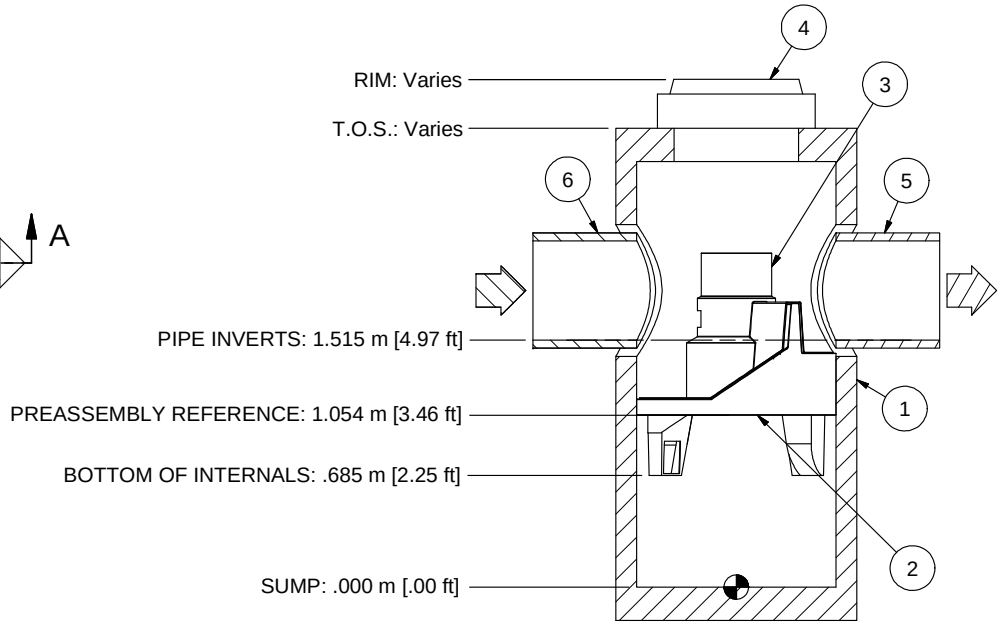
Notes:

Removal efficiencies are based on NJDEP Test Protocols and independently verified.

60 minute rainfall adjustment factor applied for use of 60 minute time step data with Tc < 30 min. Additional information available upon request.

Design engineer responsible for ensuring compliance with applicable regulations. Aqua Q supplied units have numerous certifications, copies of which can be provided upon request.





SECTION A-A

CAPACITIES:

1. PEAK HYDRAULIC FLOW: 18.0 cfs (510 l/s)
2. TREATMENT FLOW: 0.7 cfs (20 l/s)
3. SEDIMENT STORAGE CAPACITY: 0.7 cu. yd. (0.5 cu. m.)
4. OIL STORAGE CAPACITY: 191 gal. (723 liters)
5. MAXIMUM INLET/OUTLET PIPE DIAMETERS: 24 in. (600 mm)

PRODUCT SPECIFICATIONS:

A. The treatment system shall use an induced vortex to separate pollutants from stormwater runoff.
B. The treatment system shall fit within the limits of excavation (area and depth) as shown in the project plans and will not exceed the dimensions for the design flow rates specified herein.
C. The treatment system shall remove greater than or equal to 90% of TSS based on the Target Particle Size (TPS) of 106 Microns and/or 80% of TSS based on the TPS of 230 microns at 0.7 cfs and 1.2 cfs, respectively.
D. The treatment system shall convey the Peak On-line Flow Rates of up to 32 cfs without causing upstream surcharge conditions. Full-scale independent laboratory scour testing shall demonstrate effluent control of less than or equal to 5 mg/L for all flows up to 200% of MTFR-106.
E. The treatment system shall be capable of capturing and retaining fine silt and sand size particles. Analysis of captured sediment from full-scale field installations shall demonstrate particle sizes predominately in the 20-micron range

PARTS LIST

ITEM	QTY	SIZE (mm)	DESCRIPTION	TYPE
1	1	1200	I.D. PRECAST MANHOLE	
2	1		LEDGER SUPPORT	
3	1		SEPARATION MODULE	
4	1	750	FRAME AND COVER (ROUND)	
5	1	600	OUTLET PIPE (BY OTHERS)	CPP
6	1	600	INLET PIPE (BY OTHERS)	CPP

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES. TOLERENCES ARE:

FRACTIONS ± 1/16
DECIMALS ± .06
ANGLES ± 1°

PROJECTION

COMMENTS:
1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE.
2. CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING FIRST DEFENSE MANHOLE.
3. CONTRACTOR TO CONFIRM RIM, PIPE INVERTS, PIPE DIA. AND PIPE ORIENTATION PRIOR TO RELEASE OF UNIT TO FABRICATION.

