

**FUNCTIONAL SERVICING AND
STORMWATER MANAGEMENT
REPORT**

FOR

**MATTAMY HOMES
WATERIDGE VILLAGE – BLOCK 15**

CITY OF OTTAWA

PROJECT NO.: 17-946

**FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
FOR
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JUNE 2019 – REV. 2**

CITY OF OTTAWA

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1.0 INTRODUCTION

David Schaeffer Engineering Limited (DSEL) has been retained by Mattamy Homes to prepare a Functional Servicing and Stormwater Management report to amend the previously approved Site Plan Control Application (SPC), dated March 2018, for Block 15 of Wateridge Village. Subject lands are within the former CFB Rockcliffe lands, which are currently under re-development by the Canada Lands Company.

The subject property is located within the City of Ottawa urban boundary, in the Rideau-Rockcliffe area. As illustrated in **Figure 1**, below, the subject property is encompassed by Hemlock Road, Mikinak Road and Moses Tennisco Street, all of which are currently under construction. Comprised of a single parcel, the subject property measures approximately **1.96 ha** and is zoned Residential Fourth Density Zone (R4Y[2311]).



Figure 1: Site Location

The proposed development by Mattamy Homes involves the construction of 124 Stacked Townhomes and 68 Back-to-Back Townhomes. Of the Back-to-Back Townhomes, 34 units are proposed to have laneway access directly to Squadron Crescent. These 34 units will require Part Lot Control. The previously approved **FSR-Block15**, prepared by DSEL and dated March 2018, contemplated 124 rear lane townhomes, whereas the amendment proposes an additional 68 townhouse style units for a proposed total of 192 rear lane townhomes.

The objective of this report is to provide sufficient detail with respect to the availability of site services, to support the amended application for Site Plan Control.

1.1 Existing Conditions

The construction of the surrounding road network and underground services was completed in 2018, while the existing lands encompassing the subject property remain vacant. Historically, the lands were part of the Canadian Forces Base Rockcliffe (CFB Rockcliffe).

A geotechnical investigation was completed by Paterson Group Inc. in August 2017. Per the geotechnical report, the subject site consists of a layer of existing fill from the previous land use, underlain by stiff to very stiff brown silty clay. Practical refusal was encountered between 9.1 m and 24.1 m, below existing grade.

Supplemental information from Paterson Group Inc. was also received regarding the anticipated infiltration rates. An infiltration rate of 140 mm/day was estimated for Block 15, collaborating correspondence is saved in **Appendix A**.

The Canada Lands Company will be delivering the site to a pre-grade condition, in accordance with Mattamy Homes requirements.

Existing infrastructure, outlined below, was garnered from design drawings, not As-Built drawings. The design drawings are as per the **Wateridge Village at Rockcliffe, Phase 1B**, drawing set, prepared by IBI Group, and dated, September 15, 2017:

- **Squadron Crescent**
 - 200 mm diameter PVC watermain;
 - 2400 mm diameter storm sewer; and
 - 300 mm diameter sanitary sewer.
- **Mikinak Road**
 - 300 mm diameter watermain;
 - 900 mm diameter storm sewer; and
 - 250 mm diameter sanitary sewer.

- The servicing received from IBI Group September 15, 2017 was updated by IBI Group to provide stubs to the proposed property and to confirmed storm and sanitary capacity within the external system at these new connection points.

1.2 Required Permits / Approvals

The proposed development is subject to the site plan control approval process. The City of Ottawa must approve the engineering design drawings and reports prior to the issuance of site plan control. Lots fronting Squadron Crescent require Part Lot Control.

1.3 Pre-consultation

Pre-consultation correspondence, along with the servicing guidelines checklist, is located in **Appendix A**.

2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

The following studies were utilized in the preparation of this report:

- **Ottawa Sewer Design Guidelines,**
City of Ottawa, *SDG002*, October 2012.
(City Standards)
 - **Technical Bulletin ISTB-2018-01**
City of Ottawa, March 21, 2018.
(ISTB-2018-01)
 - **Technical Bulletin ISTB-2018-04**
City of Ottawa, June 27, 2018.
(ISTB-2018-04)
- **Ottawa Design Guidelines – Water Distribution**
City of Ottawa, July 2010.
(Water Supply Guidelines)
 - **Technical Bulletin ISD-2010-2**
City of Ottawa, December 15, 2010.
(ISD-2010-2)
 - **Technical Bulletin ISDTB-2014-02**
City of Ottawa, May 27, 2014.
(ISDTB-2014-02)
 - **Technical Bulletin ISDTB-2018-02**
City of Ottawa, March 21, 2018.
(ISDTB-2018-02)
- **Design Guidelines for Sewage Works,**
Ministry of the Environment, 2008.
(MOE Design Guidelines)
- **Stormwater Planning and Design Manual,**
Ministry of the Environment, March 2003.
(SWMP Design Manual)
- **Ontario Building Code Compendium**
Ministry of Municipal Affairs and Housing Building Development Branch,
January 1, 2010, Update.
(OBC)

-
- **Low Impact Development Stormwater Management Planning and Design Guide**
Credit Valley Conservation & Toronto and Region Conservation, 2010.
(LID Guide)
 - **Former CFB Rockcliffe Master Servicing Study**
IBI Group, August 2015.
(MSS)
 - **Low Impact Development (LID) Demonstration Project**
Aquafor Beech Ltd., August 2015.
(LID Demonstration Project)
 - **Design Brief Wateridge Village at Rockcliffe Phase 1A**
IBI Group., April 2016.
(Design Brief Phase 1A)
 - **Design Brief Wateridge Village at Rockcliffe Phase 1B**
IBI Group., June 2017.
(Design Brief Phase 1B)
 - **Functional Servicing and Stormwater Management Report – Wateridge Village Block 15**
DSEL, March 2018.
(FSR-Block15)

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies within the City of Ottawa MONT pressure zone, as shown by the Pressure Zone map in **Appendix B**. A local 200 mm diameter watermain exists within the Squadron Crescent right-of-way to service the subject site.

The water servicing for the subject site was accounted for in the design of the water distribution system outlined in the **Design Brief Phase 1B**, water demand for the subject property is summarized below:

Table 1
Summary of Water Demand per *Design Brief Phase 1B*

Design Parameter	Total Demand (L/min)
Average Day	185.9
Peak Hour	709.8
Max Day + Fire Flow	13,000 + 322.7

3.2 Water Supply Servicing Design

It is proposed to provide two connections plus individual connections to the 200 mm watermain within Squadron Crescent. The site is serviced by surrounding fire hydrants on Squadron Crescent, Mikinak Road, and internal hydrants proposed on-site.

Individual units cannot be serviced horizontally through an adjacent unit, unless that service is accessible, see **OBC** section 7.1.5.4 (4) for detail. The proposed units could not be developed to accommodate the requirements of **OBC** section 7.1.5.4 (4) therefore, individual services are proposed for the back-to-back townhomes. Refer to **SSP-1**, accompanying this report, for servicing layout. Due to the limiting distance from the property line to the townhomes, it is proposed to provide a sanitary sewer and watermain along the north property line with a separation of 1.0 m between both. The water and sanitary sewers are designed in accordance with *Procedures to Govern Separation of Sewers and Watermains (Procedure F-6-1)* prepared by the Ontario Ministry of the Environment, Parks and Conservation.

Table 2, below, summarizes the **Water Supply Guidelines** employed in the preparation of the water demand estimate for the proposed development.

Table 2
Water Supply Design Criteria

Design Parameter	Value
Townhouse	2.7 P/unit
Residential Average Daily Demand	280 L/d/P
Residential Maximum Daily Demand	2.5 x avg. day *
Residential Maximum Hourly	5.5 x max. day *
Minimum Watermain Size	150 mm diameter
Minimum Depth of Cover	2.4 m from top of watermain to finished grade
During normal operating conditions desired operating pressure is within	350 kPa and 480 kPa
During normal operating conditions pressure must not drop below	275 kPa
During normal operating conditions pressure must not exceed	552 kPa
During fire flow operating pressure must not drop below	140 kPa
<i>*Daily average based on Appendix 4-A from Water Supply Guidelines</i> <i>** Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons.</i> <i>-Table updated to reflect ISD-2010-2</i>	

Table 3, below, summarizes the anticipated water supply demand and boundary conditions for the subject site, received from the City of Ottawa.

Table 3
Water Demand and Boundary Conditions
Proposed Conditions

Design Parameter	Anticipated Demand ¹ (L/min)	Boundary Condition ² Connection 1 (m H ₂ O / kPa)		Boundary Condition ² Connection 2 (m H ₂ O / kPa)	
Average Daily Demand	100.9	57.7	566.4	56.9	558.6
Peak Hour	555.0	57.4	563.5	56.6	555.6
Max Day + Fire Flow	19,000 + 252.3	32.7	321.2	21.3	146.6
1) Water demand calculation per Water Supply Guidelines . See Appendix B for detailed calculations. 2) Boundary supplied by the City of Ottawa for the demands indicated in the correspondence. The assumed ground elevation for Connection 1 to Squadron close to Mikanik Road is 89.26m, and for Connection 2 to Squadron Crescent is 90.06 m. See Appendix B .					

The City provided both the anticipated minimum and maximum water pressures, as well as, the estimated water pressure during fire flow, as indicated by the correspondence in **Appendix A**.

- The required fire flow (RFF) was estimated in accordance with City of Ottawa Technical Bulletin **ISTB-2018-02**. Parameters used in calculating the RFF were received from Q4 Architects Incorporated, included in **Appendix A** and summarized below:
- Type of construction – Wood Frame Construction;
- Occupancy type – Limited Combustible; and

- Sprinkler Protection – Non-Sprinklered.
 - The maximum estimated fire flow is **19,000 L/min** at Blocks 2 and 3; see **Appendix B** for detailed calculations.

Table 4, below, summarizes the fire flow requirement calculated for each block, per the above assumptions and the available fire flow per **Table 18.5.4.3** of the **ISTB-2018-02**.

Table 4
Estimated Fire Flow Demand

Block and Townhome Type	Estimated Fire Demand (L/min)	Available Fire Flow per Table 18.5.4.3 of ISTB-2018-02 (L/min)
Block 1 (Stacked)	18,000	29,335
Block 2 (Stacked)	19,000	35,960
Block 3 (Stacked)	19,000	35,013
Block 4 (Stacked)	18,000	35,013
Block 5 (Stacked)	16,000	19,873
Block 6 (Stacked)	16,000	19,873
Block 7 (Stacked)	16,000	17,034
Block 8 (Back-to-Back)	12,000	28,389
Block 9 (Back-to-Back)	13,000	31,229
Block 10 (Back-to-Back)	11,000	24,604
Block 11 (Back-to-Back)	10,000	22,711
Block 12 (Back-to-Back)	10,000	22,711
Block 13 (Back-to-Back)	12,000	25,551
Block 14 (Back-to-Back)	12,000	25,551

The property has eight (8) adjacent hydrants used to calculate the available fire flow as well as one proposed hydrant within the site:

- Four (4) hydrants are located along the south side of Mikinak Road, one east of the property, one west of the property and two north of the property;
- Four (4) hydrants are located on Squadron Crescent, one west of the property, one east of the property and two south of the property; and
- One (1) hydrant is located at the south-west corner of Takamose Private and Kiniw Private

3.3 Watermain Modelling

EPANet was utilized to determine the availability of pressures throughout the system during average day, max day plus fire flow, and peak hour demands. This static model determines pressures based on the available head obtained from the boundary conditions provided by the City of Ottawa.

The model utilizes the Hazen-Williams equation to determine pressure drop, while the pipe properties have been selected in accordance with **Water Supply Guidelines**. The model was prepared to assess the available pressure at the finished first floor of each building, as well as, the pressures the watermain provides to fire hydrants during fire flow conditions.

A summary of the resulting pressures at the critical nodes resulting in the lowest pressures are summarized in **Table 5**, below. A summary of all resulting pressures for each simulation is included in **Appendix B**.

Table 5
Model Simulation Output Summary

Location	Average Day (kPa)	Max Day + Fire Flow (kPa)	Peak Hour (kPa)
Node 4	572.8	149.9	569.7
Node 13	549.0	193.3	544.9
Node 9	585.4	174.6	582.3
Node 5	556.4	152.2	553.2
Node 12 (Hydrant)	581.6	156.9	578.6

The maximum fire flow demand of **19,000 L/min** was divided between two hydrants; one existing hydrant and the proposed hydrant along Takamose Private. The minimum pressures shown in **Table 5**, above, with **9,500 L/min** run through the proposed hydrant are above the minimum required pressure described in **Table 2**. Based on the boundary conditions received from the City of Ottawa, included in **Appendix A**, there is sufficient pressure within the existing hydrants to supply the remaining **9,500 L/min** required fire flow at the existing hydrants.

As shown in **Table 5**, above, the pressure at some locations during Average Day and Peak Hour exceed the maximum allowable pressure described in **Table 2**, therefore pressure reducing valves are recommended.

Water will flow in all areas of the system and no ‘dead’ zones were found. **Appendix B** contains output reports and model schematics for each scenario.

3.4 Water Supply Conclusion

It is proposed to service the development through two separate connections to the 200 mm diameter watermain within Squadron Crescent; one along the west and one along the south.

The anticipated water demand was submitted to the City of Ottawa for establishing boundary conditions.

The maximum fire flow for the development is **19,000 L/min**, the flow was analyzed through 2 hydrants using EPANET. The resulting pressure exceeded the minimum per the **Water Supply Guidelines**. Pressures during the average day and peak hour scenario are higher than allowable pressure in **Table 2**; thus, pressure reducing valves are recommended.

The proposed water supply design conforms to all relevant City Guidelines and Policies.

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The sanitary flow from the subject property was considered in the wastewater design for the Wateridge Subdivision. Block 15 was contemplated to discharge to the 300 mm sanitary sewer within Squadron Crescent. The total wastewater flow from the **Design Brief Phase 1B** is summarized in **Table 6**, below.

Table 6
Wastewater Flow per Design Brief Phase 1B – Total Site Area

Design Parameter	Total Flow (L/s)
Estimated Average Dry Weather Flow	1.97
Estimated Peak Dry Weather Flow	7.85
Estimated Peak Wet Weather Flow	8.40

The total flow summarized in **Table 6**, above, is from the drainage areas from Block 15. Please refer to **Appendix C** for reduced copies of the IBI sanitary design calculations and drainage area map.

4.2 Wastewater Design

It is proposed that the development will connect to the 300 mm diameter sewer within the Squadron Crescent right-of-way, as contemplated in the **Design Brief Phase 1B**. Individual services laterals are proposed to service the back to back townhomes directly from Squadron Crescent. **Table 7**, below, summarizes the **City Standards** employed in the design of the proposed wastewater sewer system.

Table 7
Wastewater Design Criteria

Design Parameter	Value
Townhouse	2.7 P/unit
Average Daily Demand	280 L/d/per
Peaking Factor	Harmon's Peaking Factor. Max 3.8, Min 2.0 Harmon's Corrector Factor 0.8
Infiltration and Inflow Allowance	0.05 L/s/ha (Dry Weather) 0.28 L/s/ha (Wet Weather) 0.33 L/s/ha (Total)
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sewer Size	200 mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5 m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6 m/s
Maximum Full Flowing Velocity	3.0 m/s
<i>Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012.</i>	

Table 8, below, demonstrates the anticipated peak flow from the proposed development compared to the estimated sanitary flow proposed in **FSR-Block 15**. See **Appendix C** for associated calculations.

Table 8
Summary of Total Estimated Peak Wastewater Flow

Design Parameter	Total Flow per FSR-Block15 (L/s)	Total Flow (L/s)
Estimated Average Dry Weather Flow	1.37	1.78
Estimated Peak Dry Weather Flow	5.48	6.22
Estimated Peak Wet Weather Flow	6.03	7.52

The estimated total sanitary flow discharged to the existing sanitary sewers within Squadron Crescent, based on the site plan provided in **Drawings/Figures**, anticipates a peak wet weather flow of **7.52 L/s**.

The proposed sanitary flow entering the sanitary sewer system within Squadron Crescent result in an overall decrease of **0.88 L/s** from the contemplated sanitary flow in the **Design Brief Phase 1B**, therefore, no negative impact is anticipated to the existing downstream sanitary sewer network.

4.3 Wastewater Servicing Conclusions

The sanitary flow from the subject property has been considered in the wastewater design for the Wateridge Subdivision, outlined in the **Design Brief Phase 1B**.

The proposed development results in an overall decrease in wastewater flow than what was contemplated in the **Design Brief Phase 1B**, therefore, no negative impact is anticipated to the existing downstream sanitary network.

The proposed wastewater design conforms to all relevant **City Standards**.

5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Services

Minor and major flow from the subject site were accounted for in the Wateridge Subdivision. The subject site was contemplated in the **Design Brief Phase 1B** to be conveyed to the Eastern SWM Facility. Major flow was proposed to be directed to a dry pond to the south of Mikinak Road for quantity control and will eventually discharge through the minor system to the Eastern SWM Facility.

The **Design Brief Phase 1B** contemplated minor and major system drainage from Block 15 to be directed to Squadron Crescent. Refer to **Appendix D** for reduced copy of the storm design sheet and drainage area figures prepared by IBI for the Wateridge Subdivision.

Flows that influence the watershed in which the subject property is located are further reviewed by the principal authority. The subject property is located within the Ottawa River watershed, and is therefore subject to review by the Rideau Valley Conservation Authority (RVCA).

5.2 Post-development Stormwater Management Target

Stormwater management requirements for the proposed development were reviewed with the City of Ottawa and CLC, where the proposed development is required to:

- Follow quantity and quality controls outlined in the **Design Brief Phase 1B**; and
- Incorporate Low Impact Development measures in accordance with the **Design Brief Phase 1B** and **LID Demonstration Project**.

5.3 Proposed Stormwater Management System

It is proposed that the stormwater from the development will be directed to the 2400 mm storm sewer within Michael Stoqua Street.

As discussed in **Section 5.1**, the quantity controls for Block 15 will be provided by the dry pond south of the subject site and through the Eastern SWM Facility as outlined in the **Design Brief Phase 1B**.

The subject site was also accounted for in the design of the permanent pool of the Eastern SWM Facility which provides 80% TSS removal for the subdivision.

A storm design sheet was prepared to support the capacity of the internal storm sewers, refer to **Appendix D** for the calculation sheet and **SWM-1**, accompanying this report, for the drainage area figure. Each catch basin has been equipped with an inlet control device (ICD) to ensure only the 5-year flow will enter the proposed minor system equal to **274 L/s**. The overall Runoff Coefficient from the site is equal to what was allocated in the

Design Brief Phase 1B and therefore, no additional quantity or quality controls are required.

Major flow on-site has been modeled using SWMHYMO. The analysis of different storm events resulted in the 24-Hour Chicago storm distribution resulting in the highest flows on-site. Major overland flow was determined based on the capture rate of the catch basins and minor system. It was determined that the depth of flow will be contained within the access lane at both critical sections during the simulated 100-year storm event. A maximum depth of flow in the 100-year storm event upstream of the intersection of Takamose Private and Squadron Crescent resulted in 0.08 m depth of flow, contained within the access lane. Please refer to **Appendix D** for input and output summary of the SWMHYMO analysis.

5.4 Low Impact Development (LID) Practices

LID measures are proposed in accordance with the **Design Brief Phase 1B** and **LID Demonstration Project**. It is proposed that flow from rooftops, sidewalks, landscaped areas and access lanes be directed to bioretention cells located throughout the property. Refer to drawing **SSP-1** for bioretention cell locations. The granular base below the overflow elevation has been sized in accordance with the **LID Design Guide** and based on infiltration rates, to ensure a maximum drawdown time of 48 hours. Based on correspondence with Paterson Group, included in **Appendix A**, an infiltration rate of **140 mm/day** was estimated for the soil in Block 15.

The bioretention cells are designed with a 75 mm layer of mulch/riverstone; underlain by 600 mm deep layer of filter media (3 parts sand, 2 parts topsoil, 1 part organic soil components and additives); a 100 mm layer of pea gravel; and a 525 mm layer of clear stone equipped with a perforated pipe. When the perforated pipe and clearstone is saturated an overflow is provided which directs flow to the minor system. An overflow is provided by an area drain at the surface of the bioretention unit that conveys flow to the perforated pipe and overflow during events that pond greater than 5 cm.

Details of the bioretention cells are shown on drawing **DS-2**, accompanying this report.

All LID measures are designed to infiltrate or detain an equivalent of the 4 mm event over the site area and each LID measure must treat the minimum of the 15 mm event. A total infiltration requirement of 4 mm or **78.4 m³** and a total treatment volume of the 15 mm event, or **181.7 m³** is required per the **LID Demonstration Project**. The bioretention cells provide **82.6 m³** of volume being retained within the perforated pipe and clear stone below the overflow to the minor system. The filter media, clear stone, perforated pipe and ponding volume results in a treatment volume of **188.7 m³**, exceeding the 15 mm volume described above.

5.5 Stormwater Servicing Conclusions

Minor and major system flow from Block 15 were accounted for in the subdivision design. Quantity and quality controls are provided through a dry stormwater pond to the south and the Eastern SWM Facility to the north.

LID practices in the form bioretention cells are proposed for treatment, storage and infiltration of roof, landscaped and road runoff from the site, in accordance with the ***LID Demonstration Project***.

The proposed stormwater design conforms to all relevant ***City Standards*** and Policies.

6.0 EROSION AND SEDIMENT CONTROL

Soil erosion occurs naturally and is a function of soil type, climate and topography. During construction the extent of erosion losses is exaggerated due to the removal of vegetation and the top layer of soil becoming agitated.

Prior to topsoil stripping, earthworks or underground construction, erosion and sediment controls will be implemented and will be maintained throughout construction.

Silt fence will be installed around the perimeter of the site and will be cleaned and maintained throughout construction. Silt fence will remain in place until the working areas have been stabilized and re-vegetated.

Catch basins will have SILTSACKs or an approved equivalent installed under the grate during construction to protect from silt entering the storm sewer system.

A mud mat will be installed at the construction access in order to prevent mud tracking onto adjacent roads.

Erosion and sediment controls must be in place during construction. The following recommendations to the contractor will be included in contract documents:

- Limit extent of exposed soils at any given time;
- Re-vegetate exposed areas as soon as possible;
- Minimize the area to be cleared and grubbed;
- Protect exposed slopes with plastic or synthetic mulches;
- Install silt fence to prevent sediment from entering existing ditches;
- No refueling or cleaning of equipment near existing watercourses;
- Provide sediment traps and basins during dewatering;
- Install filter cloth between catch basins and frames;
- Plan construction at proper time to avoid flooding; and
- Establish material stockpiles away from watercourses, so that barriers and filters may be installed.

The contractor will, at every rainfall, complete inspections and guarantee proper performance. The inspection is to include:

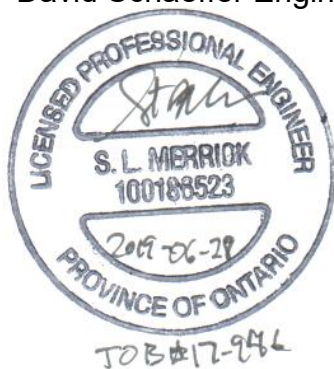
- Verification that water is not flowing under silt barriers; and
- Clean and change filter cloth at catch basins.

7.0 CONCLUSION AND RECOMMENDATIONS

David Schaeffer Engineering Ltd. (DSEL) has been retained to amend the previously approved Site Plan Control Application (SPC), dated March 2018, for Block 15 of Wateridge Village, which are currently under re-development. The preceding report outlines the following:

- Based on boundary conditions from the City of Ottawa, sufficient pressure exists to support average day flow, maximum daily flow and peak hourly flow requirements of the proposed development. Pressure reducing valves are recommended;
- Based on estimated fire flow per **Table 18.5.4.3** of **ISTB-2018-02**, a combination of internal and existing hydrants have the capacity to supply the required fire flow for the development and based on boundary conditions and the EPANet model, the hydrants have sufficient pressure to provide the maximum required fire flow;
- The proposed development is anticipated to have a peak wet weather flow of **7.52 L/s**, a reduction in flow compared to the **Design Brief Phase 1B**;
- The quantity and quality controls are provided for the site through a dry pond to the south of the site and the Eastern SWM Facility outlined in the **Design Brief Phase 1B**; and
- LID practices in the form of bioretention cells are proposed to treat, storage and infiltrate roof, landscaped and road runoff from the site, in accordance with the **LID Demonstration Project**.

Prepared by,
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Per: Genavieve Greenberg

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APPENDIX A

Pre-Consultation

DEVELOPMENT SERVICING STUDY CHECKLIST

17-948

08/08/2017

4.1 General Content		
☐	Executive Summary (for larger reports only).	N/A
☒	Date and revision number of the report.	Report Cover Sheet
☒	Location map and plan showing municipal address, boundary, and layout of proposed development.	Drawings/Figures
☒	Plan showing the site and location of all existing services.	Figure 1
☒	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Section 1.0
☒	Summary of Pre-consultation Meetings with City and other approval agencies.	Section 1.3
☒	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defensible design criteria.	Section 2.1
☒	Statement of objectives and servicing criteria.	Section 1.0
☒	Identification of existing and proposed infrastructure available in the immediate area.	Sections 3.1, 4.1, 5.1
☐	Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	N/A
☒	Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	N/A
☐	Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A
☐	Proposed phasing of the development, if applicable.	N/A
☒	Reference to geotechnical studies and recommendations concerning servicing.	Section 1.4
☒	All preliminary and formal site plan submissions should have the following information: -Metric scale -North arrow (including construction North) -Key plan -Name and contact information of applicant and property owner -Property limits including bearings and dimensions -Existing and proposed structures and parking areas -Easements, road widening and rights-of-way -Adjacent street names	N/A
4.2 Development Servicing Report: Water		
☐	Confirm consistency with Master Servicing Study, if available	N/A
☒	Availability of public infrastructure to service proposed development	Section 1.1
☒	Identification of system constraints	Section 3.1
☒	Identify boundary conditions	Section 3.1, 3.2
☒	Confirmation of adequate domestic supply and pressure	Section 3.3

☒	Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Section 3.2
☐	Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	N/A
☐	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
☐	Address reliability requirements such as appropriate location of shut-off valves	N/A
☐	Check on the necessity of a pressure zone boundary modification	N/A
☒	Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range	Section 3.2, 3.3
☐	Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	N/A
☐	Description of off-site required feeder mains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
☒	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Section 3.2
☐	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

4.3 Development Servicing Report: Wastewater

☒	Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Section 4.2
☐	Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
☐	Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A
☒	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 4.1
☒	Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Section 4.2
☒	Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Section 4.2, Appendix C
☒	Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 4.2
☐	Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A

☐	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐	Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

☒	Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 5.1
☒	Analysis of available capacity in existing public infrastructure.	Section 5.1, Appendix D
☒	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Drawings/Figures
☒	Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Section 5.2
☒	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 5.2
☒	Description of the stormwater management concept with facility locations and descriptions with references and supporting information	Section 5.3
☐	Set-back from private sewage disposal systems.	N/A
☐	Watercourse and hazard lands setbacks.	N/A
☒	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Appendix A
☐	Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A
☒	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	Section 5.3
☐	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A
☒	Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Section 5.1, 5.3
☐	Any proposed diversion of drainage catchment areas from one outlet to another.	N/A
☐	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	N/A
☐	If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	N/A
☐	Identification of potential impacts to receiving watercourses	N/A
☐	Identification of municipal drains and related approval requirements.	N/A

☒	Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 5.3
☐	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	N/A
☐	Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A
☒	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	N/A
☐	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A
☐	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 Approval and Permit Requirements: Checklist

☒	Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement ct. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	Section 1.2
☐	Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
☐	Changes to Municipal Drains.	N/A
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

4.6 Conclusion Checklist

☒	Clearly stated conclusions and recommendations	Section 7.0
☐	Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	
☐	All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	

Genavieve Greenberg

From: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Sent: Tuesday, June 25, 2019 11:20 AM
To: Genavieve Greenberg
Subject: RE: Wateridge Block 15 - Boundary Conditions Request

Hi Genavieve

The following are boundary conditions, HGL, for hydraulic analysis at Wateridge Village – Block 15 (zone MONT) assumed to be connected to the 203mm on Squadron (see attached PDF for location).

Domestic demands for Blocks 19, 22 and 24 were also included in the model.

Existing Conditions based on current pump operations:

Connection 1

MAX HGL = 147.0m, *the maximum pressure is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.*

MIN HGL = 146.7m

MXDY+Fire (317 L/s) = 122.0m

Connection 2

MAX HGL = 147.0m, *the maximum pressure is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.*

MIN HGL = 146.7m

MXDY+Fire (317 L/s) = 105.0m

Please note the following:

- *Boundary conditions provided above are for existing conditions. Upgrades to the Montreal and Brittany pump stations are currently being planned to support the CFB Rockcliffe development. The City plans to control the discharge HGL to 143.0m. Furthermore, the current plan is to use a different pumping strategy that will try to maintain a constant HGL of 143.0m even during peak hour and/or fire flow conditions.*

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

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

Richard Buchanan, CET

Coordinator, Front Ending Agreements and Brownfields Programs
Planning Services, Development Review Branch
Planning, Infrastructure and Economic Development Department

From: Genavieve Melatti <GMelatti@dsel.ca>
Sent: Wednesday, January 30, 2019 1:46 PM
To: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Subject: RE: Wateridge Block 15 - Boundary Conditions Request

Hey Richard,

I have attached a figure showing the location of the different blocks as well as their connection points. The demand for each Block is included below.

Block 19:

Design Parameter	Anticipated Demand ¹ (L/min)
Average Daily Demand	128.5
Peak Hour	697.1
Max Day + Fire Flow	15,000 + 317.8

Block 22:

Design Parameter	Anticipated Demand ¹ (L/min)
Average Daily Demand	33.5
Peak Hour	248.2
Max Day + Fire Flow	11,000 + 164.4

Block 24:

Design Parameter	Anticipated Demand ¹ (L/min)
Average Daily Demand	82.2
Peak Hour	369.7
Max Day + Fire Flow	12,000 + 246.5

Please let me know if there is any more information that you would be needing. Do you know how soon it would be possible it would be to get the boundary conditions back?

Thank you,

Genavieve Melatti
Project Coordinator/ Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103

Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 569

email: gmelatti@DSEL.ca

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From: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Sent: Wednesday, January 30, 2019 1:00 PM
To: Genavieve Melatti <GMelatti@dsel.ca>
Subject: FW: Wateridge Block 15 - Boundary Conditions Request

Hi Genavieve;

You will need to also include demands from other Phases of this development. You must provide these demands and where to assign those demands.

