Bayview Hospitality Holdings Ltd

6301 Campeau Drive

Stormwater Management Report

December 04, 2020

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Issue for City Review
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Revision History

FIRST ISSUE

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Signatures

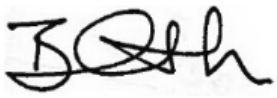
Prepared by

December 4, 2020

Michael Stewart, M.A.Sc., E.I.T.
Land Development E.I.T.

Date

APPROVED BY



December 4, 2020

Ben Worth, P.Eng., C.Eng., MICE
Manager, Water Resources

Date

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1 INTRODUCTION

1.1 Scope

WSP Canada Inc. was retained by Bayview Hospitality Group to conduct a stormwater management study to service the proposed new residential development, including apartments and townhouses.

1.2 Site Location

The existing site is located at 6301 Campeau Drive, Ottawa, Ontario, bounded by Campeau Drive to the north, Cordillera Street to the east, future Canadian Shield Avenue to the south, and an existing property at 6501 Campeau Drive to the west. The location of the proposed re-development is split into two parcels and is illustrated in **Figure 1**.

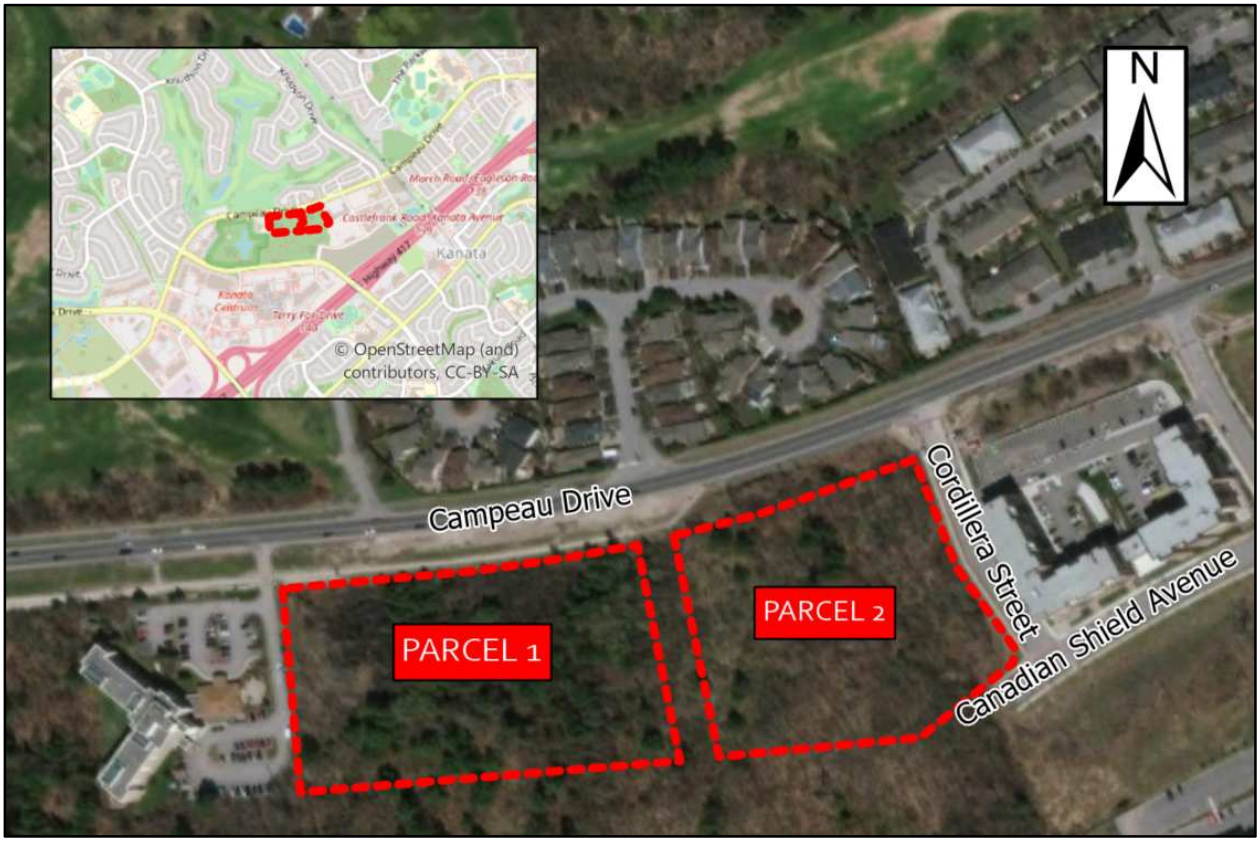


Figure 1: Site Location

1.3 Stormwater Management Plan Objectives

The objectives of the stormwater management (SWM) study are as follows:

- Collect and review background information.
- Determine site specific stormwater management requirements to ensure that future development projects are in line with Bayview Hospitality Holdings Ltd's vision for the site and conform with the requirements of the City, Mississippi Valley Conservation Authority (MVCA), and established reports.
- Ensure downstream capacity is sufficient for receiving allowed discharge.
- Evaluate various stormwater management practices that meet the stormwater management requirements and recommend a preferred stormwater management strategy.

1.4 Design Criteria

There are two sets of stormwater management criteria for 6301 Campeau drive as governed by the pre-development drainage boundaries and the existing drainage strategies of adjacent developments. The criteria for these two areas were discussed in a pre-consultation meeting with the City, owner (OCLDC), and development applicant (Bayview Hospitality Inc.) dated November 8, 2019 **(Appendix A)** and supported by the following stormwater management reports and resources:

1. Kanata Town Centre Phasing and Servicing Overview by IBI (September 23, 2013)
2. Stormwater Management Report, Kanata Town Centre, Central Business District by J.L. Richards & Associates Limited (January 1999)
3. Kanata Lakes Golf Course Development Application: Stormwater Management Technical Memo, JFSA Water Resources and Environmental Consultants (September 20, 2019) and Storm Servicing and Drainage Plan, DSEL Engineering Ltd. (August 2019)

Select figures and tables from the above reports detailing storm drainage boundaries have been provided in **Appendix B**. PDFs from the reports have been overlain and traced to show their relation to the proposed development boundaries in **Figure 2**.

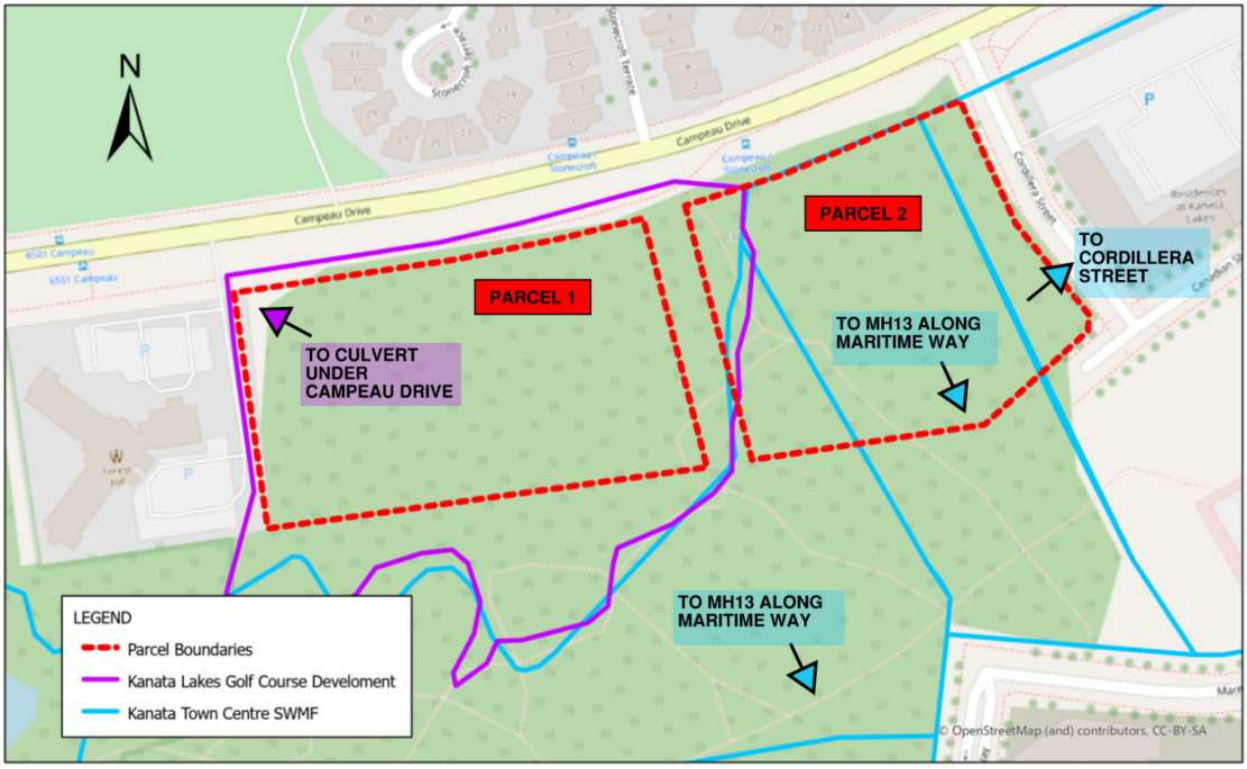


Figure 2: Approximate Stormwater Management Boundaries

All of Parcel 1 lands and a portion of Parcel 2 are governed by the criteria set forward by the Kanata Lakes Golf Course development (purple) whereas the majority of parcel 2 is governed by drainage captured by the Kanata Town Centre SWMF (blue).

1.4.1 Stormwater management criteria for lands draining toward the Kanata Lakes Golf Course Development

The first set of criteria is detailed in the *Kanata Town Centre Phasing and Servicing Overview by IBI (September 23, 2013)* and *Kanata Lakes Development Application Documents (2019)*. These criteria are for the lands draining northwest toward Campeau Drive.

The following are key points regarding the stormwater servicing from this report:

- The existing storm sewer along Campeau Drive adjacent to Parcel 1 is a shallow sewer designed to capture roadway drainage and has no identified capacity for receiving drainage from additional developments
- A 1200 mm diameter culvert crossing Campeau drive exists at the northwest edge of the site. “This storm outlet is directly available to Blocks A to D inclusive. On-site attenuation to predevelopment flow should be considered a requirement for the purposes of advancing use of this storm outlet”

CRITERIA

Water Quality – Water quality is accommodated by SWMFs within the Kanata Lakes Golf Course development north of Campeau Drive.

Water Quantity Control and Discharge to Municipal Infrastructure – Runoff from the 5-year to 100-year design storms must not exceed the peak 5-year pre-development flow rate with a runoff coefficient of 0.20.

1.4.2 Stormwater management criteria for lands draining toward the Kanata Town Centre SWMF

The second set of criteria is detailed in *Stormwater Management Report, Kanata Town Centre, Central Business District by J.L. Richards & Associates Limited (January 1999)*.

The following are key points regarding the stormwater servicing from this report:

- Lands are accommodated by a major/ 5-year minor storm system discharging to a SWMF in the southeast corner of the Kanata Town Centre development.
- The proposed development at 6301 Campeau Drive sits within three separate drainage areas; two of which are accounted for at a manhole along Marine Way and one of which is accounted for along Cordillera Avenue.

CRITERIA

Water Quality – Water quality is accommodated by the SWMF in the southeast of the Kanata Town Centre.

Water Quantity Control and Discharge to Municipal Infrastructure – Runoff from the 5-design storm must not exceed the peak 5-year pre-development flow rate of the receiving system as previously calculated by J.L. Richards & Associates Limited (January 1999).

2 PRE-DEVELOPMENT CONDITIONS

2.1 General

Currently the land proposed for the residential development is undeveloped, mainly covered by grass and tress, and forms part of the Kanata Town Centre development lands. The total study area for Parcels 1 and 2 are 1.964 and 1.741 ha, respectively. Please refer to **Appendix C** for existing site conditions as provided by the Topographical Survey Plan by Annis, O'Sullivan, Vollebekk Ltd. (February 2020).

2.2 Rainfall Information

The rainfall intensity is calculated in accordance with Section 5.4.2 of the Ottawa Sewer Design Guidelines (October 2012):

$$i = \left[\frac{A}{(T_d + C)^B}\right]$$

Where;

- A, B, C = regression constants for each return period (defined in section 5.4.2)
- i = rainfall intensity (mm/hour)
- T_d = storm duration (minutes)
- The IDF parameters/regression constants are included in **Appendix C**.

2.3 Allowable Flow Rates – Parcel 1

As noted in **Section 1.4.1**, post-development stormwater runoff from the 5-year to 100-year design storms must not exceed the peak 5-year pre-development flow rate with a runoff coefficient value of 0.20.

The total site area draining through the site is 3.09 ha. This area will discharge to a 750mm storm pipe at the northwest edge of the site which ultimately drains through a culvert toward the Kanata Lakes Development (previously golf course lands). Within the 3.09 ha. draining through the site, 1.40 ha will remain undeveloped and will be routed downstream of proposed site controls (i.e. bypassing the system and remaining unchanged from existing conditions). Because this area will not be developed and will not mix with Parcel 1's stormwater system, it has been excluded from the pre-development controlled area. Therefore, the area to be controlled is 1.69 ha. The

calculated peak flow rates for the site in the pre-development condition are summarized below in **Appendix D**.There are four major storm boundaries within Parcel 2 which govern the post-development criteria (**Figure 2**). The northwest corner of the site will remain undeveloped and drains through and is controlled onsite within Parcel 1 in accordance with the criteria set out in **Section 2.3.** The remaining site area was accounted for by J.L. Richards (January 1999) during the design of the Kanata Town Centre minor system. As noted in **Section 1.4.2,** post-development stormwater runoff from the 5-design storm must not exceed the peak 5-year pre-development flow rate of the receiving system as previously calculated by J.L. Richards & Associates Limited (January 1999, **Appendix B-2 and B-3**).

While the majority of site area was accounted for in 'Manhole 13' along Maritime Way (centre areas of Parcel 2 from **Figure 2**), the roadway and associated minor pipe systems along Canadian Shield Avenue which tie into Maritime Way have not yet been constructed. The remaining 0.25 ha. (eastern area of Parcel 2 from **Figure 2**) of site area has been accounted for in the design of the minor system along Cordillera Street. Because Canadian Shield Avenue is not yet constructed, all site areas not draining toward Parcel 1 must be controlled to the allocated minor system flow along Cordillera Street.

The calculated peak flow rates for the site to Cordillera Street in the 5-year storm, which align with the flow rates provided in the report by J.L. Richards (1999) are summarized below in **Table 2-2.** Detailed calculations are contained within **Appendix D**.

Table 2-1: Pre-Development Peak Flow Rate Calculations (Runoff Coefficient, C = 0.50 and T_c=20 min)

Return Period (Years)	Rainfall Intensity (MM/hour)	Peak Flow Rate (l/s)	Target Release Rate (l/s)
2	52.0	48.9	**66.0**
5	70.3	**66.0**	
10	82.2	77.2	
25	97.3	100.5	
50	108.5	122.3	
100	120.0	140.9	

2.4 Allowable Flow Rates – Parcel 2

There are four major storm boundaries within Parcel 2 which govern the post-development criteria (**Figure 2**). The northwest corner of the site will remain undeveloped and drains through and is controlled onsite within Parcel 1 in accordance with the criteria set out in **Section 2.3**. The remaining site area was accounted for by J.L. Richards (January 1999) during the design of the Kanata Town Centre minor system. As noted in **Section 1.4.2**, post-development stormwater runoff from the 5-design storm must not exceed the peak 5-year pre-development flow rate of the receiving system as previously calculated by J.L. Richards & Associates Limited (January 1999, **Appendix B-2 and B-3**).

While the majority of site area was accounted for in 'Manhole 13' along Maritime Way (centre areas of Parcel 2 from **Figure 2**), the roadway and associated minor pipe systems along Canadian Shield Avenue which tie into Maritime Way have not yet been constructed. The remaining 0.25 ha. (eastern area of Parcel 2 from **Figure 2**) of site area has been accounted for in the design of the minor system along Cordillera Street. Because Canadian Shield Avenue is not yet constructed, all site areas not draining toward Parcel 1 must be controlled to the allocated minor system flow along Cordillera Street.

The calculated peak flow rates for the site to Cordillera Street in the 5-year storm, which align with the flow rates provided in the report by J.L. Richards (1999) are summarized below in **Table 2-2**. Detailed calculations are contained within **Appendix D**.

Table 2-2: Pre-Development Peak Flow Rate Calculations (Runoff Coefficient, C = 0.50 and T_c=20 min)

Return Period (Years)	Rainfall Intensity (MM/hour)	Peak Flow Rate (l/s)	Target Release Rate (l/s)
2	52.0	29.0	**39.1**
5	70.3	**39.1**	
10	82.2	45.8	
25	97.3	59.6	
50	108.5	72.5	
100	120.0	83.5	

3 POST-DEVELOPMENT CONDITIONS

3.1 General

The two parcels each have new proposed residential developments, including apartments and townhouses. Please refer to **Appendix E** for an illustration of the project (Storm Drainage Area Plan).

The following assumptions have been used to quantify stormwater runoff for modelling/analysis purposes: 100% of proposed apartment roof surfaces have been considered as impervious, and 100% of the rooftop area of each of these apartment buildings will be available for temporary surface ponding (via drainage by controlled discharge roof drains).

Each parcel will comply with their respective allowable release rates; 100-year discharge from Parcel 1 excluding undeveloped areas routed around the site will be limited to 66.0 L/s and 5-year minor-system discharge from Parcel 2 will be limited to 39.1 L/s along Cordillera Street.

3.2 Water Quantity – Parcel 1

As noted in **Section 2.3**, the target allowable discharge rate discharging to the to Campeau Drive excluding undeveloped areas routed around the site is 66 l/s. This is equivalent to the peak runoff rate under pre-development conditions during a 5-year design storm event with a runoff coefficient of 0.20. Compliance with the 100-yr target offsite discharge rate will be achieved through use of rooftop ponding on the apartment building with flow control drains (240.1 m^3), pipe storage (30.8 m^3), and the provision of an underground cistern storage structure (353.0 m^3). Post-development runoff calculations have accounted for uncontrolled runoff from portions of the site that will not drain to storage features.

Most water quantity control will be provided with the provision of an underground storage cistern and upstream pipe storage. This system will be designed to receive runoff (for all events up to and including the 100-year return period) from the townhouses fronting onto Campeau Drive and at-grade areas within the development **Appendix E** illustrates the small portions of the project site that will drain offsite uncontrolled in post-development conditions. These uncontrolled runoff rates contribute to the total allowable release rate modelled.

The cistern will discharge to Campeau Drive via gravity, and peak outflow rates will be controlled via an orifice control device. A 150 mm diameter circular orifice has been specified to meet the target release rate.

The apartment building will provide its own stormwater detention through use of temporary surface ponding. It has been assumed that 100% of the apartment building rooftop will be available for ponding (via drainage by controlled discharge roof drains). Controlled runoff from the roof is directed downstream of the cistern storage structure. Detailed roof drain layouts were not available at this point; therefore, it was assumed that one drain would be provided for approximately every 150m^2 of roof area. For modelling purposes, these outlets were simulated using rating curves for a *Watts Accutrol* product (in the "fully closed" position, **Appendix F**).

As mentioned above, flows from the proposed townhouses fronting onto Campeau Drive will be directed to the stormwater cistern instead of being released directly to Campeau Drive. Foundation drains will be connected to a secondary pipe system which will discharge downstream of system controls to protect foundations from backups in the cistern. To satisfy net target release rates for controlled and uncontrolled site areas, the recommended peak discharge rate for flow control device is 60.3 l/s. If a storm event that occurs fills the cistern, the access hatch at the top of the cistern would allow water to spill to the Cordillera Street major system. It is noted that the return period associated with an overflow event requiring these facilities to spill would exceed 100-years.

A HydroCAD model of the project was constructed and utilized to include:

- storage and controlled release of stormwater from 100% of apartment rooftop areas downstream of the cistern
- controlled runoff from at-grade areas directed to pipe storage + cistern
- controlled runoff from townhouse areas directed to pipe storage + cistern
- uncontrolled runoff rates generated from at grade areas constructed with soft and hard landscaping
- uncontrolled runoff rates generated from undeveloped areas routed around site

The Modified Rational Method (an inherent subroutine of the HydroCAD software) has been used for the modelling exercise, and the model has informed the maximum storage volume used in the stormwater cistern based on the proposed flow. The peak flow rate generated from uncontrolled drainage areas within the project site and controlled flow from the cistern, pipe storage, and rooftops is 58.3 l/s which is below the allowable 100-year release rate of 66.0 l/s. Modelling results are summarized below in **Table 3-1** and shown in **Appendix G**.

Table 3-1: Summary of Modelling Results

Return Period (Years)	Time of Conc. (min)	Utilized Cistern / Pipe / Roof Storage (m^3)	Peak Water Elevation in Cistern (m)	Peak Flow Rate from Cistern (L/s)	Total Flow Leaving Site* (L/s)	Allowable 100-yr Flow Rate (L/s)
5	45	195.8 9.2 96.7	102.48	38.5	43.9	**66.0**
100 (Peak Discharge)	57	352.5 31.0 96.7	103.03	52.0	**58.3**	
100 (Peak Storage)	60	352.5 31.4 96.7	103.03	52.0	58.3	

*'Total Flow Leaving Site' includes cistern/pipe flow, uncontrolled areas, and apartment rooftop runoff but excludes the undeveloped areas being routed around the site as these are left unchanged and do not impact the criteria

3.3 Water Quantity – Parcel 2

As noted in **Section 2.4**, the target allowable release rate to the municipal sewer along Cordillera Street during a 5-year storm is 39.1 L/s. This is equivalent to the peak runoff rate under post-development conditions for 0.25 ha of the site area during a 5-year design storm event with a runoff coefficient of 0.80 (Time of Concentration = 20 minutes). Compliance with the 5-year target offsite discharge rate will be achieved through use of rooftop ponding on the apartment building with flow control drains (69.4 m^3), pipe storage (7.2 m^3), and the provision of an underground cistern storage structure (139.9 m^3). Post-development runoff calculations have accounted for uncontrolled runoff from portions of the site that will not drain to storage features.

A significant portion of quantity control will be provided with the provision of an underground storage cistern and upstream pipe storage. This system will be designed to receive runoff (5-year return period) from the townhouses fronting onto Campeau drive and at-grade areas within the development **Appendix D** illustrates the small portions of the project site that will drain offsite uncontrolled in post-development conditions. These uncontrolled runoff rates contribute to the total allowable release rate modelled.

The cistern will discharge to Cordillera Street via gravity, and peak outflow rates will be controlled via an orifice control device. A 100 mm diameter circular orifice has been specified to meet the target release rate.

The apartment building will provide its own stormwater detention through use of temporary surface ponding. It has been assumed that 100% of the apartment building rooftop will be available for ponding (via drainage by controlled discharge roof drains). Controlled runoff from the roof is directed downstream of the cistern storage structure. Detailed roof drain layouts were not available at this point; therefore, it was assumed that one drain would be provided for approximately every 150m^2 of roof area. For modelling purposes, these outlets were simulated using rating curves for a *Watts Accutrol* product (in the "fully closed" position, **Appendix F**).

As mentioned above, flows from the proposed townhouses fronting onto Campeau Drive will be directed to the stormwater cistern instead of being released directly to Campeau Drive. Foundation drains will be connected to a secondary pipe system which will discharge downstream of system controls to protect foundations from backups in the cistern.

The cistern will discharge to the existing municipal storm sewer system via gravity, and peak outflow rates will be controlled via an orifice control device. As noted above, a 100 mm diameter orifice (opening area of 0.0095 m^2) has been specified to meet the target release rate.

To satisfy net target release rates for site areas, the recommended peak discharge rate for flow control device is 34.4 l/s. If a storm event that occurs fills the cistern, the access hatch at the top of the cistern would allow water to spill to the Cordillera Street major system. It is noted that the return period associated with an overflow event requiring these facilities to spill would exceed 5-years.

As per Site Servicing Plan Drawing discharge from the cistern is proposed to the Cordillera Street trunk storm sewer.

Appendix E illustrates the small portions of the project site that will drain offsite uncontrolled in post-development conditions. These uncontrolled runoff rates contribute to the total allowable release rate modelled.

A HydroCAD model of the project was constructed and utilized to include:

- storage and controlled release of stormwater from 100% of apartment rooftop areas downstream of the cistern
- controlled runoff from at-grade areas directed to pipe storage + cistern
- controlled runoff from townhouse areas directed to pipe storage + cistern

– uncontrolled runoff rates generated from at grade areas constructed with soft and hard landscaping

The Modified Rational Method (an inherent subroutine of the HydroCAD software) has been used for the modelling exercise, and the model has informed the maximum storage volume used in the stormwater cistern based on the proposed flow. Flow rates generated from areas within the project site discharging to the minor system along Cordillera Street is 37.8 l/s, which is below the allowable release rate of 39.1 l/s during the 5-year storm event.

Modelling results are summarized below in **Table 3-2** and shown in **Appendix G**.

Table 3-2: Summary of Modelling Results

Return Period (Years)	Time of Conc. (min)	Utilized Cistern / Pipe / Roof Storage (m^3)	Peak Water Elevation in Cistern (m)	Peak Flow Rate from Cistern (L/s)	Total Flow Leaving Site* (L/s)	Allowable 5-yr Flow Rate (L/s)
5 (Peak Discharge)	24	129.3 6.2 58.0	101.09	27.5	**37.8**	**39.1**
5 (Peak Storage)	48	139.9 7.2 69.4	101.23	28.6	36.8	
100	14	143.7 7.8 92.5	101.28	28.9	635.1	

*'Total Flow Leaving Site' includes cistern/pipe flow, uncontrolled areas, and apartment rooftop runoff

4 CONCLUSIONS

A stormwater management plan has been prepared to support the site plan application for the 6301 Campeau Drive development in the City of Ottawa. The key points are summarized below.

WATER QUANTITY FOR PARCEL 1

Controlled runoff collected from the project site will be slowed using surface flow controls then directed to a stormwater cistern with a minimum active storage volume of 353.0 m^3 to control the 100-year event. Stormwater from the apartment roof top will be controlled using roof drains and discharged downstream of the cistern control. The peak 100-year discharge from the site excluding undeveloped areas routed around the site controls is 58.3 l/s, below the allowable release rate of 66.0 l/s.

WATER QUANTITY FOR PARCEL 2

Controlled runoff collected from the project site will be slowed using surface flow controls then directed to a stormwater cistern with a minimum active storage volume of 144.0 m^3 to control the 5-year event. Stormwater from the apartment roof top will be controlled using roof drains and discharged downstream of the cistern control. The peak 5-year discharge from the site excluding the undeveloped area draining through Parcel 1 is 37.8 l/s which is below the peak allowable release rate of 39.1 l/s. Flows in excess of the 5-year storm will be directed as surface flows along Cordillera toward the Kanata Town Centre SWMF.

WATER QUALITY

Water treatment is provided for as part of downstream systems and therefore, no specific water quality treatment features are required.

This report demonstrates that the proposed SWM strategy will address stormwater management related impacts from this project and meet the requirements of the City of Ottawa.

Respectfully submitted,

APPENDIX

A

Pre-consultation meeting minutes (November 8, 2019)

Part of 6301 Campeau Drive
Pre-Consultation Meeting Minutes

Location: Room 4102E, City Hall
Date: November 8, 2:00pm to 3:00pm

Attendee	Role	Organization
Mark Young	Planner	City of Ottawa
Justin Armstrong	Project Manager (Infrastructure)	
Neeti Paudel	Project Manager (Transportation)	
Matthew Hayley	Planner (Environment)	
Justyna Garbos	Planner (Parks)	
Matthew Ippersiel	Planner (Urban Design)	
Lauren Reeves	Owner	OCLDC
Sameer Gulamani	Applicant	Bayview Hospitality
Alnoor Gulamani	Applicant	Bayview Hospitality

Comments from Applicant

1. The applicant is proposing a phased development of purpose-built 6-storey multi-residential apartment buildings at the south side of the site and 3-storey townhouses on the north side of the site along Campeau Drive. The buildings would have shared covered podium parking in the middle of the site which will have amenity space on top. Access is provided through Cordillera street and through a laneway shared with the adjacent private retirement home (which may not be feasible).
2. A central access point or alternative access point for the western development block would be preferable.
3. Zoning By-law relief will be requested for the requirement for 50% at grade commercial development.

Planning Comments

1. The proposal will require a major Zoning By-law Amendment Application and a New complex site plan approval application.
2. Please ensure that all zoning requirements and provisions are indicated on the provided plans.
3. Commercial uses should be maintained as a permitted use at grade, but a stringent requirement for 50% should be revisited. Commercial viability at grade on Cordillera Street and Maritme Way.

4. A joint access for both parcels on Campeau Drive aligned with Stonecroft Terrace may be a viable option. This would also need to include accessible pedestrian access to the Town Centre Park.
5. Consideration for the opportunity for flexible units that could accommodate small businesses on Campeau Drive needs to be considered as part of the design and zoning.
6. The maximum permitted height is 3 storeys – therefore the basement level as proposed must be more than 50% below grade. We would recommend front to back ground floor suites, with accessible access to allow for home based business opportunities.
7. Zoning By-law amendment application will need to address portions of the site currently zoned Development Reserve (DR), proposed performance standards and the addition of townhouse as a permitted use.

Urban Design Comments

1. Generally supportive of the proposed scale of the buildings and the urban treatment of Campeau.
2. The apartment building in the south-east corner of the site should be an L-shaped building, wrapping the corner of the site with a frontage on Cordillera Street. This may also be an appropriate location for ground floor retail.
3. The greening of the rooftops of the parking decks as amenity space is supported. The internal courtyard spaces would likely be even stronger places if they were entirely at grade level.
4. Consider the relationship that will be created between the townhomes and the parking garage, what the pedestrian experience will be in that space, and how the raised amenity space will be accessed from the north. Alternatively, connecting the raised parking structure directly to the buildings, as suggested, may be worth exploring as an option.
5. As the plan progresses, consider what the interface between the development and the park to the south will be. Try to establish a clear delineation between public and private space and ensure there are pedestrian connections through the site.
6. Consider relocating the east-west drive aisle to the south of the property, between the development and the park. This would improve the relationship with the park, clarify the distinction of public and private space, and may help connect the apartment buildings to the amenity space (as they would be shifted north).
7. The proposal will be subject to a formal review with the Urban Design Review Panel. An informal pre-consultation meeting with the panel is also recommended at an early stage in the development review process. The next meetings are scheduled for:
    - December 6th (Nov 22nd submission deadline)
    - January 10th (Dec 27th submission deadline)

- More details available on the UDRP webpage. For questions, email UDRP coordinator David Maloney: David.Maloney@ottawa.ca

Parks Planning:

1. Parks will take cash-in-lieu of parkland at an amount equivalent to 10% of the value of the land area of the site being developed. The exact amount will be identified as a condition of site plan approval. In addition, the applicant will be charged a land appraisal fee of $565 (HST included).
2. Bill Teron Park is planned to be expanded in the future. Please see the attached plan for illustration of the expansion. The applicant should be mindful of their development's transition to/connection into the future parkland south of it.
3. If a combined vehicular/pedestrian site access is considered on the intervening city parkland access block, Parks planning will play an active role in the detailed design of this access to ensure that pedestrian access to Bill Teron Park is prioritized, designed in accordance with the Parks Development Manual, and meets accessibility requirements. The construction of said vehicular and pedestrian access shall be solely at the cost of the developer, and shall not be credited toward cash-in-lieu of parkland requirements. Parks Planning is willing and wanting to work with the developer to help find solutions that benefit both parties.
4. All efforts shall be utilized to protect and retain city owned trees on the abutting city park land. The required TCR shall identify how these trees are being protected. The report shall also address any mitigation measures required for tree retention if blasting and associated grading is required adjacent to the park property line.
5. Efforts shall be undertaken to ensure that the grade differential between the park block and the development sites is minimized to the greatest extent possible.

Engineering Comments

The following are engineering comments related to the recent pre-consultation meeting for the development of 6301 Campeau Drive that was held on Friday November 8th, 2019. It is recommended that the developer retain a local engineering firm familiar with the City of Ottawa's procedures and requirements in order to navigate the comments made below and provide recommendations pertaining to the potential engineering design for the proposed site.

1. WATER

- Water is available along Campeau and along Cordillera/Canadian Shield.
- Watermain looping will be required for the proposed development.

- As per The City of Ottawa's Water Distribution Guidelines Technical Bulletin ISDTB-2014-02, individual residential facilities with a basic day demand greater than 50m^3/day shall be connected with a minimum of two water services, separated by an isolation valve, to avoid the creation of a vulnerable service area.
- A watermain boundary condition request should be made for each proposed connection to the City watermain. As part of the request, anticipated domestic demands and FUS fireflow requirements should be provided along with a screenshot of the proposed connection locations. The request can be sent to justin.armstrong@ottawa.ca.