REVISION HISTORY

REV	BY	DESCRIPTION	DATE
-		FIRST RELEASE	

DATE: 2/16/2018
SCALE: NTS
DRAWN BY: KO
CHECKED BY:
APPROVED BY

Title
1200mm DIAMETER
FIRST DEFENSE HIGH CAPACITY

Hydro International

94 Hutchins Drive
Portland, ME 04102
Tel: +1 (207) 756-6200
Fax: +1 (207) 756-6212
hydro-int.com

APPROX WEIGHT: N/A
MATERIAL:
NEXT ASSEMBLY: PROJECT NO.-NEXT ASSY
DRAWING NO.: PROJECT NO.-FDHC GA
SHEET SIZE: B
SHEET: 1 OF 1
Rev: -

AQUA Q

Smarter drainage solutions.

Stormwater Treatment and Flow Control

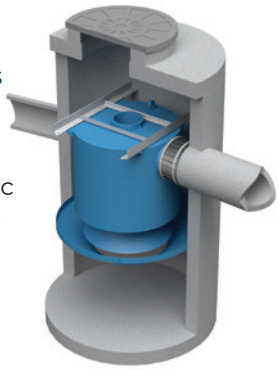
Proudly owned and operated in Canada.

aquaq.ca

AQUA Q is excited to partner with Hydro International to provide a full line of stormwater treatment solutions. Each device delivers proven, measurable and repeatable surface water treatment performance and can be used independently to meet the specific treatment needs of a site or combined to form a stormwater management train. With the growing trend towards regulated municipal stormwater management, Hydro International's treatment systems are designed to remove trash, oil, heavy metals and other contaminants from surface water. Installed in conjunction with a stormwater collection system they are sized to meet the site-specific flow, removal efficiency and target particle size requirements.

The Canadian Environmental Technology Verification (ETV) Program is a nationally recognized program that provides independent validation of environmental performance claims for innovative technologies, processes, and products. **The New Jersey Corporation of Advanced Technologies (NJCAT)** verifies the testing of Manufactured Treatment Devices (MTDs) relative to the performance claims. Only with verification by NJCAT will the **New Jersey Department of Environmental Protection (NJDEP)** certify the verification. These processes provide objective and quality-assured performance data on environmental technologies so that users, developers, regulators, and other stakeholders can make informed decisions about purchasing, applying and regulating these technologies.

DOWNSTREAM DEFENDER®

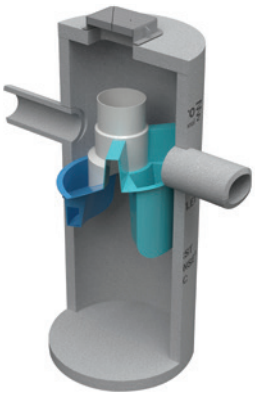


Capture and retain sediment, oils and floatables from stormwater runoff over a wide range of flows in a small footprint.

Downstream Defender® is an advanced hydrodynamic vortex separator that provides impressive and reliable removal of sediments, oil and floatables from stormwater runoff.

FINE PARTICLES | METALS | OILS & HYDROCARBONS | TRASH & FLOATABLES

FIRST DEFENSE®



Capture and retain stormwater sediment, trash and floatables in a unit that saves site space and adapts to smaller or logistically difficult site locations.

First Defense® is a versatile stormwater separator that works with single and multiple inlet pipes and inlet grates. It is easily maintained from the surface by a standard vacuum tanker.

COARSE PARTICLES | OILS & HYDROCARBONS | TRASH & FLOATABLES

KEY POLLUTANTS

Product	Description	Catchment Size			Target Particle Size (Average) (Microns)	Targeted Pollutants
		Small	Medium	Large		
FIRST DEFENSE®	Vortex separator	✓			240**	Coarse sediment, litter, debris and hydrocarbons
DOWNSTREAM DEFENDER®	Advanced hydrodynamic vortex separator		✓	✓	160**	Fine sediment, litter, debris, hydrocarbons, metals and nutrients
UP-FLO FILTER™	Fluidized bed up-flow filtration system	✓	✓*		20	Very fine sediment, litter, debris, hydrocarbons, metals and nutrients

* With the use of vault design
** May be sized for different target particle sizes and removal efficiencies – Contact an AQUA Q representative for site specific design.

UP-FLO FILTER®

Capture sediment, debris, heavy metals, oil and nutrients from stormwater while reducing your site footprint and cutting maintenance costs.

The Up-Flo® Filter is an advanced stormwater treatment solution that combines sedimentation and screening with filtration to deliver exceptional stormwater pollution removal.

INDUSTRIAL MATERIALS
METALS
OILS & HYDROCARBONS
TRASH & FLOATABLES
VERY FINE PARTICLES

HYDRO-BRAKE® VORTEX FLOW CONTROL

Regulates low, moderate and high flows to deliver low-impact drainage from single sites to large networks.

The Hydro-Brake® vortex flow control provides customized water quantity management across a wide range of flows and for a variety of applications.

LOW FLOW
MEDIUM FLOW
HIGH FLOW

Hydro International®

Helping people improve the way they process, treat and manage water.

Hydro International is a global company that provides advanced products, services and expertise to help municipal, industrial and construction customers improve their water management processes, increase operational performance and reduce environmental impact.