We will run the interim and the ultimate. Important to consider under utilization and the need for Chlorine contact time.

Thanks

Richard Buchanan, CET

Project Manager, Development Approvals
Planning, Infrastructure and Economic Development Department
Planning & Growth Management Branch
City of Ottawa | Ville d'Ottawa
☎ 613.580.2424 ext./poste 27801
ottawa.ca/planning / ottawa.ca/urbanisme

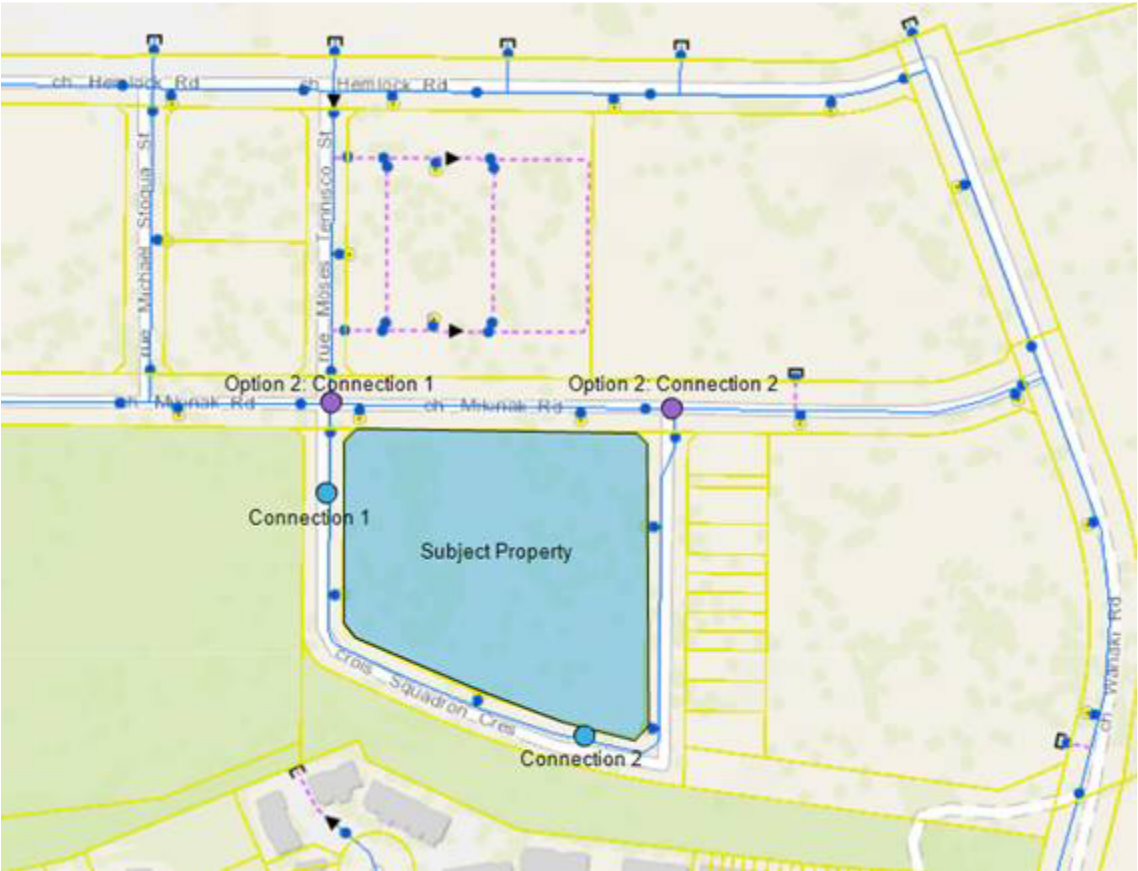
From: Genavieve Melatti <GMelatti@dsel.ca>
Sent: Wednesday, January 23, 2019 9:58 AM
To: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Cc: Steve Merrick <SMerrick@dsel.ca>
Subject: Wateridge Block 15 - Boundary Conditions Request

Good morning Richard,

Would we be able to request boundary conditions for Wateridge Block 15:

1. Location of Service / Street Number: Block 15 - the property is bound by Mikinak Road to the north and Squadron Crescent to the west, south and east
2. Type of development and the fire flow required for the proposed development:
 - The proposed development is residential and would consist of 124 stacked townhomes and 68 back-to-back townhomes.

- We are proposing to two connections to the 200 mm diameter watermain within Squadron Crescent.
- The maximum fire flow demand for the proposed development is 19,000 L/min at Blocks 2 and 3. The calculations and parameters used in these calculations are in the attached FUS calculation sheet.
- We are looking for the boundary conditions at the proposed connection point shown below in blue. We were hoping that these point were available in the City model, however, if not, would it be possible to have the boundary conditions for the points labeled as option 2 in purple on the sketch where both ends of Squadron Crescent meet Mikinak Road.



3.

	L/min	L/s
Avg. Daily	100.9	1.68
Max Day	252.3	4.20
Peak Hour	555.0	9.25

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

Thank you,

Genavieve Melatti
 Project Coordinator/ Junior Designer

DSEL
 david schaeffer engineering ltd.

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

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'

**Boundary Condition for Wateridge Village (CFB Rockcliffe)
Block 15**



Connection 1

Connection 2

**Legend
w_Pipe
Ownership**

- Private
- Public

Genavieve Melatti

From: Sabrina Castellanos <scastellanos@q4architects.com>
Sent: Tuesday, January 22, 2019 11:02 AM
To: Genavieve Melatti
Cc: Steve Merrick; Conor Sutherland; Jillian Normand; Daniel Sousa
Subject: RE: Wateridge Block 15 FUS Information

Hi Genavieve,

Please see my answers in **red** below

Regards,

Sabrina Castellanos
Project Manager, B.Arch

Q4 Architects Inc.
2171 Avenue Road, Suite 302, Toronto, Ontario M5M 4B4
T: 416-322-6334 x256 F: 416-322-7294
www.q4architects.com

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From: Genavieve Melatti <GMelatti@dsel.ca>
Sent: January 17, 2019 10:08 AM
To: Sabrina Castellanos <scastellanos@q4architects.com>
Cc: Steve Merrick <SMerrick@dsel.ca>
Subject: RE: Wateridge Block 15 FUS Information

Hey Sabrina,

As mentioned below we are looking for the following information:

- **Confirmation that these blocks will not have a sprinkler system installed? They are not sprinkler – Part 9 of the OBC**
- **The ISO class for the for each Block style. All the blocks will be Wood frame construction – Class 1**

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

A. Determine the type of construction.

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

Correspondence between FUS and ISO construction coefficients

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

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

- With the exception of fire-resistive construction that is defined differently by FUS and ISO, practitioners can refer to the definitions of the ISO construction classes (and the supporting definitions of the types of materials and assemblies that make up the ISO construction classes) found in the current ISO guide [4] (see Annex i) to help select coefficient *C*.
- To identify the most appropriate type of construction for buildings of mixed construction, the rules included in the current ISO guide [4] can be followed (see Annex i). For a building to be assigned a given classification, the rules require $\frac{2}{3}$ (67%) or more of the total wall area and $\frac{2}{3}$ (67%) or more of the total floor and roof area of the building to be constructed according to the given construction class or a higher class.
- New residential developments (less than 4 storeys) are predominantly of wood frame construction ($C = 1.5$) or ordinary construction ($C = 1.0$) if exterior walls are of brick or masonry. Residential buildings with exterior walls of brick or masonry veneer and those with less than $\frac{2}{3}$ (67%) of their exterior walls made of brick or masonry are considered wood frame construction ($C = 1.5$).

If you need any more information please let me know.

Thank you,

Genavieve Melatti
Project Coordinator/ Junior Designer

DSEL

david schaeffer engineering ltd.

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

phone: (613) 836-0856 ext. 569
email: gmelatti@DSEL.ca

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From: Conor Sutherland <Conor.Sutherland@mattamycorp.com>

Sent: Thursday, January 17, 2019 10:04 AM

To: Genavieve Melatti <GMelatti@dsel.ca>

Cc: Steve Merrick <SMerrick@dsel.ca>; Jillian Normand <Jillian.Normand@mattamycorp.com>; Sabrina Castellanos <scastellanos@q4architects.com>

Subject: RE: Wateridge Block 15 FUS Information

Hi Genavieve,

Please find Sabrina's contact information below. She is also cc'd in this email.

scastellanos@q4architects.com

Sabrina if you could please work with DSEL to assist them in the design of Block 15 it would be greatly appreciated!

Thank you,

Conor



Conor Sutherland, B.Eng.

Land Development Coordinator

T (613) 831-3548 (direct). F (613) 831-9060

Conor.Sutherland@mattamycorp.com

Ottawa Office: 50 Hines Road, Suite 100, Ottawa, ON Canada K2K 2M5

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From: Genavieve Melatti <GMelatti@dsel.ca>

Sent: Thursday, January 17, 2019 9:55 AM

To: Conor Sutherland <Conor.Sutherland@mattamycorp.com>

Cc: Steve Merrick <SMerrick@dsel.ca>

Subject: Wateridge Block 15 FUS Information

Good morning Conor,

I was wondering if you could let me know who from Q4 I should contact for some information we will need for FUS calculations.

We will be needing the following information:

- We assume that as these are townhomes there will not be sprinkler systems installed. I would need this to please be confirmed.
- We will need the the ISO class for each Block style.

If you are able to let me know who I should contact with regards to this that would be great.

Thank you,

Genavieve Melatti
Project Coordinator/ Junior Designer

DSEL

david schaeffer engineering ltd.

120 Iber Road, Unit 103

Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext. 569

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re: **Infiltration Rates**
Proposed Residential Development - Block 15
Wateridge Village - Ottawa

cc: David Shaeffer Engineering Ltd. - **Mr. Steve Merrick** - smerrick@dsel.ca

date: January 21, 2019

file: PG4064-MEMO.09

Further to your request, Paterson Group (Paterson) carried out a review of available information obtained from a geotechnical program at a location adjacent to Block 15 of the proposed Wateridge Development.

Background

The purpose of this review was to provide a range of theoretical infiltration rates to be encountered within the subsoils below the proposed infiltration system at the aforementioned site.

The subsurface profile encountered at the test hole locations in Block 15 of the proposed development generally consisted of an overlaying fill extending to a maximum depth of 1.8 m below existing grade, underlain by a very stiff to stiff brown silty clay, which in turn is underlain by a stiff to firm grey silty clay.

Geotechnical Commentary

The field saturated hydraulic conductivity (K_{fs}) values were selected using Engineering Technologies Canada (ETC) Ltd and based on a clay. Reference tables provided in the most recent ETC Pasl Permeameter User Guide. The infiltration rates were determined using Appendix C of the Low Impact Development Stormwater Management Planning and Design Guide (CVC 2011). It should be noted that a safety correction factor of 3.5 was used when calculating the infiltration rate to account for any variations in the soil.

Based on the theoretical calculations, the infiltration rate of the subsoils below the proposed infiltration system for Block 15 will be approximately **140 to 200 mm/d**.

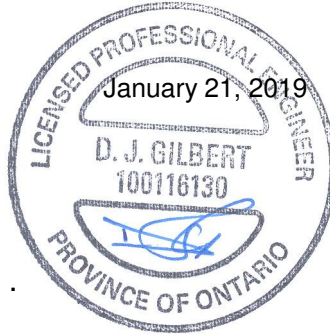
Please note that the values in this memorandum report are strictly theoretical and based on values obtained in similar materials during previous investigations in the surrounding area. It should also be noted that it was assumed the infiltration system will be installed within the silty clay layer of the subsurface.

We trust that this information is satisfactory for your immediate requirements.

Paterson Group Inc.



Nick Giamberardino, E.I.T.



David J. Gilbert, P.Eng.

Paterson Group Inc.

Head Office and Laboratory

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993 Princess Street - Suite 100
Kingston - Ontario - K7L 1H3
Tel: (613) 542-7381

Steve Merrick

From: Winston Yang <Winston.Yang@ibigroup.com>
Sent: Wednesday, August 16, 2017 11:50 AM
To: Adam Fobert; Jean Lachance
Cc: Jillian Normand; Jim Moffatt
Subject: RE: 918 Mattamy - Wateridge: IBI Servicing Review

Hi Adam and Jean,

I have reviewed the impact as per DSEL design for Block 15, 22 and 24.

Upon review of the proposed grading plans for Blocks 15, 22, and 24, we found the leave grades provided by DSEL to be reasonable.

We do not have a conceptual plan for Block 19 yet. The leave grades for that block seem low for a typical basement development. However they might be fine if underground parking is planned.

For the Servicing side, the storm and sanitary outlets location for each block were changed compared to the MSS and Design Brief.

Then we have implemented the changes DSEL made into our sewer design and have examined the capacity for each downstream sewers.

The result shows that the downstream sewers for storm and sanitary have the capacity to convey the flow for all new outlets for blocks, 15, 22 and 24.

In order to minimize the impact and cost, we are going to shift some manholes to accommodate the new outlets base on DSEL design.

For Block 22, MH210 and MH210A can be shifted to the south to replace the STM101 and SAN1 along Michael Stoqua Street.

For Block 24, MH213 and MH213A can be shifted to the south to replace the STM101 and SAN1 along Moses Tenisco Street. At the same time, MH212 and MH212A will be shifted to the south in order to reduce the length of the sewers.

For Block 15, there is no choice, the manhole STM101 and SAN1 are required for Squadron Crescent.

Since the typical 1200mm Dia. Manholes have been already ordered by the contractor.

We will contact the contractor to find out any further impacts will be caused by shifting the manholes.

For the storm section below. DSEL met the IBI criteria for the proposed lots.

In regards to Block 19, the drainage areas should be corresponded to IBI Lot141, Lot 167 in Phase 1A and Lot208B, Lot209 in Phase 1B.

And the IBI 100 year capture rate is 475l/s (283l/s+63l/s+46l/s+83l/s). Please considered in your design later on.

Should you have any questions please do not hesitate to contact either Jim or me.

Yours truly,

Winston Yang P.Eng.

email Winston.Yang@ibigroup.com web www.ibigroup.com

IBI GROUP

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Ottawa ON K1S 5N4 Canada
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From: Adam Fobert [mailto:AFobert@dsel.ca]
Sent: Tuesday, August 15, 2017 5:27 PM
To: Winston Yang <Winston.Yang@ibigroup.com>; Jim Moffatt <jmoffatt@IBIGroup.com>
Cc: Jean Lachance <JLachance@clc.ca>; Jillian Normand <Jillian.Normand@mattamycorp.com>
Subject: 918 Mattamy - Wateridge: IBI Servicing Review

Hello Jim and Winston,

How is your review of our site servicing is coming along? I have reviewed your Design Brief's for Phase 1A and 1B and have compared the analysis contained within to our proposed design.

I offer the following considerations based on my review:

General:

DSEL proposed one storm and one sanitary connection to each block. The City indicated that this was their expectation during our pre-consultation as it is their standard practice for multi-block parcels.

Block 15: The servicing brief shows three connections to Squadron Crescent. DSEL are proposing one connection downstream of the contemplated connections.

Block 22: The surrounding grades slope from east to west. The servicing brief shows a drainage divide mid-block, where half the site drains to Moses Tenisco and the other to Michael Stoqua. Moses Tenisco is 1.14m higher than Michael Stoqua at the proposed road connection points. As such, to avoid fighting grades DSEL proposed storm and sanitary connections to Michael Stoqua only.

Block 24: Moses Tenisco slopes from north to south 1.1m from Hemlock to Mikinak. The servicing brief shows a drainage divide mid-block with connections to Moses Tenisco and Mikinak. DSEL proposed a storm and sanitary outlet at the southern road connection on Moses Tenisco based on Mattamy's proposed site. This avoids fighting grades internally.

Wastewater:

Block 15:

IBI Servicing Brief = 487.3p

Mattamy Proposal = 335p

Proposed connections are downstream of IBI contemplated connections. Population is less than included in servicing brief. Therefore, we do not expect servicing issues with Block 15.

Block 22:

IBI Servicing Brief ~ 105p (note that I am interpolating since half of Block 22 is included in northern half of Block 24.)

Mattamy Proposal = 52p

IBI servicing brief assumed 52.5p tributary to Moses Tenisco. Therefore, we do not expect capacity issues.

Block 24:

IBI Servicing Brief ~284.4p (note that I am interpolating based on the population shown on phase 1A southern half of block 24).

Mattamy Proposal = 364p

DSEL reviewed the available capacity in the receiving sewers and did not see any capacity issues.

Note: Mattamy's proposed servicing eliminates the need for 63.8m of sanitary sewer on Moses Tennisco from MH213A to MH212A. Savings to CLC.

Stormwater:

I have reviewed Appendix E of the servicing briefs to compare our calculations to the assumptions used in the model.

Review of the Summary of DDSWMM Parameters

Block 15:

IBI Servicing brief: No storage assumed. 5 and 100 year capture 396L/s

Mattamy's proposal: 275m³ of storage provided. DSEL's estimated 5-year peak 357.4L/s

Block 19:

IBI Servicing brief: No storage assumed. 194 + 57 (note that Lot 209 and 208B are missing from chart).

Mattamy's proposal: TBD.

Block 22:

IBI Servicing brief: No storage assumed. 5 and 100 year (46 + 46) 92L/s

Mattamy's proposal: 46.5m³ of storage provided. DSEL's estimated 5-year peak 87L/s.

Block 24:

IBI Servicing brief: No Storage. 5 and 100 year capture (162 +162) 324L/s.

Mattamy's proposal: 27.3m³ of storage provided. DSEL's estimated 5-year peak 325.7L/s.

Let me know if you have any comments or questions. Thank you for your time.

Adam Fobert, P.Eng.
Manager of Site Plan Design

DSEL

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APPENDIX B

Water Supply

Ogilvie Rd.
Backup P.S.

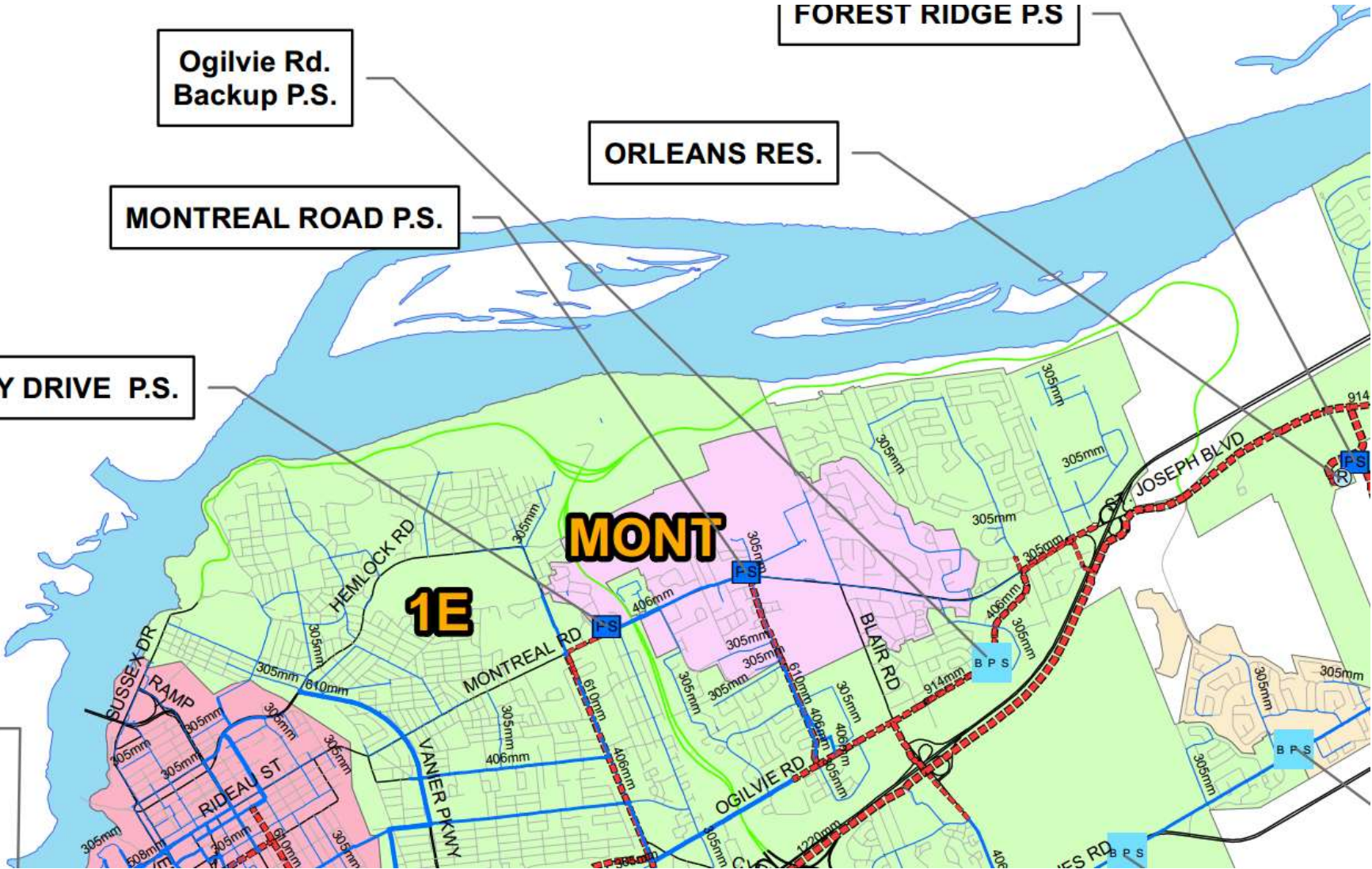
FOREST RIDGE P.S.

ORLEANS RES.

MONTREAL ROAD P.S.

BRITTANY DRIVE P.S.

REET P.S.



```

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

```

Input File: 2019-06-24_946_Block15_ggg.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
3	9	8	49.3	200
5	3	6	9.3	200
6	6	12	76	200
8	5	8	55.6	100
9	8	11	51.6	200
1	3	1	55.4	200
11	1	11	43.8	200
4	WSquadron	3	35.4	200
10	12	2	8.7	200
12	2	9	78.9	200
14	9	SSquadron	38.6	200
2	2	4	22.1	100
7	13	10	107.4	100
13	10	6	35.7	100
15	7	10	32	100

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality
3	7.76	147.00	60.14	0.00
6	7.76	147.00	59.85	0.00
8	7.76	147.00	59.90	0.00
9	7.76	147.00	59.67	0.00
11	7.76	147.00	59.86	0.00
12	7.76	147.00	59.29	0.00
1	7.76	147.00	59.95	0.00
2	7.76	147.00	59.55	0.00
4	7.76	147.00	58.39	0.00
5	7.76	147.00	56.72	0.00
7	7.76	147.00	57.29	0.00
10	7.76	147.00	56.81	0.00

13	7.76	147.00	55.96	0.00	
WSquadron	-54.58	147.00	0.00	0.00	Reservoir
SSquadron	-46.30	147.00	0.00	0.00	Reservoir



Page 2

Link Results:

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
3	19.75	0.01	0.00	Open
5	35.54	0.02	0.01	Open
6	4.50	0.00	0.00	Open
8	-7.76	0.02	0.01	Open
9	4.23	0.00	0.00	Open
1	11.29	0.01	0.00	Open
11	3.53	0.00	0.00	Open
4	54.58	0.03	0.01	Open
10	-3.26	0.00	0.00	Open
12	-18.78	0.01	0.00	Open
14	-46.30	0.02	0.01	Open
2	7.76	0.02	0.01	Open
7	-7.76	0.02	0.01	Open
13	-23.28	0.05	0.08	Open
15	-7.76	0.02	0.01	Open

```

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

```

Input File: 2019-06-24_946_Block15_ggg.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
3	9	8	49.3	200
5	3	6	9.3	200
6	6	12	76	200
8	5	8	55.6	100
9	8	11	51.6	200
1	3	1	55.4	200
11	1	11	43.8	200
4	WSquadron	3	35.4	200
10	12	2	8.7	200
12	2	9	78.9	200
14	9	SSquadron	38.6	200
2	2	4	22.1	100
7	13	10	107.4	100
13	10	6	35.7	100
15	7	10	32	100

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality
3	42.69	146.69	59.83	0.00
6	42.69	146.69	59.54	0.00
8	42.69	146.69	59.59	0.00
9	42.69	146.69	59.36	0.00
11	42.69	146.69	59.55	0.00
12	42.69	146.69	58.98	0.00
1	42.69	146.69	59.64	0.00
2	42.69	146.69	59.24	0.00
4	42.69	146.68	58.07	0.00
5	42.69	146.67	56.39	0.00
7	42.69	146.61	56.90	0.00
10	42.69	146.62	56.43	0.00

13	42.69	146.59	55.55	0.00	
WSquadron	-300.86	146.70	0.00	0.00	Reservoir
SSquadron	-254.11	146.70	0.00	0.00	Reservoir

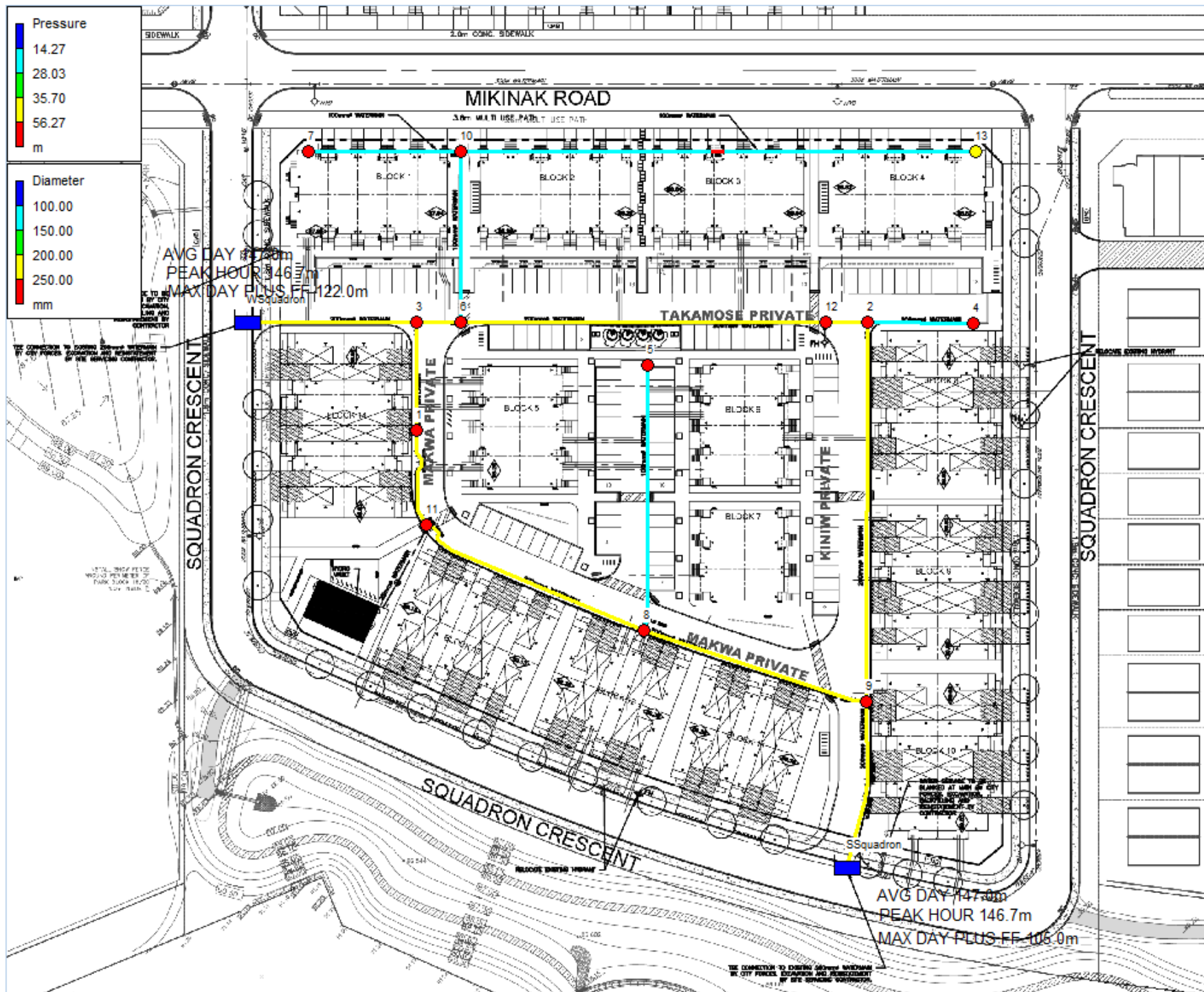


Page 2

Link Results:

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
3	107.81	0.06	0.05	Open
5	195.22	0.10	0.16	Open
6	24.46	0.01	0.00	Open
8	-42.69	0.09	0.25	Open
9	22.43	0.01	0.00	Open
1	62.95	0.03	0.02	Open
11	20.26	0.01	0.00	Open
4	300.86	0.16	0.32	Open
10	-18.23	0.01	0.00	Open
12	-103.61	0.05	0.04	Open
14	-254.11	0.13	0.26	Open
2	42.69	0.09	0.24	Open
7	-42.69	0.09	0.24	Open
13	-128.07	0.27	1.96	Open
15	-42.69	0.09	0.26	Open

Peak Hour Scenario - Block 15



```

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

```

Input File: 2019-06-24_946_Block15_ggg.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
3	9	8	49.3	200
5	3	6	9.3	200
6	6	12	76	200
8	5	8	55.6	100
9	8	11	51.6	200
1	3	1	55.4	200
11	1	11	43.8	200
4	WSquadron	3	35.4	200
10	12	2	8.7	200
12	2	9	78.9	200
14	9	SSquadron	38.6	200
2	2	4	22.1	100
7	13	10	107.4	100
13	10	6	35.7	100
15	7	10	32	100

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality
3	19.41	112.13	25.27	0.00
6	19.41	110.77	23.62	0.00
8	19.41	106.80	19.70	0.00
9	19.41	105.13	17.80	0.00
11	19.41	108.44	21.30	0.00
12	9519.41	103.70	15.99	0.00
1	19.41	110.36	23.31	0.00
2	19.41	103.89	16.44	0.00
4	19.41	103.89	15.28	0.00
5	19.41	106.79	16.51	0.00
7	19.41	110.75	21.04	0.00
10	19.41	110.75	20.56	0.00

13	19.41	110.74	19.70	0.00	
WSquadron	-10735.46	122.00	0.00	0.00	Reservoir
SSquadron	983.13	105.00	0.00	0.00	Reservoir

