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# FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT

**FOR**

# GREATWISE DEVELOPMENTS 2710 DRAPER AVENUE-PHASE III

CITY OF OTTAWA

PROJECT NO.: 17-927
DEVELOPMENT FILE NO.: D07-12-17-0076

NOVEMBER 2017 – REV 2
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# FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT
# FOR
# 2710 DRAPER AVENUE-PHASE III

## GREATWISE DEVELOPMENTS

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## 1.0 INTRODUCTION

David Schaeffer Engineering Limited (DSEL) has been retained by Greatwise Developments to prepare a Functional Servicing and Stormwater Management report in support of the application for a Site Plan Control (SPC) for the Phase III development at 2710 Draper Avenue.

The subject property is located within the City of Ottawa urban boundary, lot 19, concession 2 in Ward 8 -College. As illustrated in ***Figure 1***, the site is bound by Morrison Drive to the west and Draper Avenue to the north, and an existing residential development to the east. Comprised of two parcels the subject property measures approximately ***2.1 ha*** and is zoned High Density Residential [R5A]. The Phase III development will occupy ***1.3 ha*** of the property.

**Figure 1: Site Location**


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The existing SPC for 2781 Baseline Road allowed for the Phase I and Phase II developments, Building E and Building F, respectively.

The proposed SPC for Phase III would allow for the development of 90 townhome units and a communal park space. A copy of the Site Plan is included in ***Drawings/Figures***.

The objective of this report is to provide sufficient detail to demonstrate that proposed Phase III development is supported by existing municipal services in support of the SPC.

## 1.1 Existing Conditions

The site is currently developed as residential, consisting of 4 townhome buildings and a retail office. The existing buildings are serviced by separate water and sewer services off of municipal mains along Morrison drive and Draper Avenue.

Existing on-site storm and sanitary sewers servicing the existing buildings are to be abandoned and capped at property line. Existing on-site water services are to be blanked at main. Refer to drawing EX-1 for further details on existing services to be removed; a Topographical plan is included in ***Drawings/Figures*** for existing on-site easements.

The existing site grades range from approximately 73.13m to 75.31m from the northeast to the southwest corner of the property resulting is a grade change of approximately 2.18m.

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

**Draper Avenue**

- 200 mm diameter CI watermain
- 450 mm diameter concrete storm sewer tributary to Ottawa Central sub-watershed
- 225 mm diameter concrete sanitary sewer tributary to the Pinecrest Collector

**Morrison Drive**

- 200mm diameter CI watermain
- 300 mm diameter storm sewer, within Morrison Drive, tributary to Ottawa Central sub-watershed
- 300 mm diameter storm sewer, within the subject site, tributary to Ottawa Central sub-watershed
- 225 mm diameter concrete sanitary sewer, within Morrison Drive, tributary to the Pinecrest Collector
- 200 mm diameter concrete sanitary sewer, within the subject site, tributary to the Pinecrest Collector


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## 1.2 Required Permits / Approvals

The proposed development is subject to the site plan control approval process. The City of Ottawa must approve the engineering design drawings and reports prior to the issuance of site plan control.

The Ministry of the Environment and Climate Change was contacted to determine whether an Environmental Compliance Application (ECA) would be required for the proposed development. No response was received at time of publication. Correspondence with the MOECC is included in ***Appendix A***.

## 1.3 Pre-consultation

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

## 1.4 List of Proposed Deviations

The proposed average daily demand for sanitary flow rate has been revised from the current 350 L/person/day to 280 L/person/day in line with the anticipated updates to ***City Standards***.


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# 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, July 2010.
  ***(Water Supply Guidelines)***

  - **Technical Bulletin ISD-2010-2**
    City of Ottawa, December 15, 2010.
    ***(*ISD-2010-2*)***

  - **Technical Bulletin ISDTB-2014-02**
    City of Ottawa, May 27, 2014.
    ***(*ISDTB-2014-02*)***

- **Design Guidelines for Sewage Works,**
  Ministry of the Environment, 2008.
  ***(MOE* Design Guidelines*)***

- **Stormwater Planning and Design Manual,**
  Ministry of the Environment, March 2003.
  ***(SWMP Design Manual)***

- **Ontario Building Code Compendium**
  Ministry of Municipal Affairs and Housing Building Development Branch, January 1, 2010 Update
  ***(OBC)***

- **Water Supply for Public Fire Protection**
  Fire Underwriters Survey, 1999.
  ***(FUS)***

- **Morrison Court Development Wastewater Servicing Study**
  Novatech Engineering Consultants Ltd., January 2009
  ***(Existing Wastewater Study)***


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- **Geotechnical Investigation, Residential Development, Morrison Drive at Draper Avenue, Ottawa, Ontario**
  Paterson Group, Inc., October 2015
  ***(Geotechnical Investigation)***


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# 3.0 WATER SUPPLY SERVICING

## 3.1 Existing Water Supply Services

The subject property lies within the City of Ottawa 1W pressure zone, as shown by the Pressure Zone Map in ***Appendix B***. Potable water is available to the Phase III development via an existing 200mm CI watermain on Morrison Drive and an existing 200mm CI watermain on Draper Avenue.

## 3.2 Water Supply Servicing Design

It is proposed that the development will have an internal watermain network with a connection to the existing 200 mm diameter watermain within Draper Avenue and two connections to the existing 200 mm diameter watermain within Morrison Drive to provide adequate pressure and supply to the development. Townhomes fronting Draper Avenue, Block 1, 2, and 6 will have independent connections to the existing infrastructure within the Draper Avenue right-of-way via 19mm diameter service laterals. The remaining Blocks will have connections to the internal watermain via 19mm diameter service laterals.

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

**Table 1**
**Water Supply Design Criteria**

| Design Parameter | Value |
|---|---|
| Residential Townhome | 2.7 P/unit |
| Residential 1 Bedroom Apartment | 1.4 P/unit |
| Residential 2 Bedroom Apartment | 2.1 P/unit |
| Residential Average Daily Demand | 350 L/d/P |
| Residential Maximum Daily Demand | 3.6 x Average Daily * |
| Residential Maximum Hourly | 5.4 x Average Daily * |
| Minimum Watermain Size | 150mm diameter |
| Minimum Depth of Cover | 2.4m from top of watermain to finished grade |
| During normal operating conditions desired operating pressure is within | 350kPa and 480kPa |
| During normal operating conditions pressure must not drop below | 275kPa |
| During normal operating conditions pressure must not exceed | 552kPa |
| During fire flow operating pressure must not drop below | 140kPa |

**Daily average based on Appendix 4-A from **Water Supply Guidelines***
*** 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 water supply demand and boundary conditions for the proposed development based on the ***Water Supply Guidelines***.


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**Table 2**
**Water Demand**
**Proposed Site Conditions – Phase III**

| Design Parameter | Anticipated Demand[1] (L/min) | Boundary Condition[2] Connection 1 (m $H_2O$ / kPa) | Boundary Condition[2] Connection 2 (m $H_2O$ / kPa) |
|---|---|---|---|
| Average Daily Demand | 59.1 | 43.9 / 430.7 | 43.6 / 428.0 |
| Max Day + Fire Flow | 212.6 + 12,000 = 12,173.3 | 43.4 / 425.8 | 43.2 / 424.1 |
| Peak Hour | 318.9 | 34.0 / 333.5 | 33.7 / 330.9 |

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 71.9m and 72.17m for Connection 1 and 2, respectively. See ***Appendix B.***

Fire flow requirements are to be determined in accordance with Local Guidelines (***FUS***), City of Ottawa ***Water Supply Guidelines***, and the Ontario Building Code.

Using the ***FUS*** method a conservative estimation of fire flow had been established. The following assumptions were assumed:

- Type of construction - Ordinary Construction
- Occupancy type – Combustible
- Sprinkler Protection – Non-Sprinkler System

The above assumptions result in an estimated fire flow of approximately ***12,000 L/min***, actual building materials selected will affect the estimated flow.

The City of Ottawa was contacted to obtain boundary conditions associated with the estimated water demand as indicated in the boundary request correspondence included in ***Appendix B***.

The City provided both the anticipated minimum and maximum water pressures, as well as the estimated water pressure during fire flow demand for the demands as indicated by the correspondence in ***Appendix B***. The minimum and maximum pressures fall within the required range identified in ***Table 1***.

### 3.3 EPANet Water Modelling

EPANet was utilized to determine pipe sizing and the availability of pressures throughout the system during average day demand, max day plus fire flow, and peak hour demands. The static model determines pressures based on the available head obtained from the boundary conditions provided by the City of Ottawa, as indicated in ***Table 2***.

The model utilizes the Hazen-Williams equation to determine pressure drop, while the pipe properties, including friction factors, have been selected in accordance with Table 4.4 of the ***Water Supply Guidelines***. The model was prepared to assess the available


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pressure at the finished first floor of each building as well as the pressures the watermain provided to fire hydrants during fire flow conditions.

For the purposes of providing sufficient fire flow, FHYD1, FHYD2, and the existing hydrants along Draper Avenue and Morrison Drive are available within 90m to provide ***6,000 L/min***, for a total of ***12,000 L/min*** to each townhome.

***Table 3*** summarizes the model results. ***Appendix B*** contains output reports and model schematics for each scenario.

**Table 3: Model Simulation Output Summary**

| Location | Average Day (kPa) | Max Day + Fire Flow (kPa) | Peak Hour (kPa) |
|---|---|---|---|
| 4 | 440.5 | 415.1 | 343.4 |
| 5 | 435.8 | 407.4 | 338.6 |
| 7 | 432.2 | 401.0 | 335.1 |
| 8 | 434.7 | 403.5 | 337.6 |
| 9 | 443.3 | 425.1 | 346.2 |
| 10 | 441.8 | 411.1 | 344.7 |
| 11 | 440.5 | 422.0 | 342.9 |
| 12 | 439.0 | 408.0 | 341.4 |
| 13 | 437.3 | 409.5 | 339.7 |
| 14 | 432.9 | 417.4 | 335.3 |
| 15 | 430.9 | 405.9 | 333.2 |
| 16 | 428.7 | 394.0 | 331.1 |
| 17 | 440.0 | 412.3 | 342.9 |
| 18 | 435.8 | 420.5 | 338.6 |
| 19 | 433.8 | 409.1 | 336.7 |
| 20 | 431.3 | 396.8 | 334.2 |
| 21 | 432.5 | 416.8 | 334.5 |
| 22 | 431.2 | 406.1 | 333.2 |
| 23 | 428.9 | 394.0 | 330.9 |
| 24 | 438.6 | 413.0 | 340.9 |
| 25 | 429.1 | 397.6 | 331.4 |
| 26 | 439.9 | 421.2 | 341.9 |
| 27 | 438.6 | 407.5 | 340.6 |
| 28 | 436.5 | 408.5 | 338.5 |
| 29 | 435.7 | 404.2 | 338.0 |
| FHYD1 | 441.5 | 380.1 | 344.3 |
| FHYD2 | 431.4 | 365.2 | 334.3 |
| † indicates pressures exceeded required pressure values as outlined in ***Table 1*** | | | |

***Table 4*** summarizes the water age model results. ***Appendix B*** contains output reports and model schematics for each scenario.


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**Table 4: Model Simulation Output – Water Age Summary**

| Location | Average Day | Max Day + Fire Flow | Peak Hour |
|---|---|---|---|
| | (hr) | (hr) | (hr) |
| 4 | 0.50-1 | 0-0.50 | 0-0.50 |
| 5 | 1.0-3.0 | 0-0.50 | 0-0.50 |
| 7 | 3.0-7.0 | 0-0.50 | 0.50-1.0 |
| 8 | 3.0-7.0 | 1.0-3.0 | 1.0-3.0 |
| 9 | 0.50-1 | 0-0.50 | 0-0.50 |
| 10 | 1.0-3.0 | 0-0.50 | 0-0.50 |
| 11 | 0.50-1 | 0-0.50 | 0-0.50 |
| 12 | 1.0-3.0 | 0-0.50 | 0.50-1.0 |
| 13 | 3.0-7.0 | 0-0.50 | 0.50-1.0 |
| 14 | 1.0-3.0 | 0-0.50 | 0-0.50 |
| 15 | 1.0-3.0 | 0-0.50 | 0.50-1.0 |
| 16 | 3.0-7.0 | 0-0.50 | 1.0-3.0 |
| 17 | 3.0-7.0 | 0-0.50 | 0.50-1.0 |
| 18 | 0.50-1 | 0-0.50 | 0-0.50 |
| 19 | 1.0-3.0 | 0-0.50 | 0-0.50 |
| 20 | 3.0-7.0 | 0-0.50 | 1.0-3.0 |
| 21 | 1.0-3.0 | 0-0.50 | 0-0.50 |
| 22 | 1.0-3.0 | 0-0.50 | 0.50-1.0 |
| 23 | 3.0-7.0 | 0-0.50 | 1.0-3.0 |
| 24 | 1.0-3.0 | 0-0.50 | 0-0.50 |
| 25 | 3.0-7.0 | 1.0-3.0 | 1.0-3.0 |
| 26 | 0.50-1 | 0-0.50 | 0-0.50 |
| 27 | 1.0-3.0 | 0-0.50 | 0.50-1.0 |
| 28 | 3.0-7.0 | 0-0.50 | 0.50-1.0 |
| 29 | 3.0-7.0 | 0-0.50 | 0.50-1.0 |

As demonstrated by ***Table 4***, water age within the proposed system does not exceed 7 hours.

The model indicates that pressure within the watermain network are within ***City Standards***.

## 3.4 Water Supply Conclusion

The FUS assumptions result in an estimated fire flow of approximately ***12,000 L/min***. The proposed average day water supply demand for the development based on the site plan is calculated to be ***59.1 L/min***.

Based on the EPANET model, pressures during average day, max day + fire flow and peak hour, and peak hour respect the requirements of the ***Water Supply Guidelines***.

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


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# 4.0 WASTEWATER SERVICING

## 4.1 Existing Wastewater Services

The subject site lies within the Pinecrest Collector Sewer catchment area, as shown by the City sewer mapping included in ***Appendix C***. An existing 225 mm diameter sanitary sewer within Draper Avenue and a 225mm and 200mm diameter sanitary sewer within Morrison Drive is available to service the proposed development.

The existing site consists of residential units contributing wastewater to the local Draper Avenue and Morrison Drive sewer system. The sanitary sewers are tributary to the Pinecrest Trunk Collector sewer approximately 1.4km downstream of the site.

An assessment of the existing Morrison drive sanitary sewer capacity was conducted for the Phase I and Phase II development; the analysis identified that there is an available capacity of ***8.0 L/s***. Refer to Section 4.3 for further discussion.

***Table 5*** demonstrate the anticipated peak flow from the existing development prior to Phase I and Phase II. See ***Appendix C*** for associated calculations.

**Table 5**
**Summary of Existing Peak Wastewater Flow**

| Design Parameter | Total Flow (L/s) |
|---|---|
| Estimated Average Dry Weather Flow | 0.92 |
| Estimated Peak Dry Weather Flow | 3.68 |
| Estimated Peak Wet Weather Flow | 4.27 |

## 4.2 Wastewater Design

It is proposed that the development will have an internal sanitary sewer network with a connection to the existing 225 mm diameter sanitary sewer within Draper Avenue. Townhomes fronting Draper Avenue, Block 1, 2, and 6, will have independent connections to the existing 225mm diameter sanitary sewer within Draper Avenue via 135mm diameter service laterals. The remaining Blocks will have connections to the internal network via 135mm diameter service laterals. Sanitary calculation sheet employed in the design of the internal network is included in ***Appendix C***.

***Table 6*** summarizes the ***City Standards*** employed in the design of the proposed wastewater sewer system.


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**Table 6**
**Wastewater Design Criteria**

| Design Parameter | Value |
|---|---|
| Residential Townhome | 2.7 P/unit |
| Residential 1 Bedroom Apartment | 1.4 P/unit |
| Residential 2 Bedroom Apartment | 2.1 P/unit |
| Existing Average Daily Demand | 350 L/d/per |
| Proposed Average Daily Demand * | 280 L/d/per |
| 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 Sewer Size | 250mm 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*
*Please note that the residential average daily flow uses 280 L/person/d in line with proposed updates to City Design Guidelines.

***Table 7*** and ***8*** demonstrate the estimated peak flow from the proposed development. See ***Appendix C*** for associated calculations.

**Table 7**
**Summary of Estimated Peak Wastewater Flow – Phase III**

| Design Parameter | Total Flow (L/s) |
|---|---|
| Estimated Average Dry Weather Flow | 0.79 |
| Estimated Peak Dry Weather Flow | 3.15 |
| Estimated Peak Wet Weather Flow | 3.52 |

**Table 8**
**Summary of Estimated Peak Wastewater Flow – Ultimate**

| Design Parameter | Total Flow (L/s) |
|---|---|
| Estimated Average Dry Weather Flow | 1.67 |
| Estimated Peak Dry Weather Flow | 6.49 |
| Estimated Peak Wet Weather Flow | 7.08 |

DSEL estimates the peak wet weather flow based on the development statistics provided by Roderick Lahey Architect Inc.


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## 4.3 Morrison Drive Sanitary Sewer HGL Assessment

A preliminary assessment of the existing Morrison drive sanitary sewer capacity was conducted by Novatech. This analysis is provided in ***Appendix C*** in the report *Morrison Court Development Wastewater Servicing* Study dated January 26, 2009. The Novatech study used GIS data provided by the City to model the existing sewer network. Their study found that under existing conditions, the minimum freeboard between the hydraulic grade line (HGL) and the lowest connected underside of footing (USF) elevation was **0.33m**.

To support this study, J.F. Sabourin and Associates (JFSA) was retained by Greatwise to re-create the Novatech model of the Morrison Drive sanitary sewer under both existing and proposed Phase I and Phase II conditions. JFSA recreated the Novatech model using XPSWMM, while Novatech had previously used H2OMAP Sewer/Pro. It was therefore anticipated that JFSA would arrive at slightly different results than Novatech when modelling the same system. In the JFSA model it was found that the minimum freeboard was **0.37m**.

To verify existing sanitary pipe inverts and sizes, Stantec Geomatics Ltd. (Stantec) was retained by Greatwise to conduct a field survey along the Morrison Drive sewer. Several differences were present between the existing conditions data provided by Novatech and the survey performed by Stantec. When the surveyed data was input into the model it was found that the minimum freeboard was **0.48m**.

In proposed Phase I and Phase II scenarios, it was found that the minimum freeboard between the HGL and the lowest connected USF was **0.44m**. This is greater than the City of Ottawa's minimum allowable value of 0.30m. An email report from JFSA as well as detailed modeling information is provided in ***Appendix C***.

Based on the previous HGL assessment and the email from JFSA dated January 21, 2013, included in the ***Appendix C***, an available capacity of ***8.0 L/s*** was identified. As a result, no changes to the downstream sanitary network is required at this time. As indicated by Table 5 and the ultimate condition sanitary calculation sheet included in ***Appendix C***, there is sufficient capacity to support the proposed ultimate development.

## 4.4 Wastewater Servicing Conclusions

The site is tributary to the Pinecrest Trunk Collector sewer; based on the sanitary analysis provided by JFSA, sufficient capacity is available to accommodate the estimated ***7.08 L/s*** peak wet weather flow from the proposed ultimate development.

The proposed wastewater design conforms to all relevant ***City Standards*** with the exception of the average daily demand which has been revised to 280 L/person/day in line with anticipated updates to City Standards.


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# 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 development 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 site is serviced by existing storm sewers which outlet to Morrison Drive and Draper Avenue. Drainage is routed north along Morrison Drive, then west to the outlet at a tributary to Graham Creek, approximately 1.5 km from the site.

It was assumed that the existing development contained no stormwater management controls for flow attenuation. The estimated pre-development peak flows for the 2, 5, and 100-year are summarized in ***Table 9***:

**Table 9**
**Summary of Existing Peak Storm Flow Rates**

| City of Ottawa Design Storm | Estimated Peak Flow Rate (L/s) |
|---|---|
| 2-year | 141.4 |
| 5-year | 191.6 |
| 100-year | 409.9 |

## 5.2 Post-development Stormwater Management Target

Stormwater management requirements for the proposed development were established using the City of Ottawa standards, where the proposed development is required to:

- Meet an allowable release rate based on a Rational Method Coefficient of 0.50, employing the City of Ottawa IDF parameters for a 5-year storm with a calculated time of concentration greater than or equal to 10 minutes.
- Attenuate all storms up to and including the City of Ottawa 100-year design event on site.
- Provide quality controls to an enhanced level of treatment due to the site's distance from the outlet and the current Site Plan; correspondence with the RVCA is included in ***Appendix A***.

Based on the above the allowable release rate for the proposed development is ***170.7 L/s***.


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## 5.3 Proposed Stormwater Management System

The proposed stormwater management system will include private catch basin and storm sewer system with an underground storage unit to achieve the target release rates. The stormwater management design consists of a private storm sewer system with a connection to the existing 450mm diameter storm sewer within the Draper Avenue right-of-way.

Townhomes fronting Draper Avenue, Block 1, 2, and 6, will have independent connections to the existing 450mm diameter storm sewer within Draper Avenue via 100mm diameter service laterals. The remaining Blocks will have connections to the internal network via 100mm diameter service laterals.

Area A1, shown by drawing ***SWM-1***, is tributary to the internal storm sewers connecting to Draper Avenue. ***309.0 m³*** of underground storage is provided via a Brentwood ST-30 and a Brentwood ST-18 or an approved equivalent storage system and will be attenuated by a ***185 mm*** ICD located in ***MH8***. Detailed calculations are located in ***Appendix D***.

To meet stormwater quality criteria specified by RVCA, an oil/grit separator will be installed downstream of all catch basins, as shown by ***SSP-1***. Based on Stormceptor sizing, a Stormceptor ***OSR 750*** will provide an enhanced level of quality control (80% TSS removal) in accordance with the RVCA requirement. Stormceptor sizing has been included in ***Appendix D***.

***Table 10*** summarize post-development flow rates.

**Table 10**
**Summary of Release Rates and Discharge Location**

| Control Area | 5-Year Release Rate | 5-Year Storage | 100-Year Release Rate | 100-Year Required Storage | 100-Year Available Storage |
|---|---|---|---|---|---|
| | (L/s) | ($m^3$) | (L/s) | ($m^3$) | ($m^3$) |
| Unattenuated Areas | 27.2 | 0.0 | 58.2 | 0.0 | 0.0 |
| Attenuated Areas | 89.3 | 101.4 | 111.0 | 304.0 | 309.0 |
| **Total** | **116.5** | **101.4** | **169.2** | **304.0** | **309.0** |

As demonstrated by ***Table 10***, ***304.0 m³*** of storage will be required on site to attenuate flow to the established release rate of ***170.7 L/s***; storage calculations are contained within ***Appendix D***.

## 5.4 Stormwater Servicing Conclusions

Post development stormwater runoff will be required to be restricted to the allowable target release rate for storm events up to and including the 100-year storm in accordance with City of Ottawa ***City Standards***. The post-development allowable release rate was calculated as ***170.7 L/s*** based on consultation with the City of Ottawa; ***304.0 m³*** will be required to meet this release rate.


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Based on consultation with the RVCA, stormwater quality controls to an enhanced level of treatment are required.

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.


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## 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 or an approved equivalent installed under the grate during construction to protect from silt entering the storm sewer system.

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

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

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

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.


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## 8.0 CONCLUSION AND RECOMMENDATIONS

David Schaeffer Engineering Ltd. (DSEL) has been retained by Greatwise Developments to prepare a Functional Servicing and Stormwater Management report in support of the application for a Site Plan Control (SPC) for the Phase III development at 2710 Draper 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 FUS method for estimating fire flow indicated ***12,000 L/min*** is required for the proposed development,
- The proposed average daily demand for sanitary flow rate has been revised from the current 350 L/person/day to 280 L/person/day in line with the anticipated updates to ***City Standards***;
- The proposed ultimate development is anticipated to have a peak wet weather flow of ***7.08 L/s***; Based on the sanitary analysis prepared by JFSA, the existing municipal sewer infrastructure has sufficient capacity to support the development;
- Based on consultation with the City of Ottawa, the proposed development will be required to attenuate post development flows to an equivalent release rate of ***170.7 L/s*** for all storms up to and including the 100-year storm event;
- Stormwater objectives will be met through storm water retention via subsurface storage, ***309.0 $m^3$*** underground storage system will be provided to attenuate flow to the established release rate above;
- Based on consultation with the RVCA, stormwater quality controls to an enhanced level of treatment are required, a Stormceptor has been provided to meet this requirement;
- The MOECC was contacted to determine whether an ECA would be required for the proposed development. No response was received at time of publication.


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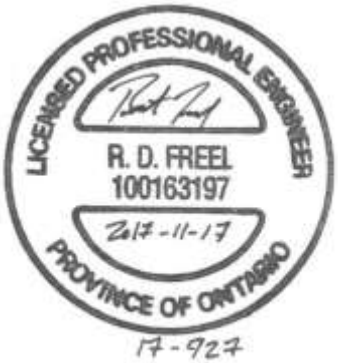
Prepared by,
**David Schaeffer Engineering Ltd.**

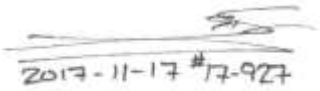
Per: Alison J. Gosling, EIT.

Prepared by,
***David Schaeffer Engineering Ltd.***




Per: Robert D. Freel, P. Eng.

Reviewed by,
**David Schaeffer Engineering Ltd.**




Per: Adam D. Fobert, P.Eng

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# *APPENDIX A*

## *Pre-Consultation*

# DEVELOPMENT SERVICING STUDY CHECKLIST

17-927 01/06/2017

| 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. | GP-1 |
| ☐ | Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts. | N/A |
| ☐ | Proposed phasing of the development, if applicable. | N/A |
| ☒ | Reference to geotechnical studies and recommendations concerning servicing. | Section 1.4 |
| ☒ | All preliminary and formal site plan submissions should have the following information:<br>-Metric scale<br>-North arrow (including construction North)<br>-Key plan<br>-Name and contact information of applicant and property owner<br>-Property limits including bearings and dimensions<br>-Existing and proposed structures and parking areas<br>-Easements, road widening and rights-of-way<br>-Adjacent street names | SSP-1 |

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


*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. | Section 6.0 |
| ☐ | 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 8.0 |
| ☐ | 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

## Alison Gosling

**From:** Jamie Batchelor <jamie.batchelor@rvca.ca>
**Sent:** Wednesday, October 18, 2017 11:49 AM
**To:** Alison Gosling
**Subject:** RE: 2710 Draper Avenue - RVCA

Hi Alison,

Thanks for providing the information and for the clarification on the stages. While there is no surface parking proposed in the traditional sense of a large parking lot, there are several driveways proposed which would be utilized for parking and the construction of new streets. Therefore the Conservation Authority would still advise the proponent that onsite water quality treatment of 80% TSS removal should be the water quality target for this site.

---

**From:** Alison Gosling [mailto:AGosling@dsel.ca]
**Sent:** Wednesday, October 18, 2017 10:35 AM
**To:** Jamie Batchelor <jamie.batchelor@rvca.ca>
**Subject:** RE: 2710 Draper Avenue - RVCA

Good morning Jamie,

As discussed, phase III of the development includes 91 townhome units and a community park post-development, with no proposed surface parking. The subject site contains 84 townhome pre-development, with surface parking.

Stormwater in the post-development will be runoff from rooftops and landscaped areas. It is not proposed to have surface ponding within the private streets.

Please note that Phase III will be independently serviced and not connected to the services within Phase I and Phase II.

Can you provide an updated recommendation regarding quality controls?

Thank you,

Alison Gosling, E.I.T.
Project Coordinator / Junior Designer

**DSEL**
**david schaeffer engineering ltd.**

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

**phone:** (613) 836-0856 ext.542
**fax**: (613) 836-7183
**email**: agosling@dsel.ca

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**From:** Jamie Batchelor [mailto:jamie.batchelor@rvca.ca]
**Sent:** Wednesday, June 21, 2017 2:19 PM
**To:** Alison Gosling <AGosling@dsel.ca>
**Subject:** RE: 2710 Draper Avenue - RVCA

Good Afternoon Alison,

Given that the site outlets to an existing storm sewer approximately 1.5 km to Graham Creek and there is no municipal facility which provides water quality treatment for the Stormwater entering the watercourse, we would advise the proponent that onsite water quality treatment of 80% TSS removal should be the water quality target for this site.

**From:** Alison Gosling [mailto:AGosling@dsel.ca]
**Sent:** Thursday, June 15, 2017 9:53 AM
**To:** Jamie Batchelor <jamie.batchelor@rvca.ca>
**Subject:** 2710 Draper Avenue - RVCA

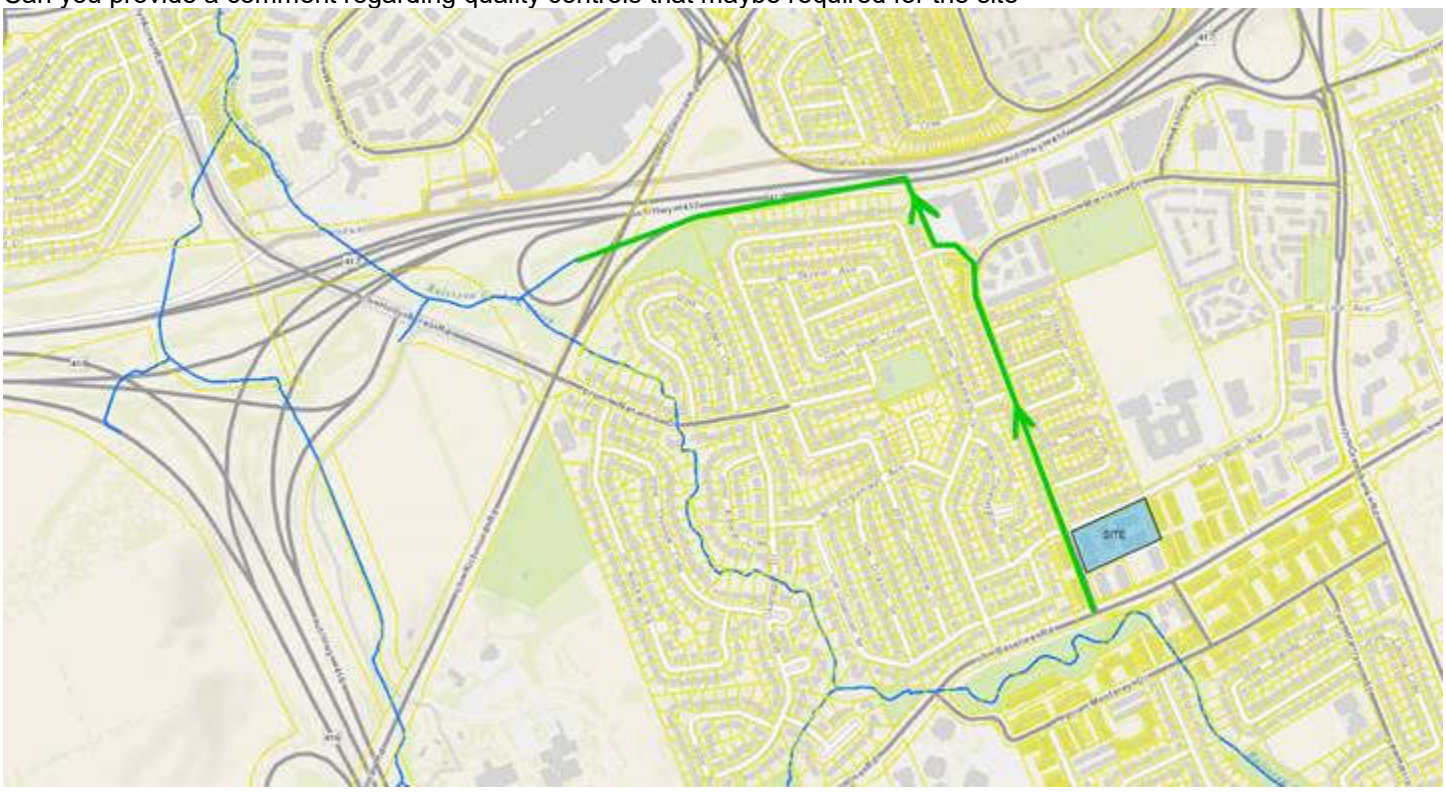
Good morning Jamie,

We wanted to touch base with you regarding a development we are working on located at 2710 Draper Avenue.

