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FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

FOR

THEBERGE HOMES DEVELOPMENT 21 WITHROW AVENUE

CITY OF OTTAWA

PROJECT NO.: 17-931

NOVEMBER 2017 – REV 1

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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 Plan of Subdivision and Site Plan Control (SPC) for the proposed development at 21 Withrow Avenue. The drawing package to be read in conjunction with this report supports the Building Permit Application for the residential units fronting Withrow Avenue, in addition to, the Plan of Subdivision and SPC

The subject property is located within the City of Ottawa urban boundary, in the College ward. As illustrated in ***Figure 1***, the subject property is bounded by existing residences and Tower Road to the north, St. Helen's Place to the east, Withrow Avenue to the south and existing residences and Rita Avenue to the west. The subject property measures approximately ***0.82ha*** and is designated Residential First Density Zone (R1FF) under the current City of Ottawa zoning by-law.

Figure 1: Site Location

The proposed development involves the construction of 13 single family homes, and a garage for the existing residence on the property. A copy of the proposed site plan is included in ***Drawings/Figures***. It is proposed to subdivide the single parcel into 4 units fronting Withrow Avenue from the property and further subdivide the main property in accordance with the legal plan show in ***Drawings/Figures***.

The objective of this report is to support the application for Plan of Subdivision and SPC 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. Please refer to the associated drawing package to support the Building Permit Application for the units fronting Withrow Avenue.

1.1 Existing Conditions

The subject site currently consists one single family home and garage, surrounded by grassy areas and a few trees.

Sewer system and watermain distribution mapping collected from the City of Ottawa indicate that the following services exist across the property frontages within the adjacent municipal right-of-ways:

St. Helen's Place

150mm diameter watermain

200mm diameter sanitary sewer

Withrow Avenue

150mm diameter watermain

200mm diameter sanitary sewer

Cleto Avenue

150mm diameter watermain

200mm diameter sanitary sewer

300mm diameter storm sewer

Rita Avenue

150mm diameter watermain

200mm diameter sanitary 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.

The subject property contains existing trees. Development, which may require removal of existing trees, may be subject to the City of Ottawa Urban Tree Conservation By-law No. 2009-200.

It is proposed that drainage will be directed between future severance lines as indicated from the units fronting Withrow Avenue to the private roadway and associated stormwater management system. As such, it is anticipated that an Environmental Compliance Approval (ECA) through the City of Ottawa Transfer or Review program will be required.

1.3 Pre-consultation

Pre-consultation correspondence and the servicing guidelines checklist are located in ***Appendix A***.

The pre-consultation notes indicates the City requires separate stormwater requirements for the proposed 4 lots fronting Withrow Avenue and the remaining property being serviced by a private roadway. The lots fronting Withrow Avenue will be subject to a Building Permit Application, it is required these units be serviced independently directly from Withrow Ave. The servicing and stormwater management for these units are not analyzed as part of the plan of subdivision and SPC application and not discussed further in this report.

The City pre-consultation notes indicate that a high level stormwater analysis be completed prior to severance of the 4 lots fronting Withrow Avenue. This report includes a detailed analysis of stormwater management prepared in support of Plan of Subdivision and SPC.

Sanitary and water servicing described in the pre-consultation notes were based on an outdated concept plan. The current plan shows only a road connection to St. Helen's Place and therefore water and sanitary servicing proposed is different than described in the pre-consultation notes.

City of Ottawa staff have indicated the importance of retention of the landscaping edge condition of at the property line and on adjacent property. The plan and reports have been prepared in consideration of retaining the edge condition and landscaping on adjacent property.

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)

- **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*)

- **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)

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies within the City of Ottawa 2W pressure zone, as shown by the Pressure Zone map in ***Appendix B.*** Watermains exist within St. Helen's Place, Withrow Avenue, Cleto Avenue and Rita Avenue.

3.2 Water Supply Servicing Design

The subject property is proposed to be serviced through a connection to the existing 150mm municipal watermain within St. Helen's Place. Water servicing for the units fronting the private site was analyzed for pressure and fire flow.

Table 1 summarizes the ***Water Supply Guidelines*** employed in the preparation of the water demand estimate.

Table 1
Water Supply Design Criteria

Design Parameter	Value
Residential Demand	350 L/p/d
Residential Maximum Daily Demand	4.9 x Average Daily *
Residential Maximum Hourly	7.4 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 ISD-2010-2*	

Table 2 summarizes the anticipated water demand and boundary conditions for the proposed development, calculated using the ***Water Supply Guidelines.***

Table 2
Proposed Water Demand for Riverside Drive

Design Parameter	Anticipated Demand[1] (L/min)	Boundary Conditions[2] (m H_2O / kPa)	
Average Daily Demand	11.7	66.0	647.5
Max Day + Fire Flow	57.2 + 8,000	26.1	256.0
Peak Hour	86.3	60.9	597.4

1) Water demand calculation per ***Water Supply Guidelines***. See ***Appendix B*** for detailed calculations.
2) Boundary conditions supplied by the City of Ottawa for the demands indicated in the correspondence; assumed ground elevation 97.5m at the connection to the municipal watermain. See ***Appendix B.***

The City of Ottawa requires fire flow to be estimated using the ***FUS* method.** A fire flow of ***8,000L/min*** was estimated using the following inputs provided by the Architect, see ***Appendix A*** for correspondence.

- Type of construction – Wood frame
- Occupancy type –Limited combustible
- Sprinkler Protection – Not sprinklered

The City provided both the anticipated minimum and maximum water pressures, as well as the estimated water pressure during fire flow as indicated by the correspondence in ***Appendix A***. Pressures during the average day scenario are higher than allowable pressures; a pressure check should be completed at the time of construction to determine if pressure reducing controls are required.

3.3 Watermain Modelling

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

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

The highest fire flow estimated from the ***FUS*** method for the single family residences was used to model fire demand at the hydrant servicing the site. The demand applied to the proposed fire hydrant was ***8,000 L/min***, with a resulting minimum pressure of ***173.0 kPa***. This hydrant can provide the required fire flow while maintaining minimum pressures described in ***Table 1***. ***Appendix B*** contains a model sketch showing the node locations, fire demand assigned to the hydrant and resulting pressures.

Table 3
Model Simulation Output Summary

Location	Average Day (kPa)	Max Day + Fire Flow (kPa)	Peak Hour (kPa)
Node 2	669.3	179.0	619.3
Node 3 (Hydrant)	668.2	177.9	618.1
Node 4	667.4	173.7	609.9
Node 5	666.1	173.0	609.0
Node 6	667.4	173.4	609.2

As demonstrated in ***Table 3***, the anticipated pressures during the average day and peak hour simulations are higher than allowable pressures in ***Table 1***. The recommended pressures from the ***Water Supply Guidelines*** are respected during the max day + fire flow scenario. ***Appendix B*** contains output reports and model schematics for each scenario.

The model predicted that water will flow in all areas of the system and no 'dead' zones were found. ***Appendix B*** contains output reports and model schematics for each scenario.

3.4 Water Supply Conclusion

It is proposed to service the private development from one connection to the existing 150mm watermain within St. Helen's Place. Servicing for the units fronting Withrow Avenue will be reviewed during the building permit application.

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

Based on the EPANET model, pressures during max day + fire flow respect the requirements of the ***Water Supply Guidelines***. Pressures during the average day and peak hour scenario are higher than allowable pressure in ***Table 1***; a pressure check should be completed at the time of construction to determine if pressure reducing controls are required.

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 Viewmount Drive Trunk sewer catchment area, as shown by the Trunk Sanitary Sewers and Collection Areas map included in ***Appendix C***. There are existing sanitary sewers within St. Helen's Place, Withrow Avenue, Cleto Avenue and Rita Avenue. The existing site consists of a single residential unit, anticipated wastewater flow is summarized below:

Table 4
Summary of Existing Wastewater Flows

Design Parameter	Anticipated Sanitary Flow[1] (L/s)
Average Dry Weather Flow Rate	0.02
Peak Dry Weather Flow Rate	0.06
Peak Wet Weather Flow Rate	0.29

A sanitary analysis was conducted for the local municipal sanitary sewers, in order to assess the available capacity. The analysis was conducted from the upstream extents of the drainage area located on Withrow Avenue, St. Helen's Place and Cleto Avenue to the trunk sewer within Merivale Road.

City of Ottawa Sewer Design Guidelines (2004) Figure 4.3 'Peak Flow Design Parameters' were employed to generate a conservative estimate of the existing wastewater flow conditions within the sewer.

Based on the sanitary analysis, the controlling section of the local sewer system is located within St. Helen's Place, with an available residual capacity of ***9.6L/s***, please refer to the design sheet and drainage mapping in ***Appendix C***.

4.2 Wastewater Design

It is anticipated that the proposed development will be serviced via a connection to the existing 200mm sanitary sewer within St. Helen's Place. Refer to the ***Proposed Servicing Plan*** in ***Drawings/Figures*** 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	350 L/p/d
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0
Infiltration and Inflow Allowance	0.28L/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 demonstrates the anticipated peak flow from the proposed development to the sanitary connection within St. Helen's Place. 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	0.19
Peak Dry Weather Flow Rate	0.78
Peak Wet Weather Flow Rate	1.01
1) Based on criteria shown in ***Table 4***	

The estimated sanitary flow based on the site plan provided in ***Drawings/Figures*** anticipates a peak wet weather flow of ***1.01L/s*** to the St. Helen's Place sanitary connection. This results in an increase of ***0.72 L/s*** compared to existing conditions.

Based on the existing sanitary analysis completed, the most restrictive leg of sewer has an available capacity of ***9.6L/s***, therefore, the increase can be accommodated in the downstream system.

4.3 Wastewater Servicing Conclusions

The site is tributary to the Viewmount Drive Trunk sewer; currently the site consists of a single residential unit. Sufficient capacity is available to accommodate the anticipated ***0.72L/s*** peak wet weather flow increase 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 Ottawa Central sub-watershed. 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 Ottawa River watershed, and is therefore subject to review by the Rideau Valley Conservation Authority (RVCA).

The existing drainage patterns on-site result in a portion of flow directed to Tower Road and a portion of the site discharging to the St. Helen's Place. There is also an external area that currently drains to the site, again with a portion eventually discharging to Tower Road and a portion draining to St. Helen's Place. Refer to drawing ***SWM-1*** for existing drainage area delineation.

The estimated pre-development peak flows for the 2, 10, and 100-year are summarized in ***Table 6***:

Table 7
Summary of Existing Peak Storm Flow Rates

City of Ottawa Design Storm	Estimated Peak Flow Rate to St. Helen's Place (L/s)	Estimated Peak Flow Rate to Tower Road (L/s)
Area per SWM-1	Area A1, Area EX1	Area A2, Area EX2
2-year	41.5	32.2
5-year	56.1	43.5
100-year	119.9	92.9

5.2 Post-development Stormwater Management Targets

Stormwater management requirements for the proposed development were reviewed with the City of Ottawa. The development has the following requirements:

- Attenuate to an allowable release rate based on a calculated Rational Method Coefficient no more than 0.5, employing the City of Ottawa IDF parameters for a 2-year storm with a calculated time of concentration equal to or greater than 10 minutes;
- Flow attenuation is required up to and including the 100-year storm event;
- Areas to be retained as existing to ensure the edge condition and adjacent landscaping is maintained, will continue to drain as existing and not contemplated as part of the stormwater management system

- Based on consultation with the RVCA, the off-site system would sufficiently handle quality control for the released flow, and best management practices are encouraged where feasible, see ***Appendix A***.

Based on the above quantity control criteria, the allowable release rate for the site is ***30.8 L/s***, refer to ***Appendix D*** for supporting calculations.

5.3 Proposed Stormwater Management System

As discussed in ***Section 1.3***, the City of Ottawa has stressed the importance of retaining the existing edge condition on the adjacent property. To ensure no impact to adjacent landscaping, the grading of the north-west edge of the site has been retained as existing. Alternatively, if this area is re-graded to fully capture stormwater in the on-site system, a retaining wall would be required along the north-west edge impacting the existing edge condition and off-site mature trees.

The total drainage from this portion to of the site has been reduced from ***0.194 ha*** (See Area ***A2*** in ***SWM-1***) to a drainage area of **0.075 Ha** *(*See Area ***U2*** in ***SWM-2***) in the proposed condition. This will result in a reduction in runoff to Tower Road in the proposed condition. No further stormwater controls are proposed for the portion of site to be retained as existing.

It is proposed that the stormwater outlet for the remaining development will be serviced from a connection to the existing 300mm diameter storm sewer within Cleto Avenue. Flow from the site will be directed to Cleto Avenue / St Helen's Place through the use of a rural cross section. Ditches and culverts have been sized based on the 100-year storm event, refer to ***Appendix D*** for supporting calculations.

To meet the stormwater quantity objectives the proposed development will employ underground and surface storage. It is proposed to install a ***125mm*** circular inlet control device at ***DICB101*** to control flow to the allowable release rate. As previously discussed, the ditches and culverts will be sized for the 100-year storm event including the external area ***EX1*** from ***SWM-2***.

Table 8 estimates post-development flow rates to the storm sewer within Cleto Avenue.

Table 8
Stormwater Flow Rate Summary

Control Area	5-Year Release Rate	5-Year Storage	100-Year Release Rate	100-Year Storage
	(L/s)	(m^3)	(L/s)	(m^3)
Unattenuated Areas	0.8	0.0	1.5	0.0
Attenuated Areas	16.5	75.5	29.1	173.8
Total	**17.3**	**75.5**	**30.6**	**173.8**

Approximately ***173.8m^3*** of storage is required on site to attenuate flow to the release rate of ***30.6 L/s***, storage calculations are contained within ***Appendix D***.