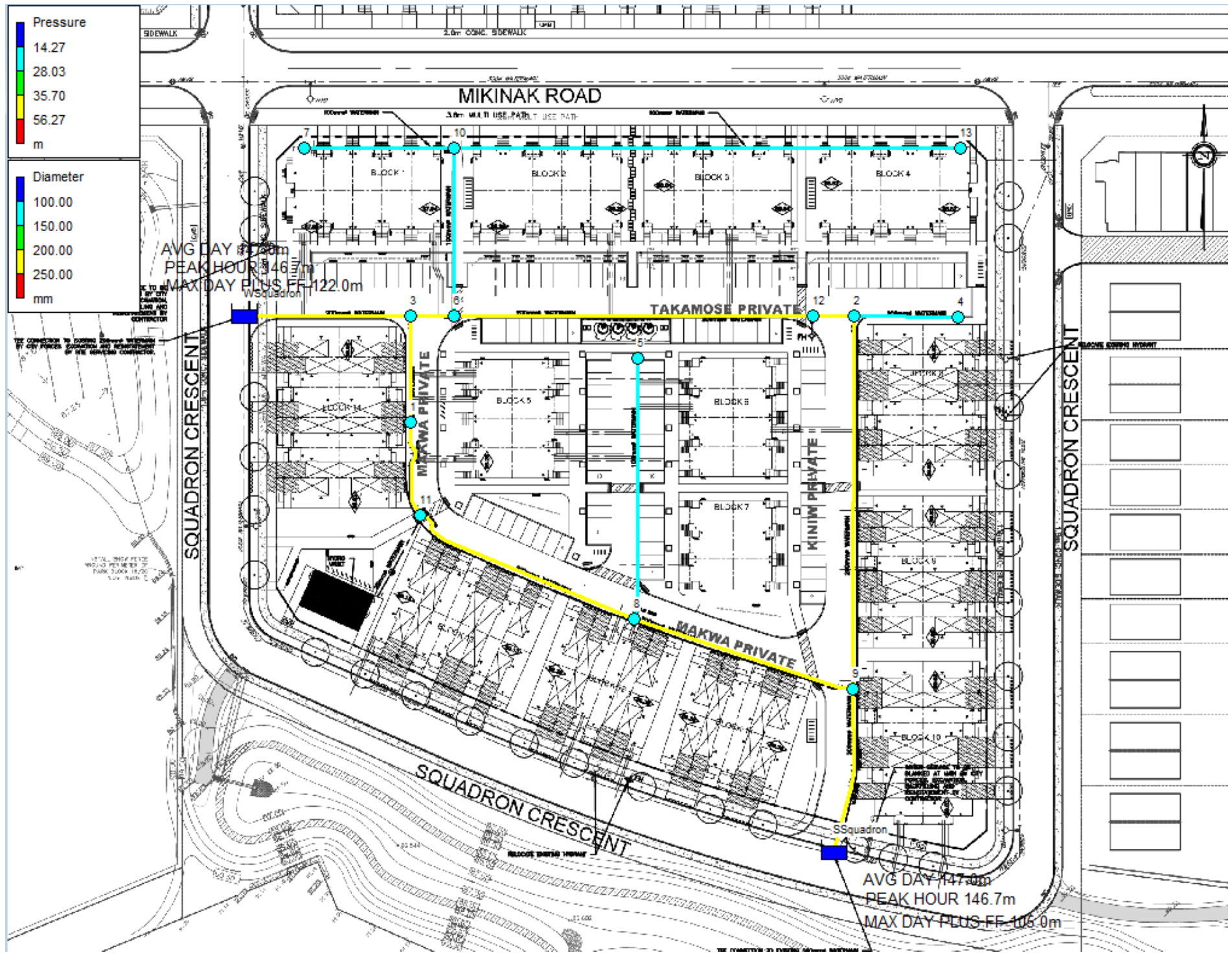


Page 2

Link Results:

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
3	-3571.21	1.89	33.78	Open
5	7067.20	3.75	147.05	Open
6	6989.56	3.71	92.94	Open
8	-19.41	0.04	0.06	Open
9	-3610.03	1.92	31.87	Open
1	3648.85	1.94	32.01	Open
11	3629.44	1.93	43.85	Open
4	10735.46	5.70	278.71	Open
10	-2529.85	1.34	21.19	Open
12	-2568.67	1.36	15.75	Open
14	983.13	0.52	3.36	Open
2	19.41	0.04	0.06	Open
7	-19.41	0.04	0.06	Open
13	-58.23	0.12	0.45	Open
15	-19.41	0.04	0.06	Open

Max. Day + Fire Flow Scenario - Block 15



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



Domestic Demand

Type of Housing	Per / Unit	Units	Pop
Single Family	3.4	-	0
Semi-detached	2.7	-	0
Townhouse	2.7	192	519
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1	-	0
Average	1.8	-	0

	Pop	Avg. Daily		Max Day		Peak Hour	
		m ³ /d	L/min	m ³ /d	L/min	m ³ /d	L/min
Total Domestic Demand	519	145.3	100.9	363.3	252.3	799.3	555.0

Institutional / Commercial / Industrial Demand

Property Type	Unit Rate	Units	Avg. Daily		Max Day		Peak Hour	
			m ³ /d	L/min	m ³ /d	L/min	m ³ /d	L/min
Commercial floor space	2.5 L/m ² /d	-	0.00	0.0	0.0	0.0	0.0	0.0
Office	75 L/9.3m ² /d	-	0.00	0.0	0.0	0.0	0.0	0.0
Restaurant*	125 L/seat/d	-	0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Light	35,000 L/gross ha/d	-	0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Heavy	55,000 L/gross ha/d	-	0.00	0.0	0.0	0.0	0.0	0.0
Total I/CI Demand			0.0	0.0	0.0	0.0	0.0	0.0
Total Demand			145.3	100.9	363.3	252.3	799.3	555.0

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



Fire Flow Required

1. Base Requirement

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

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Wood Frame

C 1.5

Type of Construction Coefficient per FUS Part II, Section 1

A 2033.4

m² Total floor area based on FUS Part II section 1

Fire Flow

14880.8 L/min

15000.0 L/min rounded to the nearest 1,000 L/min

Adjustments

2. Reduction for Occupancy Type

Limited Combustible

-15%

Fire Flow

12750.0 L/min

3. Reduction for Sprinkler Protection

Non-Sprinklered

0%

Reduction

0 L/min

4. Increase for Separation Distance

Cons. of Exposed Wall

S.D

Lw

Ha

LH

EC

N Wood Frame

30.1m-45m

32

3

96

5%

S Wood Frame

20.1m-30m

32

3

96

10%

E Wood Frame

3.1m-10m

16

3

48

18%

W Wood Frame

30.1m-45m

16

3

48

5%

% Increase

38% value not to exceed 75%

Increase

4845.0 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

Total Fire Flow

Fire Flow

17595.0 L/min

fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 1

18000.0 L/min

rounded to the nearest 1,000 L/min

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



Fire Flow Required

1. Base Requirement

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

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Wood Frame

C 1.5
A 2022.3

Type of Construction Coefficient per FUS Part II, Section 1
m² Total floor area based on FUS Part II section 1

Fire Flow

14840.2 L/min

15000.0 L/min rounded to the nearest 1,000 L/min

Adjustments

2. Reduction for Occupancy Type

Limited Combustible

-15%

Fire Flow

12750.0 L/min

3. Reduction for Sprinkler Protection

Non-Sprinklered

0%

Reduction

0 L/min

4. Increase for Separation Distance

Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N Wood Frame	30.1m-45m	32		3	96	5%
S Wood Frame	20.1m-30m	32		3	96	10%
E Wood Frame	3.1m-10m	16		3	48	18%
W Wood Frame	3.1m-10m	16		3	48	18%
% Increase						51% value not to exceed 75%

Increase

6502.5 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

Total Fire Flow

Fire Flow

19252.5 L/min

19000.0 L/min fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 1

rounded to the nearest 1,000 L/min

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



Fire Flow Required

1. Base Requirement

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

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Wood Frame

C 1.5 Type of Construction Coefficient per FUS Part II, Section 1
A 2022.3 m² Total floor area based on FUS Part II section 1

Fire Flow 14840.2 L/min
15000.0 L/min rounded to the nearest 1,000 L/min

Adjustments

2. Reduction for Occupancy Type

Limited Combustible -15%

Fire Flow 12750.0 L/min

3. Reduction for Sprinkler Protection

Non-Sprinklered 0%

Reduction 0 L/min

4. Increase for Separation Distance

Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N Wood Frame	30.1m-45m	32		3	96	5%
S Wood Frame	20.1m-30m	32		3	96	10%
E Wood Frame	3.1m-10m	16		3	48	18%
W Wood Frame	3.1m-10m	16		3	48	18%
% Increase						51% value not to exceed 75%

Increase 6502.5 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

Total Fire Flow

Fire Flow 19252.5 L/min fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4
19000.0 L/min rounded to the nearest 1,000 L/min

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



Fire Flow Required

1. Base Requirement

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

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Wood Frame

C 1.5
A 2033.4

Type of Construction Coefficient per FUS Part II, Section 1
m² Total floor area based on FUS Part II section 1

Fire Flow

14880.8 L/min

15000.0 L/min rounded to the nearest 1,000 L/min

Adjustments

2. Reduction for Occupancy Type

Limited Combustible

-15%

Fire Flow

12750.0 L/min

3. Reduction for Sprinkler Protection

Non-Sprinklered

0%

Reduction

0 L/min

4. Increase for Separation Distance

Cons. of Exposed Wall

N Wood Frame

S.D 30.1m-45m

Lw

Ha

LH

EC

96 5%

S Wood Frame

20.1m-30m

32

3

96

10%

E Wood Frame

30.1m-45m

16

3

48

5%

W Wood Frame

3.1m-10m

16

3

48

18%

% Increase

38% value not to exceed 75%

Increase

4845.0 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

Total Fire Flow

Fire Flow

17595.0 L/min

18000.0 L/min

fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 1
rounded to the nearest 1,000 L/min

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



Fire Flow Required

1. Base Requirement

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

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Wood Frame

C 1.5

Type of Construction Coefficient per FUS Part II, Section 1

A 1622.7

m² Total floor area based on FUS Part II section 1

Fire Flow

13293.4 L/min

13000.0 L/min rounded to the nearest 1,000 L/min

Adjustments

2. Reduction for Occupancy Type

Limited Combustible

-15%

Fire Flow

11050.0 L/min

3. Reduction for Sprinkler Protection

Non-Sprinklered

0%

Reduction

0 L/min

4. Increase for Separation Distance

Cons. of Exposed Wall

S.D

Lw

Ha

LH

EC

N Wood Frame

20.1m-30m

18

3

54

8%

S Wood Frame

10.1m-20m

18

3

54

13%

E Wood Frame

20.1m-30m

26

3

78

9%

W Wood Frame

10.1m-20m

26

3

78

14%

% Increase

44% value not to exceed 75%

Increase

4862.0 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

Total Fire Flow

Fire Flow

15912.0 L/min

fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 1

16000.0 L/min

rounded to the nearest 1,000 L/min

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



Fire Flow Required

1. Base Requirement

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

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Wood Frame

C 1.5 Type of Construction Coefficient per FUS Part II, Section 1
A 1622.7 m² Total floor area based on FUS Part II section 1

Fire Flow 13293.4 L/min
13000.0 L/min rounded to the nearest 1,000 L/min

Adjustments

2. Reduction for Occupancy Type

Limited Combustible -15%

Fire Flow 11050.0 L/min

3. Reduction for Sprinkler Protection

Non-Sprinklered 0%

Reduction 0 L/min

4. Increase for Separation Distance

Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N Wood Frame	20.1m-30m	18		3	54	8%
S Wood Frame	3.1m-10m	18		3	54	18%
E Wood Frame	20.1m-30m	26		3	78	9%
W Wood Frame	10.1m-20m	26		3	78	14%
% Increase						49% value not to exceed 75%

Increase 5414.5 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

Total Fire Flow

Fire Flow 16464.5 L/min fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4
16000.0 L/min rounded to the nearest 1,000 L/min

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



Fire Flow Required

1. Base Requirement

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

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Wood Frame

C 1.5

Type of Construction Coefficient per FUS Part II, Section 1

A 1222.9

m² Total floor area based on FUS Part II section 1

Fire Flow

11540.1 L/min

12000.0 L/min rounded to the nearest 1,000 L/min

Adjustments

2. Reduction for Occupancy Type

Limited Combustible

-15%

Fire Flow

10200.0 L/min

3. Reduction for Sprinkler Protection

Non-Sprinklered

0%

Reduction

0 L/min

4. Increase for Separation Distance

Cons. of Exposed Wall

S.D

Lw

Ha

LH

EC

N Wood Frame

3.1m-10m

18

3

54

18%

S Wood Frame

10.1m-20m

18

3

54

13%

E Wood Frame

10.1m-20m

26

3

78

14%

W Wood Frame

20.1m-30m

26

3

78

9%

% Increase

54% value not to exceed 75%

Increase

5508.0 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

Total Fire Flow

Fire Flow

15708.0 L/min

fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 1

16000.0 L/min

rounded to the nearest 1,000 L/min

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



Fire Flow Required

1. Base Requirement

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

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Wood Frame

C 1.5
A 745.3

Type of Construction Coefficient per FUS Part II, Section 1
m² Total floor area based on FUS Part II section 1

Fire Flow

9008.9 L/min

9000.0 L/min rounded to the nearest 1,000 L/min

Adjustments

2. Reduction for Occupancy Type

Limited Combustible

-15%

Fire Flow

7650.0 L/min

3. Reduction for Sprinkler Protection

Non-Sprinklered

0%

Reduction

0 L/min

4. Increase for Separation Distance

Cons. of Exposed Wall

	S.D	Lw	Ha	LH	EC	
N Wood Frame	20.1m-30m	24		3	72	9%
S Wood Frame	3.1m-10m	24		3	72	19%
E Wood Frame	10.1m-20m	33		3	99	15%
W Wood Frame	10.1m-20m	33		3	99	15%

% Increase

58% value not to exceed 75%

Increase

4437.0 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

Total Fire Flow

Fire Flow

12087.0 L/min

12000.0 L/min

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

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



Fire Flow Required

1. Base Requirement

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

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Wood Frame

C 1.5
A 758.4

Type of Construction Coefficient per FUS Part II, Section 1
m² Total floor area based on FUS Part II section 1

Fire Flow

9087.7 L/min

9000.0 L/min rounded to the nearest 1,000 L/min

Adjustments

2. Reduction for Occupancy Type

Limited Combustible

-15%

Fire Flow

7650.0 L/min

3. Reduction for Sprinkler Protection

Non-Sprinklered

0%

Reduction

0 L/min

4. Increase for Separation Distance

Cons. of Exposed Wall

	S.D	Lw	Ha	LH	EC	
N Wood Frame	3.1m-10m	24		3	72	19%
S Wood Frame	3.1m-10m	24		3	72	19%
E Wood Frame	10.1m-20m	33		3	99	15%
W Wood Frame	10.1m-20m	33		3	99	15%

% Increase

68% value not to exceed 75%

Increase

5202.0 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

Total Fire Flow

Fire Flow

12852.0 L/min

13000.0 L/min

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

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



Fire Flow Required

1. Base Requirement

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

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Wood Frame

C 1.5
A 744.5

Type of Construction Coefficient per FUS Part II, Section 1
m² Total floor area based on FUS Part II section 1

Fire Flow

9004.3 L/min

9000.0 L/min rounded to the nearest 1,000 L/min

Adjustments

2. Reduction for Occupancy Type

Limited Combustible

-15%

Fire Flow

7650.0 L/min

3. Reduction for Sprinkler Protection

Non-Sprinklered

0%

Reduction

0 L/min

4. Increase for Separation Distance

Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N Wood Frame	3.1m-10m	24		3	72	19%
S Wood Frame	>45m	24		3	72	0%
E Wood Frame	10.1m-20m	33		3	99	15%
W Wood Frame	10.1m-20m	33		3	99	15%
% Increase						49% value not to exceed 75%

Increase

3748.5 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

Total Fire Flow

Fire Flow

11398.5 L/min

11000.0 L/min

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

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



Fire Flow Required

1. Base Requirement

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

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Wood Frame

C 1.5
A 617.8

Type of Construction Coefficient per FUS Part II, Section 1
m² Total floor area based on FUS Part II section 1

Fire Flow

8202.4 L/min

8000.0 L/min rounded to the nearest 1,000 L/min

Adjustments

2. Reduction for Occupancy Type

Limited Combustible

-15%

Fire Flow

6800.0 L/min

3. Reduction for Sprinkler Protection

Non-Sprinklered

0%

Reduction

0 L/min

4. Increase for Separation Distance

Cons. of Exposed Wall

	S.D	Lw	Ha	LH	EC
N Wood Frame	10.1m-20m	26		3	78
S Wood Frame	>45m	26		3	78
E Wood Frame	10.1m-20m	24		3	72
W Wood Frame	3.1m-10m	24		3	72

14%

0%

14%

19%

% Increase

47% value not to exceed 75%

Increase

3196.0 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

Total Fire Flow

Fire Flow

9996.0 L/min

10000.0 L/min

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

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



Fire Flow Required

1. Base Requirement

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

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Wood Frame

C 1.5
A 617.8

Type of Construction Coefficient per FUS Part II, Section 1
m² Total floor area based on FUS Part II section 1

Fire Flow

8202.4 L/min

8000.0 L/min rounded to the nearest 1,000 L/min

Adjustments

2. Reduction for Occupancy Type

Limited Combustible

-15%

Fire Flow

6800.0 L/min

3. Reduction for Sprinkler Protection

Non-Sprinklered

0%

Reduction

0 L/min

4. Increase for Separation Distance

Cons. of Exposed Wall

S.D

Lw

Ha

LH

EC

N Wood Frame

10.1m-20m

26

3

78

14%

S Wood Frame

>45m

26

3

78

0%

E Wood Frame

3.1m-10m

24

3

72

19%

W Wood Frame

3.1m-10m

24

3

72

19%

% Increase

52% value not to exceed 75%

Increase

3536.0 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

Total Fire Flow

Fire Flow

10336.0 L/min

10000.0 L/min

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

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



Fire Flow Required

1. Base Requirement

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

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Wood Frame

C 1.5
A 745.3

Type of Construction Coefficient per FUS Part II, Section 1
m² Total floor area based on FUS Part II section 1

Fire Flow

9008.9 L/min

9000.0 L/min rounded to the nearest 1,000 L/min

Adjustments

2. Reduction for Occupancy Type

Limited Combustible

-15%

Fire Flow

7650.0 L/min

3. Reduction for Sprinkler Protection

Non-Sprinklered

0%

Reduction

0 L/min

4. Increase for Separation Distance

Cons. of Exposed Wall

S.D

Lw

Ha

LH

EC

N Wood Frame	10.1m-20m	33	3	99	15%
S Wood Frame	>45m	33	3	99	0%
E Wood Frame	3.1m-10m	24	3	72	19%
W Wood Frame	3.1m-10m	24	3	72	19%

% Increase

53% value not to exceed 75%

Increase

4054.5 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

Total Fire Flow

Fire Flow

11704.5 L/min

12000.0 L/min

fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 1
rounded to the nearest 1,000 L/min

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.

-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999



Fire Flow Required

1. Base Requirement

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

L/min

Where *F* is the fire flow, *C* is the Type of construction and *A* is the Total floor area

Type of Construction:

Wood Frame

C 1.5
A 904.5

Type of Construction Coefficient per FUS Part II, Section 1
m² Total floor area based on FUS Part II section 1

Fire Flow

9924.7 L/min

10000.0 L/min rounded to the nearest 1,000 L/min

Adjustments

2. Reduction for Occupancy Type

Limited Combustible

-15%

Fire Flow

8500.0 L/min

3. Reduction for Sprinkler Protection

Non-Sprinklered

0%

Reduction

0 L/min

4. Increase for Separation Distance

Cons. of Exposed Wall

	S.D	Lw	Ha	LH	EC	
N Wood Frame	20.1m-30m	24		3	72	9%
S Wood Frame	3.1m-10m	24		3	72	19%
E Wood Frame	10.1m-20m	39		3	117	15%
W Wood Frame	>45m	39		3	117	0%

% Increase

43% value not to exceed 75%

Increase

3655.0 L/min

Lw = Length of the Exposed Wall

Ha = number of storeys of the adjacent structure. Max 5 stories

LH = Length-height factor of exposed wall. Value rounded up.

EC = Exposure Charge

Total Fire Flow

Fire Flow

12155.0 L/min

12000.0 L/min

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

Notes:

-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Incorporated, dated January 22nd, 2019.

-Calculations based on Fire Underwriters Survey - Part II

APPENDIX C

Wastewater Collection



IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

SANITARY SEWER DESIGN SHEET

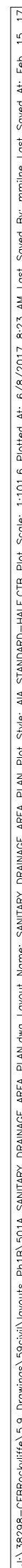
Former CFB Rockcliffe
City of Ottawa
Canada Lands Company

LOCATION				RESIDENTIAL										ICI AREAS						INFILTRATION ALLOWANCE			FIXED FLOW (L/s)	TOTAL FLOW (L/s)	CAPACITY		PROPOSED SEWER DESIGN					
STREET	AREA ID	FROM MH	TO MH	AREA Phase 1B (Ha)	UNIT TYPES				AREA EXTERNAL (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)				PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)	CAPACITY (L/s)			LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY			
					SF	SD	TH	APT		IND	CUM			IND	CUM	IND	CUM		IND	CUM									IND	CUM	L/s	(%)
Phase 1B																																
Hemlock Road	201A	MH201A	MH202A	0.31						0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.31	0.31	0.09	0.00	0.09	50.02	87.06	250	0.65	0.987	49.93	99.83%
Future Street No. 6	EX202A	BULK202AN	MH202A						2.08	358.5	358.5	4.00	5.81		0.00		0.00		0.00	0.00	2.08	2.08	0.58	0.00	6.39	31.02	21.00	250	0.25	0.612	24.63	79.40%
Hemlock Road	202A	MH202A	MH203A	0.21						0.0	358.5	4.00	5.81		0.00		0.00		0.00	0.00	0.21	2.60	0.73	0.00	6.54	75.98	86.00	250	1.50	1.500	69.44	91.40%
Future Street No. 5	EX203A	BULK203AN	MH203A						1.40	160.5	160.5	4.00	2.60		0.00		0.00		0.00	0.00	1.40	1.40	0.39	0.00	2.99	83.23	21.00	250	1.80	1.643	80.24	96.40%
Hemlock Road	203A, EXPARK2	MH203A	MH204A	0.20					0.44	0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.64	0.64	0.18	0.00	0.18	82.07	86.00	250	1.75	1.620	81.89	99.78%
rue Moses Tennisco Street	EX204A	BULK204AN	MH204A						1.39	153.5	153.5	4.00	2.49		0.00		0.00		0.00	0.00	1.39	1.39	0.39	0.00	2.88	83.23	21.00	250	1.80	1.643	80.36	96.54%
Hemlock Road	204A	MH204A	MH205A	0.21						0.0	153.5	4.00	2.49		0.00		0.00		0.00	0.00	0.21	1.60	0.45	0.00	2.94	67.96	90.00	250	1.20	1.341	65.02	95.68%
rue Michael Stoqua Street	EX205A	BULK205AN	MH205A						1.38	241.5	241.5	4.00	3.91		0.00		0.00		0.00	0.00	1.38	1.38	0.39	0.00	4.30	67.96	21.00	250	1.20	1.341	63.66	93.67%
Hemlock Road	205A	MH205A	MH206A	0.25						0.0	395.0	4.00	6.40		0.00		0.00		0.00	0.00	0.25	3.23	0.90	0.00	7.30	31.02	112.00	250	0.25	0.612	23.71	76.45%
rue Bareille-Snow Street	EX206A-B	BULK206AN	MH206A						9.61	1755.0	1755.0	3.63	25.80		0.00		0.00		0.00	0.00	9.61	9.61	2.69	0.00	28.49	87.74	21.00	250	2.00	1.731	59.24	67.52%
Hemlock Road	206A	MH206A	MH207A	0.20						0.0	2150.0	3.56	31.02		0.00		0.00		0.00	0.00	0.20	13.04	3.65	0.00	34.67	55.26	89.33	300	0.30	0.757	20.59	37.26%
Block 20	PARK1	MH207AN	MH207A	0.32						0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.32	0.32	0.09	0.00	0.09	39.24	14.00	250	0.40	0.774	39.15	99.77%
Hemlock Road	PARK1, 207A	MH207A	BULK176AE	0.12						0.0	2150.0	3.56	31.02		0.00		0.00		0.00	0.00	0.12	13.48	3.77	0.00	34.79	65.38	33.16	300	0.42	0.896	30.59	46.79%
Phase 1A																																
Hemlock Road		BULK176AE	MH176A							0.0	2150.0	3.56	31.02		0.00		0.00		0.00	0.00	0.00	13.48	3.77	0.00	34.79	65.38	21.97	300	0.42	0.896	30.59	46.79%
Phase 1B																																
chemin Wanaki Road	200A, COM1	MH200A	MH214A	0.25						0.0	0.0	4.00	0.00		0.00	0.90	0.90		0.00	0.78	1.15	1.15	0.32	0.00	1.10	73.41	98.28	250	1.40	1.449	72.30	98.50%
chemin Wanaki Road	214A, COM2	MH214A	BULK153AN	0.16						0.0	0.0	4.00	0.00		0.00	0.65	1.55		0.00	1.35	0.81	1.96	0.55	0.00	1.89	51.91	44.22	250	0.70	1.024	50.01	96.35%
Phase 1B																																
chemin Wanaki Road	143B	BULK143AE	MH143A	0.31						104.0	104.0	4.00	1.69		0.00		0.00		0.00	0.00	0.31	0.31	0.09	0.00	1.77	43.87	21.50	250	0.50	0.866	42.10	95.96%
chemin Wanaki Road	143A	MH143A	MH144A	0.27						0.0	104.0	4.00	1.69		0.00		0.00		0.00	0.00	0.27	0.58	0.16	0.00	1.85	87.74	47.73	250	2.00	1.731	85.89	97.89%
chemin Wanaki Road	144A, 144B	MH144A	MH145A	0.72						0.0	104.0	4.00	1.69		0.00		0.00		0.00	0.00	0.72	1.30	0.36	0.00	2.05	87.74	40.57	250	2.00	1.731	85.69	97.66%
chemin Wanaki Road	145A, 145B, 145C	MH145A	MH146A	2.77						835.6	939.6	3.82	14.53		0.00		0.00		0.00	0.00	2.77	4.07	1.14	0.00	15.67	107.45	53.01	250	3.00	2.121	91.79	85.42%
chemin Wanaki Road	146A	MH146A	MH147A	0.14						0.0	939.6	3.82	14.53		0.00		0.00		0.00	0.00	0.14	4.21	1.18	0.00	15.71	43.54	37.48	250	1.00	1.224	27.83	63.92%
chemin Wanaki Road	PARK2	BLK147AE	MH147A	0.55						0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.55	0.55	0.15	0.00	0.15	39.24	17.66	250	0.40	0.774	39.08	99.61%
chemin Wanaki Road	147C	BLK147AW	MH147A	0.10						33.6	33.6	4.00	0.54		0.00		0.00		0.00	0.00	0.10	0.10	0.03	0.00	0.57	43.87	17.33	250	0.50	0.866	43.30	98.70%
chemin Wanaki Road	147A	MH147A	MH170A	0.03						0.0	973.2	3.81	15.01		0.00		0.00		0.00	0.00	0.03	4.89	1.37	0.00	16.38	31.02	10.23	250	0.25	0.612	14.64	47.19%
chemin Wanaki Road	147B	MH107A	MH147C	0.16						0.0	973.2	3.81	15.01		0.00		0.00		0.00	0.00	0.16	5.05	1.41	0.00	16.42	31.02	39.00	250	0.25	0.612	14.59	47.05%
chemin Wanaki Road		MH147C	BLK148AW							0.0	973.2	3.81	15.01		0.00		0.00		0.00	0.00	0.00	5.05	1.41	0.00	16.42	31.02	11.77	250	0.25	0.612	14.59	47.05%
Phase 1B																																
Block 9	154A	MH158A	MH217A	0.19						0.0	973.2	3.81	15.01		2.62		3.83		0.00	5.60	0.19	12.94	3.62	0.00	24.23	53.37	171.95	250	0.74	1.053	29.13	54.59%
croissant Squadron Crescent	215Aa-b	MH215A	MH216A	0.79	3	4				117.8	117.8	4.00	1.91		0.00		0.00		0.00	0.00	0.79	0.79	0.22	0.00	2.13	50.02	80.00	250	0.65	0.987	47.89	95.74%
croissant Squadron Crescent	216Aa-b	MH216A	MH217A	0.67	2	6				94.5	212.3	4.00	3.44		0.00		0.00		0.00	0.00	0.67	1.46	0.41	0.00	3.85	50.0						

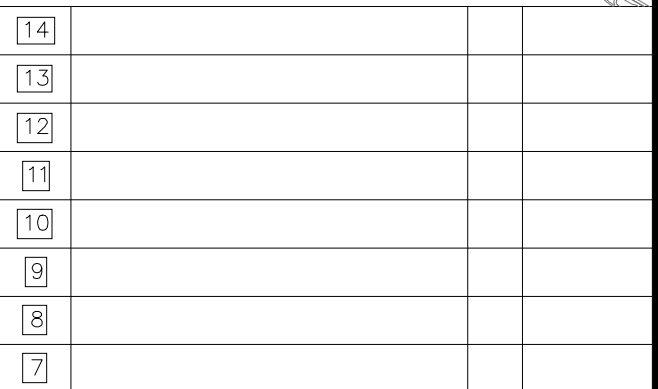


Former CFB Rockcliffe
City of Ottawa
Canada Lands Company

1/25/2017 9:11 AM



AREA NUMBER
 RUNOFF COEFFICIENT
 AREA IN HECTARES
 POTENTIAL DRAINAGE DIRECTION



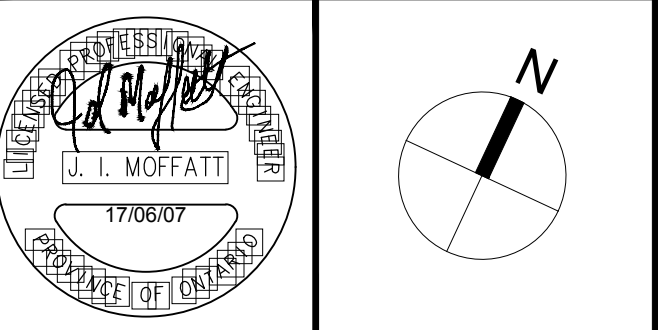
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4	SUBMISSION FOR MOECC APPROVAL	J.I.M	2017:02:16
3	SUBMISSION No.3 FOR CITY REVIEW	J.I.M	2017:01:25
2	SUBMISSION No.2 FOR CITY REVIEW	J.I.M	2016:11:04
1	SUBMISSION No.1 FOR CITY REVIEW	J.I.M	2016:07:08
No.	REVISIONS	By	Date



