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FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

FOR

HALF MOON BAY NORTH PHASE 8 - BLOCK 40

MATTAMY HOMES

CITY OF OTTAWA
D07-12-18-0048

PROJECT NO.: 17-987

AUGUST 2018 – REV 3

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
FOR
HALF MOON BAY NORTH
PHASE 8 – BLOCK 40

MATTAMY HOMES

AUGUST 2018 – REV 3
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PHASE 8 – BLOCK 40

CITY OF OTTAWA

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1.0 INTRODUCTION

David Schaeffer Engineering Ltd. (DSEL) has been retained to prepare a Functional Servicing and Stormwater Management Report in support of the Site Plan Application (SPC) for the proposed residential development of Block 40, Phase 8, in Half Moon Bay North (HMBN) on behalf of Mattamy Homes.

The subject property is located within the City of Ottawa urban boundary, in Barrhaven South as illustrated in ***Figure 1***. The subject property is bounded by Future Watercolours Way to the north, Seeley's Bay Street to the east, future development to the south and future Realignment of Greenbank Road to the west. The subject property measures approximately ***0.75 ha*** and is designated General Mixed-Use Zone (GM1628) under the current City of Ottawa zoning by-law.

FIGURE 1: SITE LOCATION

Block 40 is proposed to be developed into 20 2-storey townhomes and 40 back-to-back stacked townhouse units, with associated parking and drive aisles. A copy of the proposed site plan is included in ***Drawings/Figures***

The objective of this report is to support the Site Plan Application by providing sufficient detail to demonstrate that the proposed development is supported by existing and proposed municipal servicing infrastructure, and that the site design conforms to current City of Ottawa design standards.

1.1 Existing Conditions

The subject site was undeveloped at the time of publication. An application for draft plan of subdivision was made under separate cover for the creation of the subject block. The subdivision, including Block 40, is in the process of being registered.

Sewer system and watermain distribution mapping collected from the City of Ottawa and from design drawings prepared by DSEL for the HMBN Subdivision Phase 8 indicate that the following services exist within the adjacent municipal right-of-way noted below:

Seeley's Bay Street

- 152 mm diameter PVC watermain
- 200 mm diameter PVC sanitary sewer
- 375 mm diameter PVC storm sewer

The following future services were designed as part of the servicing for the Half Moon Bay North – Phase 8 subdivision and are anticipated to be available at the time of development of Block 40:

Watercolours Way

- 200 mm diameter PVC watermain
- 200 mm diameter PVC sanitary sewer
- 825 mm diameter concrete storm sewer

1.2 Required Permits / Approvals

Development of the site is subject to the City of Ottawa Planning and Development Approvals process. The City of Ottawa must approve detailed engineering design drawings and reports, prepared to support the proposed development plan.

1.3 Pre-Consultation

Pre-consultation correspondence and the servicing guidelines checklist are 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 PIEDTB-2016-01**
    City of Ottawa, September 6, 2016.
    (PIEDTB-2016-01)
  - **Technical Bulletin ISTB-2018-01**
    City of Ottawa, March 21, 2018.
    (ISTB-2018-01)
- **Ottawa Design Guidelines – Water Distribution**
  City of Ottawa, October 2012
  (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*)
- **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)

- **Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems**
  National Fire Protection Association
  2014 Edition
  (NFPA 25)

- **Design Brief for the Half Moon Bay North Phase 8**
  David Schaeffer Engineering Ltd.
  Revision 2, 2nd Submission, December 15, 2017
  (Phase 8 Design Brief)

- **Stormwater Management Report for Phase 8 of the Half Moon Bay Subdivision**
  J.F. Sabourin and Associates
  Updated December 2017
  (Phase 8 SWM Report)

- **Design Brief for the Clarke Stormwater Management Pond for the Half Moon Bay West Subdivision**
  J.F. Sabourin and Associates & DSEL
  Revised October 19, 2017
  (Clarke Pond Design Brief)

- **Hydraulic Capacity and Modeling Analysis Half Moon Bay North – Phase 8**
  GeoAdvice Engineering Inc.
  September 8, 2017
  (HMBN Ph 8 Water Report)

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies within the City of Ottawa BARR pressure zone, as shown by the Pressure Zone map in ***Appendix B.*** Watermains exist within Seeley's Bay Street. A local 200 mm watermain is currently being constructed within the Watercolours Way right-of-way which will be used 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 ***Phase 8 Design Brief****,* water demand for the subject property is summarized below:

Table 1
Summary of Water Demand per *Phase 8 Design Brief*

Design Parameter	Total Demand (L/min)	Pressure[1] (kPa)
Average Day	72.2	618
Peak Hour	389.8	458
Max Day + Fire Flow	15,000 + 259.9	192
1) Pressures from Node J-11 from the ***HMBN Ph 8 Water Report***		

3.2 Water Supply Servicing Design

In accordance with City of Ottawa technical bulletin ***ISDTB-2014-02***, redundant service connection was not required as the anticipated design flow is less than 50 m^3/day. The subject property is proposed to be serviced through a series of 150 mm and 50 mm watermains. Refer to the ***SSP-1*** in ***Drawings/Figures*** for proposed water servicing.

All of the buildings in the development are proposed to be serviced from a single connection to the future 200 mm diameter watermain within Watercolours Way. ***Table 2*** summarizes the ***Water Supply Guidelines*** employed in the preparation of the water demand estimate.

Table 2
Water Supply Design Criteria

Design Parameter	Value
Residential Water Demand	280 L/p/day
Residential Maximum Daily Demand	3.6 x Average Daily *
Residential Maximum Hourly	5.4 x Average Daily *
Minimum Watermain Size	150mm diameter
Minimum Depth of Cover	2.4m from top of watermain to finished grade
During normal operating conditions desired operating pressure is within	350kPa and 480kPa
During normal operating conditions pressure must not drop below	275kPa
During normal operating conditions pressure shall not exceed	552kPa
During fire flow operating pressure must not drop below	140kPa

** Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons.*
*** Table updated to reflect ISDTB-2010-2 & ISDTB-2018-02)*

Table 3 summarizes the anticipated water demand for the proposed development, calculated using the ***Water Supply Guidelines.***

Table 3
Summary of Water Demand

Design Parameter	Total Demand (L/min)
Average Day	31.5
Peak Hour	170.1
Max Day + Fire Flow	15,000 + 113.4

The proposed water demand result in a reduction of approximate ***129%*** compared to what was originally contemplated in the ***Phase 8 Design Brief.*** It is anticipated water pressure at the boundary of the site will be higher than those summarized in ***Table 1***.

A ***1.3kPa*** pressure loss along the service was estimated using the Darcy-Weisbach equation, calculation included in ***Appendix B***. Using the pressures summarized in the ***HMBN Phase 8 Water Report***, and the pressure loss calculated, the resulting pressures are greater than required per ***Table 2***. It is anticipated pressure reducing vales will be required.

Existing and future hydrants within Watercolours Way and Seeley's Bay Street are located within 90m of all proposed buildings per the ***OBC***.

A fire flow calculation per the ***ISDTB-2018-02*** was completed for all buildings; the following assumptions below were provided by the Architect, see ***Appendix A*** for correspondence.

- Type of construction – Wood frame

- Occupancy type –Limited combustible
- Sprinkler Protection – Non-Sprinklered

Based on the above assumptions, the highest resulting fire flow is at Block 1, 2 & 3 at ***15,000 L/min***, refer to ***Appendix B*** for fire flow calculations.

3.3 Water Supply Conclusion

It is proposed that the development be serviced from a single connection to the future 200 mm watermain within Watercolours Way, which will be on-line at the time of construction of Block 40.

The anticipated demands for the subject site are less than was previously accounted for during the design described in ***Phase 8 Design Brief***. Pressure during the average day scenario exceeds the normal operating pressures, therefore, pressure controls are recommended. The fire flow and pressures at peak hour are sufficient to service the development.

The design of the water distribution system conforms to all relevant City Guidelines and Policies.

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The subject property lies within the South Nepean Trunk sewer catchment area, as shown by the Trunk Sanitary Sewers and Collection Areas map included in ***Appendix C***. There is an existing sanitary sewer within Seeley's Bay Street which was constructed as part of Half Moon Bay North – Phase 6 and a future sanitary sewer within Watercolours Way which is anticipated to be on-line at the time of construction.

Wastewater flows from Block 40 were included in the design of the sanitary sewer along Seeley's Bay Street. Please refer the contemplated flow in ***Table 4*** below and the design sheet and drainage mapping in ***Appendix C***.

Table 4
Summary of Proposed Wastewater Flows (Half Moon Bay North – Phase 6)

Design Parameter	Anticipated Sanitary Flow[1] (L/s)
Average Dry Weather Flow Rate	1.97
Peak Dry Weather Flow Rate	7.84
Peak Wet Weather Flow Rate	8.05
1) Based on criteria shown in ***Table 5***	

The subdivision sanitary sewers servicing Half Moon Bay North - Phase 6 and the flows summarized in ***Table 4*** were prepared based on ***City Standards*** prior to the issuance of the technical ***ISTB-2018-0*** where the flow per person per day was reduced from 350 to 280 as well as modified peaking factors.

4.2 Wastewater Design

It is anticipated that the proposed development will be serviced via a connection to the existing 200 mm sanitary sewer within Seeley's Bay Street. Refer to the ***SSP-1*** for sanitary servicing layout.

Table 5 summarizes the ***City Standards*** employed in the calculation of wastewater flow rates for the proposed development.

Table 5
Wastewater Design Criteria

Design Parameter	Value
Residential Demand	280 L/p/d
Peaking Factor	Harmon's Peaking Factor. Max 3.8, Min 2.0, Correction Factor = 0.8
Infiltration and Inflow Allowance	0.33L/s/ha
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sanitary Sewer Lateral	135mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012.	

Table 6 summarizes the anticipated peak flow from the proposed development to the sanitary connection within Seeley's Bay Street based on the current proposal. See ***Appendix C*** for associated calculations.

Table 6
Summary of Proposed Wastewater Flows

Design Parameter	Anticipated Sanitary Flow[1] (L/s)
Average Dry Weather Flow Rate	0.53
Peak Dry Weather Flow Rate	1.86
Peak Wet Weather Flow Rate	2.11
1) Based on criteria shown in ***Table 5***	

The estimated wastewater contribution to the Seeley's Bay sanitary sewer is ***2.11L/s***. This results in a decrease of ***5.94 L/s*** compared to what was designed and accounted for in Half Moon Bay North – Phase 6. Therefore the wastewater flows from the proposed site can be accommodated in the downstream system.

4.3 Wastewater Servicing Conclusions

The site is tributary to the Seeley's Bay sanitary sewer and ultimately the South Nepean Trunk sewer. Sufficient capacity is available to accommodate the anticipated ***2.11 L/s*** peak wet weather flow from the proposed development to the downstream system.

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

5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Services

Stormwater runoff from the subject property is tributary to the City of Ottawa sewer system located within the City of Ottawa. As such, approvals for proposed developments within this area are under the approval authority of the City of Ottawa.

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 Jock River watershed, and is therefore subject to review by the Rideau Valley Conservation Authority (RVCA).

The estimated pre-development peak flows for the 2, 5, and 100-year are summarized in ***Table 7***:

Table 7
Summary of Existing Peak Storm Flow Rates

City of Ottawa Design Storm	Estimated Peak Flow Rate to West Clarke Drain (L/s)
2-year	16.3
5-year	21.9
100-year	46.5

5.2 Post-development Stormwater Management Targets

The development has the following requirements:

- Attenuate to an allowable release of ***174 L/s*** described by the ***Phase 8 SWM Report***;
- Flow attenuation is required up to and including the 100-year storm event;

5.3 Proposed Stormwater Management System

The subject site was contemplated in the ***Phase 8 Design Brief*** as well as the ***Phase 8 SWM Report*** to drain to the minor system within Watercolours Way, eventually draining to the Clarke Pond and the Jock River.

A future storm control catchbasin manhole and lead are proposed to be constructed as part of the subdivision design for Half Moon Bay North – Phase 8. The storm control catchbasin manhole and lead will outlet to a proposed 825 mm diameter sewer within Watercolours Way.

It is proposed to provide quantity control up to the 100-year storm event by installing Inlet Control Devices (ICD) at each catch basin. Surface ponding and underground storage connected to each catch basins to attenuate flow to the allowable release rate.

It is proposed each unit will have basement with foundation drainage connected to the proposed storm sewer. An internal Hydraulic Grade Line (HGL) analysis was completed to ensure adequate freeboard from the underside of footing (USF) to the proposed HGL.

Emergency overland flow from the site will be directed to Watercolours Way, Seeley's Bay Street and Future Greenbank Road. Refer to drawing ***SWM-1*** for proposed drainage areas.

5.3.1 Model Assumptions

The following assumptions were made in the preparation for the EPASWMM model:

Hydrology:

- Initial abstraction parameters per City of Ottawa standards;
- Horton's infiltration for soil loss, per City guidelines;
- Calculated % impervious area;
- Sub-catchment width measured as perpendicular area to catch basins for longest distance of travel.
- Runoff from uncontrolled areas directed to a single outfall to determine if the unattenuated flow + attenuated flow is equal to the prescribed allowable release rate.

Hydraulics:

- Storage Nodes represent both surface and subsurface components. Each node is assigned an invert elevation that corresponds with the tributary catch basin;
- "Regular" Node represent either connections to the sewer main or strategic maintenance hole locations.
- All conduits have been assigned a Mannings n = 0.013;
- Overland spill is modeled as a rectangular/triangular channel with the upstream node set to the spill elevation and the downstream node set to the CB top of lid
- Orifices representing ICD are all side mounted, circular and have a 0.61 discharge coefficient;

- Circular ICD of 42mm used to model low flow devices (Ipex LMF 65 or approved equivalent) see ***Appendix D*** for comparison between LMF 65 and a 42mm circular ICD head vs flow curve

- CB Capture modeled using a bottom draw orifice with an opening equal to 0.125m^2 per catch basin, allowing for inflow into the CB and water to backup and pond on the surface.

- Exit losses determined from Appendix 6-B of the ***City Standards,*** Entrance losses equal to 0.50 per *Water Resources Engineering (rev 2) prepared by David A. Chin (2006)***.**

- Foundation inflow modeled as a constant inflow equal to 0.45 L/s/unit (9 L/s) for the site assuming 4 ground floor units per block.

- An analysis of various storm distributions was completed to determine the critical storm event based on the proposed conditions. It was determined that during the 100-year storm event, the Chicago 6 Hour storm distribution resulted in the highest flow and storage requirements. This distribution is to be used in all future analysis of the system.

- Assumed a fixed outfall of ***92.518m*** based on ***Phase 8 SWM Report*** for each of the storm events models, a conservative approach in 2 & 5-year storm events.

Refer to a summary of the hydrological parameters used for each sub catchment in the tables below:

Table 8
Summary of Hydrologic Parameters

Proposed Condition								
Drainage Area ID	**Total Area (ha)**	**% Impervious**	**Width (m)**	**Slope (%)**	**Manning's N – Pervious**	**Manning's N – Impervious**	**Initial Abstraction – Pervious**	**Initial Abstraction – Impervious**
A1a	0.142	90	50.29	2	0.013	0.25	1.57	4.67
A1b	0.166	90	52.99	2	0.013	0.25	1.57	4.67
A2	0.123	81	31.45	1.5	0.013	0.25	1.57	4.67
U1	0.064	70	25.70	2	0.013	0.25	1.57	4.67
U2	0.042	66	23.00	2	0.013	0.25	1.57	4.67
U3	0.215	66	62.00	2	0.013	0.25	1.57	4.67
All Drainage Areas use Horton's Infiltration Parameters as per the ***City Standard***								

5.3.2 Quantity Control Requirements

To meet the stormwater quantity objectives the proposed development will employ underground and surface storage. To allow for gravity drainage from the foundation

drainage, inlet control devices (ICDs) are proposed at each catch basin to control flow. This will allow foundation drainage to gravity drain through the site and not be impacted by the proposed underground or surface storage. A ***LMF65*** low flow device is proposed at catch basins CB103A, CB103B and CB102. The release rate and underground storage require to attenuate to the allowable release rate, are summarized in ***Table 9*** below:

Table 9
Summary of Storage and Peak Flow Rates for the Chicago 6 Hour Storm Distribution

City of Ottawa Design Storm	Controlled Peak Flow (L/s)	Req. Storage (m3)[1]	Provided Storage[2] (m^3)
2-year	72.0	81	180.5
5-year	99.0	116	180.5
100-year	173.8	173	180.5

[1] Does not include structure or pipe storage accounted for in the model
[2] Total surface and subsurface storage provided at emergency spill point

A maximum of ***173m^3*** of storage is required to attenuate runoff to the allowable release rate in the 100-year event to the allowable release rate. It is proposed to use ***109m^3*** of underground storage and ***64m^3*** of surface ponding.

Controlled flow from the attenuated areas as well as all three uncontrolled areas is summarized in ***Table 10*** below:

Table 10
Summary of Storage and Peak Flow Rates for the 100-Year Chicago 6 Hour Storm Distribution – Total Site Area

Area ID	Drainage Area (Ha)	Peak Flow (L/s)[1]
A1a	0.142	5.6
A1b	0.166	5.7
A2	0.123	5.4
U1	0.064	30.5
U2	0.042	20.1
U3	0.215	99.3
Foundation Drainage [2]	N/A	9
Total	0.752	173.8

[1] Total Peak flow not summative due to varying time to peak
[2] Foundation drainage equal to a constant inflow of 0.45 L/s/unit per ***City Standards***

As shown above, the total release rate from the site is less than total allowable release rate of ***174.0 L/s***.

Please refer to existing model schematic below for more detail.

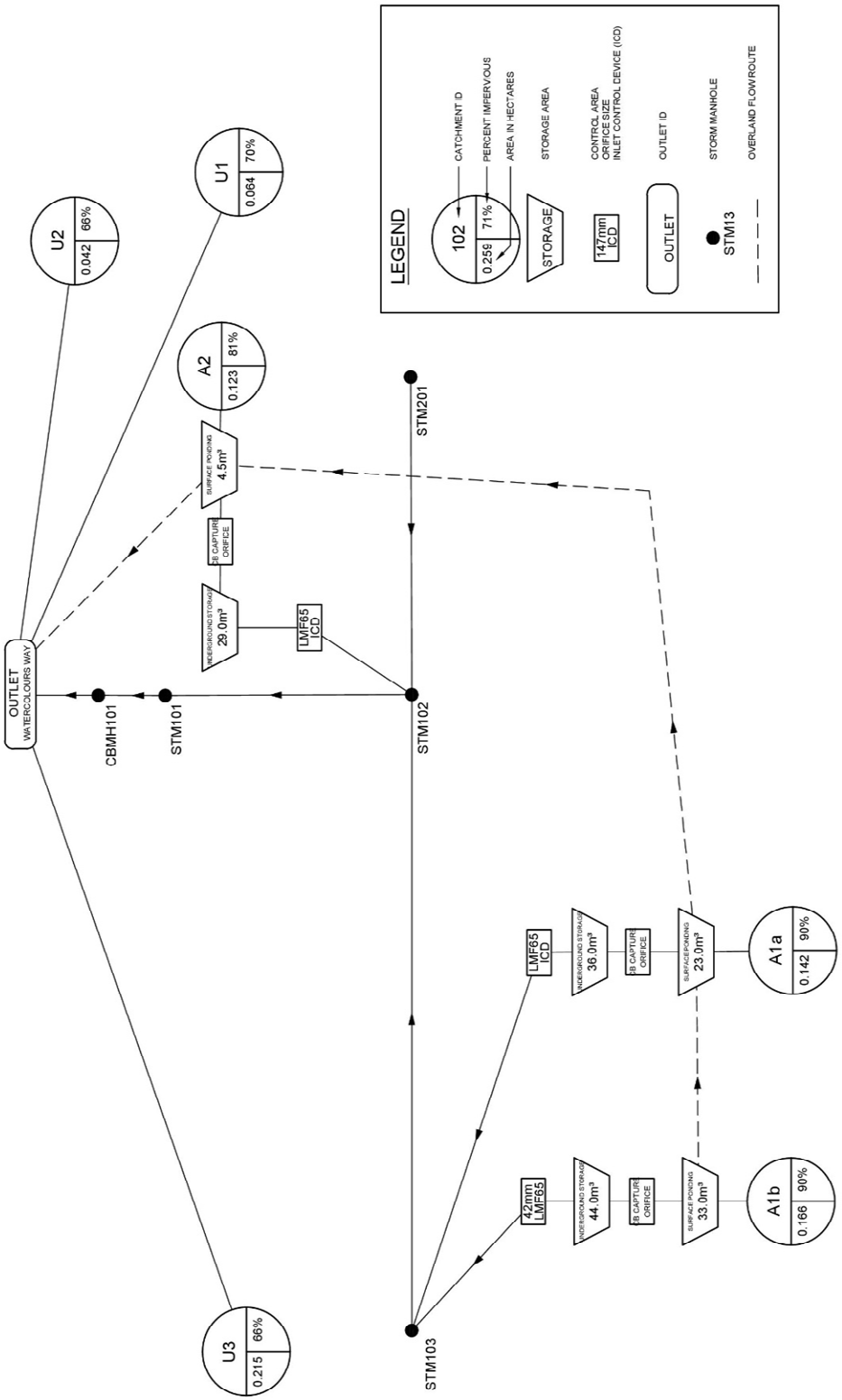


FIGURE 2: EPASWMM NODE FIGURE

Refer to drawing ***DS-1*** for ICD model and flow rates. The head vs flow rate for the proposed ICD models can be found in ***Drawings/Figures***.

5.3.3 Emergency Flow Path

The site has been graded such that the overland flow from the property would be conveyed overland to Watercolours Way in the event of blockage or a greater than 100-year storm event. A freeboard of 30cm is provided from the spill point to the grade at the footprint of the building to provide sufficient freeboard to proposed window wells.

During the stress test event (100-year + 20%) a maximum overland flow of ***4cm*** results between drainage areas ***A1b*** and ***A1a***, and would not at any point extend to the footprint of the building.

5.3.4 Hydraulic Grade Line Analysis

Per the ***Phase 8 SWM Report***, there is a Hydraulic Grade Line elevation in the 100-year storm event of ***92.518m*** at the connection of the storm sewer to Watercolours Way, refer to Plan & Profile showing the hydraulic grade line in ***Drawings/Figures***. A hydraulic model using EPASWMM was used to analyze the resulting HGL within the subject site. A summary of the HGL analysis is summarized in ***Table 11*** below:

Table 11
Summary of post-development HGL Analysis

Storm Node[1]	100-year	
	Est. Post Dev. (m)	USF
STM103	92.60	92.96
STM102	92.54	92.96
STM101	92.52	92.84
STM201	92.53	92.84
CBMH101	92.52	92.84
[1] Refer to EPASWMM Model output for Storm Node ID		

As shown above, there is sufficient freeboard from the 100-year storm event compared to the proposed USF. Refer to the results of the hydraulic analysis in ***Appendix D*** of the report.