External area (See Area ***EX-1*** from ***SWM-2***) will continue to drain on-site in the proposed condition and will be conveyed by the proposed storm system, however, will not be controlled on-site. This will result in a spill at a maximum rate of ***36.7 L/s*** will occur during the 100-year event. Major overland flow routes including the ditches and culverts have been sized to accommodate this flow.

It is proposed to service the foundation drainage from the units through the use of sump pumps as there is no storm sewer proposed for the subject site.

The development employs a rural cross section and grass swales as a best management practice. The swales have been designed with a minimal slope of 0.50% which reduces flow velocities within the swale and promotes on-site TSS removal and infiltration. Full quality controls will be provided by an external facility, per the RVCA correspondence in ***Appendix A***.

5.4 Stormwater Servicing Conclusions

Existing conditions result in flow from the subject property to Tower Road and St. Helen's Place. An allowable release rate of ***30.8 L/s*** was established based on City of Ottawa pre-consultation. Areas to be retained as existing to ensure the edge condition and adjacent landscaping is maintained, will continue to drain as existing and not contemplated as part of the stormwater management system.

Proposed runoff to the Cleto Avenue storm sewer will be controlled through the use of a ***125mm*** inlet control device to control flow to a release rate of ***30.6 L/s***. Underground and surface storage is proposed to meet the required ***173.8m^3*** of storage to attenuate flow.

Best management practices in the form of grassed swales are provided on-site to promote TSS removal and infiltration.

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:

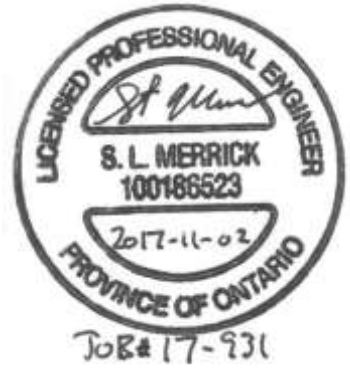
- Verification that water is not flowing under silt barriers.
- Clean and change filter cloth at catch basins.

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 Application, Plan of Subdivision and Building Permit at 21 Withrow Avenue. The preceding report outlines the following:

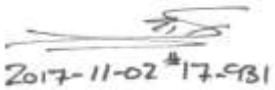
- Based on boundary conditions provided by the City the existing municipal water infrastructure is capable of providing the proposed development with water within the City's required pressure range;
- The EPANET water distribution model confirmed adequate pressure exists within fire hydrants during fire flow, and within the system for the Average Day, Max Day + Fire Flow and Peak Hour scenarios;
- The proposed development is anticipated to have a peak wet weather flow of ***1.01 L/s*** directed to the St. Helen's Place sanitary sewer. Based on the sanitary analysis that was conducted, the existing municipal sewer infrastructure has sufficient capacity to support the development;
- Based on the ***City Standards***, the proposed development will be required to attenuate post development flows directed to St. Helen's Place to an equivalent release rate of ***30.8L/s***, for all storms up to and including the 100-year storm event.
- It is proposed to attenuate flow through underground and surface storage. It is anticipated that ***173.8m³*** of onsite storage will be required to attenuate flow to the established release rate above;
- Grassed swales will be provided to promote TSS removal and infiltration, full quality controls will be provided by off-site infrastructure per RVCA correspondence.

Prepared by,
David Schaeffer Engineering Ltd.



Per: Steven L. Merrick, P.Eng.

Reviewed by,
David Schaeffer Engineering Ltd.



Per: Adam D. Fobert, P.Eng.

APPENDIX A

Pre-Consultation

DEVELOPMENT SERVICING STUDY CHECKLIST

17-931 01/11/2017

4.1 General Content		
☐	Executive Summary (for larger reports only).	N/A
☒	Date and revision number of the report.	Report Cover Sheet
☒	Location map and plan showing municipal address, boundary, and layout of proposed development.	Drawings/Figures
☒	Plan showing the site and location of all existing services.	Figure 1
☒	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Section 1.0
☒	Summary of Pre-consultation Meetings with City and other approval agencies.	Section 1.3
☒	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a 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

Hannah Pepper

Subject: FW: 21 WIthrow - Boundary condition request
Attachments: 21 Withrow Sept 2017.pdf

From: Balima, Nadege [mailto:Nadege.Balima@ottawa.ca]
Sent: October 10, 2017 4:44 PM
To: Hannah Pepper <HPepper@dsel.ca>
Subject: RE: 21 WIthrow - Boundary condition request

Good afternoon Hannah,
Please find below the results of your boundary conditions request for the property at 21 Withrow:

The following are boundary conditions, HGL, for hydraulic analysis 21 Withrow (zone ME), assumed to be connected to the 152mm on St-Helens (see attached PDF for location).

Minimum HGL = 158.4m

Maximum HGL = 163.5m; the maximum pressure is estimated to be above 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

Max Day + Fire Flow = 123.6 m

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

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

Should you have questions, please feel free to contact me.
Regards,

Nadège Balima, P.Eng., M.P.M., LEED Green Assoc.
Project Manager, Infrastructure Approvals
Development Review Services (West)
613.580.2424 ext. 13477

From: Hannah Pepper [mailto:HPepper@dsel.ca]
Sent: Tuesday, October 10, 2017 3:33 PM
To: Balima, Nadege <Nadege.Balima@ottawa.ca>
Subject: RE: 21 WIthrow - Boundary condition request

Hi Nadege,

Just wanted to follow up on the below; do you know if our request is close to being processed?

Thank you,

Hannah Pepper, EIT.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

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

phone: (613) 836-0856 ext. 569
fax: (613) 836-7183
email: hpepper@DSEL.ca

From: Balima, Nadege [mailto:Nadege.Balima@ottawa.ca]
Sent: October 3, 2017 9:15 AM
To: Hannah Pepper <HPepper@dsel.ca>
Subject: RE: 21 WIthrow - Boundary condition request

Hi Hannah,
The team that handles boundary condition requests usually need 5 business days to process it.
It may be a lot faster depending on their workload.
I will follow up with you as soon as I have more information.
Regards,

Nadège Balima, P.Eng., M.P.M., LEED Green Assoc.
Project Manager, Infrastructure Approvals
Development Review Services (West)
613.580.2424 ext. 13477

From: Hannah Pepper [mailto:HPepper@dsel.ca]
Sent: Monday, October 02, 2017 2:52 PM
To: Balima, Nadege <Nadege.Balima@ottawa.ca>
Subject: FW: 21 WIthrow - Boundary condition request

Sorry to bug you again Nadege,

I meant to also ask you in my email below when you think you could get that to us? We are trying to submit ASAP.

Thanks again!

Hannah Pepper, EIT.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

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

phone: (613) 836-0856 ext. 569
fax: (613) 836-7183
email: hpepper@DSEL.ca

From: Hannah Pepper
Sent: October 2, 2017 2:36 PM
To: 'Nadege.Balima@ottawa.ca' <Nadege.Balima@ottawa.ca>
Subject: FW: 21 WIthrow - Boundary condition request

Hi Nadege,

Could we please get a boundary condition for the same location as the boundary conditions you gave us below, but with a fire flow of 8,000 L/min?

Thanks!

Hannah Pepper, EIT.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

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

phone: (613) 836-0856 ext. 569
fax: (613) 836-7183
email: hpepper@DSEL.ca

From: Balima, Nadege [mailto:Nadege.Balima@ottawa.ca]
Sent: September 11, 2017 9:17 AM
To: Brandon Chow <BChow@dsel.ca>
Subject: RE: 21 WIthrow - Boundary condition request

Good morning Brandon,
As per our phone conversation last week, the watermain on Rita and St Helen are in two different watermain pressure zones and cannot be interconnected. Below/attached are therefore the results of your request for option 1 only. I'm also providing a snapshot of the pressure zones limits in that area for your information (the blue area is the 2W zone and the purple area is the Meadowlands Zone).

The following are boundary conditions, HGL, for hydraulic analysis 21 Withrow (zone ME), assumed to be connected to the 152mm on St-Helens (see attached PDF for location).

Minimum HGL = 158.4m

Maximum HGL = 163.5m; the maximum pressure is estimated to be above 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

Available Flow = 155 L/s assuming a residual of 20 psi and a ground elevation of 97.5m

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

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

Please let me know if you have questions.
Regards,

Nadège Balima, P.Eng., M.P.M., LEED Green Assoc.
Project Manager, Infrastructure Approvals
Development Review Services (West)
613.580.2424 ext. 13477

From: Brandon Chow [mailto:BChow@dsel.ca]
Sent: Thursday, August 31, 2017 5:43 PM
To: Balima, Nadege <Nadege.Balima@ottawa.ca>
Subject: 21 WIthrow - Boundary condition request

Hi Nadege,

We would like to request boundary conditions for 2 options for the proposed development at 21 Withrow Ave. The proposed development will consist of 14 single family homes. 10 units will be serviced from a proposed 150mm watermain within the site and 4 units will be serviced from the existing 150mm watermain within Withrow Ave.
See attached figures of the 2 options for connection point(s).

We hope that you can provide the maximum flow from the 150mm watermain in St. Helene's Place and in Rita Avenue using a fire flow of 10,000 L/m.

The anticipated water demands are summarized below:

	L/min	L/s
Avg. Daily	11.7	0.20
Max Day	57.2	0.95
Peak Hour	86.3	1.44

Thank you,

Brandon Chow
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

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

phone: (613) 836-0856 ext.532
fax: (613) 836-7183
email: bchow@DSEL.ca

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Boundary Condition for 21 Withrow
DE LA COTE-DES-NEIGES RD
152mm
ST. HELEN'S PL
MERIVALE RD
305mm
CLETO AVE
203mm
TOWER RD
152mm
ST. HELEN'S PL
PENDER ST
RITA AVE
WITHROW AVE
ST. HELEN'S PL
203mm
ROSSLAND AVE
N
1533
1509
1508
1537
1526
1528
1548
1550
1556
Legend
Pipe Ownership
Private
Public

Hannah Pepper

Subject: FW: 21 Withrow - FUS Estimation

From: Louise Langlois [mailto:llanglois@rlaarchitecture.ca]
Sent: Wednesday, August 30, 2017 1:51 PM
To: Steve Merrick <SMerrick@dsel.ca>
Cc: Joey Theberge <joeytheberge@thebergehomes.com>
Subject: RE: 21 Withrow - FUS Estimation

Please see my responses in red below.

L

From: Steve Merrick [SMerrick@dsel.ca]
Sent: August-30-17 9:07 AM
To: Louise Langlois
Cc: Joey Theberge
Subject: 21 Withrow - FUS Estimation

Hi Louise,

Hope all is well.

As we are working through detailed design for 21 Withrow we will need to confirm the fire flow required for the site based on the building construction. We hope you can advise on the below points:

1) Confirm square footage for each floor of the building. I just did some quick area calculations and the houses will range from approx. 2680-3660sq.ft not including basement areas.

2) Confirm construction type for the building (Wood Frame, Ordinary Construction, Non-combustible, fire resistive) Part 9 Wood frame

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 building will be sprinklered. They will not be sprinklered

I will send along another email to confirm a few other items in relation to the proposed plan.

Thank 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

Hannah Pepper

Subject: FW: 21 Withrow - Infrastructure Follow up

From: Bill Holzman [mailto:b.holzman@holzmanconsultants.com]
Sent: Wednesday, June 28, 2017 9:21 AM
To: joeytheberge@thebergehomes.com
Cc: Reid Shepherd <r.shepherd@holzmanconsultants.com>; Adam Fobert <AFobert@dsel.ca>
Subject: Fwd: 21 Withrow - Infrastructure Follow up

fyi,
Bill

Begin forwarded message:

From: "Dickinson, Mary" <mary.dickinson@ottawa.ca>
Subject: FW: 21 Withrow - Infrastructure Follow up
Date: June 28, 2017 at 8:32:55 AM EDT
To: Bill Holzman <b.holzman@holzmanconsultants.com>

Bill
Please see below the detailed civil notes that make up part of the pre-consultation follow up for 21 Withrow.
Please let Nadege and/or me know if you have any questions.
Thanks
Mary

Mary Dickinson, MCIP, RPP
Planner
Development Review West
Urbaniste
Examen des demandes d'aménagement ouest

City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 13923
ottawa.ca/planning / ottawa.ca/urbanisme

From: Balima, Nadege
Sent: Tuesday, June 27, 2017 4:47 PM
To: Dickinson, Mary
Subject: 21 Withrow - Infrastructure Follow up

Hi Mary,
As discussed, please find below my notes on the site at 21 Withrow.

1. The proponent may proceed with severance of lots along Withrow while ensuring that each lot:
    a) Maintains a size and imperviousness similar to what was originally planned in the subdivision for this area;
    b) Can be serviced independently for water and sanitary;
    c) Is graded to provide positive drainage and can be drained while following existing grading and drainage with no adverse effects on neighboring lots.
2. A preliminary high level stormwater analysis should be performed prior to the severance to ensure that development of the site (subdivision) can occur as planned in the future without any adverse impacts on neighboring properties. The following should be considered for storm flows:
    a) The pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less (§ 8.3.7.3 of the Ottawa Sewer Design Guidelines).
    b) A calculated time of concentration (Cannot be less than 10 minutes)
    c) Flows from the site can be accommodated by the roadside ditches without adverse impact on neighboring properties
    d) Post-development flows should be controlled to pre-developed flows for both the 2 and 100 year events. (Note that although a storm water management pond is not expected for the site, best management practices to minimize the amount of flow from the site should be incorporated in the design;)
    e) Both the interim (severance only) and the ultimate (severance and subdivision on private street) can function independently without adverse impacts on the neighboring properties and existing outlets/ditches;
3. A servicing plan, grading and drainage plan, erosion and sediment control plan as well as the high level stormwater analysis will need to be provided at the time of application for severance;
4. In addition to the information in point 3 for the subdivision, a geotechnical report, servicing and stormwater management brief will need to be submitted as part of the subdivision application;
5. If the rural type cross-section is maintained for the private street, this should also be discussed in the stormwater analysis to be submitted at the time of severance;
6. Note that water looping will likely be required due to low pressure in the area and district metering area chamber may be required on the private street;
7. The sanitary sewer connection for the future subdivision may come from Rita Avenue;
8. Keep in mind that for the private road, MOECC environmental compliance approval may be required if the lots are under different ownership (no condominium ownership).
9. With regards to the watermain analysis, you may request water boundary conditions for your watermain calculations. Requests must include the location of the service and the expected loads required by the proposed development. The following information is required:
    i. Location of service (on a plan)
    ii. Type of development and amount of fire flow required (as per FUS, 1999).
    iii. Average daily demand: ___ l/s.
    iv. Maximum daily demand: ___l/s.
    v. Maximum hourly daily demand: ___ l/s.