Project Title

**WATERIDGE VILLAGE
AT ROCKCLIFFE**

PHASE 1B



Drawing Title

**SANITARY DRAINAGE
AREA PLAN**

Scale
1 : 2000

Design J.I.M.	Date MAY 2016
Drawn M.M.	Checked J.I.M.
Project No. 38298	Drawing No. 501A

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



Site Area 1.960 ha

Extraneous Flow Allowances

Infiltration / Inflow 0.55 L/s

Domestic Contributions

Unit Type	Unit Rate	Units	Pop
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7		487
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		

Total Pop 487

Average Domestic Flow 1.97 L/s

Peaking Factor 3.98

Peak Domestic Flow 7.85 L/s

Institutional / Commercial / Industrial Contributions

Property Type	Unit Rate	No. of Units	Avg Wastewater (L/s)
Commercial floor space*	5 L/m ² /d		0.00
Hospitals	900 L/bed/d		0.00
School	70 L/student/d		0.00
Industrial - Light**	35,000 L/gross ha/d		0.00
Industrial - Heavy**	55,000 L/gross ha/d		0.00

Average I/C/I Flow 0.00

Peak Institutional / Commercial Flow 0.00

Peak Industrial Flow** 0.00

Peak I/C/I Flow 0.00

* assuming a 12 hour commercial operation

** peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B

Total Estimated Average Dry Weather Flow Rate	1.97 L/s
Total Estimated Peak Dry Weather Flow Rate	7.85 L/s
Total Estimated Peak Wet Weather Flow Rate	8.40 L/s

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



Site Area 1.960 ha

Extraneous Flow Allowances

Infiltration / Inflow (Dry)	0.10 L/s
Infiltration / Inflow (Wet)	0.55 L/s
Infiltration / Inflow (Total)	0.65 L/s

Extraneous Flow Allowances

Infiltration / Inflow 0.65 L/s

Domestic Contributions

Unit Type	Unit Rate	Units	Pop
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7	192	519
			0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

Total Pop 519

Average Domestic Flow 1.68 L/s

Peaking Factor 3.37

Peak Domestic Flow 5.67 L/s

Institutional / Commercial / Industrial Contributions

Property Type	Unit Rate	No. of Units	Avg Wastewater (L/s)
Dining room	125 L/seat/d		0.00
Commercial floor space	28,000.0 L/ha/d		0.00
Water Closets**	150 L/hr		0.00
Laundry Facility	1,200 L/unit/d		0.00
Average I/C/I Flow			0.00
Peak Institutional / Commercial Flow			0.00
Peak I/C/I Flow			0.00

Total Estimated Average Dry Weather Flow Rate	1.78 L/s
Total Estimated Peak Dry Weather Flow Rate	6.22 L/s
Total Estimated Peak Wet Weather Flow Rate	7.52 L/s

** Water closets demand of 150 L/hour from Appendix 4-A of the Sewer design guidelines, assuming a 12 hour operation

**Site Area***

1.560 ha

Infiltration / Inflow (Dry)	0.08 L/s
Infiltration / Inflow (Wet)	0.44 L/s
Infiltration / Inflow (Total)	0.51 L/s

Infiltration / Inflow **0.51 L/s**

Unit Type	Unit Rate	Units	Pop
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7	158	427
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

Total Pop **427**

Average Domestic Flow 1.38 L/s

Peaking Factor **3.41**

Peak Domestic Flow 4.71 L/s

Property Type	Unit Rate	No. of Units	Avg Wastewater (L/s)
Dining room	125 L/seat/d		0.00
Commercial floor space	28,000.0 L/ha/d		0.00
Water Closets**	150 L/hr		0.00
Laundry Facility	1,200 L/unit/d		0.00
	Average I/C/I Flow		0.00
	Peak Institutional / Commercial Flow		0.00
	Peak I/C/I Flow		0.00

Total Estimated Average Dry Weather Flow Rate	1.46 L/s
Total Estimated Peak Dry Weather Flow Rate	5.15 L/s
Total Estimated Peak Wet Weather Flow Rate	6.18 L/s

** Water closets demand of 150 L/hour from Appendix 4-A of the Sewer design guidelines, assuming a 12 hour operation

SANITARY SEWER CALCULATION SHEET

Manning's $n=0.013$ 

LOCATION				RESIDENTIAL AREA AND POPULATION						COMM		INSTIT		PARK		C+H		INFILTRATION			PIPE			VEL				
STREET		FROM M.H.	TO M.H.	AREA (ha)	UNITS	POP.	CUMULATIVE		PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	(ha)	ACCU. AREA (ha)	(ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	(FULL) (m/s)	(ACT.) (m/s)	
Private Lane																												
		103A	104A	0.20	22	60	0.20	60	3.6	0.71		0.00		0.00		0.00	0.00	0.20	0.20	0.06	0.76	43.6	200	0.65	26.44	0.03	0.84	0.37
		104A	105A				0.20	60	3.6	0.71		0.00		0.00		0.00	0.00	0.20	0.06	0.76	6.5	200	0.40	20.74	0.04	0.66	0.31	
To Makwa Private, Pipe 105A - 106A							0.20	60				0.00		0.00				0.20										
Makwa Private																												
Contribution From Kiniw Private, Pipe 101A - 102A							0.06	11				0.00		0.00			0.06	0.06										
		102A	105A	0.14	7	19	0.20	30	3.7	0.36		0.00		0.00		0.00	0.14	0.20	0.06	0.42	53.4	200	0.40	20.74	0.02	0.66	0.26	
Contribution From Private Lane, Pipe 104A - 105A							0.20	60				0.00		0.00			0.20	0.40										
		105A	106A	0.10	5	14	0.50	104	3.6	1.21		0.00		0.00		0.00	0.10	0.50	0.14	1.35	37.1	200	0.40	20.74	0.07	0.66	0.37	
		106A	107A	0.05	2	6	0.55	110	3.6	1.28		0.00		0.00		0.00	0.05	0.55	0.16	1.44	7.2	200	0.40	20.74	0.07	0.66	0.37	
		107A	115A	0.12	13	36	0.67	146	3.6	1.68		0.00		0.00		0.00	0.12	0.67	0.19	1.87	40.8	200	0.40	20.74	0.09	0.66	0.41	
To Takamose Private, Pipe 115A - 117A							0.67	146				0.00		0.00		0.00	0.12	0.67	0.19	1.87	40.8	200	0.40	20.74	0.09	0.66	0.41	
Mikinak Road (Rear Yard Service)																												
		111A	113A	0.12	30	81	0.12	81	3.6	0.95		0.00		0.00		0.00	0.12	0.12	0.03	0.98	105.9	200	0.80	29.34	0.03	0.93	0.43	
To Servicing Between Blocks 1 & 2, Pipe 113A - 114A							0.12	81				0.00		0.00			0.12	0.12										
		112A	113A	0.05	10	27	0.05	27	3.7	0.32		0.00		0.00		0.00	0.05	0.05	0.01	0.34	33.4	200	0.65	26.44	0.01	0.84	0.28	
To Servicing Between Blocks 1 & 2, Pipe 113A - 114A							0.05	27				0.00		0.00			0.05	0.05										
Servicing Between Blocks 1 & 2																												
Contribution From Unknown Road4 - 04, Pipe 111A - 113A							0.12	81				0.00		0.00			0.12	0.12										
Contribution From Unknown Road4 - 04, Pipe 112A - 113A							0.05	27				0.00		0.00			0.05	0.17										
		113A	114A				0.17	108	3.6	1.26		0.00		0.00		0.00	0.17	0.05	1.30	34.5	200	0.40	20.74	0.06	0.66	0.36		
To Takamose Private, Pipe 114A - 115A							0.17	108				0.00		0.00		0.00	0.17	0.17										
Kiniw Private																												
		101A	102A	0.06	4	11	0.06	11	3.7	0.13		0.00		0.00		0.00	0.06	0.06	0.02	0.15	30.1	200	0.65	26.44	0.01	0.84	0.22	
To Makwa Private, Pipe 102A - 105A							0.06	11				0.00		0.00				0.06										
		108A	110A	0.27	25	68	0.27	68	3.6	0.80		0.00		0.00		0.00	0.27	0.27	0.08	0.88	76.3	200	0.65	26.44	0.03	0.84	0.38	
To Kiniw Private, Pipe 110A - 114A							0.27	68				0.00		0.00			0.27	0.27										
Takamose Private																												
		109A	110A	0.08	8	22	0.08	22	3.7	0.26		0.00		0.00		0.00	0.08	0.08	0.02	0.29	26.6	200	0.67	26.85	0.01	0.85	0.27	
Contribution From Kiniw Private, Pipe 108A - 110A							0.27	68				0.00		0.00			0.27	0.35										
		110A	114A	0.28	22	60	0.63	150	3.6	1.73		0.00		0.00		0.00	0.28	0.63	0.18	1.91	80.5	200	0.40	20.74	0.09	0.66	0.41	
Contribution From Servicing Between Blocks 1&2, Pipe 113A - 114A							0.17	108				0.00		0.00			0.17	0.80										
		114A	115A	0.03	2	6	0.83	264	3.5	2.98		0.00		0.00		0.00	0.03	0.83	0.24	3.22	8.1	200	0.40	20.74	0.16	0.66	0.48	
Contribution From Makwa Private, Pipe 107A - 115A							0.67	146				0.00		0.00			0.67	1.50										
		115A	117A	0.08	8	22	1.58	432	3.4	4.77		0.00		0.00		0.00	0.08	1.58	0.45	5.22	41.2	200	0.38	20.22	0.26	0.64	0.54	
													</															

APPENDIX D

Stormwater Management

IBI GROUP 400-333 Preston Street Ottawa, Ontario K1S 5N4 Canada tel 613 225 1311 fax 613 225 9868 ibigroup.com				STORM SEWER DESIGN SHEET																															
				Former CFB Rockcliffe City of Ottawa Name of Client/Developer																															
LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW												SEWER DATA									
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.45	C= 0.50	C= 0.56	C= 0.60	C= 0.65	C= 0.70	C= 0.73	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)	
																													DIA	W	H			(L/s)	(%)
Phase 1B																																			
Hemlock Road	S201A-B, EX201	MH201	MH202								0.31		0.56	1.85	1.85	10.00	1.17	11.17	104.19	122.14	178.56	192.62				192.62	210.32	90.18	450			0.50	1.281	17.70	8.41%
Future Street No. 6	EX202A	BULK202N	MH202										0.90	2.00	2.00	12.23	0.27	12.50	93.72	109.82	160.45	187.60				187.60	286.47	16.00	600			0.20	0.982	98.87	34.51%
Hemlock Road	S202A, EX202B-C	MH202	MH203								0.10		0.55	1.42	5.27	12.50	0.53	13.03	92.61	108.50	158.52	487.86				487.86	784.52	86.00	600			1.50	2.688	296.66	37.81%
Future Street No. 5	S203B, EX203	BULK203N	203								0.09		0.73	1.80	1.80	10.88	0.12	11.00	99.76	116.92	170.90	179.44				179.44	351.93	16.00	450			1.40	2.144	172.49	49.01%
Hemlock Road	S203A, EXP203	MH203	MH204		0.44						0.16			0.68	7.75	13.03	0.49	13.53	90.49	106.01	154.87	700.89				700.89	847.38	86.00	600			1.75	2.903	146.49	17.29%
rue Moses Tennisco Street	S204B, EX204A	BULK204N	MH204								0.08		0.72	1.76	1.76	10.89	0.11	11.00	99.72	116.87	170.81	175.20				175.20	399.05	16.00	450			1.80	2.431	223.85	56.10%
Hemlock Road	S204A, EX204B	MH204	MH205								0.14		0.47	1.32	10.82	13.53	0.54	14.07	88.63	103.82	151.66	958.99				958.99	1,272.26	90.00	750			1.20	2.790	313.27	24.62%
rue Michael Stogua Street	S205A, EX205A	BULK205N	MH205								0.08		0.81	1.96	1.96	11.15	0.15	11.30	98.49	115.42	168.69	192.75				192.75	297.43	16.01	450			1.00	1.812	104.68	35.20%
Hemlock Road	S205B-C, EX205B	MH205	MH206								0.17		0.63	1.73	14.51	14.07	1.20	15.26	86.70	101.55	148.32	1,257.92				1,257.92	1,818.95	112.01	1200			0.20	1.558	561.03	30.84%
Temp Ditch	FUTURE PHASE	DI 10	BULK206N		7.68									6.41	6.41	59.66	0.16	59.82	33.08	38.61	56.13	211.89				211.89	297.43	17.03	450			1.00	1.812	85.54	28.76%
rue Bareille-Snow Street	S206A, EX206A	BULK206N	MH206								0.06		1.02	2.39	2.39	10.85	0.15	11.00	99.91	117.09	171.14	238.30				238.30	448.66	17.50	525			1.00	2.008	210.35	46.89%
Hemlock Road	S206B, EX206B	MH206	MH207								0.03		0.46	1.08	17.98	15.26	0.78	16.04	82.71	96.86	141.44	1,486.80				1,486.80	2,227.75	89.33	1200			0.30	1.908	740.96	33.26%
Block 20	P207	CBMH207N	MH207		0.32									0.27	0.27	10.00	0.27	10.27	104.19	122.14	178.56	27.81				27.81	63.80	14.00	300			0.40	0.874	36.00	56.42%
Hemlock Road	S207	MH207	BULK176E								0.22			0.43	18.67	16.04	0.37	16.42	80.33	94.05	137.32	1,499.75				1,499.75	2,156.55	32.62	1350			0.15	1.460	656.80	30.46%
Phase 1A																																			
Ex. Hemlock Road	S176C	BULK176E	MH176								0.02			0.04	18.71	16.42	0.27	16.69	79.24	92.78	135.45	1,482.57				1,482.57	2,156.55	24.06	1350			0.15	1.460	673.98	31.25%
Phase 1B																																			
Codd's Road	S230, LOT230A-B	230	231								0.16		0.70	1.87	1.87	10.00	0.63	10.63	104.19	122.14	178.56	194.65				194.65	364.28	84.30	450			1.50	2.219	169.63	46.57%
Codd's Road	S231, LOT231	231	BULK176N								0.12		0.30	0.90	2.77	10.63	0.36	11.00	100.96	118.34	172.97	279.55				279.55	549.49	53.76	525			1.50	2.459	269.94	49.12%
Phase 1A																																			
Ex. Codd's Road	---	BULK176N	MH176											0.00	2.95	11.77	0.29	12.06	95.69	112.12	163.84	281.96				281.96	339.63	18.21	525			1.50	0.919	57.67	16.98%
Phase 1B																																			
chemin Wanaki Road	S200, LOT200	MH200	MH214								0.20		0.91	2.41	2.41	10.00	0.78	10.78	104.19	122.14	178.56	251.42				251.42	351.93	99.75	450			1.40	2.144	100.51	28.56%
chemin Wanaki Road	S214, LOT214	MH214	BULK152N								0.19		0.84	2.24	4.65	10.78	0.42	11.20	100.27	117.52	171.77	466.34				466.34	535.93	46.51	600			0.70	1.836	69.59	12.99%
Phase 1B																																			
chemin Wanaki Road	EX143	BULK143E	MH143										0.33	0.73	0.73	10.00	0.29	10.29	104.19	122.14	178.56	76.47				76.47	129.34	20.00	375			0.50	1.134	52.87	40.88%
chemin Wanaki Road		MH143	MH144											0.00	0.73	10.29	0.37	10.66	102.67	120.34	175.92	75.35				75.35	258.68	50.50	375			2.00	2.269	183.33	70.87%
chemin Wanaki Road	S144, EX144	MH144	MH145		0.55						0.18			0.81	1.54	10.66	0.30	10.97	100.81	118.15	172.70	155.54				155.54	258.68	41.15	375			2.00	2.269	103.14	39.87%
chemin Wanaki Road	S145, EX145	MH145	MH146								0.15		2.74	6.39	7.93	10.97	0.28	11.24	99.35	116.44</															

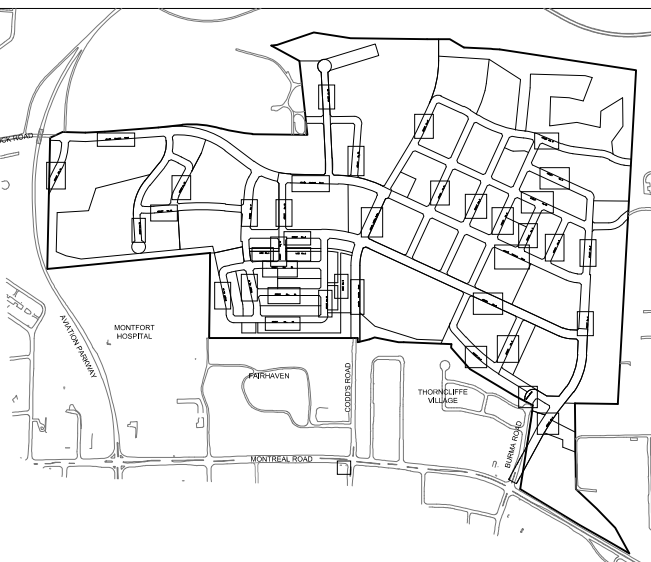


Former CFB Rockcliffe
City of Ottawa
Name of Client/Developer

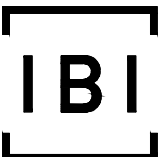
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LEGEND :



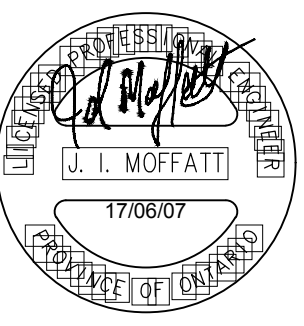
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5	ISSUED FOR TENDER	J.I.M.	2017:03:23
4	SUBMISSION FOR MOECC APPROVAL	J.I.M.	2017:02:16
3	SUBMISSION No.3 FOR CITY REVIEW	J.I.M.	2017:01:25
2	SUBMISSION No.2 FOR CITY REVIEW	J.I.M.	2016:11:04
1	SUBMISSION No.1 FOR CITY REVIEW	J.I.M.	2016:07:08
No.	REVISIONS	By	Date



Project Title

**WATERIDGE VILLAGE
AT ROCKCLIFFE**

PHASE 1B



Drawing Title

**STORM DRAINAGE
AREA PLAN**

Scale
1 : 2000

Design J.I.M.	Date MAY 2016
Drawn M.M.	Checked J.I.M.
Project No. 38298	Drawing No. 500A

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

Manning	0.013	Arterial Roads Return Frequency = 10 years
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LOCATION			AREA (Ha)																FLOW							SEWER DATA									
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO		
Location	From Node	To Node	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	Conc. (min)	2 Year (mm/h)	5 Year (mm/h)	10 Year (mm/h)	100 Year (mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min)	Q/Q full		
Private Lane																																			
	101	102			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	300	300	PVC	0.50	43.4	68.3778	0.9673	0.7477	0.000		
	102	104			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.75	74.05	100.40	117.68	172.00	0	300	300	PVC	0.50	5.4	68.3778	0.9673	0.0930	0.000		
Makwa Private, Pipe 104 - 105						0.00				0.00				0.00				0.00	10.84																
Makwa Private																																			
	103	104			0.00	0.00	0.32	0.80	0.71	0.71			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	74	300	300	PVC	0.95	39.8	94.2522	1.3334	0.4969	0.787		
Private Lane, Pipe 102 - 104						0.00				0.00				0.00				0.00	10.84																
	104	105			0.00	0.00	0.40	0.80	0.89	1.60			0.00	0.00			0.00	0.00	10.84	73.72	99.95	117.15	171.22	160	450	450	CONC	0.50	35.0	201.6005	1.2676	0.4602	0.794		
	105	106			0.00	0.00			0.00	1.60			0.00	0.00			0.00	0.00	11.30	72.15	97.79	114.60	167.48	157	450	450	CONC	0.50	6.5	201.6005	1.2676	0.0855	0.777		
	106	108			0.00	0.00			0.00	1.60			0.00	0.00			0.00	0.00	11.39	71.86	97.40	114.14	166.81	156	450	450	CONC	0.50	41.6	201.6005	1.2676	0.5463	0.774		
Takamose Private, Pipe 108 - 109						0.00				1.60				0.00				0.00	11.93																
Takemose Private																																			
	107	108			0.00	0.00	0.13	0.80	0.29	0.29			0.00	0.00			0.00	0.00																	
Contribution From Makwa Private, Pipe 106 - 108						0.00				1.60				0.00				0.00	11.93																
	108	109			0.00	0.00	0.24	0.80	0.53	2.94			0.00	0.00			0.00	0.00	11.93	70.10	94.98	111.30	162.63	279	600	600	CONC	0.34	30.4	358.0272	1.2663	0.3995	0.779		
	109	110			0.00	0.00			0.00	2.94			0.00	0.00			0.00	0.00	12.33	68.88	93.30	109.32	159.72	274	600	600	CONC	0.32	13.8	347.3374	1.2285	0.1872	0.789		

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

Notes:

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

Designed:	PROJECT:		
Checked:	LOCATION: City of Ottawa		
Dwg. Reference:	File Ref:	Date: 25 Jun 2019	Sheet No. SHEET 1 OF 1

STORAGE SUMMARY

BLOCK 15

STORAGE VOLUME AVAILABLE BELOW OVERFLOW (CLEARSTONE AND SUBDRAIN)

Total Site			
Rainfall (mm)	Drainage Area (sq.m)	Volume Required (cu.m)	Total Provided (cu.m)
4	19588	78.352	82.55

Area ID	Drainage Area (sq.m)	Volume Req. (cu.m) (4mm Storm)	Clear Stone Area (525mm Depth) (sq.m)*	Volume in Clear Stone (cu.m)**	Subdrain Length (m)	Subdrain Size (mm)	Subdrain Volume (cu.m)	Total Volume (cu.m)
101	1993	8.0	63	13.23	13.6	200	0.43	13.66
102	2442	9.8	101.8	21.378	21.4	200	0.67	22.05
105A	2324	9.3	35	7.35	25.4	200	0.80	8.15
105B	1090	4.4	43.6	9.156	31.6	200	0.99	10.15
107	2175	8.7	43.4	9.114	31.7	200	1.00	10.11
108	2090	8.4	84	17.64	25.4	200	0.80	18.44
Total	4435	48.5	370.8	77.9	149.1		4.7	82.55

* Refer to Drawing DS-2 for Bioretention Cross Section

** Volume calculation assumes 40% Void Ratio for Clear Stone

STORAGE SUMMARY
BLOCK 15
TOTAL LID TREATMENT VOLUME

Area ID	Drainage Area (sq.m)	Volume Req. (cu.m) (15mm Storm)	Area of Filter Media & Mulch (675mm Depth) (sq.m)*	Volume in Filter Media & Mulch (cu.m)**	Volume Below Overflow (Clear Stone and Subdrain)	Ponding Depth (cm)	Ponding Volume (cu.m)	Total Volume (cu.m)
101	1993	29.9	63	14.88	13.66	5.00	3.15	31.69
102	2442	36.6	101.8	24.05	22.05	5.00	5.09	51.19
105A	2324	34.9	35	8.27	8.15	5.00	1.75	18.17
105B	1090	16.4	43.6	10.30	10.15	5.00	2.18	22.63
107	2175	32.6	43.4	10.25	10.11	5.00	2.17	22.53
108	2090	31.4	84	19.85	18.44	5.00	4.20	42.48
Total	12114	181.7	370.8	87.6	82.6		18.5	188.69

* Refer to Drawing DS-2 for Bioretention Cross Section

** Volume calculation assumes 35% Void Ratio for the Filter Media

Stormwater - ICD Sizing Sheet

Control Flow to Minor System 5-Year Flow

**STM 103 to STM 104****CB103A****Inlet Control Device** 150 mm

	Stage	h_o	Ctrl Flow
	(m)	(m)	(L/s)
Orifice INV	88.22	0.00	0
Max Ponding	89.72	1.50	57.0

Inlet Control Device 110 mm**CB103B**

	Stage	h_o	Ctrl Flow
	(m)	(m)	(L/s)
Orifice INV	88.27	0.00	0
Max Ponding	89.77	1.50	30.9

5-Year Flow 74.2 L/s Per Design Sheet prepared by DSEL June 2019
 Ctrl Flow 87.9 L/s

STM104 to STM105**CB 104B****Inlet Control Device** 100 mm

	Stage	h_o	Ctrl Flow
	(m)	(m)	(L/s)
Orifice INV	86.77	0.00	0
Max Ponding	88.27	1.50	25.6

* Includes 0.08m of Flow Depth per SWMHYMO Overland Flow Analysis by DSEL (January 2019)

5-Year Flow 113.4 L/s Per Design Sheet prepared by DSEL June 2019
 Ctrl Flow 160.1 L/s

STM105 to STM106**CB103A****Inlet Control Device** 100 mm

	Stage	h_o	Ctrl Flow
	(m)	(m)	(L/s)
Orifice INV	88.27	0.00	0
Max Ponding	89.77	1.50	25.6

* Includes 0.08m of Flow Depth per SWMHYMO Overland Flow Analysis by DSEL (January 2019)

CB103**Inlet Control Device** 100 mm

	Stage	h_o	Ctrl Flow
	(m)	(m)	(L/s)
Orifice INV	88.18	0.00	0
Max Ponding	89.68	1.50	25.6

* Includes 0.08m of Flow Depth per SWMHYMO Overland Flow Analysis by DSEL (January 2019)

5-Year Flow 164.5 L/s Per Design Sheet prepared by DSEL June 2019
 Ctrl Flow 156.6 L/s

STM107 to STM108**CB107A****Inlet Control Device** 100 mm

	Stage	h _o	Ctrl Flow
	(m)	(m)	(L/s)
Orifice INV	88.89	0.00	0
Max Ponding	90.61	1.72	27.4

* Includes 0.08m of Flow Depth per SWMHYMO Overland Flow Analysis by DSEL (January 2019)

CB107B**Inlet Control Device** 100 mm

	Stage	h _o	Ctrl Flow
	(m)	(m)	(L/s)
Orifice INV	88.54	0.00	0
Max Ponding	90.15	1.61	26.5

* Includes 0.08m of Flow Depth per SWMHYMO Overland Flow Analysis by DSEL (January 2019)

CB107C**Inlet Control Device** 100 mm

	Stage	h _o	Ctrl Flow
	(m)	(m)	(L/s)
Orifice INV	88.14	0.00	0
Max Ponding	89.72	1.58	26.2

* Includes 0.08m of Flow Depth per SWMHYMO Overland Flow Analysis by DSEL (January 2019)

5-Year Flow 83.4 L/s Per Design Sheet prepared by DSEL June 2019
 Ctrl Flow 80.2 L/s

STM108 to STM109**CB108****Inlet Control Device** 150 mm

	Stage	h _o	Ctrl Flow
	(m)	(m)	(L/s)
Orifice INV	88.80	0.00	0
Max Ponding	89.34	0.54	32.6

* Includes 0.08m of Flow Depth per SWMHYMO Overland Flow Analysis by DSEL (January 2019)