5.3.5 Quality Controls

“Enhanced” Quality control is provided by the Clarke Pond per the ***Clarke Pond Design Brief.***

5.4 Stormwater Servicing Conclusions

The subject site was contemplated in the ***Phase 8 Design Brief*** and ***Phase 8 SWM Report***. An allowalbe release rate of ***174.0 L/s*** is defined in the previous studies with attenuation up to the 100-year storm event.

A Hydraulic Grade Line analysis was completed to determine the internal HGL based on the proposed HGL of ***92.518m*** within Watercolours Way. The USF are designed to be a minimum of 0.30m above the 100-year HGL per the ***City Standards***.

Controls are provided at each catch basin to restrict the total flow from the site to the allowable release rate. To provide quantity control, ***173m^3*** of underground storage and surface storage are proposed.

“Enhanced” Quality control is provided by the Clarke Pond per the ***Clarke Pond Design Brief.***

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

6.0 UTILITIES

Utility servicing will be coordinated with the individual utility companies prior to site development.

7.0 EROSION AND SEDIMENT CONTROL

Soil erosion occurs naturally and is a function of soil type, climate and topography. The extent of erosion losses is exaggerated during construction where vegetation has been removed and the top layer of soil becomes 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 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.

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:

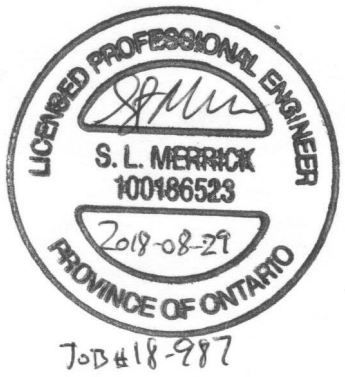
- Verification that water is not flowing under silt barriers.
- Clean and change filter cloth at catch basins.

8.0 CONCLUSION AND RECOMMENDATIONS

David Schaeffer Engineering Ltd. (DSEL) has been retained to prepare an Assessment of Adequacy of Public Services report in support of the Site Plan Control (SPC) at Half Moon Bay, Phase 8, Block 40. The preceding report outlines the following:

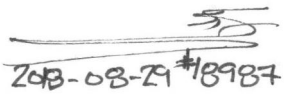
- The subject property was contemplated in the design of the Half Moon Bay North – Phase 8 Subdivision for water servicing. The demand from the proposed development is less than contemplated in the subdivision design, pressures are sufficient to service the development;
- A peak wastewater flow of ***2.11 L/s*** is estimated based on the proposed development, less than contemplated in the subdivision design of ***8.05 L/s***;
- Storm water quantity controls designed per the subdivision design, a maximum release rate of ***174 L/s*** required, flow attenuation to be provided up to the 100-year storm event;
- It is proposed to attenuate flow through underground and surface storage. It is anticipated that ***173m^3*** of onsite storage will be required to attenuate flow to the established release rate above;
- "Enhanced" quality controls provided by the Clarke Pond

Prepared by,
David Schaeffer Engineering Ltd.



Per: Steven L. Merrick, P.Eng.

Reviewed by,
David Schaeffer Engineering Ltd.



Per: Adam D. Fobert, P.Eng.

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APPENDIX A

Pre-Consultation

DEVELOPMENT SERVICING STUDY CHECKLIST

17-987 29/03/2018

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 defendable 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.	N/A
☐	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 3.1
☒	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

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☒	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 feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	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

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☐	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.	N/A
☒	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

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☒	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	

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

Genavieve Melatti

Subject: FW: 2444 Watercolours Way - ECA Exemption 525/98

From: Diamond, Emily (MECP) [mailto:Emily.Diamond@ontario.ca]
Sent: Friday, August 24, 2018 8:25 AM
To: Steve Merrick <SMerrick@dsel.ca>
Subject: RE: 2444 Watercolours Way - ECA Exemption 525/98

Hi Steve,

From the information provided, the project appears to meet the ECA exemption requirements under Section 3 of Ontario Regulation 525/98. Therefore no ECA would be required for this project.

Regards,

Emily Diamond
Environmental Officer
Ministry of the Environment, Conservation and Parks
Ottawa District Office
2430 Don Reid Drive
Ottawa, Ontario, K1H 1E1
Tel: 613-521-3450 ext 238
Fax: 613-521-5437
e-mail: emily.diamond@ontario.ca

From: Steve Merrick [mailto:SMerrick@dsel.ca]
Sent: August 23, 2018 9:15 AM
To: Diamond, Emily (MECP) <Emily.Diamond@ontario.ca>
Cc: Brandon Chow <BChow@dsel.ca>
Subject: RE: 2444 Watercolours Way - ECA Exemption 525/98

Hi Emily,

Can you confirm the below for our submission tomorrow?

Thanks in advance,

Steve Merrick, P.Eng.
Project Manager / Intermediate Designer

DSEL
david schaeffer engineering ltd.

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

phone: (613) 836-0856 ext. 561

cell: (613) 222-7816
email: smerrick@DSEL.ca

From: Steve Merrick
Sent: Friday, August 17, 2018 2:54 PM
To: 'Diamond, Emily (MOECC)' <Emily.Diamond@ontario.ca>
Cc: Brandon Chow <BChow@dsel.ca>
Subject: 2444 Watercolours Way - ECA Exemption 525/98

Hi Emily,

The City of Ottawa has requested we pre-consult with you regarding the above noted project and the ECA requirements. The property is located in the City of Ottawa bounded by Seeley's Bay to the East and Future Watercolours Way (currently under construction) to the north and future Greenbank Road to the west.

The property is proposed to be a condominium development within a single civic address of 2444 Watercolours Way. The development includes multi-unit residential blocks each with 12 units for a total of 60 units. As this is a condo, each unit will have a different owner, however, the owner of the unit will only own the sq.ft of the unit itself and will not have ownership over any land within parcel.

A single condominium corporation will be responsible for the operation and maintenance of the storm, sanitary and water services on-site. I have attached a copy of the servicing and stormwater management plan for the property, let me know if you need any further information on the subject site.

We would like to confirm, based on the above information, that the development is exempt from an ECA under *O.Reg 525/98 Section 53 (1) a. is designed to service one lot or parcel of land.* We will be re-submitting to the City at the end of next week and will need confirmation from the MOE on this prior to our re-submission. Feel free to call if you have any questions or concerns.

Thanks,

Steve Merrick, P.Eng.
Project Manager / Intermediate Designer

DSEL
david schaeffer engineering ltd.

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

phone: (613) 836-0856 ext. 561
cell: (613) 222-7816
email: smerrick@DSEL.ca

Steve Merrick

From: Sabrina Castellanos <scastellanos@q4architects.com>
Sent: Thursday, February 8, 2018 9:58 AM
To: Anthony Temelini
Cc: Steve Merrick
Subject: FW: Half Moon Bay North - Phase 8 FUS Calculations

Hi Anthony,

Please see my answer in red below

Thank you

Regards,

Sabrina

From: Anthony Temelini [mailto:ATemelini@dsel.ca]
Sent: February 7, 2018 3:52 PM
To: Sabrina Castellanos <scastellanos@q4architects.com>
Cc: Steve Merrick <SMerrick@dsel.ca>
Subject: Half Moon Bay North - Phase 8 FUS Calculations

Hi Sabrina,

We are currently preparing the FUS calculations for the proposed 12-unit back-to-back stacked townhomes in Half Moon Bay North – Phase 8 Block 40. Before we can proceed with our analysis, can you please confirm the following details regarding the buildings:

1. Confirm square footage for each floor of the buildings.

Typ block
Ground floor = 4593
Second floor= 2568
Third floor =2262

2. Confirm construction type for the buildings (Wood Frame, Ordinary Construction, Non-Combustible, Fire Resistive)

Extracted from FUS:

C = coefficient related to the type of construction.
= 1.5 for wood frame construction (structure essentially all combustible).
= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior).
= 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls).
= 0.6 for fire-resistive construction (fully protected frame, floors, roof).

Fire-Resistive Construction - Any structure that is considered fully protected, having at least 3-hour rated structural members and floors. For example, reinforced concrete or protected steel.

Non-combustible Construction - Any structures having all structural members including walls, columns, piers, beams, girders, trusses, floors, and roofs of non-combustible material and not qualifying as fire-resistive construction. For example, unprotected metal buildings.

Ordinary Construction - Any structure having exterior walls of masonry or such non-combustible material, in which the other structural members, including but not limited to columns, floors, roofs, beams, girders, and joists, are wholly or partly of wood or other combustible material.

Wood Frame Construction - Any structure in which the structural members are wholly or partly of wood or other combustible material and the construction does not qualify as ordinary construction.

3. Confirm if the buildings will be sprinklered. NO

Please let me know if you have any questions or comments.

Thank you,

Anthony Temelini, E.I.T.
Project Coordinator

DSEL
david schaeffer engineering ltd.

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

phone: (613) 836-0856 ext.524
email: atemelini@dsel.ca

Genavieve Melatti

From: Sabrina Castellanos <scastellanos@q4architects.com>
Sent: Wednesday, July 11, 2018 11:40 AM
To: Genavieve Melatti
Cc: Steve Merrick; Daniel Sousa
Subject: RE: HMB Phase 8 - FUS Calculations

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Genavieve,

The project is Wood frame construction

Let me know if you have any questions

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

From: Genavieve Melatti <GMelatti@dsel.ca>
Sent: July 11, 2018 8:52 AM
To: Sabrina Castellanos <scastellanos@q4architects.com>
Cc: Steve Merrick <SMerrick@dsel.ca>
Subject: HMB Phase 8 - FUS Calculations

Good morning Sabrina,

Would you be able to confirm the ISO construction type for the units. I have included the ISO guide in which sections 1, 2 and 3 on pages 3 to 8 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 *C*
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 ⅔ (67%) or more of the total wall area and ⅔ (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 ⅔ (67%) of their exterior walls made of brick or masonry are considered wood frame construction ($C = 1.5$).

Please feel free to let me know if you have any questions.

Thank you,

Genavieve Melatti
Project Coordinator/ Junior Designer

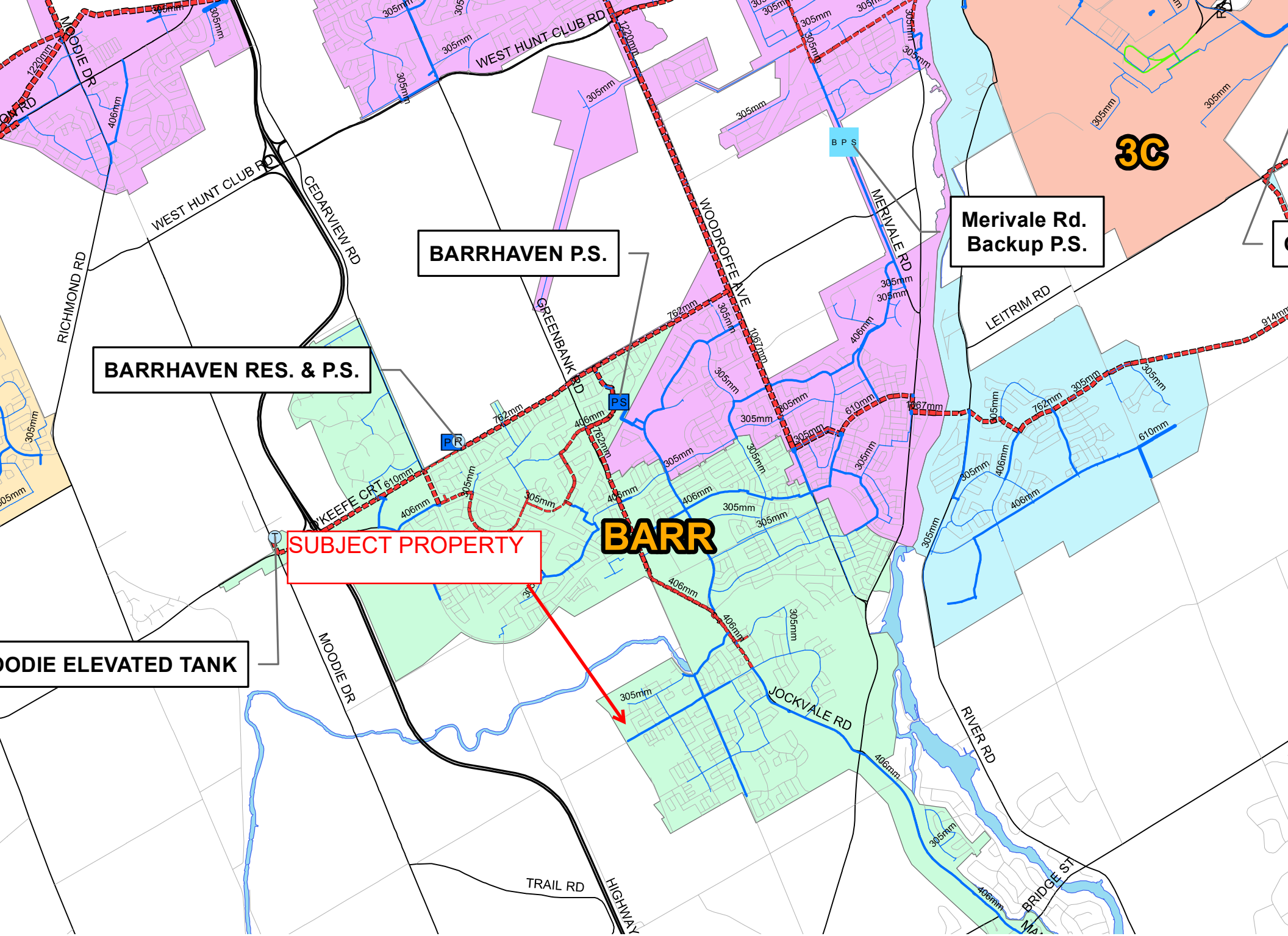
DSEL
david schaeffer engineering ltd.

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

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

APPENDIX B

Water Supply


BARRHAVEN P.S.
BARRHAVEN RES. & P.S.
Merivale Rd. Backup P.S.
SUBJECT PROPERTY
BARR
3C
WEST HUNT CLUB RD
CEDARVIEW RD
RICHMOND RD
MOODIE DR
GREENBANK RD
WOODROFFE AVE
MERIVALE RD
LEITRIM RD
O'KEEFE CRT
JOCKVALE RD
RIVER RD
TRAIL RD
HIGHWAY
BRIDGE ST
PS
PR
B P S

Mattamy Homes
Half Moon Bay North - Phase 8 Block 40
Proposed Site Conditions (from HMB Phase 8)

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	110	297
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	297	104.0	72.2	374.2	259.9	561.3	389.8

Institutional / Commercial / Industrial Demand

				Avg. Daily		Max Day		Peak Hour	
Property Type	**Unit Rate**		**Units**	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
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	**104.0**	**72.2**	**374.2**	**259.9**	**561.3**	**389.8**

Mattamy Homes
Half Moon Bay North - Phase 8 Block 40
Proposed Site Conditions

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	60	162
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	162	45.4	31.5	163.3	113.4	244.9	170.1

Institutional / Commercial / Industrial Demand

			Avg. Daily		Max Day		Peak Hour	
Property Type	**Unit Rate**	**Units**	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
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	**45.4**	**31.5**	**163.3**	**113.4**	**244.9**	**170.1**

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	1325.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	12012.2	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	20.1m-30m	16	3	48	8%
S	Wood Frame	3.1m-10m	16	3	48	18%
E	Wood Frame	3.1m-10m	40	3	120	20%
W	Wood Frame	>45m	40	3	120	0%
		% Increase				**46%** *value not to exceed 75%*

Increase	**4692.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	14892.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	15000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Inc. on July 7th, 2018.
-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	1325.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	12012.2	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	20.1m-30m	40	3	120	10%
S	Wood Frame	>45m	40	3	120	0%
E	Wood Frame	10.1m-20m	16	3	48	13%
W	Wood Frame	3.1m-10m	16	3	48	18%
		% Increase				**41%** *value not to exceed 75%*

Increase	**4182.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	14382.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	14000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Inc. on July 7th, 2018.
-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	1325.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	12012.2	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	20.1m-30m	40	3	120	10%
S	Wood Frame	10.1m-20m	40	3	120	15%
E	Wood Frame	20.1m-30m	16	3	48	8%
W	Wood Frame	10.1m-20m	16	3	48	13%
		% Increase				**46%** *value not to exceed 75%*

Increase	**4692.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	14892.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	15000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Inc. on July 7th, 2018.
-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	1325.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	12012.2	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	16	3	48	18%
S	Wood Frame	3.1m-10m	16	3	48	18%
E	Wood Frame	>45m	40	3	120	0%
W	Wood Frame	>45m	40	3	120	0%
		% Increase				**36%** *value not to exceed 75%*

Increase	**3672.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	13872.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	14000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Inc. on July 7th, 2018.
-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	1325.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	12012.2	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	10.1m-20m	16	3	48	13%
S	Wood Frame	10.1m-20m	16	3	48	13%
E	Wood Frame	20.1m-30m	40	3	120	10%
W	Wood Frame	>45m	40	3	120	0%
		% Increase				**36%** *value not to exceed 75%*

Increase	**3672.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

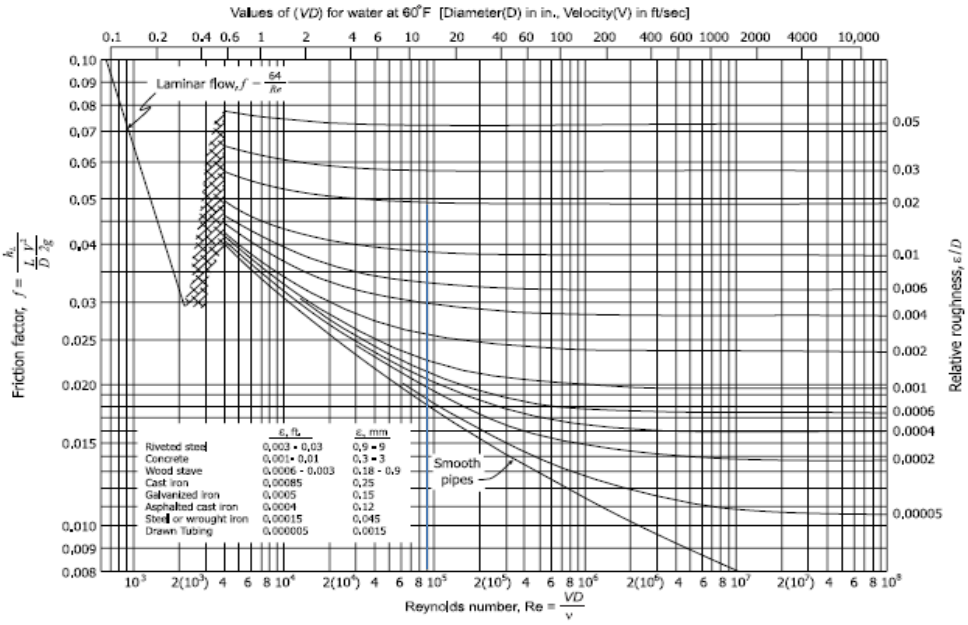
Total Fire Flow

Fire Flow	13872.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	14000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by Q4 Architects Inc. on July 7th, 2018.
-Calculations based on Fire Underwriters Survey - Part II

Estimated Head Loss per Darcy-Weisbach

Service Size	150	mm
Service Length	107.59	m
Peak Demand	6.50	L/s
Relative Roughness	0.001	
Kinematic Viscosity @ 4^{O}C, v	0.00000151	m^2/s
Velocity, V	0.37	m/s
Re	36,521	



Friction Factor, f 0.027 (From Moody Diagram)

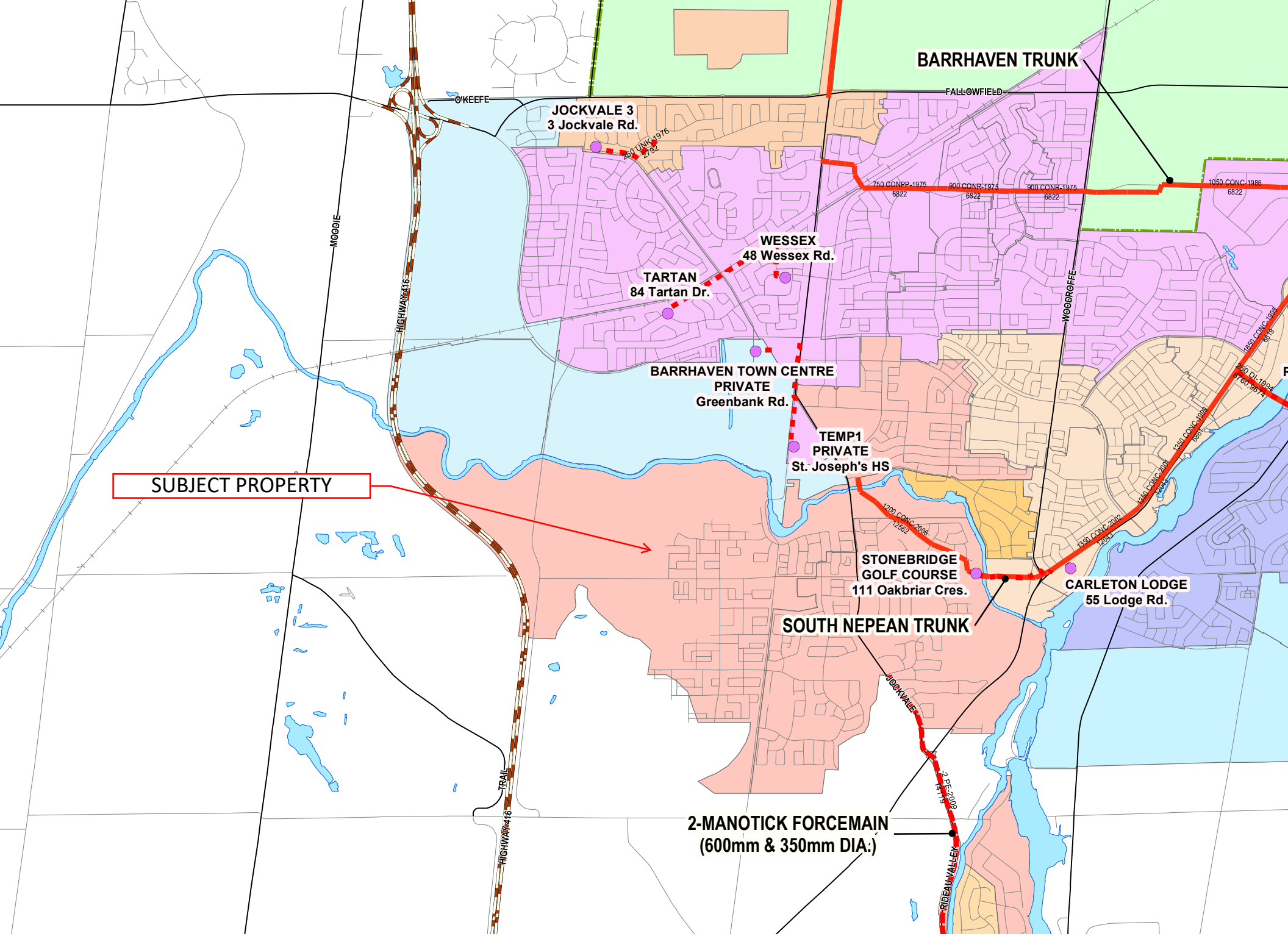
Head Loss

$$h_f = \frac{fL}{D}\frac{V^2}{2g}$$

h_f	0.13	m H_2O
h_f	1.3	kPa

APPENDIX C

Wastewater Collection


BARRHAVEN TRUNK
FALLOWFIELD
O'KEEFE
JOCKVALE 3
3 Jockvale Rd.
250.0 UNK-1976
2192
750 CONPP-1975
6822
900 CONR-1975
6822
900 CONR-1975
6822
1050 CONC-1986
6822
MOODIE
HIGHWAY 416
WESSEX
48 Wessex Rd.
TARTAN
84 Tartan Dr.
WOODROFFE
1650 CONC-1993
6819
BARRHAVEN TOWN CENTRE
PRIVATE
Greenbank Rd.
250 DI-1994
87601-96171
TEMP1
PRIVATE
St. Joseph's HS
1350 CONC-1988
6863
1350 CONC-2001
12543
SUBJECT PROPERTY
1200 CONC-2006
12562
1350 CONC-2002
12543
STONEBRIDGE
GOLF COURSE
111 Oakbriar Cres.
CARLETON LODGE
55 Lodge Rd.
SOUTH NEPEAN TRUNK
JOCKVALE
TRAIL
HIGHWAY 416
2-PE-2009
14719
2-MANOTICK FORCEMAIN
(600mm & 350mm DIA.)
RIDEAU VALLEY