You may also wish to check the City's record drawings and utility plans in case there is additional plans or reports available. To purchase available documentation, please contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455.

Please let me know if you have any further questions.
Regards,

Nadège Balima, P.Eng., M.P.M., LEED Green Assoc.
Project Manager, Infrastructure Approvals
Development Review Services (West)
Gestionnaire de Projet, Approbation des demandes en Infrastructures
Services d'examen des demandes d'aménagement (Ouest)
Planning, Infrastructure and Economic Development Department
Service de planification, d'Infrastructure et de Développement économique
City of Ottawa | Ville d'Ottawa
613.580.2424 ext.| poste 13477
ottawa.ca/planning | ottawa.ca/urbanisme

" Nous n'héritons pas de la terre de nos ancêtres, nous l' empruntons à nos enfants". Saint-Exupéry
" We do not inherit the land from our forefathers, we borrow it from our children". Saint-Exupéry

Hannah Pepper

Subject: FW: Stormwater Quality Controls - 21 Withrow Avenue

From: Eric Lalande [mailto:eric.lalande@rvca.ca]
Sent: October 13, 2017 4:24 PM
To: Hannah Pepper <HPepper@dsel.ca>
Subject: RE: Stormwater Quality Controls - 21 Withrow Avenue

Hi Hanna,

The RVCA is looking for 80% TSS removal as part of quality control for the project. This can be accomplished either through on-site controls or off site systems prior to releasing in to a watercourse. Please outline if any quality controls are proposed to be implemented on-site. The intervening pond in Gibley Park outlets back into the municipal sewer system connecting to the Rideau River. While the travel distance should be sufficient to handle quality control for the proposal, best management practices are encouraged, where feasible.

Thanks,

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

From: Jamie Batchelor
Sent: Wednesday, October 11, 2017 2:34 PM
To: Eric Lalande <eric.lalande@rvca.ca>
Subject: FW: Stormwater Quality Controls - 21 Withrow Avenue

From: Hannah Pepper [mailto:HPepper@dsel.ca]
Sent: Wednesday, October 11, 2017 1:55 PM
To: Jamie Batchelor <jamie.batchelor@rvca.ca>
Subject: FW: Stormwater Quality Controls - 21 Withrow Avenue

Hi Jamie,

Just wanted to follow up on the below?

Thanks!

Hannah Pepper, EIT.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

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

phone: (613) 836-0856 ext. 569
fax: (613) 836-7183
email: hpepper@DSEL.ca

From: Hannah Pepper
Sent: October 4, 2017 11:24 AM
To: 'jamie.batchelor@rvca.ca' <jamie.batchelor@rvca.ca>
Subject: Stormwater Quality Controls - 21 Withrow Avenue

Hi Jamie,

Could you please confirm if stormwater quality controls would be necessary for a contemplated development with the following details?

The property is located at 21 Withrow Avenue and would include the construction of 13 townhome units, with the retention of one existing single family townhome. This is outlined in the attached site plan.

Stormwater from the new buildings will discharge into proposed ditches and then to existing sewers within Cleto Avenue, which drains to storm sewers within Merivale Road and then to a pond in Gibley Park. Total flow path to the pond is about 900m; please see the attached figure.

Stormwater storage onsite would be through underground storage. There is no proposed underground parking and there will be surface parking from proposed driveways for each home.

Thanks!

Hannah Pepper, EIT.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

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

phone: (613) 836-0856 ext. 569
fax: (613) 836-7183
email: hpepper@DSEL.ca

APPENDIX B

Water Supply

Theberge Homes
21 Withrow Avenue
Existing 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	1	4
Semi-detached	2.7		0
Townhouse	2.7		0
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	4	1.4	1.0	13.3	9.2	20.0	13.9

Institutional / Commercial / Industrial Demand

Property Type	Unit Rate	Units	Avg. Daily		Max Day		Peak Hour	
			m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Commercial floor space	2.5 $L/m^2/d$		0.00	0.0	0.0	0.0	0.0	0.0
Office	75 $L/9.3m^2/d$		0.00	0.0	0.0	0.0	0.0	0.0
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	**1.4**	**1.0**	**13.3**	**9.2**	**20.0**	**13.9**

Theberge Homes
21 Withrow Avenue
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	14	48
Semi-detached	2.7		0
Townhouse	2.7		0
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	48	16.8	11.7	82.3	57.2	124.3	86.3

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	**16.8**	**11.7**	**82.3**	**57.2**	**124.3**	**86.3**

Theberge Homes
21 Withrow Avenue
FUS Calculations
Existing Single Home

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

Fire Flow	6129.5	L/min	
	6000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**5100.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

N	3.1m-10m	20%	
S	10.1m-20m	15%	
E	10.1m-20m	15%	
W	30.1m-45m	5%	
	% Increase	**55%**	*value not to exceed 75% per FUS Part II, Section 4*
	Increase	**2805.0**	**L/min**

Total Fire Flow

Fire Flow	7905.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	8000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _____.
-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	340.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	6084.9	L/min	
	6000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**5100.0 L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%
Reduction	**0 L/min**

4. Increase for Separation Distance

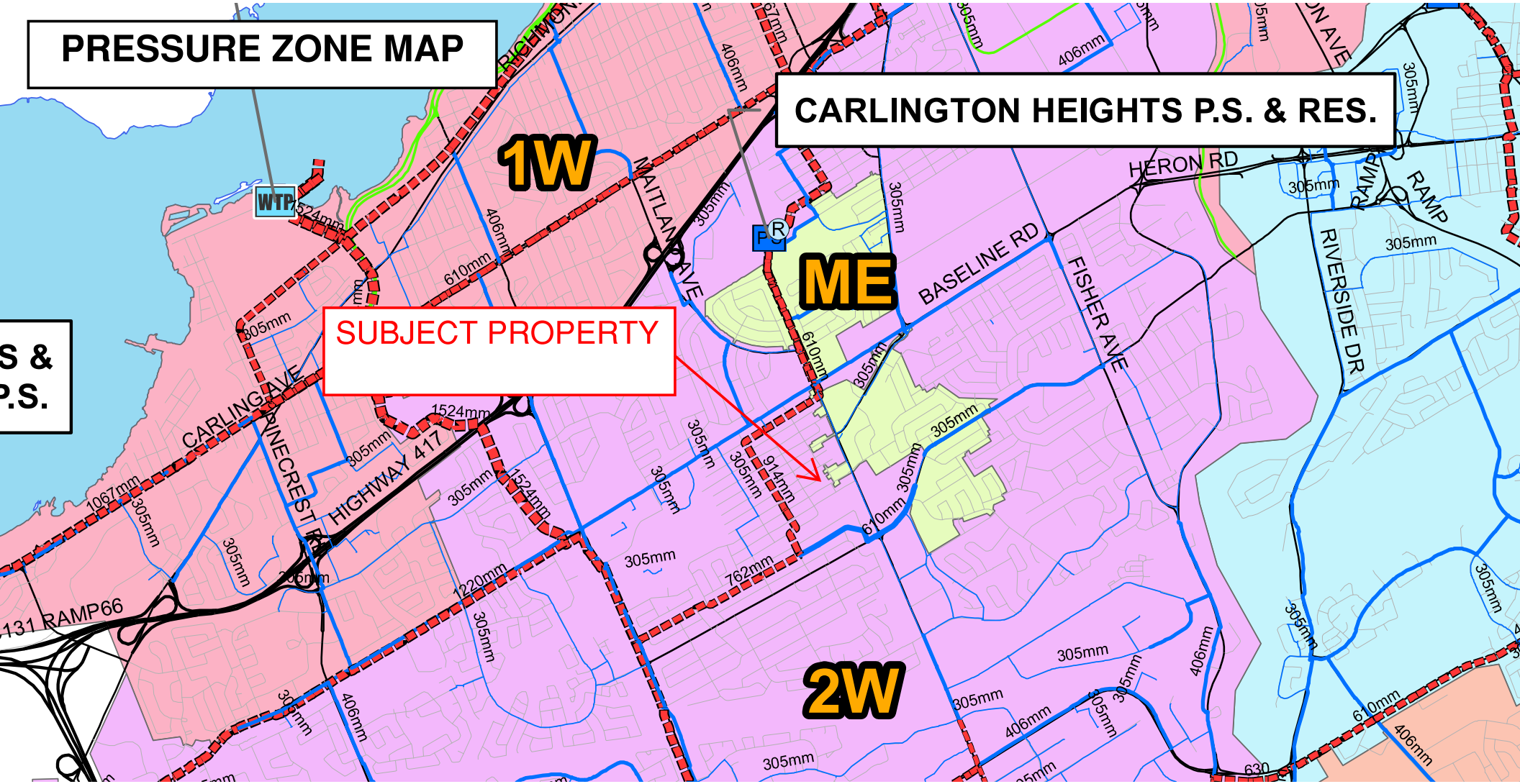
N	10.1m-20m	15%	
S	0m-3m	25%	
E	10.1m-20m	15%	
W	20.1m-30m	10%	
	% Increase	**65%**	*value not to exceed 75% per FUS Part II, Section 4*

Increase	**3315.0**	**L/min**

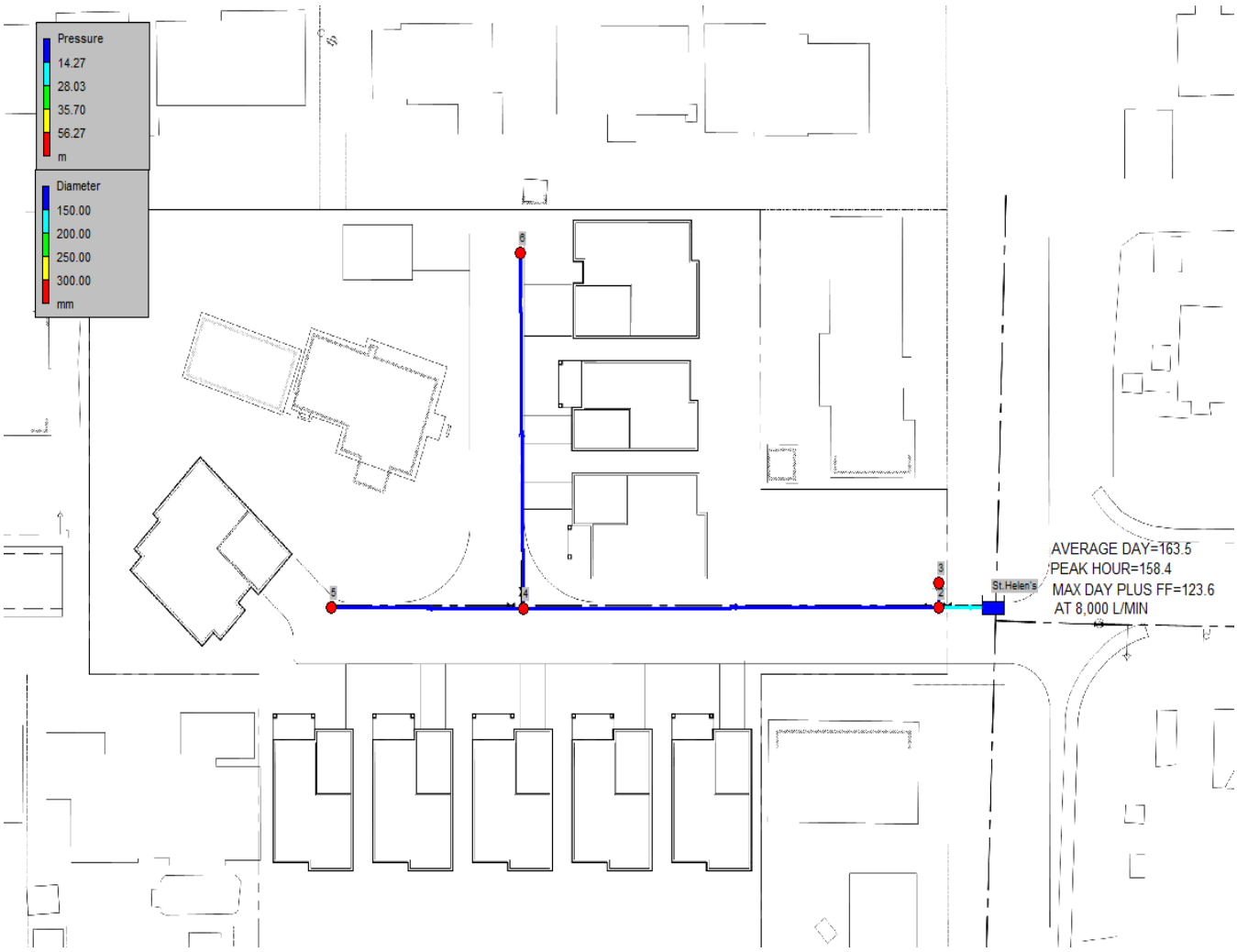
Total Fire Flow

Fire Flow	8415.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section*
	8000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _____.
-Calculations based on Fire Underwriters Survey - Part II