2. SANITARY

- Sanitary is available along Campeau and along Cordillera/Canadian Shield. For discharge to either location, it should be demonstrated that capacity exists within the receiving sewers. The Servicing Brief (Revised) Kanata Town Centre Central Business District Subdivision Memo prepared by J.L.Richards for Urbandale Corporation, dated June 13, 2012 (attached), and the sanitary sewer design sheet prepared by J.L.Richards for Urbandale dated October 12, 2016 (attached) are related to the design of the sanitary sewers along Cordillera/Canadian shield. These documents should be consulted when demonstrating capacity exists for sewage discharging to this location.

6. STORM

- The report titled *Kanata Town Centre Phasing and Servicing Overview*, prepared by IBI Group, dated September 23, 2013 (attached) states that "*a 1200 mm diameter culvert under Campeau Drive at the Omnicare site and the storm sewer outlet for Omnicare were designed to outlet a portion of the Kanata Town Centre lands adjacent to Campeau Drive. This storm outlet is directly available to Block A to D inclusive. On-site attenuation to predevelopment flow should be considered a requirement for the purposes of advancing use of the storm outlet.*" The referenced 1200 mm diameter culvert outlets under Campeau Drive to the existing Kanata Lakes Golf Course. This statement is consistent with the proposed Storm Servicing and Drainage Plan submitted by DSEL as part of the proposed Kanata Lakes Golf Course development application (D07-16-19-0026), in which a 3.32 ha drainage area (runoff coefficient = 0.2) located south of Campeau Drive has been proposed for allocation to drain to the golf course lands. The proposed Kanata Lakes Golf Course development application files can be obtained from the following link: https://app01.ottawa.ca/postingplans/appDetails.jsf?lang=en&appId= BONQGQ

Please keep in mind that providing onsite attenuation to restrict the storm release rate to predevelopment flows will require significant onsite storage (given that the site is currently grassed/landscaped).

- IBI's report, noted above, also states that *"A local storm sewer varying in size from 525mm diameter to 1650 mm diameter exists in Kanata Main Street and Canadian Shield Avenue across the full frontage of the Kanata Town Centre site. This storm sewer has limited capacity available for direct connection from the Town Centre development, with the understanding that onsite attenuation will be required to match the sewer design capacity as specified in MOE Certificate of Approval Number 3-1378-98-006."* The above-mentioned sewers ultimately outlet to Urbandale's stormwater management pond located at the south-east corner of the Town Centre lands. The SWM pond was designed in accordance with the report titled *Stormwater Management Report, Kanata Town Centre, Central Business District,* prepared by J.L. Richards, dated January 1999 (attached). JLR's report is consistent with IBI's report in which Blocks E, G, H, I and J have been allocated to the existing storm sewers within Kanata Main Street and Canadian Shield Avenue with an outlet to Urbandale's pond. The allocated release rate for each parcel of land will be restricted to the sewer design capacity of the storm sewers as well as the stormwater allocations set with JLR's report.

If servicing allows it, there may be an opportunity to re-direct storm flows from Block A through D to outlet to Canadian Shield Avenue and ultimately Urbandale's pond if it can be demonstrated that the storm sewers and stormwater management pond have capacity to accept the additional flows.

Transportation Planning:

1. Follow Traffic Impact Assessment Guidelines
    - Scoping form should be submitted– triggers trip generation. Meets the triggers for full Traffic Impact Assessment.
    - Applicant advised that their application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).
    - Request base mapping asap if RMA is required. Contact Engineering Services (https://ottawa.ca/en/city-hall/planning-and-development/engineering-services)
    - All requested access locations including the access between the two parcels on Campeau Drive (if proposed) will be reviewed at the TIA strategy (analysis) stage.
2. ROW protection on Campeau Drive between Didsbury and Teron is 40m even. Ensure that this is protected. Campeau Drive at this section is identified to be widened in the 2031 network concept of the TMP (Terry Fox to March) and no parking is currently proposed on Campeau. An eyebrow Street within the right of way is not supported as a temporary measure. Please note that if and when the EA for the widening of Campeau Drive is updated on-street parking may be considered.

3. Site triangles at the following locations on the final plan will be required:
    - Arterial Road to Local Road: 5 metre x 5 metres
4. Noise Impact Studies required:
    - Road
5. On site plan:
    - 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.
    - 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).
    - Show all curb radii measurements; ensure that all curb radii are reduced as much as possible
    - Show lane/aisle widths.
    - Sidewalk is to be continuous across access as per City Specification 7.1.

Planning Forester:

1. A Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City;
2. Tree removal
    a. 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
    b. any removal of City-owned trees will require the permission of Forestry Services who will also review the submitted TCR
3. The TCR must list all trees on site by species, diameter and health condition – separate stands of trees may be combined using averages
4. The TCR must clearly show where tree removal will occur.
5. Tree permits for geotechnical work are possible, but tree removal must be limited to areas required for machinery access and drilling; please provide a plan supported by the TCR showing travel routes and landings
6. 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
7. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca

Environment:

1. An EIS/TCR is required to address species at risk.
2. They will also need to address the Protocol for Wildlife protection during Construction which is available at www.ottawa.ca

Requested Plans and Studies

1. A list of required plans and studies required for a complete Site Plan Control application have been attached.

Process

1. This is a pre-consultation for a Zoning By-law Amendment and Site Plan Control application at 6301 Campeau Drive to the requirements for a complete application.

2. This proposal will trigger a Major Zoning By-law Amendment Application and a New Site Plan Control application, Manager Approval, subject to Public Consultation. The proposal would fall under the 'complex' category as per the Site Plan Control Subtype Threholds. The application form, timeline and fees can be found here.

Please refer to the links to "Guide to preparing studies and plans" and fees for general 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 contact me at Mark.Young@ottawa.ca or at 613-580-2424 extension 41396 if you have any questions.

Sincerely,

Mark Young MCIP RPP
Planner III
Development Review - West

APPENDIX

B

Relevant excerpts from
background studies and reports

APPENDIX

B-1 Stormwater Catchment Draining to Kanata Lakes Golf Course Development

Except from *Storm Servicing and Drainage Plan, DSEL Engineering Ltd. (August 2019)*

LEGEND

- SUBJECT LANDS
- STORM TRUNK
- LOCAL STORM SEWER
- EXISTING STORM SEWER
- STORM MANHOLE
- EXTERNAL STORM DRAINAGE AREA

1.00 / 0.8 / POND — DRAINAGE AREA / IMPERVIOUSNESS / OVERLAND FLOW ROUTE

david schaeffer engineering ltd
120 Iber Road, Unit 103
Stittsville, Ontario, K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

7000 CAMPEAU DRIVE

CITY OF OTTAWA

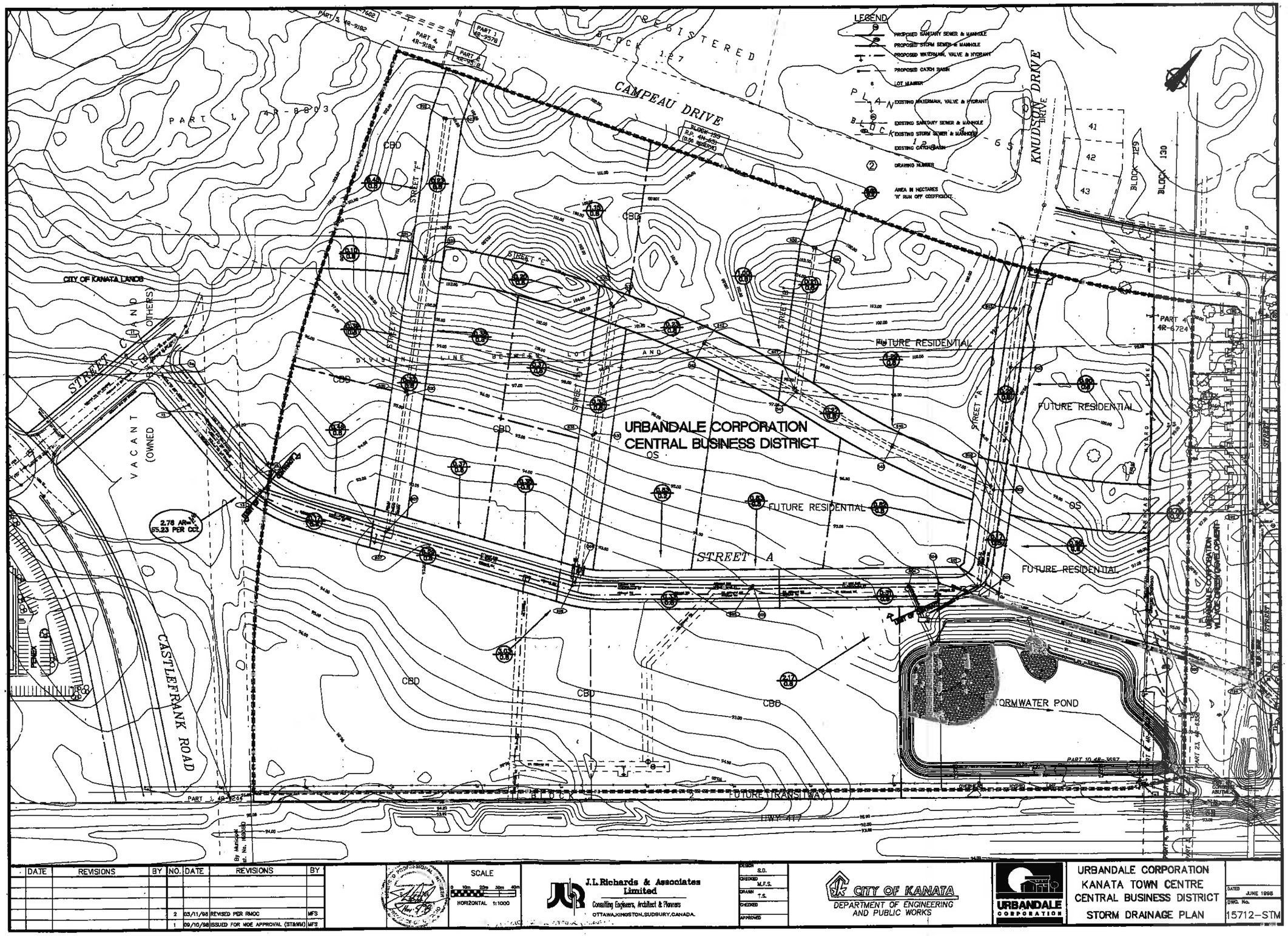
STORM SERVICING AND DRAINAGE PLAN

SCALE:	1:2500	PROJECT No.:	1061
DATE:	AUGUST 2019	DRAWING No.:	03D

APPENDIX

B-2 Stormwater Catchments Draining to Kanata Town Centre SWMF

Excerpt from *Stormwater Management Report, Kanata Town Centre, Central Business District by J.L. Richards & Associates Limited (January 1999)*



NO.	DATE	REVISIONS	BY
2	03/11/98	REVISED PER RMOC	MFS
1	09/10/98	ISSUED FOR MOE APPROVAL (ST&WM)	MFS

SCALE
HORIZONTAL 1:1000

J.L. Richards & Associates Limited
Consulting Engineers, Architect & Planners
OTTAWA, KINGSTON, SUDBURY, CANADA.

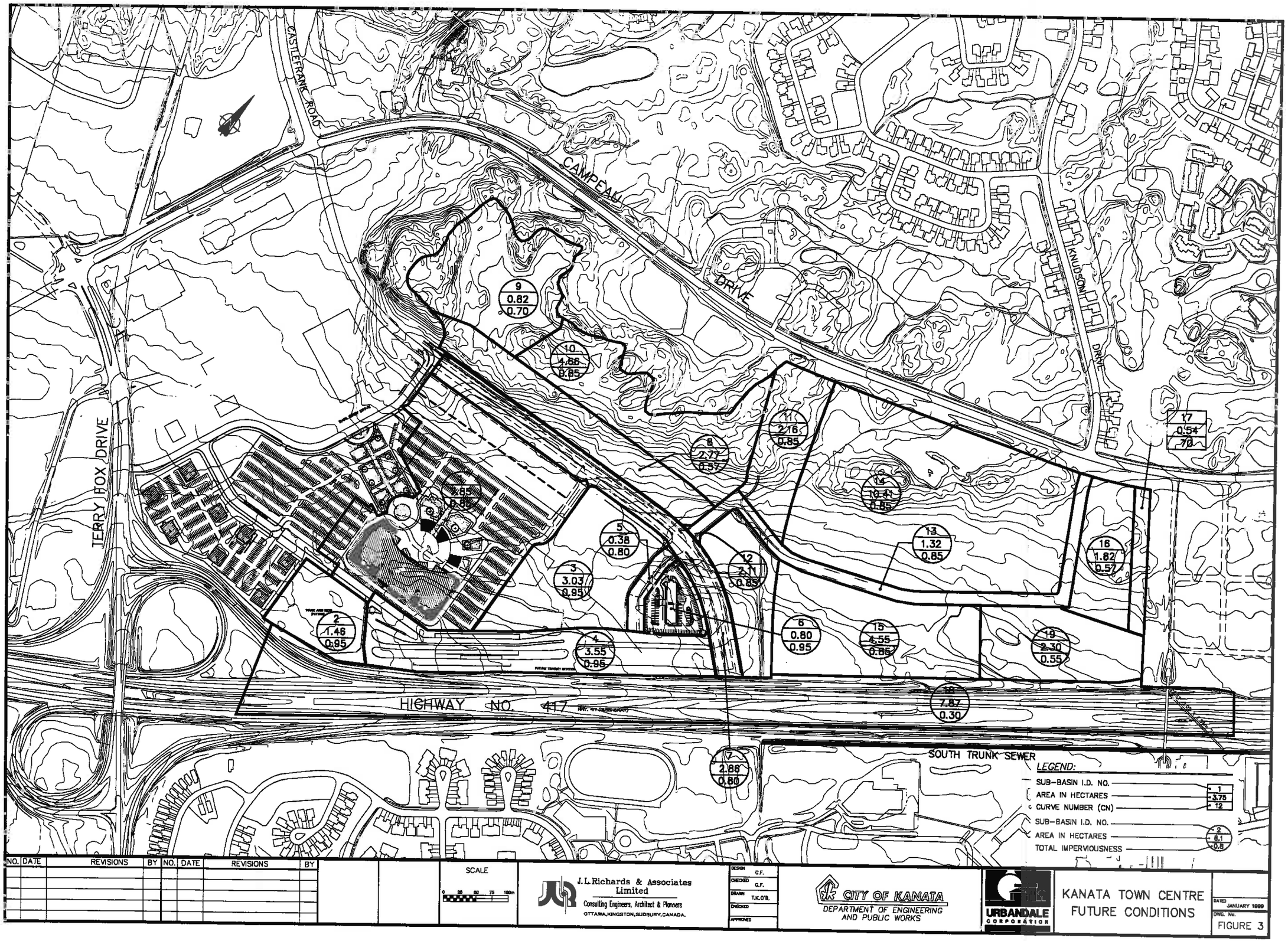
DESIGN	S.D.
CHECKED	M.F.S.
DRAWN	T.S.
CHECKED	
APPROVED	

CITY OF KANATA
DEPARTMENT OF ENGINEERING AND PUBLIC WORKS

URBANDALE CORPORATION

URBANDALE CORPORATION
KANATA TOWN CENTRE
CENTRAL BUSINESS DISTRICT
STORM DRAINAGE PLAN

DATED JUNE 1998
DWG. No. 15712-STM



NO.	DATE	REVISIONS	BY	NO.	DATE	REVISIONS	BY

SCALE 0 25 50 75 100m

J.L. Richards & Associates Limited
Consulting Engineers, Architect & Planners
OTTAWA, KINGSTON, SUDBURY, CANADA.

DESIGN	C.F.
CHECKED	C.F.
DRAWN	T.K.O'B.
CHECKED	
APPROVED	

CITY OF KANATA
DEPARTMENT OF ENGINEERING AND PUBLIC WORKS

URBANDALE CORPORATION

KANATA TOWN CENTRE FUTURE CONDITIONS

DATED JANUARY 1999
DWG. No. FIGURE 3

APPENDIX

B-3 Minor System Capacity for Lands Draining to Kanata Town Centre SWMF

Excerpt from *Stormwater Management Report, Kanata Town Centre, Central Business District by J.L. Richards & Associates Limited (January 1999)*

JLR 15712
Kanata Town Centre - Central Business District
Tributary Subwatersheds to Proposed Stormwater Management Facility

QUALHYMO LUMPED AREA No.	OTTHYMO AREA No.	Description	Area (ha)	TIMP	On-Site Storage	Description of Storage	IMP areas (ha)
1	1	AMC Site	7.85	0.85	entirely *	up to 100 yr	6.67
	2	Park & Ride	1.46	0.95	none		1.39
	3	Phase IV	3.03	0.95	entirely	up to 100 yr	2.88
	4	Transitway	3.55	0.95	none		3.37
	5	Hotel Road	0.38	0.80	none		0.30
	6	Hotel Site	0.80	0.95	entirely	up to 100 yr	0.76
2	7	Castlefrank Road	2.84	0.80	none		2.27
	8	Adjacent Lands	2.77	0.57	none		1.58
	9	Exist Pond **	0.82	---	entirely	up to 100 yr	0.00
	10	Kanata North	4.66	0.85	none		3.96
	11	Adj Lands (east)	2.16	0.85	none		1.84
	12	Adj Lands (south-east)	2.11	0.85	entirely	up to 100 yr	1.79
3	13	Street "A"	1.32	0.85	Limited	up to 10 yr	1.12
	14	Urbandale North	10.41	0.85	Limited	up to 10 yr	8.85
	15	Urbandale South	4.48	0.85	entirely	up to 100 yr	3.81
	16	Urbandale East	1.82	0.57	Limited	up to 10 yr	1.04
	17	Urbandale East (park)	0.54	---	none		0.00
	18	Queensway	7.87	0.30	none		2.36
	19A	SWMF	0.95	0.99	none		0.94
	19B	SWMF	1.42	0.20	none		0.28
		TOTAL	61.24				45.22
						Avg. TIMP =	0.74

*: Overflow of 13 l/s @ 1:100 year storm event
**: Peak flows from this area is to be restricted to 10 year based on Rc=0.2 (from CCL)

CITY OF KANATA

Manning's Coefficient N = 0.013
5 YEARS IDF CURVE

KANATA TOWN CENTRE COMMERCIAL
JLR 15712

Designed by: S.E.D.
Checked by: M.F.S.

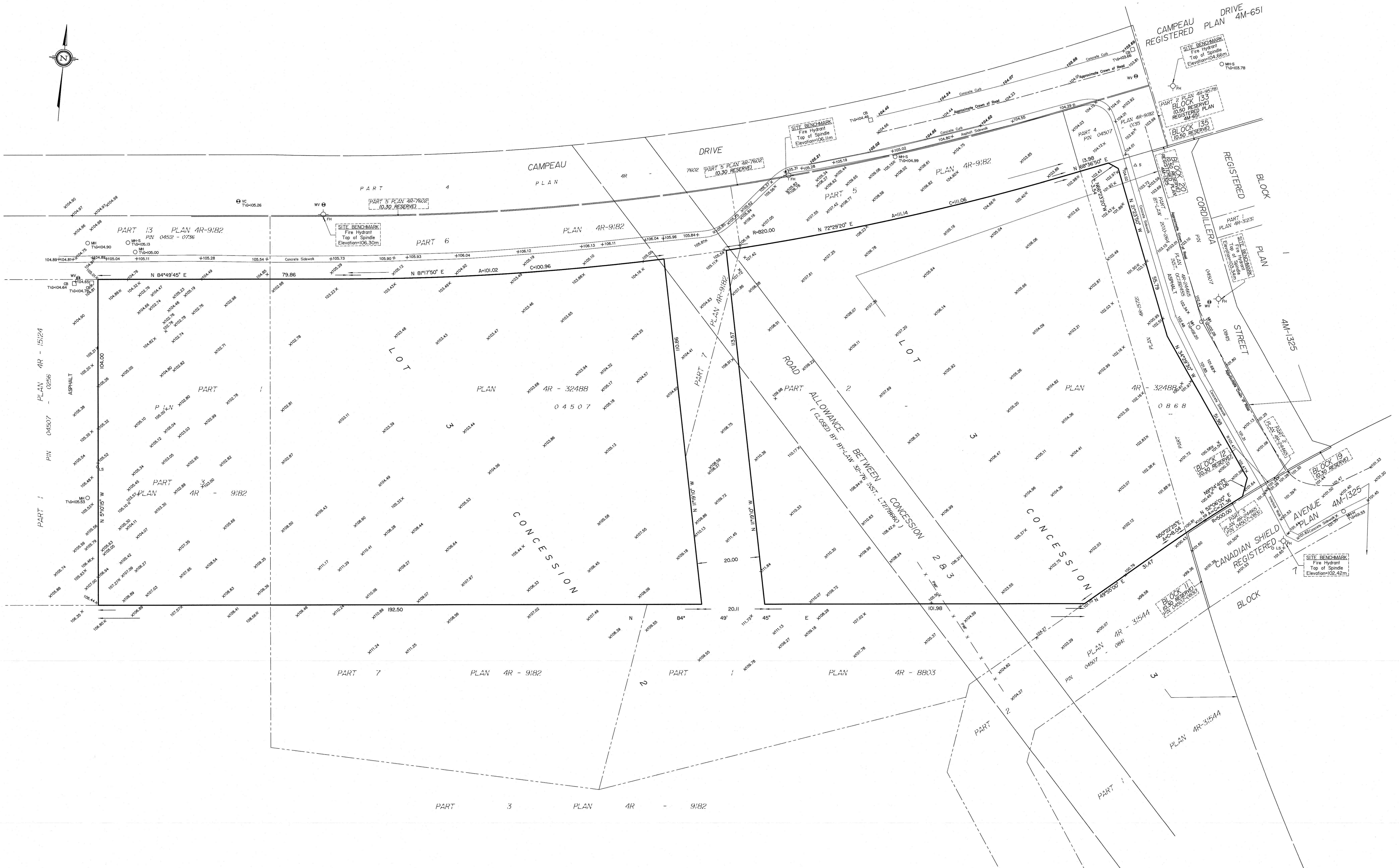
STORM SEWER DESIGN SHEET
NOVEMBER 1998
REVISED JANUARY 1999

STREET	M.H. # FROM	M.H. # TO	AREAS FOR "R" in (ha) 0.2	0.6	0.8	0.8	0.9	PEAK FLOW COMPUTATION 2.78AR	2.78AR (CUM.)	TIME (min.)	INTENS. (mm/hr)	PEAK FL. (L/s)	SEWER DATA DIA. (mm)	SLOPE (%)	CAPAC. (L/s)	VEL. (m/s)	LENGTH (m)	FL. TIME (min.)	REMARKS
AMC Site		13				7.19		15.99	15.99										area modified to match CCL incoming flow at MH 13
Park & Ride		13					1.34	3.35	19.33										area modified to match CCL incoming flow at MH 13
Phase IV		13					2.77	8.94	28.28										area modified to match CCL incoming flow at MH 13
Transitway	MH #13						3.25	6.13	34.41										area modified to match CCL incoming flow at MH 13
Hotel Road				0.17			0.17	0.73	35.13										area modified to match CCL incoming flow at MH 13
Hotel Site							0.73	1.83	36.97										area modified to match CCL incoming flow at MH 13
Castlefrank Road		13		1.30			1.30	5.42	42.39										area modified to match CCL incoming flow at MH 13
Adjacent Lands		13		2.54				4.23	46.62										area modified to match CCL incoming flow at MH 13
East Pond		13	0.75					0.42	47.04										area modified to match CCL incoming flow at MH 13
Kanata North		13				4.27		9.49	56.53										area modified to match CCL incoming flow at MH 13
Adj. Lands (east)		13				1.96		4.40	60.93										area modified to match CCL incoming flow at MH 13
Adj. Lands (SE)		13				1.93		4.30	65.23										area modified to match CCL incoming flow at MH 13
A	13	607			0.17	0.48		1.40	66.63	28.52	97.82	3052.52	1050	0.30	4992.05	2.33	48.40	0.35	as per CCL
F	622	621			0.43	0.23		1.47	1.47	20.00	72.56	106.50	300	2.00	136.74	1.93	87.00	0.75	not for MOE approval
F	621	620			0.10	0.77		1.93	3.40	20.75	71.05	241.77	375	2.00	247.94	2.24	84.00	0.62	not for MOE approval
F	620	607			0.32			0.71	4.11	21.37	69.86	287.44	450	2.00	403.17	2.53	86.00	0.57	not for MOE approval
A	607	606			0.28	0.75		2.31	73.08	28.87	57.38	4190.21	1800	0.22	5361.39	2.12	120.10	0.94	MOE Approved
D	631	630			1.35	0.37		3.83	3.83	20.00	72.56	277.55	525	0.50	304.08	1.40	82.00	0.97	not for MOE approval
D	630	606				0.32		0.71	4.54	20.97	70.62	320.38	525	0.75	372.42	1.72	82.00	0.80	not for MOE approval
A	606	605	0.83		0.33	3.03		7.93	85.83	29.61	56.13	4800.80	1475 x 2310	0.25	6203.38	2.26	109.80	0.81	MOE Approved
	605	604			0.31	0.83		2.54	88.06	30.62	55.01	4844.34	1475 x 2310	0.25	6203.38	2.26	87.00	0.49	MOE Approved (Length Revised)
	604	pond						0.00	100.45	31.11	54.17	5441.77	1475 x 2310	0.25	6203.38	2.26	40.00	0.30	MOE Approved (Flows from 601 to 604 added)
			1.58	4.01	3.30	22.13	0.57	100.45 COMPARISON	100.45										
E	642	641			1.00	0.23		2.74	2.74	20.00	72.56	198.46	450	0.60	220.83	1.38	62.00	0.74	not for MOE approval
B	650	641				0.21		0.47	0.47	20.00	72.56	33.89	300	1.00	96.89	1.37	88.00	1.07	not for MOE approval
E	641	640				0.27		0.60	3.80	21.07	70.43	267.84	525	0.50	304.08	1.40	70.00	0.83	not for MOE approval
E	640	602				1.29		2.87	6.67	21.90	68.89	459.65	600	0.60	475.56	1.68	65.00	0.64	not for MOE approval
A	603	602		0.90	0.29			2.15	2.15	20.00	72.56	155.72	375	1.50	214.72	1.94	65.00	0.56	not for MOE approval
A	602	601	0.79	0.56	0.82	0.17		3.58	12.39	22.55	67.77	839.83	600	2.00	868.29	3.07	65.00	0.35	not for MOE approval
A	601	604						0.00	12.39	22.42	67.98	842.54	675	1.40	994.54	2.78	73.10	0.44	MOE Approved (Diameter and Length Revised)
			0.79	1.48	2.11	2.17	0.00	12.39 COMPARISON	12.39										
FUTURE COMMERCIAL		pond				2.17		4.83	4.83	20.00	72.56	350.17	600	0.40	388.31	1.37	65.00	0.79	not for MOE approval
			0.00	0.00	0.00	2.17	0.00	4.83 COMPARISON	4.83										

APPENDIX

C

Existing Site Conditions



DATA COLLECTION SKETCH OF

PART OF LOT 3 CONCESSION 2
PART OF LOT 3 CONCESSION 3
AND PART OF ROAD ALLOWANCE
BETWEEN CONCESSION 2 AND 3

(CLOSED BY INST. LT278660)
GEOGRAPHIC TOWNSHIP OF MARCH

CITY OF OTTAWA

Prepared by Annis, O'Sullivan, Vollebekk Ltd.
Field Work Completed February 10, 2020.

Scale 1 : 500

20 15 10 5 0 10 20 Metres

Metric

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

Notes & Legend

MH-S	"	Maintenance Hole (Sanitary)
MH-B	"	Maintenance Hole (Bell Telephone)
MH-H	"	Maintenance Hole (Hydro)
MH	"	Maintenance Hole (Unidentified)
VC	"	Valve Chamber (Watermain)
FH	"	Fire Hydrant
LS	"	Light Standard
S	"	Sign
WV	"	Water Valve
PWF	"	Post & Wire Fence
+ 65.00	"	Location of Elevations
+ 65.00	"	Top of Concrete Curb Elevation

Distances shown on this plan are ground distances and can be converted to grid distances by multiplying by the combined scale factor of 0.999911.

SITE AREA = 37064.5 m²

BOUNDARY INFORMATION COMPILED FROM PLAN 4R-32488.

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum.
2. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.

UTILITY NOTES

1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. Only visible surface utilities were located.
3. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.

Ontario Land Surveyors
ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovltd.com

Job No. 20191-20 PrtLt3Con2 T DI | DG

APPENDIX

D

Pre-Development Stormwater Management Calculations

APPENDIX

D-1 Parcel 1

	Stormwater Management Calculations	Project: 6301 Campeau Drive	No.: 201-03048-00	
	Pre-Dev Release Rates - Parcel 1	By: MS Checked: BW	Date: 2020-02-21	Page: 1

Step 1: Determine Pre-development Flow using Rational Formula

* Runoff Coefficient, C in accordance with City of Ottawa Sewer Design Guidelines (section 8.3.7.3)

Return Period	2	5	10	25	50	100
C Multiplier (OSDG Table 5.7) =	1.00	1.00	1.00	1.10	1.20	1.25
Runoff Coefficient, C =	0.20	0.20	0.20	0.22	0.24	0.25

Rainfall intensity calculated in accordance with City of Ottawa Sewer Design Guidelines (section 5.4.2):

$$i = \left[\frac{A}{(Td + C)^B}\right]$$

Where: A, B, C = regression constants for each return period (defined in section 5.4.2)
i = rainfall intensity (mm/hour)
Td = storm duration (minutes) 180 minutes

Time of Concentration = 20 minutes
Catchment Area = 1.691 ha 2.498

Return Period	2	5	10	25	50	100
a =	733.0	998.1	1,174.2	1,402.9	1,569.6	1,735.7
b =	0.810	0.814	0.816	0.819	0.820	0.820
c =	6.199	6.053	6.014	6.018	6.014	6.014
$Intensity_{peak}$ (mm/hr) =	52.0	70.3	82.2	97.3	108.5	120.0
Q_{peak} (L/s) =	48.9	66.0	77.2	100.5	122.3	140.9
Q_{peak} (m^3/s) =	0.049	0.066	0.077	0.101	0.122	0.141

Return Period = 5 year
Q = 66.0 L/s Pre-development flow rate

Conclusion:

The 5-year pre-development flow rate for a 20-minute Tc governs the 100-year maximum post-development release rate for Parcel 1 and is 66.0 L/s.

