david schaeffer engineering ltd

120 Iber Road, Suite 103
Ottawa, Ontario K2S 1E9
Tel. (613)836-0856
Fax (613) 836-7183
www.DSEL.ca

SERVICING AND STORMWATER MANAGEMENT

FOR

GREATWISE DEVELOPMENTS 2710 DRAPER AVENUE – FRESH TOWNS - PHASE 3-2

CITY OF OTTAWA

PROJECT NO.: 17-927
DEVELOPMENT FILE NO.: D07-12-18-0184

AUGUST 2019 – REV 5

SERVICING AND STORMWATER MANAGEMENT
FOR
2710 DRAPER AVENUE – FRESH TOWNS - PHASE 3-2
GREATWISE DEVELOPMENTS

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1.0 INTRODUCTION

David Schaeffer Engineering Limited (DSEL) has been retained by Greatwise Developments to prepare a Servicing and Stormwater Management report in support of the application for a Site Plan Control (SPC) for the Phase 3-2 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. Phase 3 of the development will occupy ***1.3 ha*** of the property and is zoned High Density Residential [R5A].

Figure 1: Site Location

The existing SPC for 2781 Baseline Road allowed for the Phase 1 and Phase 2 developments, Building E and Building F, respectively. Building E has been constructed and is now part of OC1791074.

The Servicing and Stormwater Management Report, 2710 Draper Avenue – Fresh Towns – Phase 3-1 (***Phase 3-1 Report***), contemplated servicing for ***86*** slab on grade townhome units, ***32 units*** in Phase 3-1, ***54 units*** in Phase 3-2. The ultimate development, including both the Phase 3-1 and Phase 3-2 development will be herein referred to as Phase 3. Based on the Site Plan provided by Roderick Lahey Architect Inc., dated August 14th, 2019, the Phase 3-2 development proposes ***54*** townhomes. This is consistent with the previously approved ***Phase 3-1 Report*** (City Application No. D07-12-17-0076). Refer to ***Drawings/Figures*** for the Phase 3-2 Site Plan.

The objective of this report is to demonstrate that the Phase 3-2 development has been designed in accordance with the ***Phase 3-1 Report***, and is therefore supported by the existing municipal services.

1.1 Existing Conditions

The site is currently developed as residential and consists of 4 townhome buildings (84 units) 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.

The existing on-site storm and sanitary sewers which service the existing buildings are to be abandoned and capped at the property line. Existing on-site water services are to be blanked at the main. A Topographical plan and 4R Plan prepared by Annis, O'Sullivan, Vollebekk Ltd. is included in ***Drawings/Figures*** to demonstrate existing on-site easements.

Storm and sanitary sewers supporting 2702 Draper Avenue encroach into the subject property. Based on coordination with City staff, a sewer easement is to be granted for the private sewers. Refer to drawing ***EX-1*** for approximate easement location to be coordinated between Greatwise and the adjacent property owner.

The existing site grades range from approximately 73.13 m to 75.31 m from the northeast to the southwest corner of the property, which results in a grade change of approximately 2.18 m.

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

- 203 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

- 203 mm 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; and
- 200 mm diameter concrete sanitary sewer, within the subject site, tributary to the Pinecrest Collector.

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.

Based on coordination with the City of Ottawa, an Environmental Compliance Application (ECA) was required for the Phase 3-1 development once the properties were subdivided through Part Lot Control. Ontario Water Resources Act (OWRA) s.53 approval was required from the Ministry of the Environment, Conservation and Parks (MECP) for sanitary and stormwater discharge in the form of an Environmental Compliance Application (ECA) under the Direct Submission process. The Phase 3-1 servicing layout was approved by the MECP on May 12th, 2019 (ECA Approval Number 3760-BBVR23). The approval is included in ***Appendix E*** for reference.

As summarized in *Section 4.2*, a 5.5 m sanitary sewer extension is proposed within the Foliage Private right-of-way. Based on coordination with the City of Ottawa, the extension is considered a service that was required in order to support the Phase 3-2 Site Plan. As a result, an amendment to the ECA is not required.

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). Correspondence with the RVCA is included in ***Appendix A***.

1.3 Pre-consultation

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

2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

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

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

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

- **Geotechnical Investigation, Residential Development, 2710 Draper Avenue, Ottawa, Ontario**
  Paterson Group, Inc., PG1630-3 – Revision 6, September 20, 2018.
  (Geotechnical Investigation)

  - **Geotechnical Response to City Comments**
    Paterson Group, PG1630-MEMO.08, May 28, 2018.

  - **Geotechnical Response to City Comments**
    Paterson Group, PG1630-MEMO.11, September 20, 2018.

  - **Geotechnical Response to City Comments**
    Paterson Group, PG1630-MEMO.17, March 21, 2019.

  - **Geotechnical Investigation, Proposed Residential Development-Phase 3-2**
    Paterson Group, PG1630-4 – Revision 4, August 12, 2019.

  - **Geotechnical Design Summary Details**
    Paterson Group, PG1630-MEMO.18, February 27, 2019.

  - **Geotechnical Response to City Comments**
    Paterson Group, PG1630-MEMO.22, June 3, 2019.

  - **Geotechnical Response to City Comments**
    Paterson Group, PG1630-MEMO.25, July 22, 2019.

  - **Geotechnical Recommendations – Service Pipe Crossing**
    Paterson Group, PG1630-MEMO.26, August 12, 2019.

- **Functional Servicing and Stormwater Management Brief in support of Site Plan Amendment for 2781 Baseline Road**
  David Schaeffer Engineering Ltd., April 2016.
  (2781 Baseline Road Report)

- **Servicing and Stormwater Management Report, 2710 Draper Avenue – Freshtowns – Phase 3-1**
  David Schaeffer Engineering Ltd., September 2018.
  (Previously Approved Brief)

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 3 development via an existing 203 mm CI watermain on Morrison Drive and an existing 203 mm CI watermain on Draper Avenue.

3.2 Water Supply Servicing Design

As identified by the ***Phase 3-1 Report***, an internal 200 mm diameter watermain network was installed within the private right-of-ways and is available to service the proposed Phase 3-2 development. Refer to drawing ***EX-1*** for a detailed layout of the internal watermain network. There are no proposed changes to the internal watermain network indicated by the ***Phase 3-1 Report***.

Townhomes fronting Draper Avenue, within Block 6, will have independent connections to the existing infrastructure within the Draper Avenue right-of-way via 19 mm diameter service laterals. The remaining Blocks will have connections to the internal watermain via 19 mm diameter service laterals in accordance with the ***Phase 3-1 Report***. Refer to drawing ***SSP-1*** for a detailed layout of the proposed Phase 3-2 service laterals.