5-Year Flow 278.8 L/s Per Design Sheet prepared by DSEL June 2019
 Ctrl Flow 269.3 L/s Includes All Areas

```
00001> 2 Metric units
00002> *#*****
00003> *# Project Name: [ ] Project Number: [18-946]
00004> *# Date : 2019-01-30
00005> *# Modeller : [slm]
00006> *# Company : David Schaeffer Engineering Ltd.
00007> *# License # : 4488477
00008> *#*****
00009> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[1]
00010> ["C:\SWM_PRG\STMFILS\005YC24H.stm"]
00011> *#-----|
00012> READ STORM STORM_FILENAME=["STORM.001"]
00013> *#-----|
00014> *****
00015> * Post-Development Model - Wateridge Block 15
00016> *****
00017> *****
00018> * Drainage to Rear Lane
00019> *****
00020> CALIB STANDHYD ID=[1] NHYD=["RL1"], DT=[1] (min), AREA=[0.5441] (ha),
00021> XIMP=[0.86], TIMP=[0.86], DWF=[0] (cms), LOSS=[1],
00022> Horton: Fc=[76.2] (mm/hr), Fc=[13.2] (mm/hr),
00023> DCAY=[4.14] (/hr), F=[0] (mm),
00024> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[2.0] (%),
00025> LGP=[10] (m), MNP=[0.25], SCP=[0] (min),
00026> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.5] (%),
00027> LGI=[250] (m), MNI=[0.013], SCI=[0] (min)
00028> RAINFALL=[ , , , ] (mm/hr) , END=-1
00029> *#-----|
00030> *#-----|
00031> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
00032> COMPUTE DUALHYD IDIN=[1], CINLET=[0.119] (cms), NINLET=[1],
00033> MAJID=[2], MAJNHYD=["MAJOR"],
00034> MINID=[4], MINNHYD=["MINOR"],
00035> TMJSTO=[0] (cu-m)
00036> *#-----|
00037> * Rear Lane Cross Section
00038> ROUTE CHANNEL IDout=[3], NHYD=["LANE"], IDin=[2],
00039> RDT=[1] (min),
00040> CHLGTH=[20] (m), CHSLOPE=[0.5] (%),
00041> FPSLOPE=[0.5] (%),
00042> SECNUM=[15.1], NSEGE=[1]
00043> ( SEGROUGH, SEGDIST (m))=[0.013, 11.51] NSEG times
00044> ( DISTANCE (m), ELEVATION (m))=[0 , 100.00]
00045> [0.01 , 99.85]
00046> [6.5 , 99.77]
00047> [6.51 , 99.85]
00048> [11.51 , 100.17]
00049> *****
00050> *****
00051> * Remaining Drainage Area to Squadron Cres.
00052> *****
00053> CALIB STANDHYD ID=[1] NHYD=["A1"], DT=[1] (min), AREA=[0.7677] (ha),
00054> XIMP=[0.86], TIMP=[0.86], DWF=[0] (cms), LOSS=[1],
00055> Horton: Fc=[76.2] (mm/hr), Fc=[13.2] (mm/hr),
00056> DCAY=[4.14] (/hr), F=[0] (mm),
00057> Pervious surfaces: IAPER=[4.67] (mm), SLPP=[2.0] (%),
00058> LGP=[10] (m), MNP=[0.25], SCP=[0] (min),
00059> Impervious surfaces: IAIMP=[1.57] (mm), SLPI=[0.5] (%),
00060> LGI=[150] (m), MNI=[0.013], SCI=[0] (min)
00061> RAINFALL=[ , , , ] (mm/hr) , END=-1
00062> *#-----|
00063> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
00064> COMPUTE DUALHYD IDIN=[1], CINLET=[0.163] (cms), NINLET=[1],
00065> MAJID=[2], MAJNHYD=["MAJOR"],
00066> MINID=[4], MINNHYD=["MINOR"],
00067> TMJSTO=[0] (cu-m)
00068> *#-----|
00069> ADD HYD IDsum=[1], NHYD=["Total"], IDs to add=[2+3]
00070> *#-----|
00071> * Cross Section at Site Entrance (Squadron Cres.)
00072> ROUTE CHANNEL IDout=[3], NHYD=["ROAD"], IDin=[1],
00073> RDT=[1] (min),
00074> CHLGTH=[10] (m), CHSLOPE=[2] (%),
00075> FPSLOPE=[2] (%),
00076> SECNUM=[15.2], NSEGE=[1]
00077> ( SEGROUGH, SEGDIST (m))=[0.013, 6.51] NSEG times
00078> ( DISTANCE (m), ELEVATION (m))=[0 , 100.00]
00079> [0.01 , 99.85]
00080> [6.5 , 99.77]
00081> [6.51 , 99.92]
00082> *****
00083> *****
00084> *****
00085> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[2]
00086> ["C:\SWM_PRG\STMFILS\100YC24H.stm"]
00087> *#-----|
00088> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[3]
00089> ["C:\SWM_PRG\STMFILS\CH4H100x.stm"]
00090> *#-----|
00091> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[4]
00092> ["C:\SWM_PRG\STMFILS\CH6H100x.stm"]
00093> *#-----|
00094> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[5]
00095> ["C:\SWM_PRG\STMFILS\100YC12H.stm"]
00096> *#-----|
00097> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[6]
00098> ["C:\SWM_PRG\STMFILS\19790701.stm"]
00099> *#-----|
00100> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[7]
00101> ["C:\SWM_PRG\STMFILS\19880804.stm"]
00102> *#-----|
00103> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[8]
00104> ["C:\SWM_PRG\STMFILS\19960808.stm"]
00105> *#-----|
00106> *****
00107> *****
00108> *****
00109> *****
00110> FINISH
00111> *****
00112> *****
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00001>
00002>
00003> SSSSS W W M M H H Y Y M M O O 999 999
00004> S W W M M M H H Y Y M M O O 9 9 9 9
00005> SSSSS W W W M M M H H H H Y Y M M O O ## 9 9 9 9 Ver 4.05
00006> S W W M M M H H Y Y M M O O 9999 9999 Sept 2011
00007> SSSSS W W M M H H Y Y M M O O 9 9 9
00008>
00009> StormWater Management Hydrologic Model 999 999
00010>
00011>
00012> ***** SWMHYMO Ver/4.05 *****
00013> ***** A single event and continuous hydrologic simulation model *****
00014> ***** based on the principles of HYMO and its successors *****
00015> ***** OTTHYMO-83 and OTTHYMO-89. *****
00016> *****
00017> ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00018> ***** Ottawa, Ontario: (613) 836-3884 *****
00019> ***** Gatineau, Quebec: (819) 243-6858 *****
00020> ***** E-Mail: swmhymo@jfsa.com *****
00021>
00022>
00023>
00024> ***** Licensed user: David Schaeffer Engineering Ltd. *****
00025> ***** Stittsville SERIAL#:4488477 *****
00026> *****
00027>
00028> *****
00029> ***** PROGRAM ARRAY DIMENSIONS *****
00030> ***** Maximum value for ID numbers : 10 *****
00031> ***** Max. number of rainfall points: 105408 *****
00032> ***** Max. number of flow points : 105408 *****
00033> *****
00034>
00035>
00036> ***** DETAILED OUTPUT *****
00037>
00038> * DATE: 2019-01-30 TIME: 16:07:59 RUN COUNTER: 000588 *
00039>
00040> * Input filename: C:\SWM_PRG\17-918\Block15\post.DAT *
00041> * Output filename: C:\SWM_PRG\17-918\Block15\post.out *
00042> * Summary filename: C:\SWM_PRG\17-918\Block15\post.sum *
00043> * User comments: *
00044> * 1: *
00045> * 2: *
00046> * 3: *
00047>
00048>
00049>
00050> 001:0001-----
00051> *#-----
00052> *# Project Name: [ Project Number: [18-946]
00053> *# Date : 2019-01-30
00054> *# Modeler : [slm]
00055> *# Company : David Schaeffer Engineering Ltd.
00056> *# License # : 4488477
00057> *#-----
00058>
00059> | START | Project dir.: C:\SWM_PRG\17-918\Block15\
00060> | Rainfall dir.: C:\SWM_PRG\17-918\Block15\
00061> | TZERO = .00 hrs on 0
00062> | METOUT= 2 (output = METRIC)
00063> | NRUN = 001
00064> | NSTORM= 1
00065> | # 1=C:\SWM_PRG\STMFIL\005Y24H.stm
00066>
00067> 001:0002-----
00068>
00069> | READ STORM | Filename: 5-Year 24-Hour Chicago Storm, 10 min Tim
00070> | Ptotal= 64.13 mm | Comments: 5-Year 24-Hour Chicago Storm, 10 min Tim
00071>
00072> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00073> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00074> .17 .520 | 6.17 1.780 | 12.17 1.570 | 18.17 .740
00075> .33 .530 | 6.33 1.940 | 12.33 1.510 | 18.33 .730
00076> .50 .540 | 6.50 2.130 | 12.50 1.470 | 18.50 .720
00077> .67 .550 | 6.67 2.370 | 12.67 1.420 | 18.67 .710
00078> .83 .560 | 6.83 2.680 | 12.83 1.380 | 18.83 .700
00079> 1.00 .570 | 7.00 3.100 | 13.00 1.340 | 19.00 .690
00080> 1.17 .580 | 7.17 3.680 | 13.17 1.300 | 19.17 .680
00081> 1.33 .590 | 7.33 4.580 | 13.33 1.270 | 19.33 .670
00082> 1.50 .600 | 7.50 6.150 | 13.50 1.240 | 19.50 .660
00083> 1.67 .620 | 7.67 9.610 | 13.67 1.200 | 19.67 .660
00084> 1.83 .630 | 7.83 24.170 | 13.83 1.170 | 19.83 .650
00085> 2.00 .640 | 8.00 104.190 | 14.00 1.150 | 20.00 .640
00086> 2.17 .660 | 8.17 32.040 | 14.17 1.120 | 20.17 .630
00087> 2.33 .680 | 8.33 16.340 | 14.33 1.100 | 20.33 .630
00088> 2.50 .690 | 8.50 10.960 | 14.50 1.070 | 20.50 .620
00089> 2.67 .710 | 8.67 8.290 | 14.67 1.050 | 20.67 .610
00090> 2.83 .730 | 8.83 6.690 | 14.83 1.030 | 20.83 .610
00091> 3.00 .750 | 9.00 6.630 | 15.00 1.010 | 21.00 .600
00092> 3.17 .770 | 9.17 4.870 | 15.17 .990 | 21.17 .590
00093> 3.33 .800 | 9.33 4.300 | 15.33 .970 | 21.33 .590
00094> 3.50 .820 | 9.50 3.860 | 15.50 .950 | 21.50 .580
00095> 3.67 .850 | 9.67 3.510 | 15.67 .930 | 21.67 .580
00096> 3.83 .880 | 9.83 3.220 | 15.83 .920 | 21.83 .570
00097> 4.00 .910 | 10.00 2.980 | 16.00 .900 | 22.00 .560
00098> 4.17 .940 | 10.17 2.770 | 16.17 .880 | 22.17 .560
00099> 4.33 .980 | 10.33 2.600 | 16.33 .870 | 22.33 .550
00100> 4.50 1.020 | 10.50 2.440 | 16.50 .860 | 22.50 .550
00101> 4.67 1.060 | 10.67 2.310 | 16.67 .840 | 22.67 .540
00102> 4.83 1.110 | 10.83 2.190 | 16.83 .830 | 22.83 .540
00103> 5.00 1.160 | 11.00 2.080 | 17.00 .820 | 23.00 .530
00104> 5.17 1.220 | 11.17 1.990 | 17.17 .800 | 23.17 .530
00105> 5.33 1.280 | 11.33 1.900 | 17.33 .790 | 23.33 .520
00106> 5.50 1.360 | 11.50 1.820 | 17.50 .780 | 23.50 .520
00107> 5.67 1.440 | 11.67 1.750 | 17.67 .770 | 23.67 .510
00108> 5.83 1.540 | 11.83 1.680 | 17.83 .760 | 23.83 .510
00109> 6.00 1.650 | 12.00 1.620 | 18.00 .750 | 24.00 .510
00110>
00111>
00112> 001:0003-----
00113> *****
00114> * Post-Development Model - Wateridge Block 15
00115> *****
00116> *****
00117> * Drainage to Rear Lane
00118> *****
00119>
00120> | CALIB STANDHYD | Area (ha)= .54
00121> | 01:RL1 DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00
00122>
00123> IMPERVIOUS PERVIOUS (i)
00124> Surface Area (ha)= .47 .08
00125> Dep. Storage (mm)= 1.57 4.67
00126> Average Slope (%)= .50 2.00
00127> Length (m)= 250.00 10.00
00128> Mannings n = .013 .250
00129>

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00130> Max.eff.Inten.(mm/hr)= 104.19 70.88
00131> over (min) 5.00 9.00
00132> Storage Coeff. (min)= 5.36 (ii) 8.89 (ii)
00133> Unit Hyd. Tpeak (min)= 5.00 9.00
00134> Unit Hyd. peak (cms)= .22 .13
00135>
00136> PEAK FLOW (cms)= .11 .01 .119 (iii)
00137> TIME TO PEAK (hrs)= 8.02 8.08 8.017
00138> RUNOFF VOLUME (mm)= 62.55 13.08 55.630
00139> TOTAL RAINFALL (mm)= 64.13 64.13 64.127
00140> RUNOFF COEFFICIENT = .98 .20 .867
00141>
00142> (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00143> Fo (mm/hr)= 76.20 K (1/hr)= 4.14
00144> Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
00145> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00146> THAN THE STORAGE COEFFICIENT.
00147> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00148>
00149>
00150> 001:0004-----
00151> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
00152>
00153> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .119 (cms)
00154> | TotalHyd 01:RL1 | Number of inlets in system [NINLET] = 1
00155> |-----| Total minor system capacity = .119 (cms)
00156> | Total major system storage [TMJSTO] = 0 (cu.m.)
00157>
00158> ID: NHYD AREA QPEAK TPEAK R.V. DWF
00159> (ha) (cms) (hrs) (mm) (cms)
00160> TOTAL HYD. 01:RL1 .54 .119 8.017 55.630 .000
00161>
00162> MAJOR SYST 02:MAJOR .00 .000 .000 .000 .000
00163> MINOR SYST 04:MINOR .54 .119 8.017 55.630 .000
00164>
00165> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00166>
00167>
00168> 001:0005-----
00169> * Rear Lane Cross Section
00170>
00171> | ROUTE CHANNEL | Routing time step (min) = 1.00
00172> | IN: 02:MAJOR | Number of SEGMENTS = 1
00173> | OUT: 03:LANE | Slopes (%), CHANNEL=.50 FLOODPLAIN=.50
00174> | LENGTH = 20.00 (m)
00175>
00176> <----- DATA FOR SECTION ( 15.1) ----->
00177> Distance Elevation Manning
00178> .00 100.00 .0130
00179> .01 99.85 .0130
00180> 6.50 99.77 .0130
00181> 6.51 99.85 .0130
00182> 11.51 100.17 .0130
00183>
00184> <----- TRAVEL TIME TABLE ----->
00185> DEPTH ELEV X-VOLUME S-VOLUME FLOW RATE VELOCITY TRAV.TIME D x v
00186> (m) (m) (cu.m.) (cu.m.) (cms) (m/s) (min) (m2/s)
00187> .012 99.782 .119E+00 .720E-02 .001 .179 1.86 .002
00188> .024 99.794 .476E+00 .576E-01 .007 .285 1.17 .007
00189> .036 99.806 .107E+01 .194E+00 .027 .373 .89 .014
00190> .048 99.818 .190E+01 .461E+00 .043 .452 .74 .022
00191> .061 99.831 .297E+01 .900E+00 .078 .524 .64 .032
00192> .073 99.843 .428E+01 .156E+01 .127 .592 .56 .043
00193> .085 99.855 .582E+01 .246E+01 .196 .675 .49 .057
00194> .097 99.867 .743E+01 .360E+01 .289 .779 .43 .075
00195> .109 99.879 .909E+01 .494E+01 .397 .874 .38 .095
00196> .121 99.891 .108E+02 .653E+01* .519 .962 .35 .116
00197> .133 99.903 .125E+02 .835E+01* .655 1.045 .32 .139
00198> .145 99.915 .143E+02 .104E+02* .805 1.122 .30 .163
00199> .157 99.927 .162E+02 .127E+02* .968 1.195 .28 .188
00200> .169 99.939 .181E+02 .153E+02* 1.144 1.265 .26 .214
00201> .182 99.952 .200E+02 .182E+02* 1.333 1.332 .25 .242
00202> .194 99.964 .220E+02 .213E+02* 1.535 1.396 .24 .270
00203> .206 99.976 .240E+02 .247E+02* 1.750 1.457 .23 .300
00204> .218 99.988 .261E+02 .284E+02* 1.979 1.516 .22 .330
00205> .230 100.000 .282E+02 .324E+02* 2.220 1.573 .21 .362
00206>
00207> X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00208> S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00209> (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.
00210>
00211>
00212> *** WARNING: Inflow hydrograph is dry! Routing not done!
00213>
00214>
00215> 001:0006-----
00216> *****
00217> * Remaining Drainage Area to Squadron Cres.
00218> *****
00219>
00220> | CALIB STANDHYD | Area (ha)= .77
00221> | 01:AL DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00
00222>
00223> IMPERVIOUS PERVIOUS (i)
00224> Surface Area (ha)= .66 .11
00225> Dep. Storage (mm)= 1.57 4.67
00226> Average Slope (%)= .50 2.00
00227> Length (m)= 150.00 10.00
00228> Mannings n = .013 .250
00229>
00230> Max.eff.Inten.(mm/hr)= 104.19 72.34
00231> over (min) 4.00 7.00
00232> Storage Coeff. (min)= 3.95 (ii) 7.44 (ii)
00233> Unit Hyd. Tpeak (min)= 4.00 7.00
00234> Unit Hyd. peak (cms)= .28 .16
00235>
00236> PEAK FLOW (cms)= .17 .01 .184 (iii)
00237> TIME TO PEAK (hrs)= 8.00 8.05 8.000
00238> RUNOFF VOLUME (mm)= 62.55 13.08 55.630
00239> TOTAL RAINFALL (mm)= 64.13 64.13 64.127
00240> RUNOFF COEFFICIENT = .98 .20 .867
00241>
00242> (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00243> Fo (mm/hr)= 76.20 K (1/hr)= 4.14
00244> Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
00245> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00246> THAN THE STORAGE COEFFICIENT.
00247> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00248>
00249>
00250> 001:0007-----
00251> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
00252>
00253> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .163 (cms)
00254> | TotalHyd 01:AL | Number of inlets in system [NINLET] = 1
00255> |-----| Total minor system capacity = .163 (cms)
00256> | Total major system storage [TMJSTO] = 0 (cu.m.)
00257>
00258> ID: NHYD AREA QPEAK TPEAK R.V. DWF

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00259>          TOTAL HYD. 01:AL          (ha)      (cms)      (hrs)      (mm)      (cms)
00260>          .77      .184      8.000      55.630      .000
00261>-----
00262> MAJOR SYST 02:MAJOR          .01      .021      8.000      55.630      .000
00263> MINOR SYST 04:MINOR          .06      .163      7.967      55.630      .000
00264>-----
00265> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00266>-----
00267> 001:0008-----
00268>-----
00269>-----
00270> | ADD HYD (Total) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
00271> | (ha)      (cms)      (hrs)      (mm)      (cms)
00272> | ID1 02:MAJOR          .01      .021      8.00      55.63      .000
00273> | +ID2 03:LANE          .00      .000      .00      .00      .000
00274>-----
00275> | SUM 01:Total          .01      .021      8.00      55.63      .000
00276>-----
00277> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00278>-----
00279>-----
00280> 001:0009-----
00281> * Cross Section at Site Entrance (Squadron Cres.)
00282>-----
00283> | ROUTE CHANNEL | Routing time step (min) = 1.00
00284> | IN< 01:Total | Number of SEGMENTS = 1
00285> | OUT< 03:ROAD | Slopes (%), CHANNEL=2.00 FLOODPLAIN=2.00
00286>-----
00287> | LENGTH = 10.00 (m)
00288>-----
00289> <----- DATA FOR SECTION ( 15.2) ----->
00290> Distance      Elevation      Manning
00291> .00      100.00      .0130
00292> .01      99.85      .0130
00293> 6.50      99.77      .0130
00294> 6.51      99.92      .0130
00295>-----
00296> <----- TRAVEL TIME TABLE ----->
00297> DEPTH      ELEV      X-VOLUME      S-VOLUME      FLOW RATE      VELOCITY      TRAV.TIME      D x V
00298> (m)      (m)      (cu.m.)      (cu.m.)      (cms)      (m/s)      (min)      (m2/s)
00299> .008      99.778      .253E+01      .500E+03      .001      .270      .62      .002
00300> .016      99.786      .101E+00      .400E+02      .004      .428      .39      .007
00301> .024      99.794      .228E+00      .135E+01      .013      .561      .30      .013
00302> .032      99.802      .405E+00      .320E+01      .028      .680      .25      .021
00303> .039      99.809      .633E+00      .625E+01      .050      .789      .21      .031
00304> .047      99.817      .911E+00      .108E+00      .081      .891      .19      .042
00305> .055      99.825      .124E+01      .171E+00      .122      .987      .17      .055
00306> .063      99.833      .162E+01      .256E+00      .175      1.079      .15      .068
00307> .071      99.841      .205E+01      .364E+00      .239      1.167      .14      .083
00308> .079      99.849      .253E+01      .500E+00      .317      1.252      .13      .099
00309> .087      99.857      .304E+01      .661E+00      .427      1.401      .12      .122
00310> .095      99.865      .356E+01      .843E+00      .552      1.552      .11      .147
00311> .103      99.873      .407E+01      .104E+01      .690      1.695      .10      .174
00312> .111      99.881      .458E+01      .127E+01      .840      1.832      .09      .203
00313> .118      99.888      .510E+01      .151E+01      1.001      1.963      .08      .233
00314> .126      99.896      .561E+01      .177E+01      1.173      2.090      .08      .264
00315> .134      99.904      .612E+01      .206E+01      1.355      2.212      .08      .297
00316> .142      99.912      .664E+01      .236E+01      1.547      2.330      .07      .331
00317> .150      99.920      .715E+01      .268E+01      1.749      2.445      .07      .367
00318> X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00319> S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00320>-----
00321> <----- hydrograph -----> <-pipe / channel->
00322> AREA      QPEAK      TPEAK      R.V.      MAX DEPTH      MAX VEL
00323> (ha)      (cms)      (hrs)      (mm)      (m)      (m/s)
00324> INFLOW : ID= 1:Total          .01      .021      8.00      55.630      .028      .621
00325> OUTFLOW: ID= 3:ROAD          .01      .021      8.02      55.630      .028      .624
00326>-----
00327>-----
00328>-----
00329> 001:0010-----
00330>-----
00331>-----
00332> ** END OF RUN : 1
00333>-----
00334>-----
00335>-----
00336>-----
00337>-----
00338>-----
00339>-----
00340>-----
00341> | START | Project dir.: C:\SWM_PRG\17-918\Block15\
00342> | ZERO = .00 hrs | Rainfall dir.: C:\SWM_PRG\17-918\Block15\
00343> | METOUT= 2 (output= METRIC)
00344> | NRUN = 002
00345> | NSTORM= 1
00346>-----
00347> # 1=C:\SWM_PRG\STMFIL\100YC24H.stm
00348>-----
00349> 002:0002-----
00350>-----
00351> *# Project Name: [ ] Project Number: [18-946]
00352> *# Date : 2019-01-30
00353> *# Modeller : [slm]
00354> *# Company : David Schaeffer Engineering Ltd.
00355> *# License # : 4488477
00356>-----
00357>-----
00358> 002:0002-----
00359>-----
00360> | READ STORM | Filename: 100-Year 24-Hour Chicago Storm, 10 min T
00361> | Ptotal= 106.74 mm | Comments: 100-Year 24-Hour Chicago Storm, 10 min T
00362>-----
00363> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00364> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00365> .17 .830 | 6.17 2.900 | 12.17 2.550 | 18.17 1.190
00366> .33 .850 | 6.33 3.160 | 12.33 2.460 | 18.33 1.170
00367> .50 .860 | 6.50 3.480 | 12.50 2.380 | 18.50 1.160
00368> .67 .880 | 6.67 3.880 | 12.67 2.310 | 18.67 1.140
00369> .83 .900 | 6.83 4.390 | 12.83 2.240 | 18.83 1.130
00370> 1.00 .910 | 7.00 5.070 | 13.00 2.180 | 19.00 1.110
00371> 1.17 .930 | 7.17 6.050 | 13.17 2.120 | 19.17 1.100
00372> 1.33 .950 | 7.33 7.540 | 13.33 2.060 | 19.33 1.090
00373> 1.50 .970 | 7.50 10.160 | 13.50 2.010 | 19.50 1.070
00374> 1.67 .990 | 7.67 15.970 | 13.67 1.960 | 19.67 1.060
00375> 1.83 1.020 | 7.83 40.650 | 13.83 1.910 | 19.83 1.050
00376> 2.00 1.040 | 8.00 178.560 | 14.00 1.860 | 20.00 1.040
00377> 2.17 1.070 | 8.17 54.050 | 14.17 1.820 | 20.17 1.020
00378> 2.33 1.090 | 8.33 27.320 | 14.33 1.780 | 20.33 1.010
00379> 2.50 1.120 | 8.50 18.240 | 14.50 1.740 | 20.50 1.000
00380> 2.67 1.150 | 8.67 13.740 | 14.67 1.700 | 20.67 .990
00381> 2.83 1.180 | 8.83 11.060 | 14.83 1.670 | 20.83 .980
00382> 3.00 1.210 | 9.00 9.290 | 15.00 1.630 | 21.00 .970
00383> 3.17 1.250 | 9.17 8.020 | 15.17 1.600 | 21.17 .960
00384> 3.33 1.290 | 9.33 7.080 | 15.33 1.570 | 21.33 .950
00385> 3.50 1.330 | 9.50 6.350 | 15.50 1.540 | 21.50 .940
00386> 3.67 1.370 | 9.67 5.760 | 15.67 1.510 | 21.67 .930
00387> 3.83 1.420 | 9.83 5.280 | 15.83 1.480 | 21.83 .920

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00388> 4.00 1.470 | 10.00 4.880 | 16.00 1.460 | 22.00 .910
00389> 4.17 1.520 | 10.17 4.540 | 16.17 1.430 | 22.17 .900
00390> 4.33 1.580 | 10.33 4.250 | 16.33 1.410 | 22.33 .890
00391> 4.50 1.650 | 10.50 3.990 | 16.50 1.390 | 22.50 .880
00392> 4.67 1.720 | 10.67 3.770 | 16.67 1.360 | 22.67 .880
00393> 4.83 1.800 | 10.83 3.570 | 16.83 1.340 | 22.83 .870
00394> 5.00 1.880 | 11.00 3.400 | 17.00 1.320 | 23.00 .860
00395> 5.17 1.980 | 11.17 3.240 | 17.17 1.300 | 23.17 .850
00396> 5.33 2.090 | 11.33 3.100 | 17.33 1.280 | 23.33 .840
00397> 5.50 2.210 | 11.50 2.970 | 17.50 1.260 | 23.50 .840
00398> 5.67 2.340 | 11.67 2.850 | 17.67 1.240 | 23.67 .830
00399> 5.83 2.500 | 11.83 2.740 | 17.83 1.230 | 23.83 .820
00400> 6.00 2.690 | 12.00 2.640 | 18.00 1.210 | 24.00 .810
00401>-----
00402>-----
00403> 002:0003-----
00404>-----
00405> * Post-Development Model - Wateridge Block 15
00406>-----
00407>-----
00408> * Drainage to Rear Lane
00409>-----
00410>-----
00411> | CALIB STANDHYD | Area (ha)= .54
00412> | 01:RL1 DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00
00413>-----
00414> IMPERVIOUS PERVIOUS (i)
00415> Surface Area (ha)= .47 .08
00416> Dep. Storage (mm)= 1.57 4.67
00417> Average Slope (%)= .50 2.00
00418> Length (m)= 250.00 10.00
00419> Mannings n = .013 .250
00420>-----
00421> Max.eff.Inten.(mm/hr)= 178.56 158.66
00422> over (min)= 4.00 7.00
00423> Storage Coeff. (min)= 4.32 (ii) 6.88 (ii)
00424> Unit Hyd. Tpeak (min)= 4.00 7.00
00425> Unit Hyd. peak (cms)= .27 .16
00426>-----
00427> PEAK FLOW (cms)= .20 .02 *.TOTALS*
00428> TIME TO PEAK (hrs)= 8.00 8.05
00429> RUNOFF VOLUME (mm)= 105.16 37.31 95.671
00430> TOTAL RAINFALL (mm)= 106.74 106.74 106.742
00431> RUNOFF COEFFICIENT = .99 .35 .896
00432>-----
00433> (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00434> Fo (mm/hr)= 76.20 K (l/hr)= 4.14
00435> Fc (mm/hr)= 13.20 Cum.Inf. .00
00436> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00437> THAN THE STORAGE COEFFICIENT.
00438> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00439>-----
00440>-----
00441> 002:0004-----
00442> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
00443>-----
00444> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .119 (cms)
00445> | TotalHyd 01:RL1 | Number of inlets in system [NINLET] = 1
00446>-----
00447> | Total minor system capacity = .119 (cms)
00448> | Total major system storage [TMJSTO] = 0 (cu.m.)
00449>-----
00450> ID: NHYD AREA QPEAK TPEAK R.V. DWF
00451> (m) (ha) (cms) (hrs) (mm) (cms)
00452> TOTAL HYD. 01:RL1 .54 .226 8.017 95.671 .000
00453>-----
00454> MAJOR SYST 02:MAJOR .06 .107 8.017 95.671 .000
00455> MINOR SYST 04:MINOR .49 .119 7.900 95.671 .000
00456>-----
00457> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00458>-----
00459>-----
00460> * Rear Lane Cross Section
00461>-----
00462> | ROUTE CHANNEL | Routing time step (min) = 1.00
00463> | IN< 02:MAJOR | Number of SEGMENTS = 1
00464> | OUT< 03:LANE | Slopes (%), CHANNEL= .50 FLOODPLAIN= .50
00465>-----
00466> | LENGTH = 20.00 (m)
00467>-----
00468> <----- DATA FOR SECTION ( 15.1) ----->