PRESSURE ZONE MAP
CARLINGTON HEIGHTS P.S. & RES.
1W
ME
2W
SUBJECT PROPERTY
WTP
PS
MAITLAND AVE
BASELINE RD
HERON RD
FISHER AVE
RIVERSIDE DR
CARLING AVE
RIVECREST RD
HIGHWAY 417
RAMP
305mm
406mm
610mm
762mm
914mm
1067mm
1220mm
1524mm

AVERAGE DAY SCENARIO



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

AVERAGE DAY

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	6	4	38.3	50
2	4	5	23.3	50
3	4	2	51.2	50
4	2	St.Helen's	6.9	150
5	2	3	1.9	150

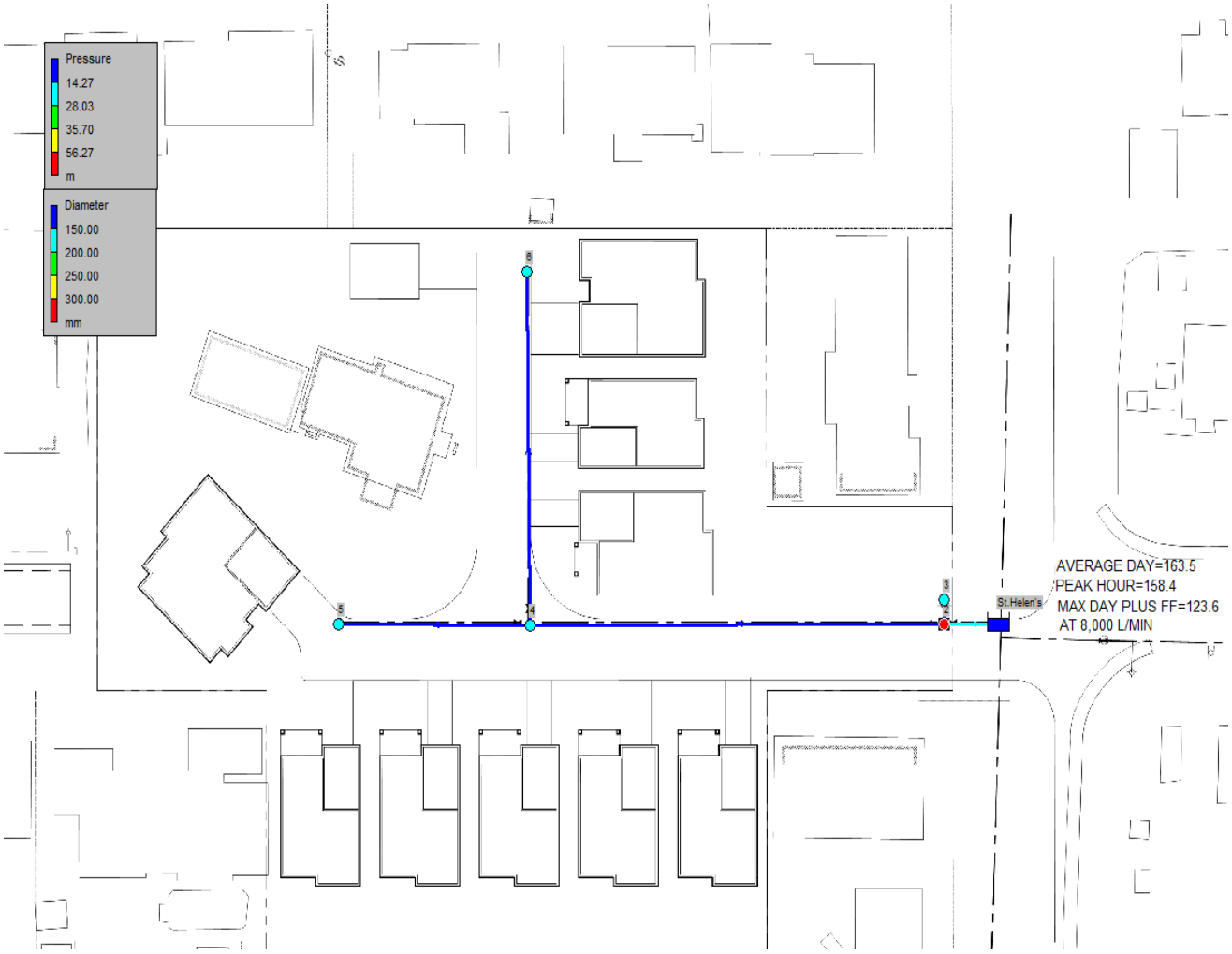
Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality	
2	0.00	163.50	68.23	0.00	
3	0.00	163.50	68.11	0.00	
4	3.40	163.48	68.03	0.00	
5	2.67	163.48	67.98	0.00	
6	2.67	163.48	68.03	0.00	
St.Helen's	-8.74	163.50	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
1	-2.67	0.02	0.04	Open
2	2.67	0.02	0.04	Open
3	-8.74	0.07	0.37	Open
4	-8.74	0.01	0.00	Open
5	0.00	0.00	0.00	Open

MAX DAY + FIRE FLOW SCENARIO



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

MAX DAY PLUS FIREFLOW

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	6	4	38.3	50
2	4	5	23.3	50
3	4	2	51.2	50
4	2	St.Helen's	6.9	150
5	2	3	1.9	150

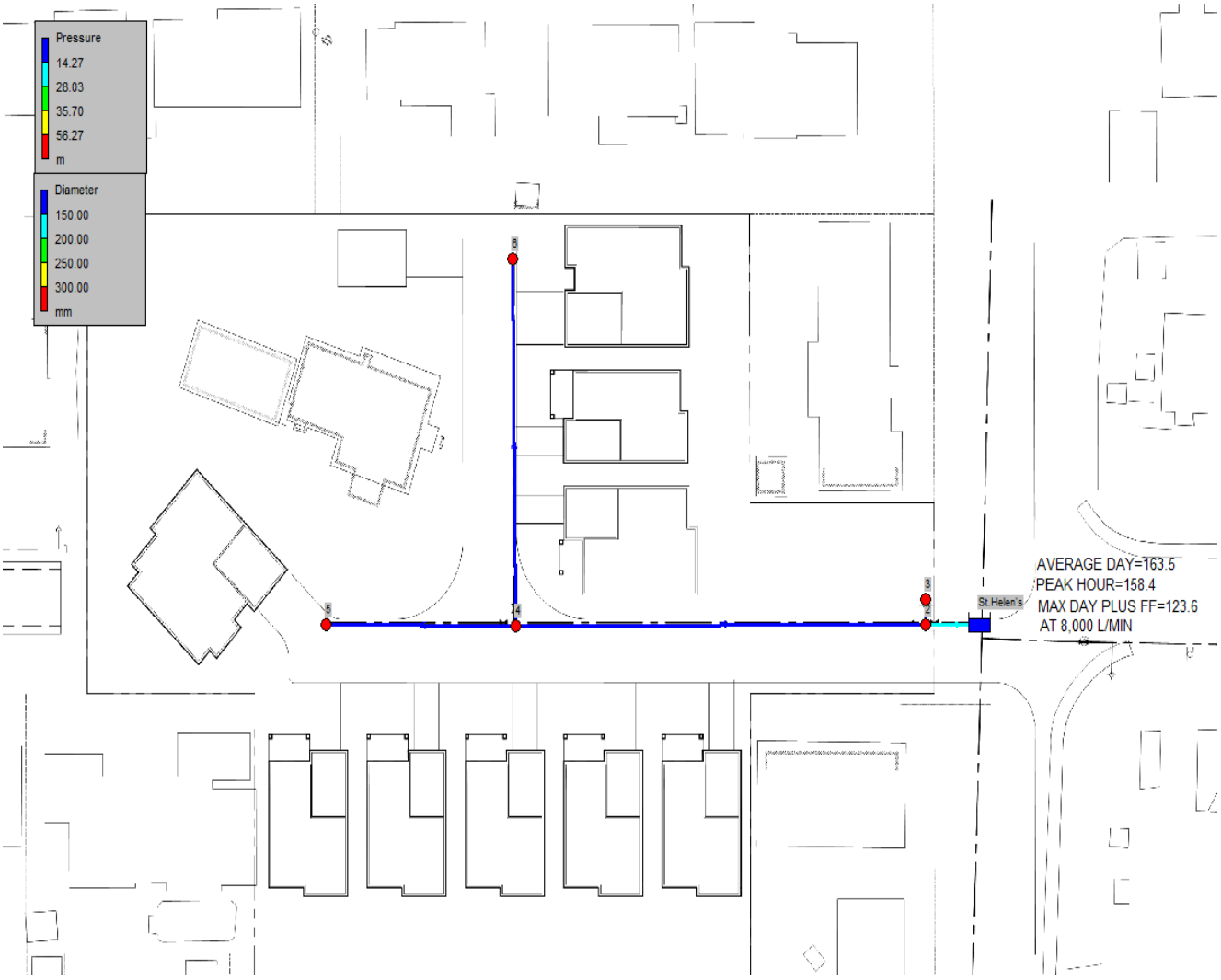
Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality	
2	7999.99	113.52	18.25	0.00	
3	0.00	113.52	18.13	0.00	
4	16.66	113.16	17.71	0.00	
5	13.08	113.14	17.64	0.00	
6	13.08	113.13	17.68	0.00	
St.Helen's	-8042.81	123.60	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
1	-13.08	0.11	0.79	Open
2	13.08	0.11	0.78	Open
3	-42.83	0.36	7.09	Open
4	-8042.81	7.59	1460.53	Open
5	0.00	0.00	0.00	Open

PEAK HOUR SCENARIO



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

PEAK HOUR

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	6	4	38.3	50
2	4	5	23.3	50
3	4	2	51.2	50
4	2	St.Helen's	6.9	150
5	2	3	1.9	150

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality	
2	0.00	158.40	63.13	0.00	
3	0.00	158.40	63.01	0.00	
4	25.16	157.62	62.17	0.00	
5	19.76	157.58	62.08	0.00	
6	19.76	157.55	62.10	0.00	
St.Helen's	-64.68	158.40	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
1	-19.76	0.17	1.70	Open
2	19.76	0.17	1.68	Open
3	-64.68	0.55	15.25	Open
4	-64.68	0.06	0.13	Open
5	0.00	0.00	0.00	Open

Average Day

APPENDIX C

Wastewater Collection

Theberge Homes
21 Withrow Avenue
Proposed Sanitary Flow

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

Site Area 0.82 **ha**

Extraneous Flow Allowances

Infiltration / Inflow	**0.23**	**L/s**

Domestic Contributions

Unit Type	**Unit Rate**	**Units**	**Pop**
Single Family	3.4	1	4
Semi-detached and duplex	2.7		0
Townhouse	2.7		0
Stacked Townhouse (Duplex)	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

Type of Housing	**Per/Bed**	**Beds**	**Pop**
Boarding*	1		0

Total Pop	**4**	
Average Domestic Flow	**0.02**	**L/s**
Peaking Factor	**4.00**	
Peak Domestic Flow	**0.06**	**L/s**

Institutional / Commercial / Industrial Contributions

Property Type	**Unit Rate**		**No. of Units**	**Avg Wastewater (L/s)**
Water Closets **	150	L/hr		0.00
Restaurant***	125	L/seat/d		0.00
Commercial floor space*	5	$L/m^2/d$		0.00
Hospitals	900	L/bed/d		0.00
School	70	L/student/d		0.00
Industrial - Light**	35,000	L/gross ha/d		0.00
Industrial - Heavy**	55,000	L/gross ha/d		0.00

Average I/C/I Flow	**0.00**
Peak Institutional / Commercial Flow	0.00
Peak Industrial Flow**	0.00
Peak I/C/I Flow	**0.00**

** assuming a 12 hour commercial operation*

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

Total Estimated Average Dry Weather Flow Rate	**0.02**	**L/s**
Total Estimated Peak Dry Weather Flow Rate	**0.06**	**L/s**
Total Estimated Peak Wet Weather Flow Rate	**0.29**	**L/s**

* Based on a daily demand of 200L/day per person as identified by Appendix 4-A of the Sewer design guidelines
** Water closets demand of 150 L/hour from Appendix 4-A of the Sewer design guidelines, assuming a 12 hour operation
***Assuming 1 seat is approximately equal to 9.3 m²

Theberge Homes
21 Withrow Avenue
Proposed Sanitary Flow

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

Site Area 0.82 **ha**

Extraneous Flow Allowances

Infiltration / Inflow	**0.23**	**L/s**

Domestic Contributions

Unit Type	**Unit Rate**	**Units**	**Pop**
Single Family	3.4	14	48
Semi-detached and duplex	2.7		0
Townhouse	2.7		0
Stacked Townhouse (Duplex)	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

Type of Housing	**Per/Bed**	**Beds**	**Pop**
Boarding*	1		0

Total Pop	**48**	
Average Domestic Flow	**0.19**	**L/s**
Peaking Factor	**4.00**	
Peak Domestic Flow	**0.78**	**L/s**

Institutional / Commercial / Industrial Contributions

Property Type	**Unit Rate**		**No. of Units**	**Avg Wastewater (L/s)**
Water Closets	150	L/hr		0.00
Restaurant	125	L/seat/d		0.00
Commercial floor space*	5	$L/m^2/d$		0.00
Laundry*	1,200	L/machine/d		0.00
Hospitals	900	L/bed/d		0.00
School	70	L/student/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*

Total Estimated Average Dry Weather Flow Rate	**0.19**	**L/s**
Total Estimated Peak Dry Weather Flow Rate	**0.78**	**L/s**
Total Estimated Peak Wet Weather Flow Rate	**1.01**	**L/s**

* Based on a daily demand of 200L/day per person as identified by Appendix 4-A of the Sewer design guidelines