With over 30 years of experience and a reputation for engineering excellence, businesses and public organizations all over the world rely on their products and services to improve water treatment and protect the environment from water pollution.

DOWNSTREAM DEFENDER®

The Downstream Defender® is an advanced vortex separator used to treat stormwater runoff in pretreatment or stand-alone applications. Its unique flow-modifying internal components distinguish the Downstream Defender® from conventional and simple swirl separators that typically bypass untreated peak flows to prevent washout of captured pollutants. The Downstream Defender treats the entire storm with no washout or untreated bypass flows. Its wide treatment flow range, low head loss, small footprint and low-profile make it a compact and economical solution for capturing non-point source pollution.

The Downstream Defender's innovative design delivers high efficiency across a wide range of flows in a much smaller footprint than conventional or other swirl-type devices. It is the perfect choice for any catchment likely to convey high quantities of contamination.

TYPICAL APPLICATIONS

- Commercial and residential developments
- Industrial areas
- Streets and highways
- Projects requiring NJCAT and NJDEP verification
- LEED® development projects
- Projects requiring ETV verification

ENVIRONMENTAL PROTECTION

- Captures and retains a wide range of Total Suspended Solids (TSS), floatable trash and petroleum products

VERSATILE

- Accommodates change in outlet pipe direction without the need to construct a second manhole

QUALITY

- Treats the entire storm with no washout or untreated bypass flows

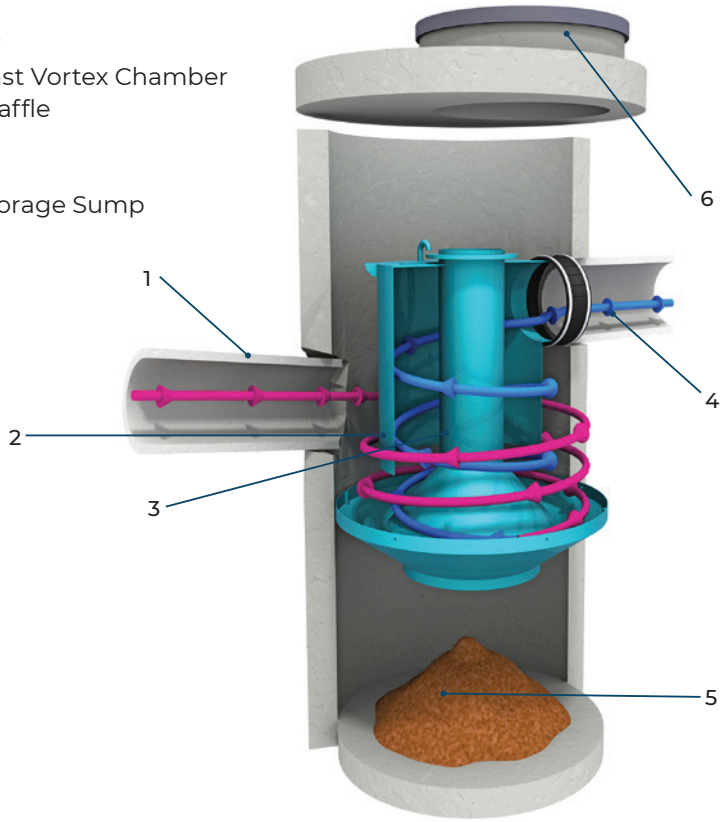
EASE OF INSTALLATION

- Variable inlet/outlet angles for ease of site layout
- Delivered to site as a precast concrete manhole chamber with pre-assembled internal components

FIG.1 The Downstream Defender® has internal components designed to maximize pollutant capture and minimize pollutant washout

Components

1. Inlet to Precast Vortex Chamber
2. Cylindrical Baffle
3. Center Shaft
4. Outlet Pipe
5. Sediment Storage Sump
6. Access Lid



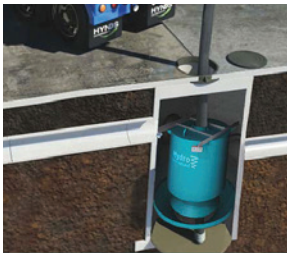
Downstream Defender has been verified by the Canadian Environmental Technology Verification Program (Canadian ETV).

Drainage Profile

The Downstream Defender® is designed with a submerged tangential inlet to minimize turbulence within the device. Turbulence increases system head losses and reduces performance by keeping pollutant particles in suspension. The inlet elevation of the Downstream Defender® is located one inlet pipe diameter lower than the elevation of the outlet invert (Fig.3). This arrangement ensures that influent flows are introduced to the treatment chamber quiescently below the water surface elevation, minimizing turbulence. The unique flow-modifying internal components also minimize hydraulic losses. There are no internal weirs or orifices; large clear openings ensure low head loss at peak flow rates with little risk of blockages that cause upstream flooding.

Inspection & Maintenance

Proper equipment inspection and maintenance is critical for ensuring optimal, ongoing device performance. Downstream Defender® maintenance is easy and safe and requires only a standard sump vacuum to remove pollutants. Confined space entry or removal of components is not necessary.