00469> Distance      Elevation      Manning
00470> .00      100.00      .0130
00471> .01      99.85      .0130
00472> 6.50      99.77      .0130
00473> 6.51      99.85      .0130
00474> 11.51      100.17      .0130
00475>-----
00476> <----- TRAVEL TIME TABLE ----->
00477> DEPTH      ELEV      X-VOLUME      S-VOLUME      FLOW RATE      VELOCITY      TRAV.TIME      D x V
00478> (m)      (m)      (cu.m.)      (cu.m.)      (cms)      (m/s)      (min)      (m2/s)
00479> .024      99.782      .119E+00      .720E+02      .001      .179      .62      .002
00480> .036      99.806      .107E+01      .194E+00      .020      .373      .89      .014
00481> .048      99.818      .190E+01      .461E+00      .043      .452      .74      .022
00482> .061      99.831      .297E+01      .900E+00      .078      .524      .64      .032
00483> .073      99.843      .428E+01      .156E+01      .127      .592      .56      .043
00484> .085      99.855      .582E+01      .246E+01      .196      .675      .49      .057
00485> .097      99.867      .743E+01      .360E+01      .289      .779      .43      .075
00486> .109      99.879      .909E+01      .495E+01*      .397      .874      .38      .095
00487> .121      99.891      .108E+02      .653E+01*      .519      .962      .35      .116
00488> .133      99.903      .125E+02      .835E+01*      .655      1.045      .32      .139
00489> .145      99.915      .143E+02      .104E+02*      .805      1.122      .30      .163
00490> .157      99.927      .162E+02      .127E+02*      .968      1.195      .28      .188
00491> .169      99.939      .181E+02      .153E+02*      1.144      1.265      .26      .214
00492> .182      99.952      .200E+02      .182E+02*      1.333      1.332      .25      .242
00493> .194      99.964      .220E+02      .213E+02*      1.535      1.396      .24      .270
00494> .206      99.976      .240E+02      .247E+02*      1.750      1.457      .23      .300
00495> .218      99.988      .261E+02      .284E+02*      1.979      1.516      .22      .330
00496> .230      100.000      .282E+02      .324E+02*      2.220      1.573      .21      .362
00497>-----
00498> X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00499> S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00500> (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.
00501>-----
00502> <----- hydrograph -----> <-pipe / channel->
00503> AREA      QPEAK      TPEAK      R.V.      MAX DEPTH      MAX VEL
00504> (ha)      (cms)      (hrs)      (mm)      (m)      (m/s)
00505> INFLOW : ID= 2:MAJOR          .06 .107 8.02 95.671 .068 .563
00506> OUTFLOW: ID= 3:LANE          .06 .107 8.02 95.671 .068 .563
00507>-----
00508>-----
00509>-----
00510> 002:0006-----
00511>-----
00512> * Remaining Drainage Area to Squadron Cres.
00513>-----
00514>-----
00515> | CALIB STANDHYD | Area (ha)= .77
00516> | 01:AL DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00

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00517> -----
00518> IMPERVIOUS PERVIOUS (i)
00519> Surface Area (ha)= .66 .11
00520> Dep. Storage (mm)= 1.57 4.67
00521> Average Slope (%)= .50 2.00
00522> Length (m)= 150.00 10.00
00523> Mannings n = .013 .250
00524>
00525> Max.eff.Inten.(mm/hr)= 178.56 158.91
00526> Storage Coeff. (min)= 3.00 6.00
00527> Unit Hyd. Tpeak (min)= 3.18 (ii) 5.73 (ii)
00528> Unit Hyd. Tpeak (min)= 3.00 6.00
00529> Unit Hyd. peak (cms)= .36 .19
00530>
00531> *TOTALS*
00532> PEAK FLOW (cms)= .31 .04 .345 (iii)
00533> TIME TO PEAK (hrs)= 8.00 8.03 8.000
00534> RUNOFF VOLUME (mm)= 105.16 37.31 95.671
00535> TOTAL RAINFALL (mm)= 106.74 106.74 106.742
00536> RUNOFF COEFFICIENT = .99 .35 .896
00537>
00538> (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00539> Fo (mm/hr)= 76.20 K (1/hr)= 4.14
00540> Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
00541> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00542> THAN THE STORAGE COEFFICIENT.
00543> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00544>
00545> 002:0007-----
00546> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
00547>
00548> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .163 (cms)
00549> | TotalHyd 01:Al | Number of inlets in system [NINLET] = 1
00550> | MINOR SYST 04:MINOR | Total minor system capacity = .163 (cms)
00551> | TOTAL MAJOR SYST 02:MAJOR | Total major system storage [TMJSTO] = 0.(cu.m.)
00552>
00553> ID: NHYD AREA QPEAK TPEAK R.V. DWF
00554> (ha) (cms) (hrs) (mm) (cms)
00555> TOTAL HYD. 01:Al .77 .345 8.000 95.671 .000
00556>
00557> MAJOR SYST 02:MAJOR .09 .182 8.000 95.671 .000
00558> MINOR SYST 04:MINOR .67 .163 7.883 95.671 .000
00559>
00560> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00561>
00562>
00563> 002:0008-----
00564>
00565> | ADD HYD (Total) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00566> (ha) (cms) (hrs) (mm) (cms)
00567> ID1 02:MAJOR .09 .182 8.000 95.67 .000
00568> +ID2 03:LANE .06 .107 8.02 95.67 .000
00569>
00570> SUM 01:Total .15 .285 8.00 95.67 .000
00571>
00572> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00573>
00574>
00575> 002:0009-----
00576> * Cross Section at Site Entrance (Squadron Cres.)
00577>
00578> | ROUTE CHANNEL | Routing time step (min) = 1.00
00579> | IN> 01:Total | Number of SEGMENTS = 1
00580> | OUT< 03:ROAD | Slopes (%), CHANNEL=2.00 FLOODPLAIN=2.00
00581> | LENGTH = 10.00 (m)
00582>
00583> <----- DATA FOR SECTION ( 15.2) ----->
00584> Distance Elevation Manning
00585> .00 100.00 .0130
00586> .01 99.85 .0130
00587> 6.50 99.77 .0130
00588> 6.51 99.92 .0130
00589>
00590> <----- TRAVEL TIME TABLE ----->
00591> DEPTH ELEV X-VOLUME S-VOLUME FLOW RATE VELOCITY TRAV.TIME D x V
00592> (m) (m) (cu.m.) (cu.m.) (cms) (m/s) (min) (m2/s)
00593> .008 99.778 .253E+01 .500E+03 .001 .270 .62 .002
00594> .016 99.786 .101E+00 .400E+02 .004 .428 .39 .007
00595> .024 99.794 .228E+00 .135E+01 .013 .561 .30 .013
00596> .032 99.802 .405E+00 .320E+01 .028 .680 .25 .021
00597> .039 99.809 .633E+00 .625E+01 .050 .789 .21 .031
00598> .047 99.817 .911E+00 .108E+02 .081 .891 .19 .042
00599> .055 99.825 .124E+01 .171E+02 .122 .987 .17 .055
00600> .063 99.833 .162E+01 .256E+02 .175 1.079 .15 .068
00601> .071 99.841 .205E+01 .364E+02 .229 1.167 .14 .083
00602> .079 99.849 .253E+01 .500E+02 .317 1.252 .13 .099
00603> .087 99.857 .304E+01 .661E+02 .427 1.401 .12 .122
00604> .095 99.865 .356E+01 .843E+02 .552 1.552 .11 .147
00605> .103 99.873 .407E+01 .104E+03 .690 1.695 .10 .174
00606> .111 99.881 .458E+01 .127E+03 .840 1.832 .09 .203
00607> .118 99.888 .510E+01 .151E+03 1.001 1.963 .08 .233
00608> .126 99.896 .561E+01 .177E+03 1.173 2.090 .08 .264
00609> .134 99.904 .612E+01 .206E+03 1.355 2.212 .08 .297
00610> .142 99.912 .664E+01 .236E+03 1.547 2.330 .07 .331
00611> .150 99.920 .715E+01 .268E+03 1.749 2.445 .07 .367
00612>
00613> X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00614> S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00615>
00616> <----- hydrograph -----> <-pipe / channel->
00617> AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEL
00618> (ha) (cms) (hrs) (mm) (m) (m/s)
00619> INFLOW : ID= 1:Total .15 .285 8.00 95.671 .076 1.215
00620> OUTFLOW: ID= 3:ROAD .15 .283 8.00 95.671 .075 1.213
00621>
00622>
00623>
00624> 002:0010-----
00625>
00626>
00627>
00628> 002:0002-----
00629> ** END OF RUN : 2
00630>
00631>
00632>
00633>
00634>
00635>
00636>
00637>
00638> | START | Project dir.: C:\SWM_FPG\17-918\Block15\
00639> | Rainfall dir.: C:\SWM_FPG\17-918\Block15\
00640> TZERO = .00 hrs on 0
00641> METOUT= 2 (output = METRIC)
00642> NRUN = 003
00643> NSTORM= 1
00644> # 1=C:\SWM_FPG\STMF\FILES\CH4H100x.stm
00645>

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00646> 003:0002-----
00647> *****
00648> *# Project Name: [ ] Project Number: [18-946]
00649> *# Date : 2019-01-30
00650> *# Modeller : [slm]
00651> *# Company : David Schaeffer Engineering Ltd.
00652> *# License # : 4488477
00653> *****
00654>
00655> 003:0002-----
00656>
00657> | READ STORM | Filename: 100 years Chicago Storm 4 Hours step 10
00658> | Ptotal= 76.00 mm | Comments: 100 years Chicago Storm 4 Hours step 10
00659>
00660> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00661> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00662> .17 4.390 | 1.17 40.670 | 2.17 11.050 | 3.17 5.280
00663> .33 5.080 | 1.33 178.560 | 2.33 9.280 | 3.33 4.880
00664> .50 6.050 | 1.50 54.040 | 2.50 8.020 | 3.50 4.540
00665> .67 7.550 | 1.67 27.310 | 2.67 7.080 | 3.67 4.240
00666> .83 10.170 | 1.83 18.230 | 2.83 6.340 | 3.83 3.990
00667> 1.00 15.980 | 2.00 13.730 | 3.00 5.760 | 4.00 3.770
00668>
00669>
00670> 003:0003-----
00671> *****
00672> * Post-Development Model - Wateridge Block 15
00673> *****
00674> *****
00675> * Drainage to Rear Lane
00676> *****
00677>
00678> | CALIB STANDHYD | Area (ha)= .54
00679> | 01:RL1 DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00
00680>
00681> IMPERVIOUS PERVIOUS (i)
00682> Surface Area (ha)= .47 .08
00683> Dep. Storage (mm)= 1.57 4.67
00684> Average Slope (%)= .50 2.00
00685> Length (m)= 250.00 10.00
00686> Mannings n = .013 .250
00687>
00688> Max.eff.Inten.(mm/hr)= 178.56 145.93
00689> over (min)= 4.00 7.00
00690> Storage Coeff. (min)= 4.32 (ii) 6.96 (ii)
00691> Unit Hyd. Tpeak (min)= 4.00 7.00
00692> Unit Hyd. peak (cms)= .27 .16
00693>
00694> PEAK FLOW (cms)= .20 .02 *TOTALS*
00695> TIME TO PEAK (hrs)= 1.33 1.38 .223 (iii)
00696> RUNOFF VOLUME (mm)= 74.43 30.74 1.350
00697> TOTAL RAINFALL (mm)= 76.00 76.00 68.312
00698> RUNOFF COEFFICIENT = .98 .40 75.998
00699> .899
00700>
00701> (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00702> Fo (mm/hr)= 76.20 K (1/hr)= 4.14
00703> Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
00704> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00705> THAN THE STORAGE COEFFICIENT.
00706> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00707>
00708>
00709> 003:0004-----
00710>
00711> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .119 (cms)
00712> | TotalHyd 01:RL1 | Number of inlets in system [NINLET] = 1
00713> | MINOR SYST 04:MINOR | Total minor system capacity = .119 (cms)
00714> | TOTAL MAJOR SYST 02:MAJOR | Total major system storage [TMJSTO] = 0.(cu.m.)
00715>
00716> ID: NHYD AREA QPEAK TPEAK R.V. DWF
00717> (ha) (cms) (hrs) (mm) (cms)
00718> TOTAL HYD. 01:RL1 .54 .223 1.350 68.312 .000
00719>
00720> MAJOR SYST 02:MAJOR .08 .104 1.350 68.312 .000
00721> MINOR SYST 04:MINOR .47 .119 1.233 68.312 .000
00722>
00723>
00724> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00725>
00726> 003:0005-----
00727> * Rear Lane Cross Section
00728>
00729> | ROUTE CHANNEL | Routing time step (min) = 1.00
00730> | IN> 02:MAJOR | Number of SEGMENTS = 1
00731> | OUT< 03:LANE | Slopes (%), CHANNEL= .50 FLOODPLAIN= .50
00732> | LENGTH = 20.00 (m)
00733>
00734> <----- DATA FOR SECTION ( 15.1) ----->
00735> Distance Elevation Manning
00736> .00 100.00 .0130
00737> .01 99.85 .0130
00738> 6.50 99.77 .0130
00739> 6.51 99.85 .0130
00740> 11.51 100.17 .0130
00741>
00742> <----- TRAVEL TIME TABLE ----->
00743> DEPTH ELEV X-VOLUME S-VOLUME FLOW RATE VELOCITY TRAV.TIME D x V
00744> (m) (m) (cu.m.) (cu.m.) (cms) (m/s) (min) (m2/s)
00745> .012 99.782 .119E+00 .720E+02 .001 .179 1.86 .002
00746> .024 99.794 .476E+00 .576E+01 .007 .285 1.17 .007
00747> .036 99.806 .107E+01 .194E+00 .020 .373 .89 .014
00748> .048 99.818 .190E+01 .461E+00 .043 .452 .74 .022
00749> .061 99.831 .297E+01 .900E+00 .078 .524 .64 .032
00750> .073 99.843 .428E+01 .156E+01 .127 .592 .56 .043
00751> .085 99.855 .582E+01 .246E+01 .196 .675 .49 .057
00752> .097 99.867 .743E+01 .360E+01 .289 .779 .43 .075
00753> .109 99.879 .909E+01 .495E+01 .397 .874 .38 .095
00754> .121 99.891 .108E+02 .653E+01 .519 .962 .35 .116
00755> .133 99.903 .125E+02 .835E+01 .653 1.045 .32 .139
00756> .145 99.915 .143E+02 .104E+02 .805 1.122 .30 .163
00757> .157 99.927 .162E+02 .127E+02 .968 1.195 .28 .188
00758> .169 99.939 .181E+02 .153E+02 1.144 1.265 .26 .214
00759> .182 99.952 .200E+02 .182E+02 1.333 1.332 .25 .242
00760> .194 99.964 .220E+02 .213E+02 1.535 1.396 .24 .270
00761> .206 99.976 .240E+02 .247E+02 1.750 1.457 .23 .300
00762> .218 99.988 .261E+02 .284E+02 1.979 1.516 .22 .330
00763> .230 100.000 .282E+02 .324E+02 2.220 1.573 .21 .362
00764>
00765> X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00766> S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00767> (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.
00768>
00769> <----- hydrograph -----> <-pipe / channel->
00770> AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEL
00771> (ha) (cms) (hrs) (mm) (m) (m/s)
00772> INFLOW : ID= 2:MAJOR .08 .104 1.35 68.312 .067 .559
00773> OUTFLOW: ID= 3:LANE .08 .104 1.35 68.312 .067 .559
00774>

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00775>
00776>-----
00777> 003:0006-----
00778> *****
00779> * Remaining Drainage Area to Squadron Cres.
00780> *****
00781>
00782> | CALIB STANDHYD | Area (ha)= .77
00783> | 01:AI | DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00
00784>-----
00785> IMPERVIOUS PERVIOUS (i)
00786> Surface Area (ha)= .66 .11
00787> Dep. Storage (mm)= 1.57 4.67
00788> Average Slope (%)= .50 2.00
00789> Length (m)= 150.00 10.00
00790> Mannings n = .013 .250
00791>
00792> Max.eff.Inten.(mm/hr)= 178.56 146.64
00793> over (min) 3.00 6.00
00794> Storage Coeff. (min)= 3.18 (ii) 5.82 (ii)
00795> Unit Hyd. Tpeak (min)= 3.00 6.00
00796> Unit Hyd. peak (cms)= .36 .19
00797>-----
00798> *TOTALS*
00799> PEAK FLOW (cms)= .31 .03 .341 (iii)
00800> TIME TO PEAK (hrs)= 1.33 1.37 1.333
00801> RUNOFF VOLUME (mm)= 74.43 30.74 68.312
00802> TOTAL RAINFALL (mm)= 76.00 76.00 75.998
00803> RUNOFF COEFFICIENT = .98 .40 .899
00804>
00805> (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00806> Fo (mm/hr)= 76.20 K (1/hr)= 4.14
00807> Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
00808> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00809> THAN THE STORAGE COEFFICIENT.
00810> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00811>-----
00812> 003:0007-----
00813> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
00814>-----
00815> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .163 (cms)
00816> | TotalHyd 01:AI | Number of inlets in system [NINLET] = 1
00817>-----
00818> Total minor system capacity = .163 (cms)
00819> Total major system storage [TMJSTO] = 0.(cu.m.)
00820>-----
00821> ID: NHYD AREA QPEAK TPEAK R.V. DWF
00822> (ha) (cms) (hrs) (mm) (cms)
00823> TOTAL HYD. 01:AI .77 .241 1.333 68.312 .000
00824> MAJOR SYST 02:MAJOR .13 .178 1.333 68.312 .000
00825> MINOR SYST 04:MINOR .64 .163 1.217 68.312 .000
00826>-----
00827> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00828>-----
00829>
00830> 003:0008-----
00831>-----
00832> | ADD HYD (Total) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00833> (ha) (cms) (hrs) (mm) (cms)
00834> ID1 02:MAJOR .13 .178 1.333 68.312 .000
00835> ID2 03:LANE .08 .104 1.35 68.31 .000
00836>-----
00837> SUM 01:Total .20 .277 1.33 68.31 .000
00838>-----
00839> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00840>-----
00841>
00842> 003:0009-----
00843> * Cross Section at Site Entrance (Squadron Cres.)
00844>-----
00845> | ROUTE CHANNEL | Routing time step (min) = 1.00
00846> | IN< 01:Total | Number of SEGMENTS = 1
00847> | OUT< 03:ROAD | Slopes (%), CHANNEL=2.00 FLOODPLAIN=2.00
00848>-----
00849> LENGTH = 10.00 (m)
00850>-----
00851> <----- DATA FOR SECTION ( 15.2) ----->
00852> Distance Elevation Manning
00853> .00 100.00 .0130
00854> 6.50 99.77 .0130
00855> 6.51 99.92 .0130
00856>-----
00857> <----- TRAVEL TIME TABLE ----->
00858> DEPTH ELEV X-VOLUME S-VOLUME FLOW RATE VELOCITY TRAV.TIME D x V
00859> (m) (m) (cu.m.) (cu.m.) (cms) (m/s) (min) (m2/s)
00860> .008 99.778 .253E+01 .500E-03 .001 .270 .62 .002
00861> .016 99.786 .101E+00 .400E-02 .004 .428 .39 .007
00862> .024 99.794 .228E+00 .135E-01 .013 .561 .30 .013
00863> .032 99.802 .405E+00 .320E-01 .028 .680 .25 .021
00864> .039 99.809 .633E+00 .625E-01 .050 .789 .21 .031
00865> .047 99.817 .911E+00 .108E+00 .081 .891 .19 .042
00866> .055 99.825 .124E+01 .171E+00 .122 .987 .17 .055
00867> .063 99.833 .162E+01 .256E+00 .175 1.079 .15 .068
00868> .071 99.841 .205E+01 .364E+00 .239 1.167 .14 .083
00869> .079 99.849 .253E+01 .500E+00 .317 1.252 .13 .099
00870> .087 99.857 .304E+01 .661E+00 .427 1.401 .12 .122
00871> .095 99.865 .356E+01 .843E+00 .552 1.552 .11 .147
00872> .103 99.873 .407E+01 .104E+01 .690 1.695 .10 .174
00873> .111 99.881 .458E+01 .127E+01 .840 1.832 .09 .203
00874> .118 99.888 .510E+01 .151E+01 1.001 1.963 .08 .233
00875> .126 99.896 .561E+01 .177E+01 1.173 2.090 .08 .264
00876> .134 99.904 .612E+01 .206E+01 1.355 2.212 .08 .297
00877> .142 99.912 .664E+01 .236E+01 1.547 2.330 .07 .331
00878> .150 99.920 .715E+01 .266E+01 1.749 2.445 .07 .367
00879>-----
00880> X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
00881> S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
00882>-----
00883> <----- hydrograph -----> <-pipe / channel->
00884> AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEL
00885> (ha) (cms) (hrs) (mm) (m) (m/s)
00886> INFLOW : ID= 1:Total .20 .277 1.33 68.312 .075 1.207
00887> OUTFLOW: ID= 3:ROAD .20 .275 1.33 68.312 .075 1.205
00888>-----
00889>
00890>
00891> 003:0010-----
00892> *****
00893> *****
00894>-----
00895> 003:0002-----
00896>-----
00897> 003:0002-----
00898> ** END OF RUN : 3
00899>-----
00900> *****
00901> *****
00902> *****
00903> *****

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00904>
00905>-----
00906> | START | Project dir.: C:\SWM_PRG\17-918\Block15\
00907>-----
00908> Rainfall dir.: C:\SWM_PRG\17-918\Block15\
00909> TZERO = .00 hrs on 0
00910> METOUT= 2 (output = METRIC)
00911> NRUN = 004
00912> NSTORM= 1
00913> # 1=C:\SWM_PRG\STMF\FILES\CH6H100x.stm
00914>-----
00915> 004:0002-----
00916> *****
00917> *# Project Name: [] Project Number: [18-946]
00918> *# Date : 2019-01-30
00919> *# Modeller : [sim]
00920> *# Company : David Schaeffer Engineering Ltd.
00921> *# License # : 4488477
00922> *****
00923>-----
00924> 004:0002-----
00925>-----
00926> | READ STORM | Filename: 100 years Chicago Storm 6 Hours step 10
00927> | Ptotal= 82.34 mm | Comments: 100 years Chicago Storm 6 Hours step 10
00928>-----
00929> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00930> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00931> .17 2.910 | 1.67 15.980 | 3.17 8.020 | 4.67 3.770
00932> .33 3.170 | 1.83 40.670 | 3.33 7.080 | 4.83 3.570
00933> .50 3.480 | 2.00 178.650 | 3.50 6.340 | 5.00 3.400
00934> .67 3.880 | 2.17 54.040 | 3.67 5.760 | 5.17 3.240
00935> .83 4.390 | 2.33 27.310 | 3.83 5.280 | 5.33 3.100
00936> 1.00 5.080 | 2.50 18.230 | 4.00 4.880 | 5.50 2.970
00937> 1.17 6.050 | 2.67 13.730 | 4.17 4.540 | 5.67 2.850
00938> 1.33 7.550 | 2.83 11.050 | 4.33 4.250 | 5.83 2.740
00939> 1.50 10.170 | 3.00 9.280 | 4.50 3.990 | 6.00 2.640
00940>-----
00941>
00942> 004:0003-----
00943> *****
00944> * Post-Development Model - Wateridge Block 15
00945> *****
00946> *****
00947> * Drainage to Rear Lane
00948> *****
00949>-----
00950> | CALIB STANDHYD | Area (ha)= .54
00951> | 01:RL1 | DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00
00952>-----
00953> IMPERVIOUS PERVIOUS (i)
00954> Surface Area (ha)= .47 .08
00955> Dep. Storage (mm)= 1.57 4.67
00956> Average Slope (%)= .50 2.00
00957> Length (m)= 250.00 10.00
00958> Mannings n = .013 .250
00959>
00960> Max.eff.Inten.(mm/hr)= 178.65 150.06
00961> over (min) 4.00 7.00
00962> Storage Coeff. (min)= 4.32 (ii) 6.93 (ii)
00963> Unit Hyd. Tpeak (min)= 4.00 7.00
00964> Unit Hyd. peak (cms)= .27 .16
00965>-----
00966> *TOTALS*
00967> PEAK FLOW (cms)= .20 .02 .224 (iii)
00968> TIME TO PEAK (hrs)= 2.00 2.05 2.017
00969> RUNOFF VOLUME (mm)= 80.77 32.23 73.975
00970> TOTAL RAINFALL (mm)= 82.34 82.34 82.340
00971> RUNOFF COEFFICIENT = .98 .39 .898
00972>-----
00973> (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
00974> Fo (mm/hr)= 76.20 K (1/hr)= 4.14
00975> Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
00976> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00977> THAN THE STORAGE COEFFICIENT.
00978> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00979>-----
00980> 004:0004-----
00981> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
00982>-----
00983> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .119 (cms)
00984> | TotalHyd 01:RL1 | Number of inlets in system [NINLET] = 1
00985>-----
00986> Total minor system capacity = .119 (cms)
00987> Total major system storage [TMJSTO] = 0.(cu.m.)
00988>-----
00989> ID: NHYD AREA QPEAK TPEAK R.V. DWF
00990> (ha) (cms) (hrs) (mm) (cms)
00991> TOTAL HYD. 01:RL1 .54 .224 2.017 73.975 .000
00992>-----
00993> MAJOR SYST 02:MAJOR .07 .105 2.017 73.975 .000
00994> MINOR SYST 04:MINOR .47 .119 1.900 73.975 .000
00995>-----
00996> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00997>-----
00998> 004:0005-----
00999> * Rear Lane Cross Section
01000>-----
01001> | ROUTE CHANNEL | Routing time step (min) = 1.00
01002> | IN< 02:MAJOR | Number of SEGMENTS = 1
01003> | OUT< 03:LANE | Slopes (%), CHANNEL= .50 FLOODPLAIN= .50
01004>-----
01005> LENGTH = 20.00 (m)
01006>-----
01007> <----- DATA FOR SECTION ( 15.1) ----->
01008> Distance Elevation Manning
01009> .00 100.00 .0130
01010> .01 99.85 .0130
01011> 6.50 99.77 .0130
01012> 6.51 99.85 .0130
01013> 11.51 100.17 .0130
01014>-----
01015> <----- TRAVEL TIME TABLE ----->
01016> DEPTH ELEV X-VOLUME S-VOLUME FLOW RATE VELOCITY TRAV.TIME D x V
01017> (m) (m) (cu.m.) (cu.m.) (cms) (m/s) (min) (m2/s)
01018> .012 99.782 .119E+00 .720E-02 .001 .179 1.86 .002
01019> .024 99.794 .476E+00 .576E-01 .007 .285 1.17 .007
01020> .036 99.806 .107E+01 .194E+00 .020 .373 .89 .014
01021> .048 99.818 .190E+01 .461E+00 .043 .452 .74 .022
01022> .061 99.831 .297E+01 .900E+00 .078 .524 .64 .032
01023> .073 99.843 .428E+01 .156E+01 .127 .592 .56 .043
01024> .085 99.855 .582E+01 .246E+01 .196 .675 .49 .057
01025> .097 99.867 .743E+01 .360E+01 .289 .779 .43 .075
01026> .109 99.879 .909E+01 .495E+01 .397 .874 .38 .095
01027> .121 99.891 .108E+02 .653E+01* .519 .962 .35 .116
01028> .133 99.903 .125E+02 .835E+01* .655 1.045 .32 .139
01029> .145 99.915 .143E+02 .104E+02* .805 1.122 .30 .163
01030> .157 99.927 .162E+02 .127E+02* .968 1.195 .28 .188
01031> .169 99.939 .181E+02 .153E+02* 1.144 1.265 .26 .214
01032> .182 99.952 .200E+02 .182E+02* 1.333 1.332 .25 .242
01033> .194 99.964 .220E+02 .213E+02* 1.535 1.396 .24 .270

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01033> .206 99.976 .240E+02 .247E+02* 1.750 1.457 .23 .300
01034> .218 99.988 .261E+02 .284E+02* 1.979 1.516 .22 .330
01035> .230 100.000 .282E+02 .324E+02* 2.220 1.573 .21 .362
01036>
01037> X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
01038> S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
01039> (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.
01040>
01041> <----- hydrograph -----> <-pipe / channel->
01042> AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEL
01043> (ha) (cms) (hrs) (mm) (m) (m/s)
01044> INFLOW : ID= 2:MAJOR .07 .105 2.02 73.975 .067 .560
01045> OUTFLOW: ID= 3:LANE .07 .105 2.02 73.975 .067 .560
01046>
01047>
01048>
01049> 004:0006-----
01050> *****
01051> * Remaining Drainage Area to Squadron Cres.
01052> *****
01053>
01054> | CALIB STANDHYD | Area (ha)= .77
01055> | 01A1 DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00
01056>
01057> IMPERVIOUS PERVIOUS (i)
01058> Surface Area (ha)= .66 .11
01059> Dep. Storage (mm)= 1.57 4.67
01060> Average Slope (%)= .50 2.00
01061> Length (m)= 150.00 10.00
01062> Mannings n = .013 .250
01063>
01064> Max.eff.Inten.(mm/hr)= 178.65 150.62
01065> over (min) 3.00 6.00
01066> Storage Coeff. (min)= 3.18 (ii) 5.79 (ii)
01067> Unit Hyd. Tpeak (min)= 3.00 6.00
01068> Unit Hyd. peak (cms)= .36 .19
01069>