Filepath:

\\Caott100dat01\I\Water Resources\Projects\2020\201-03048-00_6301 Campeau Drive\Analysis\[2020-12-02 6301 Campeau Drive.xlsx]IDF Calcs - 1

APPENDIX

D-2 Parcel 2

	Stormwater Management Calculations	Project: 6301 Campeau Drive	No.: 201-03048-00	
	Pre-Dev Release Rates - Parcel 2	By: MS	Date: 2020-02-21	Page: 1
		Checked: BW		

Step 1: Determine Pre-development Flow using Rational Formula

* Runoff Coefficient, C in accordance with City of Ottawa Sewer Design Guidelines (section 8.3.7.3)

Return Period	2	5	10	25	50	100
C Multiplier (OSDG Table 5.7) =	1.00	1.00	1.00	1.10	1.20	1.25
Runoff Coefficient, C =	0.80	0.80	0.80	0.88	0.96	1.00

Rainfall intensity calculated in accordance with City of Ottawa Sewer Design Guidelines (section 5.4.2):

$$i = \left[\frac{A}{(Td + C)^B}\right]$$

Where: A, B, C = regression constants for each return period (defined in section 5.4.2)
i = rainfall intensity (mm/hour)
Td = storm duration (minutes) 180 minutes

Time of Concentration = 20 minutes
Catchment Area = 0.2506 ha 1.74 ha. Site Area; 0.25 ha. Draining to Cordillera

Return Period	2	5	10	25	50	100
a =	733.0	998.1	1,174.2	1,402.9	1,569.6	1,735.7
b =	0.810	0.814	0.816	0.819	0.820	0.820
c =	6.199	6.053	6.014	6.018	6.014	6.014
$Intensity_{peak}$ (mm/hr) =	52.0	70.3	82.2	97.3	108.5	120.0
Q_{peak} (L/s) =	29.0	39.1	45.8	59.6	72.5	83.5
Q_{peak} (m^3/s) =	0.029	0.039	0.046	0.060	0.072	0.083

Return Period = 5 year
Q = 39.1 L/s Pre-development flow rate

Conclusion:

The 5-year pre-development flow rate for the portion of site allocated to Cordillera Street in previous reports governs the 5-year maximum minor system post-development release rate for Parcel 2 and is 39.1 L/s

Filepath:

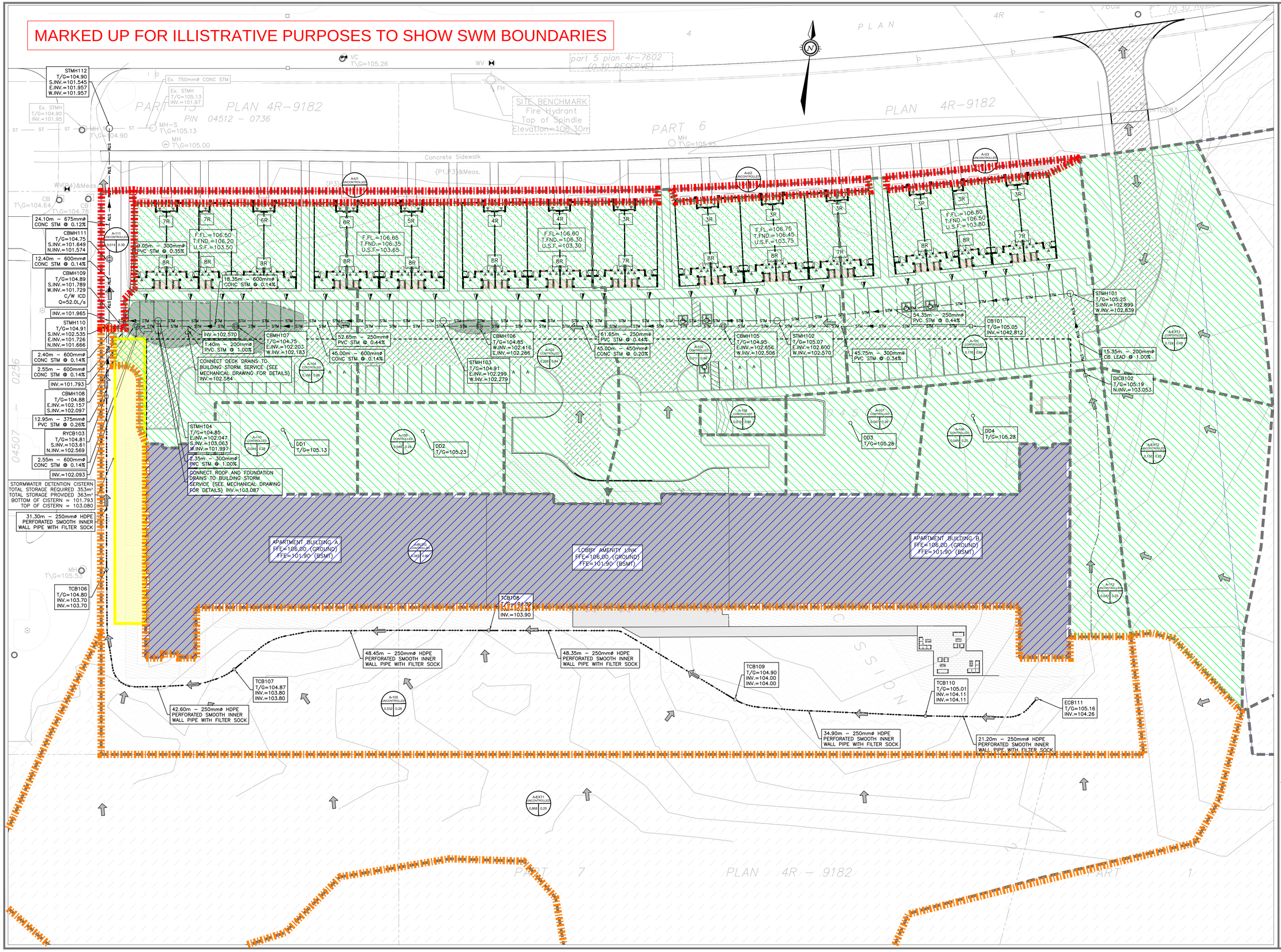
\\Caott100dat01\I\Water Resources\Projects\2020\201-03048-00_6301 Campeau Drive\Analysis\[2020-12-02 6301 Campeau Drive.xlsx]IDF Calcs - 2

APPENDIX

E

Proposed Site (Storm Drainage Plan)

MARKED UP FOR ILLISTRATIVE PURPOSES TO SHOW SWM BOUNDARIES



GENERAL NOTES:

THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY, OR FOR PROBLEMS WHICH ARISE FROM OTHERS' FAILURE TO OBTAIN AND/OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED.

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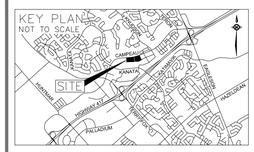

KEY PLAN
(N.T.S)

LEGEND

- Pipe and Cistern Controlled
- Rooftop Controlled
- Uncontrolled
- Undeveloped / Routed around Controls
- Stormwater Cistern

No.	REVISIONS	BY	DATE
01	ISSUED FOR SPA	D.Y.	2020-12-04

HORIZONTAL SCALE:
5m 2 0 5 10m
SCALE: 1:300

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

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wsp
2611 Queensview Dr. Ottawa, ON Canada K2B 8K2
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Ontario Land Surveyors
14 CONCOURSE GATE, SUITE 500, NEPEAN, ONTARIO, K2E 7S6
TEL.(613)727-0850 FAX(613)727-1079

DESIGNED BY:	DRAWN BY:	APPROVED BY:
D.Y.	D.Y.	D.Y./I.J.

PROJECT

6301 CAMPEAU DRIVE
RESIDENTIAL DEVELOPMENT

DRAWING TITLE

STORM DRAIANGE AREA PLAN
PARCEL 1

PROJECT NO.	DRAWING NO.
201-03048-00	C06

D07-XX-XX-XXXX

#XXXX

FILENAME: V:\10-13-MLD - 2020 Projects\201-03048-00 - 6301 Campeau Drive\3. Drawings\Working drawings\Working drawings\201-03048-00_C.dwg
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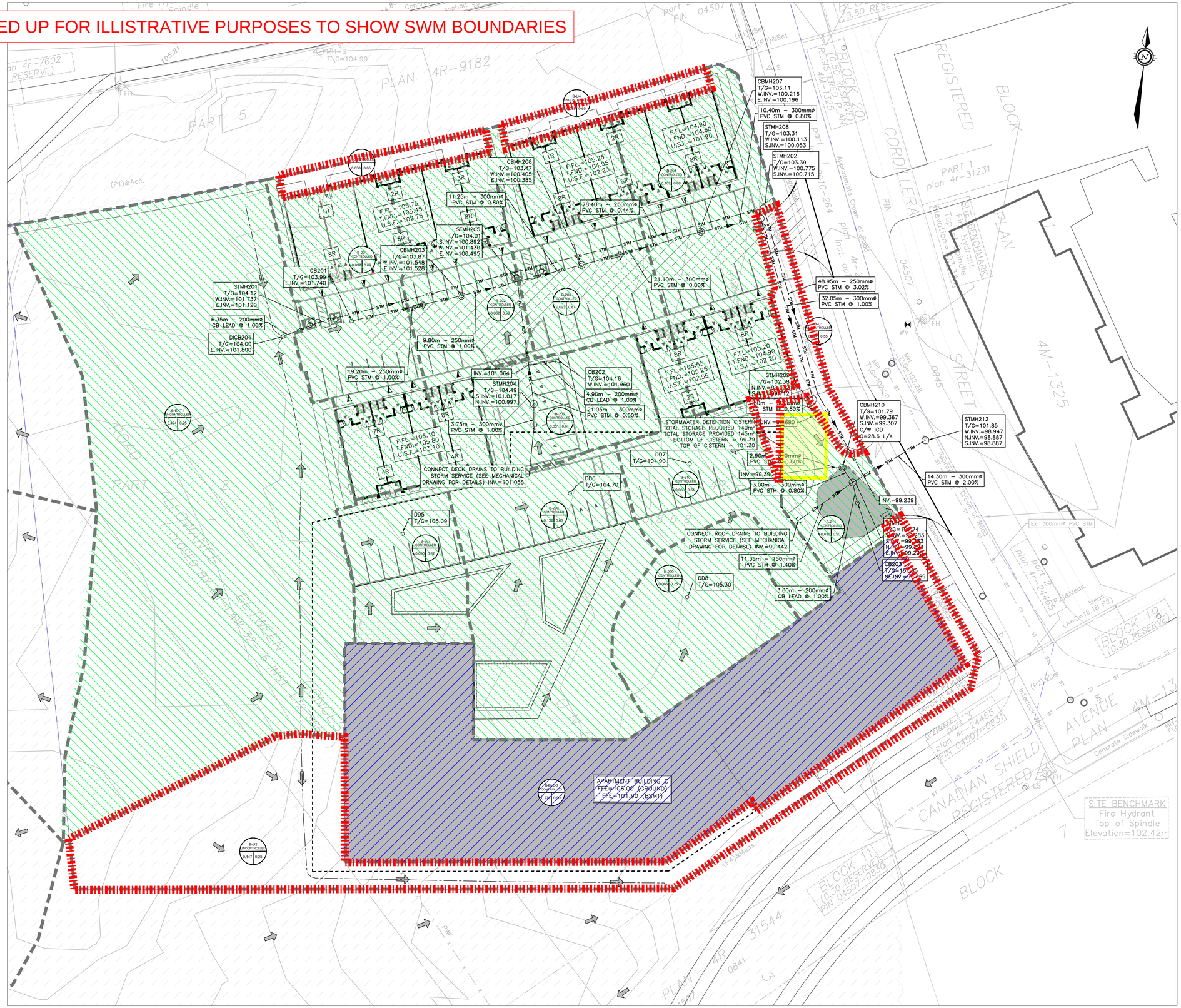

MARKED UP FOR ILLUSTRATIVE PURPOSES TO SHOW SWM BOUNDARIES

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KEY PLAN
(N.T.S)

LEGEND

🟩	Pipe and Cistern Controlled
🟦	Rooftop Controlled
🟥	Uncontrolled
🟨	Stormwater Cistern

No.	REVISIONS	BY	DATE
01	ISSUED FOR SPA	D.Y.	2020-12-04

HORIZONTAL SCALE:
5m 2 0 5 10m
SCALE: 1:300

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API DEVELOPMENT CONSULTANTS INC. ARCHITECTURE & PLANNING INITIATIVES
FABIANI ARCHITECT LTD

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DESIGNED BY:	DRAWN BY:	APPROVED BY:
D.Y.	D.Y.	D.Y./I.J.

PROJECT

6301 CAMPEAU DRIVE
RESIDENTIAL DEVELOPMENT

DRAWING TITLE

STORM DRAIANGE AREA PLAN
PARCEL 2

PROJECT NO.
201-03048-00

DRAWING NO.
C07

D07-XX-XX-XXXX

#XXXX

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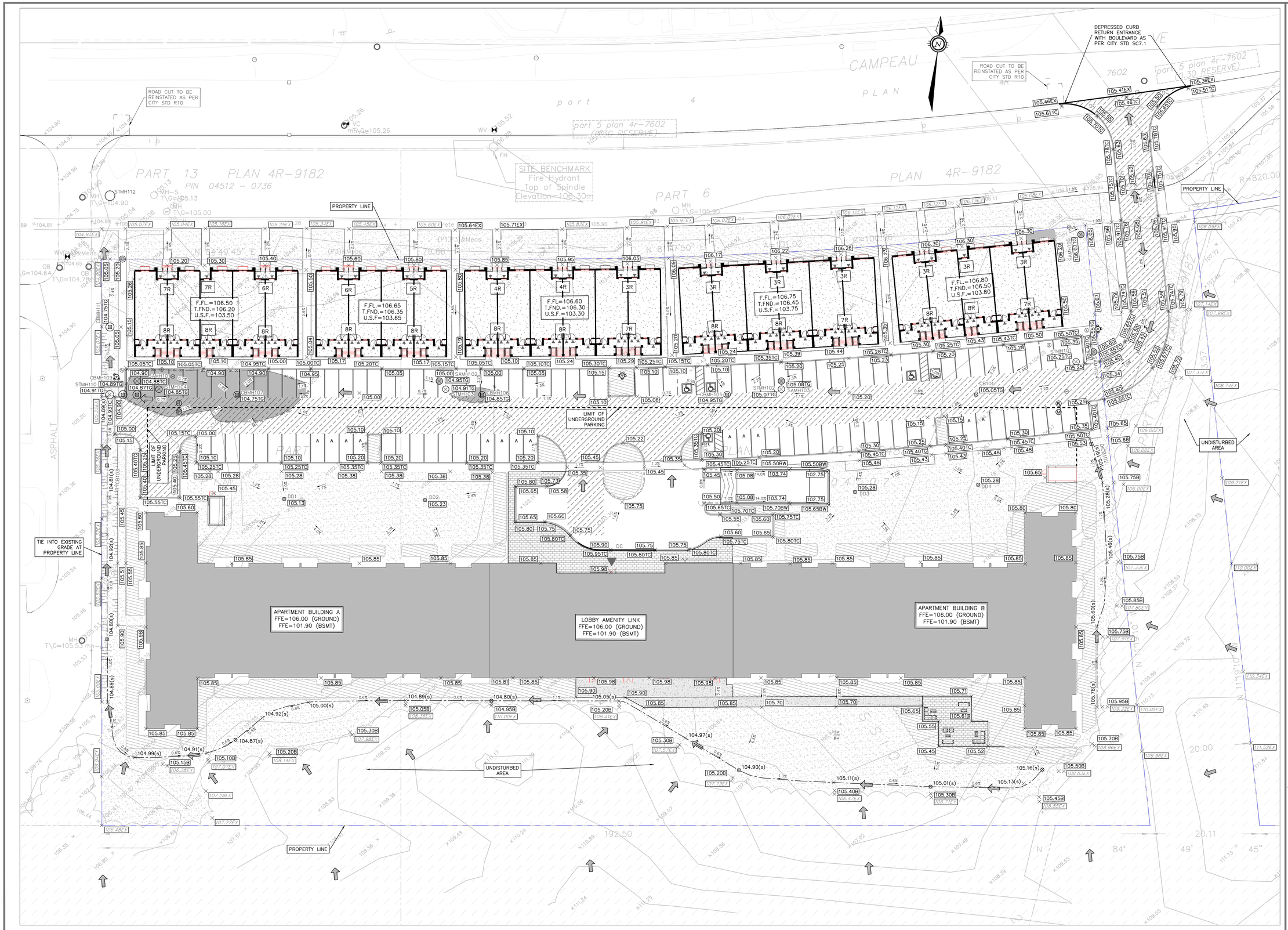

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KEY PLAN
(N.T.S.)

No.	REVISIONS	BY	DATE
01	ISSUED FOR SPA	D.Y.	2020-12-04

HORIZONTAL SCALE:
5m 2 0 5 10m
SCALE: 1:300

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REGISTERED PROFESSIONAL ENGINEER
D. B. YANG
100230568
2020-12-04
PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER
I. M. JAFFEREE
100164153
2020-12-04
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DESIGNED BY:	DRAWN BY:	APPROVED BY:
D.Y.	D.Y.	D.Y./I.J.

PROJECT

6301 CAMPEAU DRIVE
RESIDENTIAL DEVELOPMENT

DRAWING TITLE

GRADING PLAN
PARCEL 1

PROJECT NO. 201-03048-00

DRAWING NO. C02

D07-XX-XX-XXXX

#XXXX

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KEY PLAN
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No.	REVISIONS	BY	DATE
01	ISSUED FOR SPA	D.Y.	2020-12-04

HORIZONTAL SCALE:
5m 2 0 5 10m
SCALE: 1:300

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100230568
2020-12-04
PROVINCE OF ONTARIO

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DESIGNED BY:	DRAWN BY:	APPROVED BY:
D.Y.	D.Y.	D.Y./I.J.

PROJECT

6301 CAMPEAU DRIVE
RESIDENTIAL DEVELOPMENT

DRAWING TITLE

GRADING PLAN
PARCEL 2

PROJECT NO.	DRAWING NO.
201-03048-00	C03

D07-XX-XX-XXXX

#XXXX

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APPENDIX

F

Roof Drain Documentation

Watts Accutrol Weir

APPENDIX

G

HydroCAD Model Output

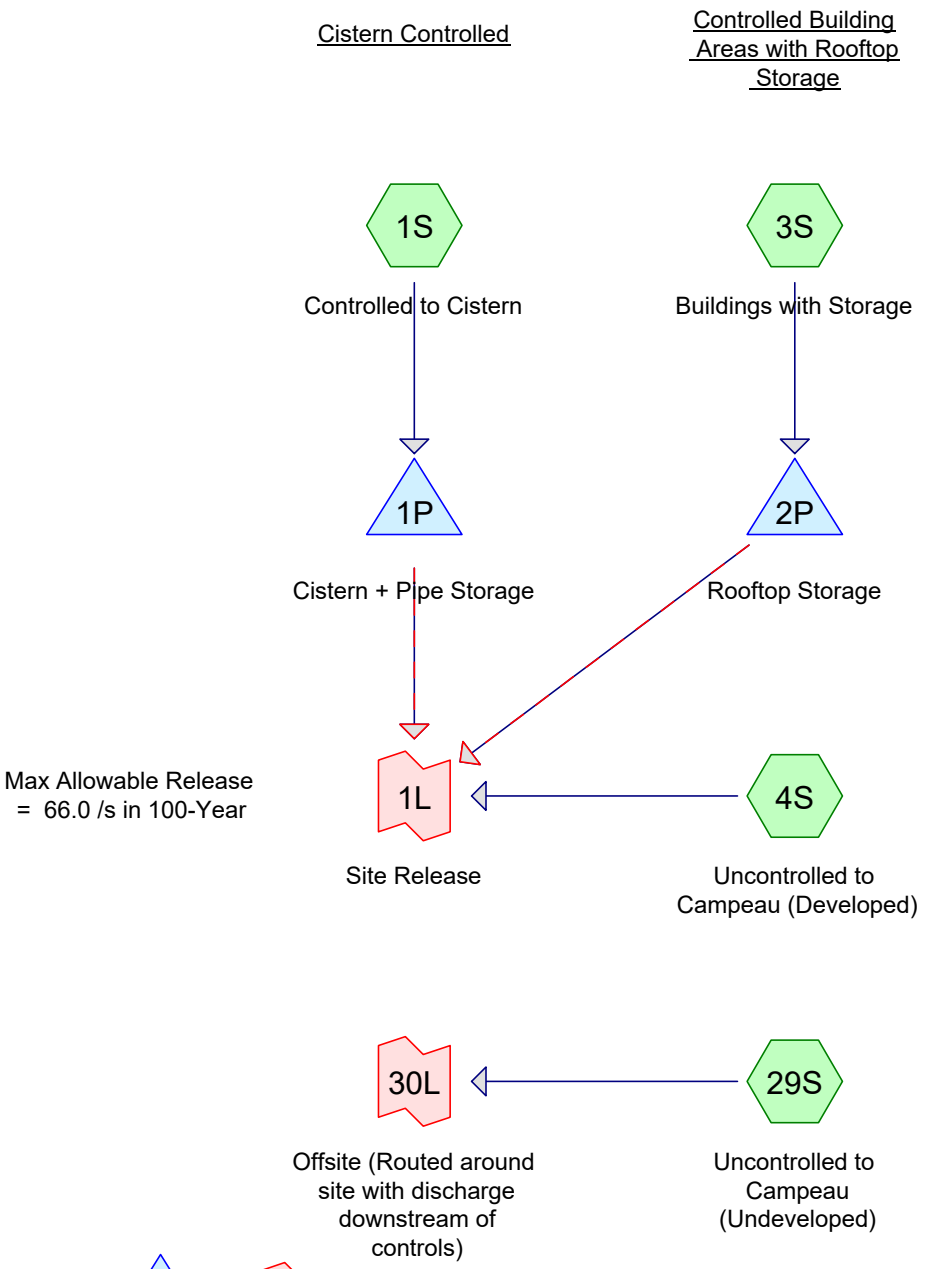
APPENDIX

G-1 Parcel 1: 5-Year Analysis (Peak Discharge, T_c = 45 min)

The storm system for Parcel 1 is governed by the 100-year storm. The 5-yr peak discharge scenario has been provided for information only.

6301 Campeu Drive
Parcel 1 - Peak Release (Tc = 45 min)

5-year C



Routing Diagram for CampeauDrive_Parcel 1 5-yr
Prepared by WSP Canada inc., Printed 2020-12-03

Area Listing (all nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
1,760.0	0.84	A-101 (1S)
2,110.0	0.86	A-102 (1S)
2,060.0	0.84	A-103 (1S)
1,660.0	0.86	A-104 (1S)
5,320.0	0.35	A-105 (29S)
450.0	0.25	A-106 (1S)
470.0	0.26	A-107 (1S)
100.0	0.90	A-108 (1S)
480.0	0.28	A-109 (1S)
440.0	0.28	A-110 (1S)
140.0	0.39	A-111 (4S)
3,870.0	0.90	A-BLDG (3S)
8,680.0	0.31	A-EXT1 (29S)
1,320.0	0.25	A-EXT2 (1S)
1,240.0	0.49	A-EXT3 (1S)
210.0	0.37	A-U1 (4S)
80.0	0.33	A-U2 (4S)
70.0	0.34	A-U3 (4S)
30,460.0	**0.53**	**TOTAL AREA**

Summary for Subcatchment 1S: Controlled to Cistern

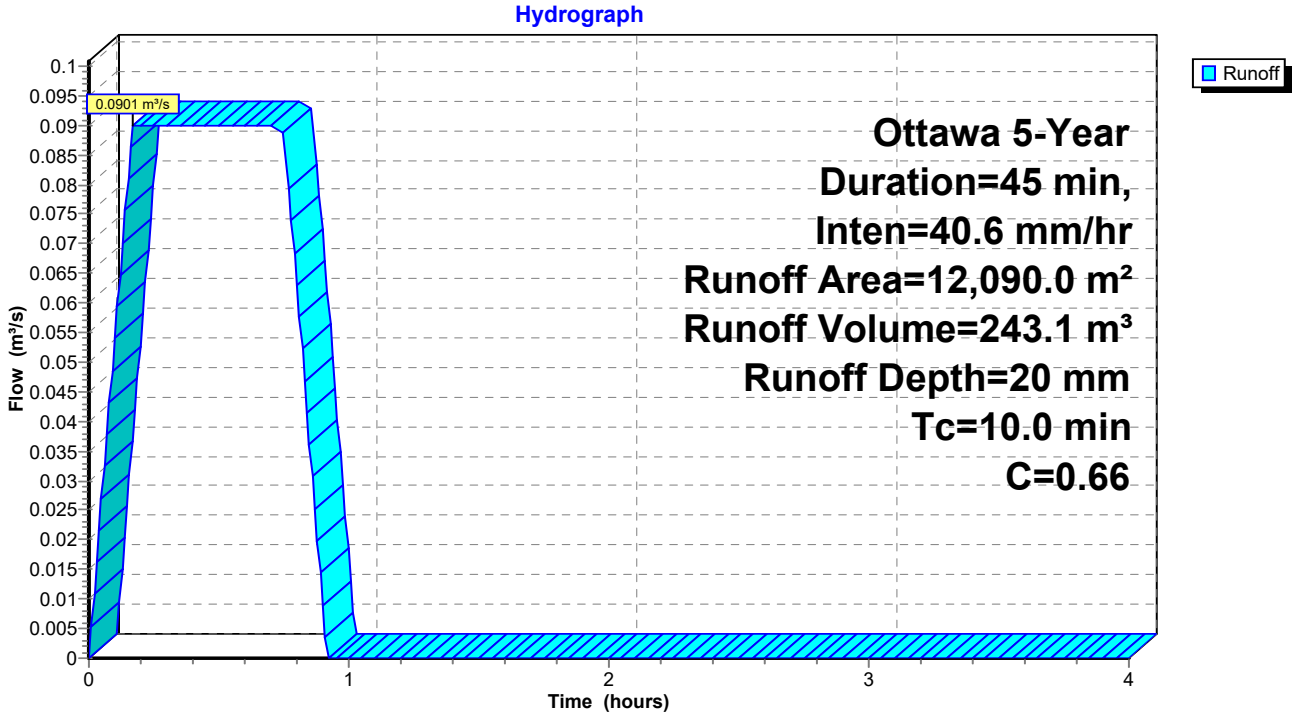
Runoff = 0.0901 m³/s @ 0.17 hrs, Volume= 243.1 m³, Depth= 20 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=45 min, Inten=40.6 mm/hr

Area (m²)	C	Description
1,760.0	0.84	A-101
1,320.0	0.25	A-EXT2
1,240.0	0.49	A-EXT3
2,110.0	0.86	A-102
2,060.0	0.84	A-103
1,660.0	0.86	A-104
450.0	0.25	A-106
470.0	0.26	A-107
100.0	0.90	A-108
480.0	0.28	A-109
440.0	0.28	A-110
12,090.0	0.66	Weighted Average
12,090.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 1S: Controlled to Cistern



Summary for Subcatchment 3S: Buildings with Storage

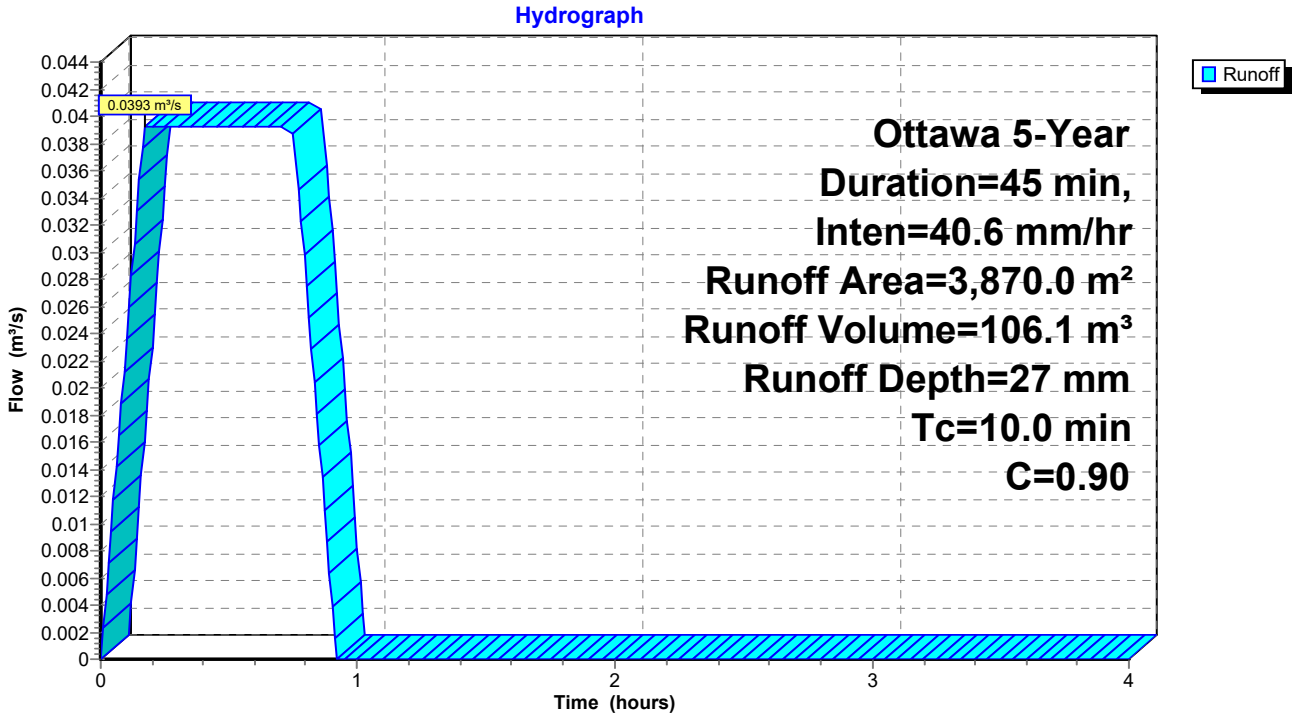
Runoff = 0.0393 m³/s @ 0.17 hrs, Volume= 106.1 m³, Depth= 27 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=45 min, Inten=40.6 mm/hr

Area (m²)	C	Description
3,870.0	0.90	A-BLDG
3,870.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 3S: Buildings with Storage



Summary for Subcatchment 4S: Uncontrolled to Campeau (Developed)

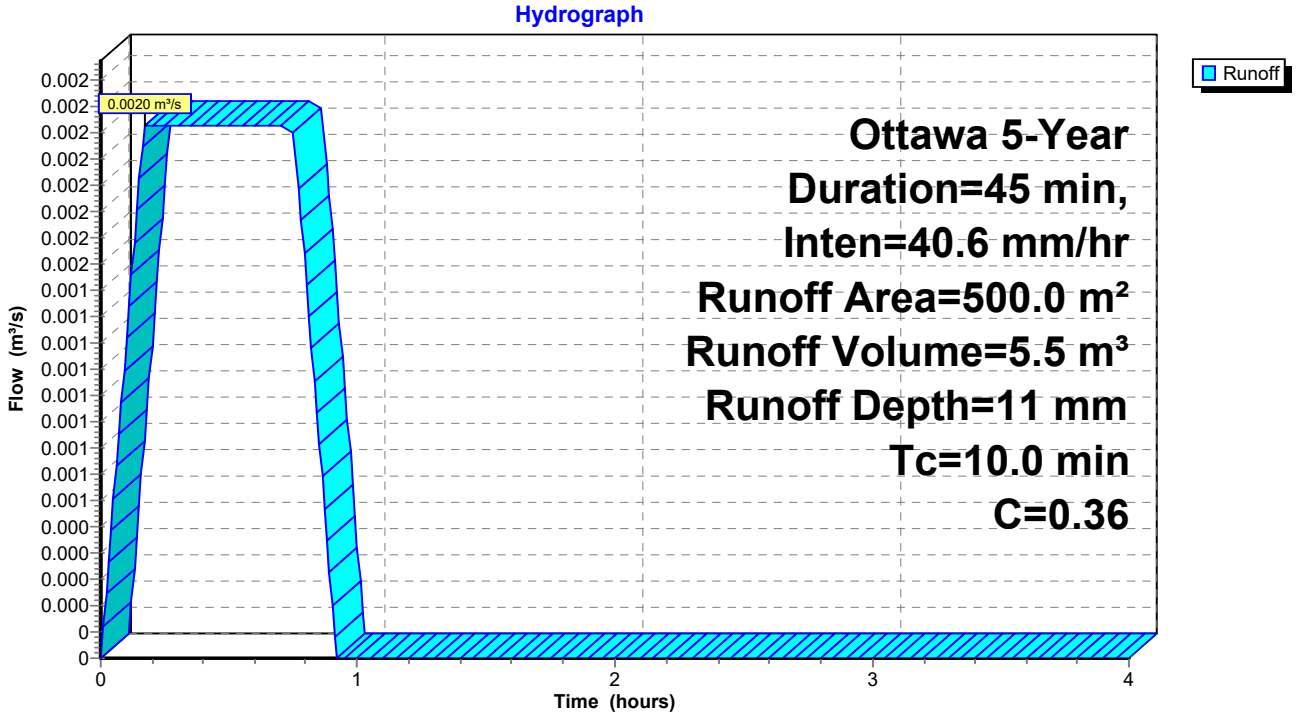
Runoff = 0.0020 m³/s @ 0.17 hrs, Volume= 5.5 m³, Depth= 11 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=45 min, Inten=40.6 mm/hr

Area (m²)	C	Description
210.0	0.37	A-U1
80.0	0.33	A-U2
70.0	0.34	A-U3
140.0	0.39	A-111
500.0	0.36	Weighted Average
500.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 4S: Uncontrolled to Campeau (Developed)



Summary for Subcatchment 29S: Uncontrolled to Campeau (Undeveloped)