PRELIMINARY DESIGN FOR
FUTURE chemin Greenbank Road
REFER TO
STANTEC
PROJECT No. 163600994

HALF MOON BAY SUBDIVISION - PHASES 7
REFER TO
DAVID SCHAEFFER ENGINEERING LIMITED
PROJECT No. 13-703

HALF MOON BAY SUBDIVISION - PHASE 1
REFER TO
DAVID SCHAEFFER ENGINEERING LIMITED
PROJECT No. 07-314

HALF MOON BAY WEST
REFER TO
DAVID SCHAEFFER ENGINEERING LIMITED
PROJECT No. 16-888

HALF MOON BAY SUBDIVISION - PHASES 5 AND 6
REFER TO
DAVID SCHAEFFER ENGINEERING LIMITED
PROJECT No. 09-384

REVIEWED BY DEVELOPMENT REVIEW BRANCH
SIGNED
DATE
PLAN NUMBER

KEY PLAN
SCALE 1:10000

LEGEND

- SANITARY DRAINAGE BOUNDARY
- SANITARY SUB-DRAINAGE BOUNDARY
- SANITARY DRAINAGE BOUNDARY (OTHER PHASES)
- UPSTREAM MH TO DOWNSTREAM MH
- AREA IN HECTARES
- POPULATION
- UPSTREAM MH TO DOWNSTREAM MH
- AREA IN OTHER PHASES IN HECTARES
- POPULATION
- EXTERNAL AREA IN HECTARES
- EXTERNAL POPULATION
- DENSITY (PERSONS/HECTARE)
- EXTERNAL LAND USE
- MAINTENANCE HOLE
- CAP

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY J.D. BARNES LIMITED,
PROJECT No. 06-10-675-00. SURVEY DATED OCTOBER 15, 2007.
CITY OF OTTAWA 2K MAPPING, RECEIVED ON JANUARY 18, 2016.

LEGAL INFORMATION

CALCULATED DRAFT PLAN PROVIDED BY J.D. BARNES LIMITED, PROJECT No.
07-10-767-00 (HALF MOON BAY PHASE 8), RECEIVED ON NOVEMBER 30, 2017.

2nd SUBMISSION 17-12-15

BENCH MARK No. 00820010126

POINT IS LOCATED 1.65km NORTH OF BARNSDALE ROAD AND 5km SOUTH OF FALLOWFIELD ROAD ON HIGHWAY 416 NORTH OF KEMPTVILLE. THE POINT IS SET EAST OF THE NORTHBOUND LANE IN THE GRASSY SHOULDER.
ELEVATION = 96.923 m

No.	BY	DATE	DESCRIPTION	BY
2	W.L.	17-12-15	2nd SUBMISSION	
1	W.L.	17-09-27	1st SUBMISSION	

CITY OF OTTAWA

PROJECT No. 17-926

© DSEL

SANITARY DRAINAGE PLAN

MATTAMY (HALF MOON BAY) LIMITED

HALF MOON BAY SUBDIVISION
PHASE 8

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

DRAWN BY:	A.B.	CHECKED BY:	W.L./C.M.	DRAWING NO.	SHEET NO.
DESIGNED BY:	P.P.	CHECKED BY:	K.M.		26
SCALE:	1:1000	DATE:	SEPTEMBER 2017		

CITY FILE No. D07-16-07-0002 PH. 8 CITY PLAN No. 14942

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							EMPLOYMENT		INSTITUTIONAL		COMMERCIAL		PARK		C+I+I	INFILTRATION			TOTAL	PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (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	VEL (FULL) (m/s)	VEL (ACT.) (m/s)
terrasse Chimney Corner Terrace																													
	1A	2A	0.07	2	6	0.07	6	4.00	0.10										0.07	0.07	0.020	0.12	14.0	200	0.65	26.44	0.005	0.84	0.20
	2A	3A	0.25	9	25	0.32	31	4.00	0.50										0.25	0.32	0.090	0.59	60.0	200	0.35	19.40	0.03	0.62	0.27
			0.06	2	7	0.38	38												0.06	0.38									
	3A	*Ex. PLUG*	0.32	10	27	0.70	65	4.00	1.05										0.32	0.70	0.196	1.25	78.5	200	0.40	20.74	0.06	0.66	0.36
	Ex. PLUG	*Ex. 630A*				0.70	65	4.00	1.05										0.00	0.70	0.196	1.25	12.0	200	0.40	20.74	0.06	0.66	0.36
To DOVETAIL HEIGHTS , *Pipe Ex. 630A - Ex. 603A*						0.70	65																						
	1A	5A	0.20	4	14	0.20	14	4.00	0.23										0.20	0.20	0.056	0.29	52.5	200	0.65	26.44	0.01	0.84	0.27
	5A	6A	0.22	5	17	0.42	31	4.00	0.50										0.22	0.42	0.118	0.62	51.0	200	0.35	19.40	0.03	0.62	0.28
	6A	7A	0.06	1	4	0.48	35	4.00	0.57										0.06	0.48	0.134	0.70	17.5	200	0.35	19.40	0.04	0.62	0.29
To voie Freshwater Way, Pipe 7A - 8A						0.48	35																						
cours Cape Jack Walk																													
	3A	4A	0.34	8	28	0.34	28	4.00	0.45										0.34	0.34	0.095	0.55	56.0	200	0.65	26.44	0.02	0.84	0.33
	4A	500A	0.24	6	21	0.58	49	4.00	0.79										0.24	0.58	0.162	0.95	34.0	200	0.35	19.40	0.05	0.62	0.32
	500A	9A	0.05	1	4	0.63	53	4.00	0.86										0.05	0.63	0.176	1.04	11.5	200	0.35	19.40	0.05	0.62	0.33
To voie Freshwater Way , Pipe 9A - *Ex. 604A*						0.63	53																						
voie Freshwater Way																													
Contribution From terrasse Chimney Corner Terrace Pipe 6A- 7A						0.48	35												0.48	0.48									
	7A	8A	0.07	2	6	0.55	41	4.00	0.66										0.07	0.55	0.154	0.81	14.0	200	0.35	19.40	0.04	0.62	0.30
	8A	9A	0.26	9	25	0.81	66	4.00	1.07										0.26	0.81	0.227	1.30	60.5	200	0.35	19.40	0.07	0.62	0.35
Contribution From cours Cape Jack Walk , Pipe 500A - 9A						0.63	53												0.63	1.44									
			0.03	1	4	1.47	123												0.03	1.47									
	9A	*Ex.604A*	0.17	6	17	1.64	140	4.00	2.27										0.17	1.64	0.459	2.73	44.0	200	0.35	19.40	0.14	0.62	0.43
			0.03	1	4	1.67	144												0.03	1.67									
	Ex.604A	*Ex.605A*	0.19	4	14	1.86	158	4.00	2.56										0.19	1.86	0.521	3.08	46.0	200	0.30	17.96	0.17	0.57	0.43
To voie Freshwater Way, *Pipe Ex. 605A - Ex. 612A*						1.86	158																						
voie Watercolours Way																													
	10A	*Ex. 606A*	0.45	14	38	0.45	38	4.00	0.62										0.45	0.45	0.126	0.75	94.5	200	0.65	26.44	0.03	0.84	0.37
			0.04	2	6	0.49	44												0.04	0.49									
	Ex.606A	*Ex.607A*	0.42	10	34	0.91	78	4.00	1.26										0.42	0.91	0.255	1.52	84.0	200	0.40	20.74	0.07	0.66	0.38
To voie Watercolours Way, *Pipe Ex. 607A - Ex. 614A*						0.91	78																						
Block 40 (Apartment Block)																													
CONTROL MH 1A		*Ex. 631A*	0.75	180	486	0.75	486	3.98	7.84										0.75	0.75	0.210	8.05	10.5	200	0.50	23.19	0.35	0.74	0.67
To Seeley's Bay Street, *Pipe Ex. 631A - Ex. 617A*						0.75	486																						

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
Dec 15, 2017
PROVINCE OF ONTARIO

DESIGN PARAMETERS

Average Daily Flow =	350	l/p/day	Industrial Peak Factor = as per MOE Graph		
Emloyment/Comm/Inst Flow =	50000	L/ha/da	Extraneous Flow =	0.280	L/s/ha
Park Average Flow =	9300	L/ha/da	Minimum Velocity =	0.600	m/s
Max Res. Peak Factor =	4.00		Manning's n =	0.013	
Emloyment / Comm / Inst / Park peak Factor =	1.50		Townhouse coeff=	2.7	
			Single house coeff=	3.4	

Designed: K.M

Checked: W.L

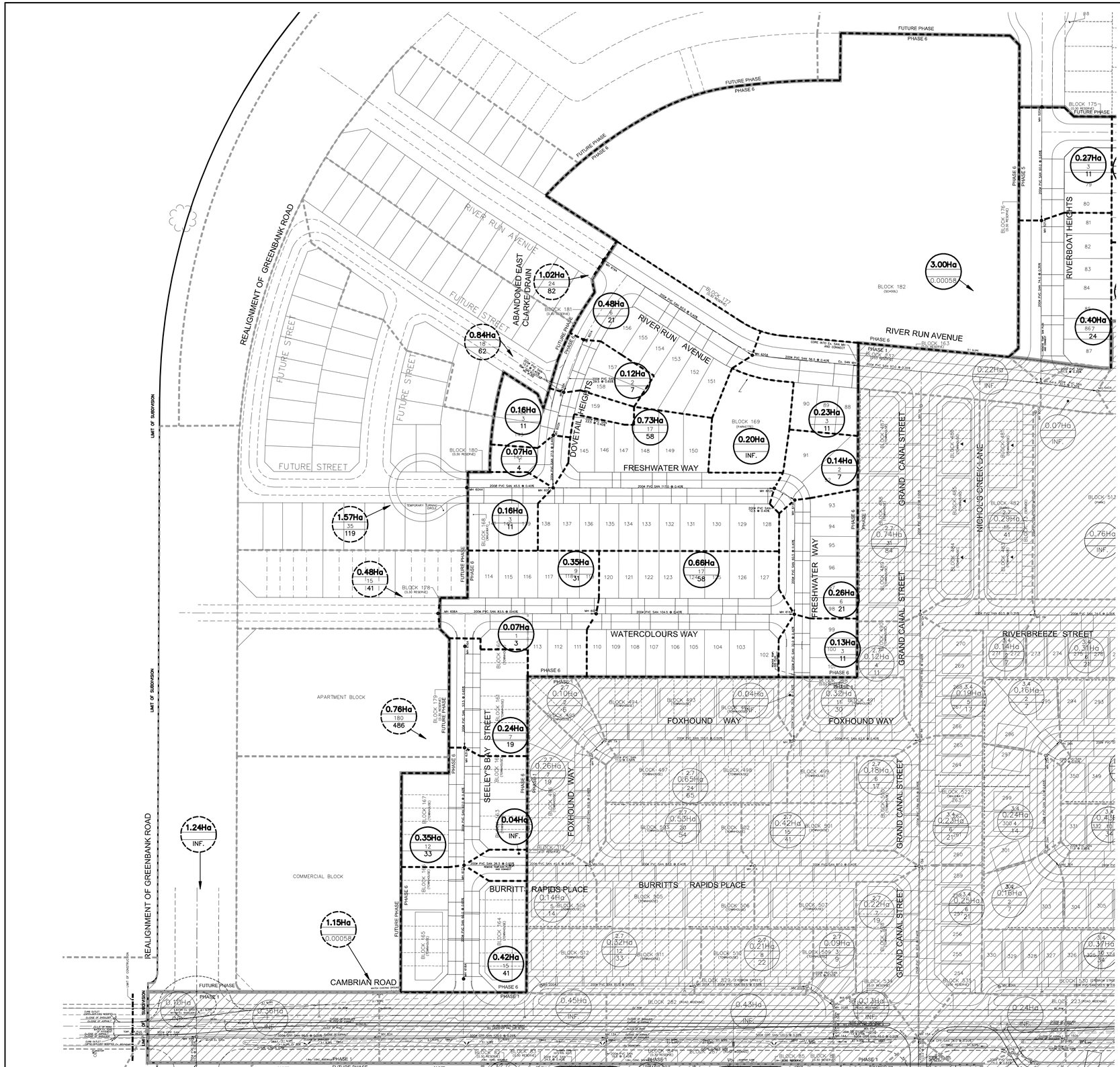
Dwg. Reference: Sanitary Drainage Plan, Dwg. 26

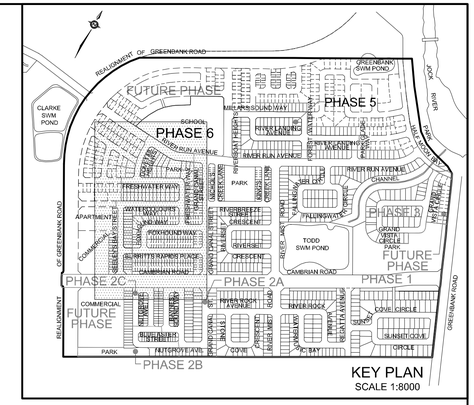
PROJECT: **HALF MOON BAY NORTH, PHASE 8**

LOCATION: **City of Ottawa**

File Ref: 17-926 | Date: December, 2017 | Sheet No. 1 of 1

926_san2.xls





LEGEND

- 0.82Ha / 20 / 111 — DRANAGE AREA IN HECTARES; NUMBER OF UNITS; POPULATION (3.4 PERSON PER UNIT FOR SINGLE HOUSE) (2.7 PERSON PER UNIT FOR TOWNHOUSE)
- 2.72Ha / 0.00058 — DRANAGE AREA IN HECTARES; COMMERCIAL/INSTITUTIONAL UNIT FLOW IN m3/s/Ha
- 1.57Ha / 35 / 119 — EXTERNAL DRANAGE AREA IN HECTARES; NUMBER OF UNITS; POPULATION (3.4 PERSON PER UNIT FOR SINGLE HOUSE) (2.7 PERSON PER UNIT FOR TOWNHOUSE)
- SANITARY MANHOLE
- SANITARY MANHOLE IN OTHER PHASES
- SANITARY SINGLE HOUSE CONNECTION
- SANITARY SEWER TRIBUTARY BOUNDARY
- PHASE LINE
- OTHER PHASES

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY J.D. BARNES LIMITED,
PROJECT No. 06-10-675-00. SURVEY DATED OCTOBER 15, 2007.

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY J.D. BARNES LIMITED,
PROJECT No. 07-10-767-00-PHASE 5, SURVEY DATED JULY 20, 2010.

4th SUBMISSION 10-08-20

NOT FOR CONSTRUCTION

BENCH MARK No. 00820010126

POINT IS LOCATED 1.65km NORTH OF BARNSDALE ROAD AND 5km SOUTH OF FALLOWFIELD ROAD ON HIGHWAY 416 NORTH OF KEMPTVILLE. THE POINT IS SET EAST OF THE NORTHBOUND LANE IN THE GRASSY SHOULDER.

ELEVATION = 96.923 m

No.	BY	DATE	DESCRIPTION	BY
4	Z.L.	10-08-20	4th SUBMISSION	
3	Z.L.	10-07-21	3rd SUBMISSION	
2	Z.L.	10-06-04	2nd SUBMISSION	
1	Z.L.	10-04-30	1st SUBMISSION	

CITY OF OTTAWA

PROJECT No. 09-384

LICENSED PROFESSIONAL ENGINEER — Z. LI — 10-08-20 — PROVINCE OF ONTARIO

SANITARY DRAINAGE PLAN

© DSEL

MATTAMY (HALF MOON BAY) LIMITED

HALF MOON BAY SUBDIVISION
PHASES 5 AND 6

DSEL
david schaeffer engineering ltd
120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

DRAWN BY: M.Z./J.Y.	CHECKED BY: K.M.	DRAWING NO.	SHEET NO.
DESIGNED BY: K.M.	CHECKED BY: Z.L.		9
SCALE: 1:1000	DATE: SEPTEMBER 2009		

K:\09384\Subm_4\Tributary\08_09_384san.dwg, 8/20/2010 1:18:16 PM, Jyu, 1:1

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		INDUST		INSTIT		C+I+I	INFILTRATION					PIPE					
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (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)	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
PHASE 6																											
SEELEY'S BAY STREET																											
	618A	617A	0.42	15	41	0.42	41	4.00	0.66								0.42	0.42	0.118	0.78	60.0	200	0.65	26.44	0.84	0.37
To BURRITTS RAPIDS PLACE , Pipe 617A - Plug						0.42	41																				
	616A	631A	0.24	7	19	0.24	19	4.00	0.31								0.24	0.24	0.067	0.38	53.5	200	0.65	26.44	0.84	0.29
Contribution From Apartment Block			0.76	180	486	0.76	486	3.98	7.84																		
	631A	617A	0.35	12	33	1.35	538										0.35	1.35	0.378	0.38	62.0	200	0.40	20.74	0.66	0.25
To BURRITTS RAPIDS PLACE , Pipe 617A - Plug						1.35	538																				
BURRITTS RAPIDS PLACE																											
Contribution From SEELEY'S BAY STREET, Pipe 618A - 617A						0.42	41																				
Contribution From SEELEY'S BAY STREET, Pipe 631A - 617A						1.35	538																				
	617A	Plug	0.04	0	0	1.81	579	3.94	9.24								0.04	1.81	0.507	9.75	26.5	200	0.65	26.44	0.84	0.78
To BURRITTS RAPIDS PLACE, Pipe, Plug to Ex. MH 10A (Phase 1)						1.81	579																				
DOVETAIL HEIGHTS																											
	601A	630A	0.12	2	7	0.12	7	4.00	0.11								0.12	0.12	0.034	0.14	29.5	200	0.65	26.44	0.84	0.22
Contribution From Future Street, Plug to 630A (Future Ph.)			0.84	18	62	0.84	62										0.84	0.84	0.235	0.24	12.0	200	0.40	20.74	0.66	0.18
	630A	603A	0.16	3	11	1.12	80	4.00	1.30								0.16	1.12	0.314	1.61	23.5	200	0.40	20.74	0.66	0.39
	603A	605A	0.07	1	4	1.19	84	4.00	1.36								0.07	1.19	0.333	1.69	27.5	200	0.40	20.74	0.66	0.39
To FRESHWATER WAY, Pipe 605A - 612A						1.19	84																				
WATERCOLOURS																											
External			0.48	15	41	0.48	41																				
			0.07	1	3	0.55	44																				
	606A	607A	0.35	9	31	0.90	75	4.00	1.22								0.35	0.90	0.252	1.47	83.5	200	0.40	20.74	0.66	0.38
	607A	614A	0.66	17	58	1.56	133	4.00	2.16								0.66	1.56	0.437	2.60	104.5	200	0.40	20.74	0.66	0.45
To FRESHWATER WAY, Pipe 614A - Plug						1.56	133																				
FRESHWATER WAY																											
External			1.57	35	119	1.57	119																				
	604A	605A	0.16	3	11	1.73	130	4.00	2.11								1.73	1.73	0.484	2.59	45.5	200	0.40	20.74	0.66	0.45
Contribution from Block 169 (Parkette)						0.20	0																				
Contribution From DOVETAIL HEIGHTS, Pipe 603A - 605A						1.19	84																				
	605A	612A	0.73	17	58	3.85	272	4.00	4.41								0.73	3.85	1.078	5.49	117.0	200	0.40	20.74	0.66	0.56
	612A	613A	0.14	2	7	3.99	279	4.00	4.52								0.14	3.99	1.117	5.64	12.5	200	0.40	20.74	0.66	0.56
	613A	614A	0.26	6	21	4.25	300	4.00	4.86								0.26	4.25	1.190	6.05	60.5	200	0.40	20.74	0.66	0.57
Contribution From WATERCOLOURS WAY, Pipe 607A - 614A						1.56	133																				
	614A	Plug	0.13	3	11	5.94	444	4.00	7.19								0.13	5.94	1.663	8.85	32.0	200	0.40	20.74	0.66	0.63
To FRESHWATER WAY, Plug to Ex. MH 8A (Phase 1)						5.94	444																				

DESIGN PARAMETERS

Average Daily Flow =	350	l/p/day	Industrial Peak Factor = as per MOE Graph		
Comm/Inst Flow =	50000	L/ha/da	Extraneous Flow =	0.280	L/s/ha
Industrial Flow =	35000	L/ha/da	Minimum Velocity =	0.760	m/s
Max Res. Peak Factor =	4.00		Manning's n =	0.013	
Commercial/Inst peak Factor =	1.50		Townhouse coeff=	2.7	
Institutional	0.60	l/s/Ha	Single house coeff=	3.4	

Designed: K.M.	PROJECT: HALF MOON BAY SUBDIVISION, PHASES 1, 2, 3, 5, 6		
Checked: Z.L.	LOCATION: City of Ottawa		
Dwg. Reference: Sanitary Drainage Plan	File Ref: 09-384	Date: August, 2010	Sheet No. 13 of 14

384_san4.xls

Half Moon Bay Phase 8 - Block 40
Existing Site Conditions

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2004

Site Area 0.750 **ha**

Extraneous Flow Allowances

Infiltration / Inflow **0.21 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		0
Stacked Townhouse	2.3		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 **0**