Table 1, below, 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 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	150 mm diameter
Minimum Depth of Cover	2.4 m from top of watermain to finished grade
During normal operating conditions desired operating pressure is within	350 kPa and 480 kPa
During normal operating conditions pressure must not drop below	275 kPa
During normal operating conditions pressure must not exceed	552 kPa
During fire flow operating pressure must not drop below	140 kPa

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 and ***Table 3***, below, summarizes the water supply demand and boundary conditions for the proposed development in accordance with the ***Phase 3-1 report***.

Table 2
Water Demand
Proposed Site Conditions – Phase 3-2

Design Parameter	Estimated Demand[1] (L/min)
Average Daily Demand	35.5
Max Day + Fire Flow	127.8 + 11,000 = 11,127.8
Peak Hour	191.6

1) Water demand calculation per ***Water Supply Guidelines***. See ***Appendix B*** for detailed calculations.

Table 3
Water Demand
Proposed Site Conditions – Phase 3-1 & Phase 3-2

Design Parameter	Estimated Demand[1] (L/min)	Boundary Condition[2] Connection 1 (Morrison Drive - Northern) (m H_2O / kPa)	Boundary Condition[2] Connection 2 (Morrison Drive - Southern) (m H_2O / kPa)	Boundary Condition[2] Connection 3 (Draper Avenue) (m H_2O / kPa
Average Daily Demand	56.6	45.0 / 441.6	43.8 / 429.3	45.7 / 448.7
Max Day + Fire Flow	203.9 + 11,000 = 11,203.9	24.0 / 235.6	23.8 / 233.1	24.2 / 237.8
Peak Hour	305.8	35.4 / 347.5	34.2 / 335.1	36.1 / 354.5

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 70.5m, 71.7m and 69.8m for Connection 1, 2 and 3, respectively. See ***Appendix B.***

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

Fire flow requirements were estimated per City of Ottawa Technical Bulletin ***ISTB-2018-02***. The following parameters were established by Roderick Lahey Architects:

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

Table 4, below, summarizes the estimated fire flow demands based on the FUS method and summarizes the available fire hydrants within 75 and 150 meters from each block

within the Phase 3-1 & 3-2 development. Detailed calculations can be found in ***Appendix B***.

Table 4
FUS Estimated Fire Flow Summary

Phase	Anticipated Demand (L/min)	Fire Hydrant(s) within 75 Meters (5,700 L/min)	Fire Hydrant(s) within 150 Meters (3,800 L/min)	Combined Fire Flow Available (L/min)
Block 5	10,000	FH2, EX. FH4, EX. FH5	FH1, EX. FH3	24,700
Block 6	11,000	FH1, EX. FH3, EX. FH4	FH2, EX. FH5	24,700
Block 7	10,000	FH1, FH2, EX, FH3	EX. FH4, EX. FH5	24,700
Block 8	10,000	FH2, EX. FH5	FH1, EX. FH3	19,000
Block 9	8,000	FH1, EX. FH3, EX. FH4	FH2	20,900
Block 10	8,000	FH1, FH2, EX. FH3	EX. FH5	20,900
Block 11	8,000	FH2, EX. FH5	FH1, EX. FH4	19,000

The above assumptions result in a maximum fire flow of approximately ***11,000 L/min***, actual building materials selected will affect the estimated flow. Based on ***Table 4***, there are a sufficient number of fire hydrants, proposed and existing, to support the Phase 3-2 development. Hydrant locations are identified on drawing ***SSP-1***.

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 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*** and ***Table 3***.

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

For the purposes of providing sufficient fire flow, ***5,500 L/min*** for a total of ***11,000 L/min*** was modelled at the proposed fire hydrants during the Phase 3 conditions.

Table 5, below, summarizes the model results. ***Appendix B*** contains output reports and model schematics for each scenario.

Table 5: Model Simulation Output Summary

Location	Average Day (kPa)	Max Day + Fire Flow (kPa)	Peak Hour (kPa)
4	437.5	209.1	343.4
5	432.8	203.1	338.6
7	429.3	198.3	335.1
8	435.7	205.7	340.9
9	440.4	225.4	346.2
10	438.9	216.1	344.7
11	437.5	222.4	342.9
12	436.1	213.0	341.4
13	434.4	202.7	339.7
14	430.0	220.0	335.3
15	427.9	206.7	333.2
16	425.8	193.0	331.1
17	437.0	205.5	342.9
18	432.8	223.1	338.6
19	430.9	209.9	336.7
20	428.4	195.8	334.2
21	429.6	219.4	334.5
22	428.3	207.0	333.2
23	426.0	193.0	330.9
24	435.7	207.1	340.9
26	436.9	221.6	341.9
27	435.7	212.5	340.6
28	433.6	201.7	338.5
FHYD1	438.5	181.3	344.3
FHYD2	428.5	169.2	334.3
† indicates pressures exceeded required pressure values as outlined in ***Table 1***			

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***. Refer to ***Appendix B*** for hydraulic modelling and water calculation.

Table 6 summarizes the water age model results. ***Appendix B*** contains output reports and model schematics for each scenario.

Table 6: Model Simulation Output – Water Age Summary

Location	Average Day	Max Day + Fire Flow	Peak Hour
	(hr)	(hr)	(hr)
P1	1.00-3.00	0.00-0.25	0.00-0.25
P2	0.50-0.75	0.00-0.25	0.00-0.25
P3	1.00-3.00	0.00-0.25	0.25-0.50
P4	1.00-3.00	0.00-0.25	1.00-3.00
P5	1.00-3.00	0.00-0.25	0.25-0.50
P6	1.00-3.00	0.00-0.25	0.25-0.50
P8	1.00-3.00	0.00-0.25	0.00-0.25
P9	1.00-3.00	0.00-0.25	0.50-0.75
P10	1.00-3.00	0.00-0.25	0.25-0.50
P11	1.00-3.00	0.00-0.25	1.00-3.00
P12	1.00-3.00	0.00-0.25	0.50-0.75
P13	1.00-3.00	0.00-0.25	1.00-3.00
P14	1.00-3.00	0.00-0.25	0.50-0.75
P15	1.00-3.00	0.00-0.25	0.00-0.25
P16	0.25-0.50	0.00-0.25	0.00-0.25
P17	0.25-0.50	0.00-0.25	0.00-0.25
P18	1.00-3.00	0.00-0.25	0.25-0.50
P19	1.00-3.00	0.00-0.25	1.00-3.00
P20	1.00-3.00	0.25-0.50	0.50-0.75
P21	1.00-3.00	0.00-0.25	0.00-0.25
P22	1.00-3.00	0.00-0.25	0.50-0.75
P23	1.00-3.00	0.25-0.50	1.00-3.00
P24	1.00-3.00	0.00-0.25	0.00-0.25
P25	1.00-3.00	0.00-0.25	0.50-0.75
P26	1.00-3.00	0.25-0.50	1.00-3.00
P27	1.00-3.00	0.00-0.25	1.00-3.00
P28	1.00-3.00	0.25-0.50	1.00-3.00

As demonstrated by ***Table 6***, water age within the proposed system does not exceed 3 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 ***11,000 L/min*** during Phase 3 conditions. The proposed average day water supply demand for the Phase 3 development based on the site plan is calculated to be ***56.6 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*** and the proposed hydrants can provide each block with their require fire flows.