The stormwater collected from the site travels approximately 1.5 km to Graham Creek tributary to the Ottawa River.

The development proposes to construct a thirteen townhome blocks and a community park. The development will discharge stormwater to the existing 450 mm diameter storm sewer within Draper Avenue.

Can you provide a comment regarding quality controls that maybe required for the site




Thank you,

Alison Gosling, E.I.T.
Project Coordinator / Junior Designer

**DSEL**
**david schaeffer engineering ltd.**

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

**phone:** (613) 836-0856 ext.542
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**email**:  agosling@DSEL.ca

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## Alison Gosling

**From:** Alison Gosling
**Sent:** Tuesday, October 24, 2017 11:55 AM
**To:** moeccottawasewage@ontario.ca
**Cc:** 'Diamond, Emily (MOECC)'
**Subject:** 2710 Draper Avenue - ECA Requirement

Good afternoon,

We wanted to touch base with you regarding a proposed Phase III development at 2710 Draper Avenue.

The existing 1.3 ha site currently consists of a 84 townhome units and is zoned Residential. The development proposes to construct a 91 townhome units and a community park.

It appears that the existing stormwater management system currently directs flow towards the municipal infrastructure within Draper Avenue and Morrison Drive. Proposed stormwater controls will use subsurface storage to attenuate the release rate to City of Ottawa requirements.

As the proposed sewage works does not discharge to a combined sewer system, and is not proposed to be used for industrial purposes, it is assumed this falls within the exemption requirements set out in Ontario Regulation 525/98 as part of the Ontario Water Resources Act.

I hope you could comment on our assumption that this property would be exempt from requiring an ECA. Please feel free to call to discuss further.

Thank you,

Alison Gosling, E.I.T.

Project Coordinator / Junior Designer


# DSEL

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# *APPENDIX B*

## *Water Supply*

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

**Domestic Demand**

| Type of Housing | Per / Unit | Units | Pop |
|---|---|---|---|
| Single Family | 3.4 | | 0 |
| Semi-detached | 2.7 | | 0 |
| Townhouse | 2.7 | 84 | 227 |
| 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** | 227 | 79.5 | 55.2 | 286.0 | 198.6 | 429.0 | 297.9 |

**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** | **79.5** | **55.2** | **286.0** | **198.6** | **429.0** | **297.9** |

**2710 Draper Avenue**
**Proposed Site Conditions - Phase III**

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

**Domestic Demand**

| Type of Housing | Per / Unit | Units | Pop |
|---|---|---|---|
| Single Family | 3.4 | | 0 |
| Semi-detached | 2.7 | | 0 |
| Townhouse | 2.7 | 90 | 243 |
| 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** | 243 | 85.1 | 59.1 | 306.2 | 212.6 | 459.3 | 318.9 |

**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** | **85.1** | **59.1** | **306.2** | **212.6** | **459.3** | **318.9** |

**2710 Draper Avenue/2781 Baseline Road**
**Proposed Site Conditions - Ultimate**

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

**Domestic Demand**

| Type of Housing | Per / Unit | Units | Pop | |
|---|---|---|---|---|
| Single Family | 3.4 | | 0 | |
| Semi-detached | 2.7 | | 0 | |
| Townhouse | 2.7 | 90 | 243 | *Phase 3 Townhomes* |
| Apartment | | | 0 | |
| **Existing Building E** | | | | |
| 1 Bedroom | 1.4 | 56 | 79 | |
| 2 Bedroom | 2.1 | 24 | 51 | |
| **Building F** | | | | |
| 1 Bedroom | 1.4 | 34 | 48 | |
| 2 Bedroom | 2.1 | 36 | 76 | |

| | 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** | 497 | 174.0 | 120.8 | 504.5 | 350.3 | 748.0 | 519.4 |

**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 $L/m^2/d$ | 225 | 0.56 | 0.4 | 0.8 | 0.6 | 1.5 | 1.1 |
| Office | 75 $L/9.3m^2/d$ | 325 | 2.62 | 1.8 | 3.9 | 2.7 | 7.1 | 4.9 |
| 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** | | | 3.2 | 2.2 | 4.8 | 3.3 | 8.6 | 6.0 |
| **Total Demand** | | | **177.1** | **123.0** | **509.2** | **353.6** | **756.6** | **525.4** |

# 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: Ordinary Construction

| | | | |
|---|---|---|---|
| **C** | 1 | | *Type of Construction Coefficient per FUS Part II, Section 1* |
| **A** | 1083.0 | $m^2$ | *Total floor area based on FUS Part II section 1* |

| | | | |
|---|---|---|---|
| **Fire Flow** | 7240.0 | L/min | |
| | **7000.0** | **L/min** | *rounded to the nearest 1,000 L/min* |

## Adjustments

### 2. Reduction for Occupancy Type

| | | |
|---|---|---|
| Combustible | 0% | |
| **Fire Flow** | **7000.0** | **L/min** |

### 3. Reduction for Sprinkler Protection

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

### 4. Increase for Separation Distance

| | | | |
|---|---|---|---|
| **N** | 0m-3m | 25% | |
| **S** | 3.1m-10m | 20% | |
| **E** | 10.1m-20m | 15% | |
| **W** | 10.1m-20m | 15% | |
| | **% Increase** | **75%** | *value not to exceed 75% per FUS Part II, Section 4* |

| | | |
|---|---|---|
| **Increase** | **5250.0** | **L/min** |

## Total Fire Flow

| | | | |
|---|---|---|---|
| **Fire Flow** | 12250.0 | L/min | *fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section* |
| | **12000.0** | **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**

**Boundary Conditions Unit Conversion**

## Connection 1 (Draper Avenue)

| | Height (m) | Elevation (m | m $H_2O$ | PSI | kPa | | L/s | L/min |
|---|---|---|---|---|---|---|---|---|
| **Avg. DD** | 115.8 | 71.9 | 43.9 | 62.5 | 430.7 | Fire Flow @ 140kPa | 200 | 12000 |
| **Fire Flow** | 115.3 | 71.9 | 43.4 | 61.7 | 425.8 | | | |
| **Peak Hour** | 105.9 | 71.9 | 34.0 | 48.4 | 333.5 | | | |

## Connection 2 (Morrison Drive)

| | Height (m) | Elevation (m | m $H_2O$ | PSI | kPa | | L/s | L/min |
|---|---|---|---|---|---|---|---|---|
| **Avg. DD** | 115.8 | 72.2 | 43.6 | 62.1 | 428.0 | Fire Flow @ 140kPa | 200 | 12000 |
| **Fire Flow** | 115.4 | 72.2 | 43.2 | 61.5 | 424.1 | | | |
| **Peak Hour** | 105.9 | 72.2 | 33.7 | 48.0 | 330.9 | | | |

## Minor Loss Coefficients

| Fitting | Loss Coefficient |
|---|---|
| Globe valve, fully open | 10 |
| Angle valve, fully open | 5 |
| Swing check valve, fully open | 2.5 |
| Gate valve, fully open | 0.2 |
| Short-radius elbow | 0.9 |
| Medium-radius elbow | 0.8 |
| Long-radius elbow | 0.6 |
| 45 degree elbow | 0.4 |
| Closed return bend | 2.2 |
| Standard tee - flow through run | 0.6 |
| Standard tee - flow through branch | 1.8 |
| Square Entrance | 0.5 |
| Exit | 1 |

*Minor loss coefficients based on EPANET 2 USERS MANUAL, dated September 2000

## Pipe Diameter vs. "C" Factor

| Pipe Diameter (m) | C-Factor |
|---|---|
| 150 | 100 |
| 200 to 250 | 110 |
| 300 to 600 | 120 |
| Over 600 | 130 |

## Node Pressures

| Kpa | Pressure (kPa) | Pressure (m H20) |
|---|---|---|
| Max | 552 | 56.3 |
| Rec Max | 480 | 49.0 |
| Rec Min | 350 | 35.7 |
| Min | 275 | 28.1 |

| Location | Average Day (L/min) | Max Day + Fire Flow (L/min) | Peak Hour (L/min) |
|---|---|---|---|
| 4 | 2.6 | 9.5 | 14.2 |
| 5 | 0.0 | 0.0 | 0.0 |
| 7 | 2.6 | 9.5 | 14.2 |
| 8 | 2.6 | 9.5 | 14.2 |
| 9 | 6.6 | 23.6 | 35.4 |
| 10 | 6.6 | 23.6 | 35.4 |
| 11 | 0.7 | 2.4 | 3.5 |
| 12 | 0.7 | 2.4 | 3.5 |
| 13 | 0.7 | 2.4 | 3.5 |
| 14 | 0.7 | 2.4 | 3.5 |
| 15 | 0.7 | 2.4 | 3.5 |
| 16 | 0.7 | 2.4 | 3.5 |
| 17 | 9.8 | 35.4 | 53.2 |
| 18 | 5.9 | 21.3 | 31.9 |
| 19 | 5.9 | 21.3 | 31.9 |
| 20 | 6.6 | 23.6 | 35.4 |
| 21 | 0.7 | 2.4 | 3.5 |
| 22 | 0.7 | 2.4 | 3.5 |
| 23 | 0.7 | 2.4 | 3.5 |
| 24 | 0.7 | 2.4 | 3.5 |
| 25 | 0.7 | 2.4 | 3.5 |
| 26 | 0.7 | 2.4 | 3.5 |
| 27 | 0.7 | 2.4 | 3.5 |
| 28 | 0.7 | 2.4 | 3.5 |
| 29 | 0.7 | 2.4 | 3.5 |
| 29 | 0.0 | 6000 | 0.0 |
| FHYD1 | 0.0 | 6000 | 0.0 |

| Location | Average Day (kPa) | Max Day + Fire Flow (kPa) | Peak Hour (kPa) |
|---|---|---|---|
| 4 | 440.5 | 415.1 | 343.4 |
| 5 | 435.8 | 407.4 | 338.6 |
| 7 | 432.2 | 401.0 | 335.1 |
| 8 | 434.7 | 403.5 | 337.6 |
| 9 | 443.3 | 425.1 | 346.2 |
| 10 | 441.8 | 411.1 | 344.7 |
| 11 | 440.5 | 422.0 | 342.9 |
| 12 | 439.0 | 408.0 | 341.4 |
| 13 | 437.3 | 409.5 | 339.7 |
| 14 | 432.9 | 417.4 | 335.3 |
| 15 | 430.9 | 405.9 | 333.2 |
| 16 | 428.7 | 394.0 | 331.1 |
| 17 | 440.0 | 412.3 | 342.9 |
| 18 | 435.8 | 420.5 | 338.6 |
| 19 | 433.8 | 409.1 | 336.7 |
| 20 | 431.3 | 396.8 | 334.2 |
| 21 | 432.5 | 416.8 | 334.5 |
| 22 | 431.2 | 406.1 | 333.2 |
| 23 | 428.9 | 394.0 | 330.9 |
| 24 | 438.6 | 413.0 | 340.9 |
| 25 | 429.1 | 397.6 | 331.4 |
| 26 | 439.9 | 421.2 | 341.9 |
| 27 | 438.6 | 407.5 | 340.6 |
| 28 | 436.5 | 408.5 | 338.5 |
| 29 | 435.7 | 404.2 | 338.0 |
| FHYD1 | 441.5 | 380.1 | 344.3 |
| FHYD2 | 431.4 | 365.2 | 334.3 |

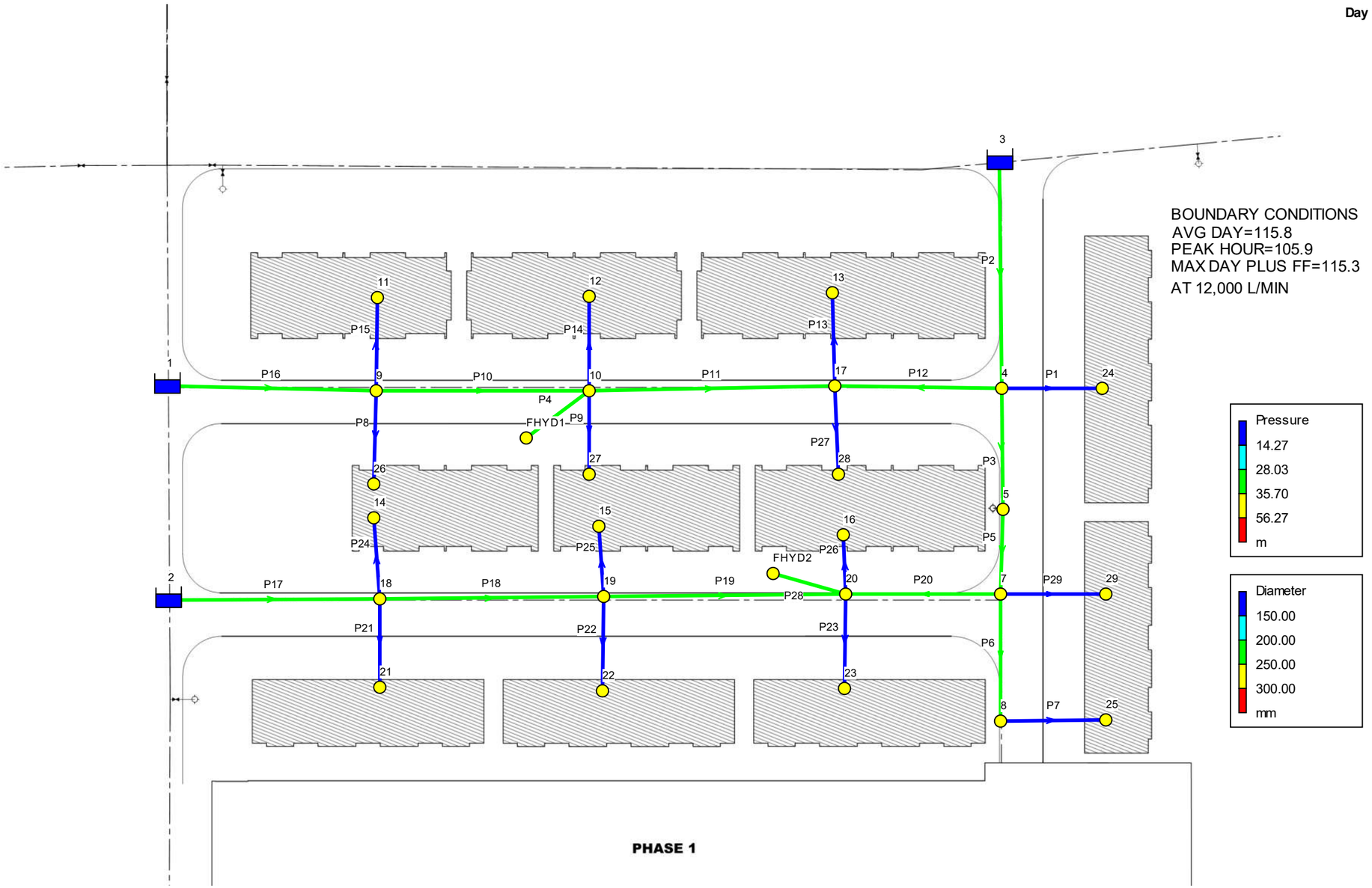
# 2710 DRAPER AVENUE PHASE III - AVERAGE DAY DEMAND

**Day 1, 12:00 AM**

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.4
AT 12,000 L/MIN

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.4
AT 12,000 L/MIN

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.3
AT 12,000 L/MIN



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

Input File: 2017-11-16_wtr_ajg.net

Link - Node Table:

| Link ID | Start Node | End Node | Length m | Diameter mm |
|---|---|---|---|---|
| P2 | 4 | 3 | 34.8 | 200 |
| P3 | 4 | 5 | 18.7 | 200 |
| P4 | 10 | FHYD1 | 1.2 | 200 |
| P5 | 5 | 7 | 14.2 | 200 |
| P6 | 7 | 8 | 25.2 | 200 |
| P10 | 9 | 10 | 35.1 | 200 |
| P11 | 10 | 17 | 39.7 | 200 |
| P12 | 17 | 4 | 24.7 | 200 |
| P13 | 17 | 13 | 6.1 | 19 |
| P14 | 10 | 12 | 6.1 | 19 |
| P15 | 9 | 11 | 6.1 | 19 |
| P16 | 9 | 1 | 29.3 | 200 |
| P17 | 2 | 18 | 33.3 | 200 |
| P18 | 18 | 19 | 36.4 | 200 |
| P19 | 19 | 20 | 38.4 | 200 |
| P20 | 20 | 7 | 20.5 | 200 |
| P21 | 18 | 21 | 10.8 | 19 |
| P22 | 19 | 22 | 10.8 | 19 |
| P23 | 20 | 23 | 10.8 | 19 |
| P24 | 18 | 14 | 6.1 | 19 |
| P25 | 19 | 15 | 6.1 | 19 |
| P26 | 20 | 16 | 6.1 | 19 |
| P1 | 4 | 24 | 6.7 | 19 |
| P7 | 8 | 25 | 6.7 | 19 |
| P8 | 9 | 26 | 10.6 | 19 |
| P9 | 10 | 27 | 10.6 | 19 |
| P27 | 17 | 28 | 10.6 | 19 |
| P28 | FHYD2 | 20 | 3 | 200 |
| P29 | 7 | 29 | 6.7 | 19 |

Page 2
Node Results:

| Node ID | Demand LPM | Head m | Pressure m | Quality hours | |
|---|---|---|---|---|---|
| 4 | 2.63 | 115.80 | 44.90 | 0.00 | |
| 5 | 0.00 | 115.80 | 44.42 | 0.00 | |
| FHYD1 | 0.00 | 115.80 | 45.00 | 0.00 | |
| 7 | 2.63 | 115.80 | 44.06 | 0.00 | |
| 8 | 2.63 | 115.80 | 44.31 | 0.00 | |
| 9 | 6.56 | 115.80 | 45.19 | 0.00 | |
| 10 | 6.56 | 115.80 | 45.04 | 0.00 | |
| 11 | 0.66 | 115.80 | 44.90 | 0.00 | |
| 12 | 0.66 | 115.80 | 44.75 | 0.00 | |
| 13 | 0.66 | 115.80 | 44.58 | 0.00 | |
| 14 | 0.66 | 115.80 | 44.13 | 0.00 | |
| 15 | 0.66 | 115.80 | 43.92 | 0.00 | |
| 16 | 0.66 | 115.80 | 43.70 | 0.00 | |
| 17 | 9.84 | 115.80 | 44.85 | 0.00 | |
| 18 | 5.91 | 115.80 | 44.42 | 0.00 | |
| 19 | 5.91 | 115.80 | 44.22 | 0.00 | |
| 20 | 6.56 | 115.80 | 43.97 | 0.00 | |
| 21 | 0.66 | 115.80 | 44.09 | 0.00 | |
| 22 | 0.66 | 115.80 | 43.96 | 0.00 | |
| 23 | 0.66 | 115.80 | 43.72 | 0.00 | |
| 24 | 0.66 | 115.80 | 44.71 | 0.00 | |
| 25 | 0.66 | 115.80 | 43.74 | 0.00 | |
| 26 | 0.66 | 115.80 | 44.84 | 0.00 | |
| 27 | 0.66 | 115.80 | 44.71 | 0.00 | |
| 28 | 0.66 | 115.80 | 44.50 | 0.00 | |
| FHYD2 | 0.00 | 115.80 | 43.98 | 0.00 | |
| 29 | 0.66 | 115.80 | 44.41 | 0.00 | |
| 1 | -19.59 | 115.80 | 0.00 | 0.00 | Reservoir |
| 2 | -19.45 | 115.80 | 0.00 | 0.00 | Reservoir |
| 3 | -20.09 | 115.80 | 0.00 | 0.00 | Reservoir |

Link Results:

| Link ID | Flow LPM | Velocity m/s | Unit Headloss m/km | Status |
|---|---|---|---|---|
| P2 | -20.09 | 0.01 | 0.00 | Open |
| P3 | 9.47 | 0.01 | 0.00 | Open |
| P4 | 0.00 | 0.00 | 0.00 | Open |
| P5 | 9.47 | 0.01 | 0.00 | Open |
| P6 | 3.29 | 0.00 | 0.00 | Open |

| | | | | |
|---|---|---|---|---|
| P10 | 11.71 | 0.01 | 0.00 | Open |
| P11 | 3.83 | 0.00 | 0.00 | Open |
| P12 | -7.33 | 0.00 | 0.00 | Open |
| P13 | 0.66 | 0.04 | 0.36 | Open |
| P14 | 0.66 | 0.04 | 0.36 | Open |
| P15 | 0.66 | 0.04 | 0.36 | Open |

Page 3

Link Results: (continued)

| Link ID | Flow LPM | VelocityUnit m/s | Headloss m/km | Status |
|---|---|---|---|---|
| P16 | -19.59 | 0.01 | 0.00 | Open |
| P17 | 19.45 | 0.01 | 0.00 | Open |
| P18 | 12.22 | 0.01 | 0.00 | Open |
| P19 | 4.99 | 0.00 | 0.00 | Open |
| P20 | -2.89 | 0.00 | 0.00 | Open |
| P21 | 0.66 | 0.04 | 0.35 | Open |
| P22 | 0.66 | 0.04 | 0.35 | Open |
| P23 | 0.66 | 0.04 | 0.35 | Open |
| P24 | 0.66 | 0.04 | 0.36 | Open |
| P25 | 0.66 | 0.04 | 0.36 | Open |
| P26 | 0.66 | 0.04 | 0.36 | Open |
| P1 | 0.66 | 0.04 | 0.36 | Open |
| P7 | 0.66 | 0.04 | 0.36 | Open |
| P8 | 0.66 | 0.04 | 0.35 | Open |
| P9 | 0.66 | 0.04 | 0.35 | Open |
| P27 | 0.66 | 0.04 | 0.35 | Open |
| P28 | 0.00 | 0.00 | 0.00 | Open |
| P29 | 0.66 | 0.04 | 0.36 | Open |

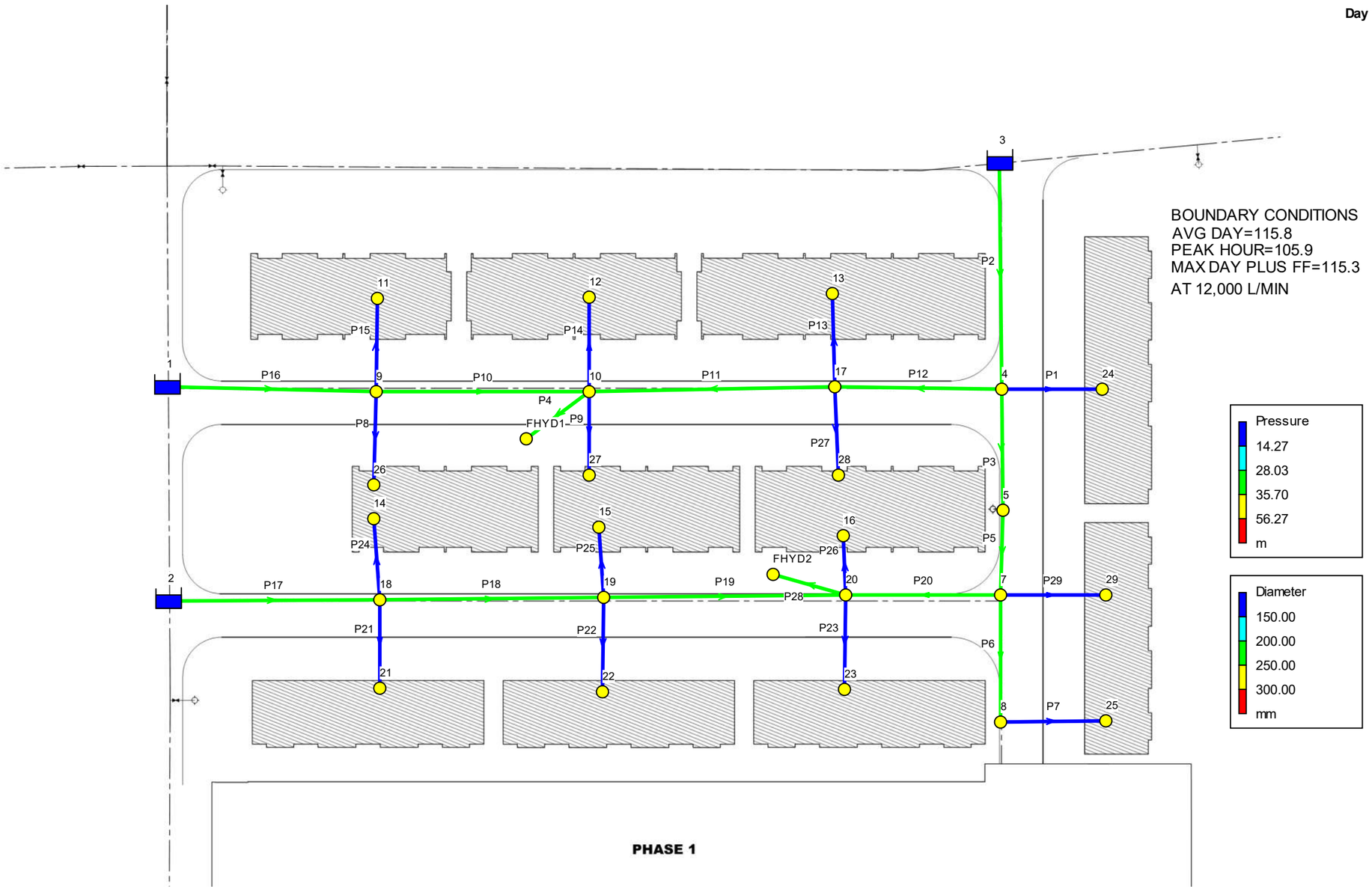
# 2710 DRAPER AVENUE PHASE III - MAX DAY + FIRE FLOW DEMAND

**Day 1, 12:00 AM**

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.4
AT 12,000 L/MIN

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.4
AT 12,000 L/MIN

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.3
AT 12,000 L/MIN




Pressure
14.27
28.03
35.70
56.27
m

Diameter
150.00
200.00
250.00
300.00
mm

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

Input File: 2017-11-16_wtr_ajg.net

Link - Node Table:

| Link ID | Start Node | End Node | Length m | Diameter mm |
|---|---|---|---|---|
| P2 | 4 | 3 | 34.8 | 200 |
| P3 | 4 | 5 | 18.7 | 200 |
| P4 | 10 | FHYD1 | 1.2 | 200 |
| P5 | 5 | 7 | 14.2 | 200 |
| P6 | 7 | 8 | 25.2 | 200 |
| P10 | 9 | 10 | 35.1 | 200 |
| P11 | 10 | 17 | 39.7 | 200 |
| P12 | 17 | 4 | 24.7 | 200 |
| P13 | 17 | 13 | 6.1 | 19 |
| P14 | 10 | 12 | 6.1 | 19 |
| P15 | 9 | 11 | 6.1 | 19 |
| P16 | 9 | 1 | 29.3 | 200 |
| P17 | 2 | 18 | 33.3 | 200 |
| P18 | 18 | 19 | 36.4 | 200 |
| P19 | 19 | 20 | 38.4 | 200 |
| P20 | 20 | 7 | 20.5 | 200 |
| P21 | 18 | 21 | 10.8 | 19 |
| P22 | 19 | 22 | 10.8 | 19 |
| P23 | 20 | 23 | 10.8 | 19 |
| P24 | 18 | 14 | 6.1 | 19 |
| P25 | 19 | 15 | 6.1 | 19 |
| P26 | 20 | 16 | 6.1 | 19 |
| P1 | 4 | 24 | 6.7 | 19 |
| P7 | 8 | 25 | 6.7 | 19 |
| P8 | 9 | 26 | 10.6 | 19 |
| P9 | 10 | 27 | 10.6 | 19 |
| P27 | 17 | 28 | 10.6 | 19 |
| P28 | FHYD2 | 20 | 3 | 200 |
| P29 | 7 | 29 | 6.7 | 19 |

Page 2
Node Results:

| Node ID | Demand LPM | Head m | Pressure m | Quality hours | |
|---|---|---|---|---|---|
| 4 | 9.45 | 113.16 | 42.26 | 0.00 | |
| 5 | 0.00 | 112.87 | 41.49 | 0.00 | |
| FHYD1 | 6000.00 | 109.51 | 38.71 | 0.00 | |
| 7 | 9.45 | 112.57 | 40.83 | 0.00 | |
| 8 | 9.45 | 112.57 | 41.08 | 0.00 | |
| 9 | 23.63 | 113.92 | 43.31 | 0.00 | |
| 10 | 23.63 | 112.63 | 41.87 | 0.00 | |
| 11 | 2.36 | 113.90 | 43.00 | 0.00 | |
| 12 | 2.36 | 112.61 | 41.56 | 0.00 | |
| 13 | 2.36 | 112.92 | 41.70 | 0.00 | |
| 14 | 2.36 | 114.21 | 42.54 | 0.00 | |
| 15 | 2.36 | 113.23 | 41.35 | 0.00 | |
| 16 | 2.36 | 112.22 | 40.12 | 0.00 | |
| 17 | 35.44 | 112.94 | 41.99 | 0.00 | |
| 18 | 21.26 | 114.23 | 42.85 | 0.00 | |
| 19 | 21.26 | 113.25 | 41.67 | 0.00 | |
| 20 | 23.63 | 112.24 | 40.41 | 0.00 | |
| 21 | 2.36 | 114.19 | 42.48 | 0.00 | |
| 22 | 2.36 | 113.21 | 41.37 | 0.00 | |
| 23 | 2.36 | 112.20 | 40.12 | 0.00 | |
| 24 | 2.36 | 113.13 | 42.04 | 0.00 | |
| 25 | 2.36 | 112.55 | 40.49 | 0.00 | |
| 26 | 2.36 | 113.88 | 42.92 | 0.00 | |
| 27 | 2.36 | 112.59 | 41.50 | 0.00 | |
| 28 | 2.36 | 112.90 | 41.60 | 0.00 | |
| FHYD2 | 6000.00 | 109.01 | 37.19 | 0.00 | |
| 29 | 2.36 | 112.55 | 41.16 | 0.00 | |
| 1 | -4223.11 | 115.40 | 0.00 | 0.00 | Reservoir |
| 2 | -3572.35 | 115.40 | 0.00 | 0.00 | Reservoir |
| 3 | -4417.14 | 115.30 | 0.00 | 0.00 | Reservoir |