Sizing & Design

The Downstream Defender® can be used to meet a wide range of stormwater treatment objectives. It is available in 5 models that fit easily into the drainage network (Table 1). Selection and layout of the appropriate Downstream Defender® model depends on site hydraulics, site constraints and local regulations. Both online (Fig.2a) and offline (Fig.2b) configurations are common.

FIG.2a The Downstream Defender® in an online configuration

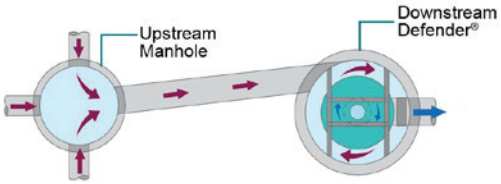


FIG.2b The Downstream Defender® in an offline configuration

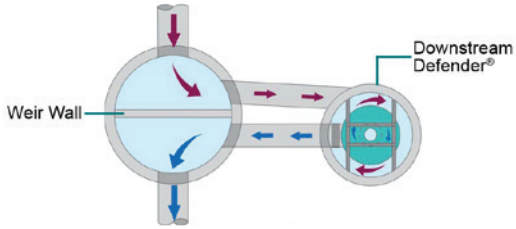
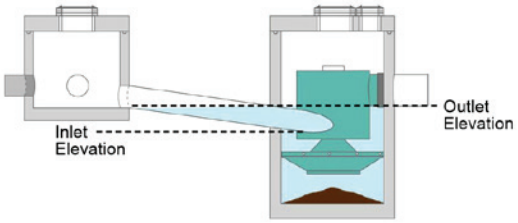


FIG.3 The Downstream Defender® has a submerged inlet that reduces head loss and improves efficiency of pollutant capture



Free Stormwater Sizing Tool

This simple online tool will recommend the best separator, model size and online/offline arrangement based on site-specific data entered by the user.

Go to hydro-int.com/sizingtool to access the tool.

TABLE 1: Downstream Defender® Design Criteria

Model Diameter		Peak Treatment Flow Rate		Maximum Pipe Diameter		Oil Storage Capacity		Sediment Storage Capacity		Minimum Distance from Outlet Invert to Top of Rim		Standard Height from Outlet Invert to Sump Floor	
(mm)	(ft)	(L/s)	(cfs)	(mm)	(in)	(L)	(gal)	(m^3)	(yd^3)	(m)	(ft)	(m)	(ft)
1,200	4	85	3.0	300	12	265	70	0.53	0.70	0.85	2.8	1.25	4.1
1,800	6	227	8.0	450	18	818	216	1.61	2.10	0.98	3.2	1.80	5.9
2,400	8	425	15.0	600	24	2,044	540	3.56	4.65	1.28	4.2	2.35	7.7
3,000	10	708	25.0	750	30	3,975	1,050	6.65	8.70	1.52	5.0	2.85	9.4
3,700*	12*	1,076	38.0	900	36	6,700	1,770	11.24	14.70	1.71	5.6	3.41	11.2

*Not available in all areas. Please contact an AQUA Q representative for details.

FIRST DEFENSE® HIGH CAPACITY

The First Defense® High Capacity is an enhanced vortex separator that combines an effective stormwater treatment chamber with an integral peak flow bypass. It efficiently removes total suspended solids (TSS), metals, trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® High Capacity is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints (Table 2).

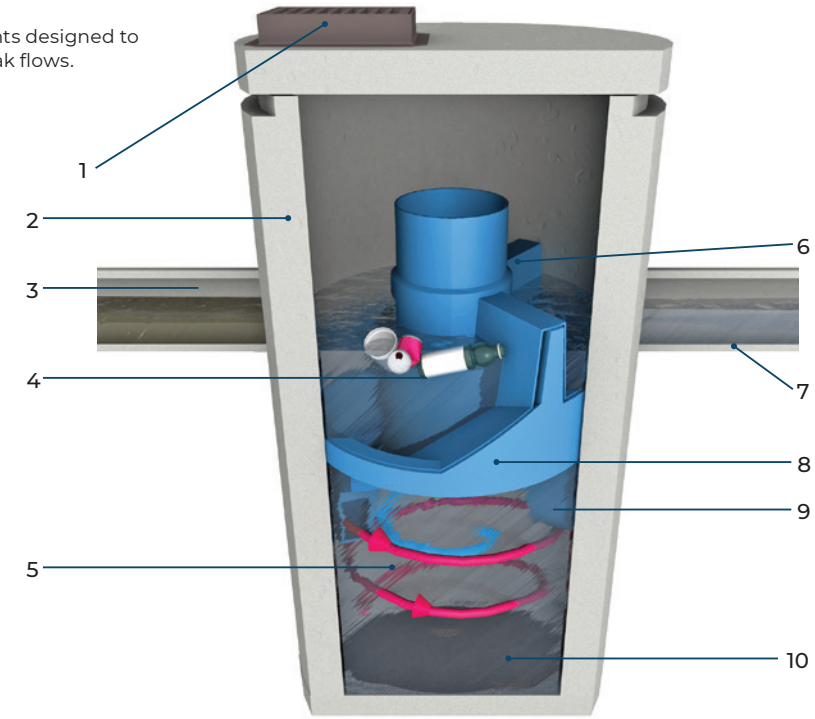
Suitable for at-source pollution control in small to medium catchments, the First Defense® provides space saving, easy-to-install surface water treatment in a standard size manhole which is verified by both the New Jersey Comprehensive Assessment Tool (NJCAT) and New Jersey Department of Environmental Protection (NJDEP).