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

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 225 mm and a 200 mm diameter sanitary sewer within Morrison Drive are 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 1.4 km downstream of the site.

4.2 Wastewater Design

As identified by the ***Phase 3-1 Report***, an internal 250 mm diameter sanitary sewer network was installed within the private right-of-ways and is available to service the proposed Phase 3-2 development. Refer to drawing ***EX-1*** for detailed Phase 3-1 sanitary sewer layout.

Townhomes fronting Draper Avenue, within Block 6, will have independent connections to the existing 225 mm diameter sanitary sewer within Draper Avenue via 135 mm diameter service laterals. The remaining Blocks will have connections to the internal network via 135 mm diameter service laterals in accordance with the ***Phase 3-1 Report***. Refer to drawing ***SSP-1*** for a layout of the proposed sanitary service lateral locations.

In order to service units within proposed Block 8, a 5.5 m extension to the previously approved sanitary sewer network within Foliage Private is proposed. The proposed sanitary sewer slope has been increased to 1% in accordance with ***City Standards***. Refer to drawing ***SSP-1*** and ***PP-1*** for the detailed Phase 3-1 and Phase 3-2 servicing layout.

Table 7 summarizes the ***City Standards*** employed in the design of the proposed wastewater sewer system.

Table 7
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
Average Daily Demand	280 L/d/per
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0 Harmon's Correction Factor 0.8
Infiltration and Inflow Allowance	0.05 L/s/ha (Dry Weather) 0.28 L/s/ha (Wet Weather) 0.33 L/s/ha (Total)
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sewer Size (Inside Greenbelt)	250 mm 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 8, below, demonstrates the estimated peak flow from the proposed Phase 3-1 & 3-2 development. See ***Appendix C*** for associated calculations.

Table 8
Summary of Estimated Peak Wastewater Flow – Phase 3-1 & 3-2

Design Parameter	Total Flow (L/s)
Estimated Average Dry Weather Flow	0.76
Estimated Peak Dry Weather Flow	2.71
Estimated Peak Wet Weather Flow	3.15

Table 9, below, summarizes the estimated peak flow from the proposed Phase 3-1 & 3-2 development at 2710 Draper Avenue, the existing development at 2785 Baseline Road and the future development at 2795 Baseline Road, in accordance with the ***Phase 3-1 Report***. See ***Appendix C*** for associated calculations.

Table 9
Summary of Estimated Peak Wastewater Flow – Ultimate

Design Parameter	Total Flow (L/s)
Estimated Average Dry Weather Flow	1.70
Estimated Peak Dry Weather Flow	5.67
Estimated Peak Wet Weather Flow	6.38

In accordance with the ***Phase 3-1 Report***, Novatech, Stantec, and JFSA prepared an assessment of the local sanitary sewers. 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 are required at this time.

As indicated by ***Table 9*** and the ultimate condition sanitary calculation sheet included in ***Appendix C***, there is sufficient capacity to support the proposed ultimate development.

4.3 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 ***6.38 L/s*** peak wet weather flow from the proposed ultimate development.

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

5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Services

Stormwater runoff from the subject property is tributary to the City of Ottawa sewer system located within the Ottawa Central sub-watershed. As such, approvals for proposed 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).

5.2 Post-development Stormwater Management Target

In accordance with the ***Phase 3-1 Report***, stormwater management requirements for the proposed development were established using the City of Ottawa standards, where the 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 2-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 ***126.3 L/s***.

5.3 Proposed Minor Stormwater Management System

In accordance with the ***Phase 3-1 Report***, the proposed stormwater management system will include private storm sewer system with three underground storage units to achieve the established release rate of ***126.3 L/s***. Stormwater is to be controlled via a ***144 mm plug style ICD*****,** which is to be permanently affixed to the outlet side of storm maintenance structure MH8. The stormwater management design consists of a private storm sewer system with a connection to the existing 450 mm diameter storm sewer within the Draper Avenue right-of-way. No changes to the internal storm sewer network by the ***Phase 3-1 Report*** are proposed as the network was designed to accommodate the Phase 3-2 development.

Due to the updated Site Plan, minor relocations of catchbasins are required to accommodate adjusted driveways. Minor relocations are not anticipated to create a

significant impact to the approved hydrologic model. Refer to drawing ***SSP-1*** for the detailed servicing layout and ***Appendix D*** for the approved hydrologic model for reference.

Minor revisions to the rear yard drainage system abutting Block 5, Block 8, and Block 11 are proposed. As demonstrated by the Phase 3-1 hydrologic model, included in ***Appendix D***, approximately ***0.26 ha*** of rear yard drainage was proposed to be directed towards storm maintenance structure MH2 and ***0.07 ha*** was proposed to be directed towards storm maintenance structure MH3. Due to the separation distance between Block 5 and Block 8, approximately ***0.32 ha*** of rear yard drainage will be directed towards MH2 and ***0.05 ha*** directed towards MH3. Refer to updated hydrologic model included in ***Appendix D*** for further details.

Townhomes fronting Draper Avenue, within Block 6, will have independent connections to the existing 450 mm diameter storm sewer within Draper Avenue via 100 mm diameter service laterals. The remaining Blocks will have connections to the internal network via 100 mm diameter service laterals in accordance with the ***Phase 3-1 Report***. Refer to drawing ***SSP-1*** for detail storm sewer layout. Service laterals placed under driveways are to be sleeved per geotechnical recommendations. Refer to the Response to City comments memorandum (PG1630-MEMO.22) prepared by Paterson Group and included in ***Appendix E*** for further details.

Based on coordination with City staff, a ditch analysis was prepared for the proposed swale to the West of Block 11. As indicated by the calculation sheets and drawing ***FIG-1*** included in ***Appendix D***, sufficient capacity is available to support the rear yard drainage should the subdrain system become block.

Table 10, below, summarizes the results of the EPASWMM model at the outfall included in the ***Phase 3-1 Report***. Model input and output summary is included in ***Appendix D*** for reference.

Table 10
Summary of Storage and Peak Flow Rates for the 5 and 100-Year Storm Distribution – Previously Approved

Outfall Node	5-Year (L/s)	100-Year (L/s)
System (Uncontrolled & Attenuated)	**23.82**	**125.49**

Table 11, summarizes the results of the updated EPASWMM model. Model input and output summary is included in ***Appendix D*** for reference.