Link Results:

| Link ID | Flow LPM | VelocityUnit m/s | Headloss m/km | Status |
|---|---|---|---|---|
| P2 | -4417.14 | 2.34 | 61.51 | Open |
| P3 | 2531.58 | 1.34 | 15.71 | Open |
| P4 | 6000.00 | 3.18 | 2600.71 | Open |
| P5 | 2531.58 | 1.34 | 20.53 | Open |
| P6 | 11.81 | 0.01 | 0.00 | Open |

| | | | | |
|---|---|---|---|---|
| P10 | 4194.76 | 2.23 | 36.83 | Open |
| P11 | -1833.59 | 0.97 | 7.75 | Open |
| P12 | -1873.75 | 0.99 | 8.94 | Open |
| P13 | 2.36 | 0.14 | 3.87 | Open |
| P14 | 2.36 | 0.14 | 3.87 | Open |
| P15 | 2.36 | 0.14 | 3.87 | Open |



Link Results: (continued)

| Link ID | Flow LPM | VelocityUnit m/s | Headloss m/km | Status |
|---|---|---|---|---|
| P16 | -4223.11 | 2.24 | 50.38 | Open |
| P17 | 3572.35 | 1.90 | 35.14 | Open |
| P18 | 3546.37 | 1.88 | 26.80 | Open |
| P19 | 3520.39 | 1.87 | 26.28 | Open |
| P20 | -2507.96 | 1.33 | 16.06 | Open |
| P21 | 2.36 | 0.14 | 3.73 | Open |
| P22 | 2.36 | 0.14 | 3.73 | Open |
| P23 | 2.36 | 0.14 | 3.73 | Open |
| P24 | 2.36 | 0.14 | 3.87 | Open |
| P25 | 2.36 | 0.14 | 3.87 | Open |
| P26 | 2.36 | 0.14 | 3.87 | Open |
| P1 | 2.36 | 0.14 | 3.84 | Open |
| P7 | 2.36 | 0.14 | 3.84 | Open |
| P8 | 2.36 | 0.14 | 3.73 | Open |
| P9 | 2.36 | 0.14 | 3.73 | Open |
| P27 | 2.36 | 0.14 | 3.73 | Open |
| P28 | -6000.00 | 3.18 | 1078.15 | Open |
| P29 | 2.36 | 0.14 | 3.84 | Open |

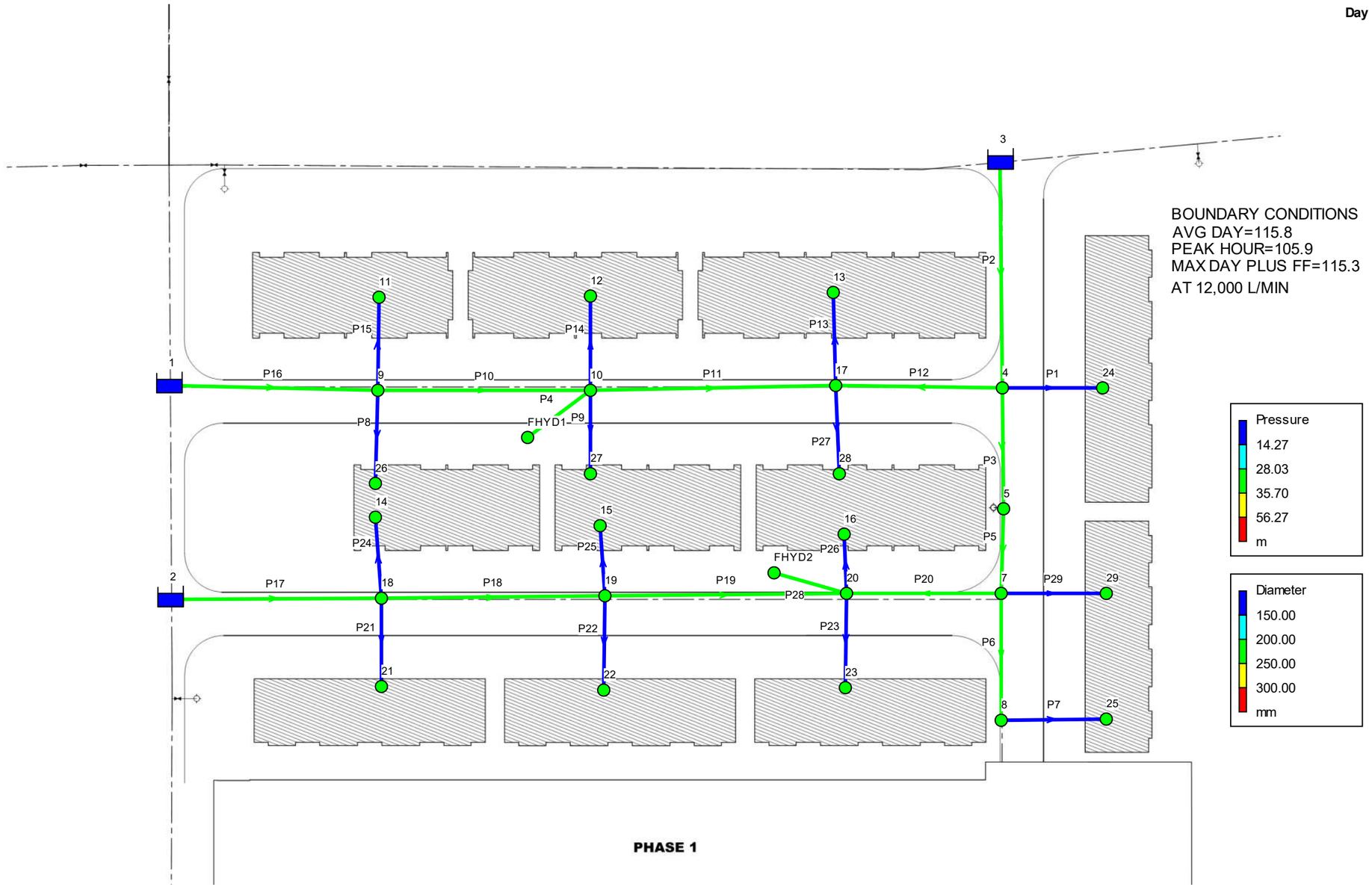
# 2710 DRAPER AVENUE PHASE III - PEAK HOUR DEMAND