01070> PEAK FLOW (cms)= .31 .03 .342 (iii)
01071> TIME TO PEAK (hrs)= 2.00 2.03 2.000
01072> RUNOFF VOLUME (mm)= 80.77 32.23 73.975
01073> TOTAL RAINFALL (mm)= 82.34 82.34 82.340
01074> RUNOFF COEFFICIENT = .38 .39 .898
01075>
01076> (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
01077> Fo (mm/hr)= 76.20 K (1/hr)= 4.14
01078> Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
01079> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01080> THAN THE STORAGE COEFFICIENT.
01081> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01082>
01083>
01084> 004:0007-----
01085> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
01086>
01087> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .163 (cms)
01088> | TotalHyd 01:A1 | Number of inlets in system [NINLET] = 1
01089> -----
01090> Total minor system capacity = .163 (cms)
01091> Total major system storage [TMJSTO] = 0. (cu.m.)
01092>
01093> ID: NHYD AREA QPEAK TPEAK R.V. DWF
01094> (ha) (cms) (hrs) (mm) (cms)
01095> TOTAL HYD. 01:A1 .77 .342 2.000 73.975 .000
01096>
01097> MAJOR SYST 02:MAJOR .12 .179 2.000 73.975 .000
01098> MINOR SYST 04:MINOR .65 .163 1.883 73.975 .000
01099>
01100> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01101>
01102> 004:0008-----
01103>
01104> | ADD HYD (Total) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01105> (ha) (cms) (hrs) (mm) (cms)
01106> ID1 02:MAJOR .12 .179 2.00 73.97 .000
01107> ID2 03:LANE .07 .105 2.02 73.97 .000
01108>
01109> SUM 01:Total .19 .279 2.00 73.97 .000
01110>
01111> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01112>
01113>
01114> 004:0009-----
01115> * Cross Section at Site Entrance (Squadron Cres.)
01116>
01117> | ROUTE CHANNEL | Routing time step (min) = 1.00
01118> | IN< 01:Total | Number of SEGMENTS = 1
01119> | OUT< 03:ROAD | Slopes (%), CHANNEL=2.00 FLOODPLAIN=2.00
01120> -----
01121> LENGTH = 10.00 (m)
01122>
01123> <----- DATA FOR SECTION ( 15.2) ----->
01124> Distance Elevation Manning
01125> .00 100.00 .0130
01126> .01 99.85 .0130
01127> 6.50 99.77 .0130
01128> 6.51 99.92 .0130
01129>
01130> <----- TRAVEL TIME TABLE ----->
01131> DEPTH ELEV X-VOLUME S-VOLUME FLOW RATE VELOCITY TRAV.TIME D x V
01132> (m) (m) (cu.m.) (cu.m.) (cms) (m/s) (min) (m2/s)
01133> .008 99.778 .253E+01 .500E-03 .001 .270 .62 .002
01134> .016 99.786 .101E+00 .400E-02 .004 .428 .39 .007
01135> .024 99.794 .228E+00 .135E-01 .013 .561 .30 .013
01136> .032 99.802 .405E+00 .320E-01 .028 .680 .25 .021
01137> .039 99.809 .633E+00 .625E-01 .050 .789 .21 .031
01138> .047 99.817 .911E+00 .108E+00 .081 .891 .19 .042
01139> .055 99.825 .124E+01 .171E+00 .122 .987 .17 .055
01140> .063 99.833 .162E+01 .256E+00 .175 1.079 .15 .068
01141> .071 99.841 .205E+01 .364E+00 .239 1.167 .14 .083
01142> .079 99.849 .253E+01 .500E+00 .317 1.252 .13 .099
01143> .087 99.857 .304E+01 .661E+00 .427 1.401 .12 .122
01144> .095 99.865 .356E+01 .843E+00 .552 1.552 .11 .147
01145> .103 99.873 .407E+01 .104E+01 .690 1.695 .10 .174
01146> .111 99.881 .458E+01 .127E+01 .840 1.832 .09 .203
01147> .118 99.888 .510E+01 .151E+01 1.001 1.963 .08 .233
01148> .126 99.896 .561E+01 .177E+01 1.173 2.090 .08 .264
01149> .134 99.904 .612E+01 .206E+01 1.355 2.212 .08 .297
01150> .142 99.912 .664E+01 .236E+01 1.547 2.330 .07 .331
01151> .150 99.920 .715E+01 .268E+01 1.749 2.445 .07 .367
01152> X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
01153> S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
01154>
01155> <----- hydrograph -----> <-pipe / channel->
01156> AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEL
01157> (ha) (cms) (hrs) (mm) (m) (m/s)
01158> INFLOW : ID= 1:Total .19 .279 2.00 73.975 .075 1.209
01159> OUTFLOW: ID= 3:ROAD .19 .277 2.00 73.975 .075 1.207
01160>
01161>

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01162>
01163> 004:0010-----
01164> *****
01165> *****
01166>
01167> 004:0002-----
01168>
01169> 004:0002-----
01170>
01171> 004:0002-----
01172> ** END OF RUN : 4
01173>
01174> *****
01175>
01176>
01177>
01178>
01179>
01180>
01181> | START | Project dir.: C:\SWM_PRG\17-918\block15\
01182> Rainfall dir.: C:\SWM_PRG\17-918\block15\
01183> TZERO = .00 hrs on 0
01184> METOUT= 2 (output= METRIC)
01185> NRUN = 005
01186> NSTORM= 1
01187> # 1=C:\SWM_PRG\STMFIL\100VC12H.stm
01188>
01189> 005:0002-----
01190> *****
01191> ** Project Name: [ ] Project Number: [18-946]
01192> ** Date : 2019-01-30
01193> ** Modeller : [slm]
01194> ** Company : David Schaeffer Engineering Ltd.
01195> ** License # : 4488477
01196> *****
01197>
01198> 005:0002-----
01199>
01200> | READ STORM | Filename: 100-Year 12-Hour Chicago Storm, 10 min T
01201> | Ptotal= 93.91 mm | Comments: 100-Year 12-Hour Chicago Storm, 10 min T
01202>
01203> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01204> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01205> .17 1.520 | 3.17 6.050 | 6.17 4.540 | 9.17 2.120
01206> .33 1.580 | 3.33 7.540 | 6.33 4.250 | 9.33 2.060
01207> .50 1.650 | 3.50 10.160 | 6.50 3.990 | 9.50 2.010
01208> .67 1.720 | 3.67 15.970 | 6.67 3.770 | 9.67 1.960
01209> .83 1.800 | 3.83 40.650 | 6.83 3.570 | 9.83 1.910
01210> 1.00 1.880 | 4.00 178.560 | 7.00 3.400 | 10.00 1.860
01211> 1.17 1.980 | 4.17 54.050 | 7.17 3.240 | 10.17 1.820
01212> 1.33 2.090 | 4.33 27.320 | 7.33 3.100 | 10.33 1.780
01213> 1.50 2.210 | 4.50 18.240 | 7.50 2.970 | 10.50 1.740
01214> 1.67 2.340 | 4.67 13.740 | 7.67 2.850 | 10.67 1.700
01215> 1.83 2.500 | 4.83 11.060 | 7.83 2.740 | 10.83 1.670
01216> 2.00 2.690 | 5.00 9.290 | 8.00 2.640 | 11.00 1.630
01217> 2.17 2.900 | 5.17 8.020 | 8.17 2.550 | 11.17 1.600
01218> 2.33 3.160 | 5.33 7.080 | 8.33 2.460 | 11.33 1.570
01219> 2.50 3.480 | 5.50 6.350 | 8.50 2.380 | 11.50 1.540
01220> 2.67 3.880 | 5.67 5.760 | 8.67 2.310 | 11.67 1.510
01221> 2.83 4.390 | 5.83 5.280 | 8.83 2.240 | 11.83 1.480
01222> 3.00 5.070 | 6.00 4.880 | 9.00 2.180 | 12.00 1.460
01223>
01224>
01225> 005:0003-----
01226> *****
01227> * Post-Development Model - Wateridge Block 15
01228> *****
01229> *****
01230> * Drainage to Rear Lane
01231>
01232>
01233> | CALIB STANDHYD | Area (ha)= .54
01234> | 01:RL1 DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00
01235>
01236> IMPERVIOUS PERVIOUS (i)
01237> Surface Area (ha)= .47 .08
01238> Dep. Storage (mm)= 1.57 4.67
01239> Average Slope (%)= .50 2.00
01240> Length (m)= 250.00 10.00
01241> Mannings n = .013 .250
01242>
01243> Max.eff.Inten.(mm/hr)= 178.56 153.85
01244> over (min) 4.00 7.00
01245> Storage Coeff. (min)= 4.32 (ii) 6.91 (ii)
01246> Unit Hyd. Tpeak (min)= 4.00 7.00
01247> Unit Hyd. peak (cms)= .27 .16
01248>
01249> PEAK FLOW (cms)= .20 .02 .225 (iii)
01250> TIME TO PEAK (hrs)= 4.00 4.05 4.017
01251> RUNOFF VOLUME (mm)= 92.33 34.06 84.178
01252> TOTAL RAINFALL (mm)= 93.91 93.91 93.907
01253> RUNOFF COEFFICIENT = .98 .36 .896
01254>
01255> (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
01256> Fo (mm/hr)= 76.20 K (1/hr)= 4.14
01257> Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
01258> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01259> THAN THE STORAGE COEFFICIENT.
01260> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01261>
01262>
01263>
01264> 005:0004-----
01265> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
01266>
01267> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .119 (cms)
01268> | TotalHyd 01:RL1 | Number of inlets in system [NINLET] = 1
01269> -----
01270> Total minor system capacity = .119 (cms)
01271> Total major system storage [TMJSTO] = 0. (cu.m.)
01272>
01273> ID: NHYD AREA QPEAK TPEAK R.V. DWF
01274> (ha) (cms) (hrs) (mm) (cms)
01275> TOTAL HYD. 01:RL1 .54 .225 4.017 84.178 .000
01276>
01277> MAJOR SYST 02:MAJOR .06 .106 4.017 84.178 .000
01278> MINOR SYST 04:MINOR .48 .119 3.900 84.178 .000
01279>
01280> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01281>
01282> 005:0005-----
01283> * Rear Lane Cross Section
01284>
01285> | ROUTE CHANNEL | Routing time step (min) = 1.00
01286> | IN< 02:MAJOR | Number of SEGMENTS = 1
01287> | OUT< 03:LANE | Slopes (%), CHANNEL=.50 FLOODPLAIN=.50
01288> -----
01289> LENGTH = 20.00 (m)
01290>
01291> <----- DATA FOR SECTION ( 15.1) ----->
01292> Distance Elevation Manning

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01291> .00 100.00 .0130
01292> .01 99.85 .0130
01293> 6.50 99.77 .0130
01294> 6.51 99.85 .0130
01295> 11.51 100.17 .0130
01296>
01297> <----- TRAVEL TIME TABLE ----->
01298> DEPTH ELEV X-VOLUME S-VOLUME FLOW RATE VELOCITY TRAV.TIME D x V
01299> (m) (m) (cu.m.) (cu.m.) (cms) (m/s) (min) (m2/s)
01300> .012 99.782 .119E+00 .720E-02 .001 .179 1.86 .002
01301> .024 99.794 .476E+00 .576E-01 .007 .285 1.17 .007
01302> .036 99.806 .107E+01 .194E+00 .020 .373 .89 .014
01303> .048 99.818 .190E+01 .461E+00 .043 .452 .74 .022
01304> .061 99.831 .297E+01 .900E+00 .078 .524 .64 .032
01305> .073 99.843 .428E+01 .156E+01 .127 .592 .56 .043
01306> .085 99.855 .582E+01 .246E+01 .196 .675 .49 .057
01307> .097 99.867 .743E+01 .340E+01 .289 .779 .43 .075
01308> .109 99.879 .909E+01 .455E+01* .397 .874 .38 .095
01309> .121 99.891 .108E+02 .653E+01* .519 .962 .35 .116
01310> .133 99.903 .125E+02 .835E+01* .655 1.045 .32 .139
01311> .145 99.915 .143E+02 .104E+02* .805 1.122 .30 .163
01312> .157 99.927 .162E+02 .127E+02* .968 1.195 .28 .188
01313> .169 99.939 .181E+02 .153E+02* 1.144 1.265 .26 .214
01314> .182 99.952 .200E+02 .182E+02* 1.333 1.332 .25 .242
01315> .194 99.964 .220E+02 .213E+02* 1.535 1.396 .24 .270
01316> .206 99.976 .240E+02 .247E+02* 1.750 1.457 .23 .300
01317> .218 99.988 .261E+02 .284E+02* 1.979 1.516 .22 .330
01318> .230 100.000 .282E+02 .324E+02* 2.220 1.573 .21 .362
01319>
01320> X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
01321> S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
01322> (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.
01323>
01324> <----- hydrograph -----> <-pipe / channel->
01325> AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEL
01326> (ha) (cms) (hrs) (mm) (m) (m/s)
01327> INFLOW : ID= 2:MAJOR .06 .106 4.02 84.178 .067 .561
01328> OUTFLOW: ID= 3:LANE .06 .106 4.02 84.178 .067 .561
01329>
01330>
01331>
01332> 005:0006-----
01333> *****
01334> * Remaining Drainage Area to Squadron Cres.
01335> *****
01336>
01337> | CALIB STANDHYD | Area (ha)= .77
01338> | 01:RL DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00
01339>
01340> IMPERVIOUS PERVIOUS (i)
01341> Surface Area (ha)= .66 .11
01342> Dep. Storage (mm)= 1.57 4.67
01343> Average Slope (%)= .50 2.00
01344> Length (m)= 150.00 10.00
01345> Mannings n = .013 .250
01346>
01347> Max.eff.Inten.(mm/hr)= 178.56 154.27
01348> over (min)= 3.00 6.00
01349> Storage Coeff. (min)= 3.18 (ii) 5.76 (ii)
01350> Unit Hyd. Tpeak (min)= 3.00 6.00
01351> Unit Hyd. peak (cms)= .36 .19
01352>
01353> PEAK FLOW (cms)= .31 .03 *TOTALS*
01354> TIME TO PEAK (hrs)= 4.00 4.03 4.000
01355> RUNOFF VOLUME (mm)= 92.33 34.06 84.178
01356> TOTAL RAINFALL (mm)= 93.91 93.91 93.907
01357> RUNOFF COEFFICIENT = .98 .36 .896
01358>
01359> (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
01360> Fo (mm/hr)= 76.20 K (1/hr)= 4.14
01361> Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
01362> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01363> THAN THE STORAGE COEFFICIENT.
01364> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01365>
01366>
01367> 005:0007-----
01368> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
01369>
01370> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .163 (cms)
01371> | TotalHyd 01:RL | Number of inlets in system [NINLET] = 1
01372> | | Total minor system capacity = .163 (cms)
01373> | | Total major system storage [TMJSTO] = 0. (cu.m.)
01374>
01375> ID: NHYD AREA QPEAK TPEAK R.V. DWF
01376> (ha) (cms) (hrs) (mm) (cms)
01377> TOTAL HYD. 01:RL .77 .343 4.000 84.178 .000
01378>
01379> MAJOR SYST 02:MAJOR .11 .180 4.000 84.178 .000
01380> MINOR SYST 04:MINOR .66 .163 3.883 84.178 .000
01381>
01382> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01383>
01384>
01385> 005:0008-----
01386>
01387> | ADD HYD (Total ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01388> (ha) (cms) (hrs) (mm) (cms)
01389> ID1 02:MAJOR .11 .180 4.00 84.18 .000
01390> ID2 03:LANE .06 .106 4.02 84.18 .000
01391>
01392> SUM 01:Total .17 .281 4.00 84.18 .000
01393>
01394> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01395>
01396>
01397> 005:0009-----
01398> * Cross Section at Site Entrance (Squadron Cres.)
01399>
01400> | ROUTE CHANNEL | Routing time step (min) = 1.00
01401> | IN= 01:Total | Number of segments = 1
01402> | OUT= 03:ROAD | Slopes (%), CHANNEL=2.00 FLOODPLAIN=2.00
01403> | | LENGTH = 10.00 (m)
01404>
01405> <----- DATA FOR SECTION ( 15.2) ----->
01406> Distance Elevation Manning
01407> .00 100.00 .0130
01408> .01 99.85 .0130
01409> 6.50 99.77 .0130
01410> 6.51 99.92 .0130
01411>
01412> <----- TRAVEL TIME TABLE ----->
01413> DEPTH ELEV X-VOLUME S-VOLUME FLOW RATE VELOCITY TRAV.TIME D x V
01414> (m) (m) (cu.m.) (cu.m.) (cms) (m/s) (min) (m2/s)
01415> .008 99.778 .253E-01 .500E-03 .001 .270 .62 .002
01416> .016 99.786 .101E+00 .400E-02 .004 .428 .39 .007
01417> .024 99.794 .228E+00 .135E-01 .013 .561 .30 .013
01418> .032 99.802 .405E+00 .320E-01 .028 .680 .25 .021
01419> .039 99.809 .633E+00 .625E-01 .050 .789 .21 .031

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01420> .047 99.817 .911E+00 .108E+00 .081 .891 .19 .042
01421> .055 99.825 .124E+01 .171E+00 .122 .987 .17 .055
01422> .063 99.833 .162E+01 .256E+00 .175 1.079 .15 .068
01423> .071 99.841 .205E+01 .364E+00 .239 1.167 .14 .083
01424> .079 99.849 .253E+01 .500E+00 .317 1.252 .13 .099
01425> .087 99.857 .304E+01 .661E+00 .427 1.401 .12 .122
01426> .095 99.865 .356E+01 .843E+00 .552 1.552 .11 .147
01427> .103 99.873 .407E+01 .104E+01 .690 1.695 .10 .174
01428> .111 99.881 .458E+01 .127E+01 .840 1.832 .09 .203
01429> .118 99.888 .510E+01 .151E+01 1.001 1.963 .08 .233
01430> .126 99.896 .561E+01 .177E+01 1.173 2.090 .08 .264
01431> .134 99.904 .612E+01 .206E+01 1.355 2.212 .08 .297
01432> .142 99.912 .664E+01 .236E+01 1.547 2.330 .07 .331
01433> .150 99.920 .715E+01 .268E+01 1.749 2.445 .07 .367
01434>
01435> X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
01436> S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
01437>
01438> <----- hydrograph -----> <-pipe / channel->
01439> AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEL
01440> (ha) (cms) (hrs) (mm) (m) (m/s)
01441> INFLOW : ID= 1:Total .17 .281 4.00 84.178 .075 1.211
01442> OUTFLOW: ID= 3:ROAD .17 .279 4.00 84.178 .075 1.209
01443>
01444>
01445>
01446> 005:0010-----
01447> *****
01448> *****
01449>
01450> 005:0002-----
01451>
01452> 005:0002-----
01453>
01454> 005:0002-----
01455>
01456> 005:0002-----
01457> ** END OF RUN : 5
01458>
01459> *****
01460>
01461>
01462>
01463>
01464>
01465>
01466> | START | Project dir.: C:\SWM_PRG\17-918\Block15\
01467> | | Rainfall dir.: C:\SWM_PRG\17-918\Block15\
01468> TZERO = .00 hrs on 0
01469> METOUT= 2 (output = METRIC)
01470> NRUN = 006
01471> NSTORM= 1
01472> # 1=C:\SWM_PRG\STMFILES\19790701.stm
01473>
01474> 006:0002-----
01475> *****
01476> *# Project Name: [ ] Project Number: [18-946]
01477> *# Date : 2019-01-30
01478> *# Modeller : [slm]
01479> *# Company : David Schaeffer Engineering Ltd.
01480> *# License # : 4488477
01481> *****
01482>
01483> 006:0002-----
01484>
01485> | READ STORM | Filename: City of Ottawa July 1, 1979 Storm - 5min
01486> | Ptotal= 83.99 mm | Comments: City of Ottawa July 1, 1979 Storm - 5min
01487>
01488> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01489> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01490> .08 2.300 | .83 38.100 | 1.58 71.100 | 2.33 3.800
01491> .17 2.300 | .92 38.100 | 1.67 71.100 | 2.42 3.800
01492> .25 8.890 | 1.00 38.100 | 1.75 30.500 | 2.50 3.800
01493> .33 8.890 | 1.08 38.100 | 1.83 30.500 | 2.58 3.800
01494> .42 8.890 | 1.17 50.800 | 1.92 30.500 | 2.67 3.800
01495> .50 8.890 | 1.25 50.800 | 2.00 30.500 | 2.75 3.800
01496> .58 38.100 | 1.33 76.200 | 2.08 3.800 | 2.83 3.800
01497> .67 38.100 | 1.42 106.700 | 2.17 3.800 | 2.92 3.800
01498> .75 38.100 | 1.50 106.700 | 2.25 3.800 | 3.00 3.800
01499>
01500>
01501> 006:0003-----
01502> *****
01503> * Post-Development Model - Wateridge Block 15
01504> *****
01505> *****
01506> * Drainage to Rear Lane
01507> *****
01508>
01509> | CALIB STANDHYD | Area (ha)= .54
01510> | 01:RL DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00
01511>
01512> IMPERVIOUS PERVIOUS (i)
01513> Surface Area (ha)= .47 .08
01514> Dep. Storage (mm)= 1.57 4.67
01515> Average Slope (%)= .50 2.00
01516> Length (m)= 250.00 10.00
01517> Mannings n = .013 .250
01518>
01519> Max.eff.Inten.(mm/hr)= 106.70 91.22
01520> over (min)= 5.00 8.00
01521> Storage Coeff. (min)= 5.31 (ii) 8.50 (ii)
01522> Unit Hyd. Tpeak (min)= 5.00 8.00
01523> Unit Hyd. peak (cms)= .22 .14
01524>
01525> PEAK FLOW (cms)= .13 .02 *TOTALS*
01526> TIME TO PEAK (hrs)= 1.52 1.58 1.517
01527> RUNOFF VOLUME (mm)= 82.42 42.29 76.801
01528> TOTAL RAINFALL (mm)= 83.99 83.99 83.988
01529> RUNOFF COEFFICIENT = .98 .50 .914
01530>
01531> (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
01532> Fo (mm/hr)= 76.20 K (1/hr)= 4.14
01533> Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
01534> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01535> THAN THE STORAGE COEFFICIENT.
01536> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01537>
01538>
01539> 006:0004-----
01540> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
01541>
01542> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .119 (cms)
01543> | TotalHyd 01:RL | Number of inlets in system [NINLET] = 1
01544> | | Total minor system capacity = .119 (cms)
01545> | | Total major system storage [TMJSTO] = 0. (cu.m.)
01546>
01547> ID: NHYD AREA QPEAK TPEAK R.V. DWF
01548> (ha) (cms) (hrs) (mm) (cms)

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01549> TOTAL HYD. 01:RL1 .54 .141 1.517 76.801 .000
01550>
01551> MAJOR SYST 02:MAJOR .01 .022 1.517 76.801 .000
01552> MINOR SYST 04:MINOR .53 .119 1.433 76.801 .000
01553>
01554> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01555>
01556>
01557> 006:0005-----
01558> * Rear Lane Cross Section
01559>
01560> | ROUTE CHANNEL | Routing time step (min) = 1.00
01561> | IN> 02:MAJOR | Number of SEGMENTS = 1
01562> | OUT< 03:LANE | Slopes (%), CHANNEL=.50 FLOODPLAIN=.50
01563> | | LENGTH = 20.00 (m)
01564>
01565> <----- DATA FOR SECTION ( 15.1) ----->
01566> Distance Elevation Manning
01567> .00 100.00 .0130
01568> .01 99.85 .0130
01569> 6.50 99.77 .0130
01570> 6.51 99.85 .0130
01571> 11.51 100.17 .0130
01572>
01573> <----- TRAVEL TIME TABLE ----->
01574> DEPTH ELEV X-VOLUME S-VOLUME FLOW RATE VELOCITY TRAV.TIME D x V
01575> (m) (m) (cu.m.) (cu.m.) (cms) (m/s) (min) (m2/s)
01576> .012 99.782 .119E+00 .720E-02 .001 .179 1.86 .002
01577> .024 99.794 .476E+00 .576E-01 .007 .285 1.17 .007
01578> .036 99.806 .107E+01 .194E+00 .020 .373 .89 .014
01579> .048 99.818 .190E+01 .461E+00 .043 .452 .74 .022
01580> .061 99.831 .297E+01 .900E+00 .078 .524 .64 .032
01581> .073 99.843 .428E+01 .156E+01 .127 .592 .56 .043
01582> .085 99.855 .582E+01 .246E+01 .196 .675 .49 .057
01583> .097 99.867 .743E+01 .360E+01 .289 .779 .43 .075
01584> .109 99.879 .909E+01 .495E+01* .397 .874 .38 .095
01585> .121 99.891 .108E+02 .653E+01* .519 .962 .35 .116
01586> .133 99.903 .125E+02 .835E+01* .655 1.045 .32 .139
01587> .145 99.915 .143E+02 .104E+02* .805 1.122 .30 .163
01588> .157 99.927 .162E+02 .127E+02* .968 1.195 .28 .188
01589> .169 99.939 .181E+02 .153E+02* 1.144 1.265 .26 .214
01590> .182 99.952 .200E+02 .182E+02* 1.333 1.332 .25 .242
01591> .194 99.964 .220E+02 .213E+02* 1.535 1.396 .24 .270
01592> .206 99.976 .240E+02 .247E+02* 1.750 1.457 .23 .300
01593> .218 99.988 .261E+02 .284E+02* 1.979 1.516 .22 .330
01594> .230 100.000 .282E+02 .324E+02* 2.220 1.573 .21 .362
01595>
01596> X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
01597> S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
01598> (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.
01599>
01600> <----- hydrograph -----> <-pipe / channel->
01601> AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEL
01602> (ha) (cms) (hrs) (mm) (m) (m/s)
01603> INFLOW : ID= 2:MAJOR .01 .022 1.52 76.801 .037 .379
01604> OUTFLOW: ID= 3:LANE .01 .022 1.53 76.801 .037 .379
01605>
01606>
01607>
01608> 006:0006-----
01609>
01610> * Remaining Drainage Area to Squadron Cres.
01611>
01612>
01613> | CALIB STANDHYD | Area (ha)= .77
01614> | 01:AL DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00
01615>
01616> IMPERVIOUS PERVIOUS (i)
01617> Surface Area (ha)= .66 .11
01618> Dep. Storage (mm)= 1.57 4.67
01619> Average Slope (%)= .50 2.00
01620> Length (m)= 150.00 10.00
01621> Mannings n = .013 .250
01622>
01623> Max.eff.Inten.(mm/hr)= 106.70 91.30
01624> over (min) 4.00 7.00
01625> Storage Coeff. (min)= 3.91 (ii) 7.09 (ii)
01626> Unit Hyd. Tpeak (min)= 4.00 7.00
01627> Unit Hyd. peak (cms)= .29 .16
01628>
01629> PEAK FLOW (cms)= .19 .02 *TOTALS*
01630> TIME TO PEAK (hrs)= 1.50 1.55 1.500
01631> RUNOFF VOLUME (mm)= 82.42 42.29 76.801
01632> TOTAL RAINFALL (mm)= 83.99 83.99 83.988
01633> RUNOFF COEFFICIENT = .98 .50 .914
01634>
01635> (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
01636> Fo (mm/hr)= 76.20 K (1/hr)= 4.14
01637> Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
01638> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01639> THAN THE STORAGE COEFFICIENT.
01640> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01641>
01642>
01643> 006:0007-----
01644> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
01645>
01646> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .163 (cms)
01647> | TotalHyd 01:AL | Number of inlets in system [NINLET] = 1
01648> | | Total minor system capacity = .163 (cms)
01649> | | Total major system storage [TMJSTO] = 0.(cu.m.)
01650>
01651> ID: NHYD AREA QPEAK TPEAK R.V. DWF
01652> (ha) (cms) (hrs) (mm) (cms)
01653> TOTAL HYD. 01:AL .77 .208 1.500 76.801 .000
01654>
01655> MAJOR SYST 02:MAJOR .03 .045 1.500 76.801 .000
01656> MINOR SYST 04:MINOR .74 .163 1.400 76.801 .000
01657>
01658> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01659>
01660>
01661> 006:0008-----
01662>
01663> | ADD HYD (Total ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01664> (ha) (cms) (hrs) (mm) (cms)
01665> ID1 02:MAJOR .03 .045 1.50 76.80 .000
01666> +ID2 03:LANE .01 .022 1.53 76.80 .000
01667>
01668> SUM 01:Total .04 .066 1.52 76.80 .000
01669>
01670> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01671>
01672>
01673> 006:0009-----
01674> * Cross Section at Site Entrance (Squadron Cres.)
01675>
01676> | ROUTE CHANNEL | Routing time step (min) = 1.00
01677> | IN> 01:Total | Number of SEGMENTS = 1

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01678> | OUT< 03:ROAD | Slopes (%), CHANNEL=2.00 FLOODPLAIN=2.00
01679> | | LENGTH = 10.00 (m)
01680>
01681> <----- DATA FOR SECTION ( 15.2) ----->
01682> Distance Elevation Manning
01683> .00 100.00 .0130
01684> .01 99.85 .0130
01685> 6.50 99.77 .0130
01686> 6.51 99.92 .0130
01687>
01688> <----- TRAVEL TIME TABLE ----->
01689> DEPTH ELEV X-VOLUME S-VOLUME FLOW RATE VELOCITY TRAV.TIME D x V
01690> (m) (m) (cu.m.) (cu.m.) (cms) (m/s) (min) (m2/s)
01691> .008 99.778 .253E-01 .500E-03 .001 .270 .62 .002
01692> .016 99.786 .101E+00 .400E-02 .004 .428 .39 .007
01693> .024 99.794 .228E+00 .135E-01 .013 .561 .30 .013
01694> .032 99.802 .405E+00 .320E-01 .028 .680 .25 .021
01695> .039 99.809 .633E+00 .625E-01 .050 .789 .21 .031
01696> .047 99.817 .911E+00 .108E+00 .081 .891 .19 .042
01697> .055 99.825 .124E+01 .171E+00 .122 .987 .17 .055
01698> .063 99.833 .162E+01 .256E+00 .175 1.079 .15 .068
01699> .071 99.841 .205E+01 .364E+00 .239 1.167 .14 .083
01700> .079 99.849 .253E+01 .500E+00 .317 1.252 .13 .099
01701> .087 99.857 .304E+01 .661E+00 .427 1.401 .12 .122