Table 11
Summary of Storage and Peak Flow Rates for the 5 and 100-Year Storm Distribution

Outfall Node	5-Year (L/s)	100-Year (L/s)
System (Uncontrolled & Attenuated)	**24.74**	**125.22**

As summarized in ***Table 11,*** above, the update to the hydrologic model results in an estimated 100-year release rate for the subject site meets the allowable release rate of ***126.3 L/s***. As a result, the approved storm sewer network can accommodate the Phase 3-2 development.

Based on the updated hydrologic model, the maximum unattenuated stormwater runoff directed towards the municipal right-of-ways is ***76.5 L/s***. As indicated in ***Table 10***, above, the maximum controlled release rate directed into the municipal sewers is ***53.7 L/s***. Note that due to the differences in peak time of concentrations, the summation of the unattenuated and attenuated flow rates do not equal the release rate summarized in ***Table 11***.

5.3.1 Hydraulic Grade Line Analysis

In accordance with the ***Phase 3-1 Report***, a Hydraulic Grade Line (HGL) analysis was completed using EPASWMM. The minimum freeboard between the slab elevation and the HGL will be 0.30 m. The 100-year 6-Hour Chicago storm event yielded the highest peak flows and was, therefore, used in the HGL analysis.

Table 12, below, summarizes modeled results of selected nodes that resulted in the smallest difference between slab elevation and HGL. Refer to ***Appendix D*** for hydrologic model.

Table 12
Hydraulic Grade Line Analysis 100-Year 6-Hour Storm – Phase 3-2

Node ID	Building ID	Building Slab Elevation (m)	Maximum HGL* (m)	Freeboard (m)
MH2	BLOCK 11	73.95	72.29	1.66
MH3	BLOCK 5	73.95	72.40	1.55
	BLOCK 7 (SOUTH SIDE)	73.91		1.51
MH4	BLOCK 8	73.81	71.95	1.86
	BLOCK 10	73.48		1.53
MH6	BLOCK 6 (SOUTH SIDE)	73.07	71.95	1.12
	BLOCK 7 (NORTH SIDE)	73.01		1.06
MH7	BLOCK 9	72.87	71.95	0.92

In accordance with the hydrologic model included in ***Appendix D***, a hydraulic grade line analysis was reviewed, confirming that a minimum freeboard of 0.30 m between the slab elevation of the Phase 3-2 buildings and the maximum HGL within the storm sewer has been respected.

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 ***126.3 L/s*** based on consultation with the City of Ottawa; ***449 m^3*** of underground storage will be provided to meet this release rate. Stormwater is to be controlled via a **1*44 mm plug style ICD*,** which is to be permanently affixed to the outlet side of storm maintenance structure MH8.

No changes to the previously approved storm sewer network are proposed as the network was designed to accommodate the Phase 3-2 development.

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.

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.

8.0 CONCLUSION AND RECOMMENDATIONS

David Schaeffer Engineering Ltd. (DSEL) has been retained by Greatwise Developments to prepare a Servicing and Stormwater Management report in support of the application for a Site Plan Control (SPC) for the Phase 3-2 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 ***11,000 L/min*** is required for the Phase 3 development;
- No changes are proposed to the internal watermain network approved by the ***Phase 3-1 Report***;
- A sanitary sewer extension within Foliage Private is proposed to service townhomes within Block 8. No change to the estimated peak wet weather wastewater flow of ***6.38 L/s*** for the ultimate development is proposed. As a result, sufficient capacity is available to service the Phase 3-2 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 ***126.3 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, ***449 m^3*** underground storage system will be provided to attenuate flow to the established release rate above;
- No changes are proposed to the approved storm sewer network as the system was designed to accommodate the Phase 3-2 development;
- 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.

Prepared by,
David Schaeffer Engineering Ltd.

Per: Alison J. Gosling, EIT.

Reviewed by,
David Schaeffer Engineering Ltd.

Per: Stephen J. Pichette, 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: -Metric scale -North arrow (including construction North) -Key plan -Name and contact information of applicant and property owner -Property limits including bearings and dimensions -Existing and proposed structures and parking areas -Easements, road widening and rights-of-way -Adjacent street names	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 7.0
☐	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

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

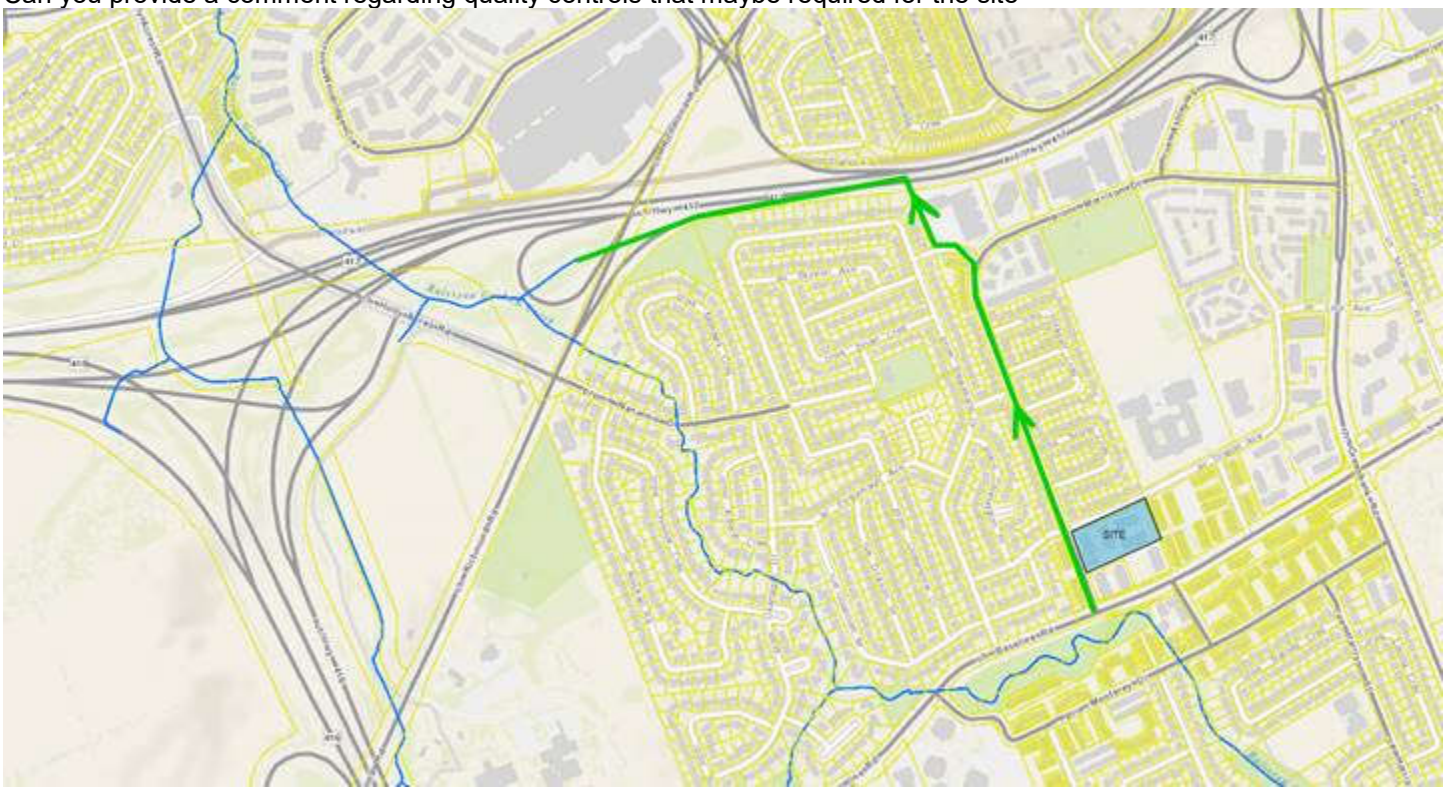
Good morning Jamie,

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
fax: (613) 836-7183
email: agosling@DSEL.ca