Theberge Homes
21 Withrow Avenue
Existing Sanitary Flow

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

Site Area 0.82 **ha**

Extraneous Flow Allowances

Infiltration / Inflow	**0.23**	**L/s**

Domestic Contributions

Unit Type	**Unit Rate**	**Units**	**Pop**
Single Family	3.4	1	4
Semi-detached and duplex	2.7		0
Townhouse	2.7		0
Stacked Townhouse (Duplex)	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

Type of Housing	**Per/Bed**	**Beds**	**Pop**
Boarding*	1		0

Total Pop	**4**	
Average Domestic Flow	**0.02**	**L/s**
Peaking Factor	**4.00**	
Peak Domestic Flow	**0.06**	**L/s**

Institutional / Commercial / Industrial Contributions

Property Type	**Unit Rate**		**No. of Units**	**Avg Wastewater (L/s)**
Water Closets **	150	L/hr		0.00
Restaurant***	125	L/seat/d		0.00
Commercial floor space*	5	$L/m^2/d$		0.00
Hospitals	900	L/bed/d		0.00
School	70	L/student/d		0.00
Industrial - Light**	35,000	L/gross ha/d		0.00
Industrial - Heavy**	55,000	L/gross ha/d		0.00

Average I/C/I Flow	**0.00**
Peak Institutional / Commercial Flow	0.00
Peak Industrial Flow**	0.00
Peak I/C/I Flow	**0.00**

** assuming a 12 hour commercial operation*

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

Total Estimated Average Dry Weather Flow Rate	**0.02**	**L/s**
Total Estimated Peak Dry Weather Flow Rate	**0.06**	**L/s**
Total Estimated Peak Wet Weather Flow Rate	**0.29**	**L/s**

* Based on a daily demand of 200L/day per person as identified by Appendix 4-A of the Sewer design guidelines
** Water closets demand of 150 L/hour from Appendix 4-A of the Sewer design guidelines, assuming a 12 hour operation
***Assuming 1 seat is approximately equal to 9.3 m²

Theberge Homes
21 Withrow Avenue
Proposed Sanitary Flow

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

Site Area 0.82 **ha**

Extraneous Flow Allowances

Infiltration / Inflow	**0.23**	**L/s**

Domestic Contributions

Unit Type	**Unit Rate**	**Units**	**Pop**
Single Family	3.4	14	48
Semi-detached and duplex	2.7		0
Townhouse	2.7		0
Stacked Townhouse (Duplex)	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

Type of Housing	**Per/Bed**	**Beds**	**Pop**
Boarding*	1		0

Total Pop	**48**	
Average Domestic Flow	**0.19**	**L/s**
Peaking Factor	**4.00**	
Peak Domestic Flow	**0.78**	**L/s**

Institutional / Commercial / Industrial Contributions

Property Type	**Unit Rate**		**No. of Units**	**Avg Wastewater (L/s)**
Water Closets	150	L/hr		0.00
Restaurant	125	L/seat/d		0.00
Commercial floor space*	5	$L/m^2/d$		0.00
Laundry*	1,200	L/machine/d		0.00
Hospitals	900	L/bed/d		0.00
School	70	L/student/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*

Total Estimated Average Dry Weather Flow Rate	**0.19**	**L/s**
Total Estimated Peak Dry Weather Flow Rate	**0.78**	**L/s**
Total Estimated Peak Wet Weather Flow Rate	**1.01**	**L/s**

* Based on a daily demand of 200L/day per person as identified by Appendix 4-A of the Sewer design guidelines

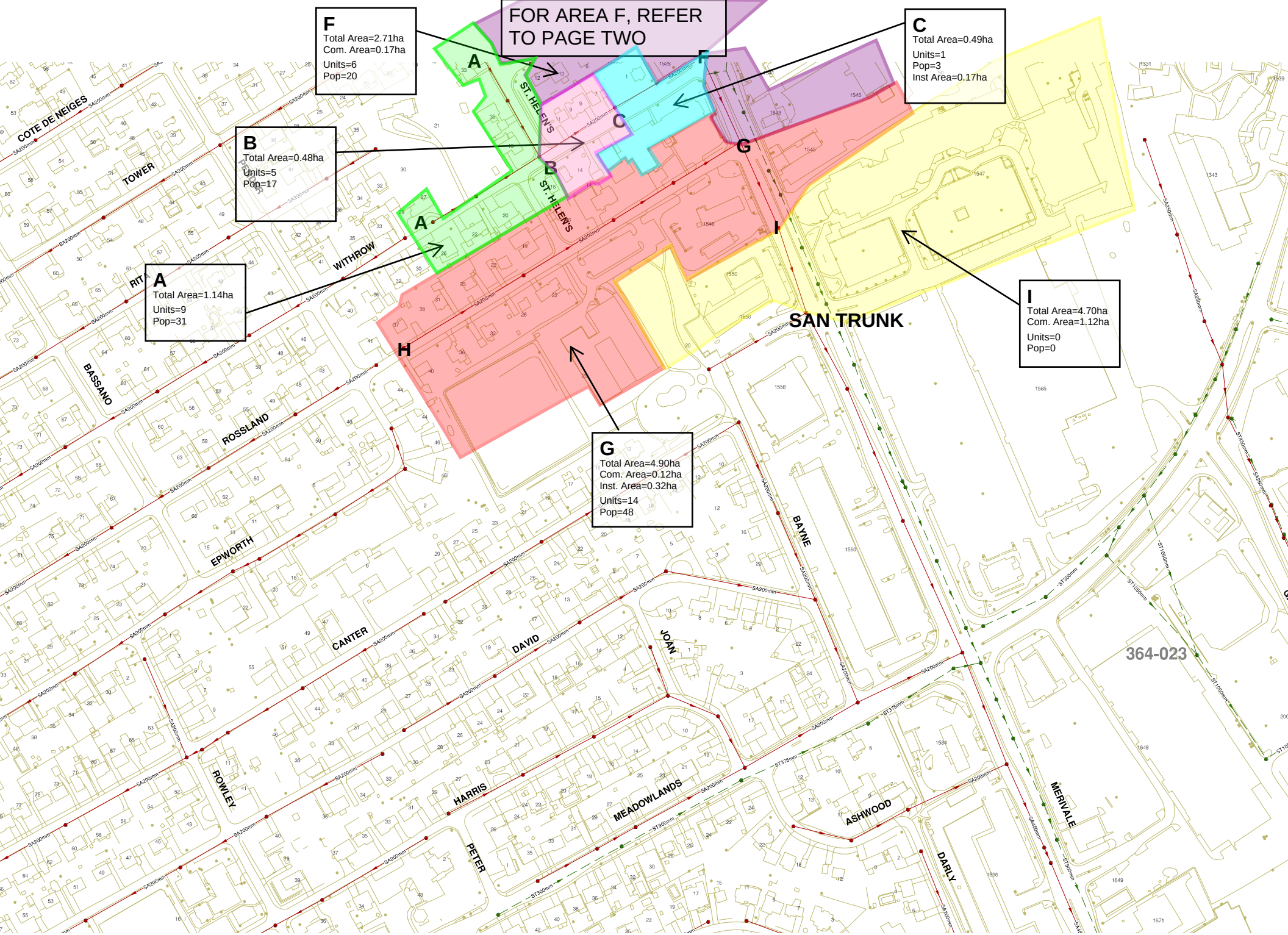
SANITARY SEWER CALCULATION SHEET - PROPOSED CONDITIONS

PROJECT: **Theberge Homes**
LOCATION: **21 Withrow Avenue**
FILE REF: **17-931**
DATE: **01-Nov-17**

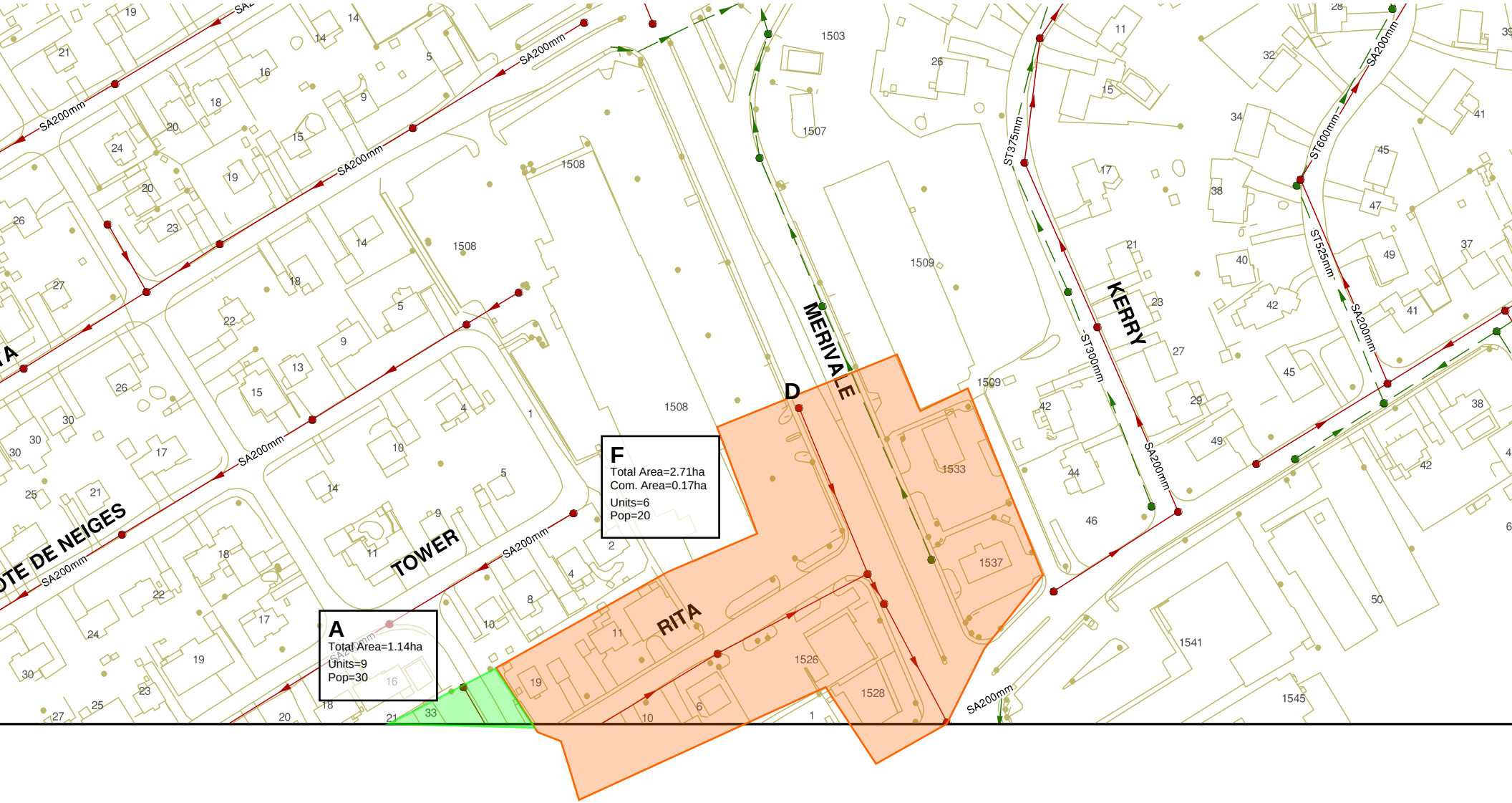
DESIGN PARAMETERS

Avg. Daily Flow Res.	350 L/p/d	Peak Fact Res. Per Harmons: Min = 2.0, Max =4.0		Infiltration / Inflow	0.28 L/s/ha
		Peak Fact. Comm.	1.5	Min. Pipe Velocity	0.60 m/s full flowing
		Peak Fact. Instit.	1.5	Max. Pipe Velocity	3.00 m/s full flowing
		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		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	Qresidual
			(ha)	Singles	Semi's	Town's	Apt's**		Area (ha)	Pop.	(-)	(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)	(-)	(L/s)
A2	SAN4	SAN2	0.173	4				14.0	0.173	14.0	4.00	0.23		0.00		0.00		0.00	0.0	0.173	0.173	0.048	0.28	200	0.35	40.1	0.031	0.050	0.62	19.4	0.01	19.1
A3	SAN3	SAN2	0.321	4				14.0	0.321	14.0	4.00	0.23		0.00		0.00		0.00	1.2	0.321	0.321	0.090	1.50	200	0.35	19.7	0.031	0.050	0.62	19.4	0.08	17.9
A1	SAN2	SAN1	0.215	2				7.0	0.215	7.0	4.00	0.11		0.00		0.00		0.00	0.0	0.215	0.215	0.060	0.17	200	0.35	61.2	0.031	0.050	0.62	19.4	0.01	19.2


FOR AREA F, REFER TO PAGE TWO
F
Total Area=2.71ha
Com. Area=0.17ha
Units=6
Pop=20
C
Total Area=0.49ha
Units=1
Pop=3
Inst Area=0.17ha
B
Total Area=0.48ha
Units=5
Pop=17
A
Total Area=1.14ha
Units=9
Pop=31
I
Total Area=4.70ha
Com. Area=1.12ha
Units=0
Pop=0
G
Total Area=4.90ha
Com. Area=0.12ha
Inst. Area=0.32ha
Units=14
Pop=48
SAN TRUNK
ST. HELEN'S
WITHROW
BASSANO
ROSSLAND
EPWORTH
CANTER
DAVID
JOAN
BAYNE
HARRIS
ROWLEY
PETER
MEADOWLANDS
ASHWOOD
DARLY
MERIVALE
COTE DE NEIGES
TOWER
364-023