TYPICAL APPLICATIONS

- Commercial and residential developments
- Industrial areas
- Streets and highways
- Pretreatment for filters, infiltration and storage
- Projects requiring NJCAT and NJDEP verification

ENVIRONMENTAL PROTECTION	VERSATILE	QUALITY	EASE OF INSTALLATION
· Treats stormwater to remove sediment, metals, litter and floatables	· Suitable for single or multiple inlet pipes and inlet grates · Adapts to smaller or logistically difficult site locations	· Proven to prevent pollutant washout at up to 450% of its treatment flow · Repeatable, reliable performance	· Internals delivered to site pre-assembled and ready for installation · No need to construct external bypass control structures

FIG.4
The First Defense® High Capacity has internal components designed to efficiently capture pollutants and prevent washout at peak flows.



Components

1. Inlet Grate (optional)
2. Precast Chamber
3. Inlet Pipe (optional)
4. Floatables Draw Off Slot (not pictured)
5. Inlet Chute
6. Internal Bypass
7. Outlet Pipe
8. Oil and Floatables Storage
9. Outlet Chute
10. Sediment Storage Sump

Verified by NJCAT and NJDEP

Sizing & Design

This adaptable online treatment system works easily with large pipes, multiple inlet pipes, inlet grates and now contains a high capacity bypass for the conveyance of large peak flows. Designed with site flexibility in mind, the First Defense® High Capacity allows engineers to maximize available site space without compromising treatment level.

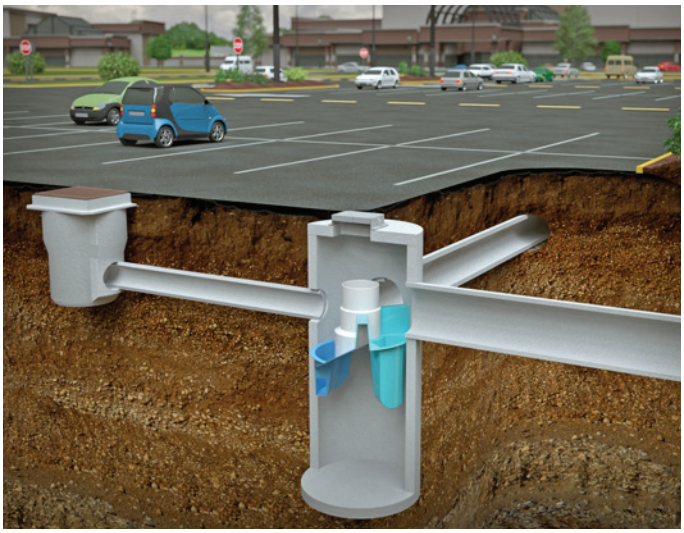
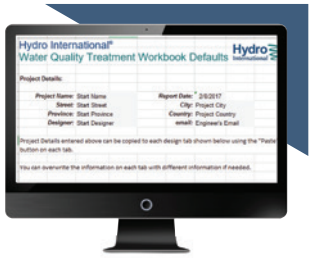


FIG.5 Works with multiple inlet pipes and grates

Free Stormwater Separator Sizing Calculator for Engineers

This simple online tool will recommend the best separator, model size and online/offline arrangement based on site-specific data entered by the user. For assistance please contact an AQUA Q representative.



Go to hydro-int.com/sizingtool to access the tool.

Inspection & Maintenance

Maintenance is safe and easy with a standard vactor truck, with no need to enter the confined space. Maintenance consists of removing sediments from the sump and floatable oils, grease, litter and other debris from the floatables capture zone.

FIG.6 Maintenance is done with a vactor truck

TABLE 2: First Defense® High Capacity Design Criteria

First Defense® High Capacity Model No.	Diameter	Typical TSS Treatment Flow Rates		Peak Online Flow Rate	Maximum Pipe Diameter[1]	Oil Storage Capacity	Typical Sediment Storage Capacity[2]	Minimum Distance from Outlet Invert to Top of Rim[3]	Standard Distance from Outlet Invert to Sump Floor
		NJDEP Certified	106µm						
	(mm/ft)	(L/s / cfs)	(L/s / cfs)	(L/s / cfs)	(mm/in)	(L/gal)	(m^3/yd^3)	(m/ft)	(m/ft)
FD-3HC	0.9 / 3	23.7 / 0.84	45.3 / 1.60	424 / 15	457 / 18	473 / 125	0.3 / 0.4	0.6 - 1.0 / 2.0 - 3.5	1.13 / 3.71
FD-4HC	1.2 / 4	42.4 / 1.50	53.2 / 1.88	510 / 18	610 / 24	723 / 191	0.5 / 0.7	0.7 - 1.2 / 2.3 - 3.9	1.5 / 4.97
FD-5HC	1.5 / 5	66.2 / 2.34	83.3 / 2.94	566 / 20	610 / 24	1,135 / 300	0.84 / 1.1	0.7 - 1.3 /2.5 - 4.5	1.5 / 5.19
FD-6HC	1.8 / 6	95.7 / 3.38	133.9 / 4.73	906 / 32	762 / 30	1,878 / 496	1.2 / 1.6	0.9 - 1.6 / 3.0 - 5.1	1.8 / 5.97
FD-8HC	2.4 / 8	169.9 / 6.00	212.9 / 7.52	1,415 / 50	1,219 / 48	4,239 / 1,120	2.1 / 2.8	0.9 -1.8 / 3.0 - 6.0	2.2 / 7.40