Average Domestic Flow **0.00 L/s**

Peaking Factor **4.00**

Peak Domestic Flow **0.00 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
Ex. Industrial - Light**	35,000	L/gross ha/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	**0.00 L/s**
Total Estimated Peak Dry Weather Flow Rate	**0.00 L/s**
Total Estimated Peak Wet Weather Flow Rate	**0.21 L/s**

Half Moon Bay Phase 8 - Block 40
Proposed Site Conditions (from HMB Phase 6)

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

Site Area	0.750	**ha**

Extraneous Flow Allowances

Infiltration / Inflow	**0.21**	**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	180	486
Stacked Townhouse	2.3		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	**486**	
Average Domestic Flow	**1.97**	**L/s**
Peaking Factor	**3.98**	
Peak Domestic Flow	**7.84**	**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
Ex. Industrial - Light**	35,000	L/gross ha/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	**7.84**	**L/s**
Total Estimated Peak Wet Weather Flow Rate	**8.05**	**L/s**

Mattamy Homes
Half Moon Bay Phase 8 - Block 40
Proposed Site Conditions

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

Site Area 0.750 **ha**

Extraneous Flow Allowances

Infiltration / Inflow	**0.25**	**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	60	162
Stacked Townhouse	2.3		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	**162**	
Average Domestic Flow	**0.53**	**L/s**
Peaking Factor	**3.54**	
Peak Domestic Flow	**1.86**	**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
Ex. Industrial - Light**	35,000	L/gross ha/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	**0.53**	**L/s**
Total Estimated Peak Dry Weather Flow Rate	**1.86**	**L/s**
Total Estimated Peak Wet Weather Flow Rate	**2.11**	**L/s**

SANITARY SEWER CALCULATION SHEET

CLIENT: **Mattamy Homes**
LOCATION: **Half Moon Bay North - Phase 8 Block 40**
FILE REF: **17-987**
DATE: **28-Aug-18**

DESIGN PARAMETERS

Avg. Daily Flow Res.	280	L/p/d	Peak Fact Res. Per Harmons: Min = 2.0, Max =3.8		Infiltration / Inflow	0.33	L/s/ha
Avg. Daily Flow Comm	28,000	L/ha/d	Peak Fact. Comm.	1	Min. Pipe Velocity	0.60	m/s full flowing
Avg. Daily Flow Instit.	28,000	L/ha/d	Peak Fact. Instit.	1	Max. Pipe Velocity	3.00	m/s full flowing
Avg. Daily Flow Indust	35,000	L/ha/d	Peak Fact. Indust. per MOE graph		Mannings N	0.013	

Location			Residential Area and Population									Commercial		Institutional		Industrial			Infiltration				Pipe Data							
Area ID	Up	Down	Area	Number of Units by type				Pop.	Cumulative Area	Cumulative Pop.	Peak. Fact.	Q_{res}	Area	Accu. Area	Area	Accu. Area	Area	Accu. Area	Q_{C+I+I}	Total Area	Accu. Area	Infiltration Flow	Total Flow	DIA	Slope	Length	$A_{hydraulic}$	R	Velocity	Q_{cap}	Q / Q full
			(ha)	Singles	Semi's	Town's	Apt's		(ha)		(-)	(L/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(mm)	(%)	(m)	(m^2)	(m)	(m/s)	(L/s)	(-)
SAN-4A	SAN6	SAN4	0.140			12		33.0	0.140	33.0	3.68	0.39		0.00		0.00		0.00	0.0	0.140	0.140	0.046	0.44	200	0.65	24.6	0.031	0.050	0.84	26.4	0.02
SAN-4B	SAN5	SAN4	0.079			12		33.0	0.079	33.0	3.68	0.39		0.00		0.00		0.00	0.0	0.079	0.079	0.026	0.42	200	0.65	26.3	0.031	0.050	0.84	26.4	0.02
SAN-3A	SAN4	SAN3	0.165			12		33.0	0.384	99.0	3.60	1.15		0.00		0.00		0.00	0.0	0.165	0.384	0.127	1.28	200	0.32	46.1	0.031	0.050	0.59	18.6	0.07
SAN-3B	SAN7	SAN3	0.153			12		33.0	0.153	33.0	3.68	0.39		0.00		0.00		0.00	0.0	0.153	0.293	0.097	0.49	200	0.65	25.9	0.031	0.050	0.84	26.4	0.02
SAN-2	SAN3	SAN2	0.097			12		33.0	0.634	165.0	3.54	1.89		0.00		0.00		0.00	0.0	0.097	0.634	0.209	2.10	200	0.32	31.2	0.031	0.050	0.59	18.6	0.11
	SAN2	SAN1	0.000					0.0	0.634	165.0	3.54	1.89		0.00		0.00		0.00	0.0	0.000	0.000	0.209	2.10	200	0.32	8.3	0.031	0.050	0.59	18.6	0.11
To Ex. MH631A												**1.89**											**2.10**								

APPENDIX D

Stormwater Management

HALF MOON BAY WEST
CLARKE SWM POND
REFER TO
DAVID SCHAEFFER ENGINEERING LIMITED
PROJECT No. 16-888

HALF MOON BAY SUBDIVISION - PHASES 7
REFER TO
DAVID SCHAEFFER ENGINEERING LIMITED
PROJECT No. 13-703

REVIEWED BY DEVELOPMENT REVIEW BRANCH
SIGNED
DATE
PLAN NUMBER

CLARKE POND
PP ELEV. 89.55
OPERATIONAL PP ELEV. 90.35
100YR W.L. 92.09

POND BLOCK

UNIT OF POND BLOCK

UNIT OF SUBDIVISION

FUTURE STREET

chemin Greenbank Road

avenue RIVER RUN AVENUE

terrasse Chimney Corner Terrace

cours Cape Jack Walk

DOVETAIL HEIGHTS

RIVER RUN AVENUE

FRESHWATER WAY

voie Freshwater Way

WATERCOLOURS WAY

SEELEY'S BAY STREET

PARKETTE

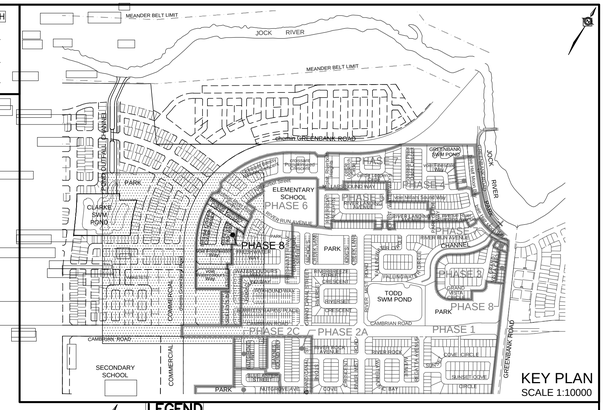
COMMERCIAL

PRELIMINARY DESIGN FOR
FUTURE chemin Greenbank Road
REFER TO
STANTEC
PROJECT No. 163600994

HALF MOON BAY WEST
REFER TO
DAVID SCHAEFFER ENGINEERING LIMITED
PROJECT No. 16-888

HALF MOON BAY SUBDIVISION - PHASES 5 AND 6
REFER TO
DAVID SCHAEFFER ENGINEERING LIMITED
PROJECT No. 09-384

HALF MOON BAY SUBDIVISION - PHASE 1
REFER TO
DAVID SCHAEFFER ENGINEERING LIMITED
PROJECT No. 07-314



KEY PLAN
SCALE 1:10000

LEGEND

- STORM DRAINAGE BOUNDARY
- SUB-DRAINAGE BOUNDARY
- STORM DRAINAGE BOUNDARY (OTHER PHASES)
- UPSTREAM MH TO DOWNSTREAM MH — 43 - 44
- AREA IN HECTARES — 0.37
- RUNOFF COEFFICIENT — 0.51
- EXTERNAL 2.78AC — **2.78AC=14.40**
- EXTERNAL TIME OF CONCENTRATION — TC=14.5 MIN
- EXTERNAL BLENDED RUNOFF COEFFICIENT — C= 0.70
- UPSTREAM MH TO DOWNSTREAM MH — 21 - 23
- AREA IN OTHER PHASES IN HECTARES — 0.28
- RUNOFF COEFFICIENT — 0.78
- STREET CATCHBASIN & LEAD
- STREET CATCHBASIN WITH CLOSED LID & LEAD
- MAINTENANCE HOLE — MH202
- CURB INLET CATCHBASIN & LEAD
- CATCHBASIN / MAINTENANCE HOLE — CBMH201
- INTERCONNECTED CATCH BASIN & LEADS
- CAP
- OVERLAND FLOW DIRECTION
- EXTERNAL OVERLAND FLOW DIRECTION
- EMERGENCY OVERLAND FLOW DIRECTION

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 06-10-675-00. SURVEY DATED OCTOBER 15, 2007. CITY OF OTTAWA 2K MAPPING, RECEIVED ON JANUARY 18, 2016.

LEGAL INFORMATION

CALCULATED DRAFT PLAN PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 07-10-767-00 (HALF MOON BAY PHASE 8), RECEIVED ON NOVEMBER 30, 2017.

2nd SUBMISSION 17-12-15

BENCH MARK No. 00820010126

POINT IS LOCATED 1.65km NORTH OF BARNSDALE ROAD AND 5km SOUTH OF FALLOWFIELD ROAD ON HIGHWAY 416 NORTH OF KEMPTVILLE. THE POINT IS SET EAST OF THE NORTHBOUND LANE IN THE GRASSY SHOULDER.

ELEVATION = 96.923 m

No.	BY	DATE	DESCRIPTION	BY
2	W.L.	17-12-15	2nd SUBMISSION	
1	W.L.	17-09-27	1st SUBMISSION	

Ottawa — CITY OF OTTAWA

PROJECT No. 17-926

© DSEL

STORM DRAINAGE PLAN

MATTAMY (HALF MOON BAY) LIMITED

HALF MOON BAY SUBDIVISION
PHASE 8

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

DRAWN BY:	A.B.	CHECKED BY:	W.L./C.M.	DRAWING NO.	SHEET NO.
DESIGNED BY:	P.P.	CHECKED BY:	K.M.		27
SCALE:	1:1000	DATE:	SEPTEMBER 2017		

EXTERNAL PRE-DEVELOPMENT
STORM DRAINAGE PLAN
SCALE: 1:4000

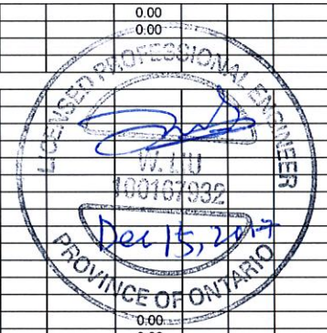
CITY FILE No. D07-16-07-0002 PH. 8 CITY PLAN No. 14942

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

	LOCATION		AREA (Ha) 2 YEAR				5 YEAR				10 YEAR				100 YEAR				FLOW Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	SEWER DATA DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min.)	Q/Q full
cours Cape Jack Walk																																	
	5	6	0.21	0.72	0.42	0.42				0.00				0.00				0.00	10.00	76.81	104.19	122.14	178.56	32	375	375	PVC	0.60	45.0	136	1.23	0.61	0.24
To voie Freashwater Way, Pipe 6 - 9						0.42				0.00				0.00				0.00	10.61														
	5	4	0.17	0.72	0.34	0.34				0.00				0.00				0.00	10.00	76.81	104.19	122.14	178.56	26	375	375	PVC	1.75	58.0	232	2.10	0.46	0.11
To terrasse Chimney Corner Terrace, Pipe 4 - 2						0.34				0.00				0.00				0.00	10.46														
voie Freshwater Way																																	
			0.07	0.49	0.10	0.10				0.00				0.00				0.00															
			0.15	0.54	0.23	0.32				0.00				0.00				0.00															
			0.07	0.72	0.14	0.46				0.00				0.00				0.00															
	600	6	0.09	0.75	0.19	0.65				0.00				0.00				0.00	10.00	76.81	104.19	122.14	178.56	50	375	375	PVC	0.45	45.0	118	1.06	0.70	0.42
Contribution From cours Cape Jack Walk, Pipe 5 - 6						0.42				0.00				0.00				0.00	10.61														
			0.29	0.54	0.44	1.50				0.00				0.00				0.00															
	6	9	0.20	0.75	0.42	1.92				0.00				0.00				0.00	10.70	74.20	100.61	117.93	172.37	143	600	600	CONC	0.15	69.5	238	0.84	1.38	0.60
To terrasse Chimney Corner Terrace, Pipe 9 - 8						1.92				0.00				0.00				0.00	12.08														
terrasse Chimney Corner Terrace																																	
DCB 3 & DCB 4 - 100 Year Intakes Concentrated Flow Calculation																																	
			0.07	0.49	0.10	0.10									0.07	0.49	0.10	0.10					178.56	57	(100YR Flow)								
			0.15	0.54	0.23	0.32									0.15	0.54	0.23	0.32	10.00	76.81				25	(2YR Flow)								
																								33	(100 - 2YR Flow)								
						0.00				0.00				0.00	0.08	0.72	0.16	0.16															
	3	4				0.00				0.00				0.00	0.11	0.75	0.23	0.39	10.00	76.81	104.19	122.14	178.56	102	450	450	CONC	0.20	77.5	128	0.80	1.61	0.80
Contribution From cours Cape Jack Walk, Pipe 5 - 4						0.34				0.00				0.00				0.00	10.46														
	4	2	0.30	0.75	0.63	0.97				0.00				0.00			0.00	0.39	11.61	71.13	96.39	112.95	165.06	166	525	525	CONC	0.20	59.0	192	0.89	1.11	0.86
	2	1				0.97				0.00				0.00			0.00	0.39	12.72	67.74	91.74	107.48	157.02	159	525	525	CONC	0.20	15.0	192	0.89	0.28	0.83
To Storm Trunk, Pipe 1 - HW 5						0.97				0.00				0.00				0.39	13.00					33	(100 - 2YR Flow)								
Contribution From voie Freshwater Way, Pipe 6 - 9						1.92				0.00				0.00				0.00	12.08														
	9	8				1.92				0.00				0.00				0.00	12.08	69.64	94.35	110.55	161.53	134	750	750	CONC	0.15	27.0	431	0.98	0.46	0.31
DCB 11 & DCB 12 - 100 Year Intakes Concentrated Flow Calculation																																	
			0.30	0.75	0.63	0.63									0.30	0.75	0.63	0.63															
			0.17	0.72	0.34	0.97									0.17	0.72	0.34	0.97															
			0.15	0.72	0.30	1.27									0.15	0.72	0.30	1.27															
			0.29	0.54	0.44	1.70									0.29	0.54	0.44	1.70															
			0.17	0.72	0.34	2.04									0.17	0.72	0.34	2.04															
			0.21	0.72	0.42	2.46									0.21	0.72	0.42	2.46															
			0.07	0.72	0.14	2.60									0.07	0.72	0.14	2.60															
			0.09	0.75	0.19	2.79									0.09	0.75	0.19	2.79					158.24	507	(100YR Flow)								
			0.20	0.75	0.42	3.21									0.20	0.75	0.42	3.21	12.54	68.25				219	(2YR Flow)								
																								289	(100 - 2YR Flow)								
	8	7	0.15	0.72	0.30	2.22				0.00				0.00				0.00	12.54	68.25	92.44	108.30	158.24	440	825	825	CONC	0.20	51.5	642	1.20	0.71	0.69
	7	1	0.17	0.72	0.34	2.56				0.00				0.00				0.00	13.26	66.21	89.65	105.01	153.41	458	825	825	CONC	0.20	53.5	642	1.20	0.74	0.71
To Storm Trunk, Pipe 1 - HW 5						2.56				0.00				0.00				0.00	14.00					289	(100 - 2YR Flow)								



Definitions:
Q = 2.78 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: K.M.	PROJECT:	Half Moon Bay North - Phase 8
Checked: W.L.	LOCATION:	City of Ottawa
Dwg. Reference: Storm Drainage Plan, Dwg. No. 27	File Ref: 17-926	Date: December, 2017
		Sheet No. 1 of 2

926_stm2.xls

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

Ottawa

	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
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min.)	Q/Q full
voie Watercolours Way																																	
DCB 21 & DCB 22 - 100 Year Intakes Concentrated Flow Calculation																																	
							0.46	0.49	0.63	0.63					0.46	0.49	0.63	0.63															
							0.36	0.75	0.75	1.38					0.36	0.75	0.75	1.38					178.56	328	(100YR Flow)								
							0.22	0.75	0.46	1.84					0.22	0.75	0.46	1.84	10.00		104.19			191	(5YR Flow)								
																								137	(100 - 5YR Flow)								
						0.00				0.00				0.00	0.04	0.75	0.08	0.08															
	100	10				0.00				0.00				0.00	0.12	0.75	0.25	0.33	10.00	76.81	104.19	122.14	178.56	196	675	675	CONC	0.25	97.5	420	1.17	1.38	0.47
						0.00				0.00				0.00	0.18	0.85	0.43	0.76															
															0.32	0.57	0.51	1.27															
	10	160				0.00	0.75	0.80	1.67	1.67				0.00	0.21	0.75	0.44	1.70	11.38	71.87	97.41	114.16	166.83	583	1050	1050	CONC	0.25	44.5	1365	1.58	0.47	0.43
To Fut. Greenbank Road Storm Trunk, Pipe 160 - 161						0.00				1.67				0.00				1.70	11.85					137	(100 - 5YR Flow)								
Fut. Greenbank Road - STM Trunk																																	
Contribution From voie Watercolours Way, Pipe 10 - 160						0.00				1.67				0.00				1.70	11.85					137	(100 - 5YR Flow)								
	160	161				0.00				1.67	0.27	0.85	0.64	0.64				1.70	11.85	70.35	95.32	111.70	163.22	645	1050	1050	CONC	0.25	52.0	1365	1.58	0.55	0.47
	161	HW 4				0.00				1.67				0.64				1.70	12.40	68.66	93.01	108.97	159.21	632	1050	1050	CONC	0.30	14.5	1496	1.73	0.14	0.42
To Temp. Diversion Channel						0.00				1.67				0.64				1.70	12.54					137	(100 - 5YR Flow)								
Contribution From terrasse Chimney Corner Terrace, Pipe 2 - 1						0.97				0.00				0.00				0.39	13.00					33	(100 - 2YR Flow)								
Contribution From terasse Chimney Corner Terrance, Pipe 7 - 1						2.56				0.00				0.00				0.00	14.00					289	(100 - 2YR Flow)								
	1	HW 5				3.53				0.00				0.00				0.39	14.00	64.23	86.93	101.82	148.72	606	900	900	CONC	0.20	47.0	810	1.27	0.62	0.75
To Temp. Diversion Channel						3.53				0.00				0.00				0.39	14.62					321	(100 - 2YR Flow)								
Fut. STM Trunk																																	
Contribution From STM Trunk, Pipe 1 - HW 5						3.53				0.00				0.00				0.39	14.62					321	(100 - 2YR Flow)								
	HW 5	FUT. 165				3.53				0.00				0.00				0.39	14.62	62.69	84.82	99.34	145.08	599	900	900	CONC	0.20	2.5	810	1.27	0.03	0.74
To Fut. STM Trunk, Future Pipe 165 - 166						3.53				0.00				0.00				0.39	14.65					321	(100 - 2YR Flow)								
Contribution From STM Trunk, Pipe 161 - HW 4						0.00				1.67				0.64				1.70	12.54					137	(100 - 2YR Flow)								
	HW 4	FUT. 162				0.00				1.67				0.64				1.70	12.54	68.25	92.44	108.30	158.23	629	1050	1050	CONC	0.30	2.0	1496	1.73	0.02	0.42
	FUT. 162	FUT. 163	0.13	0.75	0.27	0.27				1.67				0.64				1.70	12.56	68.19	92.36	108.21	158.09	647	1050	1050	CONC	0.30	50.0	1496	1.73	0.48	0.43
Contribution From Future Greenbank Road, Future Pipe 1860 - 163						0.00				0.00				2.24				0.00	11.10					200	(100 - 10YR Flow)								
	FUT. 163	FUT. 164	0.16	0.75	0.33	0.60				1.67				2.88				1.70	13.05	66.80	90.46	105.97	154.81	1097	1500	1500	CONC	0.12	52.0	2449	1.39	0.63	0.45
	FUT. 164	FUT. 165	0.11	0.75	0.23	0.83				1.67				2.88				1.70	13.67	65.09	88.11	103.21	150.76	1092	1500	1500	CONC	0.12	47.5	2449	1.39	0.57	0.45
Contribution From STM Trunk, Future Pipe HW 5 to 165						3.53				0.00				0.00				0.39	14.65					321	(100 - 2YR Flow)								
	FUT. 165	FUT. 166	0.03	0.72	0.06	4.42				1.67				2.88				2.09	14.65	62.61	84.71	99.21	144.89	1665	1500	1500	CONC	0.12	15.5	2449	1.39	0.19	0.68
			0.18	0.54	0.27	4.69				1.67				2.88				2.09															
	FUT. 166	FUT. 169	0.19	0.72	0.38	5.07				1.67				2.88				2.09	14.83	62.16	84.10	98.49	143.82	1698	1500	1500	CONC	0.12	63.5	2449	1.39	0.76	0.69
Contribution From Future Street, Future Pipe 168 - 169						2.42				0.00				0.00				0.00	13.87														
			0.17	0.54	0.26	7.74				1.67				2.88				2.09															
	FUT. 169	FUT. 1690	0.15	0.72	0.30	8.04				1.67				2.88				2.09	15.60	60.39	81.67	95.64	139.64	1848	1500	1500	CONC	0.12	40.0	2449	1.39	0.48	0.75
			0.06	0.54	0.09	8.13				1.67				2.88				2.09															
	FUT. 1690	FUT. 1810	0.08	0.72	0.16	8.29				1.67				2.88				2.09	16.08	59.33	80.22	93.93	137.14	1841	1500	1500	CONC	0.12	21.5	2449	1.39	0.26	0.75
	FUT. 1810	FUT. 181			0.00	8.29				1.67				2.88				2.09	16.34	58.78	79.47	93.05	135.84	1830	1500	1500	CONC	0.12	16.0	2449	1.39	0.19	0.75
Contribution From Future Street, Future Pipe 178 - 181						3.42				3.34				0.00				0.00	17.58														
Contribution From Future Street, Future Pipe 1800 - 181						1.90				0.00				0.00				0.00	12.74														
			0.13	0.54	0.20	13.81				5.01				2.88				2.09															
	FUT. 181	FUT. 182	0.14	0.72	0.28	14.09				5.01				2.88				2.09	17.58	56.29	76.07	89.04	129.97	2361	1800	1800	CONC	0.15	49.0	4452	1.75	0.47	0.53
			0.11	0.54	0.17	14.25				5.01				2.88				2.09															
	FUT. 182	FUT. 183	0.12	0.72	0.24	14.49				5.01				2.88				2.09	18.04	55.41	74.86	87.63	127.90	2356	1800	1800	CONC	0.15	42.5	4452	1.75	0.40	0.53
			0.03	0.54	0.05	14.54				5.01				2.88				2.09															
	FUT. 183	FUT. 185	0.03	0.72	0.06	14.60				5.01				2.88				2.09	18.45	54.67	73.86	86.45	126.16	2339	1800	1800	CONC	0.15	44.5	4452	1.75	0.42	0.53
	FUT. 185	FUT. 186	1.03	0.40	1.15	15.74				5.01				2.88				2.09	18.87	53.92	72.83	85.24	124.40	2378	1800	1800	CONC	0.15	28.0	4452	1.75	0.27	0.53
	FUT. 186	HW 2			0.00	15.74				5.01				2.88				2.09	19.14	53.46	72.20	84.50	123.31	2363	1800	1800	CONC	0.15	11.0	4452	1.75	0.10	0.53
To SWM Pond						15.74				5.01				2.88				2.09	19.24					658									