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

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

APPENDIX B

Water Supply

Greatwise Developments
2710 Draper Avenue
Proposed Site Conditions - Phase III-II

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	54	146
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	146	51.1	35.5	184.0	127.8	275.9	191.6
Total Demand		**51.1**	**35.5**	**184.0**	**127.8**	**275.9**	**191.6**

Max Day Peaking Factor (Residential) † = 3.6

Peak Hour Peaking Factor (Residential)†† = 5.4

2710 Draper Avenue
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	86	233
Apartment			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	233	81.6	56.6	293.6	203.9	440.4	305.8
Total Demand		**81.6**	**56.6**	**293.6**	**203.9**	**440.4**	**305.8**

Max Day Peaking Factor (Residential) † = 3.6 **Peak Hour Peaking Factor (Residential)†† =** 5.4

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: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	1257.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	6239.9	L/min	
	6000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Combustible	0%	
Fire Flow	**6000.0**	**L/min**

3. Reduction for Sprinkler Protection

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

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Non-Combustible	20.1m-30m	43	3	129	10%	
S	Non-Combustible	30.1m-45m	88	3	264	5%	
E	Non-Combustible	0m-3m	13.3	3	40	23%	
W	Non-Combustible	0m-3m	13.3	3	40	23%	
		% Increase				**61%**	*value not to exceed 75%*

Increase	**3660.0**	**L/min**

Lw = Length of the Exposed Wall (of the ajacent structure)
Ha = number of storeys of the adjacent structure (maximum 5 stories)
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	9660.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	10000.0	**L/min**	*rounded to the nearest 1,000 L/min*

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

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min

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

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	1647.9	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	7144.5	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

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Wood Frame	30.1m-45m	33.5	1	34	5%	
S	Non-Combustible	10.1m-20m	119	3	357	15%	
E	Non-Combustible	10.1m-20m	45	3	135	15%	
W	Non-Combustible	0m-3m	143	3	429	25%	
		% Increase				**60%**	*value not to exceed 75%*

Increase	**4200.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure (maximum 5 stories)
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	11200.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	11000.0	**L/min**	*rounded to the nearest 1,000 L/min*

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

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min

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

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	1581.3	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	6998.7	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

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Wood Frame	20.1m-30m	43	0	0	8%	
S	Non-Combustible	20.1m-30m	35	0	0	8%	
E	Non-Combustible	10.1m-20m	13.3	0	0	12%	
W	Non-Combustible	3.1m-10m	13.3	0	0	17%	
		% Increase				**45%**	*value not to exceed 75%*

Increase	**3150.0**	**L/min**	

Lw = Length of the Exposed Wall (of the ajacent structure)
Ha = number of storeys of the adjacent structure (maximum 5 stories)
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	10150.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	10000.0	**L/min**	*rounded to the nearest 1,000 L/min*

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

Greatwise Developments
2710 Draper Avenue
FUS-Fire Flow Demand
Phase III - Block 8

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: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	1257.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	6239.9	L/min	
	6000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Combustible	0%	
Fire Flow	**6000.0**	**L/min**

3. Reduction for Sprinkler Protection

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

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Non-Combustible	20.1m-30m	43	3	129	10%	
S	Ordinary - Unprotected Openings	10.1m-20m	18	3	54	11%	
E	Non-Combustible	10.1m-20m	45	3	135	15%	
W	Non-Combustible	0m-3m	12	3	36	23%	
		% Increase				**59%**	*value not to exceed 75%*

Increase	**3540.0**	**L/min**

Lw = Length of the Exposed Wall (of the ajacent structure)
Ha = number of storeys of the adjacent structure (maximum 5 stories)
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	9540.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	10000.0	**L/min**	*rounded to the nearest 1,000 L/min*

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

2710 Draper Avenue
FUS-Fire Flow Demand
Phase III - Block 9

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: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	662.7	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	4530.8	L/min	
	5000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Combustible	0%	
Fire Flow	**5000.0**	**L/min**

3. Reduction for Sprinkler Protection

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

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Wood Frame	20.1m-30m	10	1	10	8%	
S	Non-Combustible	0m-3m	13	3	39	23%	
E	Wood Frame	3.1m-10m	35	1	35	18%	
W	Non-Combustible	20.1m-30m	14	3	42	8%	
		% Increase				**57%**	*value not to exceed 75%*

Increase	**2850.0**	**L/min**	

Lw = Length of the Exposed Wall (of the ajacent structure)
Ha = number of storeys of the adjacent structure (maximum 5 stories)
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	7850.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	8000.0	**L/min**	*rounded to the nearest 1,000 L/min*

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

Greatwise Developments
2710 Draper Avenue
FUS-Fire Flow Demand
Phase III - Block 10

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: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	689.7	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	4622.1	L/min
	5000.0	**L/min** *rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Combustible	0%	
Fire Flow	**5000.0**	**L/min**

3. Reduction for Sprinkler Protection

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

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Non-Combustible	3.1m-10m	13.3	3	40	18%	
S	Non-Combustible	10.1m-20m	36	3	108	15%	
E	Non-Combustible	3.1m-10m	40	3	120	20%	
W	Non-Combustible	10.1m-20m	13.3	3	40	13%	
		% Increase				**66%**	*value not to exceed 75%*

Increase	**3300.0**	**L/min**

Lw = Length of the Exposed Wall (of the ajacent structure)
Ha = number of storeys of the adjacent structure (maximum 5 stories)
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	8300.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	8000.0	**L/min**	*rounded to the nearest 1,000 L/min*

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

Greatwise Developments
2710 Draper Avenue
FUS-Fire Flow Demand
Phase III - Block 11

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: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	1257.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	6239.9	L/min	
	6000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Combustible	0%
Fire Flow	**6000.0 L/min**

3. Reduction for Sprinkler Protection

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

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Non-Combustible	20.1m-30m	33	3	99	10%	
S	Non-Combustible	>45m			0	0%	
E	Non-Combustible	0m-3m	13.3	3	40	23%	
W	Wood Frame	30.1m-45m	13.3	3	40	5%	
		% Increase				**38%**	*value not to exceed 75%*