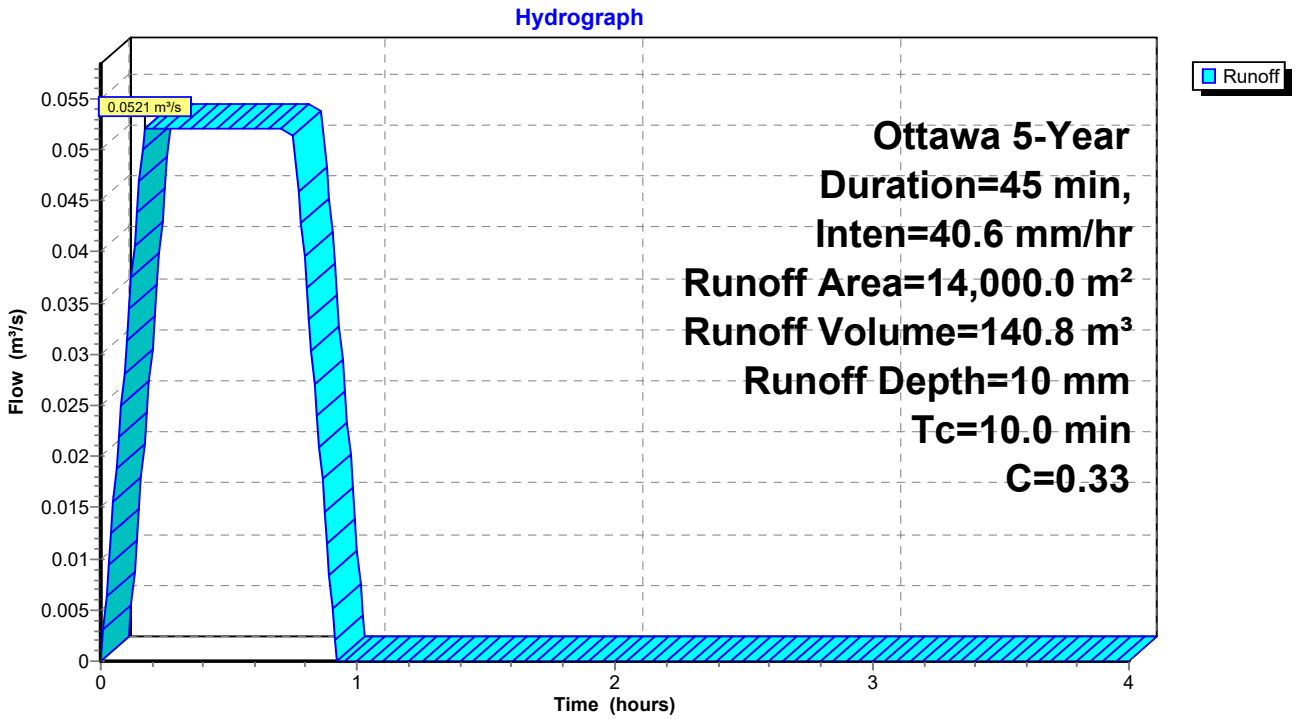
Runoff = 0.0521 m³/s @ 0.17 hrs, Volume= 140.8 m³, Depth= 10 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=45 min, Inten=40.6 mm/hr

Area (m²)	C	Description
8,680.0	0.31	A-EXT1
5,320.0	0.35	A-105
14,000.0	0.33	Weighted Average
14,000.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 29S: Uncontrolled to Campeau (Undeveloped)



Summary for Pond 1P: Cistern + Pipe Storage

Inflow Area = 12,090.0 m², 0.00% Impervious, Inflow Depth = 20 mm for 5-Year event
Inflow = 0.0901 m³/s @ 0.17 hrs, Volume= 243.1 m³
Outflow = 0.0353 m³/s @ 0.85 hrs, Volume= 243.0 m³, Atten= 61%, Lag= 40.9 min
Primary = 0.0353 m³/s @ 0.85 hrs, Volume= 243.0 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 102.369 m @ 0.85 hrs Surf.Area= 332.3 m² Storage= 168.5 m³

Plug-Flow detention time= 56.1 min calculated for 242.4 m³ (100% of inflow)
Center-of-Mass det. time= 56.4 min (83.9 - 27.5)

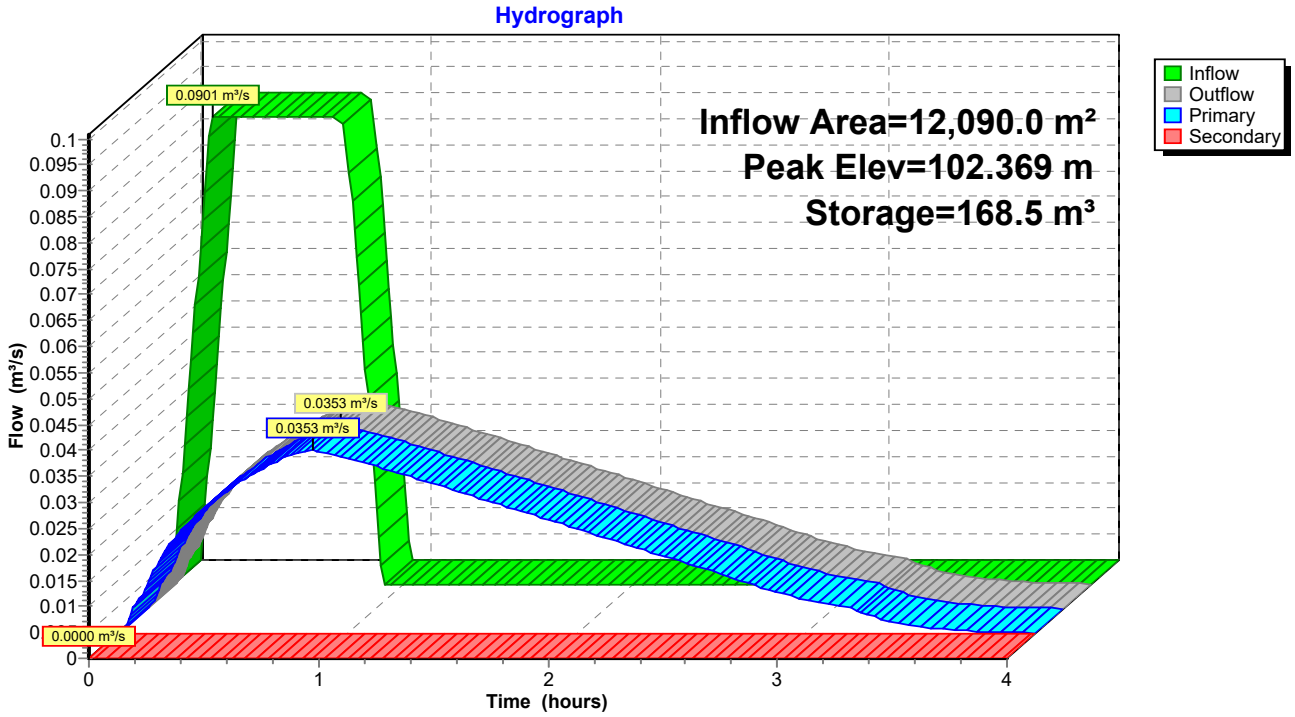
Volume	Invert	Avail.Storage	Storage Description
#1	101.793 m	390.5 m³	**5.70 mW x 50.00 mL x 1.37 mH Cistern**
#2	102.093 m	0.7 m³	**600 mm Round Pipe Storage** L= 2.55 m S= 0.0014 m/m
#3	102.157 m	5.2 m³	**600 mm Round Pipe Storage** L= 18.35 m S= 0.0014 m/m
#4	102.203 m	12.7 m³	**600 mm Round Pipe Storage** L= 45.00 m S= 0.0014 m/m
#5	102.266 m	7.2 m³	**450 mm Round Pipe Storage** L= 45.00 m S= 0.0020 m/m
#6	102.656 m	7.3 m³	**450 mm Round Pipe Storage** L= 45.75 m S= 0.0034 m/m
		423.5 m³	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Secondary	103.160 m	***Overflow Check** Head (meters) 0.000 0.010 Disch. (m³/s) 0.00000 10.00000
#2	Primary	101.729 m	**150 mm Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.0353 m³/s @ 0.85 hrs HW=102.368 m (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.0353 m³/s @ 2.00 m/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=101.793 m (Free Discharge)
↑—**1=***Overflow Check** (Controls 0.0000 m³/s)

Pond 1P: Cistern + Pipe Storage



Summary for Pond 2P: Rooftop Storage

Inflow Area = 3,870.0 m², 0.00% Impervious, Inflow Depth = 27 mm for 5-Year event
Inflow = 0.0393 m³/s @ 0.17 hrs, Volume= 106.1 m³
Outflow = 0.0040 m³/s @ 0.45 hrs, Volume= 54.4 m³, Atten= 90%, Lag= 16.8 min
Primary = 0.0040 m³/s @ 0.45 hrs, Volume= 54.4 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.050 m @ 0.90 hrs Surf.Area= 1,934.9 m² Storage= 96.7 m³

Plug-Flow detention time= 111.4 min calculated for 54.4 m³ (51% of inflow)
Center-of-Mass det. time= 100.3 min (127.8 - 27.5)

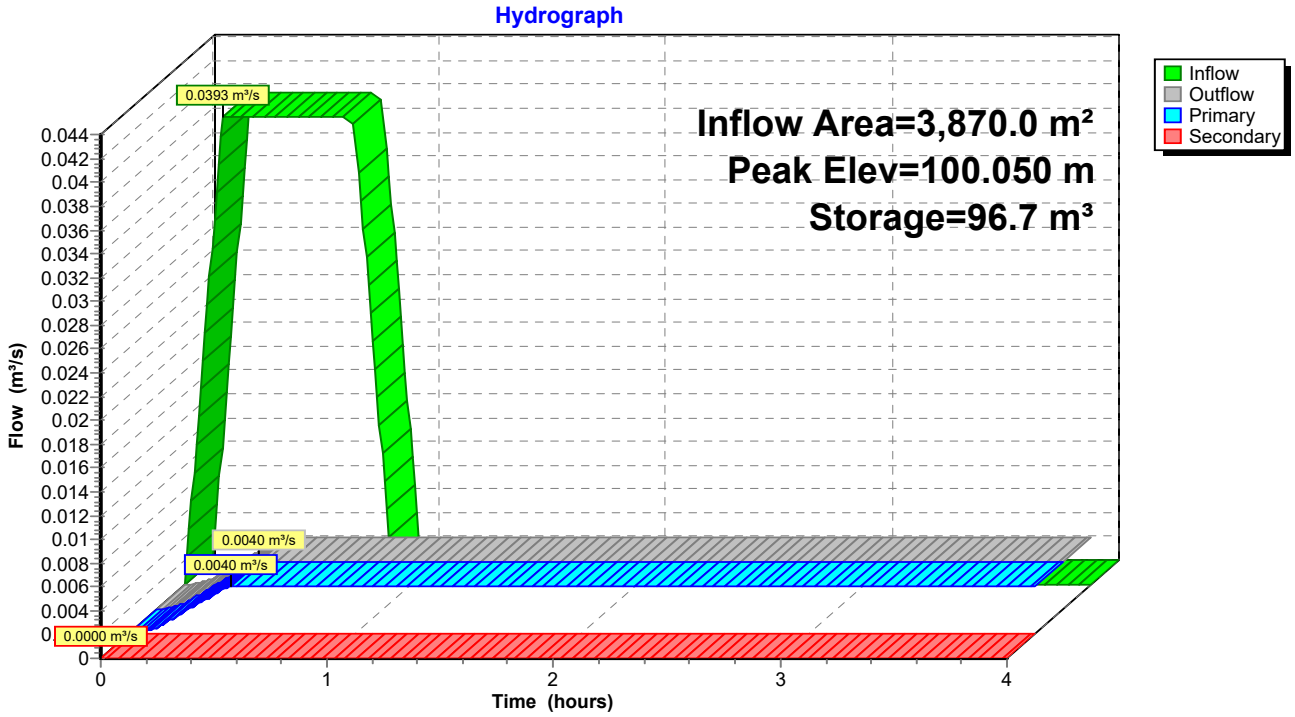
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	580.5 m³	**12.20 mW x 12.20 mL x 0.30 mH BLDG A**x 13

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 13.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031
#2	Secondary	100.299 m	**Special & User-Defined** Head (meters) 0.000 0.001 0.010 Disch. (m³/s) 0.00000 1.00000 10.00000

Primary OutFlow Max=0.0040 m³/s @ 0.45 hrs HW=100.025 m (Free Discharge)
└**1=WATTS Accutrol_5-Closed**(Custom Controls 0.0040 m³/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=100.000 m (Free Discharge)
└**2=Special & User-Defined** (Controls 0.0000 m³/s)

Pond 2P: Rooftop Storage

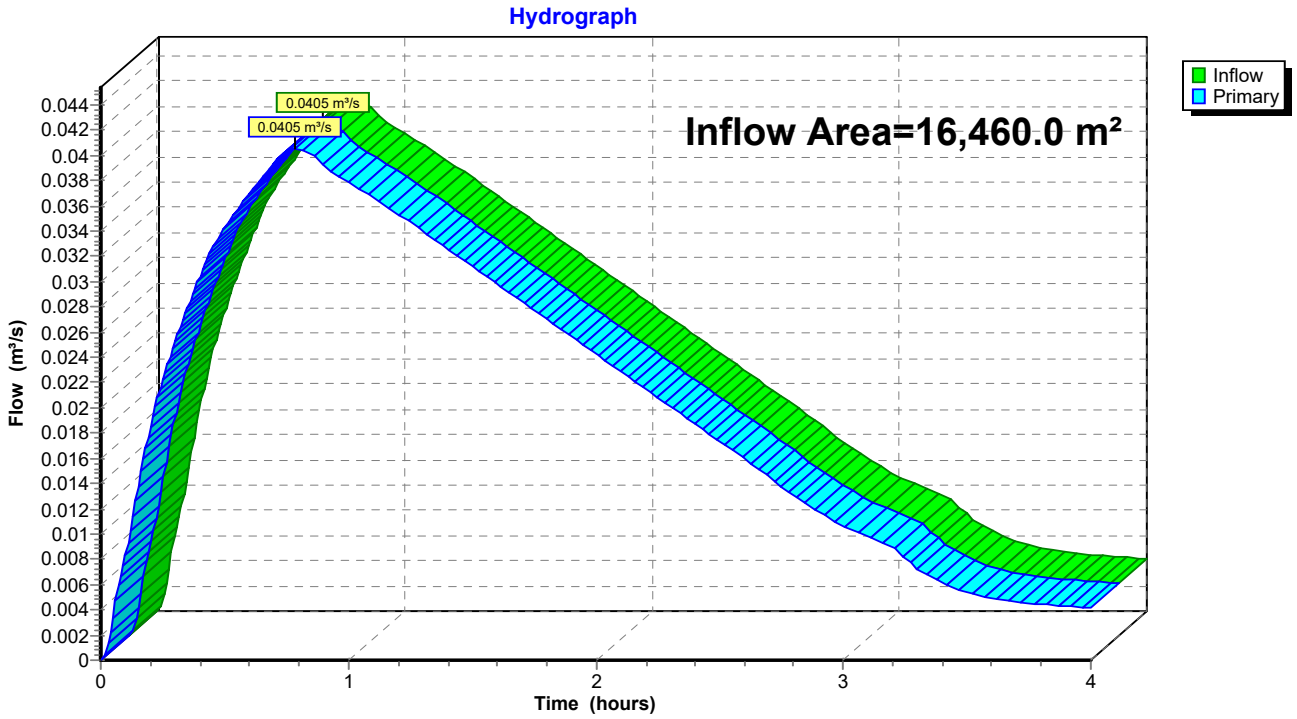


Summary for Link 1L: Site Release

Inflow Area = 16,460.0 m², 0.00% Impervious, Inflow Depth > 18 mm for 5-Year event
Inflow = 0.0405 m³/s @ 0.79 hrs, Volume= 302.9 m³
Primary = 0.0405 m³/s @ 0.79 hrs, Volume= 302.9 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 1L: Site Release

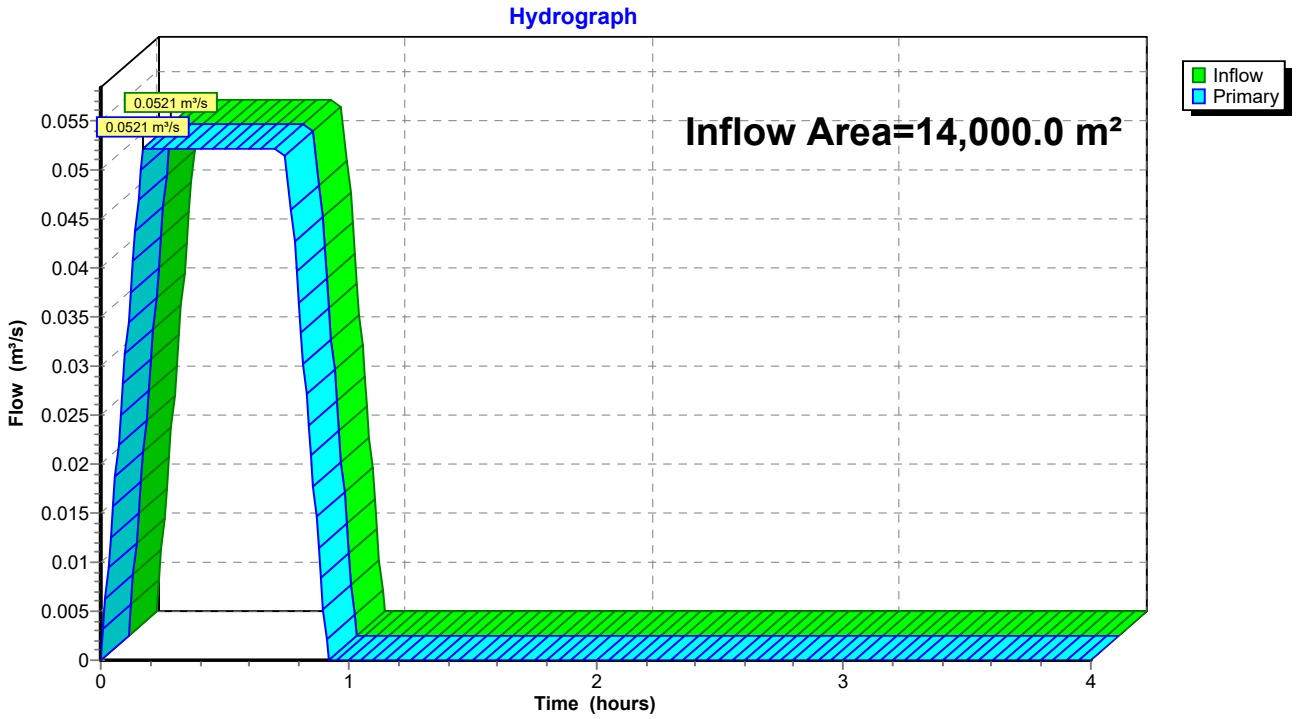


Summary for Link 30L: Offsite (Routed around site with discharge downstream of controls)

Inflow Area = 14,000.0 m², 0.00% Impervious, Inflow Depth = 10 mm for 5-Year event
Inflow = 0.0521 m³/s @ 0.17 hrs, Volume= 140.8 m³
Primary = 0.0521 m³/s @ 0.17 hrs, Volume= 140.8 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 30L: Offsite (Routed around site with discharge downstream of controls)



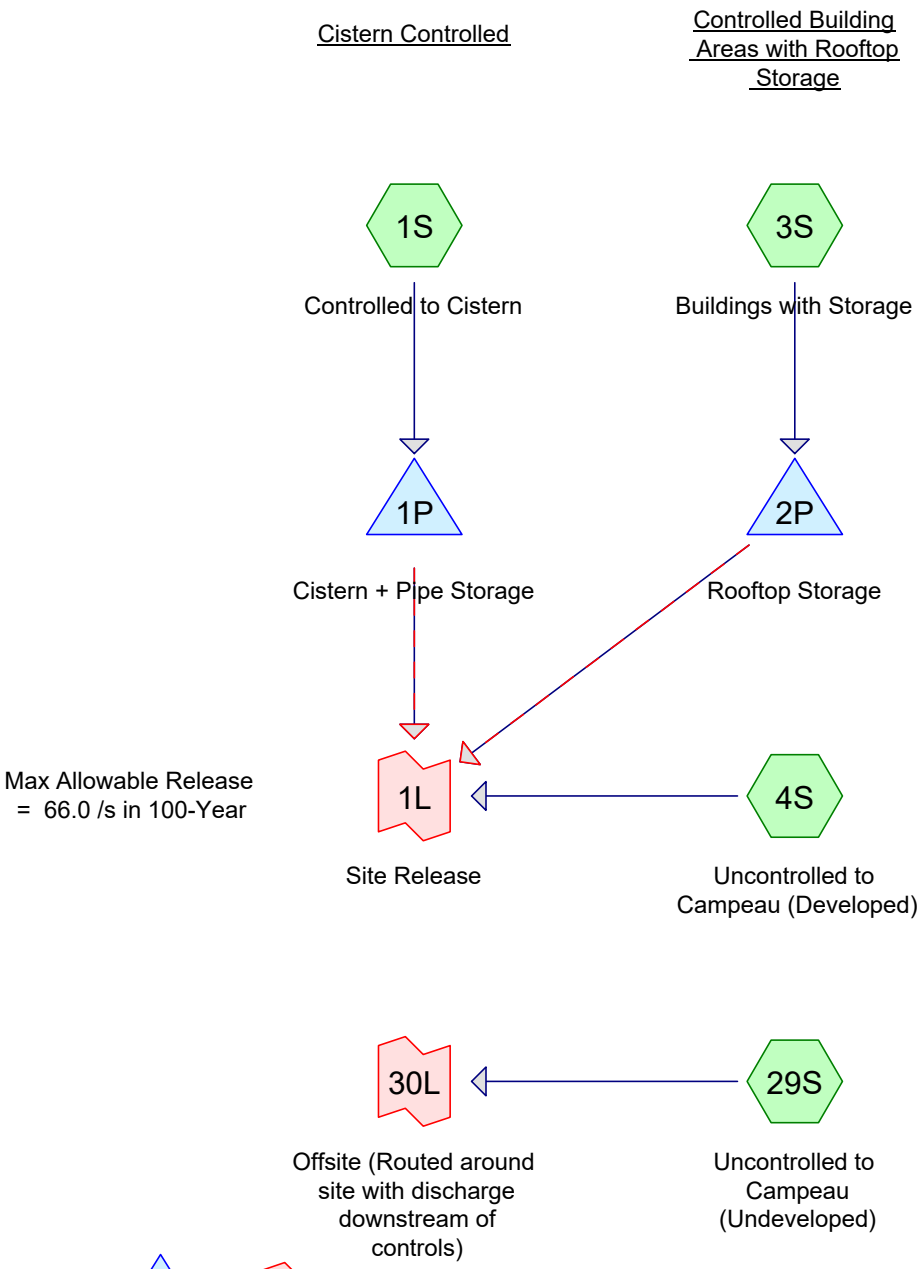
APPENDIX

G-2 Parcel 1: 100-Year Analysis (Peak Discharge, T_C = 57 Min)

The storm system for Parcel 1 is governed by the 100-year storm. Peak storage and peak discharge occur at separate times of concentration and are therefore reported separately.

6301 Campeu Drive
Parcel 1 - Peak
Release (Tc = 57 min)

100-year C



Routing Diagram for CampeauDrive_Parcel 1 100-yr
Prepared by WSP Canada inc., Printed 2020-12-03
HydroCAD® 10.00-21 s/n 10060 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
1,760.0	1.00	A-101 (1S)
2,110.0	1.00	A-102 (1S)
2,060.0	1.00	A-103 (1S)
1,660.0	1.00	A-104 (1S)
5,320.0	0.35	A-105 (29S)
450.0	0.31	A-106 (1S)
470.0	0.33	A-107 (1S)
100.0	1.00	A-108 (1S)
480.0	0.35	A-109 (1S)
440.0	0.35	A-110 (1S)
140.0	0.49	A-111 (4S)
3,870.0	1.00	A-BLDG (3S)
8,680.0	0.31	A-EXT1 (29S)
1,320.0	0.31	A-EXT2 (1S)
1,240.0	0.61	A-EXT3 (1S)
210.0	0.46	A-U1 (4S)
80.0	0.41	A-U2 (4S)
70.0	0.42	A-U3 (4S)
30,460.0	**0.59**	**TOTAL AREA**

Summary for Subcatchment 1S: Controlled to Cistern

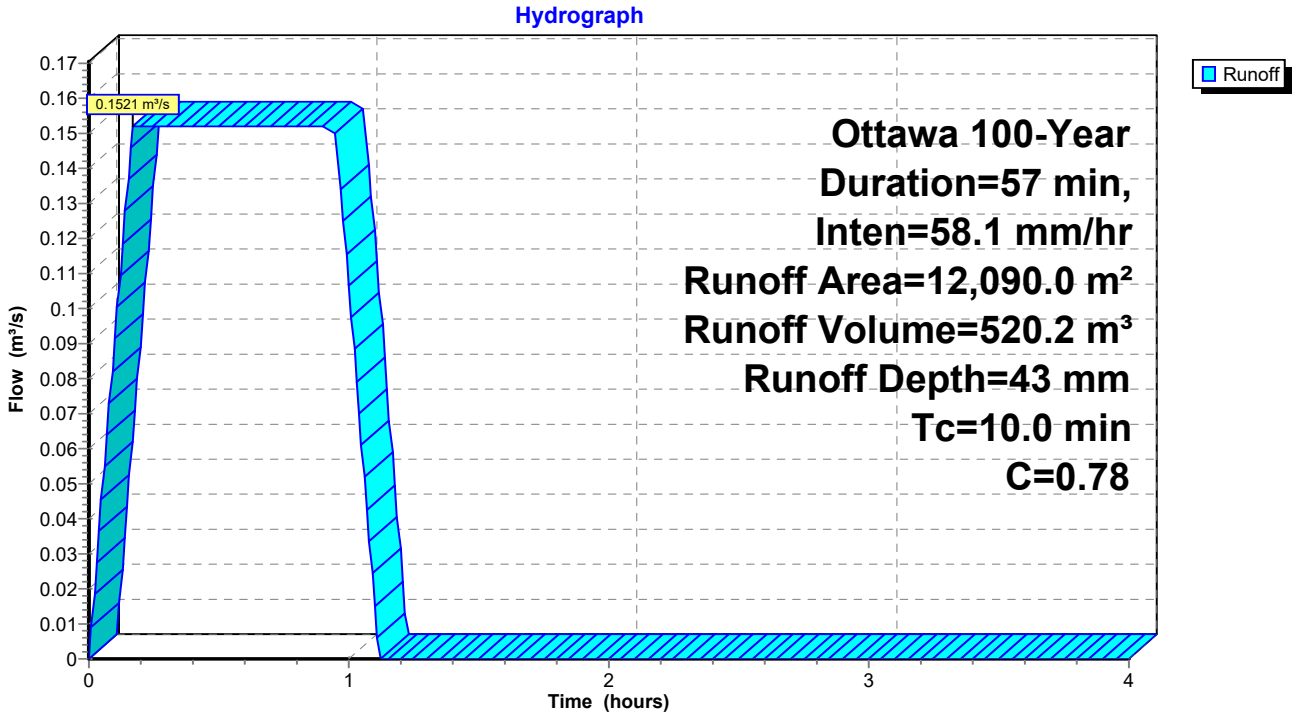
Runoff = 0.1521 m³/s @ 0.17 hrs, Volume= 520.2 m³, Depth= 43 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=57 min, Inten=58.1 mm/hr

Area (m²)	C	Description
1,760.0	1.00	A-101
1,320.0	0.31	A-EXT2
1,240.0	0.61	A-EXT3
2,110.0	1.00	A-102
2,060.0	1.00	A-103
1,660.0	1.00	A-104
450.0	0.31	A-106
470.0	0.33	A-107
100.0	1.00	A-108
480.0	0.35	A-109
440.0	0.35	A-110
12,090.0	0.78	Weighted Average
4,400.0		36.39% Pervious Area
7,690.0		63.61% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 1S: Controlled to Cistern



Summary for Subcatchment 3S: Buildings with Storage

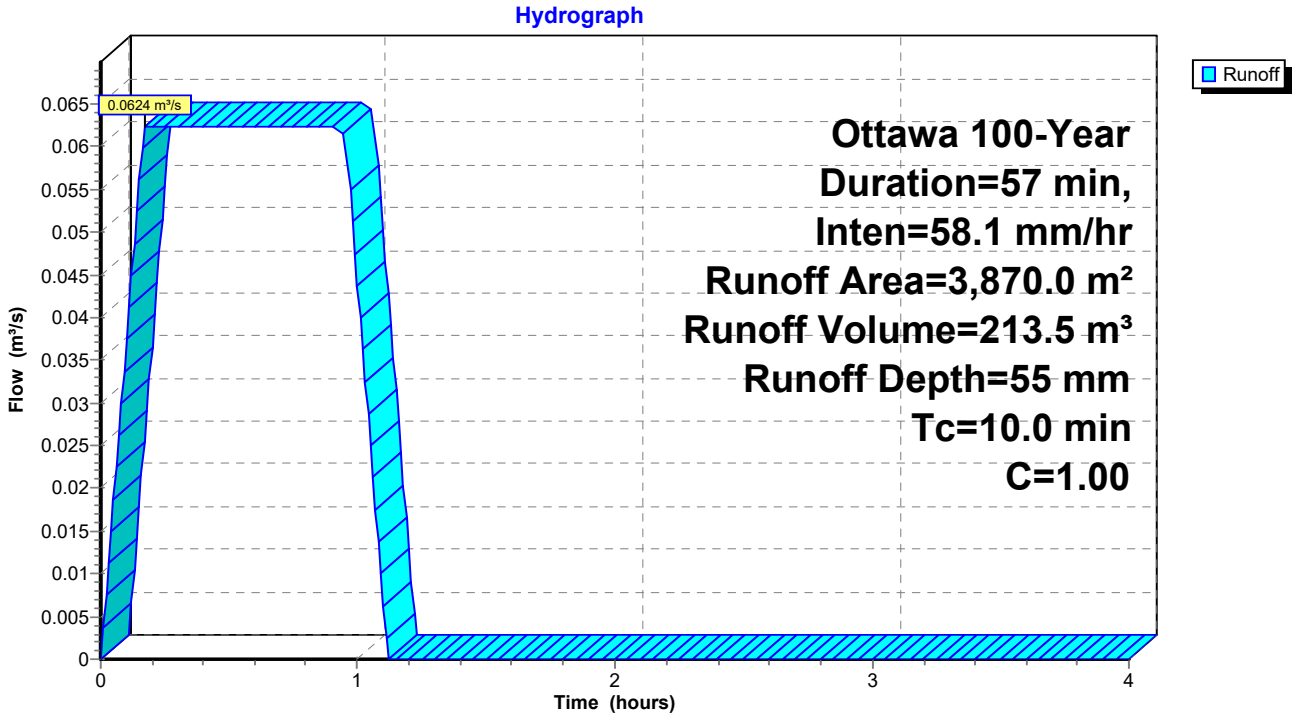
Runoff = 0.0624 m³/s @ 0.17 hrs, Volume= 213.5 m³, Depth= 55 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=57 min, Inten=58.1 mm/hr

Area (m²)	C	Description
3,870.0	1.00	A-BLDG
3,870.0		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 3S: Buildings with Storage



Summary for Subcatchment 4S: Uncontrolled to Campeau (Developed)

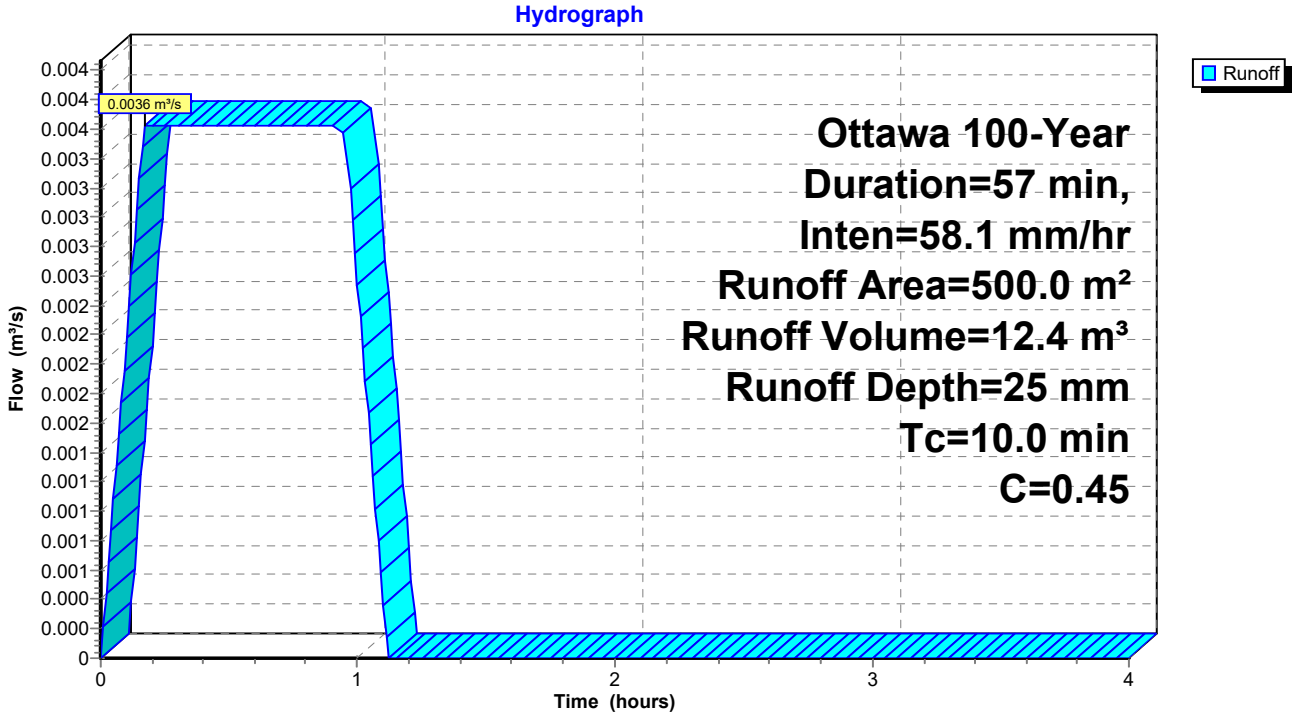
Runoff = 0.0036 m³/s @ 0.17 hrs, Volume= 12.4 m³, Depth= 25 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=57 min, Inten=58.1 mm/hr