PAGE ONE



FOR ALL AREAS BELOW,
REFER TO PAGE ONE

PAGE TWO

SANITARY SEWER CALCULATION SHEET - EXISTING CONDITIONS

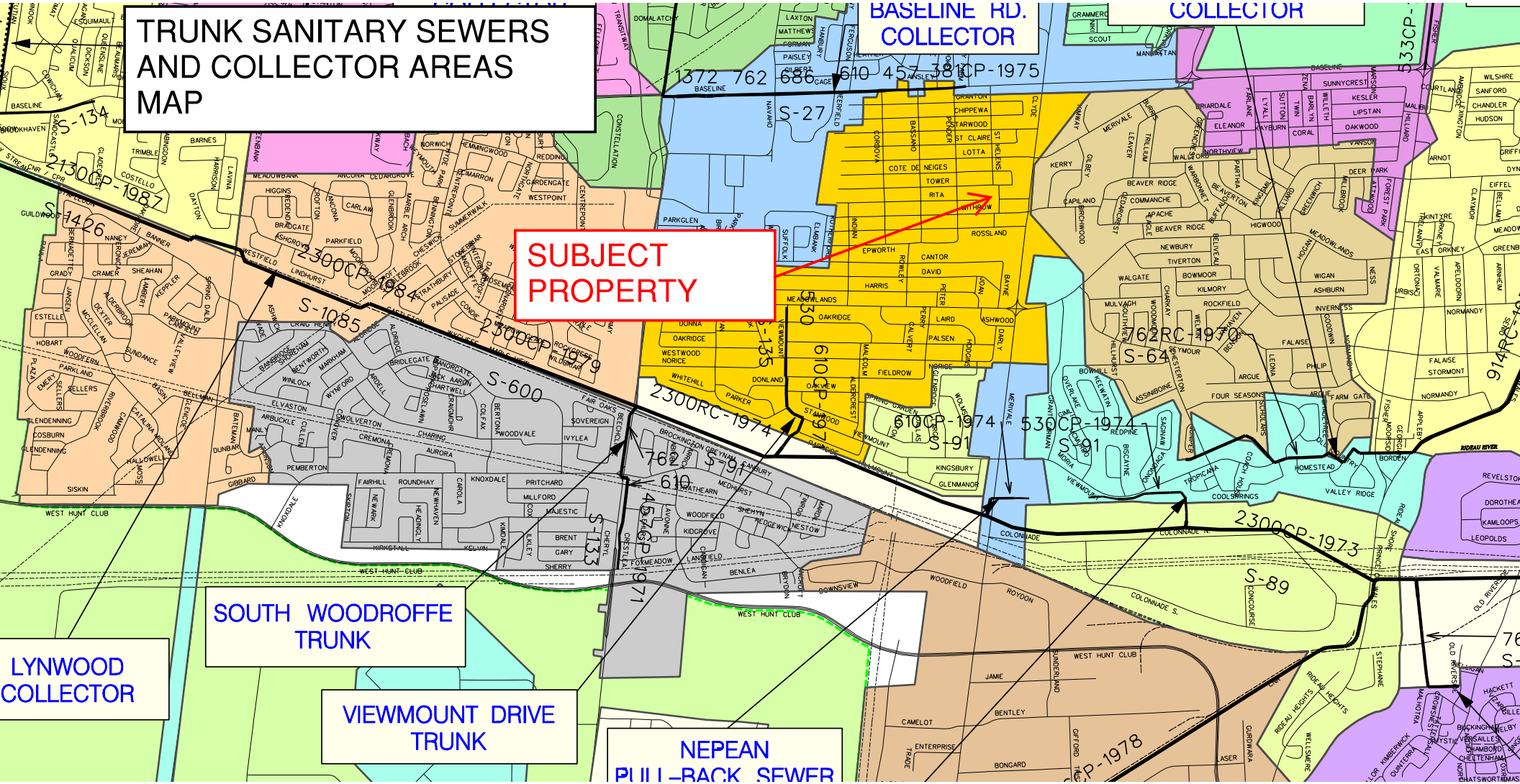
PROJECT: **Theberge Homes**
LOCATION: **21 Withrow Avenue**
FILE REF: **17-931**
DATE: **01-Nov-17**

DESIGN PARAMETERS

Avg. Daily Flow Res.	300	L/p/d	Peak Fact Res. Per Harmons: Min = 2.0, Max =4.0		Infiltration / Inflow	0.28	L/s/ha
Avg. Daily Flow Comm.	17,000	L/ha/d	Peak Fact. Comm.	1	Min. Pipe Velocity	0.60	m/s full flowing
Avg. Daily Flow Instit.	10,000	L/ha/d	Peak Fact. Instit.	1	Max. Pipe Velocity	3.00	m/s full flowing
Avg. Daily Flow Indust.	10,000	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		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	Qresidual
			(ha)	Singles	Semi's	Town's	Apt's		Area (ha)	Pop.	(-)	(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)	(-)	(L/s)
A	A	B	1.14	9				31.0	1.140	31.0	4.00	0.43		0.00		0.00		0.00	0.0	1.140	1.140	0.319	0.75	200	0.1	54.0	0.031	0.050	0.33	10.4	0.07	9.6
B	B	C	0.48	5				17.0	1.62	48.0	4.00	0.67		0.00		0.00		0.00	0.0	0.480	1.620	0.454	1.12	200	0.3	74.7	0.031	0.050	0.59	18.6	0.06	17.4
C	C	F	0.49	1				3.0	2.110	51.0	4.00	0.71		0.00	0.17	0.17		0.00	0.1	0.660	2.280	0.638	1.49	200	0.3	77.6	0.031	0.050	0.59	18.6	0.08	17.1
F	D	G	2.71	6				20.0	2.71	20.0	4.00	0.28	0.17	0.17		0.17		0.00	0.3	2.880	2.880	0.806	1.38	250	0.7	68.0	0.049	0.063	0.99	48.7	0.03	47.3
G	H	I	4.90	14				48.0	9.72	119.0	4.00	1.65	0.12	0.29	0.32	0.49		0.00	0.7	5.340	10.500	2.940	5.27	250	4.4	57.0	0.049	0.063	2.54	124.6	0.04	119.3
i	i	TRUNK SAN	4.70					0.0	14.42	119.0	4.00	1.65	1.12	1.41		0.49		0.00	1.6	5.820	16.320	4.570	7.87	250	2.5	97.0	0.049	0.063	1.90	93.5	0.08	85.6

*No sanitary asbuilts were available to obtain slopes as constructed, so minimum slopes were assumed


TRUNK SANITARY SEWERS AND COLLECTOR AREAS MAP
SUBJECT PROPERTY
SOUTH WOODROFFE TRUNK
LYNWOOD COLLECTOR
VIEWMOUNT DRIVE TRUNK
NEPEAN PUMP-BACK SEWER
BASELINE RD. COLLECTOR
COLLECTOR
S-600
S-1085
S-91
S-64
S-89
S-27
S-134
S-135
S-133
2300CP-1987
2300CP-1979
2300CP-1973
2300RC-1974
610CP-1974
530CP-1974
457CP-1971
381CP-1975
762RC-1970
914RC-1978
BASELINE
COLONNADE
COLONNADE N.
COLONNADE S.
WEST HUNT CLUB
CONCOURSE

APPENDIX D

Stormwater Management

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

Drainage Area A1 to St Helen's Place
Existing Drainage Charateristics From Internal Site - East

Area	0.62	ha
C	0.29	Rational Method runoff coefficient
L	60	m
Up Elev	98.42	m
Dn Elev	97.38	m
Slope	1.7	%
Tc	17.03	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	57.4	77.5	132.5	mm/hr
Q	28.8	39.0	83.2	L/s

External Area EX1 to St. Helen's Place
Existing Drainage Charateristics From External Site

Area	0.14	ha
C	0.47	Rational Method runoff coefficient
L	55	m
Up Elev	99.75	m
Dn Elev	98.64	m
Slope	2.0	%
Tc	12.06	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	69.7	94.5	161.7	mm/hr
Q	12.7	17.1	36.7	L/s

Total Flow to St. Helen's Place

	2-year	5-year	100-year	
i	varies	varies	varies	mm/hr
Q	41.5	56.1	119.9	L/s

Drainage Area A2 to Tower Road
Existing Drainage Charateristics From Internal Site - East

Area	0.19	ha
C	0.29	Rational Method runoff coefficient
L	49	m
Up Elev	98.45	m
Dn Elev	96.56	m
Slope	3.9	%
Tc	10.00	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	76.8	104.2	178.6	mm/hr
Q	11.8	15.9	34.2	L/s

External Area EX2 to Tower Road
Existing Drainage Charateristics From Internal Site - West

Area	0.38	ha
C	0.41	Rational Method runoff coefficient
L	100	m
Up Elev	97.50	m
Dn Elev	96.56	m
Slope	0.9	%
Tc	22.96	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	47.7	64.4	109.8	mm/hr
Q	20.4	27.6	58.8	L/s

Total Flow to Tower Road

	2-year	5-year	100-year	
i	varies	varies	varies	
Q	32.2	43.5	92.9	L/s

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

Drainage Area U2 to Tower Road
Existing Drainage Charateristics From Internal Site - East

Area	0.08	ha
C	0.32	Rational Method runoff coefficient
L	49	m
Up Elev	98.45	m
Dn Elev	96.56	m
Slope	3.9	%
Tc	11.36	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 %

External Area EX2 to Tower Road
Existing Drainage Charateristics From Internal Site - West

Area	0.38	ha
C	0.41	Rational Method runoff coefficient
L	100	m
Up Elev	97.50	m
Dn Elev	96.56	m
Slope	0.9	%
Tc	22.96	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 - Internal

	2-year	5-year	100-year	
i	72.0	97.5	167.0	mm/hr
Q	4.8	6.5	13.9	L/s

Estimated Peak Flow - External

	2-year	5-year	100-year	
i	47.7	64.4	109.8	mm/hr
Q	20.4	27.6	58.8	L/s

Total Proposed Flow to Tower Road

	2-year	5-year	100-year	
i	varies	varies	varies	
Q	25.2	34.1	72.7	L/s

Note:
C value for the 100-year storm is increased by 25%, to a maximum of 1.0 per Ottawa Sewer Design Guidelines (5.4.5.2.1)

Stormwater - Proposed Development
City of Ottawa Sewer Design Guidelines, 2012

Target Flow Rate

Area	0.67	ha
C	0.29	Rational Method runoff coefficient
t_c	17.0	min

2-year

i	57.4	mm/hr
Q	30.8	L/s

Estimated Post Development Peak Flow from Unattenuated Areas

Total Area	0.0030	ha
C	0.88	Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}* (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10.0	104.2	0.8	0.8	0.0	0.0	178.6	1.5	1.5	0.0	0.0

Note:
C value for the 100-year storm is increased by 25%, to a maximum of 1.0 per Ottawa Sewer Design Guidelines (5.4.5.2.1)

Estimated Post Development Peak Flow from Attenuated Areas

Area ID A1

Available Sub-surface Storage
Maintenance Structures

ID	**DICB101**
Structure Dia./Area (mm/mm^2)	360
T/L*	96.95
INV	96.54
Depth	0.41
$V_{structure}$ (m^3)	0.0

Sewers

ID	**200mm**	**250mm**	**U/G STORG.**
Storage Pipe Dia (mm)	200	250	
L (m)	2.6	7.6	
V_{sewer} (m^3)	0.1	0.4	161.7

*Top of lid or max ponding elevation = 97.32

Total Subsurface Storage (m^3) 161.7

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage (m)	**Ponding** (m^2)	**h_o** (m)	**delta d** (m)	**V*** (m^3)	**V_{acc}**** (m^3)	**$Q_{release}$†** (L/s)	**$V_{drawdown}$** (hr)
Orifice INV	96.54	-	0.00			0.0	0.0	0.00
U/G STORAGE INV	96.58	-	0.04	0.04	0.0	0.0	6.6	0.00
U/G STORAGE SL	96.81	-	0.27	0.23	80.9	80.9	17.2	1.30
T/L	96.95	0.36	0.41	0.14	0.0	80.9	21.2	1.06
U/G STORAGE OBV	97.04	6.35	0.50	0.09	81.1	161.9	23.4	1.92
MAX PONDING	97.32	99.40	0.78	0.28	12.2	174.2	29.3	1.65

* V=Incremental storage volume
** V_{acc}=Total surface and sub-surface
† $Q_{release}$ = Release rate calculated from orifice equation

Orifice Location **DICB101** **Dia** 125
Total Area 0.66 ha
C 0.59 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10	104.2	112.7	16.5	96.1	57.7	178.6	241.3	29.1	212.2	127.3
15	83.6	90.3	16.5	73.8	66.4	142.9	193.1	29.1	164.0	147.6
20	70.3	76.0	16.5	59.4	71.3	120.0	162.1	29.1	133.0	159.6
25	60.9	65.8	16.5	49.3	74.0	103.8	140.4	29.1	111.2	166.8
30	53.9	58.3	16.5	41.8	75.2	91.9	124.2	29.1	95.0	171.1
35	48.5	52.5	16.5	35.9	75.5	82.6	111.6	29.1	82.5	173.2
40	44.2	47.8	16.5	31.3	75.0	75.1	101.6	29.1	72.4	173.8
45	40.6	43.9	16.5	27.4	74.0	69.1	93.3	29.1	64.2	173.3
50	37.7	40.7	16.5	24.2	72.6	64.0	86.4	29.1	57.3	171.9
55	35.1	38.0	16.5	21.5	70.8	59.6	80.6	29.1	51.5	169.8
60	32.9	35.6	16.5	19.1	68.7	55.9	75.5	29.1	46.4	167.1
65	31.0	33.6	16.5	17.0	66.5	52.6	71.2	29.1	42.0	163.9
70	29.4	31.8	16.5	15.2	64.0	49.8	67.3	29.1	38.2	160.3
75	27.9	30.2	16.5	13.6	61.3	47.3	63.9	29.1	34.7	156.3
80	26.6	28.7	16.5	12.2	58.5	45.0	60.8	29.1	31.7	152.1
85	25.4	27.4	16.5	10.9	55.6	43.0	58.1	29.1	28.9	147.5
90	24.3	26.3	16.5	9.7	52.6	41.1	55.6	29.1	26.4	142.7
95	23.3	25.2	16.5	8.7	49.5	39.4	53.3	29.1	24.2	137.8
100	22.4	24.2	16.5	7.7	46.2	37.9	51.2	29.1	22.1	132.6
105	21.6	23.3	16.5	6.8	42.9	36.5	49.3	29.1	20.2	127.2
110	20.8	22.5	16.5	6.0	39.5	35.2	47.6	29.1	18.4	121.8