[1]Contact an AQUA Q representative when larger pipe sizes are required.
[2]Contact an AQUA Q representative when custom sediment storage capacity is required.
[3]Minimum distance for models depends on pipe diameter.

UP-FLO® FILTER

The Up-Flo® Filter is a multi-stage stormwater treatment system that combines pretreatment with fluidized bed filtration technology in one structure for superior filtration rates and media longevity. The Up-Flo® Filter optimizes the balance between high treatment performance and total cost of ownership.

Designed with efficiency, longevity and upkeep in mind, the Up-Flo® Filter has high loading rates and long media life. The upflow fluidized bed technology prevents clogging of the filter media. A high flow bypass and trap for oils and trash is integrated into the design. The Up-Flo® Filter is independently verified through the TARP field monitoring program.

TYPICAL APPLICATIONS

- Residential and commercial areas
- Industrial developments
- Streets and highways
- LEED® construction projects
- Projects requiring NJCAT and NJDEP verification

ENVIRONMENTAL PROTECTION	VERSATILE	QUALITY	EASE OF MAINTENANCE
· Certified removal rate of 80% TSS by the New Jersey Department of Environmental Protection	· Modular filtration components allow adaptation to any catchment area	· Increased treatment efficiency in multi-stage treatment device	· Media bags are easily removed and replaced without purchase of new cartridge

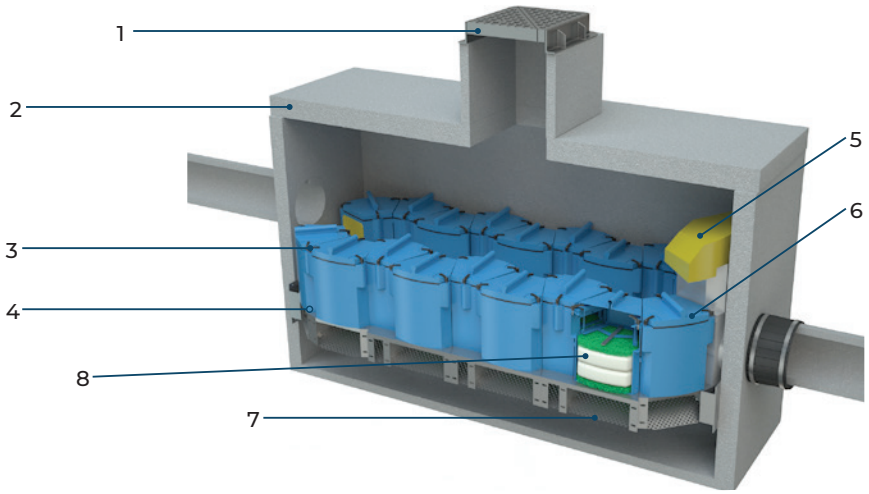


FIG.7 The Up-Flo® Filter includes sedimentation, screening and filtration in a single device

System Components

1. Inlet Grate (pictured) or Inlet Pipe (not shown)
2. Precast Filtration Chamber
3. Filter Module
4. 4mm Screening
5. Bypass Hood/Siphon
6. Outlet Module with Drain Down Filter
7. Pollutant Storage Sump
8. Media Bags

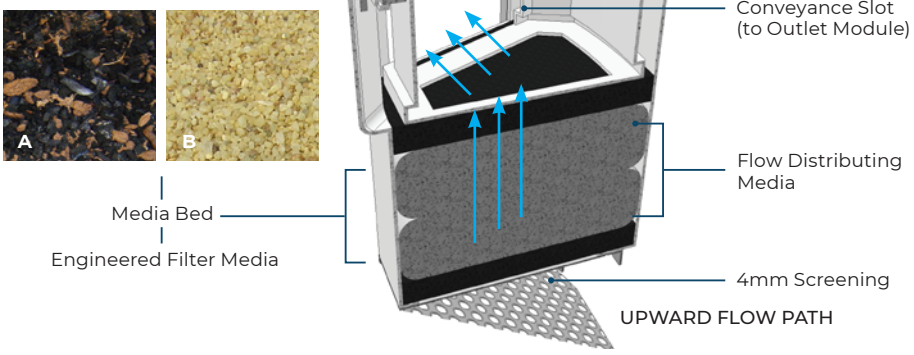


FIG.8 Engineered media mixes include (A) CPZ™ Mix for TSS, nutrients, metals and organics removal or (B) Hydro Filter Sand for TSS, particle-bound nutrients and metals removal

Filter Module Components

Each filter module contains two filter bags containing an engineered media mix designed to optimize pollutant removal by evenly spreading the flow across the entire surface area.