Definitions:
Q = 2.78 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: K.M.	PROJECT:	Half Moon Bay North - Phase 8	
Checked: W.L.	LOCATION:	City of Ottawa	
Dwg. Reference: Storm Drainage Plan, Dwg. No. 27	File Ref: 17-926	Date: December, 2017	Sheet No. 2 of 2

926_stm2.xls

Half Moon Bay North - Phase 8 Block 40
Existing Conditions

Estimated Peak Stormwater Flow Rate
City of Ottawa Sewer Design Guidelines, 2012

Existing Drainage Charateristics From Internal Site

Area	0.75	ha
C	0.25	Rational Method runoff coefficient
L	126	m
Up Elev	92.95	m
Dn Elev	92.47	m
Slope	0.4	%
Tc	42.9	min

1) Time of Concentration per Federal Aviation Administration

$$t_c = \frac{1.8(1.1-C)L^{0.5}}{S^{0.333}}$$

tc, in minutes
C, rational method coefficient, (-)
L, length in ft
S, average watershed slope in %

Estimated Peak Flow

	2-year	5-year	100-year	
i	31.3	42.0	71.5	mm/hr
Q	16.3	21.9	46.5	L/s

										Sewer Data								
Area ID	Up	Down	Area	C	Indiv AxC	Acc AxC	T_C	I	Q	DIA	Slope	Length	$A_{hydraulic}$	R	Velocity	Qcap	Time Flow	Q / Q full
			(ha)	(-)			(min)	(mm/hr)	(L/s)	(mm)	(%)	(m)	(m^2)	(m)	(m/s)	(L/s)	(min)	(-)
A1b			0.166	0.83	0.14	0.14												
A1a			0.142	0.83	0.12	0.26												
	STM103	STM102			0.00	0.26	10.0	104.2	74.0	300	1.00	42.4	0.071	0.075	1.37	96.7	0.5	0.77
A2	STM201	STM102	0.000	0.00	0.00	0.00	10.0	104.2	0.0	250	1.00	15	0.049	0.063	1.21	59.5	0.2	0.00
	STM102	STM101	0.123	0.77	0.09	0.35	10.5	101.5	98.8	375	1.00	25.2	0.110	0.094	1.59	175.3	0.3	0.56
	STM101	CBMH101				0.35	10.8	100.2	97.6	375	1.00	2	0.110	0.094	1.59	175.3	0.0	0.56
	CBMH101	FUT. STM101				0.35	10.8	100.1	97.5	450	1.00	6.75	0.159	0.113	1.79	285.1	0.1	0.34

User Inputs

Chamber Model	MC-3500
Outlet Control Structure	Yes (Outlet)
Project Name	Block 40 - HMB Ph 8 (102)
Project Location	2444 Watercolours Way
Project Date	07/17/2018
Measurement Type	Metric
Required Storage Volume	27 cubic meters
Stone Porosity	40%
Stone Above Chambers	305 mm.
Stone Foundation Depth	229 mm.
Average Cover Over Chambers	610 mm.
Design Constraint	Width
Design Constraint Dimension	5 meters

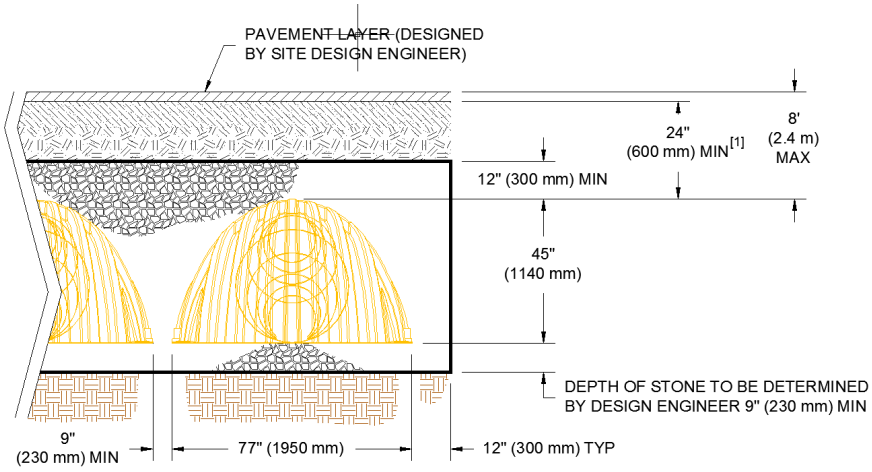
Results

System Volume and Bed Size

Installed Storage Volume	29 cubic meters
Storage Volume Per Chamber	5.0 cubic meters
Storage Volume Per End Cap	1.3 cubic meters
Number Of Chambers Required	3 each
Number Of End Caps Required	4 each
Rows/Chambers	1 row(s) of 2 chamber(s)
Leftover Rows/Chambers	1 row(s) of 1 chamber(s)
Maximum Length	7.20 meters
Maximum Width	4.93 meters
Approx. Bed Size Required	33 square meters

System Components

Amount Of Stone Required	45 cubic meters
Volume Of Excavation (Not Including Fill)	56 cubic meters
Non-woven Filter Fabric Required	109 square meters
Length Of Isolator Row	5.50 meters
Woven Isolator Row Fabric	40 square meters



[1] - TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 30" (750 mm).

User Inputs

Chamber Model	MC-3500
Outlet Control Structure	Yes (Outlet)
Project Name	Block 40 - HMB Ph 8 (103A)
Project Location	2444 Watercolours Way
Project Date	07/17/2018
Measurement Type	Metric
Required Storage Volume	31 cubic meters
Stone Porosity	40%
Stone Above Chambers	305 mm.
Stone Foundation Depth	229 mm.
Average Cover Over Chambers	610 mm.
Design Constraint	Width
Design Constraint Dimension	9 meters

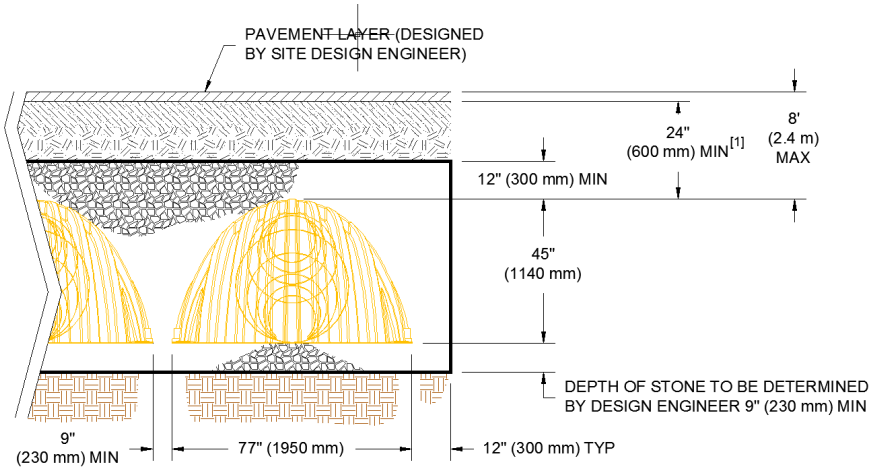
Results

System Volume and Bed Size

Installed Storage Volume	36 cubic meters
Storage Volume Per Chamber	5.0 cubic meters
Storage Volume Per End Cap	1.3 cubic meters
Number Of Chambers Required	5 each
Number Of End Caps Required	4 each
Rows/Chambers	2 row(s) of 2 chamber(s)
Maximum Length	8.39 meters
Maximum Width	4.93 meters
Approx. Bed Size Required	39 square meters

System Components

Amount Of Stone Required	48 cubic meters
Volume Of Excavation (Not Including Fill)	65 cubic meters
Non-woven Filter Fabric Required	120 square meters
Length Of Isolator Row	5.50 meters
Woven Isolator Row Fabric	29 square meters



[1] - TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 30" (750 mm).

User Inputs

Chamber Model	MC-3500
Outlet Control Structure	Yes (Outlet)
Project Name	Block 40 - HMB Ph 8 (103A)
Project Location	2444 Watercolours Way
Project Date	07/17/2018
Measurement Type	Metric
Required Storage Volume	43 cubic meters
Stone Porosity	40%
Stone Above Chambers	305 mm.
Stone Foundation Depth	229 mm.
Average Cover Over Chambers	610 mm.
Design Constraint	Width
Design Constraint Dimension	9 meters

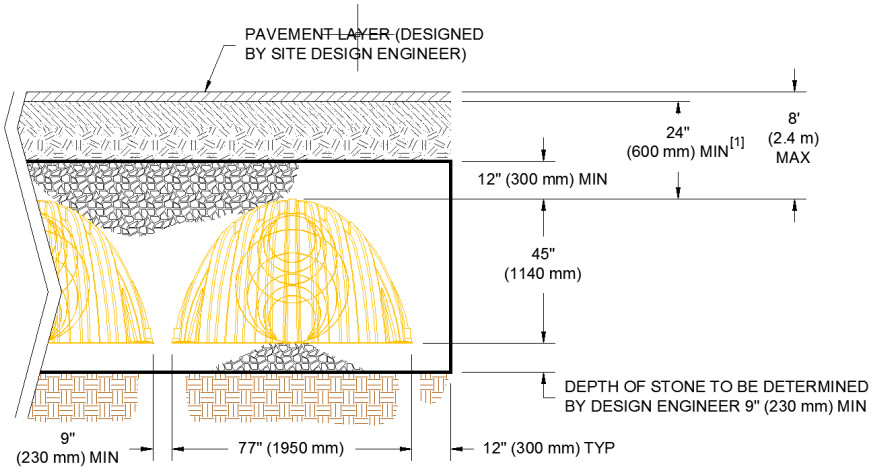
Results

System Volume and Bed Size

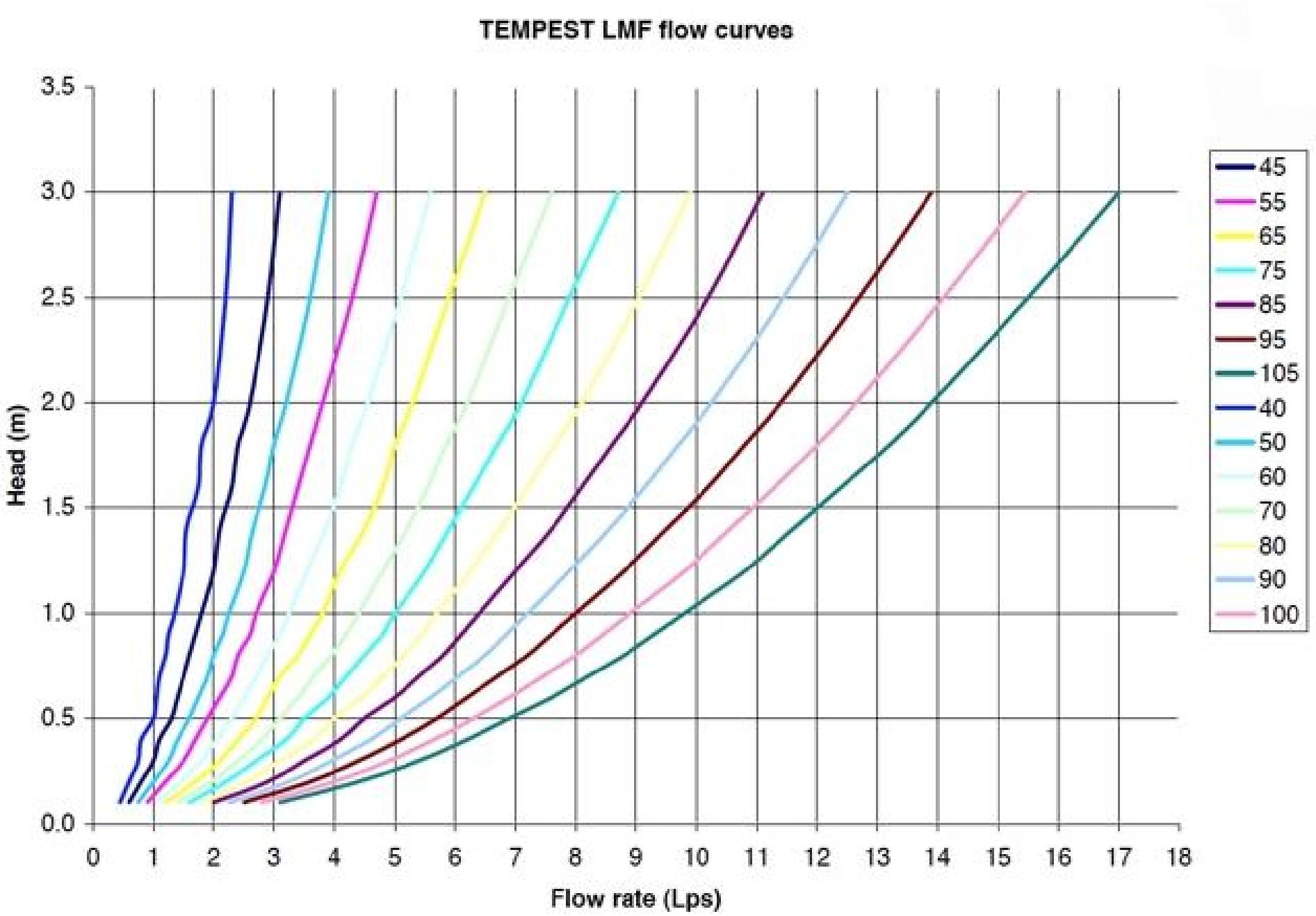
Installed Storage Volume	44 cubic meters
Storage Volume Per Chamber	5.0 cubic meters
Storage Volume Per End Cap	1.3 cubic meters
Number Of Chambers Required	5 each
Number Of End Caps Required	6 each
Rows/Chambers	2 row(s) of 2 chamber(s)
Leftover Rows/Chambers	1 row(s) of 1 chamber(s)
Maximum Length	7.20 meters
Maximum Width	7.12 meters
Approx. Bed Size Required	49 square meters

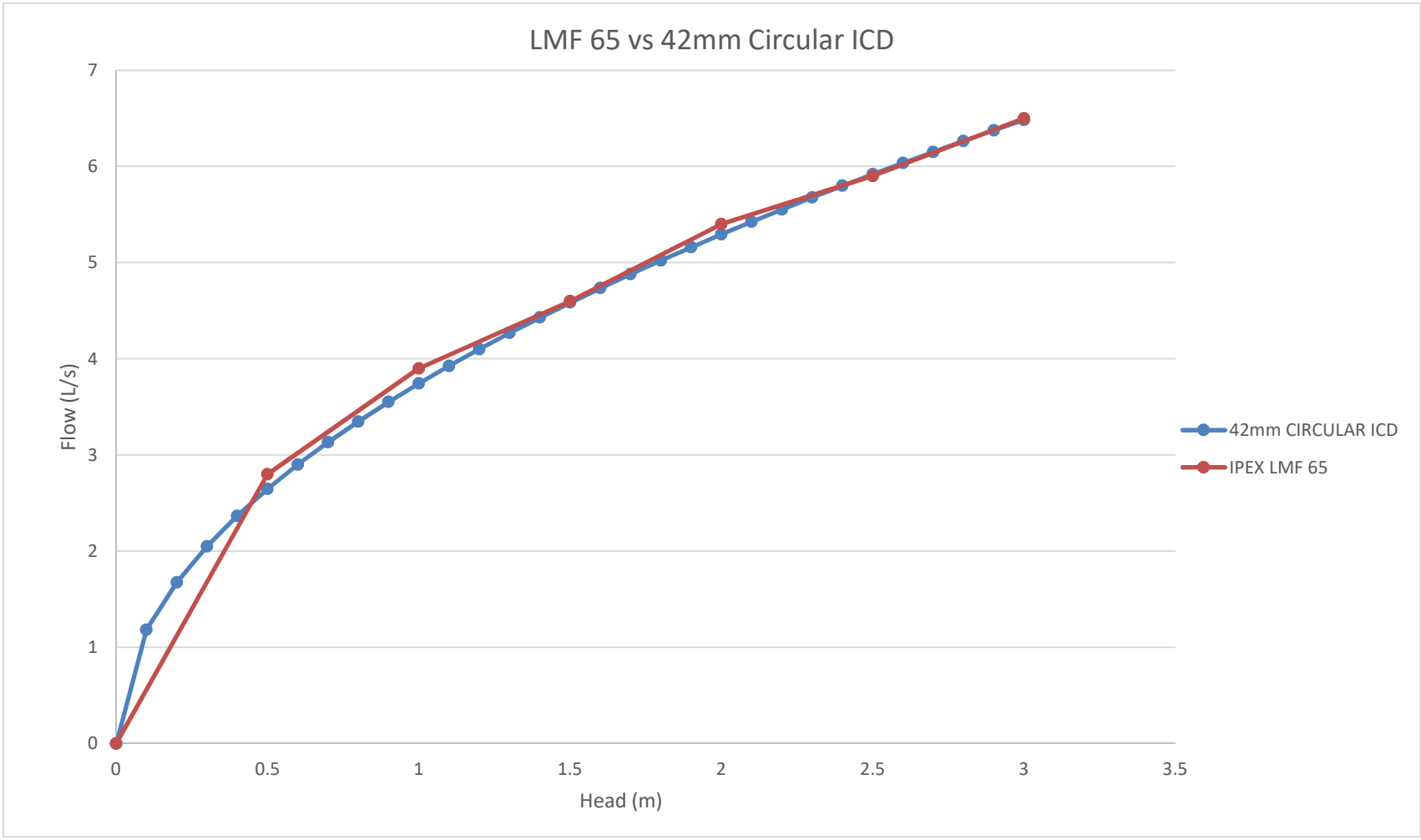
System Components

Amount Of Stone Required	64 cubic meters
Volume Of Excavation (Not Including Fill)	82 cubic meters
Non-woven Filter Fabric Required	148 square meters
Length Of Isolator Row	5.50 meters
Woven Isolator Row Fabric	40 square meters

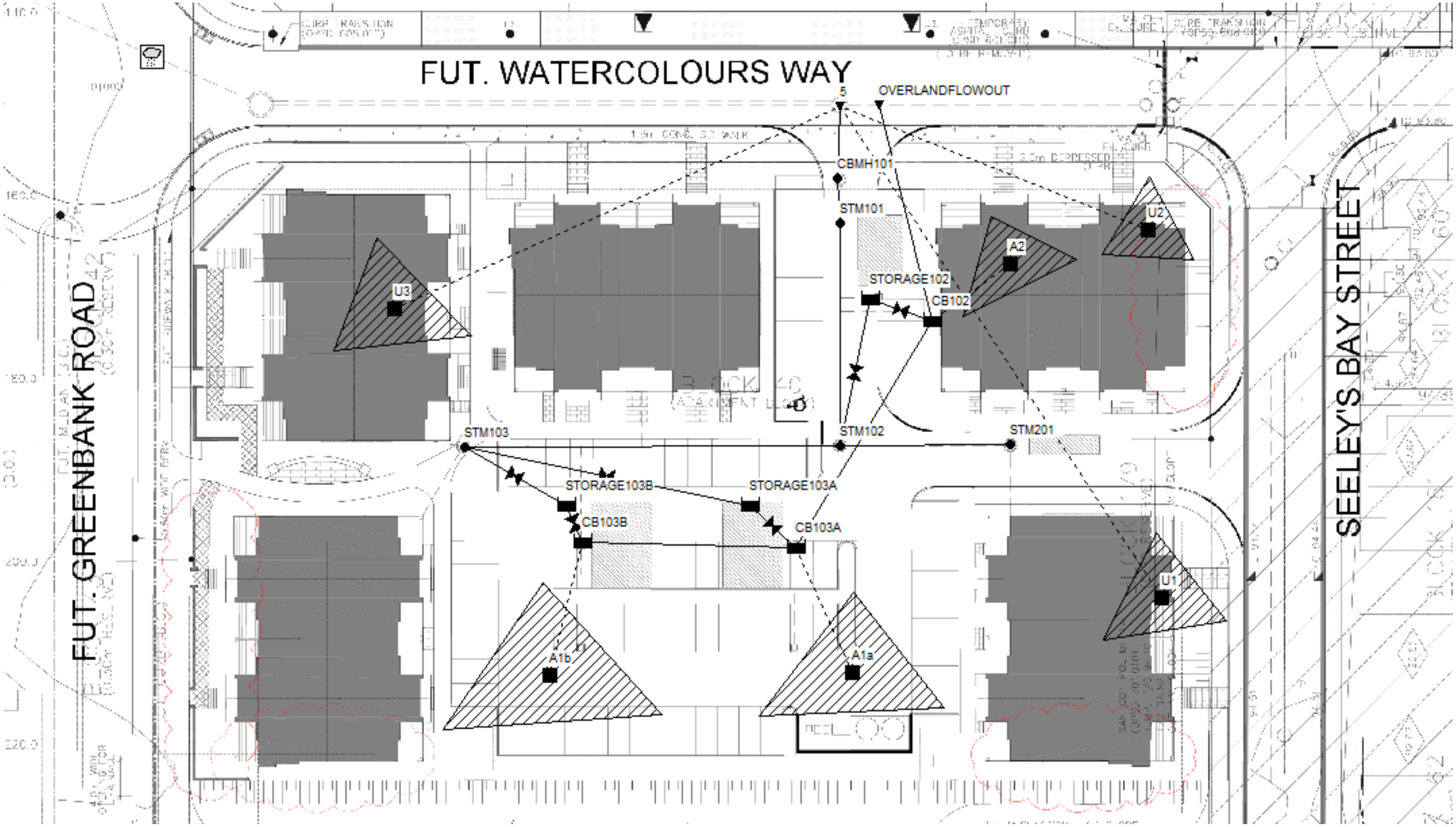


[1] - TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 30" (750 mm).