Area (m²)	C	Description
210.0	0.46	A-U1
80.0	0.41	A-U2
70.0	0.42	A-U3
140.0	0.49	A-111
500.0	0.45	Weighted Average
500.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 4S: Uncontrolled to Campeau (Developed)



Summary for Subcatchment 29S: Uncontrolled to Campeau (Undeveloped)

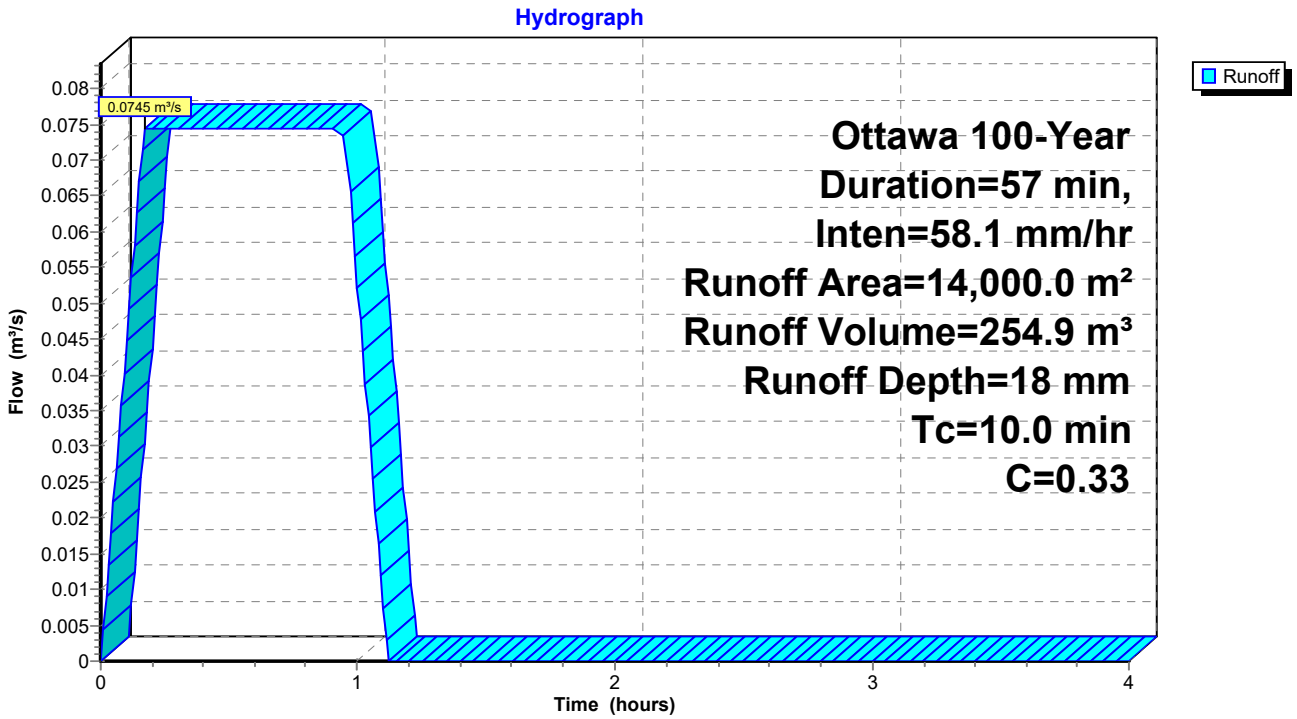
Runoff = 0.0745 m³/s @ 0.17 hrs, Volume= 254.9 m³, Depth= 18 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=57 min, Inten=58.1 mm/hr

Area (m²)	C	Description
8,680.0	0.31	A-EXT1
5,320.0	0.35	A-105
14,000.0	0.33	Weighted Average
14,000.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 29S: Uncontrolled to Campeau (Undeveloped)



Summary for Pond 1P: Cistern + Pipe Storage

Inflow Area = 12,090.0 m², 63.61% Impervious, Inflow Depth = 43 mm for 100-Year event
Inflow = 0.1521 m³/s @ 0.17 hrs, Volume= 520.2 m³
Outflow = 0.0520 m³/s @ 1.06 hrs, Volume= 490.5 m³, Atten= 66%, Lag= 53.4 min
Primary = 0.0520 m³/s @ 1.06 hrs, Volume= 490.5 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 103.031 m @ 1.06 hrs Surf.Area= 304.0 m² Storage= 383.5 m³

Plug-Flow detention time= 77.8 min calculated for 489.3 m³ (94% of inflow)
Center-of-Mass det. time= 76.3 min (109.8 - 33.5)

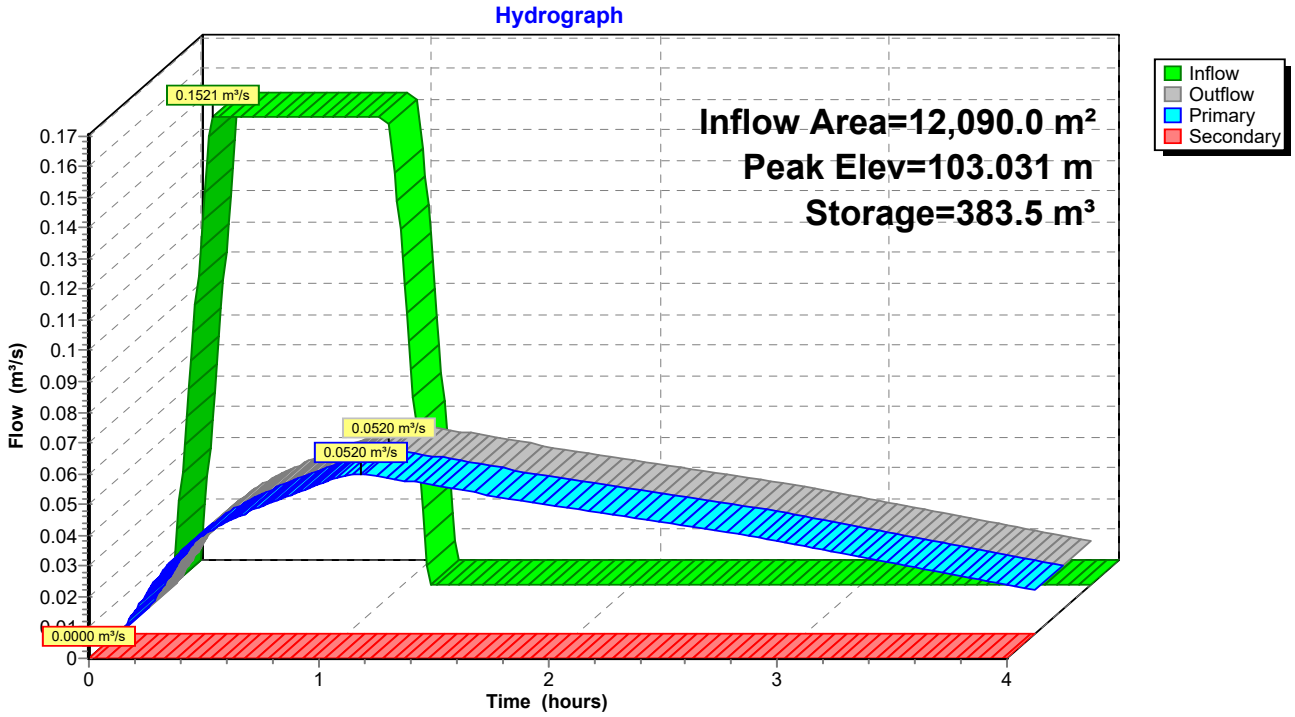
Volume	Invert	Avail.Storage	Storage Description
#1	101.793 m	390.5 m³	**5.70 mW x 50.00 mL x 1.37 mH Cistern**
#2	102.093 m	0.7 m³	**600 mm Round Pipe Storage** L= 2.55 m S= 0.0014 m/m
#3	102.157 m	5.2 m³	**600 mm Round Pipe Storage** L= 18.35 m S= 0.0014 m/m
#4	102.203 m	12.7 m³	**600 mm Round Pipe Storage** L= 45.00 m S= 0.0014 m/m
#5	102.266 m	7.2 m³	**450 mm Round Pipe Storage** L= 45.00 m S= 0.0020 m/m
#6	102.656 m	7.3 m³	**450 mm Round Pipe Storage** L= 45.75 m S= 0.0034 m/m
		423.5 m³	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Secondary	103.160 m	***Overflow Check** Head (meters) 0.000 0.010 Disch. (m³/s) 0.00000 10.00000
#2	Primary	101.729 m	**150 mm Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.0520 m³/s @ 1.06 hrs HW=103.031 m (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.0520 m³/s @ 2.94 m/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=101.793 m (Free Discharge)
↑—**1=***Overflow Check** (Controls 0.0000 m³/s)

Pond 1P: Cistern + Pipe Storage



Summary for Pond 2P: Rooftop Storage

Inflow Area = 3,870.0 m², 100.00% Impervious, Inflow Depth = 55 mm for 100-Year event
Inflow = 0.0624 m³/s @ 0.17 hrs, Volume= 213.5 m³
Outflow = 0.0040 m³/s @ 0.31 hrs, Volume= 55.4 m³, Atten= 94%, Lag= 8.4 min
Primary = 0.0040 m³/s @ 0.31 hrs, Volume= 55.4 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.103 m @ 1.11 hrs Surf.Area= 1,934.9 m² Storage= 200.1 m³

Plug-Flow detention time= 113.6 min calculated for 55.4 m³ (26% of inflow)
Center-of-Mass det. time= 92.3 min (125.8 - 33.5)

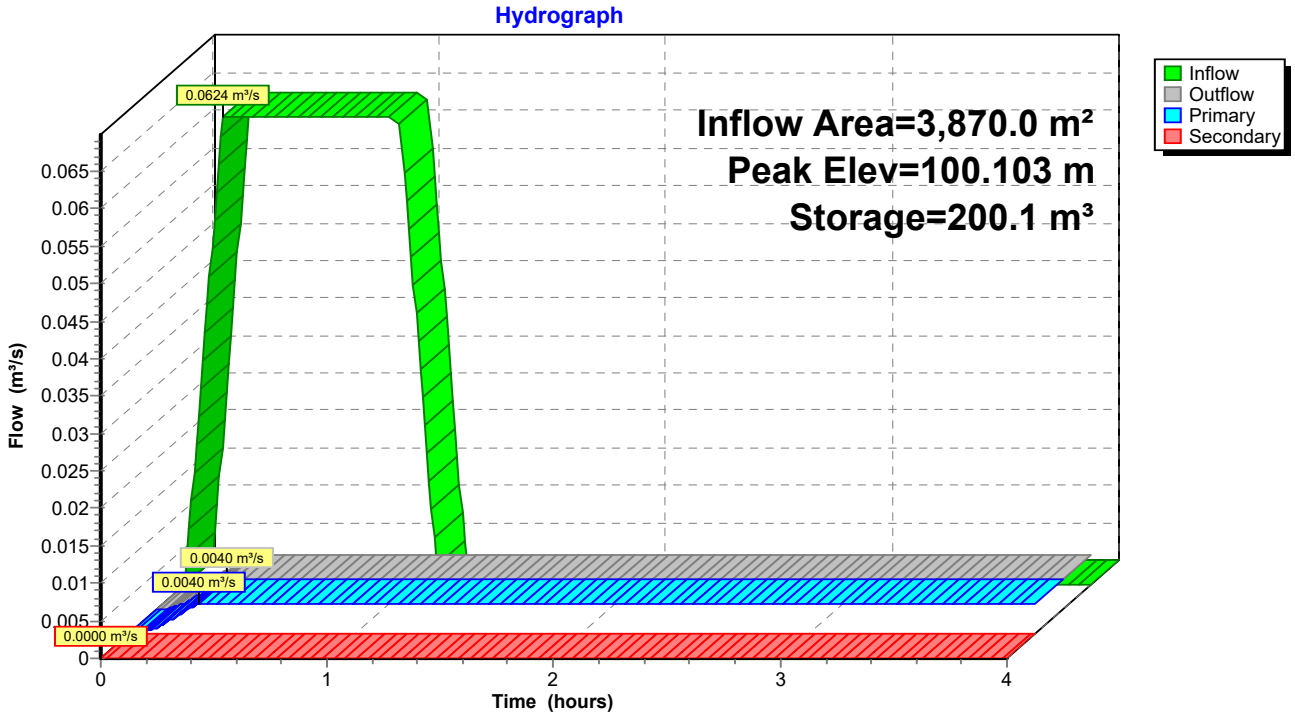
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	580.5 m³	**12.20 mW x 12.20 mL x 0.30 mH BLDG A**x 13

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 13.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031
#2	Secondary	100.299 m	**Special & User-Defined** Head (meters) 0.000 0.001 0.010 Disch. (m³/s) 0.00000 1.00000 10.00000

Primary OutFlow Max=0.0040 m³/s @ 0.31 hrs HW=100.025 m (Free Discharge)
└**1=WATTS Accutrol_5-Closed**(Custom Controls 0.0040 m³/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=100.000 m (Free Discharge)
└**2=Special & User-Defined** (Controls 0.0000 m³/s)

Pond 2P: Rooftop Storage

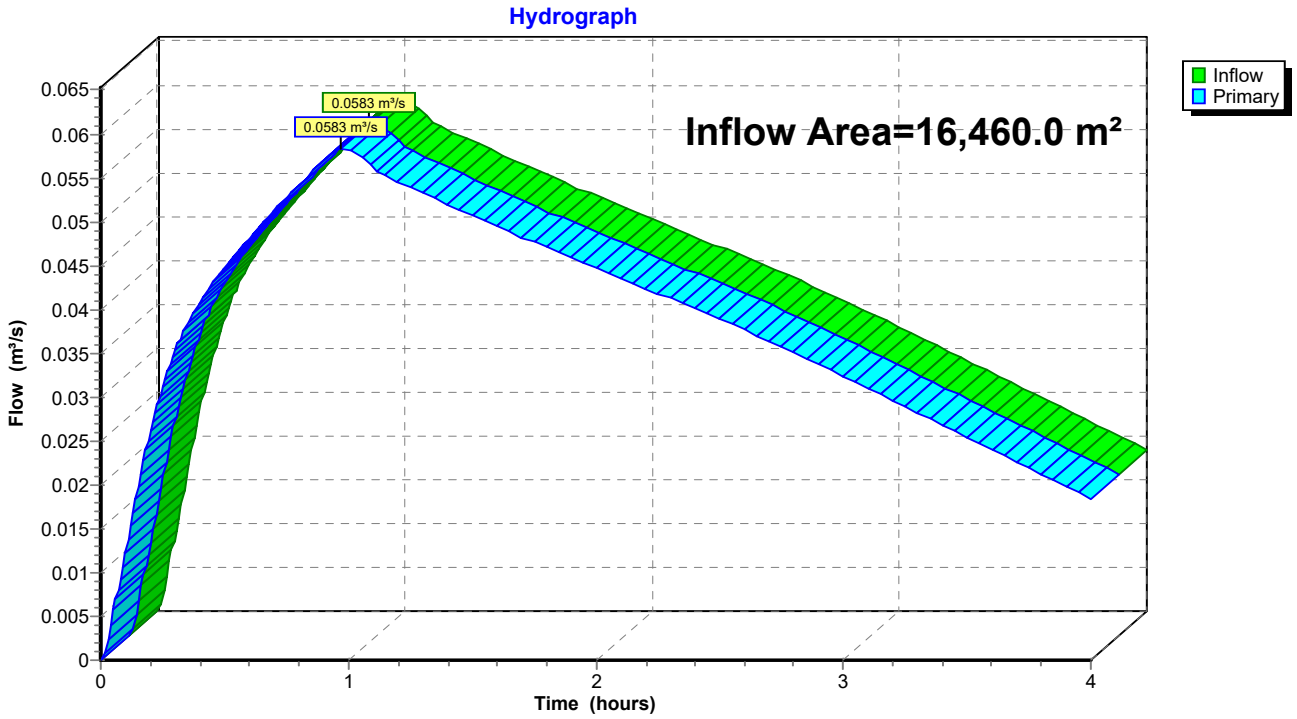


Summary for Link 1L: Site Release

Inflow Area = 16,460.0 m², 70.23% Impervious, Inflow Depth > 34 mm for 100-Year event
Inflow = 0.0583 m³/s @ 0.97 hrs, Volume= 558.3 m³
Primary = 0.0583 m³/s @ 0.97 hrs, Volume= 558.3 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 1L: Site Release

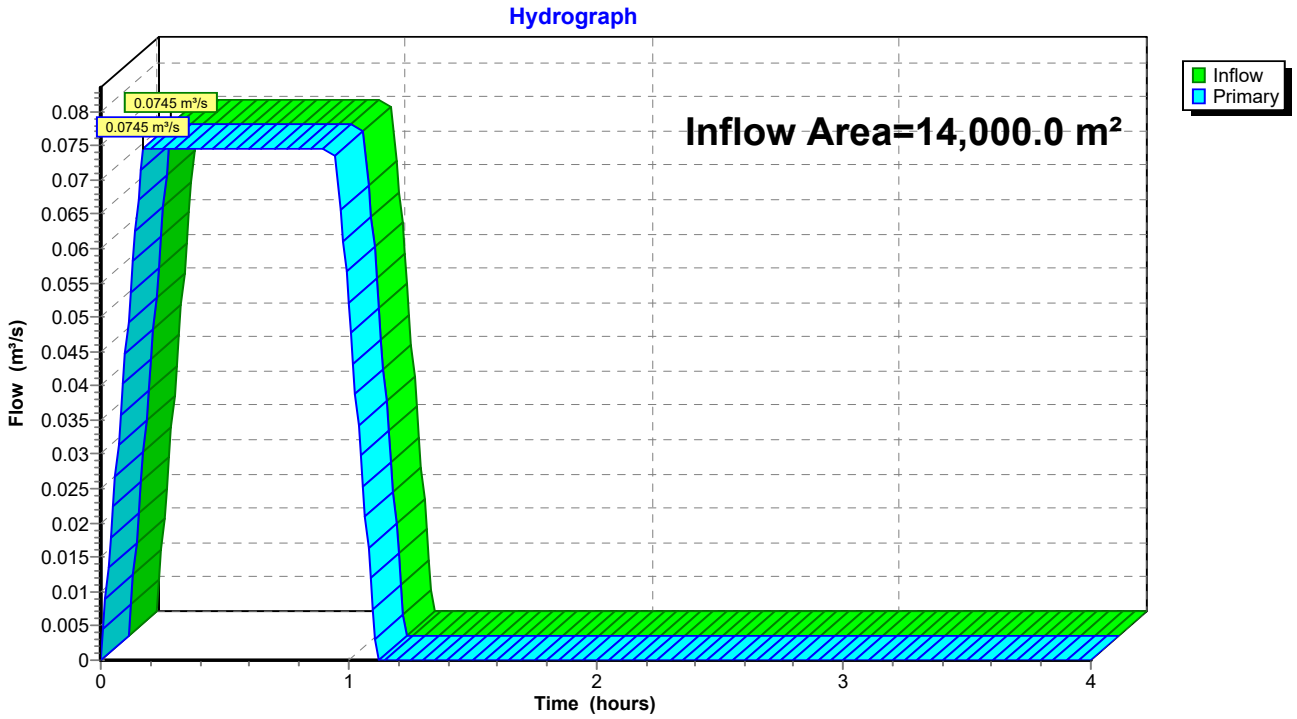


Summary for Link 30L: Offsite (Routed around site with discharge downstream of controls)

Inflow Area = 14,000.0 m², 0.00% Impervious, Inflow Depth = 18 mm for 100-Year event
Inflow = 0.0745 m³/s @ 0.17 hrs, Volume= 254.9 m³
Primary = 0.0745 m³/s @ 0.17 hrs, Volume= 254.9 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 30L: Offsite (Routed around site with discharge downstream of controls)



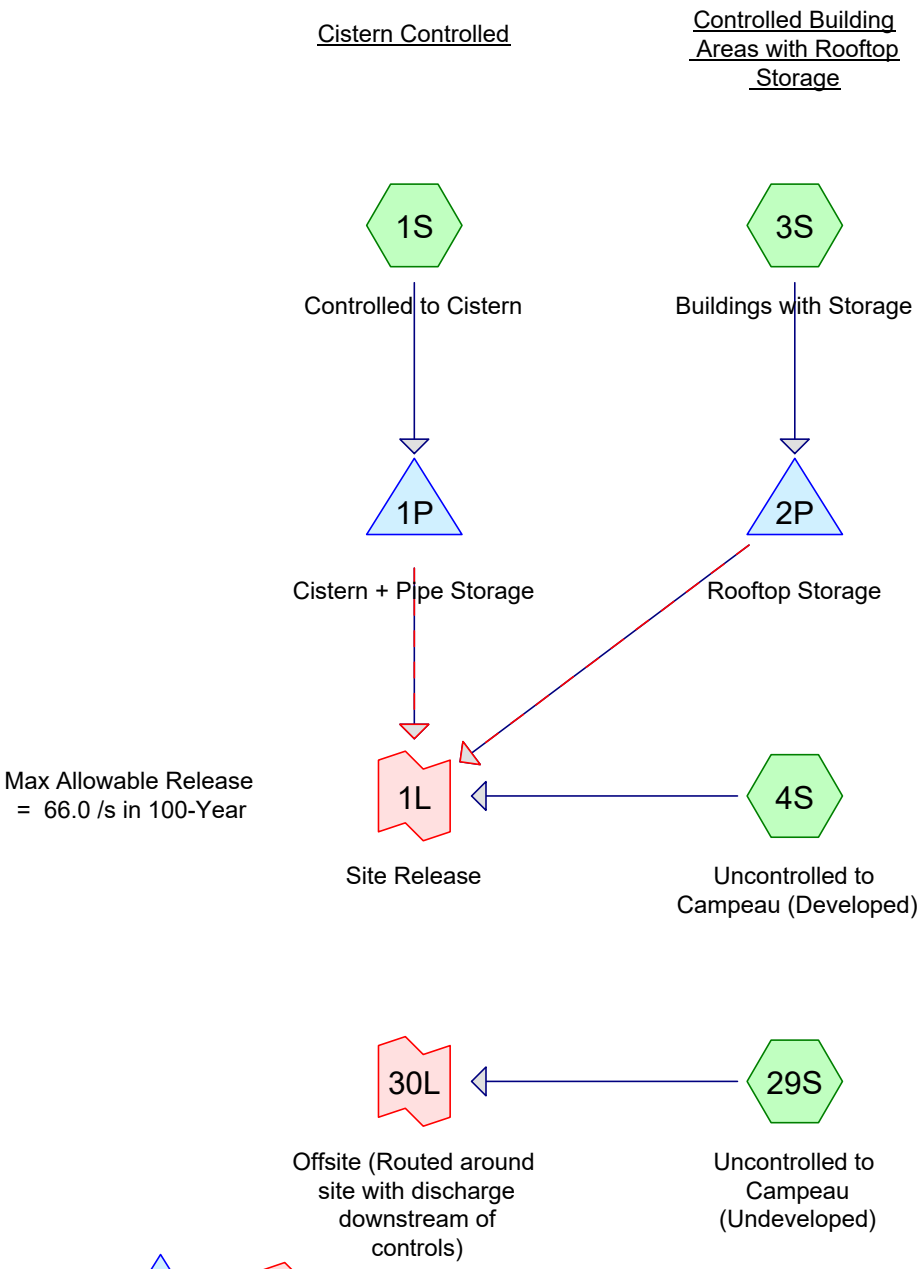
APPENDIX

G-3 Parcel 1: 100-Year Analysis (Peak Storage, T_C = 60 Min)

The storm system for Parcel 1 is governed by the 100-year storm. Peak storage and peak discharge occur at separate times of concentration and are therefore reported separately.

6301 Campeu Drive
Parcel 1 - Peak
Storage (Tc = 60 min)

100-year C



Routing Diagram for CampeauDrive_Parcel 1 100-yr
Prepared by WSP Canada inc., Printed 2020-12-03

Area Listing (all nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
1,760.0	1.00	A-101 (1S)
2,110.0	1.00	A-102 (1S)
2,060.0	1.00	A-103 (1S)
1,660.0	1.00	A-104 (1S)
5,320.0	0.35	A-105 (29S)
450.0	0.31	A-106 (1S)
470.0	0.33	A-107 (1S)
100.0	1.00	A-108 (1S)
480.0	0.35	A-109 (1S)
440.0	0.35	A-110 (1S)
140.0	0.49	A-111 (4S)
3,870.0	1.00	A-BLDG (3S)
8,680.0	0.31	A-EXT1 (29S)
1,320.0	0.31	A-EXT2 (1S)
1,240.0	0.61	A-EXT3 (1S)
210.0	0.46	A-U1 (4S)
80.0	0.41	A-U2 (4S)
70.0	0.42	A-U3 (4S)
30,460.0	**0.59**	**TOTAL AREA**

Summary for Subcatchment 1S: Controlled to Cistern

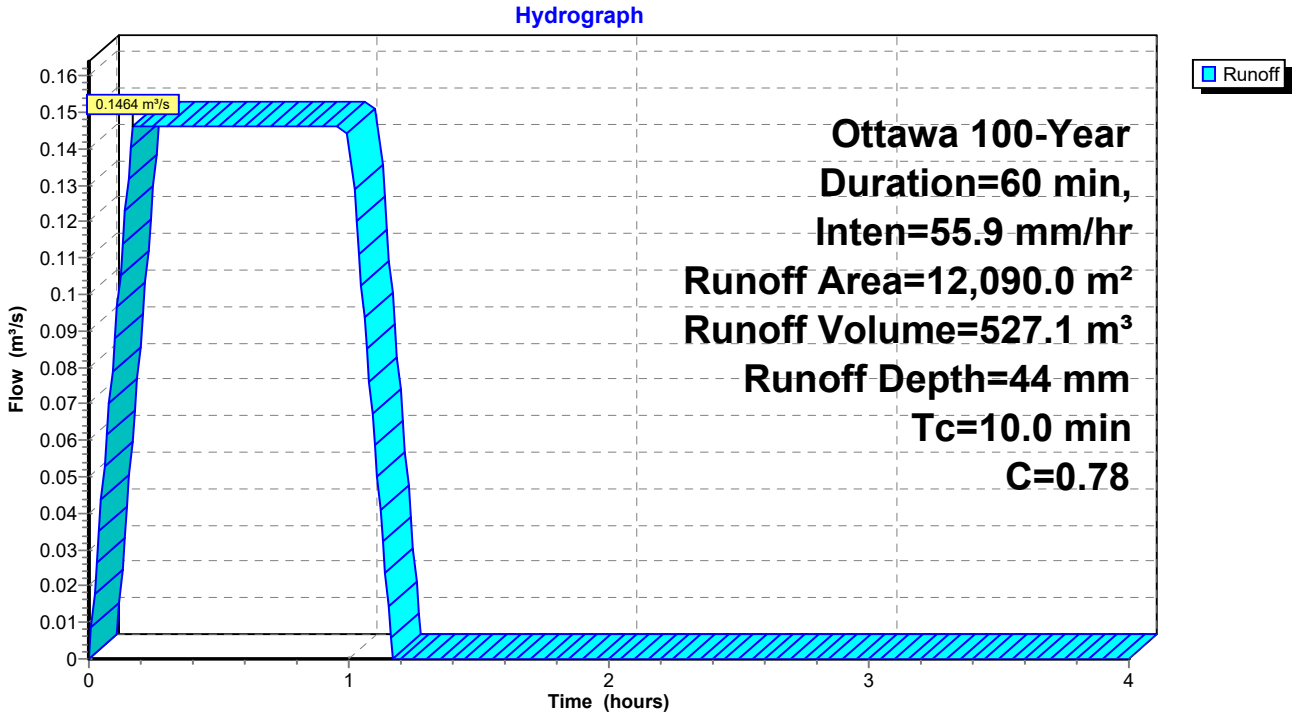
Runoff = 0.1464 m³/s @ 0.17 hrs, Volume= 527.1 m³, Depth= 44 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=60 min, Inten=55.9 mm/hr

Area (m²)	C	Description
1,760.0	1.00	A-101
1,320.0	0.31	A-EXT2
1,240.0	0.61	A-EXT3
2,110.0	1.00	A-102
2,060.0	1.00	A-103
1,660.0	1.00	A-104
450.0	0.31	A-106
470.0	0.33	A-107
100.0	1.00	A-108
480.0	0.35	A-109
440.0	0.35	A-110
12,090.0	0.78	Weighted Average
4,400.0		36.39% Pervious Area
7,690.0		63.61% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 1S: Controlled to Cistern



Summary for Subcatchment 3S: Buildings with Storage

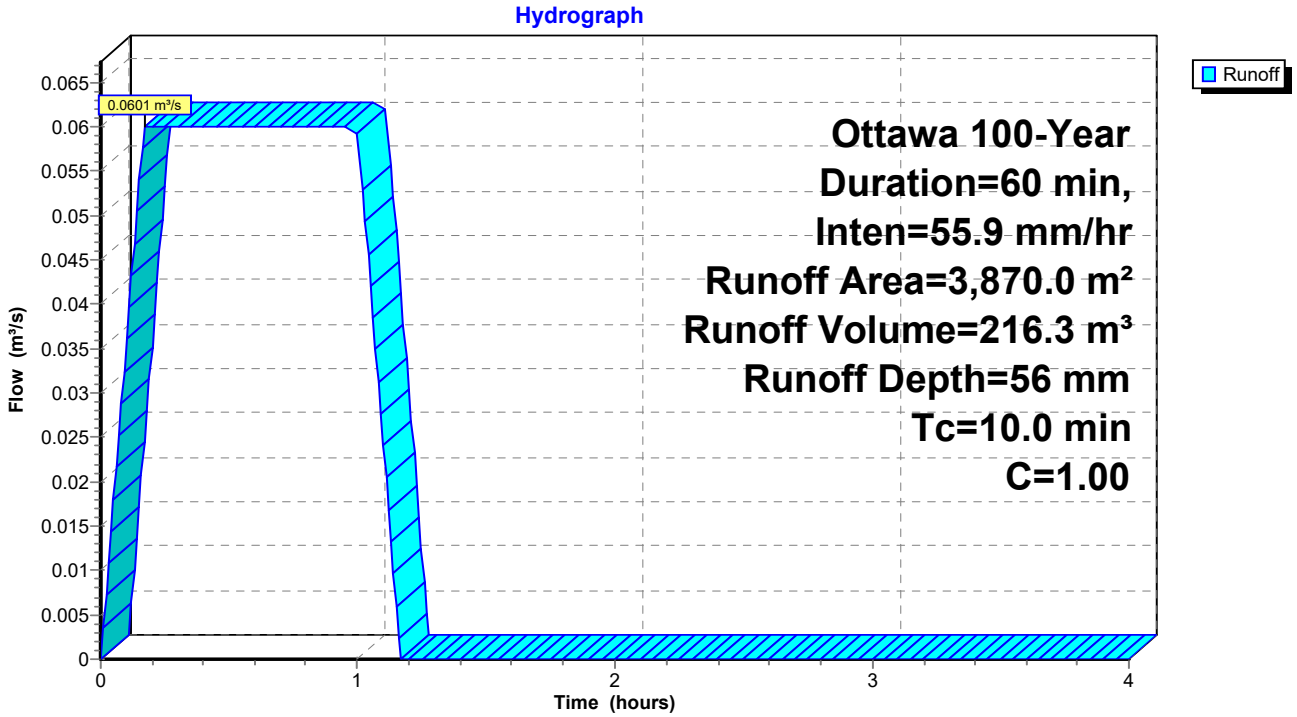
Runoff = 0.0601 m³/s @ 0.17 hrs, Volume= 216.3 m³, Depth= 56 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=60 min, Inten=55.9 mm/hr

Area (m²)	C	Description
3,870.0	1.00	A-BLDG
3,870.0		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 3S: Buildings with Storage



Summary for Subcatchment 4S: Uncontrolled to Campeau (Developed)