Day 1, 12:00 AM

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.4
AT 12,000 L/MIN

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.3
AT 12,000 L/MIN

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.4
AT 12,000 L/MIN



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

Input File: 2017-11-16_wtr_ajg.net
```

Link - Node Table:

| Link ID | Start Node | End Node | Length m | Diameter mm |
|---|---|---|---|---|
| P2 | 4 | 3 | 34.8 | 200 |
| P3 | 4 | 5 | 18.7 | 200 |
| P4 | 10 | FHYD1 | 1.2 | 200 |
| P5 | 5 | 7 | 14.2 | 200 |
| P6 | 7 | 8 | 25.2 | 200 |
| P10 | 9 | 10 | 35.1 | 200 |
| P11 | 10 | 17 | 39.7 | 200 |
| P12 | 17 | 4 | 24.7 | 200 |
| P13 | 17 | 13 | 6.1 | 19 |
| P14 | 10 | 12 | 6.1 | 19 |
| P15 | 9 | 11 | 6.1 | 19 |
| P16 | 9 | 1 | 29.3 | 200 |
| P17 | 2 | 18 | 33.3 | 200 |
| P18 | 18 | 19 | 36.4 | 200 |
| P19 | 19 | 20 | 38.4 | 200 |
| P20 | 20 | 7 | 20.5 | 200 |
| P21 | 18 | 21 | 10.8 | 19 |
| P22 | 19 | 22 | 10.8 | 19 |
| P23 | 20 | 23 | 10.8 | 19 |
| P24 | 18 | 14 | 6.1 | 19 |
| P25 | 19 | 15 | 6.1 | 19 |
| P26 | 20 | 16 | 6.1 | 19 |
| P1 | 4 | 24 | 6.7 | 19 |
| P7 | 8 | 25 | 6.7 | 19 |
| P8 | 9 | 26 | 10.6 | 19 |
| P9 | 10 | 27 | 10.6 | 19 |
| P27 | 17 | 28 | 10.6 | 19 |
| P28 | FHYD2 | 20 | 3 | 200 |
| P29 | 7 | 29 | 6.7 | 19 |

Page 2
Node Results:

| Node ID | Demand LPM | Head m | Pressure m | Quality hours | |
|---|---|---|---|---|---|
| 4 | 14.18 | 105.90 | 35.00 | 0.00 | |
| 5 | 0.00 | 105.90 | 34.52 | 0.00 | |
| FHYD1 | 0.00 | 105.90 | 35.10 | 0.00 | |
| 7 | 14.18 | 105.90 | 34.16 | 0.00 | |
| 8 | 14.18 | 105.90 | 34.41 | 0.00 | |
| 9 | 35.44 | 105.90 | 35.29 | 0.00 | |
| 10 | 35.44 | 105.90 | 35.14 | 0.00 | |
| 11 | 3.54 | 105.85 | 34.95 | 0.00 | |
| 12 | 3.54 | 105.85 | 34.80 | 0.00 | |
| 13 | 3.54 | 105.85 | 34.63 | 0.00 | |
| 14 | 3.54 | 105.85 | 34.18 | 0.00 | |
| 15 | 3.54 | 105.85 | 33.97 | 0.00 | |
| 16 | 3.54 | 105.85 | 33.75 | 0.00 | |
| 17 | 53.16 | 105.90 | 34.95 | 0.00 | |
| 18 | 31.89 | 105.90 | 34.52 | 0.00 | |
| 19 | 31.89 | 105.90 | 34.32 | 0.00 | |
| 20 | 35.44 | 105.90 | 34.07 | 0.00 | |
| 21 | 3.54 | 105.81 | 34.10 | 0.00 | |
| 22 | 3.54 | 105.81 | 33.97 | 0.00 | |
| 23 | 3.54 | 105.81 | 33.73 | 0.00 | |
| 24 | 3.54 | 105.84 | 34.75 | 0.00 | |
| 25 | 3.54 | 105.84 | 33.78 | 0.00 | |
| 26 | 3.54 | 105.81 | 34.85 | 0.00 | |
| 27 | 3.54 | 105.81 | 34.72 | 0.00 | |
| 28 | 3.54 | 105.81 | 34.51 | 0.00 | |
| FHYD2 | 0.00 | 105.90 | 34.08 | 0.00 | |
| 29 | 3.54 | 105.84 | 34.45 | 0.00 | |
| 1 | -106.05 | 105.90 | 0.00 | 0.00 | Reservoir |
| 2 | -105.30 | 105.90 | 0.00 | 0.00 | Reservoir |
| 3 | -107.55 | 105.90 | 0.00 | 0.00 | Reservoir |

Link Results:

| Link ID | Flow LPM | Velocity m/s | Unit Headloss m/km | Status |
|---|---|---|---|---|
| P2 | -107.55 | 0.06 | 0.05 | Open |
| P3 | 50.60 | 0.03 | 0.01 | Open |
| P4 | 0.00 | 0.00 | 0.00 | Open |
| P5 | 50.60 | 0.03 | 0.01 | Open |
| P6 | 17.72 | 0.01 | 0.00 | Open |

| | | | | |
|---|---|---|---|---|
| P10 | 63.53 | 0.03 | 0.01 | Open |
| P11 | 21.01 | 0.01 | 0.00 | Open |
| P12 | -39.23 | 0.02 | 0.01 | Open |
| P13 | 3.54 | 0.21 | 8.24 | Open |
| P14 | 3.54 | 0.21 | 8.24 | Open |
| P15 | 3.54 | 0.21 | 8.24 | Open |

Page 3
Link Results: (continued)

| Link ID | Flow LPM | Velocity m/s | Unit Headloss m/km | Status |
|---|---|---|---|---|
| P16 | -106.05 | 0.06 | 0.05 | Open |
| P17 | 105.30 | 0.06 | 0.04 | Open |
| P18 | 66.33 | 0.04 | 0.02 | Open |
| P19 | 27.36 | 0.01 | 0.00 | Open |
| P20 | -15.16 | 0.01 | 0.00 | Open |
| P21 | 3.54 | 0.21 | 7.92 | Open |
| P22 | 3.54 | 0.21 | 7.92 | Open |
| P23 | 3.54 | 0.21 | 7.92 | Open |
| P24 | 3.54 | 0.21 | 8.24 | Open |
| P25 | 3.54 | 0.21 | 8.24 | Open |
| P26 | 3.54 | 0.21 | 8.24 | Open |
| P1 | 3.54 | 0.21 | 8.17 | Open |
| P7 | 3.54 | 0.21 | 8.17 | Open |
| P8 | 3.54 | 0.21 | 7.93 | Open |
| P9 | 3.54 | 0.21 | 7.93 | Open |
| P27 | 3.54 | 0.21 | 7.93 | Open |
| P28 | 0.00 | 0.00 | 0.00 | Open |
| P29 | 3.54 | 0.21 | 8.17 | Open |

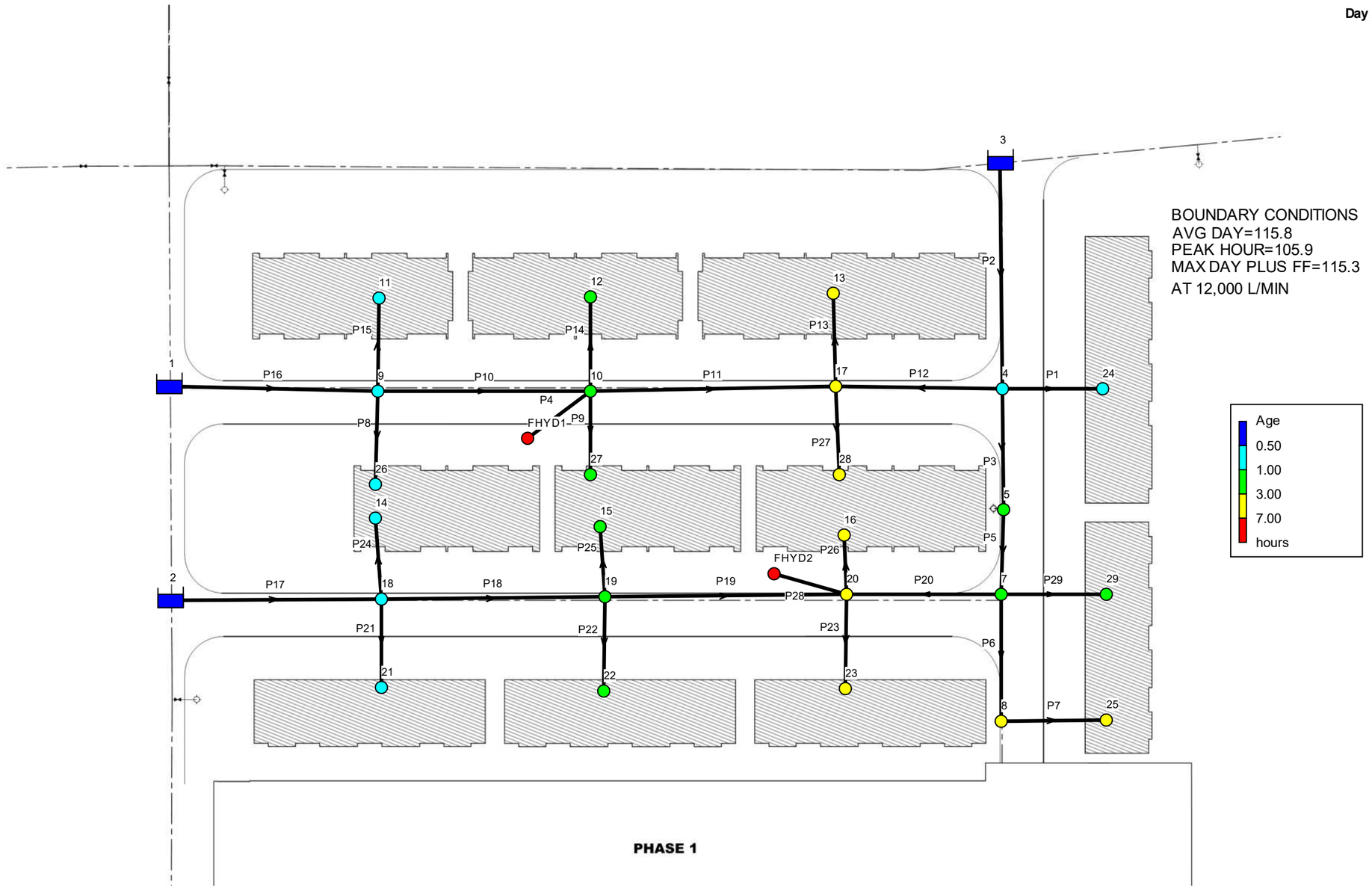
# 2710 DRAPER AVENUE PHASE III - AVERAGE DAY DEMAND

**Day 2, 12:00 AM**

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.4
AT 12,000 L/MIN

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.4
AT 12,000 L/MIN

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.3
AT 12,000 L/MIN



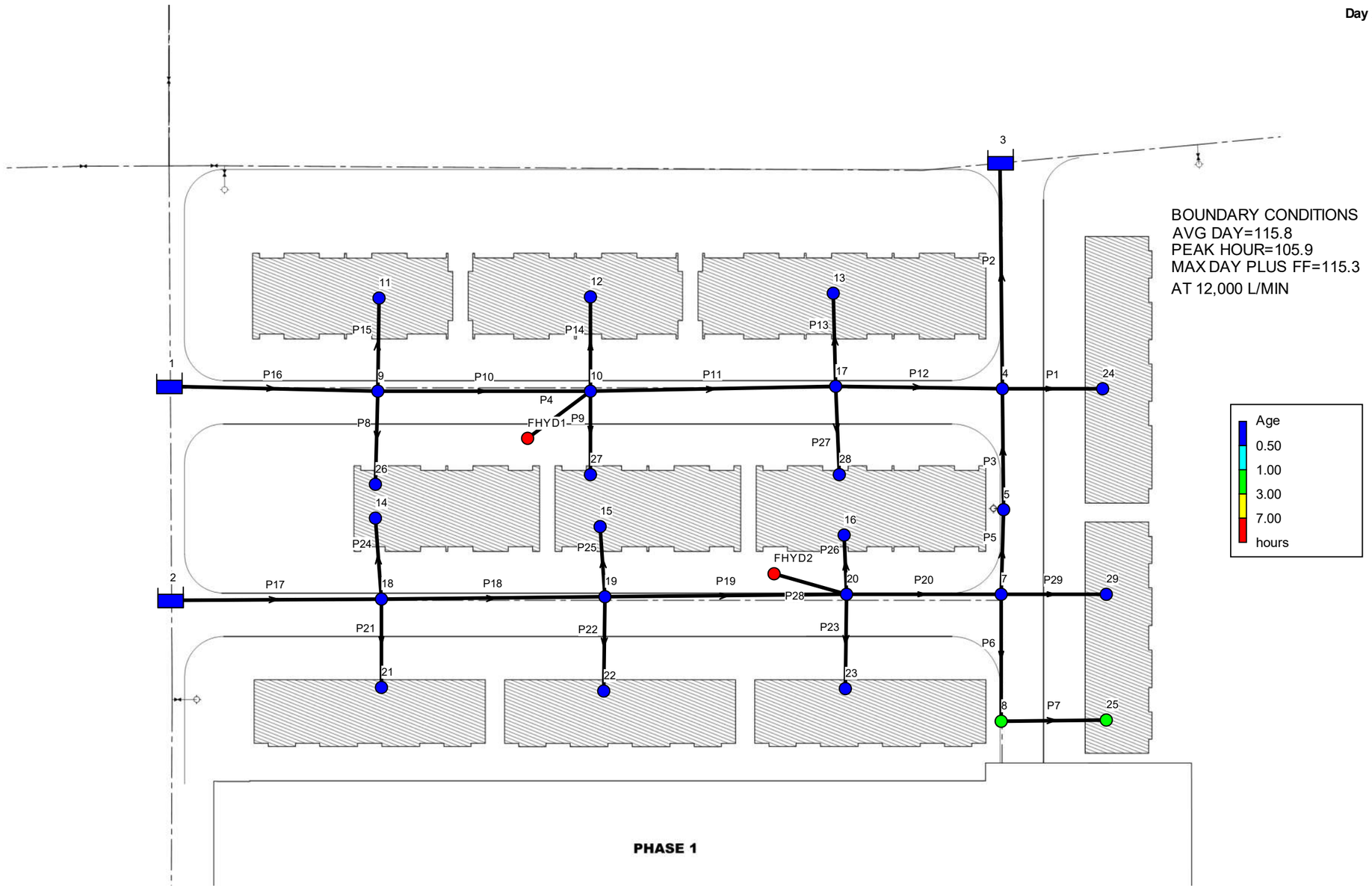
# 2710 DRAPER AVENUE PHASE III - MAX DAY + FIRE FLOW DEMAND

**Day 2, 12:00 AM**

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.4
AT 12,000 L/MIN

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.3
AT 12,000 L/MIN

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.4
AT 12,000 L/MIN



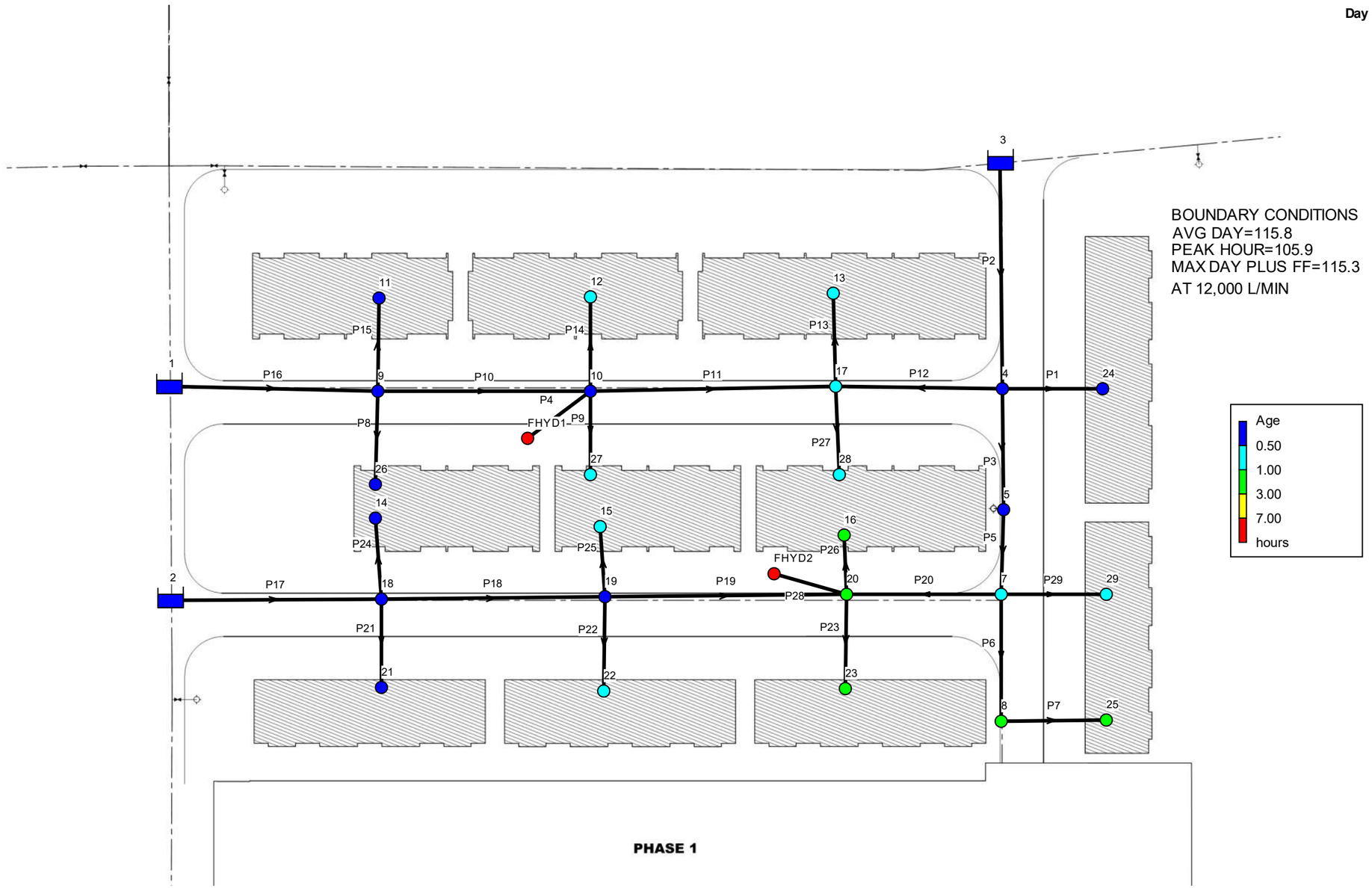
# 2710 DRAPER AVENUE PHASE III - PEAK HOUR DEMAND

**Day 2, 12:00 AM**

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.4
AT 12,000 L/MIN

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.3
AT 12,000 L/MIN

BOUNDARY CONDITIONS
AVG DAY=115.8
PEAK HOUR=105.9
MAX DAY PLUS FF=115.4
AT 12,000 L/MIN



## Alison Gosling

**From:** Oram, Cody <Cody.Oram@ottawa.ca>
**Sent:** Monday, October 23, 2017 8:55 AM
**To:** Alison Gosling
**Cc:** Newton, Tim
**Subject:** RE: 2710 Draper Avenue - Boundary condition request
**Attachments:** 2710 Draper Oct 2017.pdf

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

Hi Alison,

The following are boundary conditions, HGL, for hydraulic analysis at 2710 Draper (zone 1W) assumed to be connected to the 203 mm on Draper Ave and the 203 mm on Morrison Dr (see attached PDF for location).

Minimum HGL = 105.9 m (Both connections)

Maximum HGL = 115.8 m (Both connections)

Max Day + Fire Flow = 115.3 m (Connection 1)

Max Day + Fire Flow = 115.4 m (Connection 2)

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.*

**Cody Oram**, P.Eng. Senior Engineer
Development Review, South Services
Planning, Infrastructure and Economic Development Department | Services de planification, d'infrastructure et de développement économique
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West. Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste **13422**, fax/téléc:613-580-2576, cody.oram@ottawa.ca

**From:** Alison Gosling [mailto:AGosling@dsel.ca]
**Sent:** Thursday, October 05, 2017 10:06 AM
**To:** Oram, Cody <Cody.Oram@ottawa.ca>
**Subject:** 2710 Draper Avenue - Boundary condition request

Good morning Cody.

We would like to request updated water boundary conditions for 2710 Draper Avenue using the following proposed development demands:

1. Location of Service / Street Number: 2710 Draper Avenue

2. Type of development and the amount of fire flow required for the proposed development:

- The proposed Phased development is residential. The Phase III development proposes 92 residential units townhome units.
- It is anticipated that the development will have a connection to be serviced from the existing 200 mm diameter watermain within Draper Avenue and to the existing 200 mm diameter watermain within Morrison Drive, as shown by the attached map.
- Fire demand based on FUS will be used to calculate fire demand, 12,000 L/min is anticipated.

3.

| | L/min | L/s |
|---|---|---|
| **Avg. Daily** | 60.5 | 1.01 |
| **Max Day** | 217.9 | 3.63 |
| **Peak Hour** | 326.8 | 5.45 |

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

Thank you,

Alison Gosling, E.I.T.
Project Coordinator / Junior Designer

**DSEL**
**david schaeffer engineering ltd.**

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

**phone:** (613) 836-0856 ext.542
**fax**:  (613) 836-7183
**email**:  agosling@dsel.ca

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**From:** Fraser, Mark [mailto:Mark.Fraser@ottawa.ca]
**Sent:** Friday, June 9, 2017 12:00 PM
**To:** Alison Gosling <AGosling@dsel.ca>
**Subject:** RE: 22781 Baseline Road Phase II - Boundary condition request

Hi Alison,

Please find below water distribution boundary conditions for hydraulic analysis as requested based on the provided anticipated water demands:

Proposed Development Location: **2781 Baseline Road**
**Average Day** = 48.1 L/s and 0.80 L.s
**Max Day** = 173.3 L/s and 2.89 L/s
**Peak Hour** = 259.9 L/s and 4.33 L/s
**Fire Flow** = 12,000 L/min

**City of Ottawa Boundary Conditions:**

The following are boundary conditions, HGL, for hydraulic analysis at 2781 Baseline (zone 1W) assumed to be connected to the 203mm on Draper Ave (see attached PDF for location).

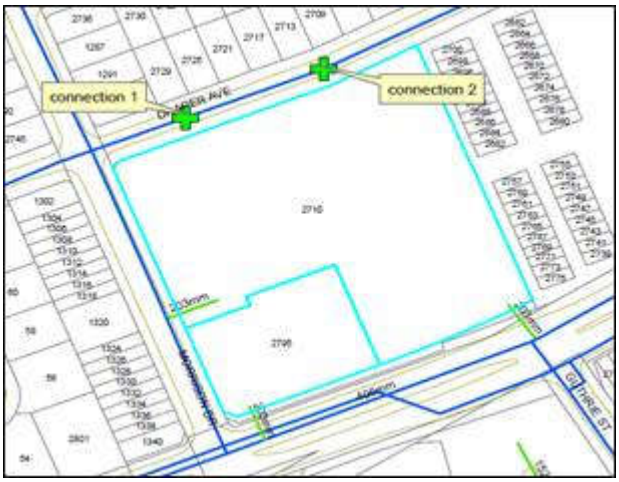
Minimum HGL = **106.9m**

Maximum HGL = **117.7m**

MaxDay (2.9 L/s) + FireFlow (200 L/s) = **91.0m**

**Note: HGL is the same at both connections**

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




Please refer to City of Ottawa, *Ottawa Design Guidelines – Water Distribution*, First Edition, July 2010, WDG001 Clause 4.2.2 for watermain pressure and demand objectives.

***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. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.*

If you have any questions or require any clarification please let me know.

Regards,

**Mark Fraser**
Project Manager, Planning Services
Development Review West Branch
City of Ottawa | Ville d'Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West. 4th Floor, Ottawa ON, K1P 1J1
Tel:613.580.2424 ext. 27791
Fax: 613-580-2576
Mail: Code 01-14
Email: Mark.Fraser@ottawa.ca

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---

**From:** Fraser, Mark
**Sent:** June 01, 2017 12:15 PM
**To:** 'Alison Gosling' <AGosling@dsel.ca>
**Subject:** RE: 22781 Baseline Road Phase II - Boundary condition request

Hi Alison,

Please accept this email as confirmation that boundary conditions for hydraulic analysis have been requested based on the water demands provided for the subject development. Please note that it will take approximately 5-10 business days to receive and provide you with boundary conditions.

If you have any questions please let me know.

Regards,

**Mark Fraser**
Project Manager, Planning Services

PLANNING AND GROWTH MANAGEMENT
URBANISME ET GESTION DE LA CROISSANCE

Development Review West Branch
City of Ottawa | Ville d'Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West. 4th Floor, Ottawa ON, K1P 1J1
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Fax: 613-580-2576
Mail: Code 01-14
Email: Mark.Fraser@ottawa.ca

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---

**From:** Alison Gosling [mailto:AGosling@dsel.ca]
**Sent:** June 01, 2017 12:05 PM
**To:** Fraser, Mark <Mark.Fraser@ottawa.ca>
**Subject:** 22781 Baseline Road Phase II - Boundary condition request

Good afternoon Mark,

We would like to request water boundary conditions for 2781 Baseline Road – Phase II using the following proposed development demands:

1. Location of Service / Street Number: 2781 Baseline Road

2. Type of development and the amount of fire flow required for the proposed development:

- The proposed Phased development is residential. The full build-out proposes 73 residential units within 13 3-story townhome units.
- It is anticipated that the development will have a dual connection to be serviced from the existing 200 mm diameter watermain within Draper Avenue, as shown by the attached map.
- Fire demand based on FUS will be used to calculate fire demand, 12,000 L/min is anticipated.

3.

| | L/min | L/s |
|---|---|---|

| | | |
|---|---|---|
| **Avg. Daily** | 48.1 | 0.80 |
| **Max Day** | 173.3 | 2.89 |
| **Peak Hour** | 259.9 | 4.33 |

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

Thank you,

Alison Gosling, E.I.T.
Project Coordinator / Junior Designer

**DSEL**
**david schaeffer engineering ltd.**

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

**phone:** (613) 836-0856 ext.542
**fax**:  (613) 836-7183
**email**:  agosling@DSEL.ca

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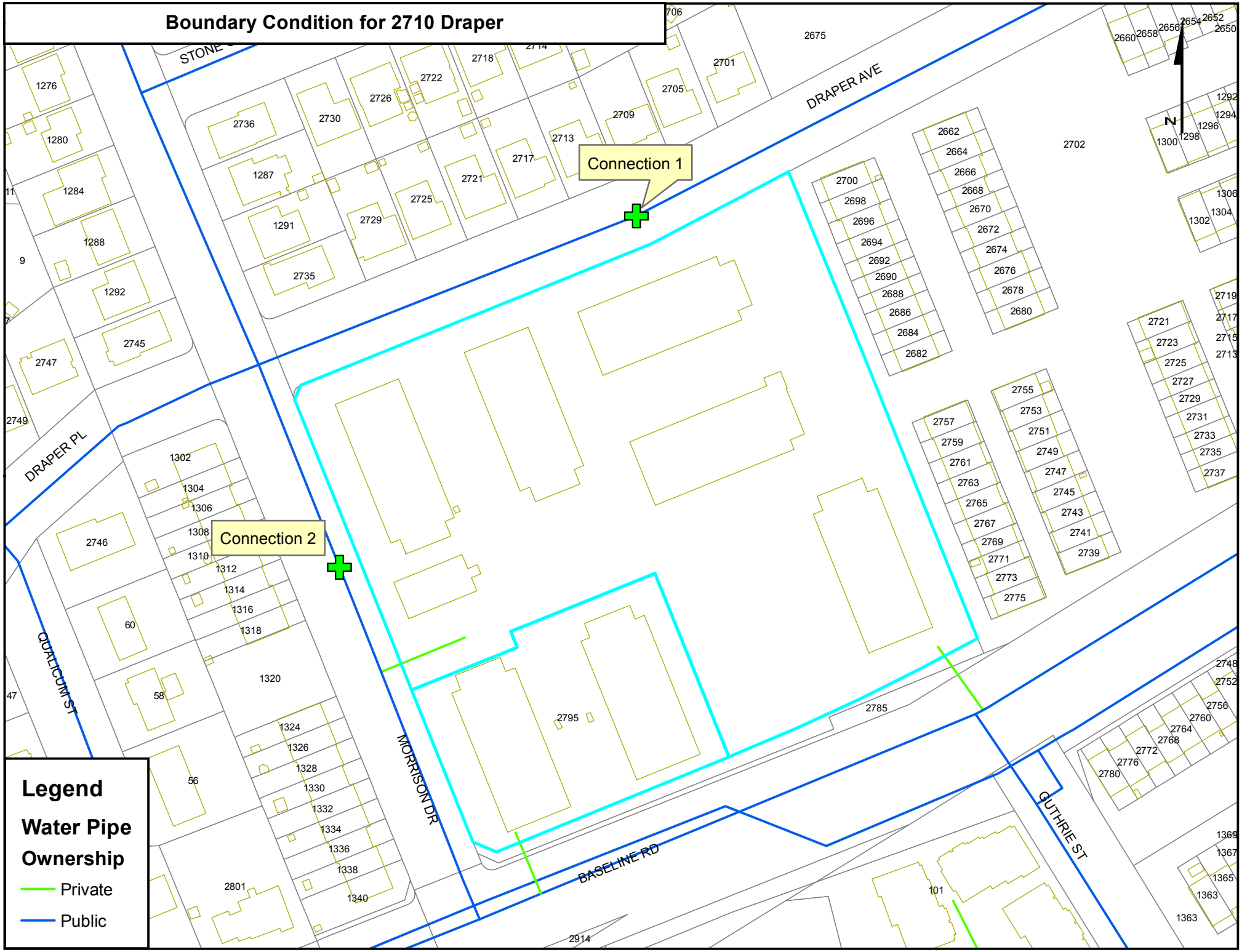
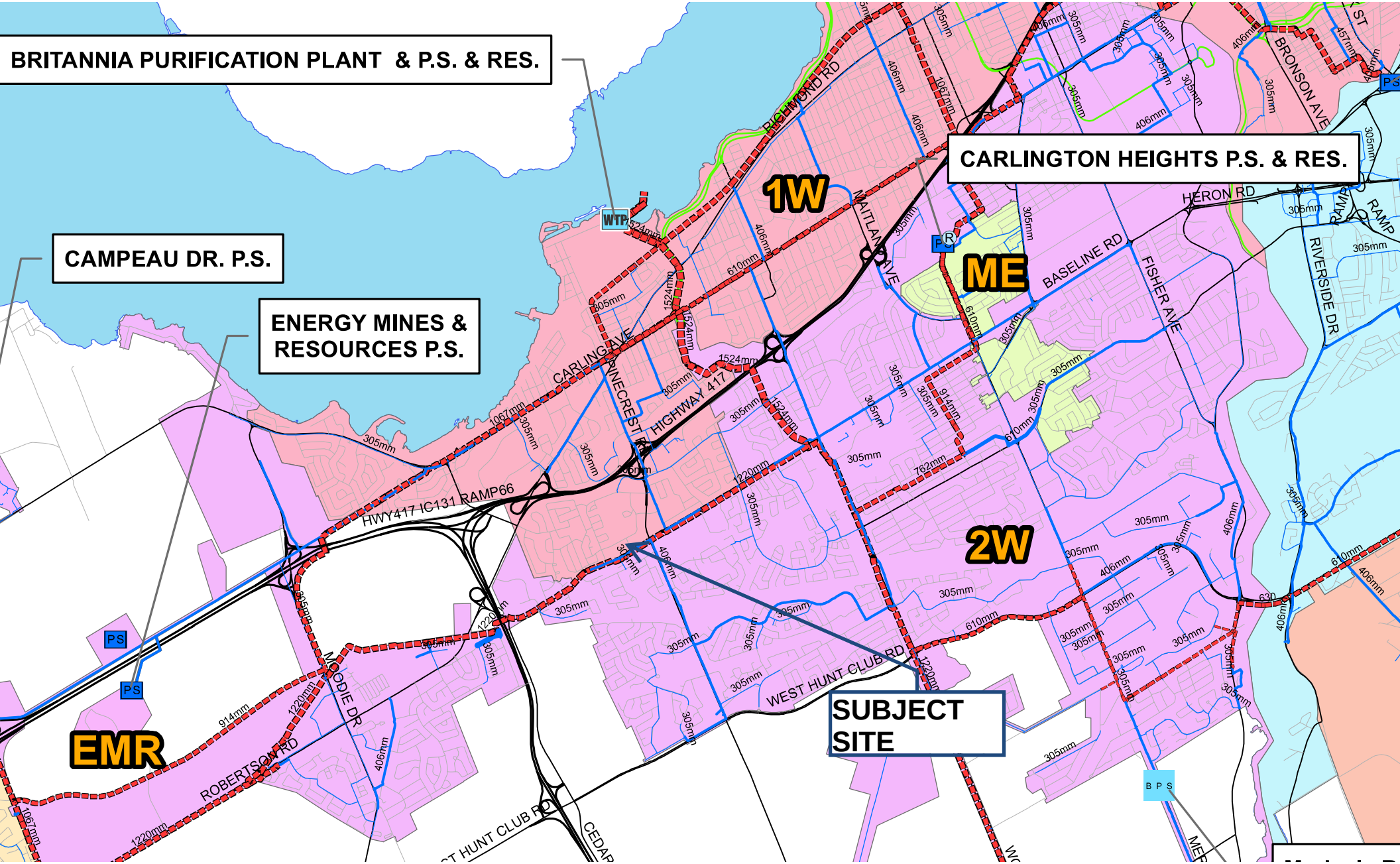
# Boundary Condition for 2710 Draper



# City of Ottawa - Water Distribution System



# *APPENDIX C*

## *Wastewater Collection*

**2710 Draper Avenue**
**Existing Site Conditions**

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

| | | |
|---|---|---|
| **Site Area** | 2.130 | **ha** |

**Extraneous Flow Allowances**

| | | |
|---|---|---|
| **Infiltration / Inflow** | **0.60** | **L/s** |

**Domestic Contributions**

| Unit Type | Unit Rate | Units | Pop |
|---|---|---|---|
| Single Family | 3.4 | | 0 |
| Semi-detached and duplex | 2.7 | | 0 |
| Duplex | 2.3 | | 0 |
| Townhouse | 2.7 | 84 | 227 |
| Apartment | | | |
| Bachelor | 1.4 | | 0 |
| 1 Bedroom | 1.4 | | 0 |
| 2 Bedroom | 2.1 | | 0 |
| 3 Bedroom | 3.1 | | 0 |
| Average | 1.8 | | 0 |
| | **Total Pop** | | **227** |

| | | |
|---|---|---|
| **Average Domestic Flow** | **0.92** | **L/s** |
| **Peaking Factor** | **4** | |
| **Peak Domestic Flow** | **3.68** | **L/s** |

**Institutional / Commercial / Industrial Contributions**

| Property Type | Unit Rate | | No. of Units | Avg Wastewater (L/s) |
|---|---|---|---|---|
| Commercial floor space* | 5 | $L/m^2/d$ | | 0.00 |
| Office | 75 | $L/9.3m^2/d$ | | 0.00 |
| Restaurant** | 125 | L/seat/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*
*** Estimated number of seats at 1 seat per 9.3m$^2$*
*** peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B*

| | |
|---|---|
| **Total Estimated Average Dry Weather Flow Rate** | **0.92 L/s** |
| **Total Estimated Peak Dry Weather Flow Rate** | **3.68 L/s** |
| **Total Estimated Peak Wet Weather Flow Rate** | **4.27 L/s** |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**Greatwise Developments**
**2710 Draper Avenue**
**Proposed Site Conditions - Phase III**

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

**Site Area** 1.33 **ha**

**Extraneous Flow Allowances**

| | | |
|---|---|---|
| **Infiltration / Inflow** | **0.37** | **L/s** |

**Domestic Contributions**

| Unit Type | Unit Rate | Units | Pop | |
|---|---|---|---|---|
| Single Family | 3.4 | | 0 | |
| Semi-detached and duplex | 2.7 | | 0 | |
| Townhouse | 2.7 | 90 | 243 | *Phase 3 Townhomes* |
| Stacked Townhouse | 2.3 | | 0 | |
| Apartment | | | | |
| 1 Bedroom | 1.4 | | 0 | |
| 2 Bedroom | 2.1 | | 0 | |

| | | |
|---|---|---|
| **Total Pop** | **243** | |
| **Average Domestic Flow*** ** | **0.79** | **L/s** |
| **Peaking Factor** | **4.00** | |
| **Peak Domestic Flow** | **3.15** | **L/s** |

**Institutional / Commercial / Industrial Contributions**

| Property Type | Unit Rate | | No. of Units | Avg Wastewater (L/s) |
|---|---|---|---|---|
| Commercial floor space* | 5 | $L/m^2/d$ | | 0.00 |
| Office | 75 | $L/9.3m^2/d$ | | 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*

***Please note that the residential average daily flow uses 280 L/person/d in line with proposed updates to City Design Guidelines.

| | | |
|---|---|---|
| **Total Estimated Average Dry Weather Flow Rate** | **0.79** | **L/s** |
| **Total Estimated Peak Dry Weather Flow Rate** | **3.15** | **L/s** |
| **Total Estimated Peak Wet Weather Flow Rate** | **3.52** | **L/s** |



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**Greatwise Developments**
**2710 Draper Avenue/2781 Baseline Road**
**Proposed Site Conditions - Ultimate**

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

**Site Area** 2.130 **ha**

**Extraneous Flow Allowances**

| | | |
|---|---|---|
| **Infiltration / Inflow** | **0.60** | **L/s** |

**Domestic Contributions**

| Unit Type | Unit Rate | Units | Pop | |
|---|---|---|---|---|
| Single Family | 3.4 | | 0 | |
| Semi-detached and duplex | 2.7 | | 0 | |
| Townhouse | 2.7 | 90 | 243 | *Phase 3 Townhomes* |
| Stacked Townhouse | 2.3 | | 0 | |
| Apartment | | | | |
| **Existing Building E** | | | | |
| 1 Bedroom | 1.4 | 56 | 79 | |
| 2 Bedroom | 2.1 | 24 | 51 | |
| **Proposed Building F** | | | | |
| 1 Bedroom | 1.4 | 34 | 48 | |
| 2 Bedroom | 2.1 | 36 | 76 | *124 pop* |

| | | |
|---|---|---|
| **Total Pop** | **497** | |
| **Average Domestic Flow*** ** | **1.61** | **L/s** |
| **Peaking Factor** | **3.98** | |
| **Peak Domestic Flow** | **6.40** | **L/s** |

**Institutional / Commercial / Industrial Contributions**

| Property Type | Unit Rate | | No. of Units | Avg Wastewater (L/s) |
|---|---|---|---|---|
| Commercial floor space* | 5 | $L/m^2/d$ | 225 | 0.03 |
| Office | 75 | $L/9.3m^2/d$ | 325 | 0.03 |
| 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** | **0.06** |
| **Peak Institutional / Commercial Flow** | 0.08 |
| **Peak Industrial Flow**** | 0.00 |
| **Peak I/C/I Flow** | **0.08** |

** assuming a 12 hour commercial operation*

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

***Please note that the residential average daily flow uses 280 L/person/d in line with proposed updates to City Design Guidelines.

| | |
|---|---|
| **Total Estimated Average Dry Weather Flow Rate** | **1.67 L/s** |
| **Total Estimated Peak Dry Weather Flow Rate** | **6.49 L/s** |
| **Total Estimated Peak Wet Weather Flow Rate** | **7.08 L/s** |



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# SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

| LOCATION | | | RESIDENTIAL AREA AND POPULATION | | | | | | | COMM | | INSTIT | | PARK | | C+I+I | INFILTRATION | | | | PIPE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STREET | FROM M.H. | TO M.H. | AREA (ha) | UNITS | POP. | CUMULATIVE AREA (ha) | CUMULATIVE POP. | PEAK FACT. | PEAK FLOW (l/s) | AREA (ha) | ACCU. AREA (ha) | AREA (ha) | ACCU. AREA (ha) | AREA (ha) | ACCU. AREA (ha) | PEAK FLOW (l/s) | TOTAL AREA (ha) | ACCU. AREA (ha) | INFILT. FLOW (l/s) | TOTAL FLOW (l/s) | DIST (m) | DIA (mm) | SLOPE (%) | CAP. (FULL) (l/s) | RATIO Q act/Q cap (%) | VEL. (FULL) (m/s) | VEL. (ACT.) (m/s) | Type | NVALUE |
| **Unknown Road1 - 01** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 5A | 6A | | 13.00 | 35.00 | | 35.00 | 4.00 | 0.57 | | | | | | | | 0.00 | 0.00 | 0.00 | 0.57 | 59.00 | 250.00 | 0.30 | 32.57 | 0.02 | 0.66 | 0.04 | PVC | 0.013 |
| | 6A | 7A | | 14.00 | 38.00 | | 73.00 | 4.00 | 1.18 | | | | | | | | 0.00 | 0.00 | 0.00 | 1.18 | 62.50 | 250.00 | 0.30 | 32.57 | 0.04 | 0.66 | 0.06 | PVC | 0.013 |
| To Unknown Road3, Pipe 7A - 8A | | | | | | | 73.00 | | | | | | | | | | | 0.00 | | | | | | | | | | |
| **Unknown Road2 - 02** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2A | 3A | | 17.00 | 46.00 | | 46.00 | 4.00 | 0.75 | | | | | | | | 0.00 | 0.00 | 0.00 | 0.75 | 59.00 | 250.00 | 0.30 | 32.57 | 0.02 | 0.66 | 0.06 | PVC | 0.013 |
| | 3A | 4A | | 17.00 | 46.00 | | 92.00 | 4.00 | 1.49 | | | | | | | | 0.00 | 0.00 | 0.00 | 1.49 | 62.50 | 250.00 | 0.30 | 32.57 | 0.05 | 0.66 | 0.08 | PVC | 0.013 |
| To Unknown Road3, Pipe 4A - 7A | | | | | | | 92.00 | | | | | | | | | | | 0.00 | | | | | | | | | | |
| **Unknown Road3 - 03** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1A | 4A | | 4.00 | 11.00 | | 11.00 | 4.00 | 0.18 | | | | | | | | 0.00 | 0.00 | 0.00 | 0.18 | 20.50 | 250.00 | 1.85 | 80.88 | 0.00 | 1.65 | 0.09 | PVC | 0.013 |
| Contribution From Unknown Road2, Pipe 3A - 4A | | | | | | | 92.00 | | | | | | | | | | 0.00 | 0.00 | | | | | | | | | | |
| | 4A | 7A | | 6.00 | 16.00 | | 119.00 | 4.00 | 1.93 | | | | | | | | 0.00 | 0.00 | 0.00 | 1.93 | 33.00 | 250.00 | 2.30 | 90.19 | 0.02 | 1.84 | 0.16 | PVC | 0.013 |
| Contribution From Unknown Road1, Pipe 6A - 7A | | | | | | | 73.00 | | | | | | | | | | 0.00 | 0.00 | | | | | | | | | | |
| | 7A | 8A | | 5.00 | 14.00 | | 206.00 | 4.00 | 3.34 | | | | | | | | 0.00 | 0.00 | 0.00 | 3.34 | 33.50 | 250.00 | 0.30 | 32.57 | 0.10 | 0.66 | 0.09 | PVC | 0.013 |
| | 8A | 9A | | | | | 206.00 | 4.00 | 3.34 | | | | | | | | 0.00 | 0.00 | 0.00 | 3.34 | 9.50 | 250.00 | 0.30 | 32.57 | 0.10 | 0.66 | 0.09 | PVC | 0.013 |

DESIGN PARAMETERS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Park Flow = | 9300 | L/ha/da | 0.10764 | l/s/Ha | | | |
| Average Daily Flow = | 350 | l/p/day | | | Industrial Peak Factor = as per MOE Graph | | |
| Comm/Inst Flow = | 50000 | L/ha/da | 0.5787 | l/s/Ha | Extraneous Flow = | 0.280 | L/s/ha |
| Industrial Flow = | 35000 | L/ha/da | 0.40509 | l/s/Ha | Minimum Velocity = | 0.600 | m/s |
| Max Res. Peak Factor = | 4.00 | | | | Manning's n = (Conc) | 0.013 | (Pvc) 0.013 |
| Commercial/Inst./Park Peak Factor = | 1.50 | | | | Townhouse coeff= | 2.7 | |
| Institutional = | 0.58 | l/s/Ha | | | Single house coeff= | 3.4 | |

Designed:

Checked:

Dwg. Reference:
Sanitary Drainage Plan, Dwgs. No. SAN-1

PROJECT:
**2710 DRAPER AVENUE - PHASE III**

LOCATION:
**City of Ottawa**

File Ref: 17-927

Date: 11/17/2017

Sheet No 1 of 1

Existing Conditions (Reproduction of Novatech Table 2.2)

| City MH ID | Pipe ID | Population | | Local Area (ha) | | | | | | Cumulative Area (ha) | Design Flow (L/S) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Local | Cumulative | Res. | Com. | Com. Cumul. | Inst. | Inst. Cumul. | Total | | |
| Morrison Drive Sewer (Upper Reach) | | | | | | | | | | | |
| 25698 | 1 | 113 | 113 | 1.39 | | 0 | | 0 | 1.39 | 1.39 | 1.8 |
| 25699 | 2 | 592 | 705 | 7.91 | | 0 | 8.21 | 8.21 | 16.12 | 17.51 | 16.4 |
| 25700 | 3 | 71 | 776 | 1.55 | | 0 | | 8.21 | 1.55 | 19.06 | 17.8 |
| 25701 | 4 | 85 | 861 | 1.7 | | 0 | | 8.21 | 1.7 | 20.76 | 19.4 |
| 25702 | 5 | 58 | 919 | 1.05 | | 0 | | 8.21 | 1.05 | 21.81 | 20.5 |
| 25703 | 6 | 27 | 946 | 0.59 | | 0 | | 8.21 | 0.59 | 22.4 | 21.0 |
| 25704 | 7 | 160 | 1106 | 3.22 | | 0 | | 8.21 | 3.22 | 25.62 | 24.0 |
| 25706 | 8 | 43 | 1149 | 0.57 | | 0 | | 8.21 | 0.57 | 26.19 | 24.6 |
| 43673 | 9 | 162 | 1311 | 2.17 | 2.38 | 2.38 | | 8.21 | 4.55 | 30.74 | 28.8 |
| 25709 | 10 | | 1311 | 0.76 | 0.39 | 2.77 | | 8.21 | 1.15 | 31.89 | 29.4 |
| 25710 | 11 | | 1311 | 0.71 | 1.05 | 3.82 | | 8.21 | 1.76 | 33.65 | 30.5 |
| 25711 | 12 | | 1311 | 1.29 | 0.8 | 4.62 | | 8.21 | 2.09 | 35.74 | 31.7 |
| 25713 | 13 | 378 | 1689 | 3.19 | | 4.62 | | 8.21 | 3.19 | 38.93 | 36.5 |
| 25715 | 14 | 2294 | 3983 | 34.61 | 6.5 | 11.12 | 1.39 | 9.6 | 42.5 | 81.43 | 77.2 |
| Draper Avenue Sewer System | | | | | | | | | | | |
| | 15A | 38 | 38 | 1.38 | | 0 | 1.47 | 1.47 | 2.85 | 2.85 | 2.0 |
| | 15B | 135 | 173 | 2.2 | | 0 | | 1.47 | 2.2 | 5.05 | 4.4 |
| | 15C | 230 | 403 | 0.54 | | 0 | | 1.47 | 0.54 | 5.59 | 6.9 |
| | 15D | 360 | 763 | 0.84 | | 0 | | 1.47 | 0.84 | 6.43 | 10.6 |
| | 15E | 905 | 1668 | 4.13 | | 0 | | 1.47 | 4.13 | 10.56 | 20.4 |
| | 15F | 251 | 1919 | 2.98 | | 0 | 0.5 | 1.97 | 3.48 | 14.04 | 24.3 |
| | 15G | 111 | 2030 | 0.94 | | 0 | 0.25 | 2.22 | 1.19 | 15.23 | 25.8 |
| Morrison Drive Sewer (Lower Reach) | | | | | | | | | | | |
| 25723 | 15 | | 6013 | | | 11.12 | | 11.82 | 0 | 96.66 | 100.4 |
| 25722 | 16 | | 6013 | 0.38 | 1.88 | 13 | | 11.82 | 2.26 | 98.92 | 101.4 |
| 25720 | 17 | 154 | 6167 | 2.07 | 0.84 | 13.84 | | 11.82 | 2.91 | 101.83 | 104.2 |

| | | |
|---|---|---|
| Domestic Flow | 300 | (L/per/day) |
| Correction Factor Dom (Harmon Equation) | 0.6 | |
| Extraneous Flow | 0.5 | L/s/ha |
| Commercial | 17000 | L/ha/day |
| Institutional | 10000 | |
| Industrial | 10000 | |
| Peaking Factor non-res | 1 | |

| Population density | |
|---|---|
| Single Family | 3.4 |
| Townhouse | 2.7 |
| Apartment Units | 1.4 |

Phase 1 Conditions as per DSEL 2012

| City MH ID | Pipe ID | Population | | Local Area (ha) | | | | | | Cumulative Area (ha) | Design Flow (L/S) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Local | Cumulative | Res. | Com. | Com. Cumul. | Inst. | Inst. Cumul. | Total | | |
| Morrison Drive Sewer (Upper Reach) | | | | | | | | | | | |
| 25698 | 1 | 305 | 305 | 1.33 | 0.06 | 0.06 | | 0 | 1.39 | 1.39 | 4.0 |
| 25699 | 2 | 592 | 897 | 7.91 | | 0.06 | 8.21 | 8.21 | 16.12 | 17.51 | 20.3 |
| 25700 | 3 | 71 | 968 | 1.55 | | 0.06 | | 8.21 | 1.55 | 19.06 | 21.7 |
| 25701 | 4 | 85 | 1053 | 1.7 | | 0.06 | | 8.21 | 1.7 | 20.76 | 23.3 |
| 25702 | 5 | 58 | 1111 | 1.05 | | 0.06 | | 8.21 | 1.05 | 21.81 | 24.3 |
| 25703 | 6 | 27 | 1138 | 0.59 | | 0.06 | | 8.21 | 0.59 | 22.4 | 24.8 |
| 25704 | 7 | 160 | 1298 | 3.22 | | 0.06 | | 8.21 | 3.22 | 25.62 | 27.7 |
| 25706 | 8 | 43 | 1341 | 0.57 | | 0.06 | | 8.21 | 0.57 | 26.19 | 28.4 |
| 43673 | 9 | 162 | 1503 | 2.17 | 2.38 | 2.44 | | 8.21 | 4.55 | 30.74 | 32.5 |
| 25709 | 10 | | 1503 | 0.76 | 0.39 | 2.83 | | 8.21 | 1.15 | 31.89 | 33.1 |
| 25710 | 11 | | 1503 | 0.71 | 1.05 | 3.88 | | 8.21 | 1.76 | 33.65 | 34.2 |
| 25711 | 12 | | 1503 | 1.29 | 0.8 | 4.68 | | 8.21 | 2.09 | 35.74 | 35.4 |
| 25713 | 13 | 378 | 1881 | 3.19 | | 4.68 | | 8.21 | 3.19 | 38.93 | 40.1 |
| 25715 | 14 | 2294 | 4175 | 34.61 | 6.5 | 11.18 | 1.39 | 9.6 | 42.5 | 81.43 | 80.5 |
| Draper Avenue Sewer System | | | | | | | | | | | |
| | 15A | 38 | 38 | 1.38 | | 0 | 1.47 | 1.47 | 2.85 | 2.85 | 4.5 |
| | 15B | 135 | 173 | 2.2 | | 0 | | 1.47 | 2.2 | 5.05 | 6.9 |
| | 15C | 230 | 403 | 0.54 | | 0 | | 1.47 | 0.54 | 5.59 | 9.2 |
| | 15D | 360 | 763 | 0.84 | | 0 | | 1.47 | 0.84 | 6.43 | 12.8 |
| | 15E | 905 | 1668 | 4.13 | | 0 | | 1.47 | 4.13 | 10.56 | 22.5 |
| | 15F | 251 | 1919 | 2.98 | | 0 | 0.5 | 1.97 | 3.48 | 14.04 | 26.3 |
| | 15G | 111 | 2030 | 0.94 | | 0 | 0.25 | 2.22 | 1.19 | 15.23 | 27.8 |
| Morrison Drive Sewer (Lower Reach) | | | | | | | | | | | |
| 25723 | 15 | | 6205 | | | 11.18 | | 11.82 | 0 | 96.66 | 103.0 |
| 25722 | 16 | | 6205 | 0.38 | 1.88 | 13.06 | | 11.82 | 2.26 | 98.92 | 104.5 |
| 25720 | 17 | 154 | 6359 | 2.07 | 0.84 | 13.9 | | 11.82 | 2.91 | 101.83 | 107.2 |

Population increase based on Phase I proposed development, net population increase of 220.

| | | |
|---|---|---|
| Domestic Flow - Existing | 300 | (L/per/day) |
| Domestic Flow Proposed | 350 | (L/per/day) |
| Correction Factor Dom[1] (Harmon Equation) | 0.6 | |
| Extraneous Flow | 0.5 | L/s/ha |
| Commercial | 17000 | L/ha/day |
| Institutional | 10000 | |
| Industrial | 10000 | |
| Peaking Factor non-res | 1 | |

[1]Correction factor for proposed buildings = 1.0

Population density

| | |
|---|---|
| Townhouse | 2.7 |
| Apartment 1 Bedroom | 1.4 |
| Apartment 2 Bedroom | 2.1 |
| Apartment 3 Bedroom | 3.1 |

Total Population Increase

| | | |
|---|---|---|
| Existing Townhouses 5*12 units | 162 | persons |
| Proposed | 354 | persons |
| Difference | 192 | |
| 100 % will be added at Link 1 | 354 | persons |

## Ultimate Proposed Conditions - as per DSEL 2012

| City MH ID | Pipe ID | Population | | Local Area (ha) | | | | | | Cumulative Area (ha) | Design Flow (L/S) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Local | Cumulative | Res. | Com. | Com. Cumul. | Inst. | Inst. Cumul. | Total | | |
| Morrison Drive Sewer (Upper Reach) | | | | | | | | | | | |
| 25698 | 1 | 347 | 347 | 1.33 | 0.06 | 0.06 | | 0 | 1.39 | 1.39 | 4.6 |
| 25699 | 2 | 1060 | 1407 | 7.91 | | 0.06 | 8.21 | 8.21 | 16.12 | 17.51 | 28.0 |
| 25700 | 3 | 71 | 1478 | 1.55 | | 0.06 | | 8.21 | 1.55 | 19.06 | 29.3 |
| 25701 | 4 | 85 | 1563 | 1.7 | | 0.06 | | 8.21 | 1.7 | 20.76 | 30.9 |
| 25702 | 5 | 58 | 1621 | 1.05 | | 0.06 | | 8.21 | 1.05 | 21.81 | 31.9 |
| 25703 | 6 | 27 | 1648 | 0.59 | | 0.06 | | 8.21 | 0.59 | 22.4 | 32.4 |
| 25704 | 7 | 160 | 1808 | 3.22 | | 0.06 | | 8.21 | 3.22 | 25.62 | 35.2 |
| 25706 | 8 | 43 | 1851 | 0.57 | | 0.06 | | 8.21 | 0.57 | 26.19 | 35.9 |
| 43673 | 9 | 162 | 2013 | 2.17 | 2.38 | 2.44 | | 8.21 | 4.55 | 30.74 | 39.9 |
| 25709 | 10 | | 2013 | 0.76 | 0.39 | 2.83 | | 8.21 | 1.15 | 31.89 | 40.5 |
| 25710 | 11 | | 2013 | 0.71 | 1.05 | 3.88 | | 8.21 | 1.76 | 33.65 | 41.6 |
| 25711 | 12 | | 2013 | 1.29 | 0.8 | 4.68 | | 8.21 | 2.09 | 35.74 | 42.8 |
| 25713 | 13 | 378 | 2391 | 3.19 | | 4.68 | | 8.21 | 3.19 | 38.93 | 47.4 |
| 25715 | 14 | 2294 | 4685 | 34.61 | 6.5 | 11.18 | 1.39 | 9.6 | 42.5 | 81.43 | 87.1 |
| Draper Avenue Sewer System | | | | | | | | | | | |
| | 15A | 38 | 38 | 1.38 | | 0 | 1.47 | 1.47 | 2.85 | 2.85 | 8.6 |
| | 15B | 135 | 173 | 2.2 | | 0 | | 1.47 | 2.2 | 5.05 | 10.8 |
| | 15C | 230 | 403 | 0.54 | | 0 | | 1.47 | 0.54 | 5.59 | 13.0 |
| | 15D | 360 | 763 | 0.84 | | 0 | | 1.47 | 0.84 | 6.43 | 16.4 |
| | 15E | 905 | 1668 | 4.13 | | 0 | | 1.47 | 4.13 | 10.56 | 25.8 |
| | 15F | 251 | 1919 | 2.98 | | 0 | 0.5 | 1.97 | 3.48 | 14.04 | 29.6 |
| | 15G | 111 | 2030 | 0.94 | | 0 | 0.25 | 2.22 | 1.19 | 15.23 | 31.1 |
| Morrison Drive Sewer (Lower Reach) | | | | | | | | | | | |
| 25723 | 15 | | 6715 | | | 11.18 | | 11.82 | 0 | 96.66 | 109.3 |
| 25722 | 16 | | 6715 | 0.38 | 1.88 | 13.06 | | 11.82 | 2.26 | 98.92 | 110.8 |
| 25720 | 17 | 154 | 6869 | 2.07 | 0.84 | 13.9 | | 11.82 | 2.91 | 101.83 | 113.5 |

Population increase based on proposed development, net population increase of 702, new pop = 929.

| | | |
|---|---|---|
| Domestic Flow - Existing | 300 | (L/per/day) |
| Domestic Flow Proposed | 350 | (L/per/day) |
| Correction Factor Dom[1] (Harmon Equation) | 0.6 | |
| Extraneous Flow | 0.5 | L/s/ha |
| Commercial | 17000 | L/ha/day |
| Institutional | 10000 | |
| Industrial | 10000 | |
| Peaking Factor non-res | 1 | |

[1]Correction factor for proposed buildings = 1.0

Population density

| | |
|---|---|
| Townhouse | 2.7 |
| Apartment 1 Bedroom | 1.4 |
| Apartment 2 Bedroom | 2.1 |
| Apartment 3 Bedroom | 3.1 |

Total Population Increase

| | | |
|---|---|---|
| Existing Townhouses 7*12 units | 227 | persons |
| Proposed | 929 | persons |
| Difference | 702 | |
| 1/3 will be added at Link 1 | 310 | persons |
| 2/3 will be added at Link 2 | 619 | L/s |

Phase X Conditions - Max Flow increase to not exceed 0.30 m freeboard

| City MH ID | Pipe ID | Population | | Local Area (ha) | | | | | | Cumulative Area (ha) | Design Flow (L/S) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Local | Cumulative | Res. | Com. | Com. Cumul. | Inst. | Inst. Cumul. | Total | | |
| Morrison Drive Sewer (Upper Reach) | | | | | | | | | | | |
| 25698 | 1 | 276 | 276 | 1.33 | 0.06 | 0.06 | | 0 | 1.39 | 1.39 | 4.9 |
| 25699 | 2 | 917 | 1193 | 7.91 | | 0.06 | 8.21 | 8.21 | 16.12 | 17.51 | 24.6 |
| 25700 | 3 | 71 | 1264 | 1.55 | | 0.06 | | 8.21 | 1.55 | 19.06 | 25.9 |
| 25701 | 4 | 85 | 1349 | 1.7 | | 0.06 | | 8.21 | 1.7 | 20.76 | 27.5 |
| 25702 | 5 | 58 | 1407 | 1.05 | | 0.06 | | 8.21 | 1.05 | 21.81 | 28.5 |
| 25703 | 6 | 27 | 1434 | 0.59 | | 0.06 | | 8.21 | 0.59 | 22.4 | 29.0 |
| 25704 | 7 | 160 | 1594 | 3.22 | | 0.06 | | 8.21 | 3.22 | 25.62 | 31.9 |
| 25706 | 8 | 43 | 1637 | 0.57 | | 0.06 | | 8.21 | 0.57 | 26.19 | 32.6 |
| 43673 | 9 | 162 | 1799 | 2.17 | 2.38 | 2.44 | | 8.21 | 4.55 | 30.74 | 36.6 |
| 25709 | 10 | | 1799 | 0.76 | 0.39 | 2.83 | | 8.21 | 1.15 | 31.89 | 37.3 |
| 25710 | 11 | | 1799 | 0.71 | 1.05 | 3.88 | | 8.21 | 1.76 | 33.65 | 38.3 |
| 25711 | 12 | | 1799 | 1.29 | 0.8 | 4.68 | | 8.21 | 2.09 | 35.74 | 39.5 |
| 25713 | 13 | 378 | 2177 | 3.19 | | 4.68 | | 8.21 | 3.19 | 38.93 | 44.1 |
| 25715 | 14 | 2294 | 4471 | 34.61 | 6.5 | 11.18 | 1.39 | 9.6 | 42.5 | 81.43 | 84.2 |
| Draper Avenue Sewer System | | | | | | | | | | | |
| | 15A | 38 | 38 | 1.38 | | 0 | 1.47 | 1.47 | 2.85 | 2.85 | 6.6 |
| | 15B | 135 | 173 | 2.2 | | 0 | | 1.47 | 2.2 | 5.05 | 8.9 |
| | 15C | 230 | 403 | 0.54 | | 0 | | 1.47 | 0.54 | 5.59 | 11.1 |
| | 15D | 360 | 763 | 0.84 | | 0 | | 1.47 | 0.84 | 6.43 | 14.7 |
| | 15E | 905 | 1668 | 4.13 | | 0 | | 1.47 | 4.13 | 10.56 | 24.2 |
| | 15F | 251 | 1919 | 2.98 | | 0 | 0.5 | 1.97 | 3.48 | 14.04 | 28.0 |
| | 15G | 111 | 2030 | 0.94 | | 0 | 0.25 | 2.22 | 1.19 | 15.23 | 29.5 |
| Morrison Drive Sewer (Lower Reach) | | | | | | | | | | | |
| 25723 | 15 | | 6501 | | | 11.18 | | 11.82 | 0 | 96.66 | 106.5 |
| 25722 | 16 | | 6501 | 0.38 | 1.88 | 13.06 | | 11.82 | 2.26 | 98.92 | 108.0 |
| 25720 | 17 | 154 | 6655 | 2.07 | 0.84 | 13.9 | | 11.82 | 2.91 | 101.83 | 110.7 |

Population increase based on JFSA XPSWMM Modelling - max allowable increase for freeboard >= 0.30 m.

| | | |
|---|---|---|
| Domestic Flow - Existing | 300 | (L/per/day) |
| Domestic Flow Proposed | 350 | (L/per/day) |
| Correction Factor Dom[1] (Harmon Equation) | 0.6 | |
| Extraneous Flow | 0.5 | L/s/ha |
| Commercial | 17000 | L/ha/day |
| Institutional | 10000 | |
| Industrial | 10000 | |
| Peaking Factor non-res | 1 | |

[1]Correction factor for proposed buildings = 1.0

Population density

| | |
|---|---|
| Townhouse | 2.7 |
| Apartment 1 Bedroom | 1.4 |
| Apartment 2 Bedroom | 2.1 |
| Apartment 3 Bedroom | 3.1 |

Total Population Increase

| | | |
|---|---|---|
| Existing Townhouses 5*12 units | 162 | persons |
| Proposed New | 650 | persons |
| Difference | 488 | |
| 1/3 will be added at Link 1 | 217 | persons |
| 2/3 will be added at Link 2 | 433 | L/s |

Table 1 - Comparison of Existing Conditions HGL results based on different Sanitary Sewer pipe layouts and Modelling Programs.

| City MH ID | Underside of Footing Elevation (m)[1] | Novatech 2009 Existing Conditions[2] | | XPSWMM Replica of Novatech 2009 Model[2] | | XPSWMM Model with Stantec 2012 Survey data[3] | |
|---|---|---|---|---|---|---|---|
| | | HGL (m) | Freeboard (m) | HGL (m) | Freeboard (m) | HGL (m) | Freeboard (m) |
| 25697 | N/A | 73.87 | N/A | 73.77 | N/A | N/A | N/A |
| 25698 | N/A | 71.28 | N/A | 71.20 | N/A | 71.30 | N/A |
| 25699 | N/A | 68.75 | N/A | 68.69 | N/A | 69.18 | N/A |
| 25700 | N/A | 67.88 | N/A | 67.81 | N/A | 68.99 | N/A |
| 25701 | 67.50 | 66.07 | 1.43 | 66.00 | 1.50 | 66.07 | 1.43 |
| 25702 | 66.65 | 65.68 | 0.97 | 65.61 | 1.04 | 65.69 | 0.96 |
| 25703 | 66.25 | 65.44 | 0.81 | 65.38 | 0.87 | 65.44 | 0.81 |
| 25704 | 66.50 | 65.12 | 1.38 | 65.12 | 1.39 | 65.20 | 1.30 |
| 25704i[4] | N/A | N/A | N/A | N/A | N/A | 64.95 | N/A |
| 25705 | 65.50 | 65.09 | 0.41 | 64.97 | 0.53 | 64.93 | 0.57 |
| 25706 | 65.40 | 65.07 | 0.33 | 64.94 | 0.46 | 64.92 | 0.48 |
| 25707 | N/A | 64.90 | N/A | 64.90 | N/A | 64.87 | N/A |
| 25708 | N/A | 64.85 | N/A | 64.82 | N/A | 64.74 | N/A |
| 43673 | 65.15 | 64.82 | 0.33 | 64.78 | 0.37 | 64.67 | 0.48 |
| 25709 | 67.08 | 64.77 | 2.31 | 64.74 | 2.34 | 64.63 | 2.45 |
| 25710 | N/A | 64.69 | N/A | 64.66 | N/A | 64.55 | N/A |
| 25711 | N/A | 64.59 | N/A | 64.57 | N/A | 64.46 | N/A |
| 25712 | N/A | 64.57 | N/A | 64.55 | N/A | 64.43 | N/A |
| 25713 | N/A | 64.55 | N/A | 64.53 | N/A | 64.41 | N/A |
| 25714 | N/A | 64.54 | N/A | 64.53 | N/A | 64.41 | N/A |
| 25715 | N/A | 64.54 | N/A | 64.52 | N/A | 64.40 | N/A |
| 25723 | N/A | 64.53 | N/A | 64.52 | N/A | 64.39 | N/A |
| 25722 | N/A | 64.51 | N/A | 64.51 | N/A | 64.37 | N/A |
| 25721 | N/A | 64.50 | N/A | 64.51 | N/A | 64.37 | N/A |
| 25720 | N/A | 64.49 | N/A | 64.50 | N/A | 64.36 | N/A |
| 25719 | N/A | 64.48 | N/A | 64.50 | N/A | 64.36 | N/A |

[1]Underside of footing elevation as estimated by Novatech in their January 2009 report titled *Morrison Court Development Wastewater servicing Study* .

[2]Sanitary sewer layout as per Novatech 2009 survey

[3]Sanitary sewer layout as per a survey conducted by Stantec in August 2012.

[4]During the survey conducted by Stantec in August 2012, they identified a maintenance hole between City structures 25704 and 25705. This structure is refered to as 25704i for the purposes of this study.

Note 1: Freeboard distances have only been calculated at maintenance holes where Novatech calculated/reported an underside of footing elevation. N/A in the freeboard column denotes missing USF data.

Note 2: Hydraulic Gradeline elevations have not been calculated at all location in each model due to data gaps. N/A in the HGL column denotes missing pipe data for that particular model.

Table 2 - Existing Conditions, Phase 1 and Phase X Hydraulic Gradeline Results

| City MH ID | Underside of Footing Elevation (m)[1] | Novatech 2009 Existing Conditions[2] | | XPSWMM Model Existing Condition[3] | | XPSWMM Proposed Phase I Condition[3] | | XPSWMM Proposed Phase X Condition[4] | |
|---|---|---|---|---|---|---|---|---|---|
| | | HGL (m) | Freeboard (m) | HGL (m) | Freeboard (m) | HGL (m) | Freeboard (m) | HGL (m) | Freeboard (m) |
| 25697 | N/A | 73.87 | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 25698 | N/A | 71.28 | N/A | 71.30 | N/A | 71.32 | N/A | 71.32 | N/A |
| 25699 | N/A | 68.75 | N/A | 69.18 | N/A | 69.27 | N/A | 69.38 | N/A |
| 25700 | N/A | 67.88 | N/A | 68.99 | N/A | 69.00 | N/A | 69.00 | N/A |
| 25701 | 67.50 | 66.07 | 1.43 | 66.07 | 1.43 | 66.09 | 1.41 | 66.11 | 1.39 |
| 25702 | 66.65 | 65.68 | 0.97 | 65.69 | 0.96 | 65.71 | 0.94 | 65.73 | 0.92 |
| 25703 | 66.25 | 65.44 | 0.81 | 65.44 | 0.81 | 65.47 | 0.78 | 65.49 | 0.76 |
| 25704 | 66.50 | 65.12 | 1.38 | 65.20 | 1.30 | 65.21 | 1.29 | 65.23 | 1.27 |
| 25704i[5] | N/A | N/A | N/A | 64.95 | N/A | 64.97 | N/A | 65.03 | N/A |
| 25705 | 65.50 | 65.09 | 0.41 | 64.93 | 0.57 | 64.96 | 0.54 | 65.04 | 0.47 |
| 25706 | 65.40 | 65.07 | 0.33 | 64.92 | 0.48 | 64.94 | 0.46 | 65.02 | 0.39 |
| 25707 | N/A | 64.9 | N/A | 64.87 | N/A | 64.89 | N/A | 64.96 | N/A |
| 25708 | N/A | 64.85 | N/A | 64.74 | N/A | 64.80 | N/A | 64.90 | N/A |
| 43673 | 65.15 | 64.82 | 0.33 | 64.67 | 0.48 | 64.75 | 0.40 | 64.84 | 0.31 |
| 25709 | 67.08 | 64.77 | 2.31 | 64.63 | 2.45 | 64.70 | 2.38 | 64.77 | 2.31 |
| 25710 | N/A | 64.69 | N/A | 64.55 | N/A | 64.59 | N/A | 64.64 | N/A |
| 25711 | N/A | 64.59 | N/A | 64.46 | N/A | 64.47 | N/A | 64.49 | N/A |
| 25712 | N/A | 64.57 | N/A | 64.43 | N/A | 64.44 | N/A | 64.46 | N/A |
| 25713 | N/A | 64.55 | N/A | 64.41 | N/A | 64.42 | N/A | 64.43 | N/A |
| 25714 | N/A | 64.54 | N/A | 64.41 | N/A | 64.41 | N/A | 64.42 | N/A |
| 25715 | N/A | 64.54 | N/A | 64.40 | N/A | 64.41 | N/A | 64.42 | N/A |
| 25723 | N/A | 64.53 | N/A | 64.39 | N/A | 64.39 | N/A | 64.40 | N/A |
| 25722 | N/A | 64.51 | N/A | 64.37 | N/A | 64.37 | N/A | 64.38 | N/A |
| 25721 | N/A | 64.50 | N/A | 64.37 | N/A | 64.37 | N/A | 64.37 | N/A |
| 25720 | N/A | 64.49 | N/A | 64.36 | N/A | 64.36 | N/A | 64.36 | N/A |
| 25719 | N/A | 64.48 | N/A | 64.36 | N/A | 64.36 | N/A | 64.36 | N/A |

[1]Underside of footing elevation as estimated by Novatech in their January 2009 report titled *Morrison Court Development Wastewater servicing Study* .

[2]Sanitary sewer layout as per Novatech 2009 survey

[3]Sanitary sewer layout as per a survey conducted by Stantec in August 2012.

[4]Phase X condition is a test case to determine the maximum sanitary flow increase from the proposed development that will result in a minimum freeboard of no less than 0.30 m. Modelled flow increase = 8 L/s.

[5]During the survey conducted by Stantec in August 2012, they identified a maintenance hole between City structures 25704 and 25705. This structure is refered to as 25704i for the purposes of this study.

Note 1: Freeboard distances have only been calculated at maintenance holes where Novatech calculated/reported an underside of footing elevation. N/A in the freeboard column denotes missing USF data.

Note 2: Hydraulic Gradeline elevations have not been calculated at all location in each model due to data gaps. N/A in the HGL column denotes missing pipe data for that particular model.

## Alison Gosling

**From:** C. Brennan <cbrennan@jfsa.com>
**Sent:** January-21-13 2:51 PM
**To:** 'natan'; 'Andrew Finnson'
**Cc:** 'J.F. Sabourin'; 'Lloyd Phillips'
**Subject:** RE: Morrison Drive MH's
**Attachments:** 20130114 - Hydraulic Gradeline Results + Sanitary Design.pdf

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

Hello Andrew,

As requested by your office and Greatwise Developments Corporation (Greatwise), J.F. Sabourin and Associates Inc. (JFSA) have completed our hydraulic analysis of the existing Morrison Drive sanitary sewer system. This analysis is meant to augment the findings that JFSA provided to Greatwise in August 2012. During the previous analysis it was determined that the existing sanitary sewer along Morrison Drive had sufficient capacity to convey the sanitary flow increases from Phase I of the proposed Morrison Court development while maintaining a freeboard of greater than 0.30 m at the critical location, MHSA43673. The current analysis has been undertaken to determine the maximum peak sanitary flow increase from the proposed development that would still result in a freeboard of greater than 0.30 m along the existing Morrison Drive sanitary sewer.

JFSA updated the sanitary sewer design calculations and XPSWMM model of the existing sanitary sewer to determine the maximum flow increase that would meet the 0.30 m freeboard criterion. Based on that analysis it was determined that an overall peak sanitary flow increase of **8 L/s** will result in a freeboard of 0.31 m at the critical location, MHSA43673, along the existing sanitary sewer. Please refer to the Hydraulic Gradeline Results and Sanitary Design sheets attached, these results supersede the tables that were submitted in August 2012. As is illustrated in the sanitary design table for Phase X, the scenario that was used to arrive at the max allowable peak flow increase of 8 L/s is a new development with a population of 650 replacing five (5) of the existing townhouses (population of 162) for a net population increase of 488. Please note that the freeboard calculations are based on the hydraulic gradeline results from JFSA's XPSWMM model and the underside of footing determinations made by Novatech in their January 26, 2009 report titled *Morrison Court Development Wastewater Servicing Study*.