Sizing & Design

The modular design of the Up-Flo® Filter ensures that project specific treatment goals are easily met.

Standard and typical dimensions are listed below. Use our sizing calculator to determine appropriate site-specific sizing.

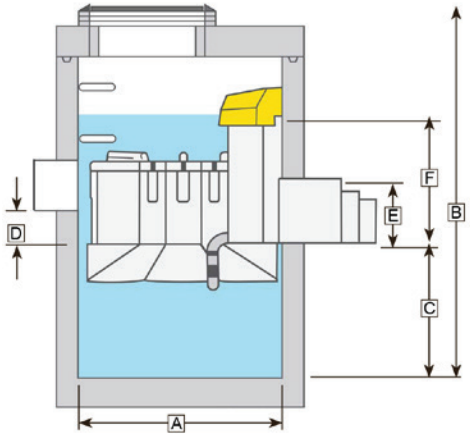


TABLE 3: Up-Flo® Filter Design Criteria

	A		B	C	D	E	F	
Chamber	Diameter	Maximum Filter Modules	Height	Sump Depth	Inlet/Outlet Drop	Maximum Pipe Diameter	Operating Head	Maximum Treatment Flow
	(mm/ft)	(No.)	(m/ft)	(m/ft)	(m/ft)	(mm/in)	(m/ft)	(L/s / cfs)
Round Manhole	1,200 / 4	6	2.29 / 7.5	0.91 / 3.0	0.24 / 0.8	375 / 15	0.76 / 2.5	1.586 / 0.056 per module
Rectangle Vault	1,800 x 2,400 / 6 x 8	7	1.98 / 6.5	0.60 / 2.0		609 / 24		
	1,800 x 3,900 / 6 x 13	18						
	2,500 x 3,900 / 8.5 x 13	36						
	4,500 x 3,900 / 15 x 13	54						

Inspection & Maintenance

Regular inspection and maintenance is critical to ensure optimal device performance.

Filter modules are situated along chamber walls enabling easy sump access for vactor trucks. Light-weight media bags can be manually replaced without removing the entire module.

FREE Up-Flo® Filter Sizing Calculator for Engineers

This simple tool will recommend the best filter size and arrangement based on site-specific data entered by the user.

Go to hydro-int.com/sizingtool to access the tool.

HYDRO-BRAKE® VORTEX FLOW CONTROL

The Hydro-Brake® Vortex Flow Control is a specially designed vortex flow control valve which provides water quantity management for stormwater drainage systems. Its unique vortex flow technology effectively and reliably controls discharge flow across a wide range of operating conditions and applications from small individual plots to large sewer networks. Self-activated and precision engineered, each unit can be custom designed to meet site-specific requirements, offering exceptional flood protection in even the most challenging environments.

The Hydro-Brake® is used to maximize savings on new construction projects by reducing stormwater detention volumes. Also an economical retrofit solution, the Hydro-Brake® can be installed in over-discharging ponds and catch basins to restrict the outflow without requiring the construction of additional detention volumes.

TYPICAL APPLICATIONS

- Outlet flow control for stormwater detention
- Outlet flow control for dams and flood reservoirs
- Reduction of runoff volume from sites
- Erosion control and energy dissipation

COST EFFECTIVE	VERSATILE	ADVANCED DESIGN	EASE OF MAINTENANCE
· Reduced stormwater storage volumes mean up to 50% savings in project storage costs	· Available in wall-mounted or floor-mounted geometries	· Area of opening is 3 to 6 times larger than an equivalent orifice	· Self-activating with no moving parts or power requirements · Virtually maintenance free

The Hydro-Brake® operates on simple fluid hydraulics. Flow enters the volute tangentially through the inlet. Under low flow conditions, the Hydro-Brake® acts as a large orifice and water passes directly from the inlet to the outlet (Fig.9a).

As flow increases and reaches the Flush-Flo™ point, high peripheral velocities initiate the throttling action. As head increases, the valve approaches the Switch-Flo™ and Kick-Flo™ points and an air-filled core starts to form in the volute. As head continues to increase, the air core fully stabilizes and the valve discharge is throttled to that of a smaller orifice (Fig.9b).

The Hydro-Brake® Vortex Flow Control optimizes flow control to allow for higher discharge rates at lower heads than conventional flow control options. The head/discharge curves shown below illustrate the behavior of a Hydro-Brake® Vortex Flow Control compared to an orifice (Fig.10).