5-year $Q_{attenuated}$ **16.52 L/s** **100-year $Q_{attenuated}$** **29.13 L/s**
5-year Max. Storage Required **75.5 m^3** **100-year Max. Storage Required** **173.8 m^3**
Est. 5-year Storage Elevation **96.79 m** **Est. 100-year Storage Elevation** **97.31 m**

Summary of Release Rates and Storage Volumes

Control Area	5-Year Release Rate (L/s)	5-Year Required Storage (m^3)	100-Year Release Rate (L/s)	100-Year Required Storage (m^3)	100-Year Available Storage (m^3)
Unattenuated Areas	0.8	0.0	1.5	0.0	0.0
Attenutated Areas	16.5	75.5	29.1	173.8	174.2
Total	**17.3**	**75.5**	**30.6**	**173.8**	**174.2**

Theberge Homes
21 Withrow Avenue
Ditch Calculation Sheet - 100 Year Storm

									Ditch Data												
	Area	Area	C	Indiv AxC	Acc AxC	T_C	I	Q	depth	Side Slope	Bot. Width	Mannings	Slope	Length	A_{flow}	Wet. Per.	R	Velocity	Qcap	Time Flow	Q / Q full
		(ha)	(-)			(min)	(mm/hr)	(L/s)	(mm)	(X:1)	(m)	n	(%)	(m)	(m^2)	(m)	(m)	(m/s)	(L/s)	(min)	(-)
	EX1	0.139	0.47	0.07	0.07																
	D1	0.341	0.61	0.21	0.27	10.0	178.6	135.6	400	3	0	0.03	0.50	79.8	0.480	2.530	0.19	0.78	373.6	1.7	0.36
						11.7															
	D2	0.139	0.48	0.07	0.07	10.0	178.6	33.1	360	3	0	0.03	0.50	72.9	0.389	2.277	0.17	0.73	282.1	1.7	0.12
						11.7															
	D3	0.060	0.83	0.05	0.05	10.0	178.6	24.7	400	3	0	0.03	0.50	47.5	0.480	2.530	0.19	0.78	373.6	1.0	0.07
						11.0															
	D4	0.038	0.83	0.03	0.42	11.7	164.6	192.6	370	3	0	0.03	0.80	25.7	0.411	2.340	0.18	0.93	383.8	0.5	0.50
						12.1															
	D5	0.052	0.44	0.02	0.02	10.0	178.6	11.3	330	3	0	0.03	0.50	39.3	0.327	2.087	0.16	0.68	223.7	1.0	0.05
						11.0															
	D6	0.035	0.36	0.01	0.46	12.1	161.2	204.5	500	3	0	0.03	0.50	18.8	0.750	3.162	0.24	0.90	677.3	0.3	0.30
						12.5	158.7														

Theberge Homes
21 Withrow Avenue
Culvert/Sewer Calculation Sheet - 100 Year Storm

								Sewer Data								
Area ID	**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)**	**(-)**
EX1	0.139	0.47	0.07	0.07												
D1	0.341	0.61	0.21	0.27	11.7	164.3	124.8	450	0.50	5.0	0.159	0.113	1.27	201.6	0.1	0.62
D2	0.139	0.48	0.07	0.07	11.7	164.6	30.5	300	0.50	5.0	0.071	0.075	0.97	68.4	0.1	0.45
D3	0.060	0.83	0.05	0.05	11.0	169.8	23.5	300	0.50	5.0	0.071	0.075	0.97	68.4	0.1	0.34
D4	0.038	0.83	0.03	0.15	12.1	161.2	66.3									
D5	0.052	0.44	0.02	0.02	11.0	170.3	10.8									
D6	0.035	0.36	0.01	0.46	12.5	158.7	201.4									
DICB101*	0.000	0.00	0.00	0.46	12.5	158.7	29.1	300	0.35	30.9	0.071	0.075	0.81	57.2	0.6	0.51
AD102	0.000	0.00	0.00	0.00	13.1	154.3	29.1	300	0.35	9.7	0.071	0.075	0.81	57.2	0.2	0.51

*Pipe sized for the proposed controlled elease rate

STORMTANK® Module Volume Calculator

Inputs

Project Name:	21 Withrow Avenue - Storage Tank #1		
Engineer:		Date:	2017-10-31
Units:	SI	Shape:	Square/Rectangle
Liner:	No	Location:	N/A
Stacking:	Single	Height:	457.2
Stone Storage:	All	Porosity:	40%

Dimensions

Module		
Length:	59.5	m
Width:	3.1	m
Excavation		
Length:	60.1	m
Width:	3.7	m
Stone		
Leveling Bed:	0.15	m
Top Backfill:	0.3	m
Compacted Fill:	0.3	m

Results

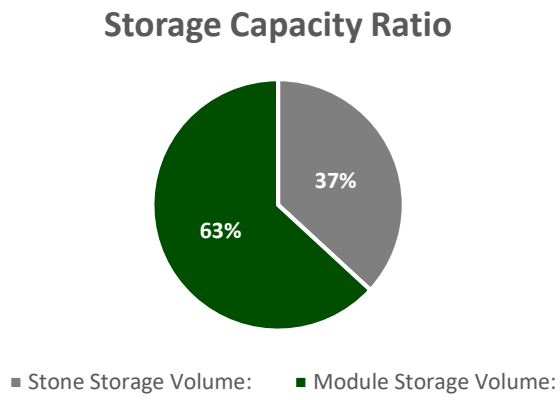
Capacity:

Stone Storage Volume:	46.96	m^3
Module Storage Volume:	80.47	m^3
Total Storage Volume:	127.43	m^3

Quantities:

Required Excavation:	268.45	m^3
Required Stone Volume:	117.40	m^3
Estimated Geotextile:	1,096.27	m^2
Estimated Liner:	0.00	m^2

(Estimations include 10% for scrap and overlap)

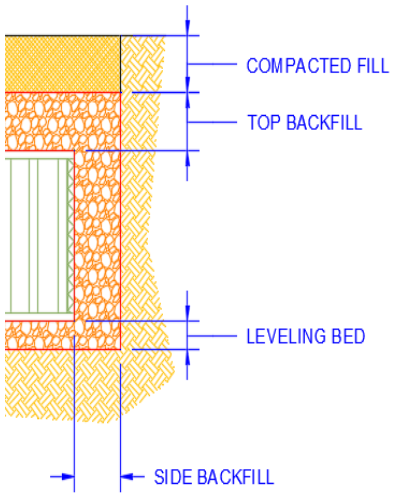


Basin Detail

Component Quantities:

	Bottom Layer	Top Layer	Total
Height	457.2	N/A	457.2
# of Modules	441	N/A	441
# of Platens	882	N/A	882
# of Side Panels	274	N/A	274
# of Columns	3,529	N/A	3,529
# of Stacking Pins	0	N/A	0

Cross-Section:



STORMTANK® Module Volume Calculator

Inputs

Project Name:	21 Withrow Avenue - Storage Tank #2		
Engineer:		Date:	2017-10-31
Units:	SI	Shape:	Square/Rectangle
Liner:	No	Location:	N/A
Stacking:	Single	Height:	457.2
Stone Storage:	All	Porosity:	40%

Dimensions

Module		
Length:	22.3	m
Width:	2.1	m
Excavation		
Length:	22.9	m
Width:	2.7	m
Stone		
Leveling Bed:	0.15	m
Top Backfill:	0.3	m
Compacted Fill:	0.3	m

Results

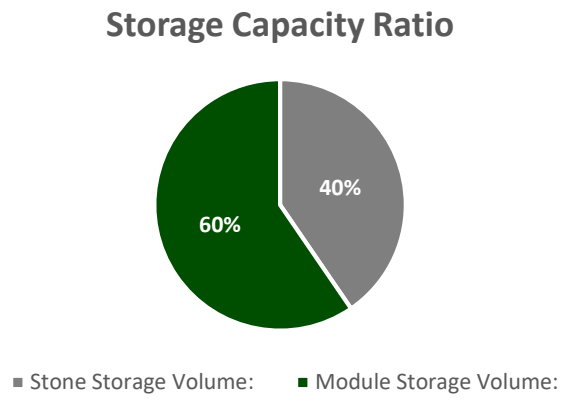
Capacity:

Stone Storage Volume:	13.87	m^3
Module Storage Volume:	20.43	m^3
Total Storage Volume:	34.30	m^3

Quantities:

Required Excavation:	74.64	m^3
Required Stone Volume:	34.68	m^3
Estimated Geotextile:	317.87	m^2
Estimated Liner:	0.00	m^2

(Estimations include 10% for scrap and overlap)

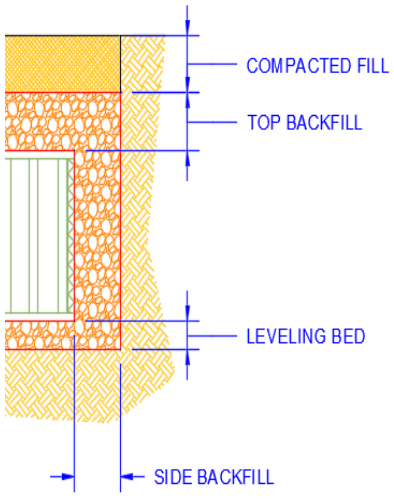


Basin Detail

Component Quantities:

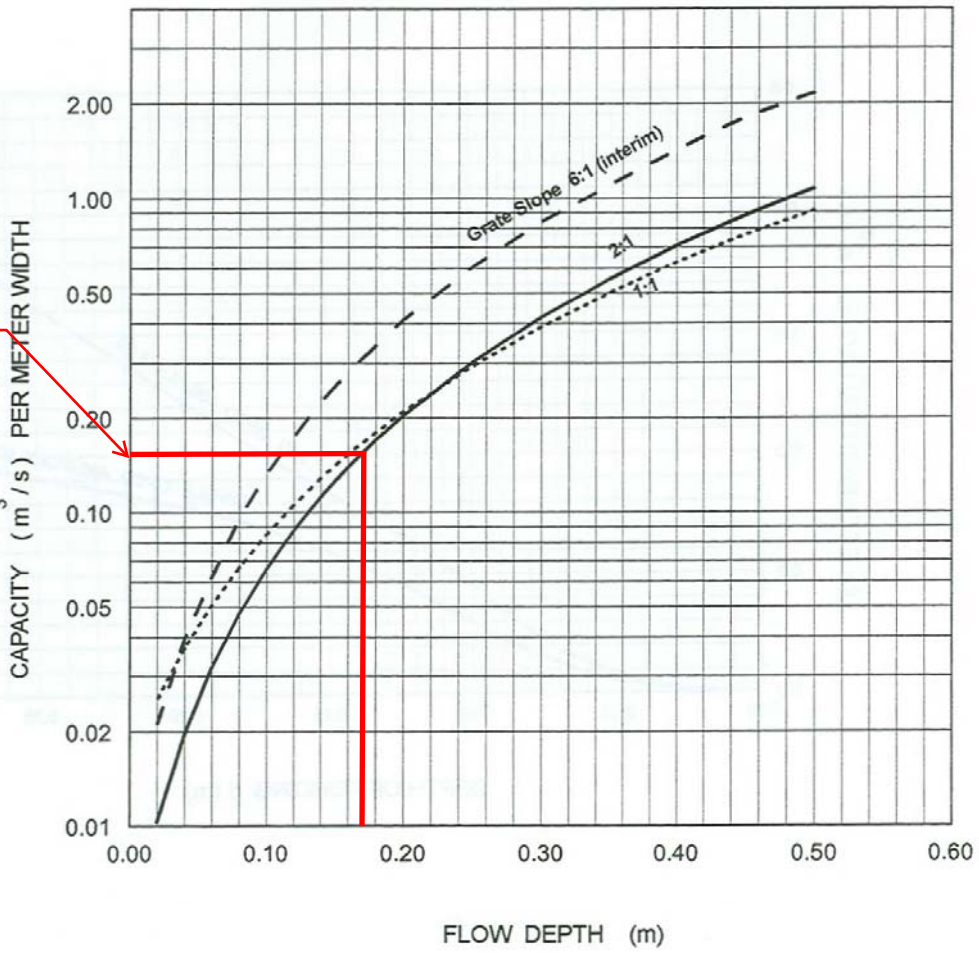
	Bottom Layer	Top Layer	Total
Height	457.2	N/A	457.2
# of Modules	112	N/A	112
# of Platens	224	N/A	224
# of Side Panels	107	N/A	107
# of Columns	896	N/A	896
# of Stacking Pins	0	N/A	0

Cross-Section:



Design Chart 4.20: Ditch Inlet Capacity

162.5 L/s 100-Year Flow per Design Sheets prepared by DSEL



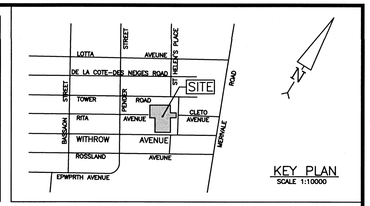
Notes:

1. Curves apply to grate Type 403.01, but may be used for straight - bar inlets without significant loss of accuracy.
2. Capacities given by curves are for unobstructed grates only. For design use working capacity ≯ 0.5 x unobstructed capacity.
3. Capacities of grates operating in high velocity flows are less than indicated.