01702> .095 99.865 .356E+01 .843E+00 .552 1.552 .11 .147
01703> .103 99.873 .407E+01 .104E+01 .690 1.695 .10 .174
01704> .111 99.881 .458E+01 .127E+01 .840 1.832 .09 .203
01705> .118 99.888 .510E+01 .151E+01 1.001 1.963 .08 .233
01706> .126 99.896 .561E+01 .177E+01 1.173 2.090 .08 .264
01707> .134 99.904 .612E+01 .206E+01 1.355 2.212 .08 .297
01708> .142 99.912 .664E+01 .236E+01 1.547 2.330 .07 .331
01709> .150 99.920 .715E+01 .268E+01 1.749 2.445 .07 .367
01710>
01711> X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
01712> S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
01713>
01714> <----- hydrograph -----> <-pipe / channel->
01715> AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEL
01716> (ha) (cms) (hrs) (mm) (m) (m/s)
01717> INFLOW : ID= 1:Total .04 .066 1.52 76.801 .044 .839
01718> OUTFLOW: ID= 3:ROAD .04 .066 1.52 76.801 .044 .839
01719>
01720>
01721>
01722> 006:0010-----
01723>
01724>
01725>
01726> 006:0002-----
01727>
01728> 006:0002-----
01729>
01730> 006:0002-----
01731>
01732> 006:0002-----
01733>
01734> 006:0002-----
01735> ** END OF RUN : 6
01736>
01737>
01738>
01739>
01740>
01741>
01742>
01743>
01744> | START | Project dir.: C:\SWM_PRC\17-918\Block15\
01745> | | Rainfall dir.: C:\SWM_PRC\17-918\Block15\
01746> TZERO = .00 hrs on 0
01747> METOUT= 2 (output = METRIC)
01748> NRUN = 007
01749> NSTORM= 1
01750> # 1=C:\SWM_PRC\STMFILES\19880804.stm
01751>
01752> 007:0002-----
01753>
01754> * Project Name: [ ] Project Number: [18-946]
01755> * Date : 2019-01-30
01756> * Modeler : [sin]
01757> * Company : David Schaeffer Engineering Ltd.
01758> * License # : 4488477
01759>
01760>
01761> 007:0002-----
01762>
01763> | READ STORM | Filename: City of Ottawa August 4, 1988 Storm - 5m
01764> | Ptotal= 80.59 mm | Comments: City of Ottawa August 4, 1988 Storm - 5m
01765>
01766> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01767> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01768> .08 100.00 | 0.8 104.400 | 2.92 .200 | 4.33 .200
01769> .17 100 | 1.58 27.500 | 3.00 12.800 | 4.42 .200
01770> .25 .000 | 1.67 62.500 | 3.08 14.000 | 4.50 .200
01771> .33 3.700 | 1.75 31.800 | 3.17 22.200 | 4.58 .200
01772> .42 6.200 | 1.83 79.800 | 3.25 21.800 | 4.67 .200
01773> .50 101.500 | 1.92 67.500 | 3.33 1.400 | 4.75 .200
01774> .58 15.500 | 2.00 156.200 | 3.42 .200 | 4.83 .200
01775> .67 29.300 | 2.08 5.100 | 3.50 .200 | 4.92 .200
01776> .75 19.800 | 2.17 .200 | 3.58 .200 | 5.00 2.900
01777> .83 1.500 | 2.25 .200 | 3.67 .200 | 5.08 7.800
01778> .92 1.700 | 2.33 .200 | 3.75 .200 | 5.17 10.000
01779> 1.00 5.400 | 2.42 .200 | 3.83 .200 | 5.25 6.300
01780> 1.08 24.600 | 2.50 .200 | 3.92 .200 | 5.33 5.100
01781> 1.17 26.500 | 2.58 .200 | 4.00 .200 | 5.42 9.800
01782> 1.25 34.900 | 2.67 .200 | 4.08 .200 | 5.50 2.600
01783> 1.33 10.200 | 2.75 .200 | 4.17 .200 | 5.58 1.700
01784> 1.42 27.100 | 2.83 .200 | 4.25 .200 |
01785>
01786>
01787> 007:0003-----
01788>
01789> * Post-Development Model - Wateridge Block 15
01790>
01791>
01792> * Drainage to Rear Lane
01793>
01794>
01795> | CALIB STANDHYD | Area (ha)= .54
01796> | 01:RL1 DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00
01797>
01798>
01799> Surface Area (ha)= .47
01800> Dep. Storage (mm)= 1.57 4.67
01801> Average Slope (%)= .50 2.00
01802> Length (m)= 250.00 10.00
01803> Mannings n = .013 .250
01804>
01805> Max.eff.Inten.(mm/hr)= 156.20 116.61
01806> over (min) 5.00 7.00

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01807> Storage Coeff. (min)= 4.56 (ii) 7.45 (ii)
01808> Unit Hyd. Tpeak (min)= 5.00 7.00
01809> Unit Hyd. peak (cms)= .24 .16
01810>
01811> PEAK FLOW (cms)= .14 .02 .160 (iii)
01812> TIME TO PEAK (hrs)= 2.02 2.05 2.03
01813> RUNOFF VOLUME (mm)= 79.02 37.60 73.223
01814> TOTAL RAINFALL (mm)= 80.59 80.59 80.591
01815> RUNOFF COEFFICIENT = .98 .47 .909
01816>
01817> (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
01818> Fo (mm/hr)= 76.20 K (1/hr)= 4.14
01819> Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
01820> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01821> THAN THE STORAGE COEFFICIENT.
01822> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01823>
01824>
01825> 007:0004-----
01826> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
01827>
01828> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .119 (cms)
01829> | TotalHyd 01:RL1 | Number of inlets in system [NINLET] = 1
01830> |-----|
01831> | Total minor system capacity = .119 (cms)
01832> | Total major system storage [TMJSTO] = 0.(cu.m.)
01833>
01834> ID: NHYD AREA QPEAK TPEAK R.V. DWF
01835> (ha) (cms) (hrs) (mm) (cms)
01836> TOTAL HYD. 01:RL1 .54 .160 2.033 73.223 .000
01837> MAJOR SYST 02:MAJOR .01 .041 2.033 73.223 .000
01838> MINOR SYST 04:MINOR .53 .119 1.983 73.223 .000
01839>
01840> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01841>
01842>
01843> 007:0005-----
01844> * Rear Lane Cross Section
01845>
01846> | ROUTE CHANNEL | Routing time step (min) = 1.00
01847> | IN: 02:MAJOR | Number of SEGMENTS = 1
01848> | OUT: 03:LANE | Slopes (%), CHANNEL=.50 FLOODPLAIN=.50
01849> |-----|
01850> | LENGTH = 20.00 (m)
01851>
01852> <----- DATA FOR SECTION ( 15.1) ----->
01853> Distance Elevation Manning
01854> .00 100.00 .0130
01855> 6.50 99.85 .0130
01856> 6.51 99.85 .0130
01857> 11.51 100.17 .0130
01858>
01859> <----- TRAVEL TIME TABLE ----->
01860> DEPTH ELEV X-VOLUME S-VOLUME FLOW RATE VELOCITY TRAV.TIME D x V
01861> (m) (m) (cu.m.) (cu.m.) (cms) (m/s) (min) (m2/s)
01862> .012 99.782 .119E+00 .720E-02 .001 .179 1.86 .002
01863> .024 99.794 .476E+00 .576E-01 .007 .285 1.17 .007
01864> .036 99.806 .107E+01 .194E+00 .020 .373 .89 .014
01865> .048 99.818 .190E+01 .461E+00 .043 .452 .74 .022
01866> .061 99.831 .125E+02 .835E+01 .078 .524 .64 .032
01867> .073 99.843 .428E+01 .156E+01 .127 .592 .56 .043
01868> .085 99.855 .582E+01 .246E+01 .196 .675 .49 .057
01869> .097 99.867 .743E+01 .360E+01 .289 .779 .43 .075
01870> .109 99.879 .909E+01 .495E+01 .397 .874 .38 .095
01871> .121 99.891 .108E+02 .653E+01 .519 .962 .35 .116
01872> .133 99.903 .125E+02 .835E+01 .655 .1045 .32 .139
01873> .145 99.915 .143E+02 .104E+02 .805 .1122 .30 .163
01874> .157 99.927 .162E+02 .127E+02 .968 .1195 .28 .188
01875> .169 99.939 .181E+02 .153E+02 1.144 .1265 .26 .214
01876> .182 99.952 .200E+02 .182E+02 1.333 .1332 .25 .242
01877> .194 99.964 .220E+02 .213E+02 1.535 .1396 .24 .270
01878> .206 99.976 .242E+02 .247E+02 1.750 .1457 .23 .300
01879> .218 99.988 .261E+02 .284E+02 1.979 .1516 .22 .330
01880> .230 100.000 .282E+02 .324E+02 2.220 .1573 .21 .362
01881>
01882> X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
01883> S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
01884> (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.
01885>
01886> <----- hydrograph -----> <-pipe / channel->
01887> AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEL
01888> (ha) (cms) (hrs) (mm) (m) (m/s)
01889> INFLOW : ID= 2:MAJOR .01 .041 2.03 73.223 .047 .443
01890> OUTFLOW: ID= 3:LANE .01 .041 2.03 73.223 .047 .441
01891>
01892>
01893>
01894> 007:0006-----
01895>
01896> * Remaining Drainage Area to Squadron Cres.
01897>
01898>
01899> | CALIB STANDHYD | Area (ha)= .77
01900> | 01:A1 DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00
01901>
01902> IMPERVIOUS PERVIOUS (i)
01903> Surface Area (ha)= .66 .11
01904> Dep. Storage (mm)= 1.57 4.67
01905> Average Slope (%)= .50 2.00
01906> Length (m)= 150.00 10.00
01907> Mannings n = .013 .250
01908>
01909> Max.eff.Inten.(mm/hr)= 156.20 127.20
01910> over (min) 3.00 6.00
01911> Storage Coeff. (min)= 3.36 (ii) 6.15 (ii)
01912> Unit Hyd. Tpeak (min)= 3.00 6.00
01913> Unit Hyd. peak (cms)= .35 .19
01914>
01915> PEAK FLOW (cms)= .23 .03 .256 (iii)
01916> TIME TO PEAK (hrs)= 2.03 2.00 2.00
01917> RUNOFF VOLUME (mm)= 79.02 37.60 73.223
01918> TOTAL RAINFALL (mm)= 80.59 80.59 80.591
01919> RUNOFF COEFFICIENT = .98 .47 .909
01920>
01921> (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
01922> Fo (mm/hr)= 76.20 K (1/hr)= 4.14
01923> Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
01924> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01925> THAN THE STORAGE COEFFICIENT.
01926> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01927>
01928>
01929> 007:0007-----
01930> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
01931>
01932> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .163 (cms)
01933> | TotalHyd 01:A1 | Number of inlets in system [NINLET] = 1
01934> |-----|
01935> | Total minor system capacity = .163 (cms)
01936> | Total major system storage [TMJSTO] = 0.(cu.m.)

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01936> ID: NHYD AREA QPEAK TPEAK R.V. DWF
01937> (ha) (cms) (hrs) (mm) (cms)
01938> TOTAL HYD. 01:A1 .77 .256 2.000 73.223 .000
01939>
01940> MAJOR SYST 02:MAJOR .03 .093 2.000 73.223 .000
01941> MINOR SYST 04:MINOR .74 .163 1.950 73.223 .000
01942>
01943> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01944>
01945>
01946>
01947> 007:0008-----
01948>
01949> | ADD HYD (Total) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01950> | ID: 02:MAJOR .03 .093 2.00 73.22 .000
01951> | ID: 03:LANE .01 .041 2.03 73.22 .000
01952>
01953> SUM 01:Total .05 .125 2.02 73.22 .000
01954>
01955>
01956> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01957>
01958>
01959> 007:0009-----
01960> * Cross Section at Site Entrance (Squadron Cres.)
01961>
01962> | ROUTE CHANNEL | Routing time step (min) = 1.00
01963> | IN: 01:Total | Number of SEGMENTS = 1
01964> | OUT: 03:ROAD | Slopes (%), CHANNEL=2.00 FLOODPLAIN=2.00
01965> |-----|
01966> | LENGTH = 10.00 (m)
01967>
01968> <----- DATA FOR SECTION ( 15.2) ----->
01969> Distance Elevation Manning
01970> .00 100.00 .0130
01971> .01 99.85 .0130
01972> 6.50 99.77 .0130
01973> 6.51 99.92 .0130
01974>
01975> <----- TRAVEL TIME TABLE ----->
01976> DEPTH ELEV X-VOLUME S-VOLUME FLOW RATE VELOCITY TRAV.TIME D x V
01977> (m) (m) (cu.m.) (cu.m.) (cms) (m/s) (min) (m2/s)
01978> .008 99.778 .253E-01 .500E-03 .001 .270 .62 .002
01979> .016 99.786 .101E+00 .400E-02 .004 .428 .39 .007
01980> .024 99.794 .228E+00 .135E-01 .013 .561 .30 .013
01981> .032 99.802 .405E+00 .320E-01 .028 .680 .25 .021
01982> .039 99.809 .633E+00 .625E-01 .050 .789 .21 .031
01983> .047 99.817 .911E+00 .108E+00 .081 .891 .19 .042
01984> .055 99.825 .124E+01 .171E+00 .122 .987 .17 .055
01985> .063 99.833 .162E+01 .256E+00 .175 1.079 .15 .068
01986> .071 99.841 .205E+01 .364E+00 .239 1.167 .14 .083
01987> .079 99.849 .253E+01 .500E+00 .317 1.252 .13 .099
01988> .087 99.857 .304E+01 .661E+00 .427 1.401 .12 .122
01989> .095 99.865 .356E+01 .843E+00 .552 1.552 .11 .147
01990> .103 99.873 .407E+01 .104E+01 .690 1.695 .10 .174
01991> .111 99.881 .458E+01 .127E+01 .840 1.832 .09 .203
01992> .118 99.888 .510E+01 .151E+01 1.001 1.963 .08 .233
01993> .126 99.896 .561E+01 .177E+01 1.173 2.090 .08 .264
01994> .134 99.904 .612E+01 .206E+01 1.355 2.212 .08 .297
01995> .142 99.912 .664E+01 .236E+01 1.547 2.330 .07 .331
01996> .150 99.920 .715E+01 .268E+01 1.749 2.445 .07 .367
01997> X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
01998> S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
01999>
02000> <----- hydrograph -----> <-pipe / channel->
02001> AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEL
02002> (ha) (cms) (hrs) (mm) (m) (m/s)
02003> INFLOW : ID= 1:Total .05 .125 2.02 73.223 .056 .991
02004> OUTFLOW: ID= 3:ROAD .05 .126 2.02 73.223 .056 .992
02005>
02006>
02007>
02008> 007:0010-----
02009>
02010>
02011>
02012> 007:0002-----
02013>
02014> 007:0002-----
02015>
02016> 007:0002-----
02017>
02018> 007:0002-----
02019>
02020> 007:0002-----
02021>
02022> 007:0002-----
02023> ** END OF RUN : 7
02024>
02025>
02026>
02027>
02028>
02029>
02030>
02031> | START | Project dir.: C:\SWM_PRG\17-918\Block15\
02032> | Rainfall dir.: C:\SWM_PRG\17-918\Block15\
02033>
02034> TZERO = .00 hrs on 0
02035> METOUT= 2 (output = METRIC)
02036> NRUN = 008
02037> NSTORM= 1
02038> # 1=C:\SWM_PRG\STMFILES\19960808.stm
02039>
02040> 008:0002-----
02041> *****
02042> *# Project Name: [] Project Number: [18-946]
02043> *# Date : 2019-01-30
02044> *# Modeller : [slm]
02045> *# Company : David Schaeffer Engineering Ltd.
02046> *# License # : 4488477
02047> *****
02048>
02049> 008:0002-----
02050>
02051> | READ STORM | Filename: City of Ottawa August 8, 1996 Storm - 5m
02052> | Ptotal= 73.90 mm | Comments: City of Ottawa August 8, 1996 Storm - 5m
02053>
02054> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
02055> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
02056> .08 4.000 | 1.58 9.300 | 3.08 63.700 | 4.58 1.300
02057> .17 11.900 | 1.67 8.000 | 3.17 58.400 | 4.67 1.300
02058> .25 26.500 | 1.75 4.000 | 3.25 47.800 | 4.75 .000
02059> .33 13.300 | 1.83 .000 | 3.33 15.900 | 4.83 .000
02060> .42 .000 | 1.92 2.700 | 3.42 13.300 | 4.92 .000
02061> .50 2.700 | 2.00 .000 | 3.50 8.000 | 5.00 .000
02062> .58 .000 | 2.08 .000 | 3.58 5.300 | 5.08 2.700
02063> .67 8.000 | 2.17 .000 | 3.67 6.600 | 5.17 .000
02064> .75 18.600 | 2.25 5.300 | 3.75 2.700 | 5.25 .000

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02065> .83 10.600 | 2.33 .000 | 3.83 4.000 | 5.33 .000
02066> .92 21.200 | 2.42 .000 | 3.92 2.700 | 5.42 .000
02067> 1.00 2.700 | 2.50 .000 | 4.00 4.000 | 5.50 .000
02068> 1.08 2.700 | 2.58 .000 | 4.08 2.700 | 5.58 .000
02069> 1.17 15.900 | 2.67 .000 | 4.17 5.300 | 5.67 .000
02070> 1.25 66.300 | 2.75 .000 | 4.25 4.000 | 5.75 1.300
02071> 1.33 55.700 | 2.83 4.000 | 4.33 2.700 |
02072> 1.42 122.000 | 2.92 53.100 | 4.42 4.000 |
02073> 1.50 88.900 | 3.00 69.000 | 4.50 2.700 |
02074>
02075>
02076> 008:0003-----
02077> *****
02078> * Post-Development Model - Wateridge Block 15
02079> *****
02080> *****
02081> * Drainage to Rear Lane
02082> *****
02083>
02084> | CALIB STANDHYD | Area (ha)= .54
02085> | 01:R1L DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00
02086>
02087> IMPERVIOUS PERVIOUS (i)
02088> Surface Area (ha)= .47 .08
02089> Dep. Storage (mm)= 1.57 4.67
02090> Average Slope (%)= .50 2.00
02091> Length (m)= 250.00 10.00
02092> Mannings n = .013 .250
02093>
02094> Max.eff.Inten.(mm/hr)= 122.00 80.61
02095> over (min) 5.00 8.00
02096> Storage Coeff. (min)= 5.03 (ii) 8.38 (ii)
02097> Unit Hyd. Tpeak (min)= 5.00 8.00
02098> Unit Hyd. peak (cms)= .23 .14
02099>
02100> PEAK FLOW (cms)= .12 .01 *TOTALS*
02101> TIME TO PEAK (hrs)= 1.48 1.53 1.483
02102> RUNOFF VOLUME (mm)= 72.33 33.77 66.931
02103> TOTAL RAINFALL (mm)= 73.90 73.90 73.900
02104> RUNOFF COEFFICIENT = .98 .46 .906
02105>
02106> (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
02107> Fo (mm/hr)= 76.20 K (1/hr)= 4.14
02108> Fc (mm/hr)= 13.20 Cum.Inf. (mm)= .00
02109> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02110> THAN THE STORAGE COEFFICIENT.
02111> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02112>
02113>
02114> 008:0004-----
02115> * Inlet Capacity per 5-Year Design Sheet Pipe Capacity
02116>
02117> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .119 (cms)
02118> | TotalHyd 01:R1L | Number of inlets in system [NINLET] = 1
02119> | ID: NHYD | AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) DWF (cms)
02120> | 01:R1L .54 .132 1.483 66.931 .000
02121> | Total minor system capacity = .119 (cms)
02122> | Total major system storage [TMJSTO] = 0. (cu.m.)
02123>
02124> TOTAL HYD. 01:R1L .54 .132 1.483 66.931 .000
02125>
02126> MAJOR SYST 02:MAJOR .00 .013 1.483 66.931 .000
02127> MINOR SYST 04:MINOR .54 .119 1.450 66.931 .000
02128>
02129> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02130>
02131>
02132> 008:0005-----
02133> * Rear Lane Cross Section
02134>
02135> | ROUTE CHANNEL | Routing time step (min) = 1.00
02136> | IN: 02:MAJOR | Number of SEGMENTS = 1
02137> | OUT: 03:LANE | Slopes (%), CHANNEL= .50 FLOODPLAIN= .50
02138> | LENGTH = 20.00 (m)
02139>
02140> <----- DATA FOR SECTION ( 15.1) ----->
02141> Distance Elevation Manning
02142> .00 100.00 .0130
02143> .01 99.85 .0130
02144> 6.50 99.77 .0130
02145> 6.51 99.85 .0130
02146> 11.51 100.17 .0130
02147>
02148> <----- TRAVEL TIME TABLE ----->
02149> DEPTH ELEV X-VOLUME S-VOLUME FLOW RATE VELOCITY TRAV.TIME D x V
02150> (m) (m) (cu.m.) (cu.m.) (cms) (m/s) (min) (m2/s)
02151> .012 99.782 .119E+00 .720E-02 .001 .179 1.86 .002
02152> .024 99.794 .476E+00 .576E-01 .007 .285 1.17 .007
02153> .036 99.806 .107E+01 .194E+00 .020 .373 .89 .014
02154> .048 99.818 .190E+01 .461E+00 .043 .452 .74 .022
02155> .061 99.831 .294E+01 .900E+00 .078 .524 .64 .032
02156> .073 99.843 .428E+01 .156E+01 .127 .592 .56 .043
02157> .085 99.855 .582E+01 .246E+01 .196 .675 .49 .057
02158> .097 99.867 .743E+01 .360E+01 .289 .779 .43 .075
02159> .109 99.879 .909E+01 .495E+01 .397 .874 .38 .095
02160> .121 99.891 .108E+02 .653E+01 .519 .962 .35 .116
02161> .133 99.903 .125E+02 .835E+01 .655 1.045 .32 .139
02162> .145 99.915 .143E+02 .104E+02 .805 1.122 .30 .163
02163> .157 99.927 .162E+02 .127E+02 .968 1.195 .28 .188
02164> .169 99.939 .181E+02 .153E+02 1.144 1.265 .26 .214
02165> .182 99.952 .200E+02 .182E+02 1.333 1.332 .25 .242
02166> .194 99.964 .220E+02 .213E+02 1.535 1.396 .24 .270
02167> .206 99.976 .240E+02 .247E+02 1.750 1.457 .23 .300
02168> .218 99.988 .261E+02 .284E+02 1.979 1.516 .22 .330
02169> .230 100.000 .282E+02 .324E+02 2.220 1.573 .21 .362
02170>
02171> X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
02172> S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
02173> (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.
02174>
02175> <----- hydrograph -----> <-pipe / channel->
02176> AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEL
02177> (ha) (cms) (hrs) (mm) (m) (m/s)
02178> INFLOW : ID= 2:MAJOR .00 .013 1.48 66.931 .030 .319
02179> OUTFLOW: ID= 3:LANE .00 .012 1.50 66.931 .029 .314
02180>
02181>
02182>
02183> 008:0006-----
02184> *****
02185> * Remaining Drainage Area to Squadron Cres.
02186> *****
02187>
02188> | CALIB STANDHYD | Area (ha)= .77
02189> | 01:A1 DT= 1.00 | Total Imp(%)= 86.00 Dir. Conn.(%)= 86.00
02190>
02191> IMPERVIOUS PERVIOUS (i)
02192> Surface Area (ha)= .66 .11
02193> Dep. Storage (mm)= 1.57 4.67

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02323>
02324>

DRAWINGS / FIGURES



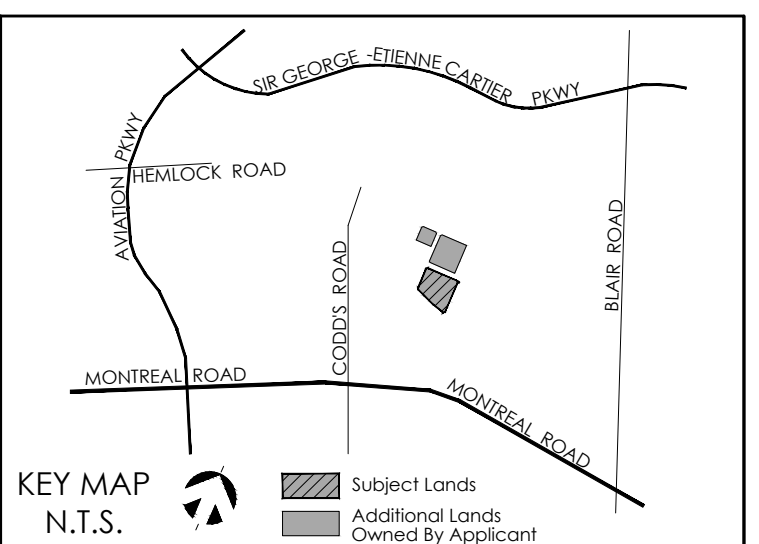
SITE STATISTICS AND DEVELOPMENT DATA

SITE AREA	19,588.25m ² (1.96 ha)
PAVED AREA	6,210.40m ² (31.7%)
LANDSCAPED AREA	6,202.15m ² (31.7%)
TOTAL BUILDING COVERAGE	7,175.70m ² (36.6%)
TOTAL GROSS FLOOR AREA	22,746.76m ²
STACKED TOWNS TYPE A UPPER MODEL (34@114m ²)	3,876m ²
STACKED TOWNS TYPE B LOWER MODEL (34@85m ²)	2,890m ²
STACKED TOWNS TYPE C UPPER MODEL (24@116.93m ²)	2,806.32m ²
STACKED TOWNS TYPE D LOWER MODEL (24@87.26m ²)	2,094.24m ²
STACKED TOWNS TYPE E UPPER MODEL (4@117.20m ²)	468.80m ²
STACKED TOWNS TYPE F LOWER MODEL (4@89.97m ²)	359.88m ²
B2B TOWNHOUSE TYPE A MODEL (20@126.72m ²)	2,525.20m ²
B2B TOWNHOUSE TYPE B MODEL (6@139.82m ²)	838.92m ²
B2B TOWNHOUSE TYPE C MODEL (14@159.24m ²)	2,229.36m ²
B2B TOWNHOUSE TYPE D MODEL (2@172.06m ²)	344.12m ²
B2B TOWNHOUSE TYPE E MODEL (26@165.92m ²)	4,313.92m ²
HYDRO VAULT (1)	116m ²
DENSITY (UPH)	98
ZONE CATEGORY	R4Y(2456)

DWELLING BLOCK	DWELLING TYPE	GROUND FLOOR AREA (m ²)	UNITS
BLOCK 1	STACKED TOWNS	503.62	20
BLOCK 2	STACKED TOWNS	499.59	20
BLOCK 3	STACKED TOWNS	499.59	20
BLOCK 4	STACKED TOWNS	503.62	20
BLOCK 5	STACKED TOWNS	400.82	16
BLOCK 6	STACKED TOWNS	400.82	16
BLOCK 7	STACKED TOWNS	301.24	12
BLOCK 8	BACK TO BACK TOWNHOUSES	571.00	10
BLOCK 9	BACK TO BACK TOWNHOUSES	591.81	10
BLOCK 10	BACK TO BACK TOWNHOUSES	575.07	10
BLOCK 11	BACK TO BACK TOWNHOUSES	480.27	8
BLOCK 12	BACK TO BACK TOWNHOUSES	469.87	8
BLOCK 13	BACK TO BACK TOWNHOUSES	571.00	10
BLOCK 14	BACK TO BACK TOWNHOUSES	691.38	12
TOTAL		7,059.70	192

SECTION	ZONE PROVISION - PLANNED UNIT DEVELOPMENT	REQUIRED	PROPOSED
162A (Table)	MIN. LOT WIDTH (m)	N/A	N/A
162A (Table)	MIN. LOT AREA (m ²)	1,400m ²	19,588m ²
162A (Table)	MAX. BUILDING HEIGHT (m)	11.0m	10.0m
162A (Table)	MIN. FRONT YARD SETBACK (m)	3.0m	3.0m
162A (Table)	MIN. CORNER SIDE YARD SETBACK (m)	3.0m	3.0m
162A (Table)	MIN. CORNER SIDE YARD SIGHT TRIANGLE SETBACK (m)	0.5m	0.6m
162A (Table)	MIN. REAR YARD SETBACK (m)	3.0m	3.0m
162A (Table)	MIN. INTERIOR YARD SETBACK (m)	3.0m	N/A
101 (Table)	RESIDENT PARKING - B2B TOWNS (68)	51 (68@0.75/unit)	68 (68@1/unit)
2018-124	VISITOR PARKING - B2B TOWNS (124)	0 (124@0.5/unit)	124 (124@1/unit)
111A (Table)	BIKE PARKING (STACKED TOWNS)	62 (0.5/unit)	140
131 (Table)	MIN. WIDTH OF PRIVATE WAY (m)	6.0m	6.0m
2018-124	SEPARATION DISTANCE BETWEEN BUILDINGS WITHIN A PLANNED UNIT DEVELOPMENT (m)	0.2m	0.4m
2018-124	MIN. SETBACK OF GARAGE DOOR TO PRIVATE WAY (m)	1.0m	5.2m
131 (Table)	SEPARATION DISTANCE BETWEEN BUILDINGS WITHIN A PLANNED UNIT DEVELOPMENT (m)	1.2m	3.0m
137 (Table)(7)	TOTAL AMENITY AREA (6m ² /unit)	744m ²	±3,321m ²
137 (Table)(7)	MIN. OF 50% AS COMMUNAL, AT LEAST 1 AGGREGATED AREA MIN. 54m ²	372m ²	±549m ²

SECTION	ADDITIONAL PROVISIONS	REQUIRED	PROPOSED
65	PERMITTED PROJECTIONS INTO YARDS:		
65(6)	COVERED OR UNCOVERED BALCONY, PORCH, DECK (m)	2.0m (Max)	1.8m
65 (5)	FIRE ESCAPES, OPEN STAIRWAYS, STOOP (m)	>1.0m to lot line	1.2m
106(1)	MIN. PERPENDICULAR PARKING SPACE SIZE (m)	>0.6m to lot line	0.9m
107 (2)	MIN. DRIVEWAY WIDTH TO GARAGE (m)	2.6m x 5.2m	2.6m x 5.2m
109 (3)(b)	MAX. WALKWAY WIDTH PERMITTED IN YARD (m)	2.6m	3.2m
110 (Table)	LANDSCAPED AREA SURROUNDING PARKING LOT- ABUTTING A STREET (m)	1.8m	1.8m
2018-124	MAX. PROJECTION HEIGHT (m)	3.0m	3.0m
91	UTILITY INSTALLATION MIN. CORNER SIDE YARD SETBACK (m)	3.2m	0.96m
		0.5m	1.9m



SCALE 1:400

LEGEND	
BACK TO BACK TOWNHOUSE	ENTRANCE
STACKED TOWNHOUSE	# UNIT NUMBER
PATHWAY	BENCH
WALKWAY TO ENTRY	RAIN WATER LEADER
CROSSWALK	HYD FIRE HYDRANT
RAISED CROSSWALK	CANADA POST MAIL BOX
ASPHALT DRIVEWAY	LIGHT DUTY PAVING
CURB (0.2m)	STOP SIGN
MOUNTABLE CURB	RA-1 BIKE RACKS
DEPRESSED CURB	V VISITOR PARKING
PORCH	TREE GRATE
PROJECTION (STAIRS)	ENTRY FEATURE
WINDOW WELL	ART FEATURE
S.S. SNOW STORAGE AREA	TACTILE WALKING SURFACE INDICATOR
L/A LANDSCAPED AREA	POLE MOUNT LIGHTING (R=0.5m)
BLOCK BOUNDARY	

DATE	REVISION	BY
26/06/19	Issued for Site Plan Second Submission	CR
19/06/19	General Revisions- Update with new landscape plan	SP
04/06/19	General Revisions- Update site statistic chart	SP
27/05/19	General Revisions- Update Block 9 & 8 and hydro vault	SP
10/05/19	General Revisions- Update Block 10	SP
16/04/19	General Revisions- Add light duty paving b/w stacked TH	SP
04/04/19	General Revisions- New street names	SP
31/01/19	Issue for Site Plan Amendment Application	SP

GENERAL NOTES:
1. DO NOT SCALE DRAWINGS FOR PRINT.
2. THIS DRAWING IS THE EXCLUSIVE PROPERTY OF KORSIAK URBAN PLANNING AND MATTHEW HOMES. COPYRIGHT RESERVED.
3. SITE PLAN PREPARED IN ACCORDANCE WITH PLAN 4M-1581 AND PLAN 4R-30196, PREPARED BY ANNIS O'SULLIVAN, VOLLEBEK LTD.
4. TOWNHOUSE DWELLING UNITS ARE DESIGNED TO ACCOMMODATE CURBSIDE GARBAGE PICK-UP.
5. MEWS ARE INTENDED FOR PUBLIC ACCESS.
6. WALKWAYS AND CURBS TO BE TIED INTO PUBLIC ROW WHERE APPLICABLE.
7. REFERENCES CITY OF OTTAWA T.S.I. DETAIL SC7.3
8. TO BE RAISED 8cm PER CITY OF OTTAWA TYPICAL RAISED CROSSWALK STANDARD DRAWING R15.

PROJECT TEAM	LANDSCAPE ARCHITECTURE	MECHANICAL/ELECTRICAL
SITE PLAN DESIGN: KORSIAK Urban Planning	NAK design strategies	LR J
PLANNING: Stantec	TRANSPORTATION: NOVATECH	ENVIRONMENTAL: VALCOUSTICS
ARCHITECTURE: Q4A	NOISE: VALCOUSTICS	ENVIRONMENTAL: KILGOUR & ASSOCIATES
CIVIL ENGINEER: DSEL	GEOTECHNICAL & STRUCTURAL: pakersongroup	

mattamyHOMES

WATERIDGE VILLAGE: PHASE 1B
245 SQUADRON CRES.
BLOCK 15
PART OF LOT 22
CONCESSION 1 (OTTAWA FRONT)
GEOGRAPHIC TOWNSHIP OF GLOUCESTER
REGISTERED PLAN 4M-1559
CITY OF OTTAWA

TITLE: BLOCK 15 SITE PLAN	DRAWN BY: SP	DRAWING NO. A1
DATE: June 26, 2019	CHECKED BY: CR	
FILE NO.: D07-12-17-0111		
JOB NO.: Mattamy - Wateridge		