Increase	**2280.0**	**L/min**

Lw = Length of the Exposed Wall (of the ajacent structure)
Ha = number of storeys of the adjacent structure (maximum 5 stories)
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	8280.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	8000.0	**L/min**	*rounded to the nearest 1,000 L/min*

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

Boundary Conditions Unit Conversion

Connection 1 (Morrison Drive - Northern Connection)

	Height (m)	Elevation (m	m H_2O	PSI	kPa		L/s	L/min
Avg. DD	115.5	70.5	45.0	64.1	441.6	Fire Flow	183	10980
Fire Flow	94.5	70.5	24.0	34.2	235.6			
Peak Hour	105.9	70.5	35.4	50.4	347.5			

Connection 3 (Morrison Drive - Southern Connection)

	Height (m)	Elevation (m	m H_2O	PSI	kPa		L/s	L/min
Avg. DD	115.5	71.7	43.8	62.3	429.3	Fire Flow	183	10980
Fire Flow	95.5	71.7	23.8	33.8	233.1			
Peak Hour	105.9	71.7	34.2	48.6	335.1			

Connection 3 (Draper Avenue)

	Height (m)	Elevation (m	m H_2O	PSI	kPa		L/s	L/min
Avg. DD	115.5	69.8	45.7	65.1	448.7	Fire Flow	183	10980
Fire Flow	94.0	69.8	24.2	34.5	237.8			
Peak Hour	105.9	69.8	36.1	51.4	354.5			

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	2.0	7.1	10.7
5	2.0	7.1	10.7
7	0.0	0.0	0.0
8	0.7	2.4	3.6
9	4.0	14.2	21.3
10	4.0	14.2	21.3
11	0.7	2.4	3.6
12	0.7	2.4	3.6
13	0.7	2.4	3.6
14	0.7	2.4	3.6
15	0.7	2.4	3.6
16	0.7	2.4	3.6
17	5.9	21.3	32.0
18	6.6	23.7	35.6
19	6.6	23.7	35.6
20	7.2	26.1	39.1
21	0.7	2.4	3.6
22	0.7	2.4	3.6
23	0.7	2.4	3.6
24	0.7	2.4	3.6
26	0.7	2.4	3.6
27	0.7	2.4	3.6
28	0.7	2.4	3.6
FHYD1	0.0	5500.0	0.0
FHYD2	0.0	5500.0	0.0

Location	Average Day (kPa)	Max Day + Fire Flow (kPa)	Peak Hour (kPa)
4	437.5	209.1	343.4
5	432.8	203.1	338.6
7	429.3	198.3	335.1
8	435.7	205.7	340.9
9	440.4	225.4	346.2
10	438.9	216.1	344.7
11	437.5	222.4	342.9
12	436.1	213.0	341.4
13	434.4	202.7	339.7
14	430.0	220.0	335.3
15	427.9	206.7	333.2
16	425.8	193.0	331.1
17	437.0	205.5	342.9
18	432.8	223.1	338.6
19	430.9	209.9	336.7
20	428.4	195.8	334.2
21	429.6	219.4	334.5
22	428.3	207.0	333.2
23	426.0	193.0	330.9
24	435.7	207.1	340.9
26	436.9	221.6	341.9
27	435.7	212.5	340.6
28	433.6	201.7	338.5
FHYD1	438.5	181.3	344.3
FHYD2	428.5	169.2	334.3

Servicing and Stormwater Management Report
2710 Draper Avenue – Fresh Towns – Phase 3-1

Water Calculations

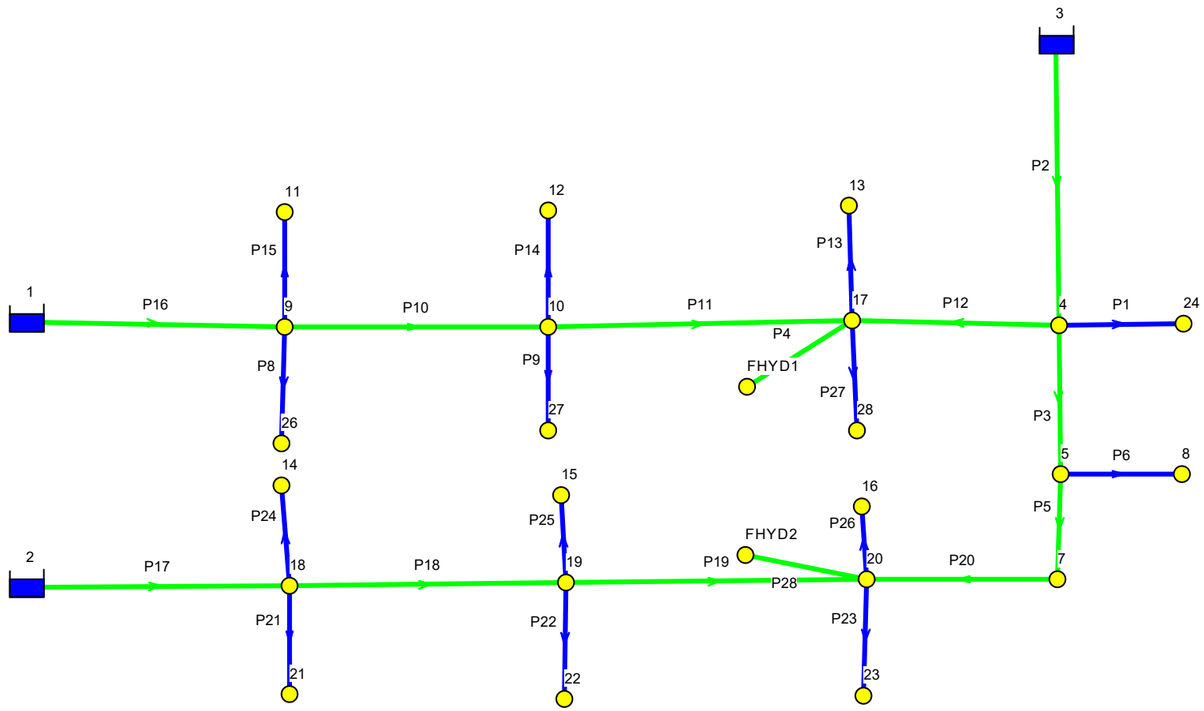
2710 DRAPER AVENUE PHASE III - AVERAGE DAY DEMAND

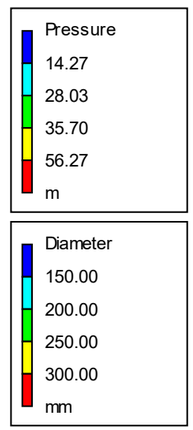
Day 1, 12:00 AM

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=94.5

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=94.0

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=95.5





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

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	17	FHYD1	1.2	200
P5	5	7	14.2	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
P8	9	26	10.6	19
P9	10	27	10.6	19
P27	17	28	10.6	19
P28	FHYD2	20	3	200
P6	8	5	6.7	19