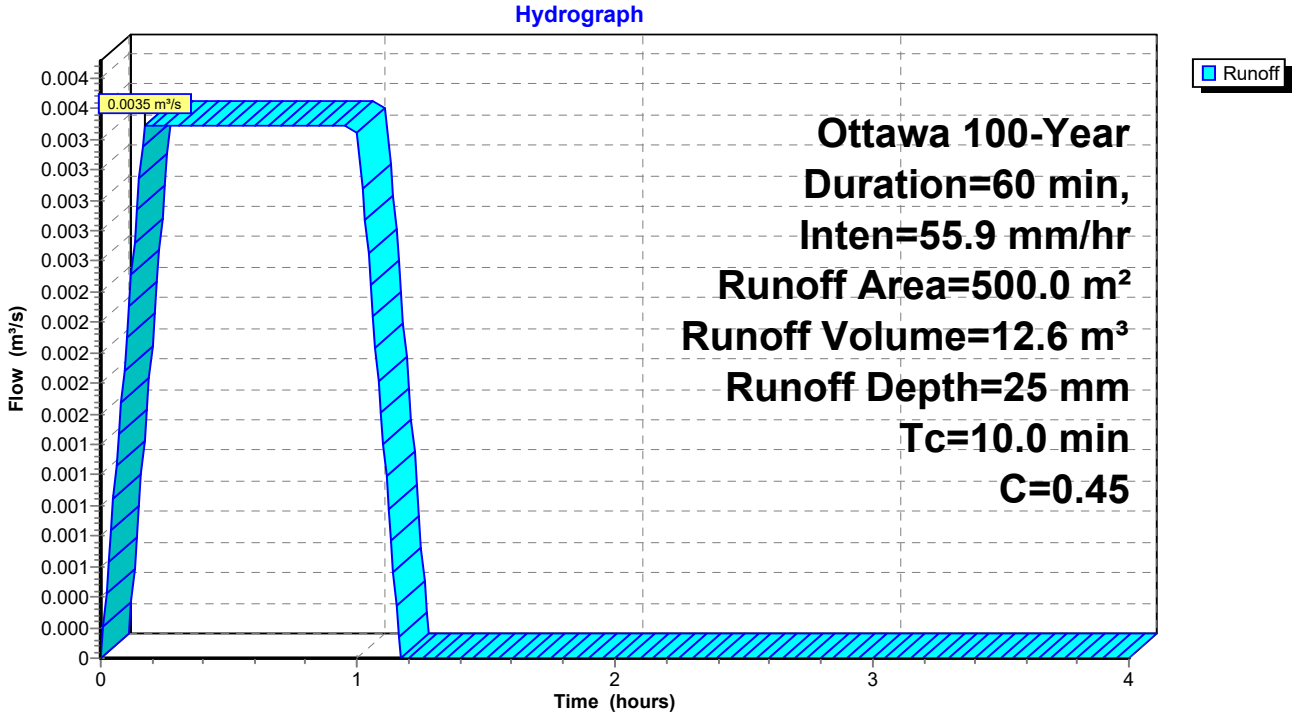
Runoff = 0.0035 m³/s @ 0.17 hrs, Volume= 12.6 m³, Depth= 25 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=60 min, Inten=55.9 mm/hr

Area (m²)	C	Description
210.0	0.46	A-U1
80.0	0.41	A-U2
70.0	0.42	A-U3
140.0	0.49	A-111
500.0	0.45	Weighted Average
500.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 4S: Uncontrolled to Campeau (Developed)



Summary for Subcatchment 29S: Uncontrolled to Campeau (Undeveloped)

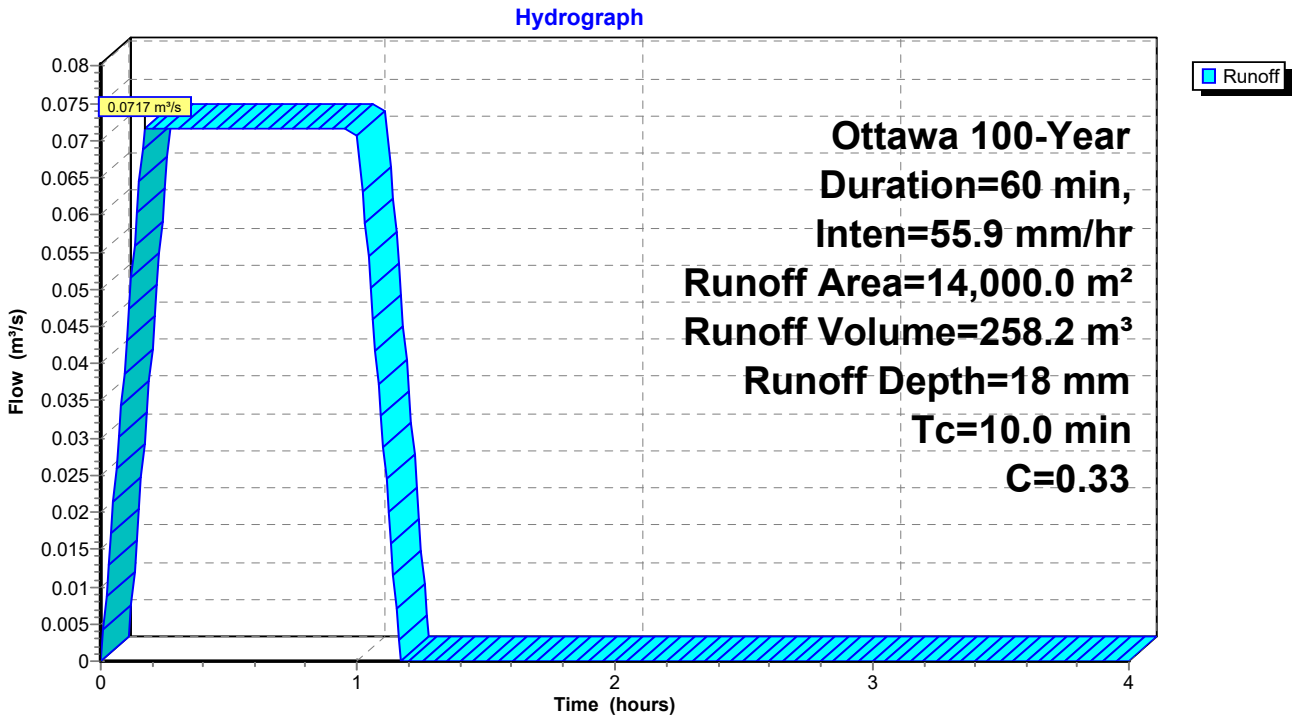
Runoff = 0.0717 m³/s @ 0.17 hrs, Volume= 258.2 m³, Depth= 18 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=60 min, Inten=55.9 mm/hr

Area (m²)	C	Description
8,680.0	0.31	A-EXT1
5,320.0	0.35	A-105
14,000.0	0.33	Weighted Average
14,000.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 29S: Uncontrolled to Campeau (Undeveloped)



Summary for Pond 1P: Cistern + Pipe Storage

Inflow Area = 12,090.0 m², 63.61% Impervious, Inflow Depth = 44 mm for 100-Year event
Inflow = 0.1464 m³/s @ 0.17 hrs, Volume= 527.1 m³
Outflow = 0.0520 m³/s @ 1.11 hrs, Volume= 494.7 m³, Atten= 64%, Lag= 56.2 min
Primary = 0.0520 m³/s @ 1.11 hrs, Volume= 494.7 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 103.032 m @ 1.11 hrs Surf.Area= 304.0 m² Storage= 383.9 m³

Plug-Flow detention time= 77.5 min calculated for 493.5 m³ (94% of inflow)
Center-of-Mass det. time= 75.8 min (110.8 - 35.0)

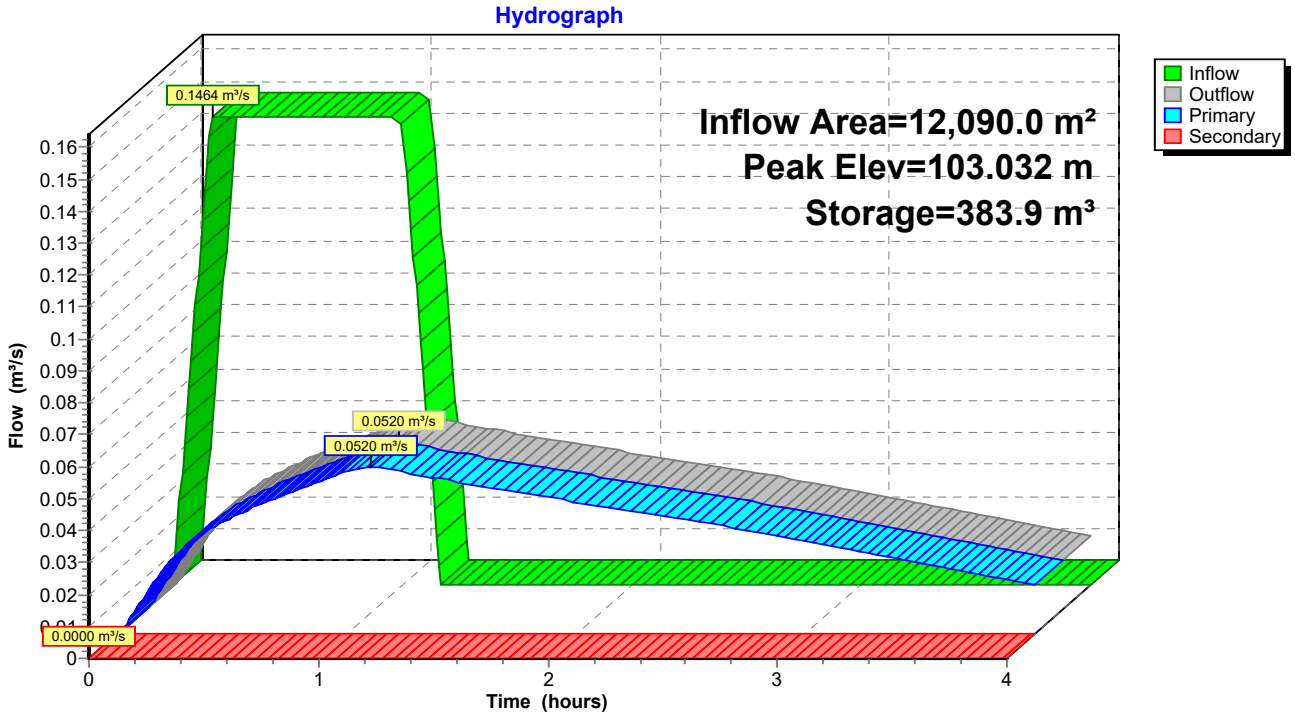
Volume	Invert	Avail.Storage	Storage Description
#1	101.793 m	390.5 m³	**5.70 mW x 50.00 mL x 1.37 mH Cistern**
#2	102.093 m	0.7 m³	**600 mm Round Pipe Storage** L= 2.55 m S= 0.0014 m/m
#3	102.157 m	5.2 m³	**600 mm Round Pipe Storage** L= 18.35 m S= 0.0014 m/m
#4	102.203 m	12.7 m³	**600 mm Round Pipe Storage** L= 45.00 m S= 0.0014 m/m
#5	102.266 m	7.2 m³	**450 mm Round Pipe Storage** L= 45.00 m S= 0.0020 m/m
#6	102.656 m	7.3 m³	**450 mm Round Pipe Storage** L= 45.75 m S= 0.0034 m/m
		423.5 m³	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Secondary	103.160 m	***Overflow Check** Head (meters) 0.000 0.010 Disch. (m³/s) 0.00000 10.00000
#2	Primary	101.729 m	**150 mm Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.0520 m³/s @ 1.11 hrs HW=103.031 m (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.0520 m³/s @ 2.94 m/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=101.793 m (Free Discharge)
↑—**1=***Overflow Check** (Controls 0.0000 m³/s)

Pond 1P: Cistern + Pipe Storage



Summary for Pond 2P: Rooftop Storage

Inflow Area = 3,870.0 m², 100.00% Impervious, Inflow Depth = 56 mm for 100-Year event
Inflow = 0.0601 m³/s @ 0.17 hrs, Volume= 216.3 m³
Outflow = 0.0040 m³/s @ 0.32 hrs, Volume= 55.3 m³, Atten= 93%, Lag= 9.0 min
Primary = 0.0040 m³/s @ 0.32 hrs, Volume= 55.3 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.105 m @ 1.16 hrs Surf.Area= 1,934.9 m² Storage= 202.2 m³

Plug-Flow detention time= 113.5 min calculated for 55.3 m³ (26% of inflow)
Center-of-Mass det. time= 90.9 min (125.9 - 35.0)

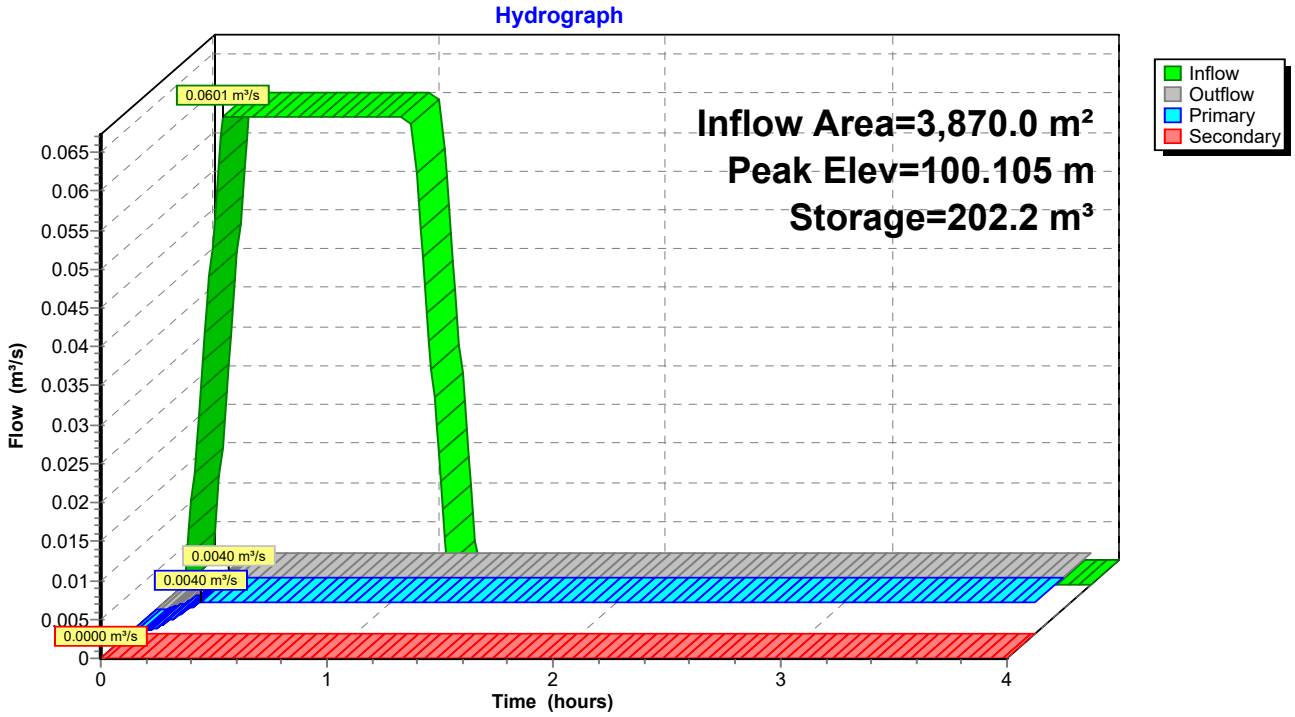
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	580.5 m³	**12.20 mW x 12.20 mL x 0.30 mH BLDG A**x 13

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 13.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031
#2	Secondary	100.299 m	**Special & User-Defined** Head (meters) 0.000 0.001 0.010 Disch. (m³/s) 0.00000 1.00000 10.00000

Primary OutFlow Max=0.0040 m³/s @ 0.32 hrs HW=100.025 m (Free Discharge)
└**1=WATTS Accutrol_5-Closed**(Custom Controls 0.0040 m³/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=100.000 m (Free Discharge)
└**2=Special & User-Defined** (Controls 0.0000 m³/s)

Pond 2P: Rooftop Storage

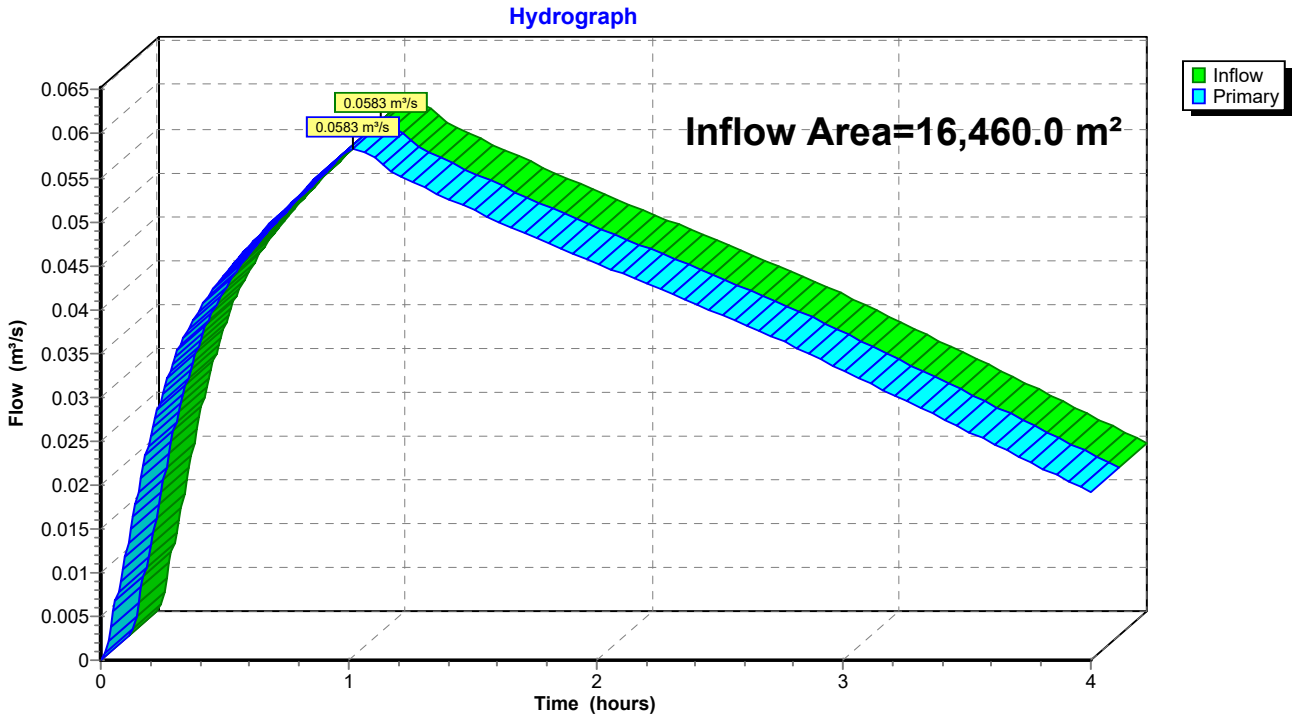


Summary for Link 1L: Site Release

Inflow Area = 16,460.0 m², 70.23% Impervious, Inflow Depth > 34 mm for 100-Year event
Inflow = 0.0583 m³/s @ 1.01 hrs, Volume= 562.6 m³
Primary = 0.0583 m³/s @ 1.01 hrs, Volume= 562.6 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 1L: Site Release

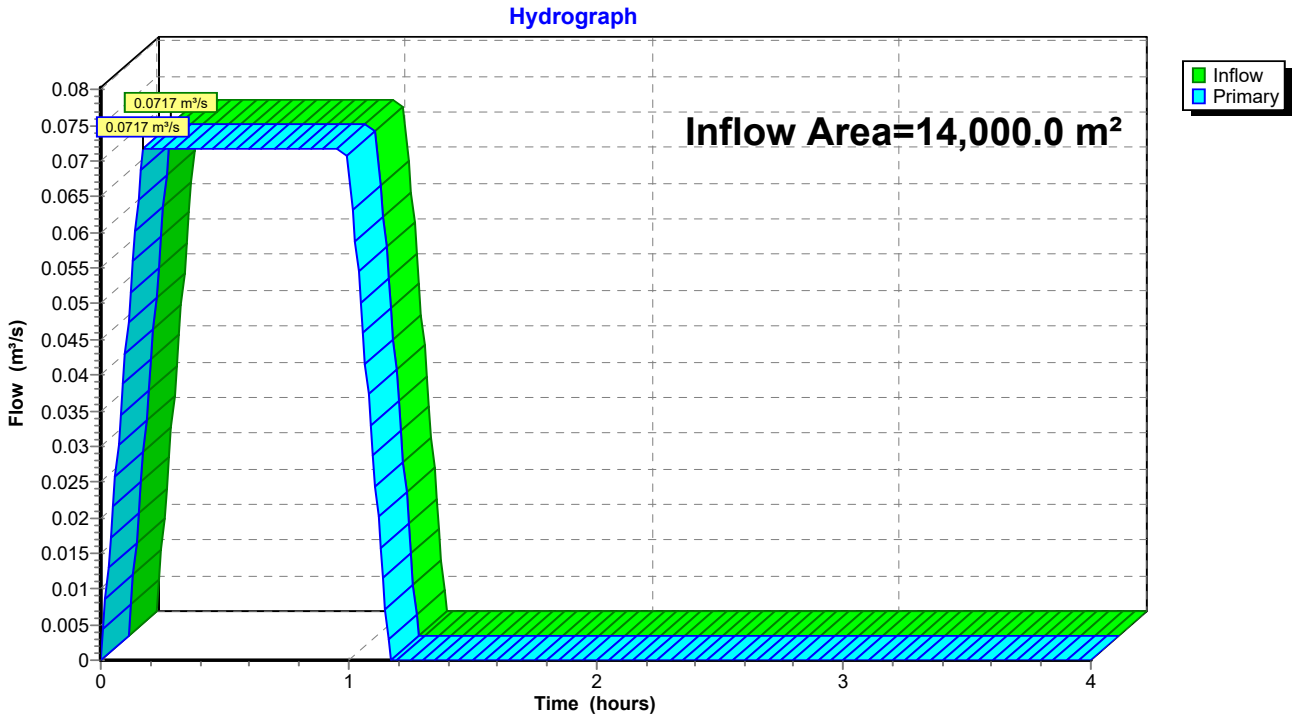


Summary for Link 30L: Offsite (Routed around site with discharge downstream of controls)

Inflow Area = 14,000.0 m², 0.00% Impervious, Inflow Depth = 18 mm for 100-Year event
Inflow = 0.0717 m³/s @ 0.17 hrs, Volume= 258.2 m³
Primary = 0.0717 m³/s @ 0.17 hrs, Volume= 258.2 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 30L: Offsite (Routed around site with discharge downstream of controls)



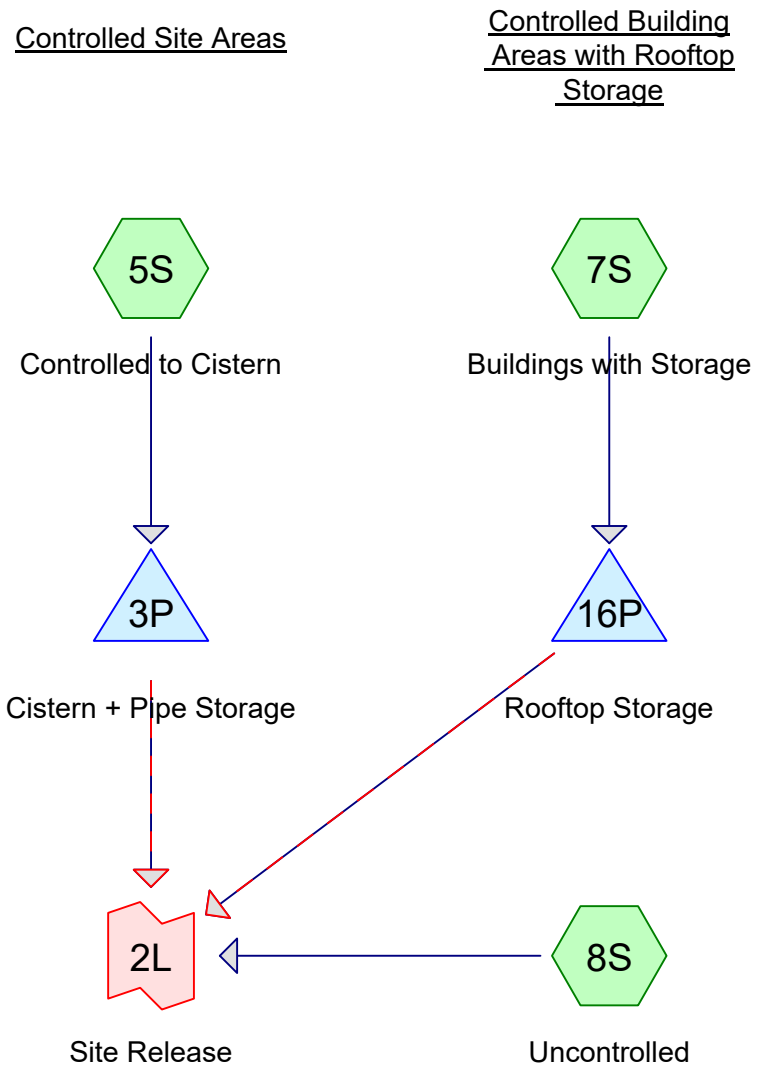
APPENDIX

G-4 Parcel 2: 5-Year Analysis (Peak Discharge, T_C = 24 Min)

The storm system for Parcel 2 is governed by the 5-year storm. Peak storage and peak discharge occur at separate times of concentration and are therefore reported separately.

6301 Campeu Drive
Parcel 2 - Peak Release (Tc = 24 min)

5-year C



Subcat Reach Pond Link

Area Listing (all nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
970.0	0.89	B-201 (5S)
820.0	0.90	B-202 (5S)
930.0	0.87	B-203 (5S)
1,090.0	0.88	B-204 (5S)
210.0	0.25	B-205 (5S)
300.0	0.86	B-206 (5S)
500.0	0.82	B-207 (5S)
1,320.0	0.63	B-208 (5S)
660.0	0.25	B-209 (5S)
600.0	0.61	B-210 (5S)
360.0	0.90	B-211 (5S)
2,760.0	0.90	B-BLDG (7S)
4,240.0	0.25	B-EXT1 (5S)
240.0	0.55	B-U1 (8S)
1,470.0	0.28	B-U2 (8S)
16,470.0	**0.60**	**TOTAL AREA**

Summary for Subcatchment 5S: Controlled to Cistern

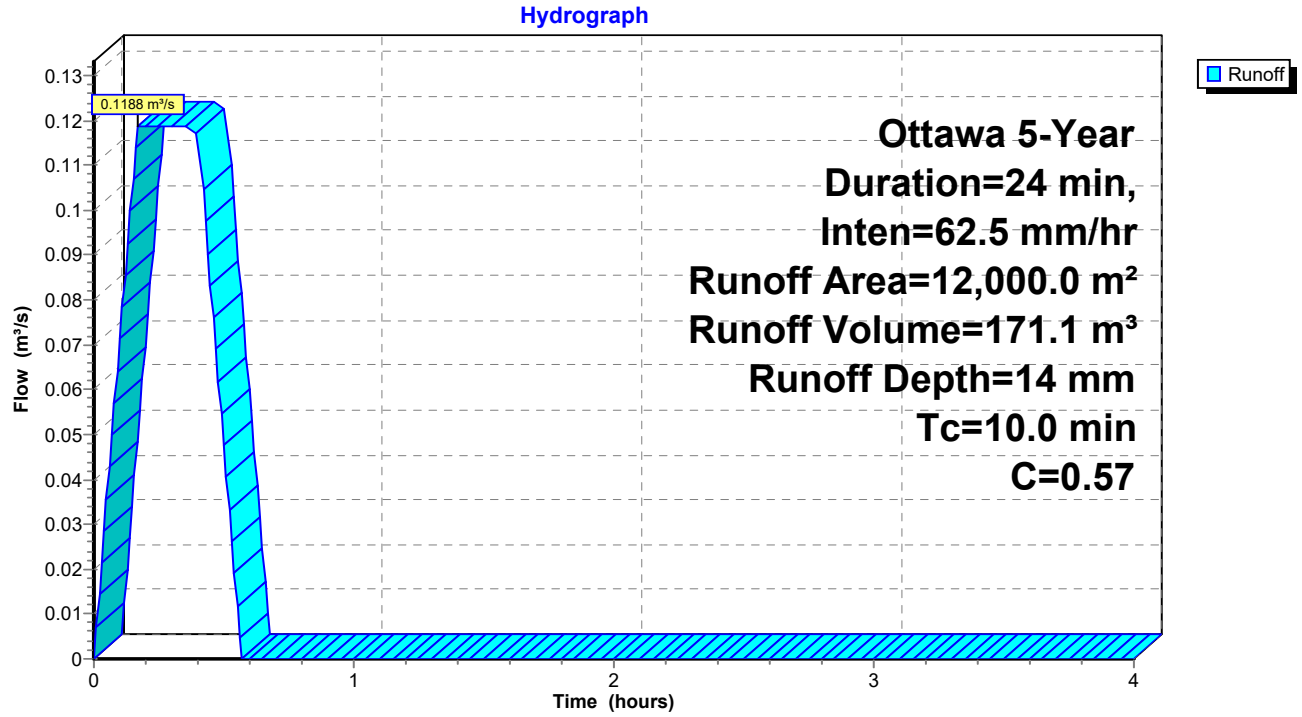
Runoff = 0.1188 m³/s @ 0.17 hrs, Volume= 171.1 m³, Depth= 14 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=24 min, Inten=62.5 mm/hr

Area (m²)	C	Description
4,240.0	0.25	B-EXT1
970.0	0.89	B-201
820.0	0.90	B-202
930.0	0.87	B-203
1,090.0	0.88	B-204
210.0	0.25	B-205
300.0	0.86	B-206
500.0	0.82	B-207
1,320.0	0.63	B-208
660.0	0.25	B-209
600.0	0.61	B-210
360.0	0.90	B-211
12,000.0	0.57	Weighted Average
12,000.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 5S: Controlled to Cistern



Summary for Subcatchment 7S: Buildings with Storage

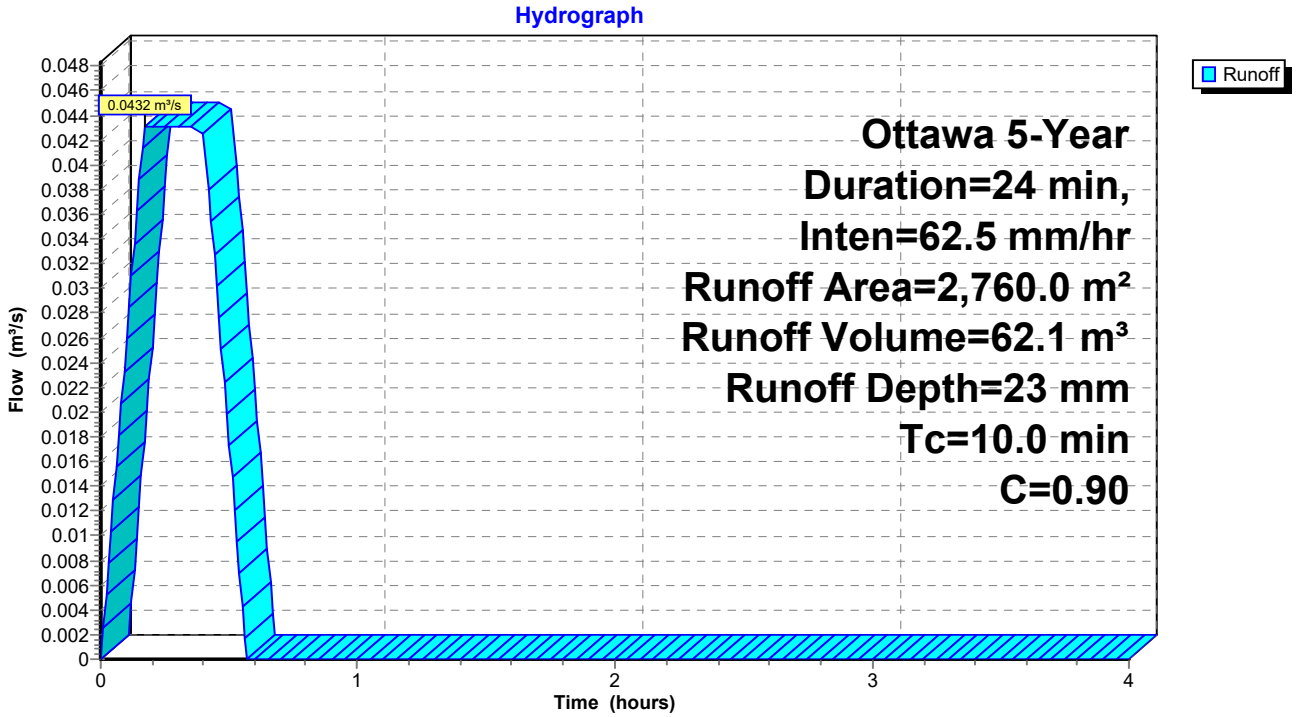
Runoff = 0.0432 m³/s @ 0.17 hrs, Volume= 62.1 m³, Depth= 23 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=24 min, Inten=62.5 mm/hr