TEMPEST LMF flow curves
Head (m)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
Flow rate (Lps)
45
55
65
75
85
95
105
40
50
60
70
80
90
100


LMF 65 vs 42mm Circular ICD
Flow (L/s)
Head (m)
0
1
2
3
4
5
6
7
0
0.5
1
1.5
2
2.5
3
3.5
42mm CIRCULAR ICD
IPEX LMF 65

EPASWMM SCHEMATIC



```
[TITLE]

[OPTIONS]
FLOW_UNITS           LPS
INFILTRATION         HORTON
FLOW_ROUTING         DYNWAVE
START_DATE           01/01/2000
START_TIME           00:01:00
REPORT_START_DATE    01/01/2000
REPORT_START_TIME    00:01:00
END_DATE             01/02/2000
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:01:00
DRY_STEP             00:01:00
ROUTING_STEP         0:00:02
ALLOW_PONDING        YES
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         1.14
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0

[FILES]
SAVE HOTSTART "Z:\Projects\17-987_Mattamy - HMB Ph8 Apartments\B_Design\B1_Analysis\B1-4_SWM\2018-06_epaswmm\post
USE HOTSTART "Z:\Projects\17-987_Mattamy - HMB Ph8 Apartments\B_Design\B1_Analysis\B1-4_SWM\2018-06_epaswmm\post.

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
CONSTANT     0.0
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
1                INTENSITY 0:10   1.0    TIMESERIES CH6H100x

[SUBCATCHMENTS]
;;                                                 Total    Pcnt.             Pcnt.    Curb     Snow
;;Name           Raingage         Outlet           Area     Imperv   Width    Slope    Length   Pack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- --------
A1b              1                CB103B           0.166    90       52.99    2        0
A1a              1                CB103A           0.142    90       50.29    2        0
A2               1                CB102            0.123    81       31.45    1.5      0
U3               1                5                0.215    66       62       2        0
U1               1                5                0.064    70       25.7     2        0
U2               1                5                0.042    66       23       2        0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
A1b              0.013      0.25       1.57       4.67       0          OUTLET
A1a              0.013      0.25       1.57       4.67       0          OUTLET
A2               0.013      0.25       1.57       4.67       0          OUTLET
U3               0.013      0.25       1.57       4.67       0          OUTLET
U1               0.013      0.25       1.57       4.67       0          OUTLET
U2               0.013      0.25       1.57       4.67       0          OUTLET

[INFILTRATION]
;;Subcatchment   MaxRate    MinRate    Decay      DryTime    MaxInfil
;;-------------- ---------- ---------- ---------- ---------- ----------
A1b              76.2       13.2       4.14       7          0
```

```
A1a              76.2       13.2       4.14       7          0
A2               76.2       13.2       4.14       7          0
U3               76.2       13.2       4.14       7          0
U1               76.2       13.2       4.14       7          0
U2               76.2       13.2       4.14       7          0

[JUNCTIONS]
;;               Invert     Max.       Init.      Surcharge  Ponded
;;Name           Elev.      Depth      Depth      Depth      Area
;;-------------- ---------- ---------- ---------- ---------- ----------
STM103           92.51      2.86       0          0          0
STM102           92.11      2.85       0          0          0
STM201           92.29      2.43       0          0          0
CBMH101          91.65      3.32       0          0          0
STM101           91.79      3.03       0          0          0

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
5                91.59      FIXED      92.518           NO
OVERLANDFLOWOUT  94.61      FREE                        NO

[STORAGE]
;;               Invert   Max.     Init.    Storage    Curve                    Ponded   Evap.
;;Name           Elev.    Depth    Depth    Curve      Params                   Area     Frac.    Infiltration
;;-------------- -------- -------- -------- ---------- -------- -------- -------- -------- -------- -------------
STORAGE103B      92.53    2.41     0        TABULAR    CB103B-UG-Storage         0        0
STORAGE103A      92.53    2.41     0        TABULAR    CB103a-UG-Storage         0        0
CB103B           94.74    0.20     0        TABULAR    CB103b-Capture           0        0
CB103A           94.74    0.20     0        TABULAR    CB103a-Capture           0        0
STORAGE102       92.58    2.17     0        TABULAR    CB102-UG-Storage         0        0
CB102            94.58    0.17     0        TABULAR    CB102-Capture            0        0

[CONDUITS]
;;               Inlet            Outlet                      Manning    Inlet      Outlet     Init.      Max.
;;Name           Node             Node             Length     N          Offset     Offset     Flow       Flow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- -------
1                STM103           STM102           42.4       0.013      92.51      92.08      0          0
2                STM201           STM102           15.00      0.013      92.29      92.14      0          0
4                CBMH101          5                6.75       0.013      91.65      91.59      0          0
OVERLANDFLOW1    CB103B           CB103A           11.7       0.013      94.89      94.74      0          0
OVERLANDFLOW2    CB103A           CB102            21.4       0.013      94.89      94.58      0          0
OVERLANDFLOW3    CB102            OVERLANDFLOWOUT  5          0.013      94.70      94.61      0          0
10               STM102           STM101           28.0       0.013      92.05      91.81      0          0
3                CBMH101          STM101           2          0.013      91.77      91.79      0          0

[ORIFICES]
;;               Inlet            Outlet           Orifice      Crest      Disch.     Flap Open/Close
;;Name           Node             Node             Type         Height     Coeff.     Gate Time
;;-------------- ---------------- ---------------- ------------ ---------- ---------- ---- ----------
5                STORAGE103B      STM103           SIDE         *          0.61       NO   0
6                STORAGE103A      STM103           SIDE         *          0.61       NO   0
7                CB103B           STORAGE103B      BOTTOM       *          0.61       NO   0
17               CB103A           STORAGE103A      BOTTOM       *          0.61       NO   0
13               CB102            STORAGE102       BOTTOM       *          0.61       NO   0
14               STORAGE102       STM102           SIDE         *          0.61       NO   0

[XSECTIONS]
;;Link            Shape        Geom1            Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
1                CIRCULAR     0.300            0          0          0          1
2                CIRCULAR     0.250            0          0          0          1
4                CIRCULAR     0.450            0          0          0          1
OVERLANDFLOW1    TRIANGULAR   0.05             10.8       0          0          1
OVERLANDFLOW2    RECT_OPEN    0.05             16.7       0          0          1
OVERLANDFLOW3    RECT_OPEN    .05              6          0          0          1
10               CIRCULAR     0.375            0          0          0          1
3                CIRCULAR     0.375            0          0          0          1
5                CIRCULAR     0.042            0          0          0
6                CIRCULAR     0.042            0          0          0
```

```
7                RECT_CLOSED  0.5              0.5        0          0
17               RECT_CLOSED  0.5              0.5        0          0
13               RECT_CLOSED  0.353            0.353      0          0
14               CIRCULAR     0.042            0          0          0

[LOSSES]
;;Link           Inlet      Outlet     Average    Flap Gate
;;-------------- ---------- ---------- ---------- ----------
1                0.5        1.3        0          NO
2                0.5        1.3        0          NO
4                0.5        1.3        0          NO
10               0.5        0.4        0          NO
3                0.5        0.4        0          NO

[INFLOWS]
;;                                                Param    Units    Scale    Baseline Baseline
;;Node           Parameter        Time Series      Type     Factor   Factor   Value    Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
STM103           FLOW             ""               FLOW     1.0      1.0      5.4
STM102           FLOW             ""               FLOW     1.0      1.0      1.8
STM201           FLOW             ""               FLOW     1.0      1.0      1.8

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
CB103b-Capture   Storage    0          0
CB103b-Capture              0.15       409
CB103b-Capture              0.20       409

CB103B-UG-Storage Storage    0          0
CB103B-UG-Storage            0.07       37.7
CB103B-UG-Storage            1.21       37.7
CB103B-UG-Storage            1.2101     0
CB103B-UG-Storage            2.41       0

CB103a-Capture   Storage    0          0
CB103a-Capture              0.15       448
CB103a-Capture              0.20       448

CB103a-UG-Storage Storage    0          0
CB103a-UG-Storage            0.07       31
CB103a-UG-Storage            1.21       31
CB103a-UG-Storage            1.2101     0
CB103a-UG-Storage            2.41       0

CB102-Capture    Storage    0          0
CB102-Capture               0.12       74
CB102-Capture               0.17       74

CB102-UG-Storage Storage    0          0
CB102-UG-Storage            0.07       25
CB102-UG-Storage            1.21       25
CB102-UG-Storage            1.2101     0
CB102-UG-Storage            2.17       0

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
CH6H100          FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\CH6H100.d

CH6H100x         FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\CH6H100x.

CH6H002          FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\CH6H002.d

CH6H005          FILE "P:\General Administrative\5 - DSEL Templates\Site Plan\EPASWMM Template\rainfall\CH6H005.d

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
```

```
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -2500.000 0.000 12500.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
STM103           3731.257           4731.834
STM102           6205.306           4743.368
STM201           7324.106           4749.135
CBMH101          6189.443           6497.906
STM101           6199.189           6205.513
5                6199.539           6969.435
OVERLANDFLOWOUT  6459.333           6978.922
STORAGE103B      4400.300           4350.466
STORAGE103A      5607.476           4350.466
CB103B           4504.037           4108.997
CB103A           5905.421           4080.161
STORAGE102       6401.024           5702.832
CB102            6803.466           5562.251

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
A1b              5032.680           2980.584
A1b              4248.366           3845.636
A1b              3590.927           2888.312
A1a              6887.736           3030.565
A1a              6287.966           3780.276
A1a              5665.129           2972.895
A2               7760.457           5962.686
A2               7016.512           5587.830
A2               7195.290           6251.036
U3               3779.429           5466.423
U3               2864.050           5362.550
U3               3149.700           6102.644
U1               8748.110           3599.241
U1               7936.604           3469.400
U1               8280.683           4177.033
U2               8529.443           5964.147
U2               7925.682           5996.607
U2               8243.793           6502.986

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
1                1681.223           7278.020


[BACKDROP]
FILE       "Z:\Projects\17-987_Mattamy - HMB Ph8 Apartments\B_Design\B1_Analysis\B1-4_SWM\2018-06_epaswmm\Backgro
DIMENSIONS -1470.588 0.000 11470.588 10000.000

[PROFILES]
;;Name           Links
;;-------------- ----------
"                " 14
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)
--------------------------------------------------------------

WARNING 03: negative offset ignored for Link 1
WARNING 03: negative offset ignored for Link 10

***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ 01/01/2000 00:01:00
Ending Date .............. 01/02/2000 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Initial LID Storage ......         0.001         1.235
Total Precipitation ......         0.028        36.852
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.005         6.638
Surface Runoff ...........         0.023        30.241
Final Storage ............         0.001         1.235
Continuity Error (%) .....        -0.072


*************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.023         0.227
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.078         0.777
External Outflow .........         0.100         1.004
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.001         0.007
Final Stored Volume ......         0.001         0.008
Continuity Error (%) .....        -0.016


***************************
Time-Step Critical Elements
***************************
None


*******************************
Highest Flow Instability Indexes
```

****
Link 5 (32)
Link 6 (32)

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 2.00 sec
Maximum Time Step : 2.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
A1b	36.85	0.00	0.00	3.03	33.85	0.06	35.49	0.918
A1a	36.85	0.00	0.00	3.03	33.85	0.05	30.44	0.919
A2	36.85	0.00	0.00	5.91	30.97	0.04	24.04	0.840
U3	36.85	0.00	0.00	10.68	26.19	0.06	36.36	0.711
U1	36.85	0.00	0.00	9.29	27.60	0.02	11.69	0.749
U2	36.85	0.00	0.00	10.47	26.42	0.01	7.60	0.717

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
STM103	JUNCTION	0.05	0.07	92.58	0 02:25	0.07
STM102	JUNCTION	0.41	0.42	92.53	0 02:27	0.42
STM201	JUNCTION	0.23	0.24	92.53	0 02:27	0.24
CBMH101	JUNCTION	0.87	0.87	92.52	0 02:27	0.87
STM101	JUNCTION	0.73	0.73	92.52	0 02:27	0.73
5	OUTFALL	0.93	0.93	92.52	0 00:00	0.93
OVERLANDFLOWOUT	OUTFALL	0.00	0.00	94.61	0 00:00	0.00
STORAGE103B	STORAGE	0.15	0.88	93.41	0 02:29	0.88
STORAGE103A	STORAGE	0.13	0.87	93.40	0 02:23	0.87
CB103B	STORAGE	0.00	0.04	94.78	0 01:59	0.04
CB103A	STORAGE	0.00	0.04	94.78	0 01:59	0.04
STORAGE102	STORAGE	0.08	0.76	93.34	0 02:29	0.76
CB102	STORAGE	0.00	0.04	94.62	0 01:59	0.04

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
STM103	JUNCTION	5.40	12.18	0 02:25	0.466	0.571	-0.069
STM102	JUNCTION	1.80	18.99	0 02:28	0.155	0.919	0.001
STM201	JUNCTION	1.80	1.80	0 00:00	0.155	0.155	-0.000
CBMH101	JUNCTION	0.00	18.99	0 02:28	0	0.919	0.000
STM101	JUNCTION	0.00	18.99	0 02:28	0	0.919	0.000
5	OUTFALL	55.66	71.95	0 01:59	0.0851	1	0.000
OVERLANDFLOWOUT	OUTFALL	0.00	0.00	0 00:00	0	0	0.000 ltr
STORAGE103B	STORAGE	0.00	34.58	0 01:59	0	0.0569	0.343
STORAGE103A	STORAGE	0.00	29.14	0 01:59	0	0.0488	0.403
CB103B	STORAGE	35.49	35.49	0 01:59	0.0562	0.0562	-0.001

CB103A	STORAGE	30.44	30.44	0	01:59	0.0481	0.0481	-0.001
STORAGE102	STORAGE	0.00	19.32	0	01:59	0	0.0381	0.000
CB102	STORAGE	24.04	24.04	0	01:59	0.0381	0.0381	-0.010

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
STM102	JUNCTION	23.98	0.041	2.434
CBMH101	JUNCTION	23.98	0.375	2.450
STM101	JUNCTION	23.98	0.336	2.299

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
STORAGE103B	0.005	10	0	0	0.032	72	0 02:29	3.40
STORAGE103A	0.003	9	0	0	0.026	71	0 02:23	3.38
CB103B	0.000	0	0	0	0.003	5	0 01:59	34.58
CB103A	0.000	0	0	0	0.002	4	0 01:59	29.14
STORAGE102	0.002	6	0	0	0.018	62	0 02:29	3.22
CB102	0.000	0	0	0	0.000	6	0 01:59	19.32

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
5	100.00	11.63	71.95	1.004
OVERLANDFLOWOUT	0.00	0.00	0.00	0.000
System	50.00	11.63	71.95	1.004

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
1	CONDUIT	12.18	0 02:25	0.26	0.13	0.62
2	CONDUIT	1.80	0 00:28	0.04	0.03	0.97
4	CONDUIT	18.99	0 02:28	0.12	0.07	1.00
OVERLANDFLOW1	CONDUIT	0.00	0 00:00	0.00	0.00	0.40
OVERLANDFLOW2	CONDUIT	0.00	0 00:00	0.00	0.00	0.38
OVERLANDFLOW3	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
10	CONDUIT	18.99	0 02:28	0.17	0.10	1.00
3	CONDUIT	18.99	0 02:28	0.17	0.11	1.00
5	ORIFICE	3.40	0 02:29			1.00

6	ORIFICE	3.38	0	02:23	1.00
7	ORIFICE	34.58	0	01:59	
17	ORIFICE	29.14	0	01:59	
13	ORIFICE	19.32	0	01:59	
14	ORIFICE	3.22	0	02:29	1.00

****
Flow Classification Summary
****

	Adjusted	Fraction of Time in Flow Class								
	/Actual		Up	Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
OVERLANDFLOW1	1.00	0.47	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OVERLANDFLOW2	1.00	0.27	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OVERLANDFLOW3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

		Hours	Hours
	Hours Full	Above Full	Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited
1	0.01	0.01	23.98	0.01	0.01
2	0.01	0.01	23.98	0.01	0.01
4	23.98	23.98	23.98	0.01	0.01
10	23.98	23.98	23.98	0.01	0.01
3	23.98	23.98	23.98	0.01	0.01

Analysis begun on: Thu Jul 19 08:19:34 2018
Analysis ended on: Thu Jul 19 08:19:34 2018
Total elapsed time: < 1 sec

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)
--------------------------------------------------------------

WARNING 03: negative offset ignored for Link 1
WARNING 03: negative offset ignored for Link 10

***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ 01/01/2000 00:01:00
Ending Date .............. 01/02/2000 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Initial LID Storage ......         0.001         1.235
Total Precipitation ......         0.037        49.016
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.006         7.649
Surface Runoff ...........         0.031        41.408
Final Storage ............         0.001         1.235
Continuity Error (%) .....        -0.082


*************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.031         0.311
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.078         0.777
External Outflow .........         0.109         1.088
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.001         0.007
Final Stored Volume ......         0.001         0.008
Continuity Error (%) .....        -0.014


***************************
Time-Step Critical Elements
***************************
None


*******************************
Highest Flow Instability Indexes
```

****
Link 6 (30)
Link 5 (30)

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 2.00 sec
Maximum Time Step : 2.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
A1b	49.02	0.00	0.00	3.51	45.55	0.08	48.10	0.929
A1a	49.02	0.00	0.00	3.50	45.56	0.06	41.20	0.929
A2	49.02	0.00	0.00	6.80	42.25	0.05	33.65	0.862
U3	49.02	0.00	0.00	12.30	36.76	0.08	53.25	0.750
U1	49.02	0.00	0.00	10.70	38.36	0.02	16.91	0.783
U2	49.02	0.00	0.00	12.07	37.00	0.02	11.11	0.755

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
STM103	JUNCTION	0.05	0.08	92.59	0 02:29	0.08
STM102	JUNCTION	0.41	0.42	92.53	0 02:29	0.42
STM201	JUNCTION	0.23	0.24	92.53	0 02:29	0.24
CBMH101	JUNCTION	0.87	0.87	92.52	0 02:29	0.87
STM101	JUNCTION	0.73	0.73	92.52	0 02:29	0.73
5	OUTFALL	0.93	0.93	92.52	0 00:00	0.93
OVERLANDFLOWOUT	OUTFALL	0.00	0.00	94.61	0 00:00	0.00
STORAGE103B	STORAGE	0.22	1.43	93.96	0 02:30	1.43
STORAGE103A	STORAGE	0.19	1.28	93.81	0 02:25	1.28
CB103B	STORAGE	0.00	0.05	94.79	0 01:59	0.05
CB103A	STORAGE	0.00	0.05	94.79	0 01:59	0.05
STORAGE102	STORAGE	0.13	1.10	93.68	0 02:31	1.10
CB102	STORAGE	0.00	0.05	94.63	0 01:59	0.05

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
STM103	JUNCTION	5.40	13.88	0 02:29	0.466	0.607	-0.061
STM102	JUNCTION	1.80	21.37	0 02:29	0.155	0.969	0.001
STM201	JUNCTION	1.80	1.80	0 00:00	0.155	0.155	-0.000
CBMH101	JUNCTION	0.00	21.37	0 02:29	0	0.969	0.000
STM101	JUNCTION	0.00	21.37	0 02:29	0	0.969	0.000
5	OUTFALL	81.27	98.97	0 01:59	0.119	1.09	0.000
OVERLANDFLOWOUT	OUTFALL	0.00	0.00	0 00:00	0	0	0.000 ltr
STORAGE103B	STORAGE	0.00	47.10	0 01:59	0	0.0763	0.242
STORAGE103A	STORAGE	0.00	39.55	0 01:59	0	0.0654	0.298
CB103B	STORAGE	48.10	48.10	0 01:59	0.0756	0.0756	-0.001

CB103A	STORAGE	41.20	41.20	0	01:59	0.0647	0.0647	-0.001
STORAGE102	STORAGE	0.00	27.91	0	01:59	0	0.052	0.000
CB102	STORAGE	33.65	33.65	0	01:59	0.052	0.052	-0.007

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
STM102	JUNCTION	23.98	0.043	2.432
CBMH101	JUNCTION	23.98	0.375	2.450
STM101	JUNCTION	23.98	0.337	2.298

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
STORAGE103B	0.007	16	0	0	0.044	100	0 02:22	4.39
STORAGE103A	0.005	14	0	0	0.036	100	0 02:22	4.13
CB103B	0.000	0	0	0	0.004	8	0 01:59	47.10
CB103A	0.000	0	0	0	0.004	6	0 01:59	39.55
STORAGE102	0.003	10	0	0	0.027	91	0 02:31	3.89
CB102	0.000	0	0	0	0.001	9	0 01:59	27.91

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
5	100.00	12.61	98.97	1.088
OVERLANDFLOWOUT	0.00	0.00	0.00	0.000
System	50.00	12.61	98.97	1.088

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
1	CONDUIT	13.88	0 02:29	0.30	0.15	0.63
2	CONDUIT	1.80	0 00:20	0.04	0.03	0.98
4	CONDUIT	21.37	0 02:29	0.13	0.08	1.00
OVERLANDFLOW1	CONDUIT	0.00	0 00:00	0.00	0.00	0.49
OVERLANDFLOW2	CONDUIT	0.00	0 00:00	0.00	0.00	0.49
OVERLANDFLOW3	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
10	CONDUIT	21.37	0 02:29	0.19	0.12	1.00
3	CONDUIT	21.37	0 02:29	0.19	0.12	1.00
5	ORIFICE	4.39	0 02:30			1.00

6	ORIFICE	4.13	0	02:25	1.00
7	ORIFICE	47.10	0	01:59	
17	ORIFICE	39.55	0	01:59	
13	ORIFICE	27.91	0	01:59	
14	ORIFICE	3.89	0	02:31	1.00

****
Flow Classification Summary
****

	Adjusted	Fraction of Time in Flow Class								
	/Actual		Up	Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
OVERLANDFLOW1	1.00	0.47	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OVERLANDFLOW2	1.00	0.26	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OVERLANDFLOW3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

		Hours	Hours
	Hours Full	Above Full	Capacity
Conduit	Both Ends Upstream Dnstream	Normal Flow	Limited
1	0.01 0.01 23.98	0.01	0.01
2	0.01 0.01 23.98	0.01	0.01
4	23.98 23.98 23.98	0.01	0.01
10	23.98 23.98 23.98	0.01	0.01
3	23.98 23.98 23.98	0.01	0.01

Analysis begun on: Thu Jul 19 08:20:08 2018
Analysis ended on: Thu Jul 19 08:20:08 2018
Total elapsed time: < 1 sec

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)
--------------------------------------------------------------

WARNING 03: negative offset ignored for Link 1
WARNING 03: negative offset ignored for Link 10

***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ 01/01/2000 00:01:00
Ending Date .............. 01/02/2000 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Initial LID Storage ......         0.001         1.235
Total Precipitation ......         0.062        82.291
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.007         9.923
Surface Runoff ...........         0.054        72.453
Final Storage ............         0.001         1.235
Continuity Error (%) .....        -0.101


*************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.054         0.545
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.078         0.777
External Outflow .........         0.132         1.322
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.001         0.007
Final Stored Volume ......         0.001         0.008
Continuity Error (%) .....        -0.018


***************************
Time-Step Critical Elements
***************************
None


*******************************
Highest Flow Instability Indexes
```

****
Link 5 (26)
Link 6 (26)

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 2.00 sec
Maximum Time Step : 2.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
A1b	82.29	0.00	0.00	4.59	77.79	0.13	81.69	0.945
A1a	82.29	0.00	0.00	4.59	77.80	0.11	69.89	0.945
A2	82.29	0.00	0.00	8.82	73.54	0.09	59.32	0.894
U3	82.29	0.00	0.00	15.89	66.48	0.14	99.34	0.808
U1	82.29	0.00	0.00	13.89	68.49	0.04	30.52	0.832
U2	82.29	0.00	0.00	15.71	66.69	0.03	20.05	0.810