Page 2

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality hours	
4	1.98	115.50	44.60	0.00	
5	1.98	115.50	44.12	0.00	
FHYD1	0.00	115.50	44.70	0.00	
7	0.00	115.50	43.76	0.00	
9	3.95	115.50	44.89	0.00	
10	3.95	115.50	44.74	0.00	
11	0.66	115.50	44.60	0.00	
12	0.66	115.50	44.45	0.00	
13	0.66	115.50	44.28	0.00	
14	0.66	115.50	43.83	0.00	
15	0.66	115.50	43.62	0.00	
16	0.66	115.50	43.40	0.00	
17	5.93	115.50	44.55	0.00	
18	6.59	115.50	44.12	0.00	
19	6.59	115.50	43.92	0.00	
20	7.24	115.50	43.67	0.00	
21	0.66	115.50	43.79	0.00	
22	0.66	115.50	43.66	0.00	
23	0.66	115.50	43.42	0.00	
24	0.66	115.50	44.41	0.00	
26	0.66	115.50	44.54	0.00	
27	0.66	115.50	44.41	0.00	
28	0.66	115.50	44.20	0.00	
FHYD2	0.00	115.50	43.68	0.00	
8	0.66	115.50	44.41	0.00	
1	-14.41	115.50	0.00	0.00	Reservoir
2	-17.32	115.50	0.00	0.00	Reservoir
3	-15.73	115.50	0.00	0.00	Reservoir
6	0.00	0.00	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
P2	-15.73	0.01	0.00	Open
P3	9.70	0.01	0.00	Open
P4	0.00	0.00	0.00	Open
P5	7.06	0.00	0.00	Open
P10	9.14	0.00	0.00	Open
P11	3.87	0.00	0.00	Open
P12	-3.38	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
P16	-14.41	0.01	0.00	Open
P17	17.32	0.01	0.00	Open

Page 3
Link Results: (continued)

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
P18	9.41	0.00	0.00	Open
P19	1.50	0.00	0.00	Open
P20	-7.06	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
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
P6	-0.66	0.04	0.36	Open

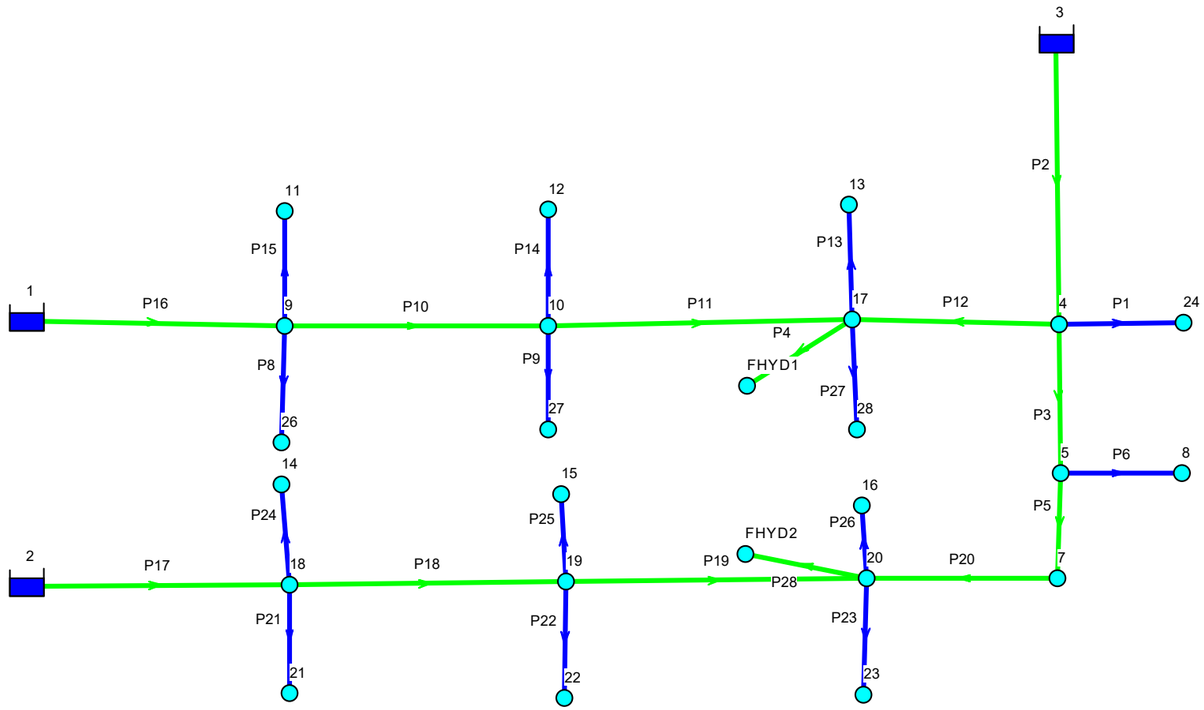
2710 DRAPER AVENUE PHASE III - MAX DAY + FIRE FLOW DEMAND

Day 1, 12:00 AM

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=94.5

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=95.5

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=94.0



Pressure
14.27
28.03
35.70
56.27
m

Diameter
150.00
200.00
250.00
300.00
mm

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

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	17	FHYD1	1.2	200
P5	5	7	14.2	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
P8	9	26	10.6	19
P9	10	27	10.6	19
P27	17	28	10.6	19
P28	FHYD2	20	3	200
P6	8	5	6.7	19

Page 2

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality hours	
4	7.11	92.22	21.32	0.00	
5	7.11	92.08	20.70	0.00	
FHYD1	5500.00	89.28	18.48	0.00	
7	0.00	91.95	20.21	0.00	
9	14.22	93.59	22.98	0.00	
10	14.22	92.79	22.03	0.00	
11	2.37	93.57	22.67	0.00	
12	2.37	92.76	21.71	0.00	
13	2.37	91.88	20.66	0.00	
14	2.37	94.10	22.43	0.00	
15	2.37	92.95	21.07	0.00	
16	2.37	91.77	19.67	0.00	
17	21.34	91.90	20.95	0.00	
18	23.71	94.12	22.74	0.00	
19	23.71	92.98	21.40	0.00	
20	26.08	91.79	19.96	0.00	
21	2.37	94.08	22.37	0.00	
22	2.37	92.94	21.10	0.00	
23	2.37	91.75	19.67	0.00	
24	2.37	92.20	21.11	0.00	
26	2.37	93.55	22.59	0.00	
27	2.37	92.75	21.66	0.00	
28	2.37	91.86	20.56	0.00	
FHYD2	5500.00	89.07	17.25	0.00	
8	2.37	92.06	20.97	0.00	
1	-3271.13	94.50	0.00	0.00	Reservoir
2	-3893.17	95.50	0.00	0.00	Reservoir
3	-4006.39	94.00	0.00	0.00	Reservoir
6	0.00	0.00	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
P2	-4006.39	2.13	51.03	Open
P3	1704.03	0.90	7.47	Open
P4	5500.00	2.92	2186.01	Open
P5	1694.55	0.90	9.55	Open
P10	3252.17	1.73	22.89	Open
P11	3233.21	1.72	22.35	Open
P12	-2292.87	1.22	13.07	Open
P13	2.37	0.14	3.90	Open