Area (m²)	C	Description
2,760.0	0.90	B-BLDG
2,760.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 7S: Buildings with Storage



Summary for Subcatchment 8S: Uncontrolled

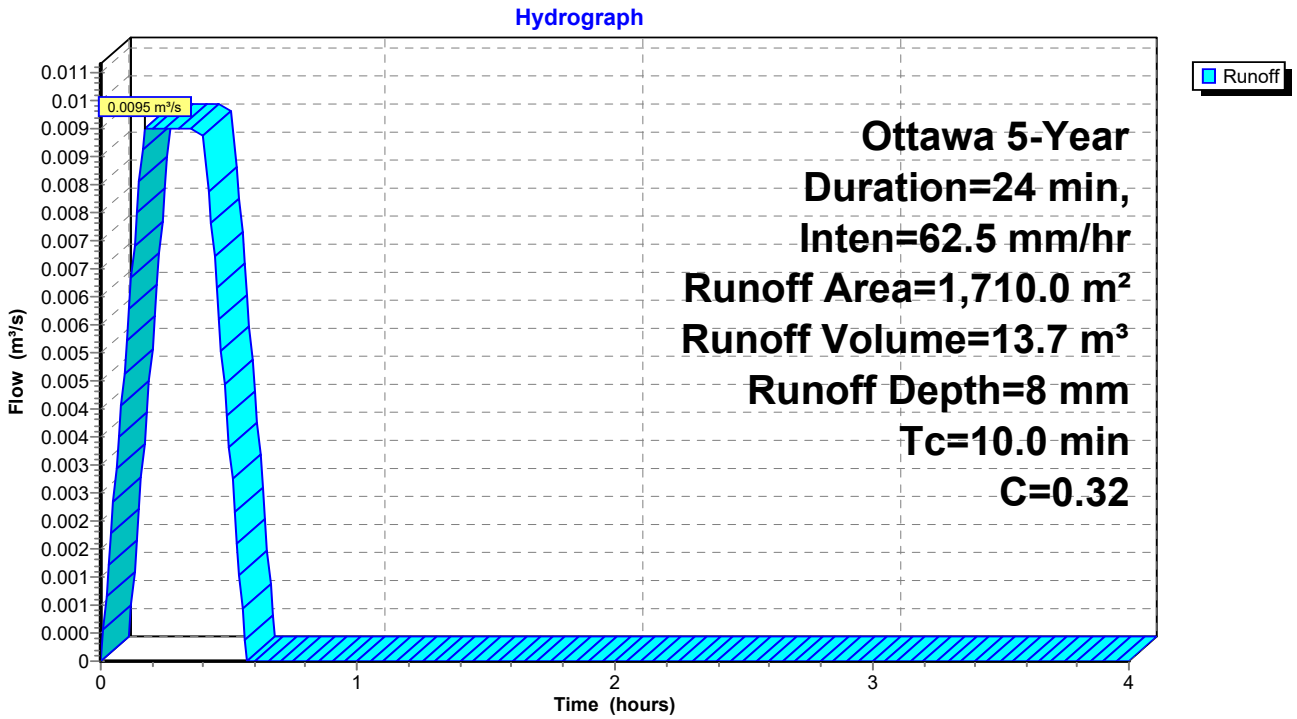
Runoff = 0.0095 m³/s @ 0.17 hrs, Volume= 13.7 m³, Depth= 8 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=24 min, Inten=62.5 mm/hr

Area (m²)	C	Description
1,470.0	0.28	B-U2
240.0	0.55	B-U1
1,710.0	0.32	Weighted Average
1,710.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 8S: Uncontrolled



Summary for Pond 3P: Cistern + Pipe Storage

Inflow Area = 12,000.0 m², 0.00% Impervious, Inflow Depth = 14 mm for 5-Year event
Inflow = 0.1188 m³/s @ 0.17 hrs, Volume= 171.1 m³
Outflow = 0.0275 m³/s @ 0.53 hrs, Volume= 171.1 m³, Atten= 77%, Lag= 21.5 min
Primary = 0.0275 m³/s @ 0.53 hrs, Volume= 171.1 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 101.087 m @ 0.53 hrs Surf.Area= 82.1 m² Storage= 135.5 m³

Plug-Flow detention time= 55.8 min calculated for 170.7 m³ (100% of inflow)
Center-of-Mass det. time= 56.0 min (73.0 - 17.0)

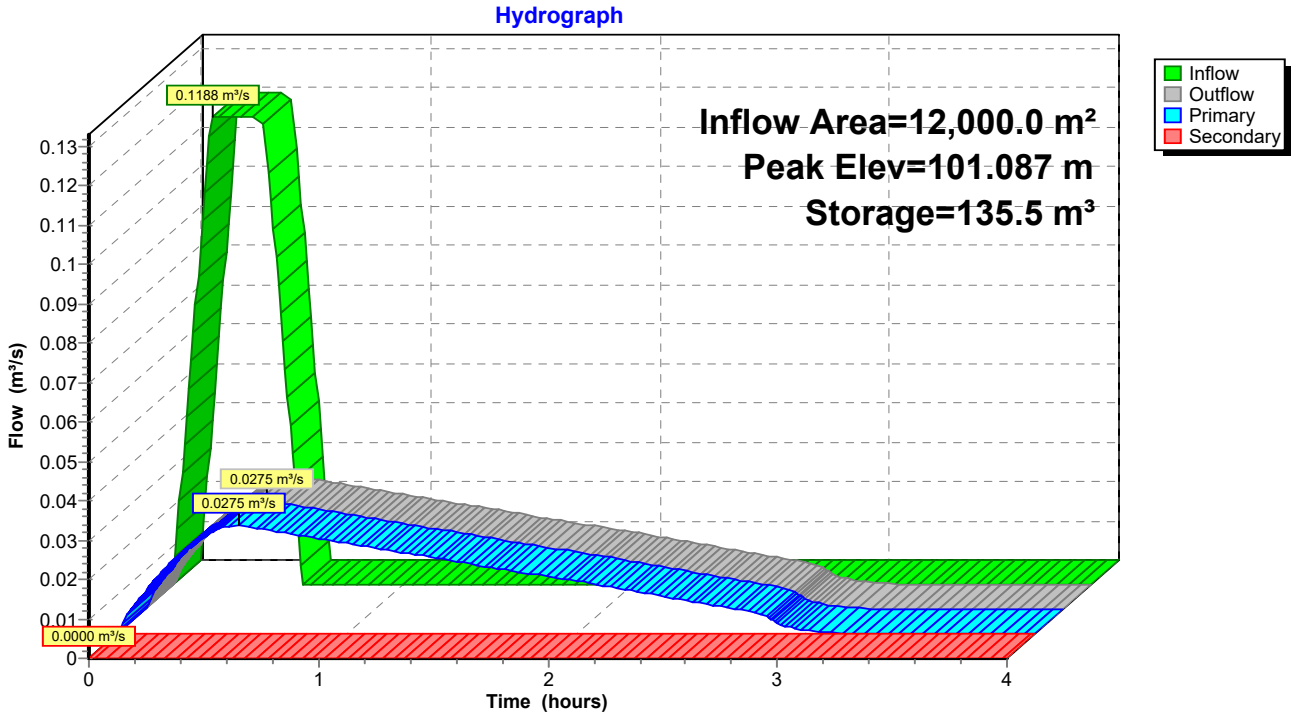
Volume	Invert	Avail.Storage	Storage Description
#1	99.390 m	152.1 m³	**7.20 mW x 10.56 mL x 2.00 mH Cistern**
#2	99.690 m	0.2 m³	**300 mm Round Pipe Storage** L= 2.80 m S= 0.0008 m/m
#3	99.732 m	2.3 m³	**300 mm Round Pipe Storage** L= 32.05 m S= 0.0010 m/m
#4	100.113 m	0.7 m³	**300 mm Round Pipe Storage** L= 10.40 m S= 0.0008 m/m
#5	100.216 m	1.5 m³	**300 mm Round Pipe Storage** L= 21.10 m S= 0.0008 m/m
#6	100.405 m	0.8 m³	**300 mm Round Pipe Storage** L= 11.25 m S= 0.0008 m/m
#7	100.892 m	1.5 m³	**300 mm Round Pipe Storage** L= 21.05 m S= 0.0005 m/m
#8	101.430 m	0.5 m³	**250 mm Round Pipe Storage** L= 9.80 m S= 0.0010 m/m
#9	101.548 m	0.9 m³	**250 mm Round Pipe Storage** L= 19.20 m S= 0.0010 m/m
		160.5 m³	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Secondary	101.280 m	***Overflow Check** Head (meters) 0.000 0.010 Disch. (m³/s) 0.00000 10.00000
#2	Primary	99.307 m	**100 mm Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.0275 m³/s @ 0.53 hrs HW=101.087 m (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 0.0275 m³/s @ 3.50 m/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=99.390 m (Free Discharge)
└**1=***Overflow Check** (Controls 0.0000 m³/s)

Pond 3P: Cistern + Pipe Storage



Summary for Pond 16P: Rooftop Storage

Inflow Area = 2,760.0 m², 0.00% Impervious, Inflow Depth = 23 mm for 5-Year event
Inflow = 0.0432 m³/s @ 0.17 hrs, Volume= 62.1 m³
Outflow = 0.0031 m³/s @ 0.32 hrs, Volume= 39.7 m³, Atten= 93%, Lag= 9.0 min
Primary = 0.0031 m³/s @ 0.32 hrs, Volume= 39.7 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.042 m @ 0.55 hrs Surf.Area= 1,380.6 m² Storage= 58.0 m³

Plug-Flow detention time= 107.1 min calculated for 39.6 m³ (64% of inflow)
Center-of-Mass det. time= 102.7 min (119.8 - 17.0)

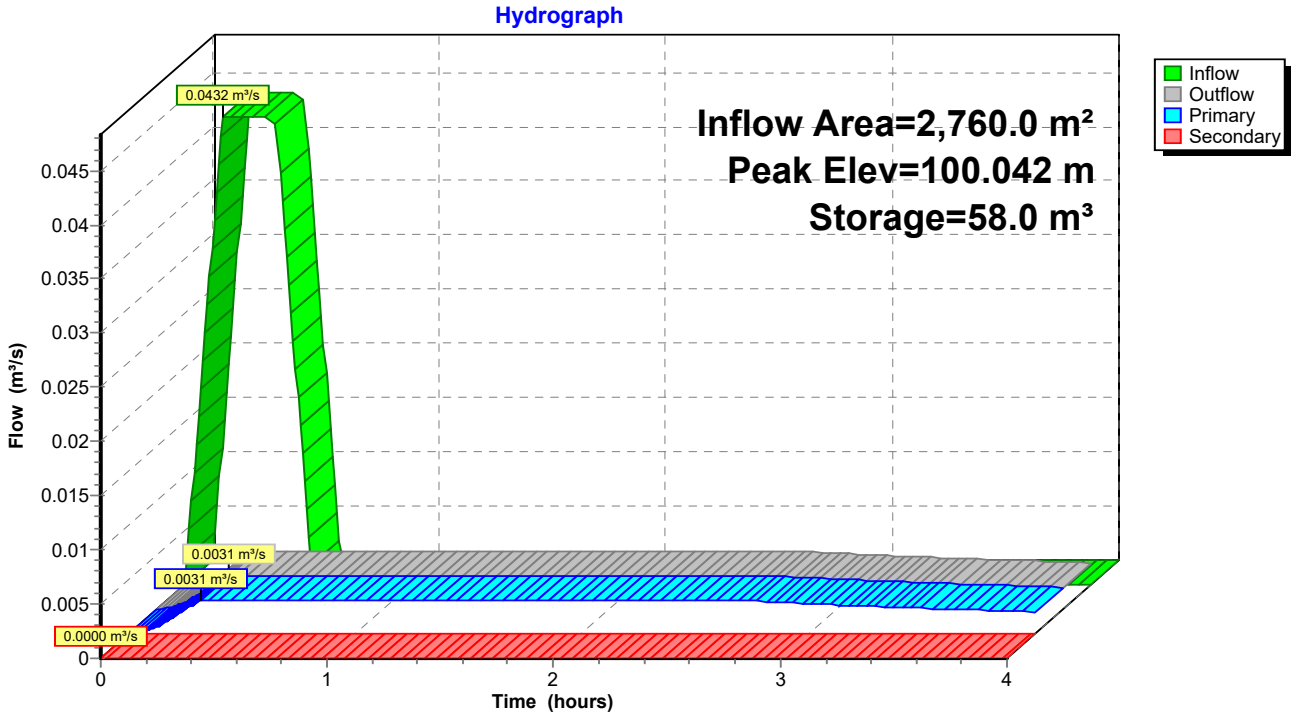
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	414.2 m³	**11.75 mW x 11.75 mL x 0.30 mH BLDG B**x 10

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 10.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031
#2	Secondary	100.299 m	**Special & User-Defined** Head (meters) 0.000 0.001 0.010 Disch. (m³/s) 0.00000 1.00000 10.00000

Primary OutFlow Max=0.0031 m³/s @ 0.32 hrs HW=100.026 m (Free Discharge)
↑—**1=WATTS Accutrol_5-Closed**(Custom Controls 0.0031 m³/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=100.000 m (Free Discharge)
↑—**2=Special & User-Defined** (Controls 0.0000 m³/s)

Pond 16P: Rooftop Storage

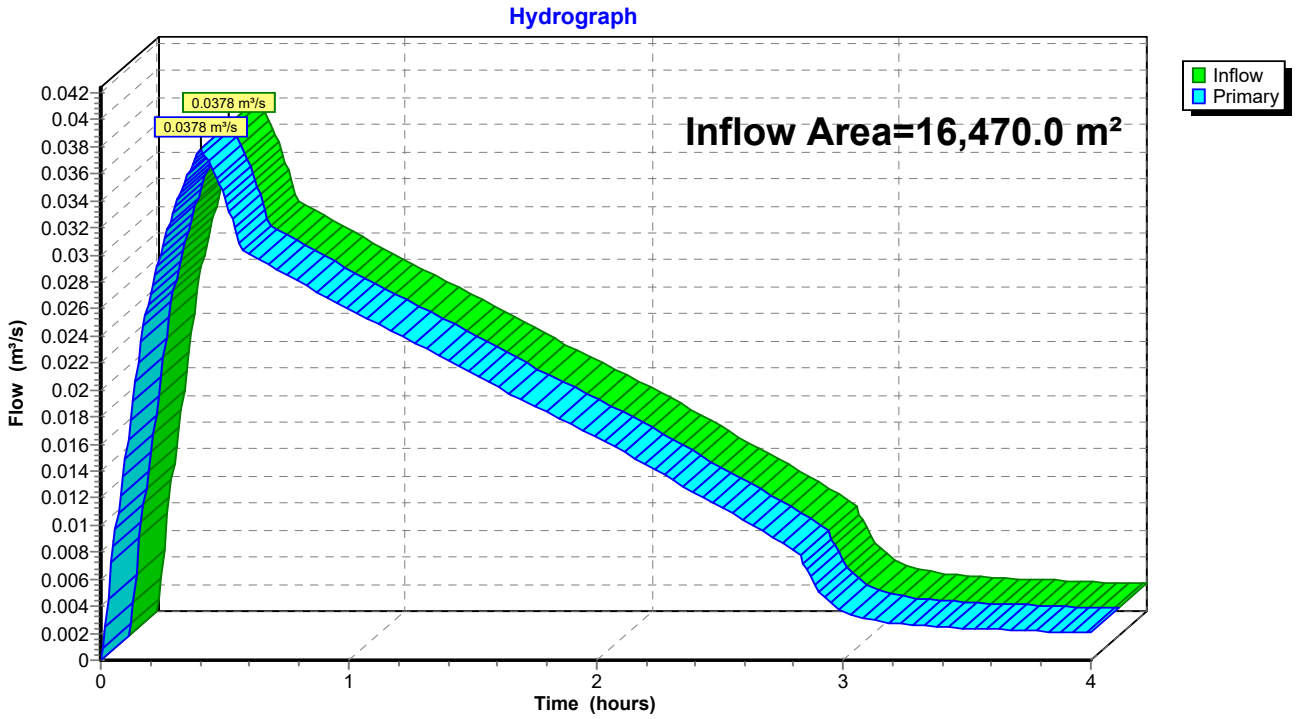


Summary for Link 2L: Site Release

Inflow Area = 16,470.0 m², 0.00% Impervious, Inflow Depth > 14 mm for 5-Year event
Inflow = 0.0378 m³/s @ 0.40 hrs, Volume= 224.5 m³
Primary = 0.0378 m³/s @ 0.40 hrs, Volume= 224.5 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 2L: Site Release



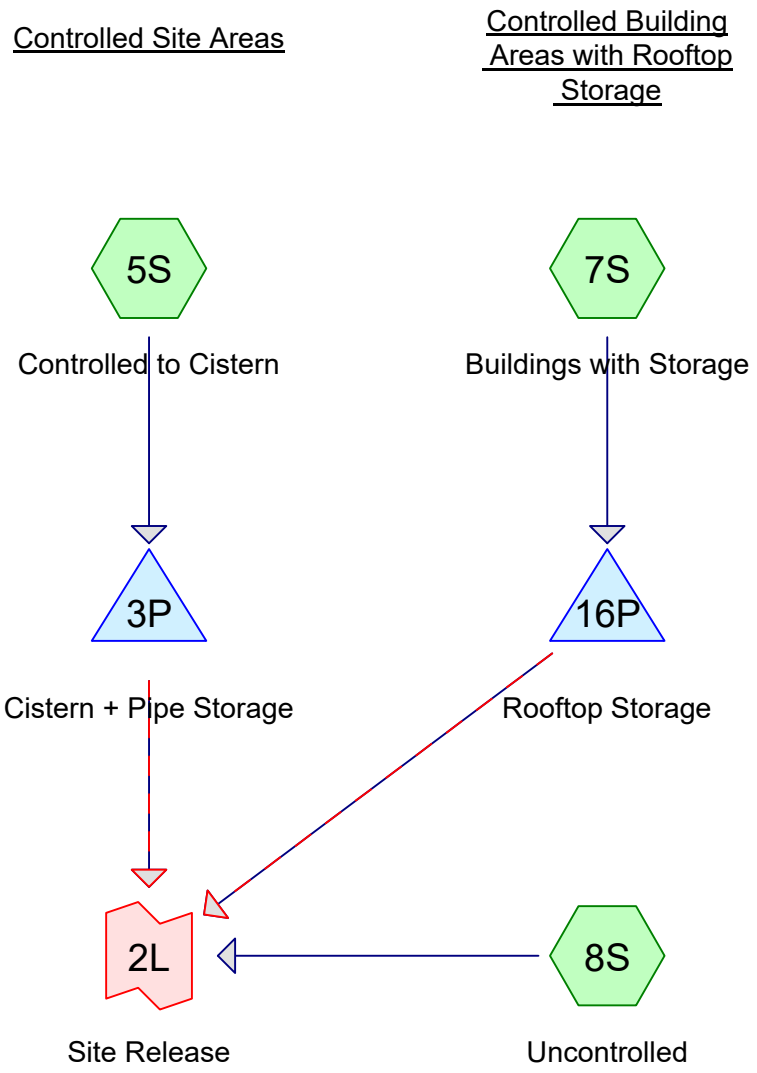
APPENDIX

G-5 Parcel 2: 5-Year Analysis (Peak Storage, T_C = 51 Min)

The storm system for Parcel 2 is governed by the 5-year storm. Peak storage and peak discharge occur at separate times of concentration and are therefore reported separately.

6301 Campeu Drive
Parcel 2 - Peak Storage (Tc = 48 min)

5-year C



Subcat Reach Pond Link

Routing Diagram for CampeauDrive_Parcel 2 5-yr
Prepared by WSP Canada inc., Printed 2020-12-03

Area Listing (all nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
970.0	0.89	B-201 (5S)
820.0	0.90	B-202 (5S)
930.0	0.87	B-203 (5S)
1,090.0	0.88	B-204 (5S)
210.0	0.25	B-205 (5S)
300.0	0.86	B-206 (5S)
500.0	0.82	B-207 (5S)
1,320.0	0.63	B-208 (5S)
660.0	0.25	B-209 (5S)
600.0	0.61	B-210 (5S)
360.0	0.90	B-211 (5S)
2,760.0	0.90	B-BLDG (7S)
4,240.0	0.25	B-EXT1 (5S)
240.0	0.55	B-U1 (8S)
1,470.0	0.28	B-U2 (8S)
16,470.0	**0.60**	**TOTAL AREA**

Summary for Subcatchment 5S: Controlled to Cistern

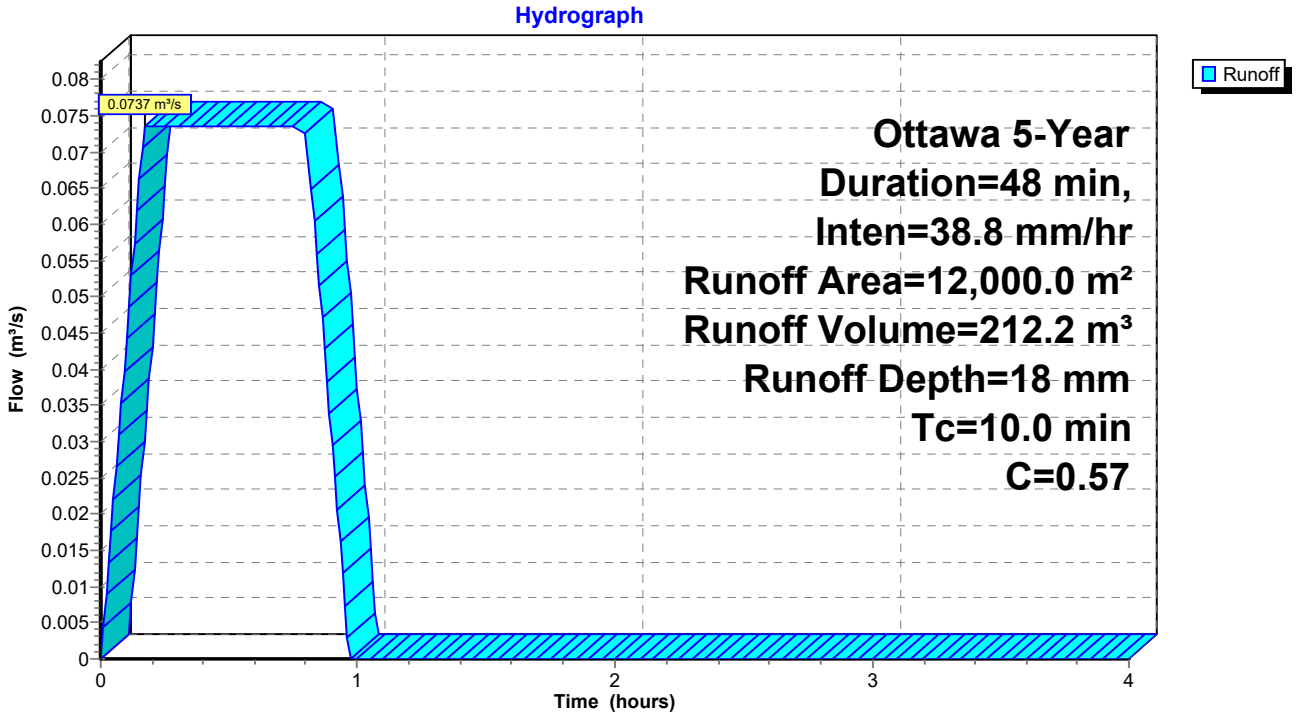
Runoff = 0.0737 m³/s @ 0.17 hrs, Volume= 212.2 m³, Depth= 18 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=48 min, Inten=38.8 mm/hr

Area (m²)	C	Description
4,240.0	0.25	B-EXT1
970.0	0.89	B-201
820.0	0.90	B-202
930.0	0.87	B-203
1,090.0	0.88	B-204
210.0	0.25	B-205
300.0	0.86	B-206
500.0	0.82	B-207
1,320.0	0.63	B-208
660.0	0.25	B-209
600.0	0.61	B-210
360.0	0.90	B-211
12,000.0	0.57	Weighted Average
12,000.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 5S: Controlled to Cistern



Summary for Subcatchment 7S: Buildings with Storage

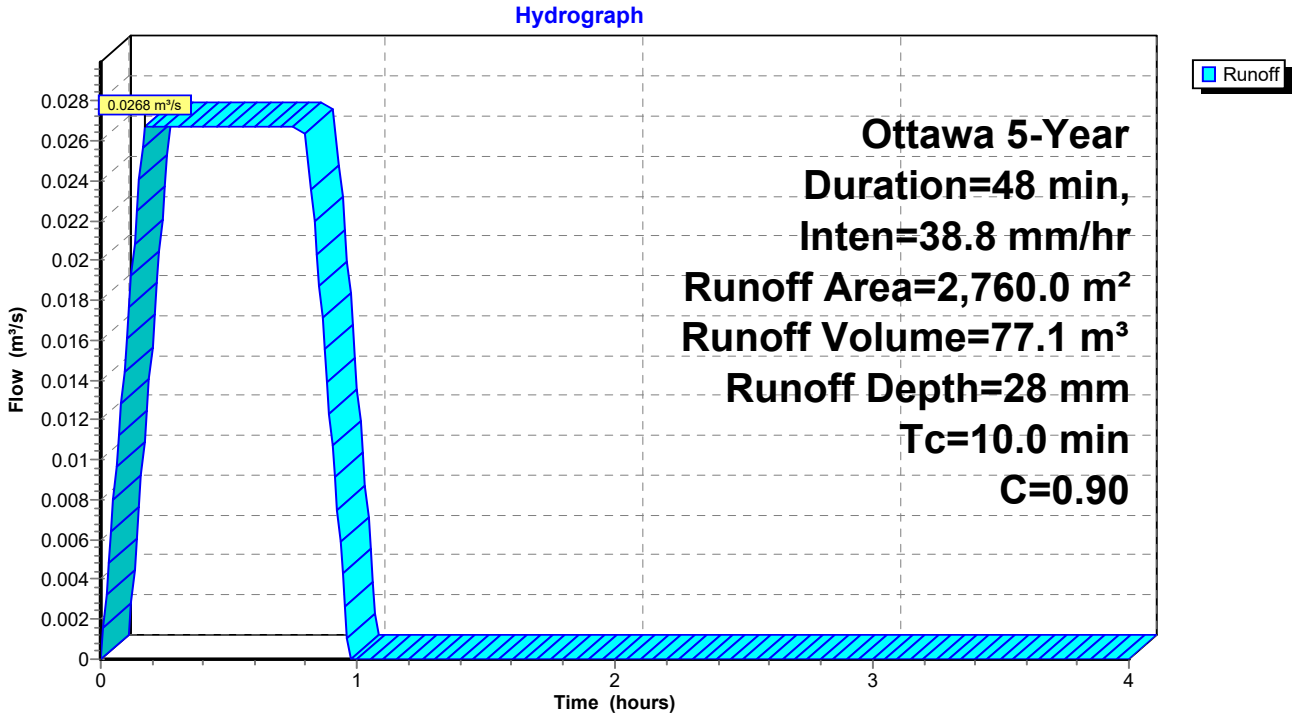
Runoff = 0.0268 m³/s @ 0.17 hrs, Volume= 77.1 m³, Depth= 28 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=48 min, Inten=38.8 mm/hr

Area (m²)	C	Description
2,760.0	0.90	B-BLDG
2,760.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 7S: Buildings with Storage



Summary for Subcatchment 8S: Uncontrolled

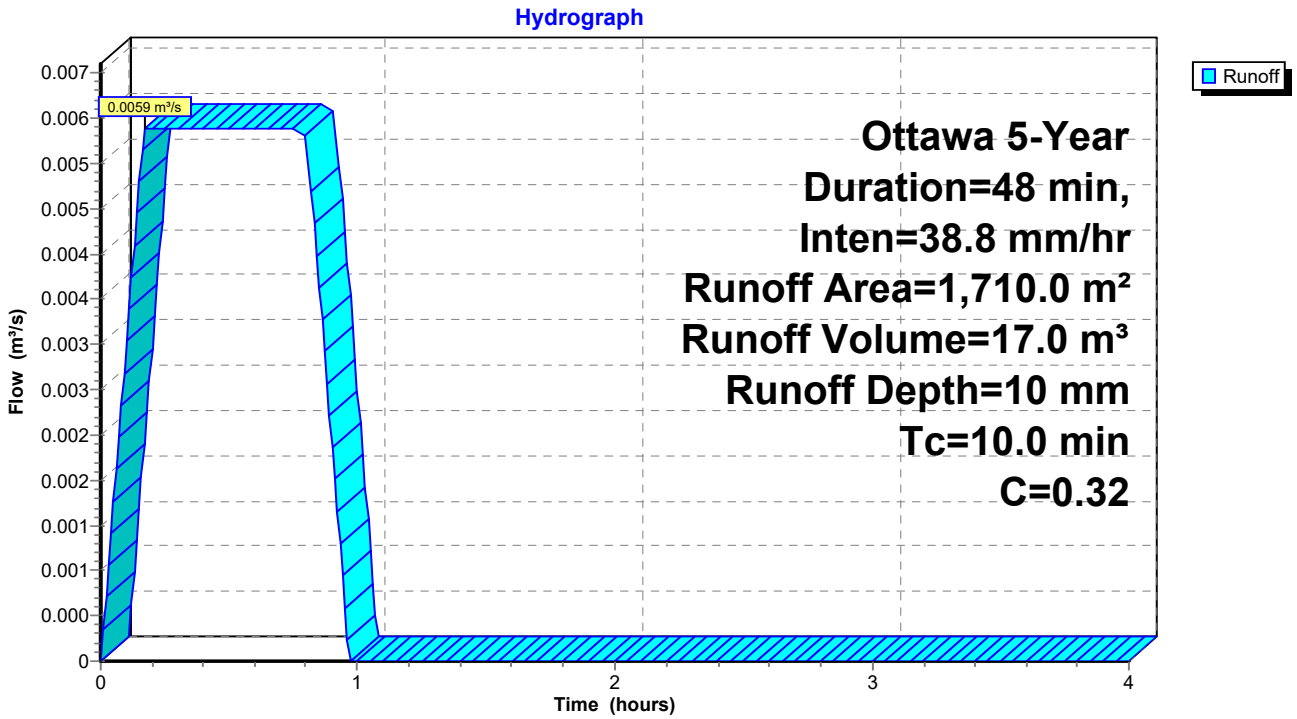
Runoff = 0.0059 m³/s @ 0.17 hrs, Volume= 17.0 m³, Depth= 10 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=48 min, Inten=38.8 mm/hr

Area (m²)	C	Description
1,470.0	0.28	B-U2
240.0	0.55	B-U1
1,710.0	0.32	Weighted Average
1,710.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 8S: Uncontrolled



Summary for Pond 3P: Cistern + Pipe Storage

Inflow Area = 12,000.0 m², 0.00% Impervious, Inflow Depth = 18 mm for 5-Year event
Inflow = 0.0737 m³/s @ 0.17 hrs, Volume= 212.2 m³
Outflow = 0.0286 m³/s @ 0.90 hrs, Volume= 212.2 m³, Atten= 61%, Lag= 43.9 min
Primary = 0.0286 m³/s @ 0.90 hrs, Volume= 212.2 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 101.234 m @ 0.90 hrs Surf.Area= 76.0 m² Storage= 147.1 m³

Plug-Flow detention time= 59.2 min calculated for 211.7 m³ (100% of inflow)
Center-of-Mass det. time= 59.5 min (88.5 - 29.0)