DRAWINGS / FIGURES

SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED _____, THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER SECTION 51 OF THE PLANNING ACT THIS _____ DAY OF _____, 2017.

Don Herweyer, MCIP, RPP, ACTING Manager
Development Review, Urban Services
Planning, Infrastructure and Economic
Development Department, City of Ottawa



KEY PLAN
SCALE 1:10000

DRAFT PLAN OF SUBDIVISION OF

LOTS 608, 609, 610, 611, 612, 613, 614, 657, 658, 659, 660, 661, 662, 663 AND PART OF LOTS 607, 664 AND PART OF THE ADJACENT LANES (Closed by Judge's Order Inst.CR294685) AND PART OF RITA AVENUE (Closed by Judge's Order Inst. NP64460) AND PART OF ST.HELENS'S PLACE (Closed by Judge's Order Inst. CR294685) REGISTERED PLAN 375 CITY OF OTTAWA

FARLEY, SMITH & DENIS SURVEYING LTD. 2017

Scale 1: 250

0 2.5 5 7.5 10 12.5 15 20 25 metres

Metric Note

Distances and coordinates on this plan are in metres and can be converted to feet by dividing by 0.3048.

Bearing Note

Bearings hereon are grid bearings and are referred to the Northerly limit of Withrow Avenue as shown on a Surveyor's Real Property Report by Farley, Smith & Denis Surveying Ltd. dated November 11, 2015, being N 58°32'35" E.

Elevation Note

Elevations are geodetic.

CO-ORDINATES WERE DERIVED FROM SMART-NET REAL TIME NETWORK OBSERVATIONS, MTM, N.A.D. 1983 (ORIGINAL) ZONE 9.

POINT ID	NORTHING	EASTING
Ⓐ	5024100.09	364422.83
Ⓑ	5024132.26	364475.42
01919680005	5027191.26	361496.76
01919750705	5016816.93	360806.84

CO-ORDINATES ARE MTM, N.A.D. 1983 (ORIGINAL) ZONE 9, TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG. 216/10, AND CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

Owner's Certificate

I hereby authorize Farley, Smith & Denis Surveying Ltd. to submit this draft plan of subdivision on our behalf.

November 1, 2017
Date

Joey Theberge
Theberge Homes Ltd.

Surveyor's Certificate

I certify that :
The boundaries of the lands to be subdivided and their relationship to adjoining lands are accurately can correctly shown.

November 1, 2017
Date

Ronald A. Denis
Ontario Land Surveyor

Additional Information

(a) See Plan
(b) See Key Plan
(c) See Plan
(d) Residential
(e) See Plan
(f) See Plan
(g) See Plan
(h) Municipal Water
(i) See Soil Report
(j) See Plan
(k) All Municipal Services
(l) See Plan

Notes & Legend

—□—	Denotes	Survey Monument Planted
—■—	"	Survey Monument Found
SIB	"	Standard Iron Bar
IB	"	Iron Bar
SSIB	"	Short Standard Iron Bar
CP	"	Concrete Pin
1692/1287	"	Farley, Smith & Denis Surveying Ltd.
AOG	"	Annis, O'Sullivan & Goltz Ltd.
—— OHW ——	"	Overhead Wires
OUP	"	Utility Pole
O AN	"	Anchor
BF	"	Board Fence
CLF	"	Chain Link Fence
PVC	"	Plastic Fence
CRW	"	Concrete Retaining Wall
SRW	"	Stone Retaining Wall
WRW	"	Wood Retaining Wall
℄	"	Centreline
Ø	"	Diameter
⊕ 65.00	"	Location of Elevations

FARLEY, SMITH & DENIS SURVEYING LTD.
ONTARIO LAND SURVEYORS
CANADA LAND SURVEYORS
190 COLONNADE ROAD, OTTAWA, ONTARIO K2E 7J5
TEL. (613) 727-8226 FAX. (613) 727-1826

FILE No. : J-1199

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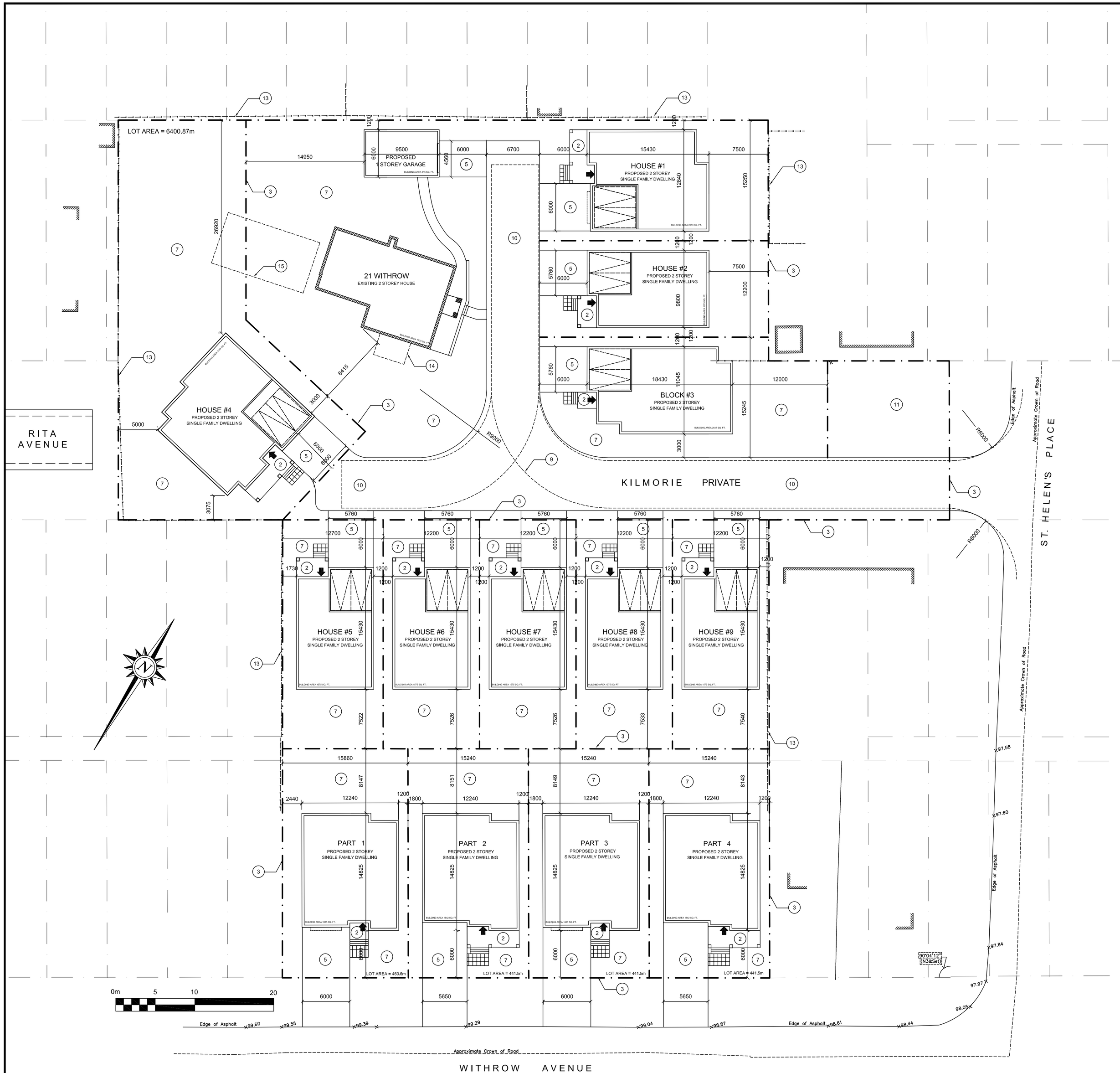
Sub 24X36



PROJECT INFORMATION:

SITE INFORMATION:

21 WITHROW AVENUE

ZONING: R1FF

SITE AREA: 8185.97 sq m (2.02 ACRES)

LEGAL DESCRIPTION:

DRAFT PLAN OF SUBDIVISION OF

LOTS 608, 609, 610, 611, 612, 613, 614, 657, 658, 659, 660, 661, 662, 663 AND PART OF LOTS 607, 664
AND PART OF THE ADJACENT LANES
(Closed by Judge's Order Inst.CR294685)
AND PART OF RITA AVENUE
(Closed by Judge's Order Inst. NP64460)
AND PART OF ST.HELEN'S PLACE
(Closed by Judge's Order Inst. CR294685)
REGISTERED PLAN 375
CITY OF OTTAWA

INTERNAL LOT AREA = 6400.87M2
INTERNAL LOT COVERAGE: 26.4%

BUILDING HEIGHT MAX 8.5 M

MIN PROPOSED SETBACKS:

FRONT YARD SETBACK	6 M
CORNER SIDE YARD SETBACK	3.0 M
INTERIOR YARD SETBACK	1.2 M
REAR YARD SETBACK	6.7 M

BUILDING FOOTPRINTS

EXISTING HOUSE BUILDING AREA	1734 SQ.FT./ 161.09 M2
NEW GARAGE	615 SQ.FT./ 57.14 M2
HOUSE #1 BUILDING AREA	2013 SQ.FT./ 187.01M2
HOUSE #2,5,6,7,8 & 9 BUILDING AREA	(6 X) 1575 SQ.FT./146.31M2 = 9450 SQ.FT./877.93M2
HOUSE #3 BUILDING AREA	2047 SQ.FT. / 190.17 M2
HOUSE #4 BUILDING AREA	2318 SQ.FT. /215.35 M2
TOTAL BUILDING AREA:	18176.9 SQ.FT/ 1688.69M2

LEGAL DESCRIPTION:

PLAN OF SURVEY OF

LOTS 407, 408, 409, 410, 411, 412, 413 AND PART OF LOT 414
AND PART OF THE ADJACENT LANE
(Closed by Judge's Order Inst. CR294685)
AND PART OF ST.HELEN'S PLACE
(Closed by Judge's Order Inst. CR294865)
REGISTERED PLAN 375
CITY OF OTTAWA

4 LOTS FRONTING ON WITHROW = 1785.10 M2
LOT COVERAGE: 38-39.7%

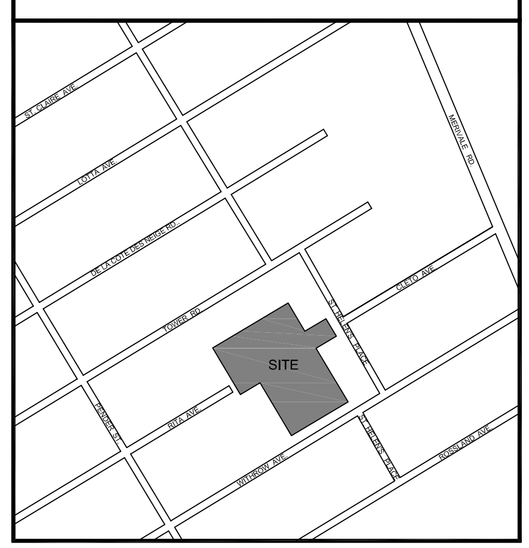
BUILDING STATISTICS:

BUILDING HEIGHT MAX 8.5 M

MIN PROPOSED SETBACKS:

FRONT YARD SETBACK	6 M
INTERIOR YARD SETBACK	1.2 M
REAR YARD SETBACK	8.11 M

PART 1	LOT AREA	460.6M2
	BUILDING AREA	1885SQ.FT. / 175.12M2
	LOT COVERAGE = 38%	
PART 2	LOT AREA	441.5M2
	BUILDING AREA	1842SQ.FT. / 171.13M2
	LOT COVERAGE = 38.8%	
PART 2	LOT AREA	441.5M2
	BUILDING AREA	1885SQ.FT. / 175.12M2
	LOT COVERAGE = 39.7%	
PART 2	LOT AREA	441.5M2
	BUILDING AREA	1842SQ.FT. / 171.13M2
	LOT COVERAGE = 38.8%	



SITE LOCATION PLAN

IT IS THE RESPONSIBILITY OF THE APPROPRIATE CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE AND TO REPORT ALL ERRORS AND/OR OMISSIONS TO THE ARCHITECT.

ALL CONTRACTORS MUST COMPLY WITH ALL PERTINENT CODES AND BY-LAWS.

DO NOT SCALE DRAWINGS.

DRAWING NOTES:

1. PRECAST PAVERS
2. PRECAST CONCRETE STAIRS
3. PROPERTY LINE
4. WOOD STAIRS AND LANDING
5. ASPHALT DRIVEWAY
6. SOFT LANDSCAPING
7. GRASS
8. STACKED PRECAST STONE RETAINING WALL
9. FIRE ROUTE
10. PRIVATE STREET ASPHALT SURFACE
11. WOODED AREA TO REMAIN
12. HYDRO/GAS METER
13. EXISTING FENCE TO BE MAINTAINED
14. EXTENT OF EXISTING PORCH ADDITON TO BE REMOVED
15. EXTENT OF EXISTING GARAGE TO BE REMOVED

no.	DESCRIPTION	DATE
1	ISSUED CONCEPT PLAN	OCT 31, 2017

REVISIONS:

NORTH ARROW:

CLIENT: THEBERGE HOMES

DESIGNER: URBANDIVA Design Inc.

PROJECT TITLE:

21 WITHROW AVENUE

OTTAWA ONTARIO

SHEET TITLE:

SITE PLAN

SCALE: 1:250

PROJECT No. 1702

SHEET No. SP1

PAPER SIZE: A1 | PLOT DATE: Tuesday, October 31, 2017 | PLOT SCALE: 1:25