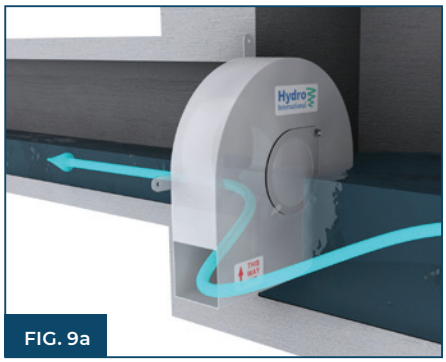


FIG. 9a

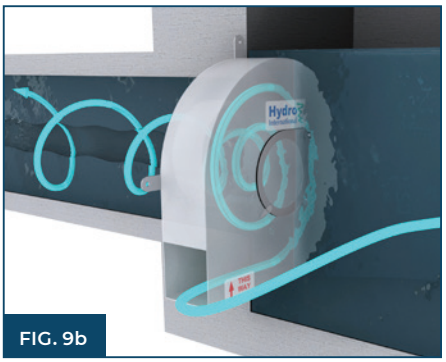
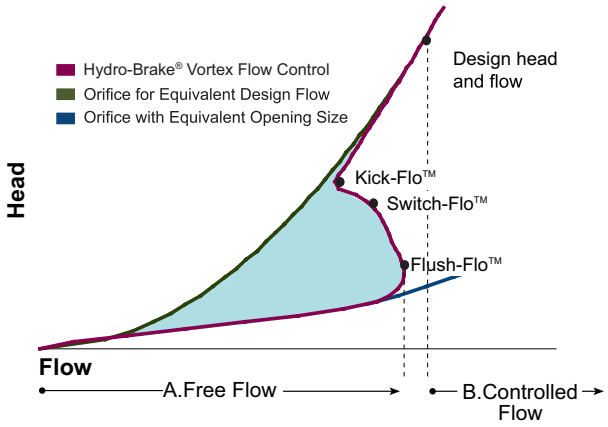


FIG. 9b

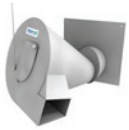
FIG.10 The characteristic of the Hydro-Brake® vs. an equivalent orifice



Sizing & Design

Three series of Hydro-Brake® Vortex Flow Controls are available to suit various applications and design constraints. Refer to the Hydro-Brake® Design Chart for typical sizing guidelines (Table 4).

TABLE 4: Hydro-Brake® Vortex Flow Control design chart

Series	S Series	V Series	C Series
Typical Geometry			
Models	SH, STH, SXH, SMH, SMXH	SV, SXV, SMV	C, CX, CH
Typical Applications	• Flow control at the inlet of the storm drain system • Outlet flow control for storm water detention systems	• Erosion control & energy dissipation	• Outlet flow control for flood dams and levees • Outlet flow control for stormwater detention systems
Typical Mount Style	Wall Mount	Downspout/Roof Mount Floor Mount, Pipe Mount	Floor Mount
Typical Diameter Range*	50 - 410 mm (2 - 16 in)	50 - 410 mm (2 - 16 in)	75 - 510 mm (3 - 20 in)
Typical Flow Range**	1 - 157 L/s (0.05 - 5.6 cfs)	1 - 174 L/s (0.05 - 6.0 cfs)	5.3 - 405 L/s (0.18 - 14.3 cfs)

NOTE:

*Listed diameter ranges are typical guidelines only. Hydro-Brake® Vortex Flow Controls can be manufactured to any specified diameter up to 6 ft.
**Flow ranges listed are for 4 - 6.5 ft. of head. Contact an AQUA Q representative for site-specific sizing and design requirements.

Optional Design Accessories

PIVOTING BYPASS DOOR

For maintenance access to the outlet pipe.

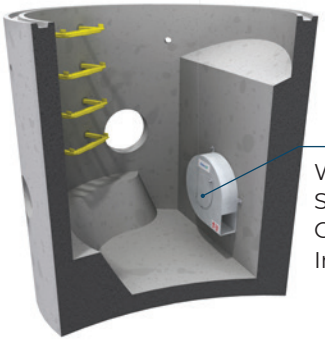
CURVED BACKPLATE

To allow for flush-mounting to the wall of a round manhole.

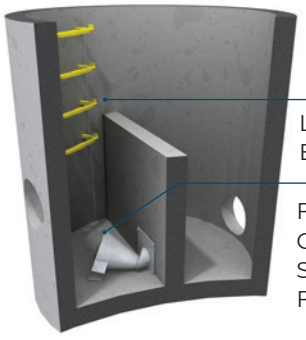
VORTEX SUPPRESSOR PIPE

To eliminate air core for emergency bypass.

Typical Chamber Configurations

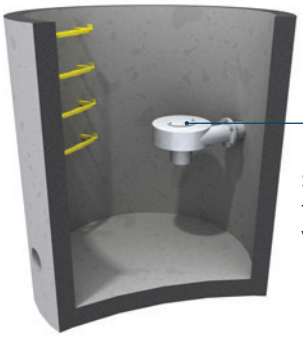


Wall Mounted SXH Model for Catch Basin Inlet Control



Large Storm Bypass Weir

Floor Mounted CH Model for Small Storm Flow Control



Pipe Mounted SXV Model for Energy & Velocity Dissipation

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