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
STM103	JUNCTION	0.06	0.09	92.60	0 02:34	0.09
STM102	JUNCTION	0.41	0.43	92.54	0 02:01	0.42
STM201	JUNCTION	0.23	0.24	92.53	0 02:01	0.24
CBMH101	JUNCTION	0.87	0.87	92.52	0 02:01	0.87
STM101	JUNCTION	0.73	0.73	92.52	0 02:01	0.73
5	OUTFALL	0.93	0.93	92.52	0 00:00	0.93
OVERLANDFLOWOUT	OUTFALL	0.00	0.00	94.61	0 00:00	0.00
STORAGE103B	STORAGE	0.49	2.35	94.88	0 02:29	2.35
STORAGE103A	STORAGE	0.44	2.32	94.85	0 02:40	2.32
CB103B	STORAGE	0.02	0.16	94.90	0 02:29	0.16
CB103A	STORAGE	0.01	0.13	94.87	0 02:40	0.13
STORAGE102	STORAGE	0.31	2.09	94.67	0 02:29	2.09
CB102	STORAGE	0.01	0.11	94.69	0 02:29	0.11

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
STM103	JUNCTION	5.40	16.68	0 02:33	0.466	0.706	-0.046
STM102	JUNCTION	1.80	25.82	0 02:01	0.155	1.11	0.000
STM201	JUNCTION	1.80	1.80	0 00:00	0.155	0.155	-0.000
CBMH101	JUNCTION	0.00	25.87	0 02:01	0	1.11	0.000
STM101	JUNCTION	0.00	25.83	0 02:01	0	1.11	0.000
5	OUTFALL	149.90	173.73	0 01:59	0.215	1.32	0.000
OVERLANDFLOWOUT	OUTFALL	0.00	0.00	0 00:00	0	0	0.000 ltr
STORAGE103B	STORAGE	0.00	79.34	0 01:58	0	0.127	0.086
STORAGE103A	STORAGE	0.00	66.60	0 01:58	0	0.114	0.150
CB103B	STORAGE	81.69	81.69	0 01:59	0.129	0.129	-0.012

CB103A	STORAGE	69.89	69.89	0	01:59	0.11	0.113	0.001
STORAGE102	STORAGE	0.00	52.50	0	01:59	0	0.0905	-0.018
CB102	STORAGE	59.32	59.32	0	01:59	0.0905	0.0905	-0.012

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
STM102	JUNCTION	23.98	0.050	2.425
CBMH101	JUNCTION	23.98	0.376	2.449
STM101	JUNCTION	23.98	0.339	2.296

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
STORAGE103B	0.011	25	0	0	0.044	100	0 01:57	5.66
STORAGE103A	0.008	23	0	0	0.036	100	0 01:58	5.62
CB103B	0.003	6	0	0	0.034	67	0 02:29	79.34
CB103A	0.002	4	0	0	0.026	46	0 02:40	66.60
STORAGE102	0.005	18	0	0	0.029	100	0 02:01	5.39
CB102	0.000	3	0	0	0.004	48	0 02:29	52.50

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
5	100.00	15.31	173.73	1.322
OVERLANDFLOWOUT	0.00	0.00	0.00	0.000
System	50.00	15.31	173.73	1.322

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
1	CONDUIT	16.68	0 02:34	0.35	0.18	0.64
2	CONDUIT	2.10	0 02:01	0.04	0.04	0.99
4	CONDUIT	25.92	0 02:01	0.16	0.10	1.00
OVERLANDFLOW1	CONDUIT	1.77	0 02:29	0.02	0.01	0.58
OVERLANDFLOW2	CONDUIT	0.00	0 00:00	0.00	0.00	0.50
OVERLANDFLOW3	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
10	CONDUIT	25.83	0 02:01	0.23	0.14	1.00
3	CONDUIT	25.87	0 02:01	0.23	0.15	1.00
5	ORIFICE	5.66	0 02:29			1.00

6	ORIFICE	5.62	0	02:40	1.00
7	ORIFICE	79.34	0	01:58	
17	ORIFICE	66.60	0	01:58	
13	ORIFICE	52.50	0	01:59	
14	ORIFICE	5.39	0	02:29	1.00

****
Flow Classification Summary
****

	Adjusted	Fraction of Time in Flow Class								
	/Actual		Up	Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
OVERLANDFLOW1	1.00	0.46	0.50	0.00	0.04	0.00	0.00	0.00	0.91	0.00
OVERLANDFLOW2	1.00	0.26	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OVERLANDFLOW3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

	Hours Full			Hours Above Full	Hours Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited
1	0.01	0.01	23.98	0.01	0.01
2	0.01	0.01	23.98	0.01	0.01
4	23.98	23.98	23.98	0.01	0.01
OVERLANDFLOW1	0.01	0.01	21.77	0.01	0.01
10	23.98	23.98	23.98	0.01	0.01
3	23.98	23.98	23.98	0.01	0.01

Analysis begun on: Thu Jul 19 08:12:21 2018
Analysis ended on: Thu Jul 19 08:12:21 2018
Total elapsed time: < 1 sec

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)
--------------------------------------------------------------

WARNING 03: negative offset ignored for Link 1
WARNING 03: negative offset ignored for Link 10

***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ 01/01/2000 00:01:00
Ending Date .............. 01/02/2000 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 1
Head Tolerance ........... 0.001500 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Initial LID Storage ......         0.001         1.235
Total Precipitation ......         0.074        98.754
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.008        10.888
Surface Runoff ...........         0.066        87.967
Final Storage ............         0.001         1.235
Continuity Error (%) .....        -0.101


*************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.066         0.662
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.078         0.777
External Outflow .........         0.144         1.439
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.001         0.007
Final Stored Volume ......         0.001         0.008
Continuity Error (%) .....        -0.020