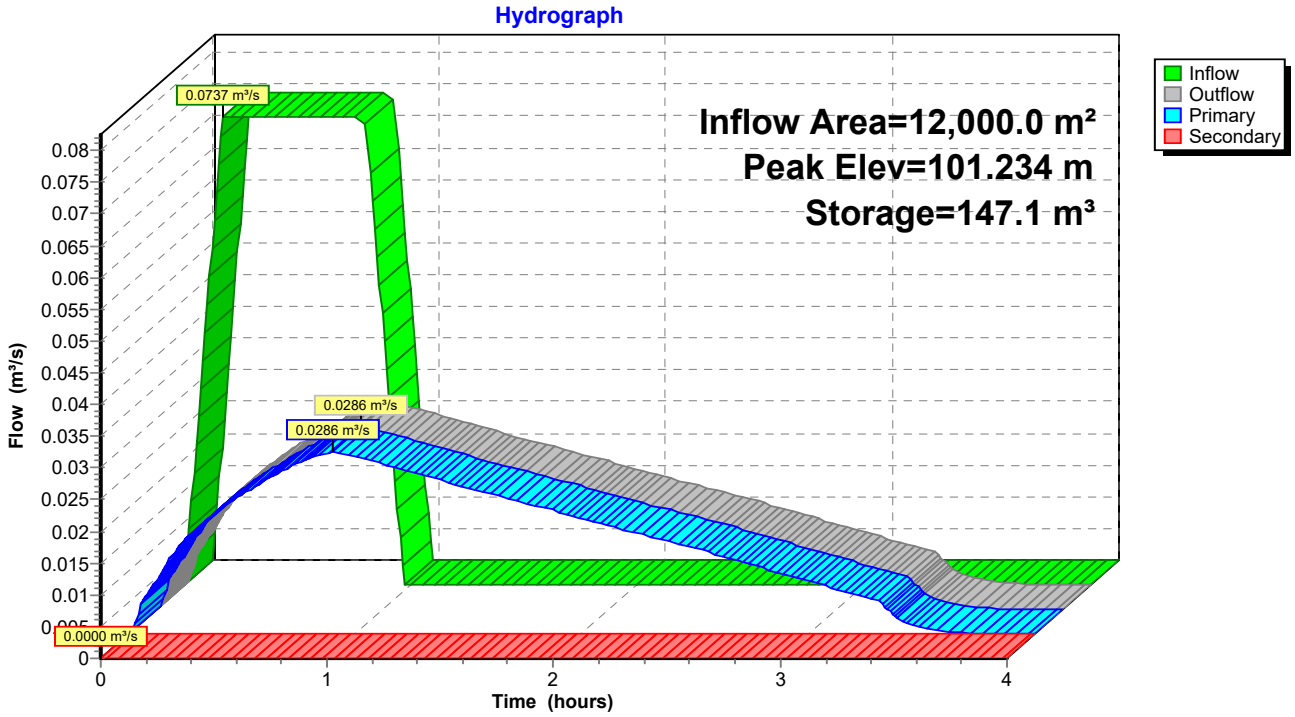
Volume	Invert	Avail.Storage	Storage Description
#1	99.390 m	152.1 m³	**7.20 mW x 10.56 mL x 2.00 mH Cistern**
#2	99.690 m	0.2 m³	**300 mm Round Pipe Storage** L= 2.80 m S= 0.0008 m/m
#3	99.732 m	2.3 m³	**300 mm Round Pipe Storage** L= 32.05 m S= 0.0010 m/m
#4	100.113 m	0.7 m³	**300 mm Round Pipe Storage** L= 10.40 m S= 0.0008 m/m
#5	100.216 m	1.5 m³	**300 mm Round Pipe Storage** L= 21.10 m S= 0.0008 m/m
#6	100.405 m	0.8 m³	**300 mm Round Pipe Storage** L= 11.25 m S= 0.0008 m/m
#7	100.892 m	1.5 m³	**300 mm Round Pipe Storage** L= 21.05 m S= 0.0005 m/m
#8	101.430 m	0.5 m³	**250 mm Round Pipe Storage** L= 9.80 m S= 0.0010 m/m
#9	101.548 m	0.9 m³	**250 mm Round Pipe Storage** L= 19.20 m S= 0.0010 m/m
		160.5 m³	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Secondary	101.280 m	***Overflow Check** Head (meters) 0.000 0.010 Disch. (m³/s) 0.00000 10.00000
#2	Primary	99.307 m	**100 mm Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.0286 m³/s @ 0.90 hrs HW=101.233 m (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 0.0286 m³/s @ 3.64 m/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=99.390 m (Free Discharge)
└**1=***Overflow Check** (Controls 0.0000 m³/s)

Pond 3P: Cistern + Pipe Storage



Summary for Pond 16P: Rooftop Storage

Inflow Area = 2,760.0 m², 0.00% Impervious, Inflow Depth = 28 mm for 5-Year event
Inflow = 0.0268 m³/s @ 0.17 hrs, Volume= 77.1 m³
Outflow = 0.0031 m³/s @ 0.47 hrs, Volume= 41.7 m³, Atten= 88%, Lag= 18.0 min
Primary = 0.0031 m³/s @ 0.47 hrs, Volume= 41.7 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.050 m @ 0.95 hrs Surf.Area= 1,380.6 m² Storage= 69.4 m³

Plug-Flow detention time= 110.0 min calculated for 41.6 m³ (54% of inflow)
Center-of-Mass det. time= 99.1 min (128.1 - 29.0)

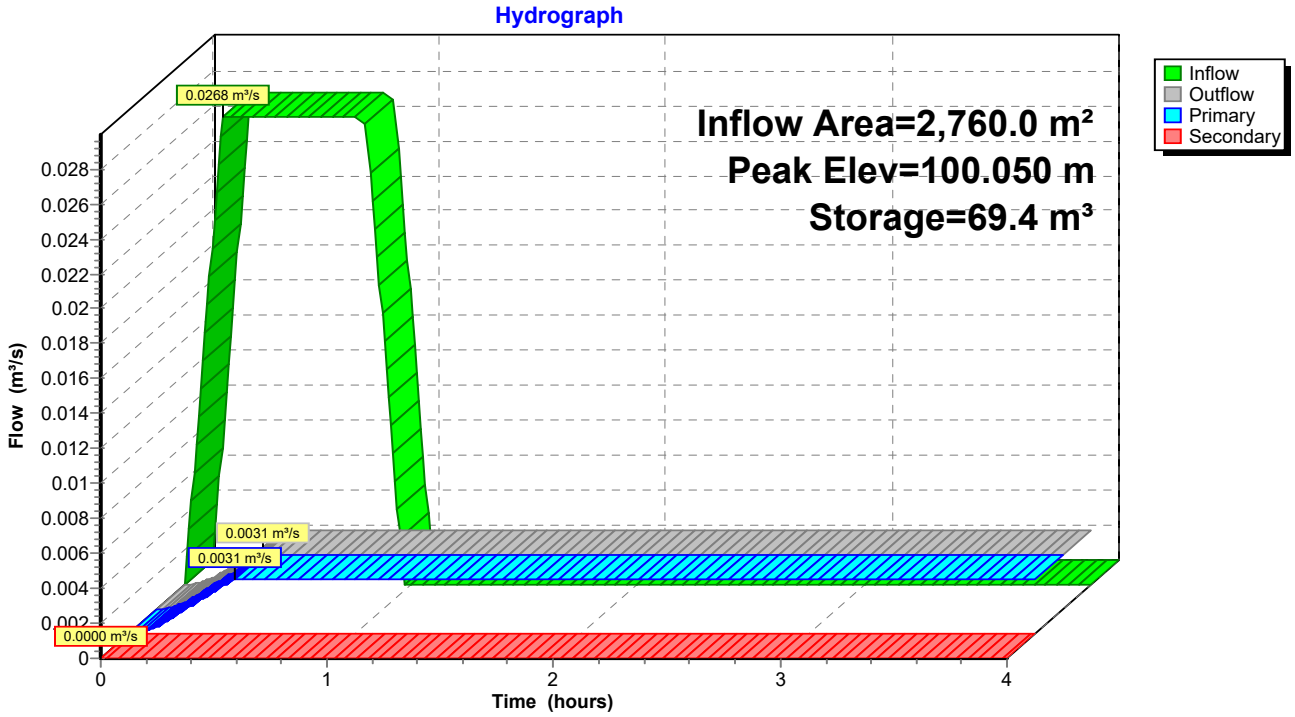
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	414.2 m³	**11.75 mW x 11.75 mL x 0.30 mH BLDG B**x 10

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 10.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031
#2	Secondary	100.299 m	**Special & User-Defined** Head (meters) 0.000 0.001 0.010 Disch. (m³/s) 0.00000 1.00000 10.00000

Primary OutFlow Max=0.0031 m³/s @ 0.47 hrs HW=100.025 m (Free Discharge)
└**1=WATTS Accutrol_5-Closed**(Custom Controls 0.0031 m³/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=100.000 m (Free Discharge)
└**2=Special & User-Defined** (Controls 0.0000 m³/s)

Pond 16P: Rooftop Storage

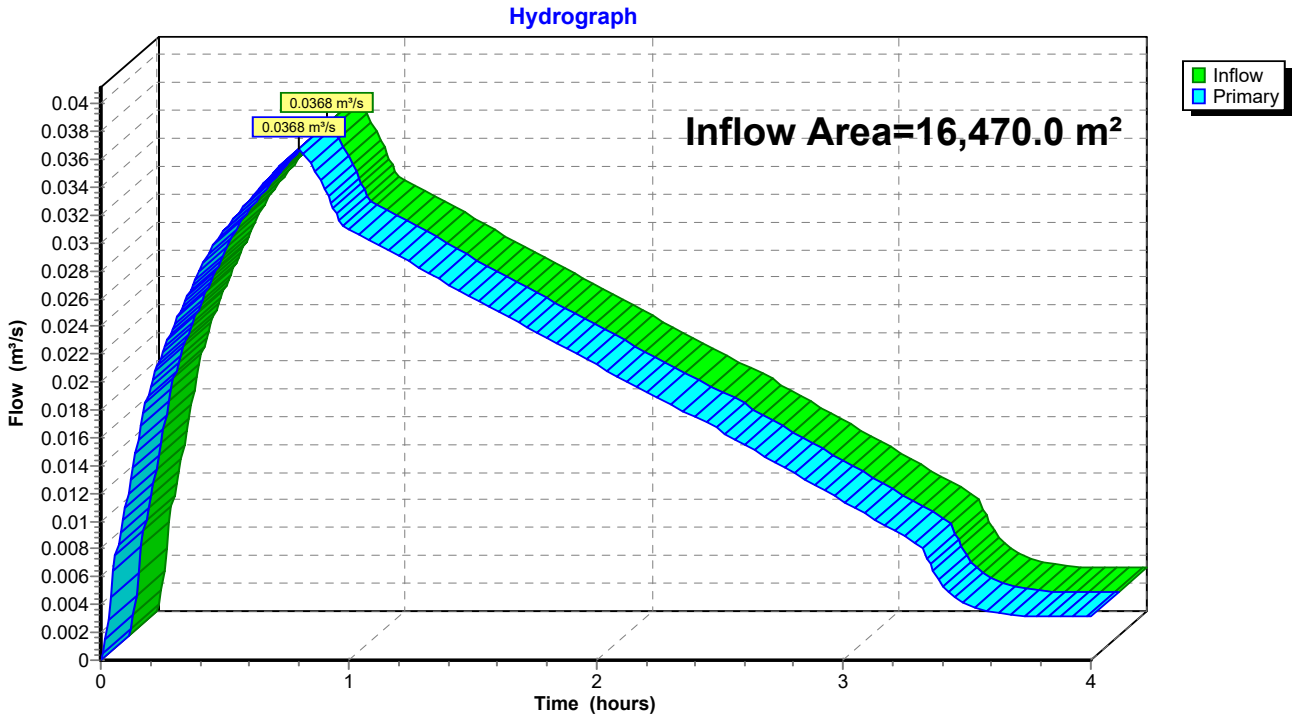


Summary for Link 2L: Site Release

Inflow Area = 16,470.0 m², 0.00% Impervious, Inflow Depth > 16 mm for 5-Year event
Inflow = 0.0368 m³/s @ 0.80 hrs, Volume= 270.9 m³
Primary = 0.0368 m³/s @ 0.80 hrs, Volume= 270.9 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 2L: Site Release



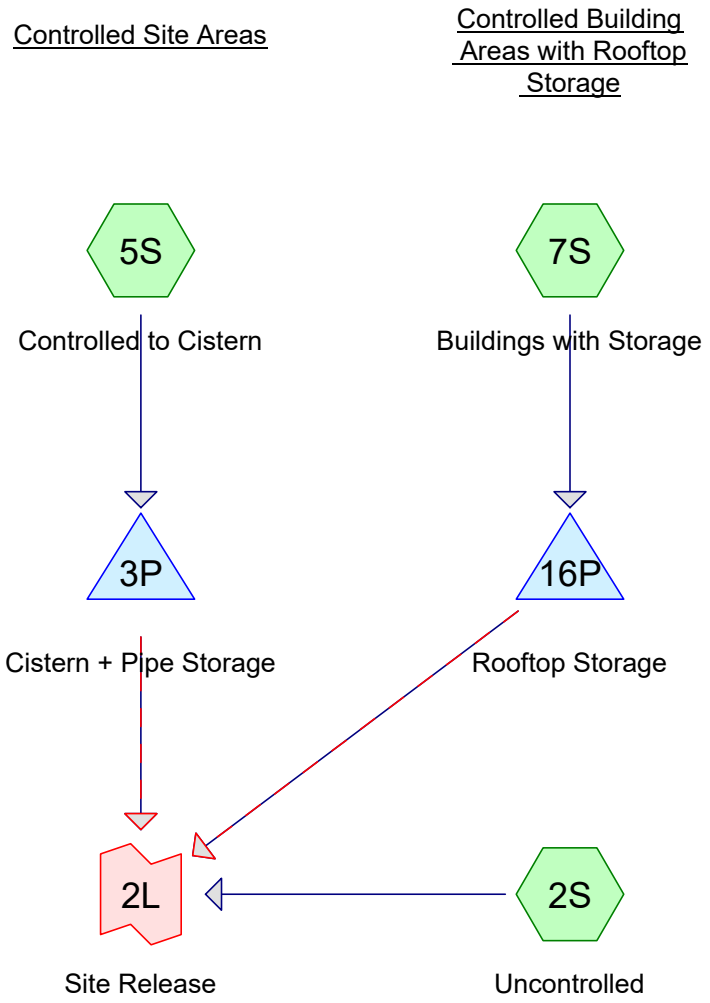
APPENDIX

G-6 Parcel 2: 100-Year Analysis (Peak Discharge, T_C = 13 Min)

The storm system for Parcel 2 is governed by the 5-year storm. The 100-yr peak discharge scenario has been provided for information only.

6301 Campeu Drive Parcel 2 - Peak Release Rate (Tc = 14 min)

100-year C



Subcat Reach Pond Link

Routing Diagram for CampeauDrive_Parcel 2 100-yr
Prepared by WSP Canada inc., Printed 2020-12-03

Area Listing (all nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
970.0	1.00	B-201 (5S)
820.0	1.00	B-202 (5S)
930.0	1.00	B-203 (5S)
1,090.0	1.00	B-204 (5S)
210.0	0.31	B-205 (5S)
300.0	1.00	B-206 (5S)
500.0	1.00	B-207 (5S)
1,320.0	0.79	B-208 (5S)
660.0	0.31	B-209 (5S)
600.0	0.76	B-210 (5S)
360.0	1.00	B-211 (5S)
2,760.0	1.00	B-BLDG (7S)
4,240.0	0.31	B-EXT1 (5S)
240.0	0.69	B-U1 (2S)
1,470.0	0.35	B-U2 (2S)
16,470.0	**0.70**	**TOTAL AREA**

Summary for Subcatchment 2S: Uncontrolled

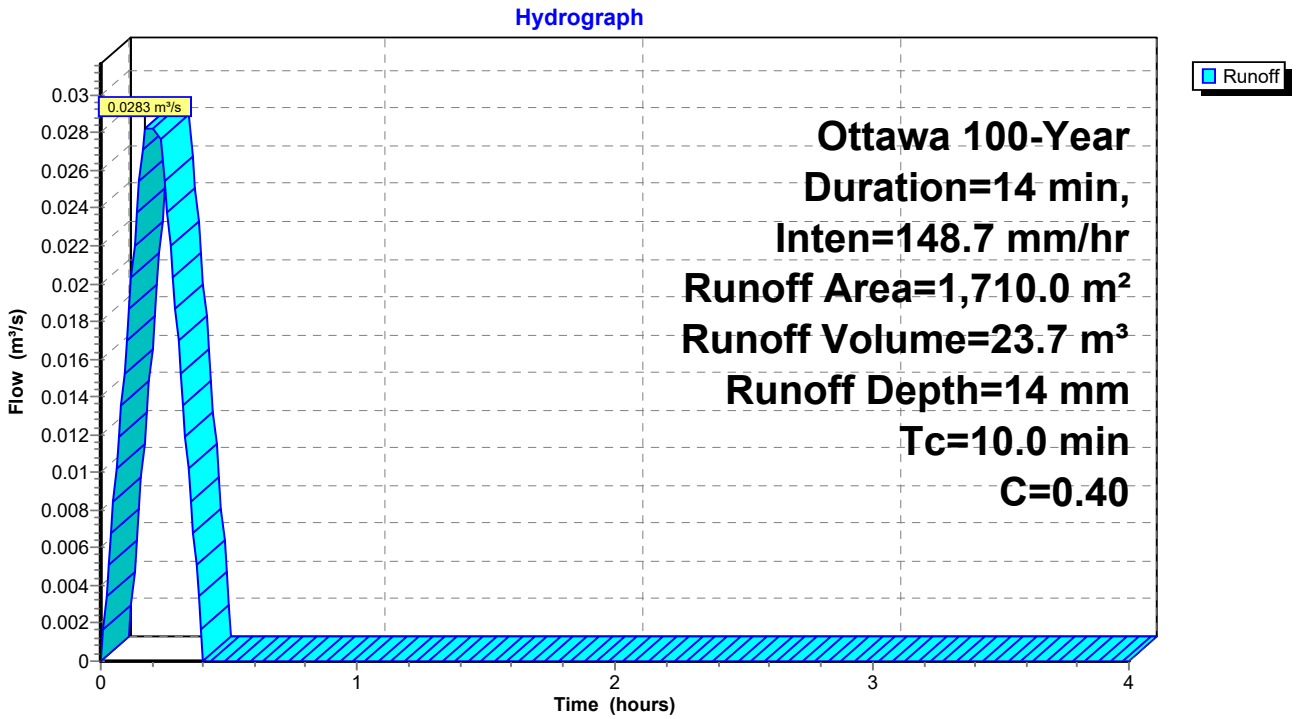
Runoff = 0.0283 m³/s @ 0.17 hrs, Volume= 23.7 m³, Depth= 14 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=14 min, Inten=148.7 mm/hr

Area (m²)	C	Description
240.0	0.69	B-U1
1,470.0	0.35	B-U2
1,710.0	0.40	Weighted Average
1,710.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 2S: Uncontrolled



Summary for Subcatchment 5S: Controlled to Cistern

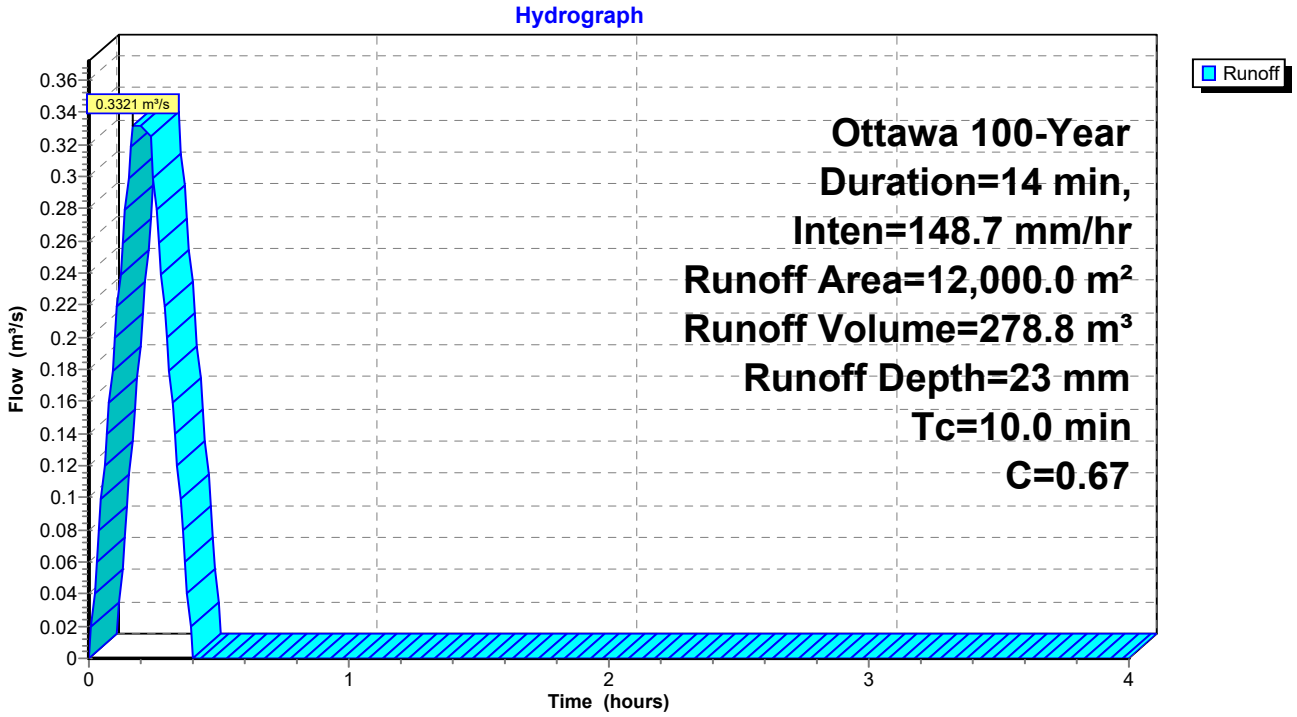
Runoff = 0.3321 m³/s @ 0.17 hrs, Volume= 278.8 m³, Depth= 23 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=14 min, Inten=148.7 mm/hr

Area (m²)	C	Description
4,240.0	0.31	B-EXT1
970.0	1.00	B-201
820.0	1.00	B-202
930.0	1.00	B-203
1,090.0	1.00	B-204
210.0	0.31	B-205
300.0	1.00	B-206
500.0	1.00	B-207
1,320.0	0.79	B-208
660.0	0.31	B-209
600.0	0.76	B-210
360.0	1.00	B-211
12,000.0	0.67	Weighted Average
7,030.0		58.58% Pervious Area
4,970.0		41.42% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 5S: Controlled to Cistern



Summary for Subcatchment 7S: Buildings with Storage

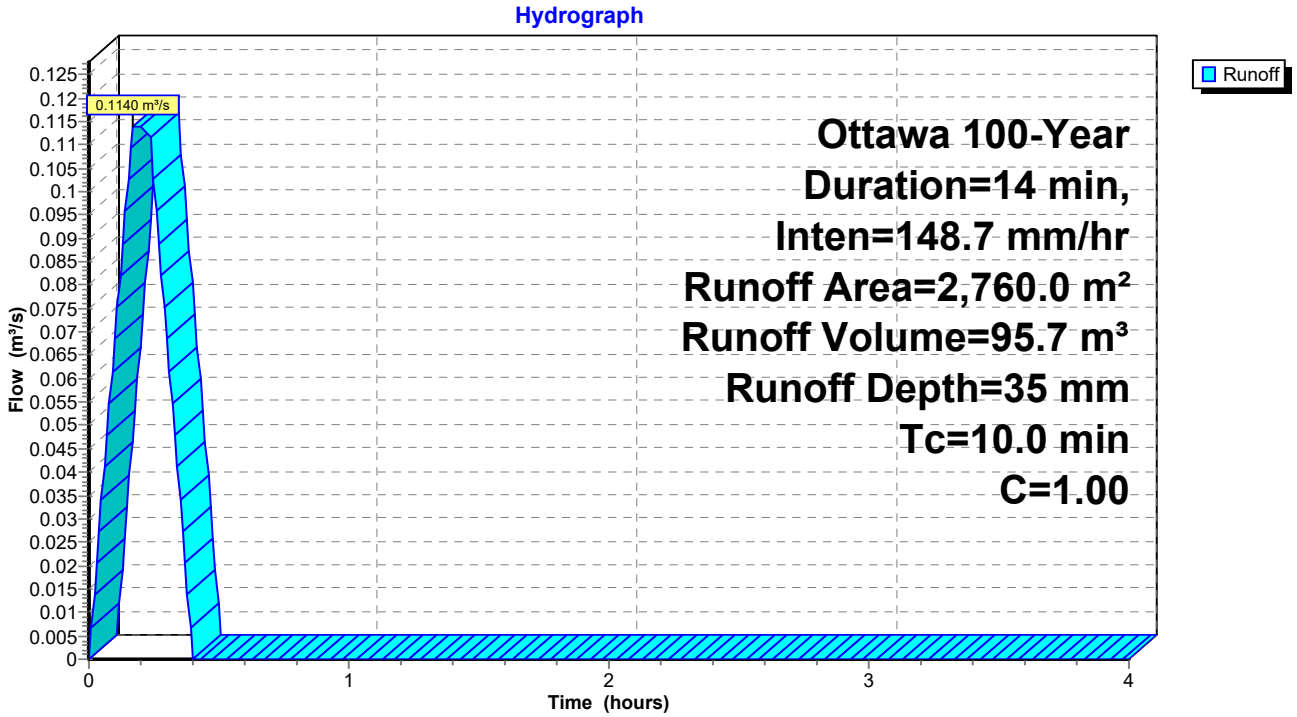
Runoff = 0.1140 m³/s @ 0.17 hrs, Volume= 95.7 m³, Depth= 35 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=14 min, Inten=148.7 mm/hr

Area (m²)	C	Description
2,760.0	1.00	B-BLDG
2,760.0		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 7S: Buildings with Storage



Summary for Pond 3P: Cistern + Pipe Storage

[88] Warning: Qout>Qin may require smaller dt or Finer Routing
[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=5)

Inflow Area = 12,000.0 m², 41.42% Impervious, Inflow Depth = 23 mm for 100-Year event
Inflow = 0.3321 m³/s @ 0.17 hrs, Volume= 278.8 m³
Outflow = 0.6037 m³/s @ 0.23 hrs, Volume= 278.8 m³, Atten= 0%, Lag= 3.6 min
Primary = 0.0289 m³/s @ 0.23 hrs, Volume= 180.6 m³
Secondary = 0.5748 m³/s @ 0.23 hrs, Volume= 98.2 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 101.281 m @ 0.23 hrs Surf.Area= 76.0 m² Storage= 150.7 m³

Plug-Flow detention time= 38.5 min calculated for 278.1 m³ (100% of inflow)
Center-of-Mass det. time= 38.8 min (50.8 - 12.0)

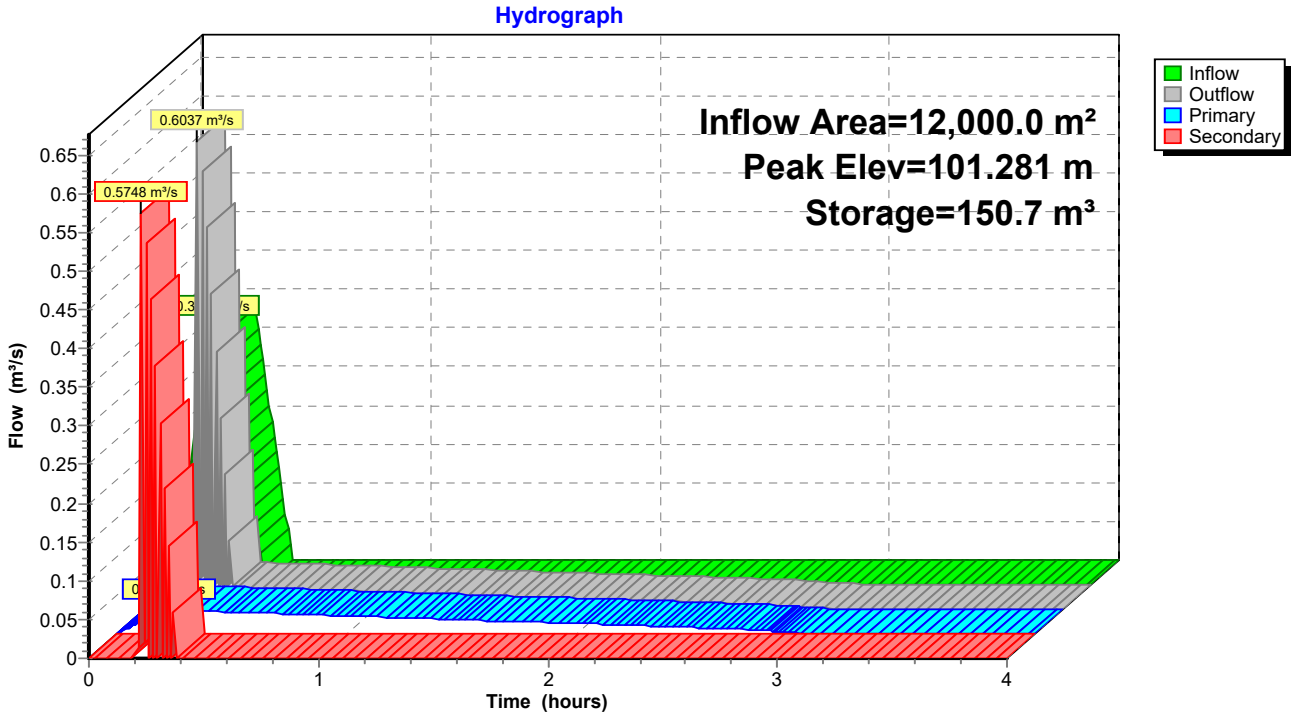
Volume	Invert	Avail.Storage	Storage Description
#1	99.390 m	152.1 m³	**7.20 mW x 10.56 mL x 2.00 mH Cistern**
#2	99.690 m	0.2 m³	**300 mm Round Pipe Storage** L= 2.80 m S= 0.0008 m/m
#3	99.732 m	2.3 m³	**300 mm Round Pipe Storage** L= 32.05 m S= 0.0010 m/m
#4	100.113 m	0.7 m³	**300 mm Round Pipe Storage** L= 10.40 m S= 0.0008 m/m
#5	100.216 m	1.5 m³	**300 mm Round Pipe Storage** L= 21.10 m S= 0.0008 m/m
#6	100.405 m	0.8 m³	**300 mm Round Pipe Storage** L= 11.25 m S= 0.0008 m/m
#7	100.892 m	1.5 m³	**300 mm Round Pipe Storage** L= 21.05 m S= 0.0005 m/m
#8	101.430 m	0.5 m³	**250 mm Round Pipe Storage** L= 9.80 m S= 0.0010 m/m
#9	101.548 m	0.9 m³	**250 mm Round Pipe Storage** L= 19.20 m S= 0.0010 m/m
		160.5 m³	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Secondary	101.280 m	***Overflow Check** Head (meters) 0.000 0.010 Disch. (m³/s) 0.00000 10.00000
#2	Primary	99.307 m	**100 mm Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.0289 m³/s @ 0.23 hrs HW=101.281 m (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 0.0289 m³/s @ 3.69 m/s)

Secondary OutFlow Max=0.5726 m³/s @ 0.23 hrs HW=101.281 m (Free Discharge)
└**1=***Overflow Check** (Custom Controls 0.5726 m³/s)

Pond 3P: Cistern + Pipe Storage



Summary for Pond 16P: Rooftop Storage

Inflow Area = 2,760.0 m², 100.00% Impervious, Inflow Depth = 35 mm for 100-Year event
Inflow = 0.1140 m³/s @ 0.17 hrs, Volume= 95.7 m³
Outflow = 0.0031 m³/s @ 0.17 hrs, Volume= 43.4 m³, Atten= 97%, Lag= 0.0 min
Primary = 0.0031 m³/s @ 0.17 hrs, Volume= 43.4 m³
Secondary = 0.0000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.067 m @ 0.40 hrs Surf.Area= 1,380.6 m² Storage= 92.5 m³

Plug-Flow detention time= 116.0 min calculated for 43.4 m³ (45% of inflow)
Center-of-Mass det. time= 111.5 min (123.5 - 12.0)

Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	414.2 m³	**11.75 mW x 11.75 mL x 0.30 mH BLDG B**x 10

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**WATTS Accutrol_5-Closed X 10.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.00000 0.00031 0.00031 0.00031 0.00031 0.00031 0.00031
#2	Secondary	100.299 m	**Special & User-Defined** Head (meters) 0.000 0.001 0.010 Disch. (m³/s) 0.00000 1.00000 10.00000

Primary OutFlow Max=0.0031 m³/s @ 0.17 hrs HW=100.025 m (Free Discharge)
└**1=WATTS Accutrol_5-Closed**(Custom Controls 0.0031 m³/s)

Secondary OutFlow Max=0.0000 m³/s @ 0.00 hrs HW=100.000 m (Free Discharge)
└**2=Special & User-Defined** (Controls 0.0000 m³/s)

Pond 16P: Rooftop Storage