Please contact me if you have any questions or comments,
Kind Regards

*Colin Brennan, B.A.Sc.*
**Water Resources EIT**

JFSA Water Resources and Environmental Consultants

J.F. Sabourin and Associates Inc.
52 Springbrook Drive , Ottawa , ON K2S 1B9
tel.: 613.836.3884 ext. 224, fax: 613.836.0332, **www.jfsa.com**

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**From:** natan [mailto:natan@gsregalgroup.com]
**Sent:** Tuesday, January 08, 2013 3:21 PM
**To:** 'Andrew Finnson'

**Cc:** 'J.F. Sabourin'; 'Lloyd Phillips'; cbrennan@jfsa.com
**Subject:** RE: Morrison Drive MH's

Andrew
Can we start with a conference call on Thursday Jan 10th
I recommend for Colin, you, Lloyd and me to be there.
Do we need James!
If the time is acceptable to all I will send the conference access info to ALL
Regards
Natan

---

**From:** Andrew Finnson [mailto:afinnson@dsel.ca]
**Sent:** January-08-13 1:43 PM
**To:** cbrennan@jfsa.com; 'natan'
**Cc:** 'J.F. Sabourin'; 'Lloyd Phillips'
**Subject:** RE: Morrison Drive MH's

Hi Natan,
Colin's email below states that they would like to have a meeting to discuss the sanitary analysis and make sure that we're all on the same page. Can you suggest a time that would work for you so we can try to set something up?

Thanks,

Andrew Finnson, P.Eng.

DSEL
david schaeffer engineering ltd

phone: (613) 836-0856 ext 229
cell: (613) 222-4957
e-mail: afinnson@DSEL.ca

---

**From:** C. Brennan [mailto:cbrennan@jfsa.com]
**Sent:** Tuesday, December 18, 2012 7:00 PM
**To:** 'Andrew Finnson'
**Cc:** 'J.F. Sabourin'; 'natan'; 'Lloyd Phillips'
**Subject:** RE: Morrison Drive MH's

Hello Andrew,

We can perform such an analysis. It would involve additional work in comparison to the quote provided below and we would like to have a brief meeting with the team to confirm the conclusions that can be drawn from such an analysis and how the project could progress from there. To perform the aforementioned our fee would be $1,250 + tax. A meeting with the City may be required to confirm that our approach will be acceptable to them, which would be charged at our standard hourly rates.

Kind Regards,
Colin

*Colin Brennan, B.A.Sc.*
**Water Resources EIT**

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52 Springbrook Drive , Ottawa , ON K2S 1B9
tel.: 613.836.3884 ext. 224, fax: 613.836.0332, **www.jfsa.com**

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**From:** Andrew Finnson [mailto:afinnson@dsel.ca]
**Sent:** Thursday, December 13, 2012 9:56 AM
**To:** cbrennan@jfsa.com
**Cc:** 'J.F. Sabourin'; 'natan'; 'Lloyd Phillips'
**Subject:** RE: Morrison Drive MH's

Hi Colin,
I've discussed this with Natan at Greatwise and what they'd like to see (since we're looking at this again) is a maximum number of units, or maximum population that could be accommodated without the need for a downstream upgrade. This analysis should show that the additional units can be accommodated, as well as give a bit of a buffer in the event that there are any site plan changes. Are you able to complete this analysis for the fee quoted below or would additional fees be required to complete this type of analysis?

Thanks,

Andrew Finnson, P.Eng.

DSEL
david schaeffer engineering ltd

phone: (613) 836-0856 ext 229
cell: (613) 222-4957
e-mail: afinnson@DSEL.ca

---

**From:** C. Brennan [mailto:cbrennan@jfsa.com]
**Sent:** Wednesday, December 12, 2012 3:14 PM
**To:** 'Andrew Finnson'
**Cc:** 'J.F. Sabourin'
**Subject:** RE: Morrison Drive MH's

Hi Andrew,

I can introduce that flow increase into our hydraulic model and confirm if Phase I can still go ahead without improving the existing sanitary sewer system. It will take about a half day to update everything and respond via email. To perform this check our fee would be $ 500.

Let me know if you would like me to proceed.

Colin

---

**From:** Andrew Finnson [mailto:afinnson@dsel.ca]
**Sent:** Monday, December 10, 2012 11:11 AM

**To:** cbrennan@jfsa.com
**Subject:** RE: Morrison Drive MH's

Hi Colin,
I've been told that they are making some minor adjustments to unit counts for the Greatwise - Morrison Drive development. Basically they are converting 5 - 2 bedroom units to 10 – 1 bedroom units. They have asked me to confirm that this will still work without upgrading the downstream sewer. Are you able to confirm that this should still work?

Give me a call if you have any questions.

Thanks,

Andrew Finnson, P.Eng.

DSEL
david schaeffer engineering ltd

phone: (613) 836-0856 ext 229
cell: (613) 222-4957
e-mail: afinnson@DSEL.ca

---

**From:** C. Brennan [mailto:cbrennan@jfsa.com]
**Sent:** Friday, August 24, 2012 11:07 AM
**To:** 'Andrew Finnson'
**Cc:** jfsabourin@jfsa.com
**Subject:** RE: Morrison Drive MH's

Hi Andrew,

As requested, we have assessed the HGL elevations along the Morrison Drive sanitary sewer under ultimate (Phase I and II) flow conditions. Sanitary flows are based on Novatech's 2009 design, with a peak flow of 112.4 L/s at the downstream end of the system. The minimum freeboard for this condition at MHSA43673 is 0.26 m, less than the City's minimum allowable freeboard of 0.30 m.

Regards,

Colin

---

**From:** Andrew Finnson [mailto:afinnson@dsel.ca]
**Sent:** Friday, August 24, 2012 9:19 AM
**To:** cbrennan@jfsa.com
**Subject:** RE: Morrison Drive MH's

Colin,
The latest sanitary design sheets are attached. The ultimate flow from the site is 12.08 L/s.

Thanks,
Andrew

**From:** C. Brennan [mailto:cbrennan@jfsa.com]
**Sent:** Wednesday, August 22, 2012 2:27 PM
**To:** 'Andrew Finnson'
**Cc:** 'J.F. Sabourin'
**Subject:** RE: Morrison Drive MH's

Hello Andrew,

As requested by your office, on behalf of Greatwise Developments Corporation, J.F. Sabourin and Associates Inc. (JFSA) have completed our modelling exercise along the Morrison Drive sanitary sewer line under both existing and proposed phase I development conditions. A preliminary assessment of the sanitary sewer capacity was previously undertaken by Novatech Engineering Consultants Ltd. (Novatech) as described in their January 26, 2009 report titled *Morrison Court Development Wastewater Servicing Study*. In that study, Novatech found that at the most critical location, MHSA43673, the existing freeboard between the Hydraulic Gradeline (HGL) in the sanitary sewer system and the lowest connected underside of footing (USF) elevation is 0.33 m. Novatech also assessed the HGL within the system under proposed development flows whereby seven (7) 12-unit townhomes (population of 223) would be replaced with a new development having a total population of 929 (representing a population increase of 702 persons). Novatech found that the peak flow at the Pinecrest Trunk confluence would increase from 104.2 L/s under existing conditions to 112.4 L/s under proposed conditions. They found that this flow increase resulted in increased HGL elevations such that, the minimum freeboard at MHSA43673 would be reduced to 0.12 m. Novatech therefore concluded that the existing system does not have adequate capacity for the entire proposed development and recommended increasing the diameter of 423 m of pipe between MHSA25705 and MHSA25711 to 375 mm at 0.14% slope, which would provide a minimum freeboard of 0.41 m.

JFSA conducted our modelling of the sanitary sewer system using XPSWMM version 10.6, while Novatech had previously used H2OMAP Sewer/Pro. It is therefore anticipated that JFSA will arrive at slightly different results than Novatech when modelling the same system. Table 1, attached, indicates that at MHSA43673 where Novatech modelled a freeboard of 0.33 m, the JFSA XPSWMM model indicates that there is a 0.37 m freeboard. Previous modelling was based on a survey conducted by Novatech during the work for their January 2009 report. Pipe lengths and dimensions from the Novatech survey and As Built plans agree with one another and have been taken as correct in JFSA's work. The sanitary pipe inverts were verified/confirmed however, using the results from a field survey conducted by Stantec Consulting Ltd. in August 2012. It is important to note that Stantec located a maintenance hole between MHSA25704 and MHSA25705, this maintenance hole has been included in JFSA's models and labelled as 25704i for the purposes of this work. Furthermore,Stantec's structure SMH2 (correlates to city MHSA25697) was not included in the JFSA modelling as: 1) the measured invert does not agree well with the As Built data and 2) that pipe is upstream of the proposed site and lowest freeboard locations. Similarly, Stantec structures SMH38, SMH39 and SMH40 appear to be a parallel sanitary line to the Morrison sewer and do not appear to have City structure ID's, therefore, JFSA was instructed by DSEL to neglect these three (3) structures as noted in the correspondence below. A graph demonstrating the Morrison Drive sanitary sewer invert elevation as per the: Novatech 2009 survey, Stantec 2012 survey and As Built plans is attached for reference, note that the first node is MHSA25698 and the final node is MHSA25759. The final two columns of attached Table 1 provide JFSA's modelling results under existing flow conditions based on the Stantec surveyed inverts. In updating the XPSWMM model to reflect the Stantec 2012 survey rather than the Novatech 2009 survey the modelled HGL elevations were reduced, such that, the minimum freeboard at MHSA43673 based on JFSA's model is 0.49 m. This freeboard is above the minimum allowable freeboard of 0.30 m as per the *City of Ottawa Sewer Design Guidelines* (November 2004).

JFSA was retained to assess the HGL elevations under the currently proposed Phase I development conditions rather than ultimate development conditions. The proposed Phase I construction will result in the demolition of four (4) existing townhouse buildings and the construction of three (3) 4-storey buildings two of which are for residential use while one is to be mixed use commercial/residential. The net impact of the proposed Phase I development is a population increase of 220 persons (350 - 130) and 600 m^2 of Commercial floor space (equivalent to 10L/s of sanitary flow), which results in a peak flow at the confluence with the Pinecrest trunk sewer of 106.2 L/s. Sanitary flow sheets

are attached for both existing and Phase I development conditions. Table 2, attached, provides a comparison the HGL results from the Novatech 2009 existing modelling, the JFSA XPSWMM existing modelling and the JFSA XPSWMM modelling for proposed Phase I flow conditions. The minimum freeboard calculated along the existing Morrison Drive sanitary sewer under Phase I flows was 0.44 m, which occurs at MHSA43673. Therefore, based on the JFSA XPSWMM model, and the Novatech 2009 USF elevations, the minimum freeboard under Phase I development flows will be 0.44 m, which is greater than the City of Ottawa's minimum allowable value of 0.30 m.

Please contact myself if you have any questions or comments.
Kind Regards,

*Colin Brennan, B.A.Sc.*
**Water Resources EIT**

JFSA Water Resources and Environmental Consultants

J.F. Sabourin and Associates Inc.
52 Springbrook Drive , Ottawa , ON K2S 1B9
tel.: 613.836.3884 ext. 224, fax: 613.836.0332, **www.jfsa.com**

---

**From:** Andrew Finnson [mailto:afinnson@dsel.ca]
**Sent:** Wednesday, August 22, 2012 10:13 AM
**To:** cbrennan@jfsa.com
**Subject:** RE: Morrison Drive MH's

Colin,
Jamie at Stantec has confirmed that it is in fact a typo. It's 1 metre high. The actual invert is 64.53.

Andrew

---

**From:** Andrew Finnson [mailto:afinnson@dsel.ca]
**Sent:** Wednesday, August 22, 2012 10:02 AM
**To:** 'cbrennan@jfsa.com'
**Subject:** RE: Morrison Drive MH's

Colin,
I've left a message with Jamie. Please proceed. I'll make sure we get confirmation from him asap.

Thanks,
Andrew

---

**From:** C. Brennan [mailto:cbrennan@jfsa.com]
**Sent:** Wednesday, August 22, 2012 8:32 AM
**To:** 'Andrew Finnson'
**Subject:** RE: Morrison Drive MH's

Thanks Andrew.

Colin

---

**From:** Andrew Finnson [mailto:afinnson@dsel.ca]
**Sent:** Wednesday, August 22, 2012 8:29 AM
**To:** cbrennan@jfsa.com
**Subject:** RE: Morrison Drive MH's

Hi Colin,
Your assumptions below are correct. 3 townhouse buildings will remain in Phase I and 4 will be demolished.

Thanks,
Andrew

---

**From:** C. Brennan [mailto:cbrennan@jfsa.com]
**Sent:** Wednesday, August 22, 2012 8:25 AM
**To:** 'Andrew Finnson'
**Subject:** RE: Morrison Drive MH's

Hi Andrew,

No problem including the new Phase 1 population numbers. Just to confirm though, from the in-progress base plan I received from you it seems like Phase 1 construction will replace four (4) of the existing Townhouses (4*12units*2.7 = 130 persons). Will the other three (3) existing townhouses remain during Phase 1 (3*12*2.7=97 persons), is this correct?

I am assuming that the proposed Phase 1 buildings will contribute flow from 350 persons which replaces flow from 130 persons, representing a net increase of 220 persons for Phase I.

Colin

---

**From:** Andrew Finnson [mailto:afinnson@dsel.ca]
**Sent:** Tuesday, August 21, 2012 9:29 AM
**To:** cbrennan@jfsa.com
**Subject:** RE: Morrison Drive MH's

Hi Colin,
We've just received a new plan with minor revisions to the unit counts for phase 1, and therefore minor revisions to the sanitary flow. If it's possible to revise the flows to match the updated plan without causing you further delay please do so, otherwise please proceed with the previous numbers you have.

Thanks,
Andrew

---

**From:** C. Brennan [mailto:cbrennan@jfsa.com]
**Sent:** Tuesday, August 21, 2012 9:31 AM
**To:** 'Andrew Finnson'
**Cc:** jfsabourin@jfsa.com; spichette@dsel.ca
**Subject:** RE: Morrison Drive MH's

Hi Andrew,

I am currently running various modelling scenarios for Monahan to respond to the RVCA letter from Bruce Reid. Therefore, I will not be able to provide the Sanitary modelling results to you today. Sorry for the delay, I will plan to return to that file first thing tomorrow morning.

Regards,
Colin

---

**From:** Andrew Finnson [mailto:afinnson@dsel.ca]
**Sent:** Tuesday, August 21, 2012 8:17 AM
**To:** cbrennan@jfsa.com
**Subject:** RE: Morrison Drive MH's

Hi Colin,
Do you have something you can send me today? I need to get this incorporated into a report which needs to be submitted to the client tomorrow.

Thanks,
Andrew

---

**From:** C. Brennan [mailto:cbrennan@jfsa.com]
**Sent:** Friday, August 17, 2012 1:09 PM
**To:** 'Andrew Finnson'
**Cc:** 'J.F. Sabourin'
**Subject:** RE: Morrison Drive MH's

Hi Andrew,

I've just come across another discrepancy. Where Stantec picks up three (3) sanitary manholes, SMH25, SMH26 and SMH27, the Novatech drawings and model only show two manholes (25705 and 25706). I'm inclined to trust the Stantec survey and add another manhole and pipe (approx. 17 m long) to the model.

Could you please check with Stantec and advise if the above assumption should be used or not.

Regards,
Colin

---

**From:** Andrew Finnson [mailto:afinnson@dsel.ca]
**Sent:** Friday, August 17, 2012 11:20 AM
**To:** cbrennan@jfsa.com
**Cc:** 'J.F. Sabourin'
**Subject:** RE: Morrison Drive MH's

Hi Colin,
I will follow up with Stantec but according to the as-builts the below assumptions are correct. Please proceed on that basis.

Thanks,
Andrew

**From:** C. Brennan [mailto:cbrennan@jfsa.com]
**Sent:** Friday, August 17, 2012 11:21 AM
**To:** 'Andrew Finnson'
**Cc:** 'J.F. Sabourin'
**Subject:** RE: Morrison Drive MH's

Hi Andrew,

As a follow-up to our phone conversation I would like to confirm the assumptions that I am to make with respect to the sanitary survey data prepared by Stantec.

1. Due to a discrepancy between the new and old inverts at SMH2 (25697) and the second south invert at SMH4 (25698), JFSA will only model from SMH4 (25698) downstream pending clarification from DSEL/Stantec.
2. The following three (3) manholes seem to be a parallel line which are not noted on the As Built drawings in DSEL's possession, SMH 38, SMH 39 and SMH 40. Therefore these manholes will be neglected in our analysis. We are under the assumption that SMH37 corresponds to the City MH 25711 and SMH41 corresponds to City MH 25712 and that these two manholes are connected by a 63.5 m long 375 mm diameter concrete sanitary pipe.
3. There is a discrepancy from SMH37 to SMH49 with respect to pipe sizes. The sizes recorded by Stantec will be neglected in favour of the sizes included in DSEL's EPA SWMM model, which are based on the As Built Drawings. Pipe diameters to be used are as follows:
   SMH37 (25711) to SMH44 (25715) - 375 mm concrete
   SMH44 (25715) to SMH49 (25719 - 600 mm concrete
4. Except as noted above, the pipe inverts and top of grate elevations recorded by Stantec will be taken as correct and used in all subsequent hydraulic (XPSWMM) modelling.

Please advise if any of the preceding assumptions are incorrect, or if clarification is provided by Stantec.

Regards,
Colin

*Colin Brennan, B.A.Sc.*
**Water Resources EIT**

JFSA Water Resources and Environmental Consultants

J.F. Sabourin and Associates Inc.
52 Springbrook Drive , Ottawa , ON K2S 1B9
tel.: 613.836.3884 ext. 224, fax: 613.836.0332, **www.jfsa.com**

---

**From:** C. Brennan [mailto:cbrennan@jfsa.com]
**Sent:** Friday, August 17, 2012 10:05 AM
**To:** 'Andrew Finnson'
**Cc:** 'J.F. Sabourin'
**Subject:** RE: Morrison Drive MH's

Hi Andrew,

I've been reviewing the Stantec Storm and Sanitary manhole survey and would like a few clarifications.

specifically:

1. there two (2) pipes coming into the South side of Structure 4. What is the second pipe, and which one represents the main sewer line.
2. There are more sanitary manholes in the NE portion of Morrison Road than recorded by Novatech. STM 38, 39 and 40 all seem like additions.
3. Several pipe size and invert comments are included on the attached drawing as well.

I have attached a CAD Drawing with City Structure labels included where I believe they may apply, I will call to discuss.

Colin

---

**From:** Andrew Finnson [mailto:afinnson@dsel.ca]
**Sent:** Monday, August 13, 2012 2:30 PM
**To:** cbrennan@jfsa.com
**Subject:** FW: Morrison Drive MH's

Colin,
See the attached survey from Stantec.
If anything is unclear let me know.

Thanks,
Andrew

---

**From:** Leslie, Jamie [mailto:Jamie.Leslie@stantec.com]
**Sent:** Monday, August 13, 2012 2:24 PM
**To:** Andrew Finnson
**Subject:** RE: Morrison Drive MH's

Hi Andrew,

Sorry for the delay. Here is the CAD file for our MH pickup and invert measurements. Let me know if you have any questions. Thank you.

**Jamie Leslie, OLS, OLIP, EIT**
Project Manager
Stantec Geomatics Ltd.
1505 Laperriere Avenue
Ottawa ON K1Z 7T1
Ph: (613) 722-4420 Ext. 592
Fx: (613) 722-2799
Jamie.Leslie@stantec.com
**stantec**.com

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**From:** Andrew Finnson [mailto:afinnson@dsel.ca]
**Sent:** Friday, August 10, 2012 11:08 AM
**To:** Leslie, Jamie
**Subject:** RE: Morrison Drive MH's

Monday morning is fine Jamie. Have a good weekend.

Thanks,
Andrew

---

**From:** Leslie, Jamie [mailto:Jamie.Leslie@stantec.com]
**Sent:** Friday, August 10, 2012 11:10 AM
**To:** Andrew Finnson (afinnson@dsel.ca)
**Subject:** Morrison Drive MH's

Hi Andrew,

I just wanted to update you on the status of the Morrison Drive MH pickup. We are finalizing the CAD file now. I do have to step out shortly for a meeting this afternoon. I'm not sure if I will return to the office this afternoon. Unless you require this information later this afternoon, I will forward you the drawing first thing Monday morning. If you do require it, I will have it sent to you by my CAD person when it is finished. Let me know your thoughts. Thank you.

**Jamie Leslie, OLS, OLIP, EIT**
Project Manager
Stantec Geomatics Ltd.
1505 Laperriere Avenue
Ottawa ON K1Z 7T1
Ph: (613) 722-4420 Ext. 592
Fx: (613) 722-2799
Jamie.Leslie@stantec.com
**stantec**.com

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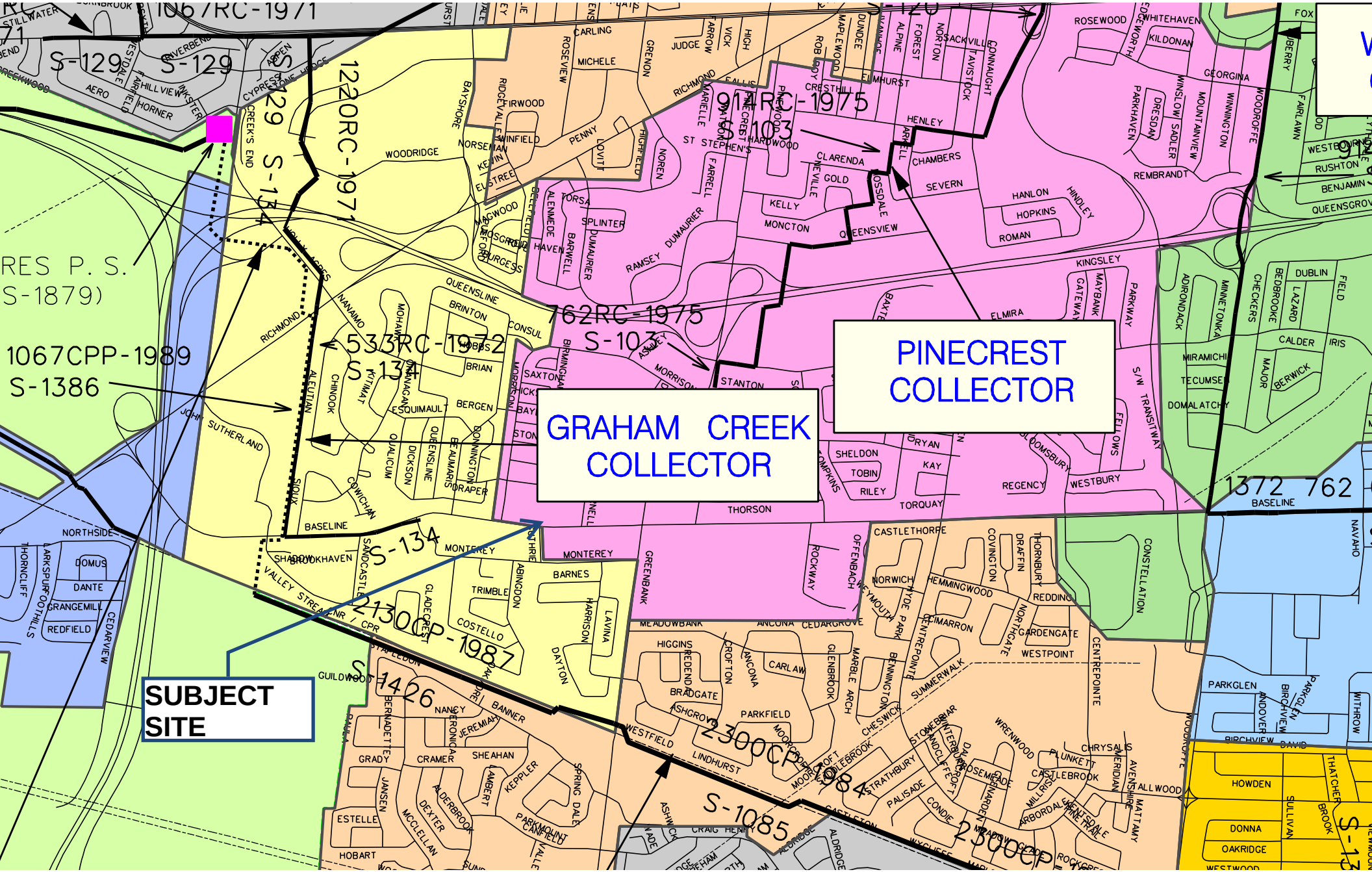