***************************
Time-Step Critical Elements
***************************
None


*******************************
Highest Flow Instability Indexes
```

****
Link 5 (25)
Link 6 (25)

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 2.00 sec
Maximum Time Step : 2.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
A1b	98.75	0.00	0.00	5.05	93.81	0.16	98.20	0.950
A1a	98.75	0.00	0.00	5.04	93.82	0.13	84.01	0.950
A2	98.75	0.00	0.00	9.68	89.16	0.11	71.77	0.903
U3	98.75	0.00	0.00	17.41	81.44	0.18	121.63	0.825
U1	98.75	0.00	0.00	15.25	83.61	0.05	37.04	0.847
U2	98.75	0.00	0.00	17.25	81.62	0.03	24.31	0.827

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
STM103	JUNCTION	0.06	0.09	92.60	0 02:10	0.09
STM102	JUNCTION	0.41	0.43	92.54	0 01:59	0.42
STM201	JUNCTION	0.23	0.25	92.54	0 01:59	0.24
CBMH101	JUNCTION	0.87	0.87	92.52	0 01:59	0.87
STM101	JUNCTION	0.73	0.73	92.52	0 01:59	0.73
5	OUTFALL	0.93	0.93	92.52	0 00:00	0.93
OVERLANDFLOWOUT	OUTFALL	0.00	0.01	94.62	0 02:11	0.01
STORAGE103B	STORAGE	0.52	2.36	94.89	0 02:09	2.36
STORAGE103A	STORAGE	0.52	2.35	94.88	0 02:11	2.35
CB103B	STORAGE	0.02	0.17	94.91	0 02:09	0.17
CB103A	STORAGE	0.02	0.16	94.90	0 02:10	0.16
STORAGE102	STORAGE	0.35	2.11	94.69	0 02:11	2.11
CB102	STORAGE	0.01	0.13	94.71	0 02:11	0.13

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
STM103	JUNCTION	5.40	16.72	0 02:10	0.466	0.728	-0.043
STM102	JUNCTION	1.80	26.01	0 01:59	0.155	1.14	0.000
STM201	JUNCTION	1.80	1.80	0 00:00	0.155	0.155	-0.000
CBMH101	JUNCTION	0.00	26.07	0 01:59	0	1.14	-0.000
STM101	JUNCTION	0.00	26.03	0 01:59	0	1.14	0.000
5	OUTFALL	182.98	207.72	0 01:59	0.263	1.4	0.000
OVERLANDFLOWOUT	OUTFALL	0.00	37.75	0 02:11	0	0.0389	0.000
STORAGE103B	STORAGE	0.00	91.78	0 01:56	0	0.133	0.041
STORAGE103A	STORAGE	0.00	76.42	0 01:56	0	0.129	0.096
CB103B	STORAGE	98.20	98.20	0 01:59	0.156	0.156	-0.011

CB103A	STORAGE	84.01	84.01	0	01:59	0.133	0.156	0.064
STORAGE102	STORAGE	0.00	64.37	0	01:59	0	0.0988	-0.068
CB102	STORAGE	71.77	71.77	0	01:59	0.11	0.138	-0.008

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
STM102	JUNCTION	23.98	0.052	2.423
CBMH101	JUNCTION	23.98	0.376	2.449
STM101	JUNCTION	23.98	0.339	2.296

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
STORAGE103B	0.012	27	0	0	0.044	100	0 01:55	5.67
STORAGE103A	0.009	26	0	0	0.036	100	0 01:56	5.65
CB103B	0.004	7	0	0	0.039	77	0 02:09	91.78
CB103A	0.004	7	0	0	0.036	65	0 02:10	76.42
STORAGE102	0.006	20	0	0	0.029	100	0 01:58	5.41
CB102	0.000	4	0	0	0.005	65	0 02:11	64.37

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
5	100.00	16.21	207.72	1.400
OVERLANDFLOWOUT	3.41	13.21	37.75	0.039
System	51.70	29.43	207.72	1.439

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
1	CONDUIT	16.72	0 02:10	0.35	0.18	0.64
2	CONDUIT	2.21	0 01:59	0.05	0.04	0.99
4	CONDUIT	26.11	0 01:59	0.16	0.10	1.00
OVERLANDFLOW1	CONDUIT	20.38	0 02:09	0.15	0.10	0.71
OVERLANDFLOW2	CONDUIT	29.07	0 02:11	0.06	0.03	0.56
OVERLANDFLOW3	CONDUIT	37.75	0 02:11	0.53	0.09	0.24
10	CONDUIT	26.03	0 01:59	0.24	0.14	1.00
3	CONDUIT	26.07	0 01:59	0.24	0.15	1.00
5	ORIFICE	5.67	0 02:09			1.00

6	ORIFICE	5.65	0	02:11	1.00
7	ORIFICE	91.78	0	01:56	
17	ORIFICE	76.42	0	01:56	
13	ORIFICE	64.37	0	01:59	
14	ORIFICE	5.41	0	02:11	1.00

****
Flow Classification Summary
****

	Adjusted	Fraction of Time in Flow Class								
	/Actual		Up	Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
OVERLANDFLOW1	1.00	0.46	0.48	0.00	0.05	0.00	0.00	0.00	0.92	0.00
OVERLANDFLOW2	1.00	0.26	0.70	0.00	0.04	0.00	0.00	0.00	0.91	0.00
OVERLANDFLOW3	1.00	0.97	0.00	0.00	0.00	0.03	0.00	0.00	0.02	0.00
10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

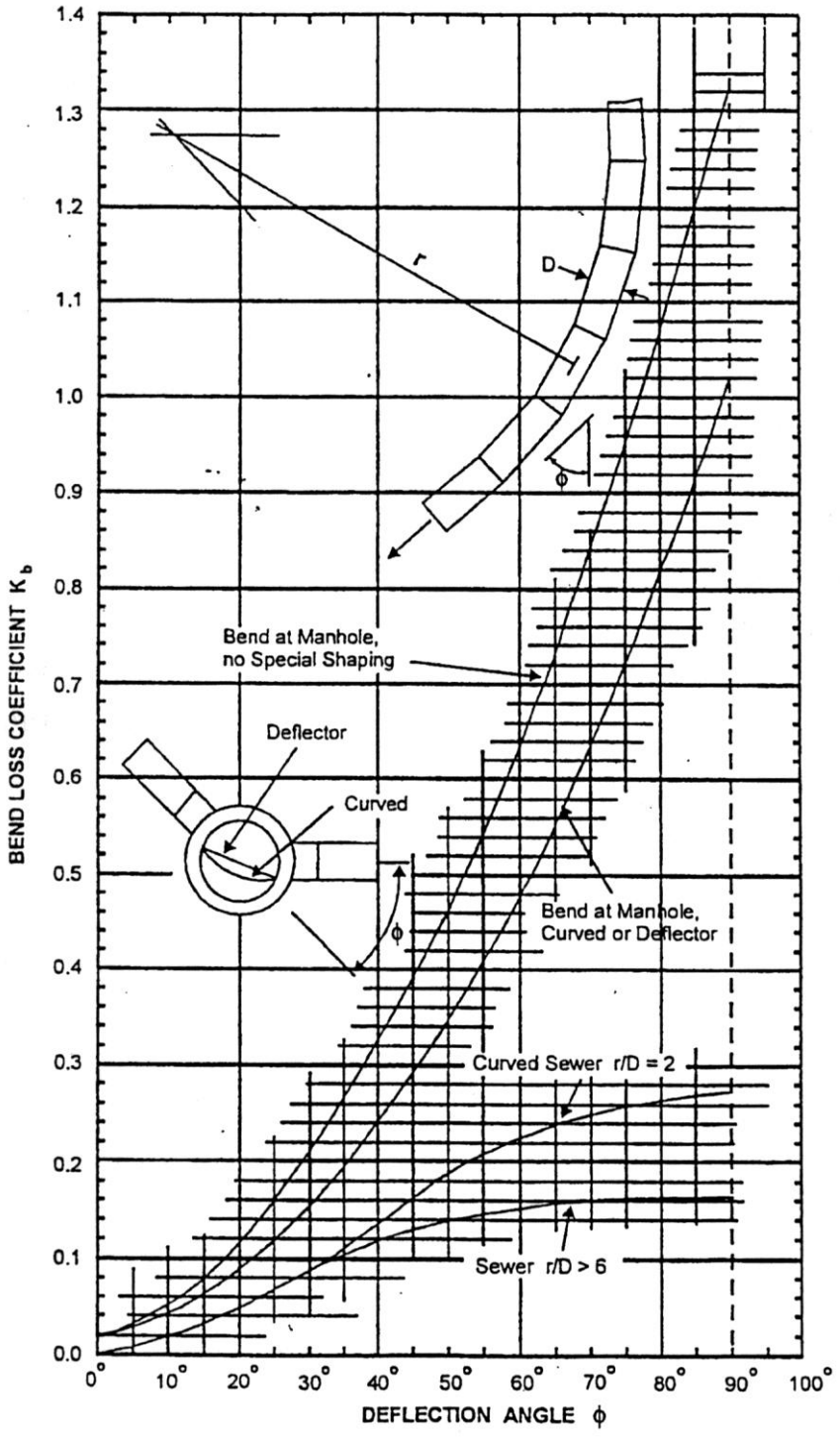
		Hours Full		Hours	Hours
	Both Ends	Upstream	Dnstream	Above Full Normal Flow	Capacity Limited
1	0.01	0.01	23.98	0.01	0.01
2	0.01	0.01	23.98	0.01	0.01
4	23.98	23.98	23.98	0.01	0.01
OVERLANDFLOW1	0.01	0.01	21.98	0.01	0.01
OVERLANDFLOW2	0.01	0.01	21.86	0.01	0.01
10	23.98	23.98	23.98	0.01	0.01
3	23.98	23.98	23.98	0.01	0.01

Analysis begun on: Thu Jul 19 08:13:53 2018
Analysis ended on: Thu Jul 19 08:13:53 2018
Total elapsed time: < 1 sec

APPENDIX 6-B

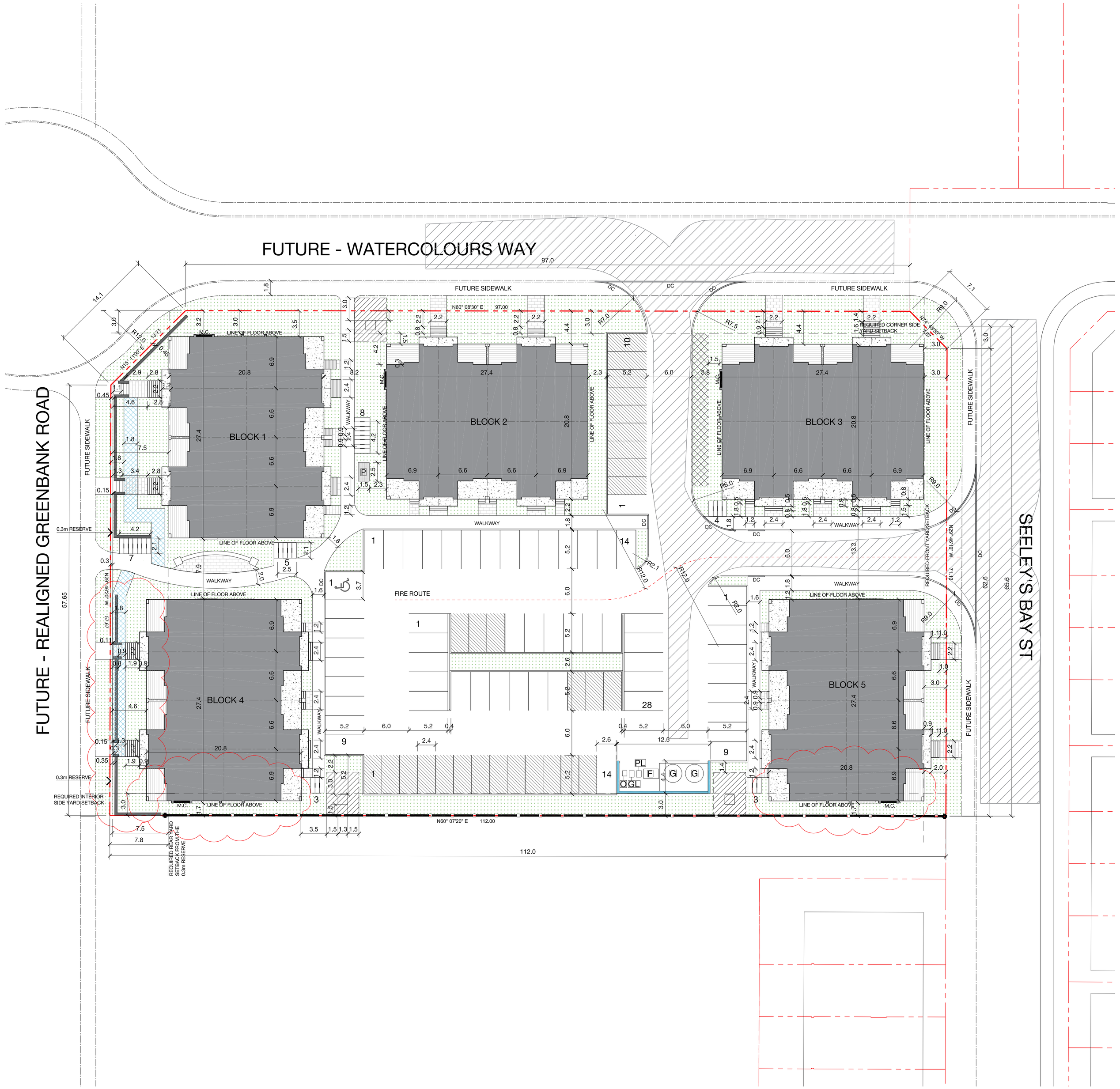
HYDRAULIC LOSSES AT BENDS

Design Chart : Sewer Bend Loss Coefficients



Source: American Iron and Steel Institute (1980)

DRAWINGS / FIGURES



DEVELOPMENT STATISTICS

Regulation (GM[1628])	Requirement		Actual
Use	Planned Unit Development Stacked Dwellings		Planned Unit development (back-to-back stacked dwelling units)
Total number of Units	Not Applicable		60 (5x12 unit blocks)
Lot Area	No minimum		7,512.4 m^2
Lot Width	No minimum		65.6 m
Front Yard Setback	Minimum 3 m		Block 3: 3 m
			Block 5: 3 m
Corner Side Yard Setback	Minimum 3 m		Block 1: 3.2 m
			Block 2: 4.4 m
			Block 3: 4.4 m
Interior Side Yard Setback	Minimum Buildings higher than 11m: 3 m		Block 4:1.7m Block 5:1.7 m
Rear Yard Setback	Minimum 7.5 m		Block 1: 7.5 m
			Block 4: 4.6 m
Building Height	Maximum 24 m (6 storeys)		Varies (3 storeys)
Vehicular Parking	Residential:	1.2 spaces/unit = 72 spaces	84 spaces* (56 regular + 28 reduced width)
	Visitor:	0.2 spaces/unit = 12 spaces	
	Total:	84 spaces	
Bicycle Parking	0.5 spaces/unit = 30 spaces		30 spaces
Landscaped Area	Within parking lot	15%	15% (Minimum)
	Parking lot buffer: abutting street	3 m	3 m
	Parking lot buffer: not abutting street	1.5 m	1.5 m
Amenity Area	6 m^2/unit = 360 m^2		+/- 413 m^2
	50% communal		100% communal

*40% of required resident parking (= 28 spaces) is permitted to be reduced in width

LEGEND

- BUILDINGS (12 UNITS/BUILDING)
- LANDSCAPING
- GARBAGE TRUCK PATH
- SNOW STORAGE (48 m^2)
- SMALL CAR SPACES
- UNIT PAVERS
- P — CANADA POST COMMUNITY MAIL BOXES
- TEMPORARY ASPHALT SIDEWALK (1.8m)
- TRANSFORMER
- WOOD DECK
- CONCRETE PORCH
- GARBAGE STORAGE ENCLOSURE FENCE (SEE DETAIL ON D-01)
- RETAINING WALL
- BIKE RACKS (SEE DETAIL ON D-01)
- REQUIRED SETBACKS
- FIRE ROUTE
- FUTURE SIDEWALKS AND STREETS
- PRIVACY FENCE (SEE DETAIL ON D-01)
- M.C. — METERING CLOSET
- D.C. — DEPRESSED CURB
- G — GARBAGE STORAGE - GENERAL
- F — GARBAGE STORAGE - FIBRES
- PL — GARBAGE STORAGE - PLASTICS
- GL — GARBAGE STORAGE - GLASS
- O — GARBAGE STORAGE - ORGANICS
- MINOR VARIANCES OBTAINED
- PROPERTY BOUNDARY

2444 Watercolours Way
HALF MOON BAY NORTH, OTTAWA
SITE PLAN

Block 235, Part of Lot II, Concession 3 (Rideau Front)
Geographic Township of Nepean

0 5m 10m 20m
1:250

No.	REVISION	DATE	BY
28	EXTEND FENCE & ADD ADDITIONAL DC AND LANDSCAPE	2018.08.22	EL
27	UPDATE SIDEWALKS, CURBS, AND WATERCOLOURS WAY	2018.08.20	EL
26	UPDATE NEW BUILDING FOOTPRINT	2018.08.02	RP
25	MINOR VARIANCE AND SPA RESUBMISSION	2018.07.06	RP
24	SHIFT BLOCK 5 TOWARDS SEELEY'S BAY ST	2018.07.05	RP
23	BLOCK 3 FRONT SETBACK TO 2.5m + BICYCLE RACKS	2018.06.29	RP
22	REVISION - UPDATES	2018.06.25	AS
21	REVISION - BLOCK 2 MOVE	2018.06.22	AS
20	UPDATE REDUCED PARKING TO 28 SPACES	2018.06.20	RP
19	REVISION- RETAINING WALL/GARBAGE ENCLOSURE SETBACK UPDATES	2018.06.19	AS
18	REVISION	2018.06.11	AS
17	REVISION	2018.06.08	AS
16	REVISION	2018.06.01	MBa
15	DEVELOPMENT STATS	2018.04.03	EL
14	SITE PLAN SUBMISSION	2018.04.02	RP
13	NAK REVISIONS	2018.03.26	RP
12	SITE PLAN REVISIONS	2018.03.13	EL
11	STAIRS AND DECKS	2018.03.01	EL
10	LANDSCAPE UDPATE	2018.02.20	EL
9	TRANSFORMER/ SNOW	2018.01.29	RP
8	REDUCED PARKING	2018.01.11	RP
7	REVIEW	2017.12.14	RP
6	FLOORPLATE INCREASE	2017.12.06	RP
5	CLIENT REVIEW	2017.11.17	RP
4	2ND ROAD ACCESS	2017.11.15	RP
3	5 BLOCKS FOR REVIEW	2017.10.19	RP
2	FOR CLIENT REVIEW	2017.09.21	RP
1	DRAWING	2017.09.20	RP

OWNER
MATTAMY HOMES
50 Hines Rd, Suite 100, Ottawa, ON K2K 2M5

Architect: Q4 Architects Inc.
2171 Avenue Rd, Suite 302, Toronto, ON M5M 4B4

Landscape Architect: NAK Design Strategies
100-250, Besserer Street, Ottawa, ON K1N 6B3

Engineer: David Schaeffer Engineering Ltd.
120 Iber Rd, Suite 103, Ottawa, ON K2S 1E9

Surveyor: J. D. Barnes Ltd.
15 - 2450 Lancaster Road, Ottawa, ON K1B 5N3

FOTENN
Planning + Design
223 McLeod Street, Ottawa ON K2P 0Z8
613.730.5709 www.fotenn.com

DESIGNED	RP
REVIEWED	JC
DATE	2018.01.11

P1
#17713
D07-12-18-0048

PAVEMENT DESIGN

40mm HL-3 OR SUPERPAVE 12.5 ASPHALT CONCRETE
50mm HL-8 OR SUPERPAVE 19.0 ASPHALT CONCRETE
150mm OPSS GRANULAR A CRUSHED STONE
450mm OPSS GRANULAR B TYPE II

NOTE
FOR WATERMAIN STUBS, 2.4m MIN. COVER TO BE PROVIDED

NOTE: ICD
FOR ICD APPLICATION, REFER TO DRAWINGS No. 6 TO 7 & 29 TO 30 FOR DETAIL.

NOTE:
THE COVER OF EX. MH, CB, CHAMBER AND OTHER ABOVEGROUND FEATURES TO BE ADJUSTED TO SUIT THE NEW FINISHED GRADE, WHERE APPLICABLE

PERMISSION REQUIRED FOR WORK ON ADJACENT LANDS

CONTRACTOR TO VERIFY THE PRECISE LOCATIONS AND INVERT ELEVATIONS OF Ex. UNDERGROUND SERVICES AND Ex. UTILITIES PRIOR TO STARTING CONSTRUCTION

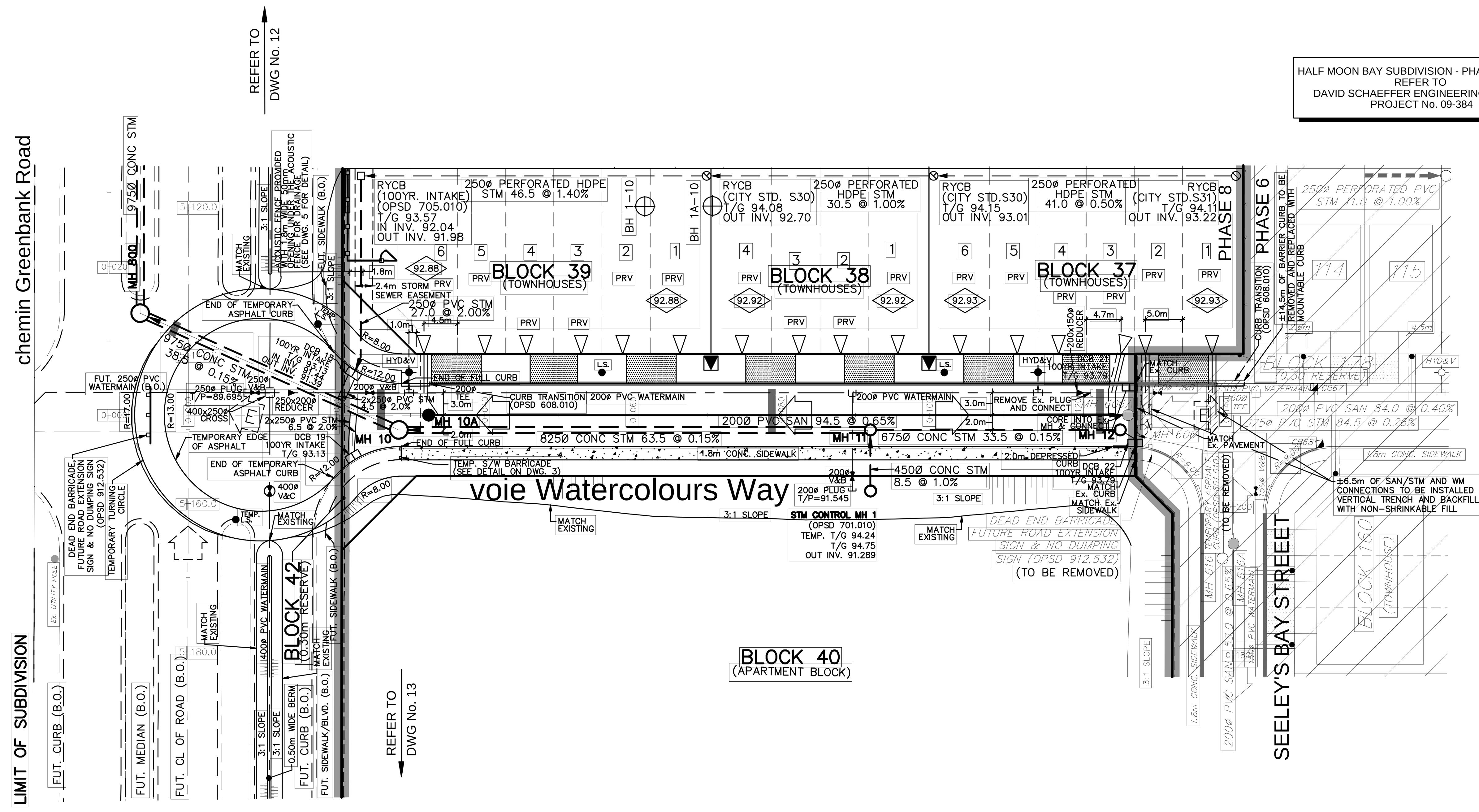
ANY DISTURBED AREA DURING CONSTRUCTION TO BE RESTORED TO THE ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITIES HAVING JURISDICTION

REVIEWED BY DEVELOPMENT REVIEW BRANCH
Signed [signature]
Date March 26, 2018
Plan Number 14942

NOTE RE: TEST PIT/BOREHOLE EXCAVATIONS
ANY DISTURBED MATERIAL ENCOUNTERED BELOW THE SUBGRADE LEVEL WITHIN A BUILDING FOOTPRINT TO BE SUB-EXCAVATED AND BACKFILLED WITH COMPACTED ENGINEERED FILL AS PER GEOTECHNICAL ENGINEERS RECOMMENDATION.

NOTE RE: PROPOSED DRIVEWAY ON EXISTING ROW
PROPOSED DRIVEWAY ON EXISTING ROW TO BE CONSTRUCTED AS FOLLOWS:
1. EXISTING FULL CURB TO BE REMOVED AND REPLACED WITH NEW DEPRESSED CURB AT THE DRIVEWAY
2. EXISTING SIDEWALK WITHIN THE DRIVEWAY TO BE REMOVED AND REPLACED WITH NEW SIDEWALK AS PER CITY OF OTTAWA STD. SC4
3. CONTRACTOR TO VERIFY THE PRECISE LOCATIONS AND INVERT ELEVATIONS OF Ex. UNDERGROUND SERVICES AND Ex. UTILITIES PRIOR TO STARTING CONSTRUCTION
4. ANY DISTURBED AREAS, INCLUDING PAVEMENT AND BOULEVARD, TO BE RESTORED TO THE ORIGINAL CONDITION OR BETTER
5. ALL REMOVED CURB AND SIDEWALK TO BE DEPOSITED OFF SITE
6. ALL WORKS INCLUDING REMOVAL AND RESTORATION TO THE SATISFACTION OF CITY OF OTTAWA

HALF MOON BAY SUBDIVISION - PHASES 5 AND 6
REFER TO
DAVID SCHAEFFER ENGINEERING LIMITED
PROJECT No. 09-384

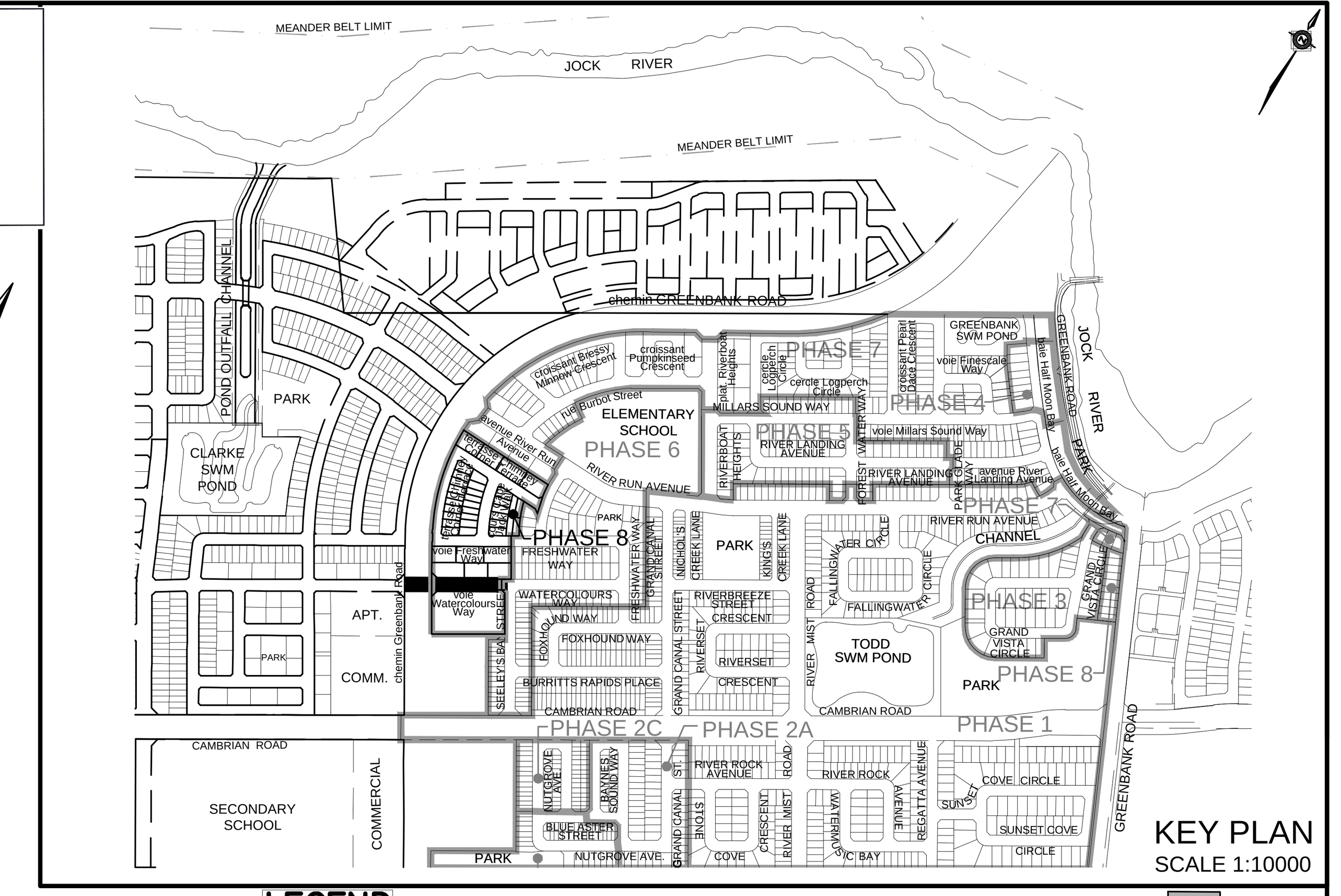


PRELIMINARY DESIGN FOR
FUTURE chemin Greenbank Road
REFER TO
STANTEC
PROJECT No. 163600994

NOTE RE: NEW chemin Greenbank Road
RETAINING WALLS ARE TO BE INSTALLED WITHIN LOCAL STREET R.O.W. AND RESIDENTIAL PROPERTY ONLY IF APPLICABLE, WHICH SHALL NOT ENCROACH NEW chemin Greenbank Road R.O.W.

NOTE:
ALL EXISTING POST & WIRE FENCE, CULVERTS, UTILITY WIRE / POLES, TREES, SHRUBS ETC. WITHIN LOTS, BLOCKS AND ROADS TO BE REMOVED, UNLESS OTHERWISE NOTED

NOTE RE: PROPOSED CONNECTION ON EXISTING PAVEMENT
PROPOSED UNDERGROUND CONNECTIONS WITHIN EXISTING PAVEMENT TO BE CONSTRUCTED AS PER THE FOLLOWS:
1. PROPOSED UNDERGROUND CONNECTIONS TO BE CONSTRUCTED IN VERTICAL TRENCH AND BACKFILLED WITH UNSHRINKABLE FILL
2. CONTRACTOR TO VERIFY THE PRECISE LOCATIONS AND INVERT ELEVATIONS OF Ex. UNDERGROUND SERVICES AND Ex. UTILITIES PRIOR TO STARTING CONSTRUCTION
3. ANY DISTURBED AREAS, INCLUDING CURB, SIDEWALK AND BOULEVARD, TO BE RESTORED TO THE ORIGINAL CONDITION OR BETTER
4. ALL REMOVED ASPHALT PAVEMENT TO BE DEPOSITED OFF SITE
5. ALL WORKS INCLUDING REMOVAL AND RESTORATION TO THE SATISFACTION OF CITY OF OTTAWA



LEGEND

CROSS
45° BEND
LATERAL
HYDRANT, VALVE & VB
TEE
VALVE & VC
VALVE & VB
22.5° BEND
11.25° BEND
REDUCER
CAP
SANITARY MAINTENANCE HOLE
CAP
STREET CATCHBASIN & LEAD
STREET CATCHBASIN WITH CLOSED LID & LEAD
STORM MAINTENANCE HOLE
CURB INLET CATCHBASIN & LEAD
CATCHBASIN/ MAINTENANCE HOLE
INTERCONNECTED CATCH BASIN & LEADS
CAP
SINGLE SERVICE LOCATION (ST, SAN & WM)
SINGLE SERVICE LOCATION (SAN & WM)
SINGLE SERVICE LOCATION (ST, SAN & WM)
TEE CATCHBASIN
PERFORATED PIPE
ELBOW CATCHBASIN
DITCH AND CULVERT

HYDRO SWITCHGEAR
HYDRO TRANSFORMER
STREET LIGHT STANDARD
CONCRETE SIDEWALK
CURB & DEPRESSED CURB
ASPHALT SIDEWALK
CHAINLINK FENCE (1.5m UNLESS OTHERWISE NOTED)
NOISE BARRIER (3.0m UNLESS OTHERWISE NOTED)
DECORATIVE FENCE (SEE LANDSCAPE DWGS FOR DETAIL)
CONSTRUCTION FENCE
POST AND RAIL FENCE
PHASING LIMITS
PROPERTY BOUNDARY
BOREHOLE (BH)
TEST PIT (TP)
AUGER HOLE (AH)
MONITORING WELL LOCATION
CONCEPTUAL WELL LOCATION
AS PER GEOTECHNICAL REPORT
TOP OF FOUNDATION ELEVATION
FINISHED FLOOR ELEVATION
UNDERSIDE OF FOOTING ELEVATION
NUMBER OF RISERS
UNITS REQUIRING PRESSURE REDUCING VALVES
WALKOUT UNITS
SLAB ON GRADE
OVERLAND FLOW DIRECTION
EXTERNAL OVERLAND FLOW DIRECTION
EMERGENCY OVERLAND FLOW DIRECTION
TACTILE WALKING SURFACE INDICATOR (AS PER CITY OF OTTAWA STD. SC6, SC7, SC7.1, SC7.2, SC7.3)
PREVIOUS PHASES
CLAY SEAL (REFER TO GENERAL NOTES. No.18. ON DWG. No. 1, AND GEOTECHNICAL CONSULTANT'S SPECIFICATIONS)

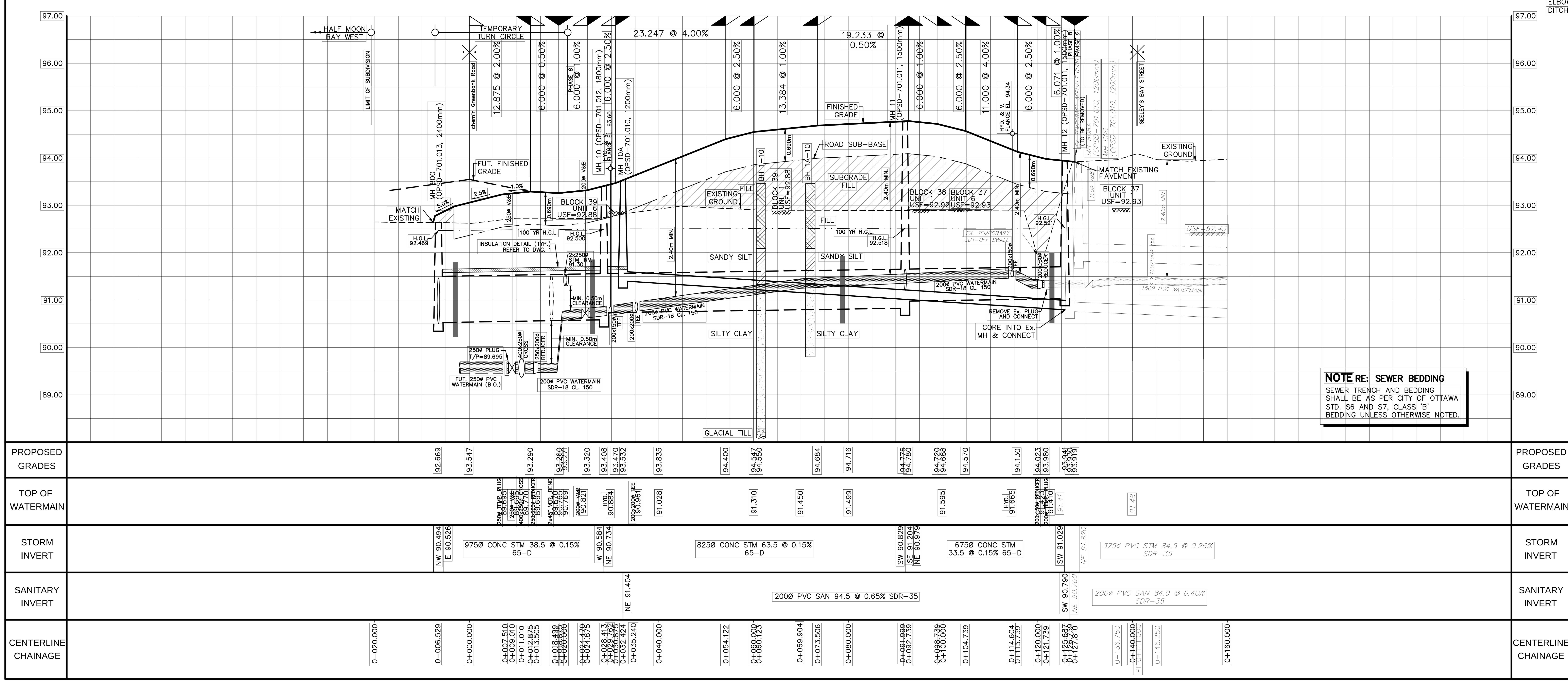
TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 06-10-675-00. SURVEY DATED OCTOBER 15, 2007. CITY OF OTTAWA 2K MAPPING, RECEIVED ON JANUARY 18, 2016.

LEGAL INFORMATION

CALCULATED DRAFT PLAN PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 07-10-767-00 (HALF MOON BAY PHASE 8), RECEIVED ON NOVEMBER 30, 2017.

3rd SUBMISSION 18-03-21



NOTE RE: SEWER BEDDING
SEWER TRENCH AND BEDDING SHALL BE AS PER CITY OF OTTAWA STD. S6 AND S7, CLASS 'B' BEDDING UNLESS OTHERWISE NOTED.

BENCH MARK No. 00820010126
POINT IS LOCATED 1.65km NORTH OF BARNSDALE ROAD AND 5km SOUTH OF FALLOWFIELD ROAD ON HIGHWAY 416 NORTH OF KEMPTVILLE. THE POINT IS SET EAST OF THE NORTHBOUND LANE IN THE GRASSY SHOULDER.
ELEVATION = 96.923 m

No.	BY	DATE	DESCRIPTION	BY
3	W.L.	18-03-21	3rd SUBMISSION	
2	W.L.	17-12-15	2nd SUBMISSION	
1	W.L.	17-09-27	1st SUBMISSION	

Ottawa CITY OF OTTAWA

LICENSED PROFESSIONAL ENGINEER W. LIU 100167932 18-03-21 PROVINCE OF ONTARIO

PROJECT No. 17-926

PLAN AND PROFILE OF
voie Watercolours Way
(STA. 0+000.000 TO STA. 0+151.002)

© DSEL

MATTAMY (HALF MOON BAY) LIMITED

HALF MOON BAY SUBDIVISION
PHASE 8

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

DRAWN BY: A.B.	CHECKED BY: W.L./C.M.	DRAWING NO.	SHEET NO.
DESIGNED BY: P.P.	CHECKED BY: K.M.		8
SCALE: H 1:500 ,V 1:50	DATE: SEPTEMBER 2017		

CITY FILE No. D07-16-07-0002 PH. 8 CITY PLAN No. 14942