# TRUNK SANITARY SEWERS & COLLECTION AREAS



# *APPENDIX D*

## *Stormwater Management*

**Greatwise Developments**
**2710 Draper Avenue**
**Storm Sewer Calculation Sheet**

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

**Existing Drainage Charateristics From Internal Site**

| | | |
|---|---|---|
| **Area** | 1.331 | ha |
| **C** | 0.56 | Rational Method runoff coefficient |
| **L** | 101.6 | m |
| **Up Elev** | 75.85 | m |
| **Dn Elev** | 73 | m |
| **Slope** | 2.8 | % |
| **Tc** | 12.6 | 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** | 68.2 | 92.4 | 158.1 | mm/hr |
| **Q** | 141.4 | 191.6 | 409.9 | 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** | 1.33 | ha |
| **C** | 0.50 | Rational Method runoff coefficient |
| **$t_c$** | 12.6 | min |

**5-year**

| | | |
|---|---|---|
| **i** | 92.4 | mm/hr |
| **Q** | 170.7 | L/s |

**Estimated Post Development Peak Flow from Unattenuated Areas**

| | | |
|---|---|---|
| **Area ID** | U1 | |
| **Total Area** | 0.160 | ha |
| **C** | 0.75 | 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) | $V_{stored}$ ($m^3$) |
| 15.6 | 81.7 | 27.2 | 27.2 | 0.0 | 0.0 | 139.6 | 58.2 | 58.2 | 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

Sewers

| ID | UG-1 (ST-30) | UG-2 (ST-30) | UG-2 (ST-18) |
|---|---|---|---|
| **$A_{sewer}$ ($m^2$)** | 38.8 | 305.5 | 305.5 |
| **Total Modules** | 86 | 576 | 576 |
| **$V_{sewer}$ ($m^3$)** | 26.5 | 177.5 | 105.1 |

*Top of lid or max ponding elevation = 72.37

**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 | 70.01 | | 0.00 | | | 0.0 | 0.0 | 0.00 |
| Underground Storage INV | 71.15 | | 1.13 | 1.13 | 0.0 | 0.0 | 77.3 | 0.00 |
| ST-30 SL | 71.53 | | 1.51 | 0.38 | 102.0 | 102.0 | 89.3 | 0.32 |
| ST-18 INV | 71.91 | | 1.90 | 0.39 | 102.0 | 204.0 | 100.1 | 0.57 |
| ST-18 SL | 72.14 | | 2.13 | 0.23 | 52.5 | 256.5 | 106.0 | 0.67 |
| Underground Storage OBV | 72.37 | | 2.36 | 0.23 | 52.5 | 309.0 | 111.5 | 0.77 |
| | | | | | | | | |
| | | | | | | | | |

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



DSEL©

**Orifice Location** **MH8** **Dia** 185
**Total Area** 1.178 ha
**C** 0.74 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 | 251.7 | 89.3 | 162.5 | 97.5 | 178.6 | 539.3 | 111.0 | 428.3 | 257.0 |
| 15 | 83.6 | 201.9 | 89.3 | 112.6 | 101.4 | 142.9 | 431.6 | 111.0 | 320.6 | 288.5 |
| 20 | 70.3 | 169.7 | 89.3 | 80.5 | 96.6 | 120.0 | 362.3 | 111.0 | 251.3 | 301.6 |
| 25 | 60.9 | 147.1 | 89.3 | 57.9 | 86.8 | 103.8 | 313.6 | 111.0 | 202.7 | 304.0 |
| 30 | 53.9 | 130.3 | 89.3 | 41.0 | 73.9 | 91.9 | 277.5 | 111.0 | 166.5 | 299.7 |
| 35 | 48.5 | 117.2 | 89.3 | 28.0 | 58.7 | 82.6 | 249.4 | 111.0 | 138.4 | 290.7 |
| 40 | 44.2 | 106.8 | 89.3 | 17.5 | 42.0 | 75.1 | 227.0 | 111.0 | 116.0 | 278.3 |
| 45 | 40.6 | 98.2 | 89.3 | 8.9 | 24.0 | 69.1 | 208.5 | 111.0 | 97.6 | 263.4 |
| 50 | 37.7 | 91.0 | 89.3 | 1.7 | 5.1 | 64.0 | 193.2 | 111.0 | 82.2 | 246.5 |
| 55 | 35.1 | 84.9 | 84.9 | 0.0 | 0.0 | 59.6 | 180.1 | 111.0 | 69.1 | 228.0 |
| 60 | 32.9 | 79.6 | 79.6 | 0.0 | 0.0 | 55.9 | 168.8 | 111.0 | 57.8 | 208.2 |
| 65 | 31.0 | 75.0 | 75.0 | 0.0 | 0.0 | 52.6 | 159.0 | 111.0 | 48.0 | 187.3 |
| 70 | 29.4 | 71.0 | 71.0 | 0.0 | 0.0 | 49.8 | 150.4 | 111.0 | 39.4 | 165.5 |
| 75 | 27.9 | 67.4 | 67.4 | 0.0 | 0.0 | 47.3 | 142.7 | 111.0 | 31.7 | 142.9 |
| 80 | 26.6 | 64.2 | 64.2 | 0.0 | 0.0 | 45.0 | 135.9 | 111.0 | 24.9 | 119.6 |
| 85 | 25.4 | 61.3 | 61.3 | 0.0 | 0.0 | 43.0 | 129.7 | 111.0 | 18.8 | 95.6 |
| 90 | 24.3 | 58.7 | 58.7 | 0.0 | 0.0 | 41.1 | 124.2 | 111.0 | 13.2 | 71.2 |
| 95 | 23.3 | 56.3 | 56.3 | 0.0 | 0.0 | 39.4 | 119.1 | 111.0 | 8.1 | 46.3 |
| 100 | 22.4 | 54.1 | 54.1 | 0.0 | 0.0 | 37.9 | 114.5 | 111.0 | 3.5 | 21.0 |
| 105 | 21.6 | 52.1 | 52.1 | 0.0 | 0.0 | 36.5 | 110.2 | 111.0 | 0.0 | 0.0 |
| 110 | 20.8 | 50.3 | 50.3 | 0.0 | 0.0 | 35.2 | 106.3 | 111.0 | 0.0 | 0.0 |

**5-year $Q_{attenuated}$** **89.26 L/s** **100-year $Q_{attenuated}$** **110.97 L/s**
**5-year Max. Storage Required** **101.4 $m^3$** **100-year Max. Storage Required** **304.0 $m^3$**
**Est. 5-year Storage Elevation** **71.52 m** **Est. 100-year Storage Elevation** **72.35 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 | 27.2 | 0.0 | 58.2 | 0.0 | 0.0 |
| Attenutated Areas | 89.3 | 101.4 | 111.0 | 304.0 | 309.0 |
| **Total** | **116.5** | **101.4** | **169.2** | **304.0** | **309.0** |

| | | | | | | | | | | Sewer Data | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Area ID** | **Up** | **Down** | **Area** | **C** | **Indiv AxC** | **Acc AxC** | **$T_c$** | **I** | **Q** | **DIA** | **Slope** | **Length** | **$A_{hydraulic}$** | **R** | **Velocity** | **Qcap** | **Time Flow** | **Q / Q full** |
| | | | **(ha)** | **(-)** | | | **(min)** | **(mm/hr)** | **(L/s)** | **(mm)** | **(%)** | **(m)** | **($m^2$)** | **(m)** | **(m/s)** | **(L/s)** | **(min)** | **(-)** |
| | | | | | | | | | | | | | | | | | | |
| Street One | | | 0.05 | 0.50 | 0.03 | 0.03 | 10.0 | 104.2 | 7.2 | 300 | 1.00 | 3.5 | 0.071 | 0.075 | 1.37 | 96.7 | 0.0 | 0.07 |
| | MH 5 | MH 6 | 0.19 | 0.75 | 0.14 | 0.17 | 10.0 | 104.0 | 48.4 | 300 | 0.35 | 58.5 | 0.071 | 0.075 | 0.81 | 57.2 | 1.2 | 0.85 |
| | MH 6 | MH 7 | 0.19 | 0.75 | 0.14 | 0.31 | 11.2 | 98.0 | 84.4 | 375 | 0.35 | 63 | 0.110 | 0.094 | 0.94 | 104.2 | 1.1 | 0.81 |
| | | | | | | | 12.4 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| Street Two | MH 2 | MH 3 | 0.03 | 0.75 | 0.02 | 0.02 | | | | | | | | | | | | |
| | | | 0.04 | 0.75 | 0.03 | 0.05 | | | | | | | | | | | | |
| | | | 0.18 | 0.75 | 0.14 | 0.19 | 10.0 | 104.2 | 54.3 | 300 | 0.35 | 58 | 0.071 | 0.075 | 0.81 | 57.2 | 1.2 | 0.95 |
| | MH 3 | MH 4 | 0.04 | 0.75 | 0.03 | 0.03 | | | | | | | | | | | | |
| | | | 0.18 | 0.75 | 0.14 | 0.35 | 11.2 | 98.3 | 96.2 | 375 | 0.45 | 63 | 0.110 | 0.094 | 1.06 | 117.6 | 1.0 | 0.82 |
| | | | | | | | 12.2 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| Street Three | MH 1 | MH 4 | 0.04 | 0.75 | 0.03 | 0.03 | | | | | | | | | | | | |
| | | | 0.06 | 0.75 | 0.05 | 0.08 | 10.0 | 104.2 | 21.7 | 300 | 0.35 | 16.5 | 0.071 | 0.075 | 0.81 | 57.2 | 0.3 | 0.38 |
| | | | | | | | 10.3 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | MH 4 | MH 7 | 0.02 | 0.75 | 0.02 | 0.02 | | | | | | | | | | | | |
| | | | 0.06 | 0.75 | 0.05 | 0.49 | 12.2 | 93.9 | 127.2 | 375 | 0.75 | 33.5 | 0.110 | 0.094 | 1.37 | 151.8 | 0.4 | 0.84 |
| | | | | | | | 12.6 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | MH 7 | MH 8 | 0.04 | 0.75 | 0.03 | 0.03 | | | | | | | | | | | | |
| | | | 0.06 | 0.75 | 0.05 | 0.87 | 12.6 | 92.3 | 223.6 | 525 | 0.71 | 33.5 | 0.216 | 0.131 | 1.67 | 362.4 | 0.3 | 0.62 |
| | MH 8 | MH 9 | | | 0.00 | 0.87 | 12.9 | 90.9 | 220.4 | 525 | 0.80 | 14.5 | 0.216 | 0.131 | 1.78 | 384.7 | 0.1 | 0.57 |
| | | | | | | | 13.1 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |

# Detailed Stormceptor Sizing Report – Ottawa

| Project Information & Location | | | |
|---|---|---|---|
| **Project Name** | Ottawa | **Project Number** | - |
| **City** | Ottawa | **State/ Province** | Ontario |
| **Country** | Canada | **Date** | 10/19/2017 |
| **Designer Information** | | **EOR Information (optional)** | |
| **Name** | Brandon O'Leary | **Name** | Alison Gosling |
| **Company** | Forterra | **Company** | David Schaeffer Engineering Ltd. |
| **Phone #** | 905-630-0359 | **Phone #** | |
| **Email** | brandon.oleary@forterrabp.com | **Email** | |

## Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

| | |
|---|---|
| **Site Name** | Ottawa |
| **Recommended Stormceptor Model** | OSR 750 |
| **Target TSS Removal (%)** | 80.0 |
| **TSS Removal (%) Provided** | 83 |
| **PSD** | OK-110 |
| **Rainfall Station** | OTTAWA MACDONALD-CARTIER INT'L A |

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

| Stormceptor Sizing Summary | | |
|---|---|---|
| **OSR Model** | **% TSS Removal Provided** | **% Runoff Volume Captured Provided** |
| OSR 300 | 74 | 88 |
| OSR 750 | 83 | 96 |
| OSR 2000 | 88 | 99 |
| OSR 4000 | 93 | 100 |
| OSR 6000 | 95 | 100 |
| OSR 9000 | 95 | 100 |
| OSR 14000 | 96 | 100 |
| StormceptorMAX | Custom | Custom |

**Stormceptor**
The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for each rainfall event, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.
Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

**Design Methodology**
Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:
• Site parameters
• Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
• Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
• TSS load
• Detention time of the system

| Hydrology Analysis |
|---|
| PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour). Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section. |

| Rainfall Station | | | |
|---|---|---|---|
| **State/Province** | Ontario | **Total Number of Rainfall Events** | 4819 |
| **Rainfall Station Name** | OTTAWA MACDONALD-CARTIER INT'L A | **Total Rainfall (mm)** | 20978.1 |
| **Station ID #** | 6000 | **Average Annual Rainfall (mm)** | 567.0 |
| **Coordinates** | 45°19'N, 75°40'W | **Total Evaporation (mm)** | 2697.6 |
| **Elevation (ft)** | 370 | **Total Infiltration (mm)** | 4807.9 |
| **Years of Rainfall Data** | 37 | **Total Rainfall that is Runoff (mm)** | 13472.6 |

| Notes |
|---|
| • Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.<br>• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.<br>• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance. |

| Drainage Area | |
|---|---|
| Total Area (ha) | 1.178 |
| Imperviousness % | 77.0 |

| Up Stream Storage | |
|---|---|
| Storage (ha-m) | Discharge (cms) |
| 0.000 | 0.000 |
| 0.000 | 0.077 |
| 0.010 | 0.089 |
| 0.020 | 0.100 |
| 0.026 | 0.106 |
| 0.031 | 0.112 |

| Water Quality Objective | |
|---|---|
| TSS Removal (%) | 80.0 |
| Runoff Volume Capture (%) | 90.00 |
| Oil Spill Capture Volume (L) | |
| Peak Conveyed Flow Rate (L/s) | 111.50 |
| Water Quality Flow Rate (L/s) | |

| Up Stream Flow Diversion | |
|---|---|
| Max. Flow to Stormceptor (cms) | 0.00000 |

| Design Details | |
|---|---|
| Stormceptor Inlet Invert Elev (m) | |
| Stormceptor Outlet Invert Elev (m) | |
| Stormceptor Rim Elev (m) | |
| Normal Water Level Elevation (m) | |
| Pipe Diameter (mm) | |
| Pipe Material | |
| Multiple Inlets (Y/N) | No |
| Grate Inlet (Y/N) | No |

**Particle Size Distribution (PSD)**

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

| OK-110 | | |
|---|---|---|
| Particle Diameter (microns) | Distribution % | Specific Gravity |
| 1.0 | 0.0 | 2.65 |
| 53.0 | 3.0 | 2.65 |
| 75.0 | 15.0 | 2.65 |
| 88.0 | 25.0 | 2.65 |
| 106.0 | 41.0 | 2.65 |
| 125.0 | 15.0 | 2.65 |
| 150.0 | 1.0 | 2.65 |
| 212.0 | 0.0 | 2.65 |

| Site Name | Ottawa |
|---|---|

## Site Details

### Drainage Area

| | |
|---|---|
| Total Area (ha) | 1.178 |
| Imperviousness % | 77.0 |

### Surface Characteristics

| | |
|---|---|
| Width (m) | 217.00 |
| Slope % | 2 |
| Impervious Depression Storage (mm) | 1.57 |
| Pervious Depression Storage (mm) | 4.67 |
| Impervious Manning's n | 0.015 |
| Pervious Manning's n | 0.25 |

### Maintenance Frequency

| | |
|---|---|
| Maintenance Frequency (months) > | 12 |

### Infiltration Parameters

Horton's equation is used to estimate infiltration

| | |
|---|---|
| Max. Infiltration Rate (mm/hr) | 76.2 |
| Min. Infiltration Rate (mm/hr) | 13.2 |
| Decay Rate (1/sec) | 0.00115 |
| Regeneration Rate (1/sec) | 0.01 |

### Evaporation

| | |
|---|---|
| Daily Evaporation Rate (mm/day) | 2.54 |

### Dry Weather Flow

| | |
|---|---|
| Dry Weather Flow (lps) | 0 |

### Winter Months

| | |
|---|---|
| Winter Infiltration | 0 |

## TSS Loading Parameters

| | |
|---|---|
| TSS Loading Function | Build Up/ Wash-off |

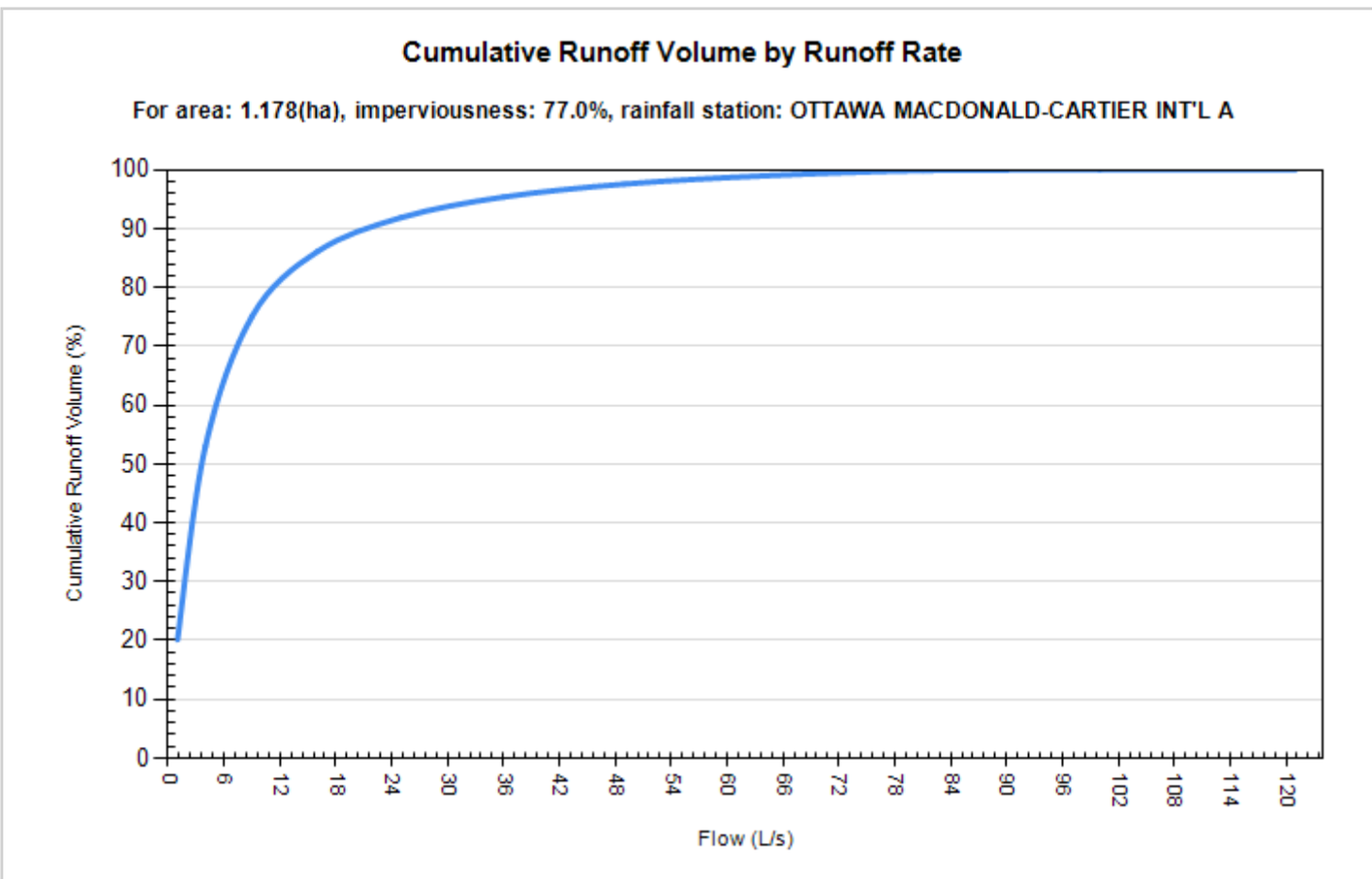
### Buildup/Wash-off Parameters

| | |
|---|---|
| Target Event Mean Conc. (EMC) mg/L | 125 |
| Exponential Buildup Power | 0.40 |
| Exponential Washoff Exponent | 0.20 |

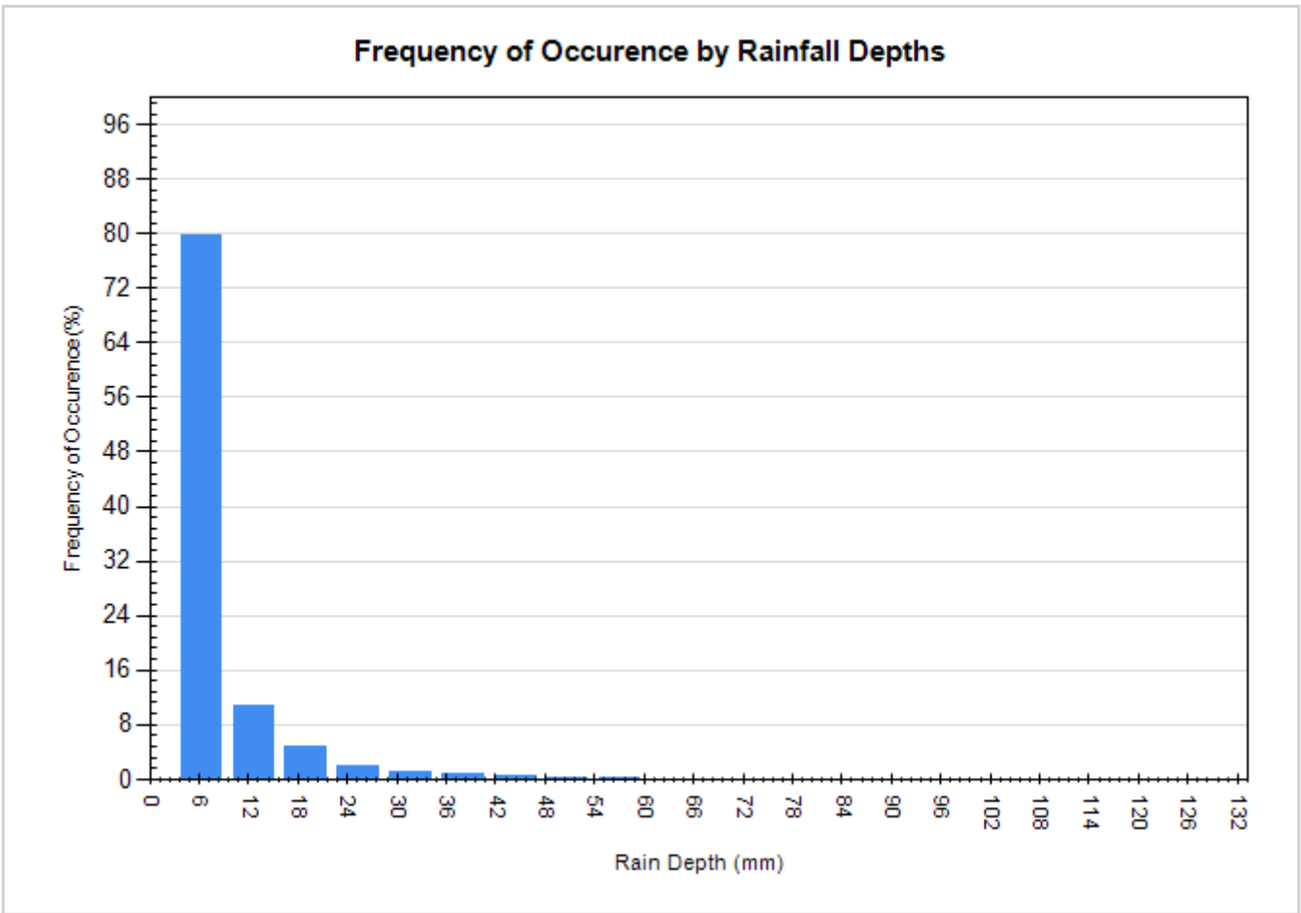
### TSS Availability Parameters

| | |
|---|---|
| Availability Constant A | 0.05 |
| Availability Factor B | 0.04 |
| Availability Exponent C | 1.10 |
| Min. Particle Size Affected by Availability (micron) | 400 |

| Cumulative Runoff Volume by Runoff Rate | | | |
|---|---|---|---|
| **Runoff Rate (L/s)** | **Runoff Volume (m³)** | **Volume Over (m³)** | **Cumulative Runoff Volume (%)** |
| 1 | 32235 | 127753 | 20.1 |
| 4 | 84873 | 75130 | 53.0 |
| 9 | 120228 | 39800 | 75.1 |
| 16 | 137700 | 22306 | 86.1 |
| 25 | 147049 | 12958 | 91.9 |
| 36 | 152664 | 7338 | 95.4 |
| 49 | 156146 | 3856 | 97.6 |
| 64 | 158406 | 1594 | 99.0 |
| 81 | 159903 | 97 | 99.9 |
| 100 | 160000 | 0 | 100.0 |
| 121 | 160000 | 0 | 100.0 |



| Rainfall Event Analysis | | | | |
|---|---|---|---|---|
| Rainfall Depth (mm) | No. of Events | Percentage of Total Events (%) | Total Volume (mm) | Percentage of Annual Volume (%) |
| 6.35 | 3843 | 79.7 | 5885 | 28.1 |
| 12.70 | 520 | 10.8 | 4643 | 22.1 |
| 19.05 | 225 | 4.7 | 3470 | 16.5 |
| 25.40 | 98 | 2.0 | 2144 | 10.2 |
| 31.75 | 58 | 1.2 | 1639 | 7.8 |
| 38.10 | 32 | 0.7 | 1118 | 5.3 |
| 44.45 | 24 | 0.5 | 996 | 4.7 |
| 50.80 | 9 | 0.2 | 416 | 2.0 |
| 57.15 | 5 | 0.1 | 272 | 1.3 |
| 63.50 | 1 | 0.0 | 63 | 0.3 |
| 69.85 | 1 | 0.0 | 64 | 0.3 |
| 76.20 | 1 | 0.0 | 76 | 0.4 |
| 82.55 | 0 | 0.0 | 0 | 0.0 |
| 88.90 | 1 | 0.0 | 84 | 0.4 |
| 95.25 | 0 | 0.0 | 0 | 0.0 |
| 101.60 | 0 | 0.0 | 0 | 0.0 |
| 107.95 | 0 | 0.0 | 0 | 0.0 |
| 114.30 | 1 | 0.0 | 109 | 0.5 |
| 120.65 | 0 | 0.0 | 0 | 0.0 |
| 127.00 | 0 | 0.0 | 0 | 0.0 |

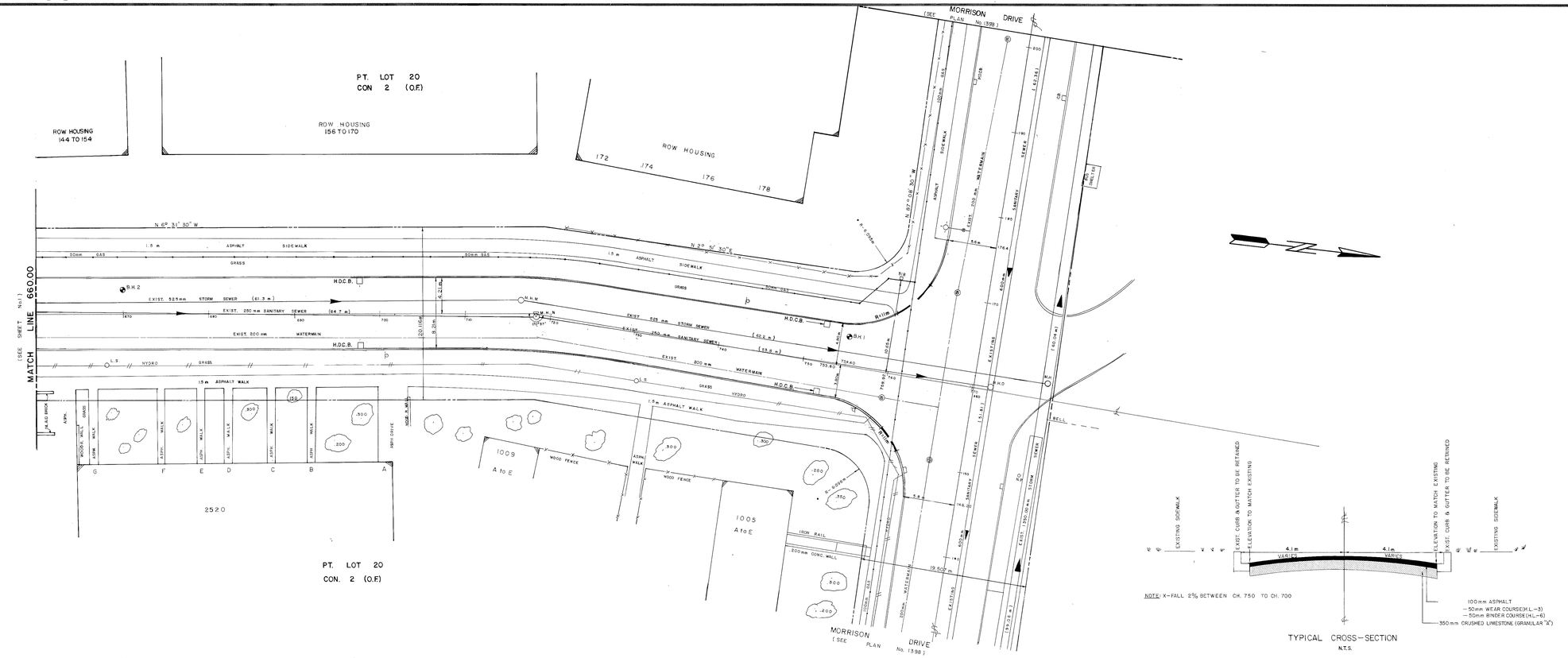



**For Stormceptor Specifications and Drawings Please Visit:**
**http://www.imbriumsystems.com/technical-specifications**

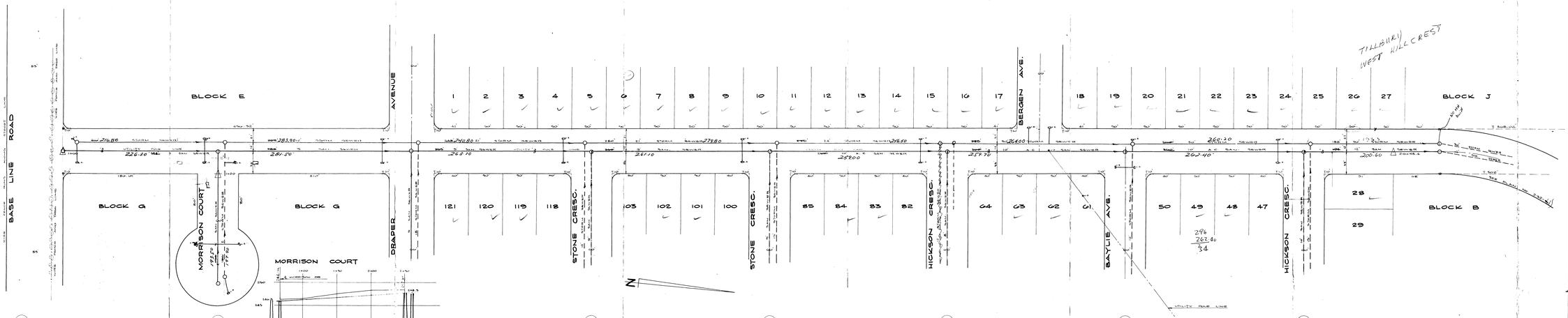
# *APPENDIX E*

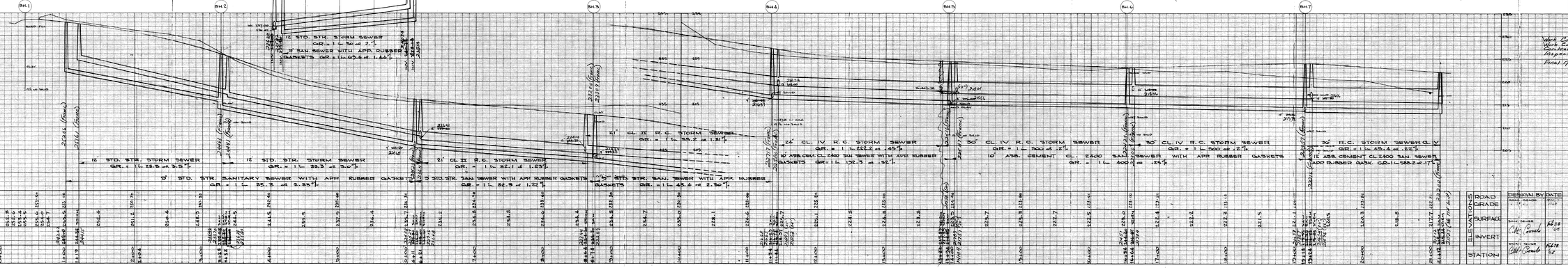
## *Supporting Documentation*

# 1935 DRAPER AVENUE 2 OF 2


P.T. LOT 20
CON 2 (O.F.)
ROW HOUSING 144 TO 154
ROW HOUSING 156 TO 170
ROW HOUSING 172 174 176 178
MORRISON DRIVE (SEE PLAN No. 1398)
MATCH LINE 660.00 (SEE SHEET No. 1)
N 6° 31' 30" W
N 20° 41' 30" E
N 87° 08' 30" W
1.5 m ASPHALT SIDEWALK
GRASS
50mm GAS
EXIST. 525mm STORM SEWER (61.3 m)
EXIST. 250 mm SANITARY SEWER (64.7 m)
EXIST. 200 mm WATERMAIN
H.D.C.B.
B.H. 2
M.H.M
C.B.H.M
B.H. 1
L.S. HYDRO
1.5m ASPHALT WALK
EXIST 525 mm STORM SEWER (62.2 m)
EXIST 250 mm SANITARY SEWER (63.8 m)
EXIST 200 mm WATERMAIN
EXIST. 1500 mm STORM SEWER
EXIST. 1350 mm STORM SEWER
EXIST. 1200 mm STORM SEWER
EXIST. 1050 mm STORM SEWER
EXIST. 900 mm STORM SEWER
EXIST. 750 mm STORM SEWER
EXIST. 600 mm STORM SEWER
EXIST. 450 mm STORM SEWER
EXIST. 375 mm STORM SEWER
EXIST. 300 mm STORM SEWER
EXIST. 250 mm STORM SEWER
EXIST. 200 mm STORM SEWER
EXIST. 150 mm STORM SEWER
EXIST. 100 mm WATERMAIN
EXIST. 150 mm SANITARY SEWER
EXIST. 200 mm SANITARY SEWER
EXIST. 250 mm SANITARY SEWER
EXIST. 300 mm SANITARY SEWER
EXIST. 375 mm SANITARY SEWER
EXIST. 450 mm SANITARY SEWER
EXIST. 525 mm SANITARY SEWER
EXIST. 600 mm SANITARY SEWER
EXIST. 750 mm SANITARY SEWER
EXIST. 900 mm SANITARY SEWER
EXIST. 1050 mm SANITARY SEWER
EXIST. 1200 mm SANITARY SEWER
EXIST. 1350 mm SANITARY SEWER
EXIST. 1500 mm SANITARY SEWER
EXIST. 1800 mm SANITARY SEWER
EXIST. 2100 mm SANITARY SEWER
EXIST. 2400 mm SANITARY SEWER
EXIST. 1800 mm STORM SEWER
EXIST. 2100 mm STORM SEWER
EXIST. 2400 mm STORM SEWER
EXIST. 2700 mm STORM SEWER
EXIST. 3000 mm STORM SEWER
EXIST. 3300 mm STORM SEWER
EXIST. 3600 mm STORM SEWER
EXIST. 3900 mm STORM SEWER
EXIST.

# MORRISON DRIVE




ROAD GRADE
SURFACE
INVERT
ELEVATIONS
STATION

ROAD GRADE
SURFACE
INVERT
ELEVATIONS
STATION

## NOTES

BENCH MARK
INFORMATION TAKEN FROM PLAN 9987
STORM MH'S WITH 12" SUMP

12" EXTRA STRENGTH (SSS) VITRIFIED CLAY PIPE PLAIN END WITH FLEXIBLE RUBBER COUPLINGS MAY BE USED IN PLACE OF 12" A.C. PIPE FROM CH. 13+16 TO CH. 21+19

36" EXTRA STRENGTH (7000) VITRIFIED CLAY PIPE PLAIN END WITH FLEXIBLE RUBBER COUPLINGS MAY BE USED IN PLACE OF 36" A.C. PIPE FROM MH 13+16 TO 13+54

## REVISIONS

| DATE | DESCRIPTION | DRAWN | APPR. |
|---|---|---|---|
| | Samples | | Chief |
| Work Commenced | | 16/12 | Nov 11/63 |
| Work Completed | | 24/12 | 2/1/64 |
| Maintenance Expires | | | Comp. Engr. 2 years |
| Final Measurements | | | |
| Book | | 3145 | 3187 |
| Page | | 117 | 47 |
| Date | | Jan 9/64 | Jan 9/64 |

O.K. to Pay
[illegible]

CITY OF OTTAWA
PLANNING AND WORKS DEPARTMENT
SEWERS AND ROADS BRANCH

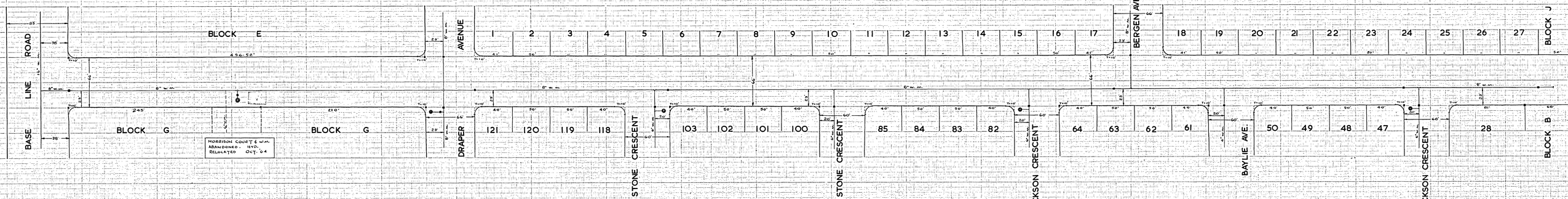
MORRISON DRIVE
BASE LINE RD. TO CH. 20+93.6

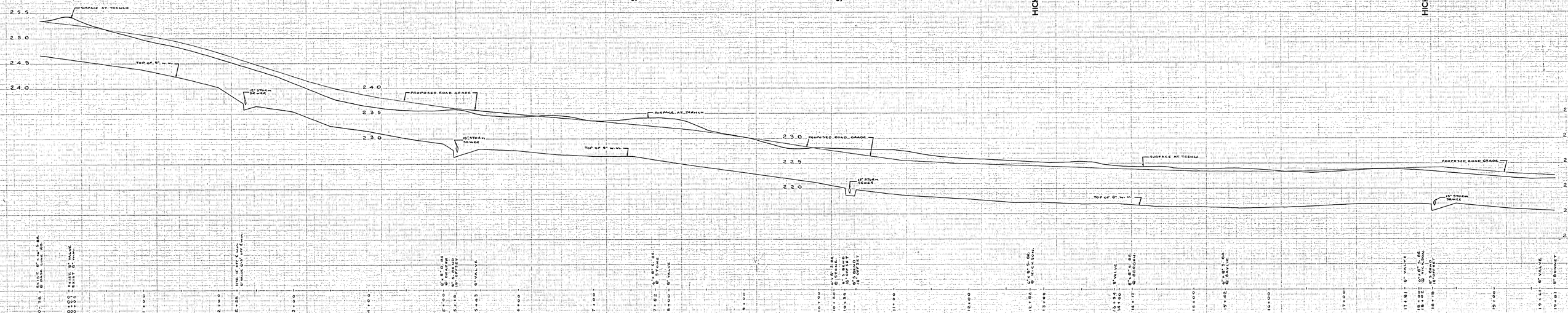
| DESIGN BY | DATE |
|---|---|
| C.H. Woods | 12/63 |
| DRAWN BY | DATE |
| C.H. Woods | 12/63 |
| CHECKED BY | DATE |
| | |

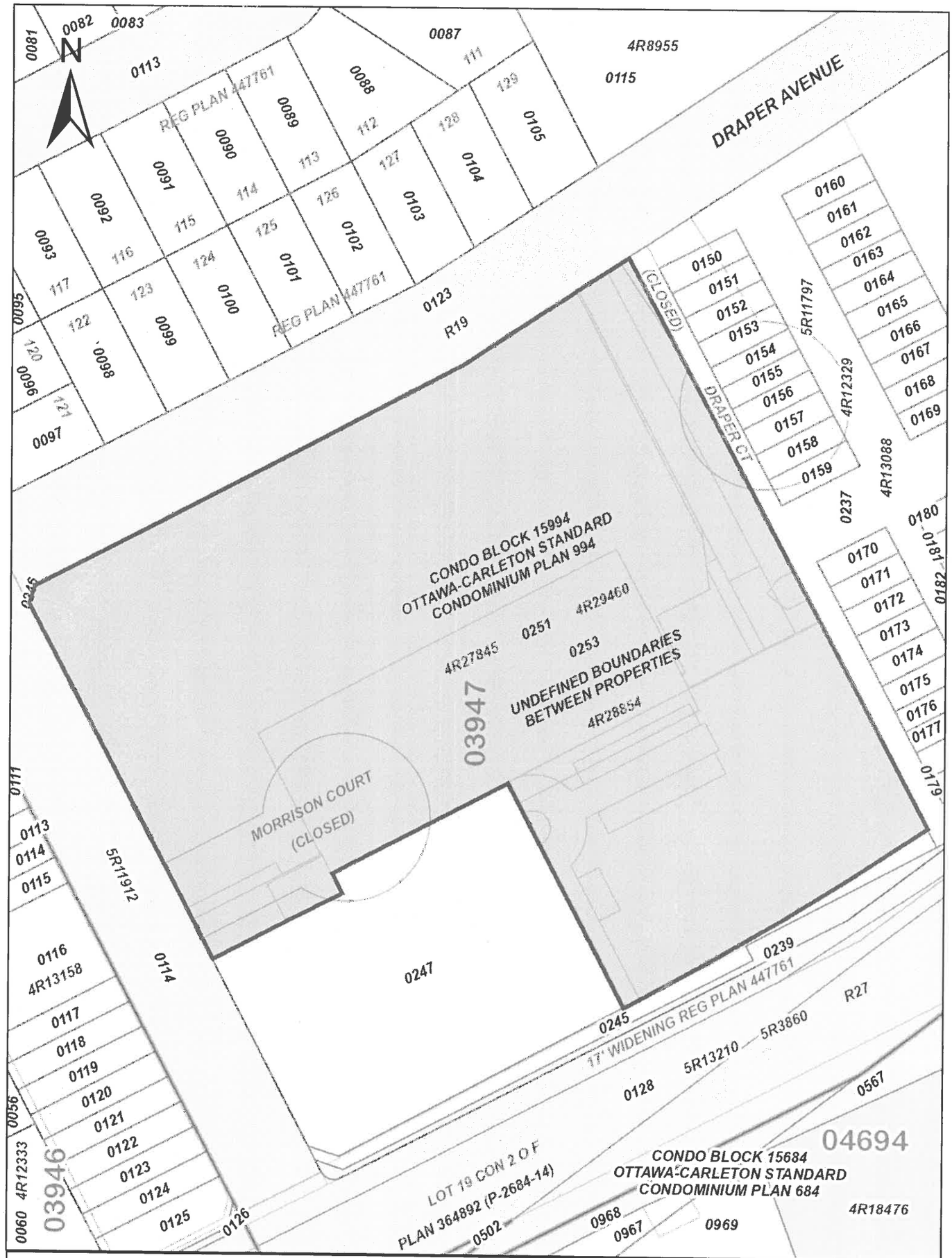
SCALES: Horiz. 1:40, Vert. 1:4
DRAWING NO. J-32
R.B. AYERS P.Eng.

6181649

# M O R R I S O N  D R I V E






ServiceOntario

PRINTED ON 07 NOV, 2017 AT 15:55:53
FOR BRIAN MULCAHY

**SCALE**

0 25 Meters

## PROPERTY INDEX MAP

OTTAWA-CARLETON(No. 04)

**LEGEND**

| | |
|---|---|
| FREEHOLD PROPERTY | |
| LEASEHOLD PROPERTY | |
| LIMITED INTEREST PROPERTY | |
| CONDOMINIUM PROPERTY | |
| RETIRED PIN (MAP UPDATE PENDING) | |
| PROPERTY NUMBER | 0449 |
| BLOCK NUMBER | 08050 |
| GEOGRAPHIC FABRIC | |
| EASEMENT | - - - - |

**THIS IS NOT A PLAN OF SURVEY**

**NOTES**

**REVIEW THE TITLE RECORDS FOR COMPLETE PROPERTY INFORMATION AS THIS MAP MAY NOT REFLECT RECENT REGISTRATIONS**

THIS MAP WAS COMPILED FROM PLANS AND DOCUMENTS RECORDED IN THE LAND REGISTRATION SYSTEM AND HAS BEEN PREPARED FOR PROPERTY INDEXING PURPOSES ONLY

FOR DIMENSIONS OF PROPERTIES BOUNDARIES SEE RECORDED PLANS AND DOCUMENTS

ONLY MAJOR EASEMENTS ARE SHOWN

REFERENCE PLANS UNDERLYING MORE RECENT REFERENCE PLANS ARE NOT ILLUSTRATED

Ontario

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Ontario ServiceOntario

LAND REGISTRY OFFICE #4

PARCEL REGISTER (ABBREVIATED) FOR PROPERTY IDENTIFIER

03947-0253 (LT)



PREPARED FOR BRIAN MULCAHY
ON 2017/11/07 AT 15:54:41

* CERTIFIED IN ACCORDANCE WITH THE LAND TITLES ACT * SUBJECT TO RESERVATIONS IN CROWN GRANT *

PROPERTY DESCRIPTION:

PART OF BLOCK G, PART OF MORRISON COURT AS CLOSED BY CR483411, PART OF DRAPER COURT AS CLOSED BY CR483411 ON PLAN 447761, BEING PARTS 1, 6, 7, 8, 9, 10, 11 AND 14 ON PLAN 4R-27845 SAVE AND EXCEPT PART 1 ON PLAN 4R-27961, SAVE AND EXCEPT PARTS 17 TO 21 ON PLAN 29460; S/T AN EASEMENT IN FAVOUR OF THE CORPORATION OF THE CITY OF OTTAWA AS IN CR448175. S/T AN EASEMENT IN FAVOUR OF OTTAWA CABLEVISION LTD AS IN N436790. S/T AN EASEMENT IN FAVOUR OF THE HYDRO-ELECTRIC COMMISSION OF THE CITY OF OTTAWA AS IN N440706. SUBJECT TO AN EASEMENT AS IN OC1706210; SUBJECT TO AN EASEMENT OVER PART 6, PLAN 4R-27845 SAVE AND EXCEPT PARTS 19 AND 20 ON PLAN 4R29460 IN FAVOUR OF PART OF BLOCK G, PART OF MORRISON COURT AS CLOSED BY CR483411 ON PLAN 447761, PARTS 2 AND 12 ON PLAN 4R-27845 AS IN OC1591626; SUBJECT TO AN EASEMENT OVER PART 6, PLAN 4R-27845 SAVE AND EXCEPT PARTS 19 AND 20 ON PLAN 4R29460 IN FAVOUR OF PART OF BLOCK G, PLAN 447761, PARTS 3 AND 13 ON PLAN 4R-27845 AS IN OC1591627; SUBJECT TO AN EASEMENT OVER PART 8, PLAN 4R-27845 IN FAVOUR OF PART OF BLOCK G, PART OF MORRISON COURT AS CLOSED BY CR483411 ON PLAN 447761, PARTS 2 AND 12 ON PLAN 4R-27845 AS IN OC1591626; SUBJECT TO AN EASEMENT OVER PART 8, PLAN 4R-27845 IN FAVOUR OF PART OF BLOCK G, PLAN 447761, PARTS 3 AND 13 ON PLAN 4R-27845 AS IN OC1591627; SUBJECT TO AN EASEMENT OVER PART 9, PLAN 4R-27845 IN FAVOUR OF PART OF BLOCK G, PART OF MORRISON COURT AS CLOSED BY CR483411 ON PLAN 447761, PARTS 2 AND 12 ON PLAN 4R-27845 AS IN OC1591626; SUBJECT TO AN EASEMENT AS IN OC1704430; SUBJECT TO AN EASEMENT AS IN OC1705029; SUBJECT TO AN EASEMENT IN GROSS OVER PARTS 1 AND 2 PLAN 4R28854 AS IN OC1706214; TOGETHER WITH AN EASEMENT OVER THE COMMON ELEMENTS OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; TOGETHER WITH AN EASEMENT OVER PART OF THE COMMON ELEMENTS OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994, PART 13 ON PLAN 4R29460 AS IN OC1791074; TOGETHER WITH AN EASEMENT OVER PART OF THE COMMON ELEMENTS OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994, PARTS 4, 6, 8, 9, 26 AND 27 PLAN 4R29460 AS IN OC1791074; TOGETHER WITH AN EASEMENT OVER PART OF THE COMMON ELEMENTS OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994, PARTS 11, 12 AND 24 PLAN 4R29460 AS IN OC1791074; TOGETHER WITH AN EASEMENT OVER THE COMMON ELEMENTS OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; TOGETHER WITH AN EASEMENT OVER THE COMMON ELEMENTS OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; SUBJECT TO AN EASEMENT OVER PARTS 1, 6, 7, 8, 9, 10, 11 AND 14, PLAN 4R27845, SAVE AND EXCEPT PART 1, PLAN 4R27961, SAVE AND EXCEPT PARTS 17 TO 21, PLAN 4R29460 IN FAVOUR OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; SUBJECT TO AN EASEMENT OVER PARTS 22 AND 23, PLAN 4R29460 IN FAVOUR OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; SUBJECT TO AN EASEMENT OVER PARTS 1, 6, 7, 8, 9, 10, 11 AND 14, PLAN 4R27845, SAVE AND EXCEPT PART 1, PLAN 4R27961, SAVE AND EXCEPT PARTS 17 TO 21, PLAN 4R29460 IN FAVOUR OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; SUBJECT TO AN EASEMENT OVER PARTS 1, 6, 7, 8, 9, 10, 11 AND 14, PLAN 4R27845, SAVE AND EXCEPT PART 1, PLAN 4R27961, SAVE AND EXCEPT PARTS 17 TO 21, PLAN 4R29460 IN FAVOUR OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; SUBJECT TO AN EASEMENT OVER PARTS 1, 6, 7, 8, 9, 10, 11 AND 14, PLAN 4R27845, SAVE AND EXCEPT PART 1, PLAN 4R27961, SAVE AND EXCEPT PARTS 17 TO 21, PLAN 4R29460 IN FAVOUR OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; TOGETHER WITH AN EASEMENT OVER THE COMMON ELEMENTS OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; TOGETHER WITH AN EASEMENT OVER PART THE COMMON ELEMENTS OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994, PARTS 18, 19 AND 20 PLAN 4R29460 AS IN OC1791074; TOGETHER WITH AN EASEMENT OVER THE COMMON ELEMENTS OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; TOGETHER WITH AN EASEMENT OVER THE COMMON ELEMENTS OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; SUBJECT TO AN EASEMENT OVER PARTS 1, 6, 7, 8, 9, 10, 11 AND 14, PLAN 4R27845, SAVE AND EXCEPT PART 1, PLAN 4R27961, SAVE AND EXCEPT PARTS 17 TO 20, PLAN 4R29460 IN FAVOUR OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; SUBJECT TO AN EASEMENT OVER PARTS 22 AND 23, PLAN 4R29460 IN FAVOUR OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; SUBJECT TO AN EASEMENT OVER PARTS 1, 6, 7, 8, 9, 10, 11 AND 14, PLAN 4R27845, SAVE AND EXCEPT PART 1, PLAN 4R27961, SAVE AND EXCEPT PARTS 17 TO 21, PLAN 4R29460 IN FAVOUR OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; SUBJECT TO AN EASEMENT OVER PARTS 1, 6, 7, 8, 9, 10, 11 AND 14, PLAN 4R27845, SAVE AND EXCEPT PART 1, PLAN 4R27961, SAVE AND EXCEPT PARTS 17 TO 21, PLAN 4R29460 IN FAVOUR OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; SUBJECT TO AN EASEMENT OVER PARTS 1, 6, 7, 8, 9, 10, 11 AND 14, PLAN 4R27845, SAVE AND EXCEPT PART 1, PLAN 4R27961, SAVE AND EXCEPT PARTS 17 TO 21, PLAN 4R29460 IN FAVOUR OF OTTAWA-CARLETON CONDOMINIUM PLAN NO. 994 AS IN OC1791074; CITY OF OTTAWA

PROPERTY REMARKS:

FOR THE PURPOSE OF THE QUALIFIER THE DATE OF REGISTRATION OF ABSOLUTE TITLE IS 2006/06/19. PLANNING ACT CONSENT IN DOCUMENT OC1591628.

ESTATE/QUALIFIER:
FEE SIMPLE
LT ABSOLUTE PLUS

RECENTLY:
DIVISION FROM 03947-0249

PIN CREATION DATE:
2016/06/14

OWNERS' NAMES
REDWOOD RESIDENCES LIMITED

CAPACITY SHARE

| REG. NUM. | DATE | INSTRUMENT TYPE | AMOUNT | PARTIES FROM | PARTIES TO | CERT/ CHKD |
|---|---|---|---|---|---|---|
| ** PRINTOUT INCLUDES ALL DOCUMENT TYPES (DELETED INSTRUMENTS NOT INCLUDED) ** | | | | | | |
| **SUBJECT TO SUBSECTION 44(1) OF THE LAND TITLES ACT, EXCEPT PARAGRAPHS 3 AND 14 AND * | | | | | | |
| ** PROVINCIAL SUCCESSION DUTIES AND EXCEPT PARAGRAPH 11 AND ESCHEATS OR FORFEITURE ** | | | | | | |
| ** TO THE CROWN UP TO THE DATE OF REGISTRATION WITH AN ABSOLUTE TITLE. ** | | | | | | |

NOTE: ADJOINING PROPERTIES SHOULD BE INVESTIGATED TO ASCERTAIN DESCRIPTIVE INCONSISTENCIES, IF ANY, WITH DESCRIPTION REPRESENTED FOR THIS PROPERTY.
NOTE: ENSURE THAT YOUR PRINTOUT STATES THE TOTAL NUMBER OF PAGES AND THAT YOU HAVE PICKED THEM ALL UP.

| REG. NUM. | DATE | INSTRUMENT TYPE | AMOUNT | PARTIES FROM | PARTIES TO | CERT/ CHKD |
|---|---|---|---|---|---|---|
| CR448175 | 1962/08/23 | AGREEMENT | | | THE CORPORATION OF THE CITY OF OTTAWA<br>THE HYDRO ELECTRIC COMMISSION OFTHE CITY OF OTTAWA<br>THE BELL TELEPHONE COMPANY OF CANADA | C |
| | *REMARKS: AND EASEMENT* | | | | | |
| | *CORRECTIONS: 'PARTY: THE HYDRO ELECTRIC COMMISSION OFTHE CITY OF OTTAWA' ADDED ON 1997/11/17 BY KATHLEEN DILLABOUGH.* | | | | *'PARTY: THE BELL TELEPHONE COMPANY OF CANADA' ADDED ON 1997/11/17 BY KATHLEEN DILLABOUGH.* | |
| CR491492 | 1965/04/02 | AGREEMENT | | | THE CORPORATION OF THE CITY OF OTTAWA | C |
| | *REMARKS: CR448175* | | | | | |
| N436790 | 1988/05/06 | TRANSFER EASEMENT | | | OTTAWA CABLEVISION LTD | C |
| N440706 | 1988/06/03 | TRANSFER EASEMENT | | | THE HYDRO-ELECTRIC COMMISSION OF THE CITY OF OTTAWA | C |
| LT1065574 | 1997/08/11 | NOTICE | | REDWOOD RESIDENCES LIMITED | | C |
| 4R27845 | 2014/04/11 | PLAN REFERENCE | | | | C |
| OC1591628 | 2014/06/24 | TRANSFER | $1 | REDWOOD RESIDENCES LIMITED | REDWOOD RESIDENCES LIMITED | C |
| OC1600588 | 2014/07/21 | NOTICE | $1 | CITY OF OTTAWA | REDWOOD RESIDENCES LIMITED | C |
| OC1600589 | 2014/07/21 | NOTICE | $1 | CITY OF OTTAWA | REDWOOD RESIDENCES LIMITED | C |
| OC1600592 | 2014/07/21 | NOTICE | $1 | CITY OF OTTAWA | REDWOOD RESIDENCES LIMITED | C |
| 4R28854 | 2015/07/10 | PLAN REFERENCE | | | | C |
| OC1704430 | 2015/07/24 | TRANSFER EASEMENT | $1 | REDWOOD RESIDENCES LIMITED | BELL CANADA | C |
| OC1705029 | 2015/07/28 | TRANSFER EASEMENT | $2 | REDWOOD RESIDENCES LIMITED | ENBRIDGE GAS DISTRIBUTION INC. | C |
| OC1706210 | 2015/07/30 | TRANSFER EASEMENT | $1 | REDWOOD RESIDENCES LIMITED | ROGERS COMMUNICATIONS INC. | C |
| OC1706214 | 2015/07/30 | TRANSFER EASEMENT | $1 | REDWOOD RESIDENCES LIMITED | HYDRO OTTAWA LIMITED | C |
| | *REMARKS: PARTS 1 AND 2 PLAN 4R28854* | | | | | |
| 4R29460 | 2016/04/11 | PLAN REFERENCE | | | | C |
| OC1789080 | 2016/05/24 | NOTICE | $1 | REDWOOD RESIDENCES LIMITED | REDWOOD RESIDENCES LIMITED | C |
| OC1790773 | 2016/05/30 | NOTICE | $1 | CITY OF OTTAWA | REDWOOD RESIDENCES LIMITED | C |

NOTE: ADJOINING PROPERTIES SHOULD BE INVESTIGATED TO ASCERTAIN DESCRIPTIVE INCONSISTENCIES, IF ANY, WITH DESCRIPTION REPRESENTED FOR THIS PROPERTY.
NOTE: ENSURE THAT YOUR PRINTOUT STATES THE TOTAL NUMBER OF PAGES AND THAT YOU HAVE PICKED THEM ALL UP.

| REG. NUM. | DATE | INSTRUMENT TYPE | AMOUNT | PARTIES FROM | PARTIES TO | CERT/ CHKD |
|---|---|---|---|---|---|---|
| OC1790776 | 2016/05/30 | NOTICE | $1 | CITY OF OTTAWA | REDWOOD RESIDENCES LIMITED | C |
| OCCP994 | 2016/05/31 | STANDARD CONDO PLN | | | | C |
| OC1791074 | 2016/05/31 | CONDO DECLARATION | | REDWOOD RESIDENCES LIMITED | | C |

NOTE: ADJOINING PROPERTIES SHOULD BE INVESTIGATED TO ASCERTAIN DESCRIPTIVE INCONSISTENCIES, IF ANY, WITH DESCRIPTION REPRESENTED FOR THIS PROPERTY.
NOTE: ENSURE THAT YOUR PRINTOUT STATES THE TOTAL NUMBER OF PAGES AND THAT YOU HAVE PICKED THEM ALL UP.

## *DRAWINGS / FIGURES*

DRAPER AVENUE

MORRISON DRIVE

BASELINE ROAD

LINE OF 5x5M SITE TRIANGLE

N68°03'15"E 105.24

N62°18'30"E 43.15

PARK AREA 410.7 m²

PLAY AREA

GAZEBO

COMMUNITY MAIL BOXES

Private Street #1

Private Street #2

Private Street #3

FIRE TRUCK ROUTE

LINE OF NEW BAY TAPER FOR AUXILIARY LEFT TURN LANE (26M IN LENGTH)

CURRENT PHASE 3

PREVIOUSLY APPROVED PHASE 1&2

PHASE 3-1

PHASE 3-2

BLOCK 1 — 3 STOREY TOWNHOUSE 8 UNITS — 380.1m²

BLOCK 2 — 3 STOREY TOWNHOUSE 8 UNITS — 402.8m²

BLOCK 6 — 3 STOREY TOWNHOUSE 12 UNITS — 549.2m²

BLOCK 3 — 3 STOREY TOWNHOUSE 8 UNITS — 358.8m²

BLOCK 4 — 3 STOREY TOWNHOUSE 8 UNITS — 358.8m²

BLOCK 7 — 3 STOREY TOWNHOUSE 10 UNITS — 527.1m²

BLOCK 9 — 3 STOREY TOWNHOUSE 8 UNITS

BLOCK 10 — 3 STOREY TOWNHOUSE 7 UNITS

BLOCK 11

BLOCK 12 — 3 STOREY TOWNHOUSE 7 UNITS — 362.2m²

BLOCK 5 — 3 STOREY TOWNHOUSE 7 UNITS — 362.2m²

BLOCK 8 — 3 STOREY TOWNHOUSE 7 UNITS — 362.2m²

RAMP LOCATION TO PHASE 1 & 2 U/G GARAGE

22 VISITOR SPACES (BLENDED COMMERCIAL)

22 VISITOR SPACES

10 VISITOR SPACES

EDGE OF EXISTING UNDER GROUND PARKING STRUCTURE

PROPERTY LINES TO BE FINALIZED SUBJECT TO COMMITTEE OF ADJUSTMENT APPROVAL

PROPERTY LINES TO BE SUBJECT TO CONDOMINIUM AMENDMENT APPROVAL

18.0M RAMP SLOPE OH @ 12%

EXHAUST FOR GARAGE BELOW

RAISED PLANTERS - SEE LANDSCAPE DRAWINGS

PROVIDE 2 BIKE RACKS

NEW HYDRANT - SEE CIVIL DRAWINGS

HATCH INDICATES PROPOSED EXTENT OF GROUND FLOOR COMMERCIAL

BUILDING F
PROPOSED 4 STOREY
COMMERCIAL / RESIDENTIAL
BUILDING
80 UNITS
56804

BUILDING E
EXISTING 4 STOREY
RESIDENTIAL BUILDING
80 UNITS
56000

EXTENT OF PHASE I GARAGE BELOW

PHASE I SITE ENTRY

LINE OF NEW AUXILIARY LEFT TURN LANE (50M IN LENGTH)

N21°57'55"W 58.94

N22°14'10"W 32.60

N21°57'55"W 45.72

N21°57'20"W 87.20

N68°16'20"E 100.40

N67°36'30"E 46.69

INTAKE FOR GARAGE BELOW

LINE OF ROAD WIDENING ALLOWANCE (ROW)

PROVIDE DEPRESSED CURBS & SIDEWALK AS PER CITY SC7.1 STANDARDS

EXISTING HYDRO POLE TO BE RELOCATED

NEW CONCRETE BUS STOP PAD & SHELTER AS PER CITY SPECIFICATIONS SC-11

EXISTING BUS STOP SHELTER & PAD TO BE RELOCATED

JOB BENCHMARK No. 1
TOP OF SPINDLE
Elev.=78.88

APPROVED ☐ REFUSED ☐

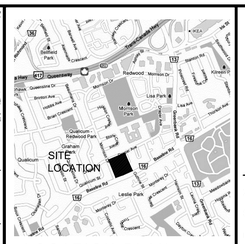
THIS ____ DAY OF _____, 20____

**DERRICK MOODIE**
**MANAGER, DEVELOPMENT REVIEW - WEST**
**PLANNING, INFRASTRUCTURE & ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA**

# SITE PLAN

0m 10 20 40

SCALE 1: 300




LOCATION PLAN- NTS

NOTE:
READ THIS DRAWING IN CONJUNCTION WITH LANDSCAPE PLAN AS PREPARED BY LAROCQUE+LEVSTEK, GRADING PLAN AND SITE SERVICES PLAN AS PREPARED BY DSEL ENGINEERING CONSULTANTS LTD., AND GEOTECHNICAL INVESTIGATION AS PREPARED BY PATERSON GROUP INC.,

GARBAGE AND RECYCLING WILL BE CURB SIDE BY PRIVATE CONTRACTOR

SNOW CLEARING AND STORAGE WILL BE BY PRIVATE CONTRACTOR

## SITE PLAN SYMBOLS

- HARD SURFACE WALKWAY
- NEW CITY CONCRETE SIDEWALK
- EXISTING CITY STREET LIGHT
- LIGHT STANDARD
- TWO WAY VEHICLE CIRCULATION
- ENTRANCE LOCATION
- BOLLARD STYLE BIKE RACK
- EXISTING GRADE
- FH — FIRE HYDRANT
- V — VISITOR PARKING SPOT
- S — SMALL CAR PARKING 2400 x 5200
- S — SMALL CAR PARKING 2400 x 4600
- DC — DEPRESSED CURB

## DRAWING NOTES

1. PROPERTY LINE (REFER TO SURVEY DRAWING FOR INTERNAL PROPERTY LINES AND PARTS)
2. 6.0M ZONING YARD SETBACK
3. FIRE TRUCK ROUTE
4. EXISTING 2 STOREY APARTMENT BUILDING TO BE REMOVED
5. 1200mm WIDE CONCRETE SIDEWALK AND CURB
6. 1800mm WIDE CITY SIDEWALK, AS PER CITY OF OTTAWA STANDARDS
7. 2000mm WIDE CITY SIDEWALK & CURB, AS PER CITY OF OTTAWA STANDARDS
8. EXISTING WOOD PRIVACY FENCE, TO BE REMOVED
9. EXISTING ASPHALT PATH TO BE REMOVED
10. EXISTING TREES TO BE REMOVED
11. RETAINING WALL WITH STEPS AS REQUIRED, SEE LANDSCAPE AND CIVIL DRAWINGS
12. PRIVATE DRIVEWAY
13. PEDESTRIAN CROSS WALK WITH DEPRESSED CURBS
14. EXISTING TREES TO REMAIN, PROTECT AS REQUIRED
15. PROPOSED COMMUNITY MAIL BOX LOCATION
16. PRIVATE PARK WITH SAND FILLED PLAY AREA
17. EXISTING FIRE HYDRANT
18. NEW ENTRY, DEPRESSED CURB AND SIDEWALK TO CITY STANDARDS, SEE CIVIL
19. PROPOSED LOT LINE
20. CONCRETE RETAINING WALL
21. RETAINING WALL / EXPOSED EXTERIOR WALL OF PHASE 1 PARKING GARAGE
22. LIGHT STANDARD, EXACT LOCATION TO BE CONFIRMED BY ELECTRICAL ENGINEER
23. EXISTING BUS STOP AND BENCH TO BE REPLACED WITH CONCRETE BUS STOP PAD & SHELTER AS PER CITY SPECIFICATIONS SC-11
24. EXISTING PARKING LOT, PHASE 1 GARAGE RAMP TO THE REMOVED UNDER THIS PHASE
25. TEMPORARY SALES CENTER AND PARKING AREA TO BE REMOVED UNDER THIS PHASE
26. RELOCATED PHASE 1 PARKING GARAGE ENTRY
27. EXISTING CITY STREET LIGHT
28. METER CLOSETS
29. CONNECT NEW SIDEWALK TO EXISTING
30. 5.0 m x 5.0 m SIGHT TRIANGLE
31. METAL FRAMED STAIRS TO MAIN LEVEL
32. WOODEN DECK OFF MAIN LEVEL, STEPS VARY
33. HYDRO TRANSFORMER
34. VISITOR PARKING SPACE
35. RETAINING WALL, HEIGHT VARIES SEE LANDSCAPE FOR TYPE
36. TRENCH DRAIN FOR RELOCATED GARAGE ENTRY

*TOPOGRAPHICAL SKETCH OF:*

MORRISON COURT & PART OF DRAPER COURT
(Closed by Judge-s Order CR483411)
PART OF BLOCK G, REGISTERED PLAN 447761
OTTAWA-CARLETON STANDARD CONDOMINIUM PLAN No. 994, CITY OF OTTAWA

Prepared by Annis, O'Sullivan, Vollebekk Ltd.
Field Work Completed May 4, 2017

## PROJECT INFORMATION - PHASE 1 & 2

| | | |
|---|---|---|
| ZONING | Zoning By-Law 2008-250 R5A[1700] S247, S282 | |
| SITE AREA - PHASE 1 & 2 | | 7,889.48 sq. m, (84,922) sq. ft. |
| BUILDING HEIGHT | 5 STOREY | 18.0 M |
| FRONT YARD SETBACK (BASELINE ROAD) | | 3.0 M |
| FRONT YARD SETBACK (MORRISON DRIVE) | | 6.0 M |
| INTERIOR SIDE YARD SETBACK | | 6.0 M |

## PROJECT STATISTICS - PHASE 1 & 2

| | | |
|---|---|---|
| BUILDING HEIGHT | 4 STOREY | 15.6 M |
| FRONT YARD SETBACK (TYPICAL) | | 6.0 M |
| CORNER YARD SETBACK (TYPICAL) | | 6.0 M |
| INTERIO YARD SETBACK (TYPICAL) | | 6.0 M |

## LOT COVERAGE

| | | |
|---|---|---|
| PAVED SURFACE = | 1,779.7 sq. m. | 22.6 % |
| BUILDING FOOTPRINT = | 2,877.0 sq. m. | 36.4 % |
| LANDSCAPE OPEN SPACE = | 3,232.8 sq. m. | 41.0 % |
| TOTAL = | 7,889.48 sq. m. | 100.0% |

## GROSS BUILDING FLOOR AREA

(OTTAWA ZONING DEFINITION)

| | BUILDING - E | BUILDING - F | |
|---|---|---|---|
| GROUND FLOOR | 1,220.4 sq. m, 13,137 sq. ft. | 1,112.8 sq. m, 11,978 sq. ft. | |
| 2nd FLOOR | 1,300.0 sq. m, 13,993 sq. ft. | 1,145.0 sq. m, 12,325 sq. ft. | |
| 3rd FLOOR | 1,300.0 sq. m, 13,993 sq. ft. | 1,145.0 sq. m, 12,325 sq. ft. | |
| 4th FLOOR | 1,175.4 sq. m, 12,652 sq. ft. | 1,020.0 sq. m, 10,979 sq. ft. | TOTAL |
| TOTAL AREA ABOVE GRADE | 4,995.8 sq. m, 53,774 sq. ft. | 4,422.8 sq. m, 47,607 sq. ft. | 9,418.6 sq. m, 101,381 sq. ft. |
| UNIT STATISTICS | | | |
| 1 BEDROOM | 56 | 43 | 99 |
| 2 BEDROOM UNIT | 24 | 37 | 61 |
| TOTAL | 80 | 80 | 160 |
| COMMERCIAL RETAIL | | 598.0 sq. m, 6,437 sq. ft. | 598.0 sq. m, 6,437 sq. ft. |

## CAR PARKING

| | | | | |
|---|---|---|---|---|
| REQUIRED | | | | |
| RESIDENCE | - 0.5 PER UNIT | 40 | 40 | 80 |
| VISITOR | - 0.2 PER UNIT | 15 | 15 | 30 |
| COMM - RETAIL | - 2.5 PER 100 m² | | 4 | 4 |
| COMM - MEDICAL | - 4.0 PER 100 m² | | 17 | 17 |
| TOTAL | | 55 | 76 | 131 |
| PROVIDED | | | | |
| RESIDENCE | - 0.5 PER UNIT | 40 | 40 | 80 |
| VISITOR | - 0.2 PER UNIT | 15 | 15 | 30 |
| COMM - RETAIL | - 2.5 PER 100 m² | | 4 | 4 |
| COMM - MEDICAL | - 4.0 PER 100 m² | | 17 | 17 |
| TOTAL | | 55 | 76 | 131 |

## BICYCLE PARKING

| | | | | |
|---|---|---|---|---|
| REQUIRED | | | | |
| RESIDENCE | - 0.5 PER UNIT | 40 | 40 | 80 |
| COMM - RETAIL | - 2.5 PER 100 m² | | 1 | 30 |
| COMM - MEDICAL | - 4.0 PER 100 m² | | 1 | 30 |
| TOTAL | | 40 | 42 | 82 |
| PROVIDED | | 40 | 42 | 82 |

## PROJECT INFORMATION - PHASE 3 (TOWNHOUSE)

| | | |
|---|---|---|
| ZONING | Zoning By-Law 2008-250 R5A[1700] S247, S282 | |
| SITE AREA - PHASE 3 | | 13,363.0 sq. m, (143,838) sq. ft. |
| BUILDING HEIGHT | 4.5 STOREY | 17.0 M |
| FRONT YARD SETBACK (BASELINE ROAD) | | 3.0 M |
| FRONT YARD SETBACK (MORRISON DRIVE) | | 6.0 M |
| FRONT YARD SETBACK (DRAPER AVENUE) | | 6.0 M |
| INTERIOR SIDE YARD SETBACK | | 6.0 M |

## PROJECT STATISTICS - PHASE 3

| | | |
|---|---|---|
| BUILDING HEIGHT | 3 STOREY | 12.0 M |
| BUILDING AREA (90 UNITS) | | 13,364.1 sq. m. (143,850) sq. ft. |
| FRONT YARD SETBACK (TYPICAL) | | 6.0 M |
| CORNER YARD SETBACK (TYPICAL) | | 6.0 M |
| INTERIO YARD SETBACK (TYPICAL) | | 6.0 M |

## LOT COVERAGE

| | | | |
|---|---|---|---|
| PAVED SURFACE (ROADS) = | 2,346.2 sq. m. | 17.6% | 12.7% |
| PAVED SURFACE (DRIVEWAY) = | 1,515.0 sq. m. | 11.3% | 15.4% |
| BUILDING FOOTPRINT = | 4,444.2 sq. m. | 33.2% | 32.7% |
| LANDSCAPE OPEN SPACE = | 4,745.0 sq. m. | 35.5% | 37.0% |
| LANDSCAPE PARK = | 313.7 sq. m. | 2.4% | 2.2% |
| TOTAL = | 13,364.1 sq. m. | 100.0% | |

## BUILDING STATISTICS

| | UNIT COUNT | TOTAL UNIT AREA |
|---|---|---|
| TOWNHOUSE TYPE 'A' (WITH GARAGE) 1,037 sq. ft. | 15 | 15,555 sq. ft. |
| TOWNHOUSE TYPE 'B' (WITH GARAGE) 1,282 sq. ft. | 30 | 38,460 sq. ft. |
| TOWNHOUSE TYPE 'C' (WITH GARAGE) 1,439 sq. ft. | 16 | 23,024 sq. ft. |
| TOWNHOUSE TYPE 'D' (WITH GARAGE) 1,472 sq. ft. | 9 | 13,248 sq. ft. |
| TOWNHOUSE TYPE 'E' (WITH GARAGE) 1,651 sq. ft. | 6 | 9,906 sq. ft. |
| TOWNHOUSE TYPE 'F' (WITH GARAGE) 1,663 sq. ft. | 8 | 13,304 sq. ft. |
| TOWNHOUSE TYPE 'G' (WITH GARAGE) 1,514 sq. ft. | 3 | 4,542 sq. ft. |
| TOWNHOUSE TYPE 'H' (WITH GARAGE) 1,539 sq. ft. | 3 | 4,617 sq. ft. |
| TOTAL UNITS | 90 | 122,656 sq. ft. |

## CAR PARKING

| | | | |
|---|---|---|---|
| REQUIRED | | | |
| RESIDENCE | - 1.0 PER UNIT (90 UNITS) | 90 | |
| VISITOR | - NOT REQUIRED | 0 | |
| TOTAL | | 90 | |
| PROVIDED | | | |
| RESIDENCE | - PRIVATE GARAGE | 90 | |
| VISITOR | - PRIVATE IN DRIVEWAY | 90 | |
| VISITOR | - COMMUNAL NEAR PARK | 4 | |
| TOTAL | | 184 | |

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.

THIS DRAWING MAY NOT BE USED FOR CONSTRUCTION UNTIL SIGNED BY THE ARCHITECT.

DO NOT SCALE DRAWINGS.

## NOTATION SYMBOLS:

- (00) — INDICATES DRAWING NOTES, LISTED ON EACH SHEET.
- <00> — INDICATES ASSEMBLIE TYPE; REFER TO TYPICAL ASSEMBLIES SCHEDUAL.
- (00) — INDICATES WINDOW TYPE; REFER TO WINDOW ELEVATIONS AND DETAILS ON A900 SERIES.
- (000) — INDICATES DOOR TYPE; REFER TO DOOR SCHEDULE AND DETAILS ON A900 SERIES.
- 00 — DETAIL NUMBER
- TITLE — SCALE
- DETAIL REFERENCE PAGE
- DETAIL CROSS REFERENCE PAGE

## GENERAL NOTES:

A. REFER TO TYPICAL ASSEMBLIES SHEET FOR WALL, PARTITION, ROOF CEILING & FLOOR TYPES.

B. FOR DOOR TYPES AND HARDWARE REQUIREMENTS REFER TO DOOR SCHEDULE ON A900 SERIES.

C. ALL INTERIOR DIMENSIONS ARE TAKEN FROM THE FACE OF STUD

D. ALL EXTERIOR DIMENSIONS ARE TAKEN FROM THE FACE OF STUD

E. ALL EXTERIOR WALLS ARE TO BE TYPE 'W1' UNLESS NOTED OTHER WISE.

F. ALL INTERIOR PARTITIONS ARE TO BE TYPE 'P1' UNLESS NOTED OTHER WISE.

G. ALL REINFORCED CONCRETE SUSPENDED SLABS, COLUMNS & BEAMS HAVE A MIN. FRR OF 1.5 HRS (AS DETERMINED BY OBC SB-2) UNLESS OTHERWISE STATED.

| No. | DESCRIPTION | DATE |
|---|---|---|
| 18 | ISSUED FOR SPC - PHASE 3 REVISED CONCEPT | Nov 13,17 |
| 17 | ISSUED FOR SITE PLAN APPROVAL - PHASE 3 | June 12,17 |
| 16 | ISSUED FOR AS-BUILT DRAWINGS | June 27,16 |
| 15 | ISSUED FOR CONDOMINIUM REGISTRATION | Apr 27,16 |
| 14 | CITY COMMENTS - REVISED SPA | Apr 04,16 |
| 13 | CITY COMMENTS - REVISED SPA | Feb 03,16 |
| 12 | ISSUED FOR REVISED SPA | Nov 11,15 |
| 11 | ISSUED FOR TEMP. ENTRY ACCESS PERMIT | Sep 18,15 |
| 10 | ISSUED FOR CONSTRUCTION | Oct 17,14 |
| 9 | ISSUED FOR CONSTRUCTION - FNDTION ONLY | Apr 25,14 |
| 8 | ISSUED FOR PARTIAL TENDER I | Nov 07,13 |
| 7 | ISSUED FOR SITE SEVERANCE APPLICATION | Aug 21,13 |
| 6 | ISSUED FOR FOUNDATION PERMIT | Aug 01,13 |
| 5 | FINAL SITE PLAN CONTROL | Mar 20,13 |
| 4 | COMMENTS RE: SITE PLAN CONTROL | Jan 28,13 |
| 3 | REVISED SITE PLAN CONTROL | Nov 30,12 |
| 2 | ISSUED FOR DEMOLITION PERMIT | Sept 13,12 |
| 1 | ISSUED FOR SITE PLAN CONTROL | Sept 04,12 |

REVISIONS:

ARCHITECT SEAL: ONTARIO ASSOCIATION OF ARCHITECTS — RODERICK J. LAHEY — LICENCE 4375

SEAL DATE: STAMP DATE

NORTH ARROW:

CLIENT: Greatwise DEVELOPMENTS


ARCHITECT:
rla/architecture
roderick lahey architect inc.
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t. 613.724.9932 f. 613.724.1209 rla@architecture.ca


PROJECT TITLE: FRESH TOWNS
2781, 2791 & 2797 BASELINE ROAD
2704, 2706, 2724 & 2764 DRAPER AVENUE
OTTAWA ONTARIO

SHEET TITLE: SITE PLAN - PROPOSED OVERALL

| DRAWN: | CHECKED: |
|---|---|
| RV | RL |

SCALE: 1:300

SHEET No.: SP-1

PROJECT No.: 1020

D07-12-14-0076

PLOT DATE: Friday, November 10, 2017


PROJECT DEVELOPER
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DRAPER AVENUE

REGISTERED PLAN 447761

MORRISON DRIVE

PIN 03947 - 0114

PIN 03947 - 0125

PIN 03947-0269

PART 1 PLAN 4R-27845

2 STOREY BRICK EXISTING TOWNHOUSE

PIN 03947 - 0247 SUBJECT TO EASEMENT INST. NA56790, NA40706, CR488175, OC1706920, OC1704430, OC1703029 & OC1791074

BLOCK G REGISTERED PLAN 447761

PART 2 PLAN 4R-27845

PART 3 PLAN 4R-27845

PART 4 PLAN 4R-27845

PART 5 PLAN 4R-27845

PART 6 PLAN 4R-27845

PART 7 PLAN 4R-27845

PART 8 PLAN 4R-27845

PART 9 PLAN 4R-27845

PART 10 PLAN 4R-27845

PART 11 PLAN 4R-27845

PART 12 PLAN 4R-27845

PART 13 PLAN 4R-27845

PART 14 PLAN 4R-27845

PART 1 PLAN 4R-29460

PART 2B PLAN 4R-29460

PART 3 PLAN 4R-29460

PART 4 PLAN 4R-29460

PART 2 PLAN 4R-29460 SUBJECT TO EASEMENT INST. OC1706074

PART 1 PLAN 4R-29529

PART 2 PLAN 4R-29529

PART 3 PLAN 4R-29529

PART 4 PLAN 4R-29529

PART 1 PLAN 4R-29529 SUBJECT TO EASEMENT INST. OC1706074

PART 2 PLAN 4R-29529