P14	2.37	0.14	3.90	Open
P15	2.37	0.14	3.90	Open
P16	-3271.13	1.74	30.99	Open
P17	3893.17	2.07	41.38	Open

Page 3

Link Results: (continued)

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
P18	3864.72	2.05	31.47	Open
P19	3836.27	2.04	30.86	Open
P20	-1694.55	0.90	7.68	Open
P21	2.37	0.14	3.76	Open
P22	2.37	0.14	3.76	Open
P23	2.37	0.14	3.76	Open
P24	2.37	0.14	3.90	Open
P25	2.37	0.14	3.90	Open
P26	2.37	0.14	3.90	Open
P1	2.37	0.14	3.87	Open
P8	2.37	0.14	3.76	Open
P9	2.37	0.14	3.76	Open
P27	2.37	0.14	3.76	Open
P28	-5500.00	2.92	906.63	Open
P6	-2.37	0.14	3.87	Open

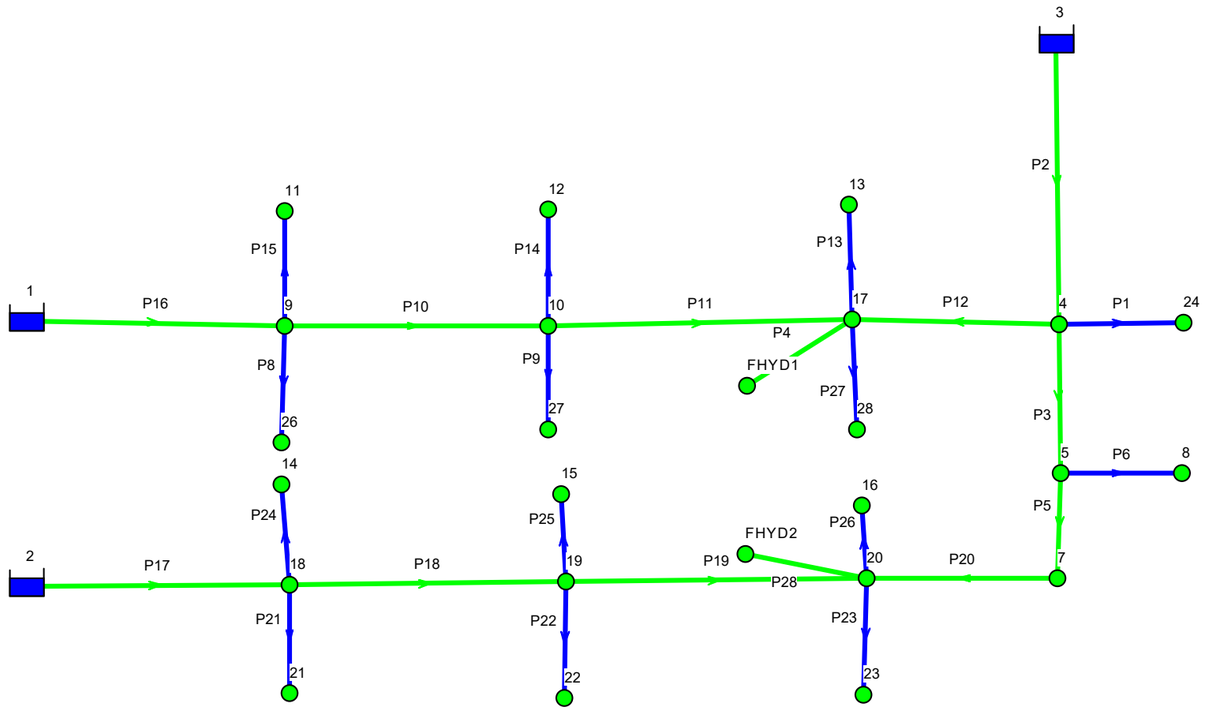
2710 DRAPER AVENUE PHASE III - PEAK HOUR DEMAND

Day 1, 12:00 AM

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=94.5

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=95.5

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=94.0



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                            *
******************************************************************
```

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	17	FHYD1	1.2	200
P5	5	7	14.2	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
P8	9	26	10.6	19
P9	10	27	10.6	19
P27	17	28	10.6	19
P28	FHYD2	20	3	200
P6	8	5	6.7	19

Page 2

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality hours	
4	10.67	105.90	35.00	0.00	
5	10.67	105.90	34.52	0.00	
FHYD1	0.00	105.90	35.10	0.00	
7	0.00	105.90	34.16	0.00	
9	21.34	105.90	35.29	0.00	
10	21.34	105.90	35.14	0.00	
11	3.56	105.85	34.95	0.00	
12	3.56	105.85	34.80	0.00	
13	3.56	105.85	34.63	0.00	
14	3.56	105.85	34.18	0.00	
15	3.56	105.85	33.97	0.00	
16	3.56	105.85	33.75	0.00	
17	32.00	105.90	34.95	0.00	
18	35.56	105.90	34.52	0.00	
19	35.56	105.90	34.32	0.00	
20	39.12	105.90	34.07	0.00	
21	3.56	105.81	34.10	0.00	
22	3.56	105.81	33.97	0.00	
23	3.56	105.81	33.73	0.00	
24	3.56	105.84	34.75	0.00	
26	3.56	105.81	34.85	0.00	
27	3.56	105.81	34.72	0.00	
28	3.56	105.81	34.51	0.00	
FHYD2	0.00	105.90	34.08	0.00	
8	3.56	105.84	34.75	0.00	
1	-78.14	105.90	0.00	0.00	Reservoir
2	-93.67	105.90	0.00	0.00	Reservoir
3	-84.29	105.90	0.00	0.00	Reservoir
6	0.00	0.00	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
P2	-84.29	0.04	0.03	Open
P3	52.16	0.03	0.01	Open
P4	0.00	0.00	0.00	Open
P5	37.93	0.02	0.01	Open
P10	49.68	0.03	0.01	Open
P11	21.22	0.01	0.00	Open
P12	-17.90	0.01	0.00	Open
P13	3.56	0.21	8.32	Open

P14	3.56	0.21	8.32	Open
P15	3.56	0.21	8.32	Open
P16	-78.14	0.04	0.03	Open
P17	93.67	0.05	0.04	Open

Link Results: (continued)

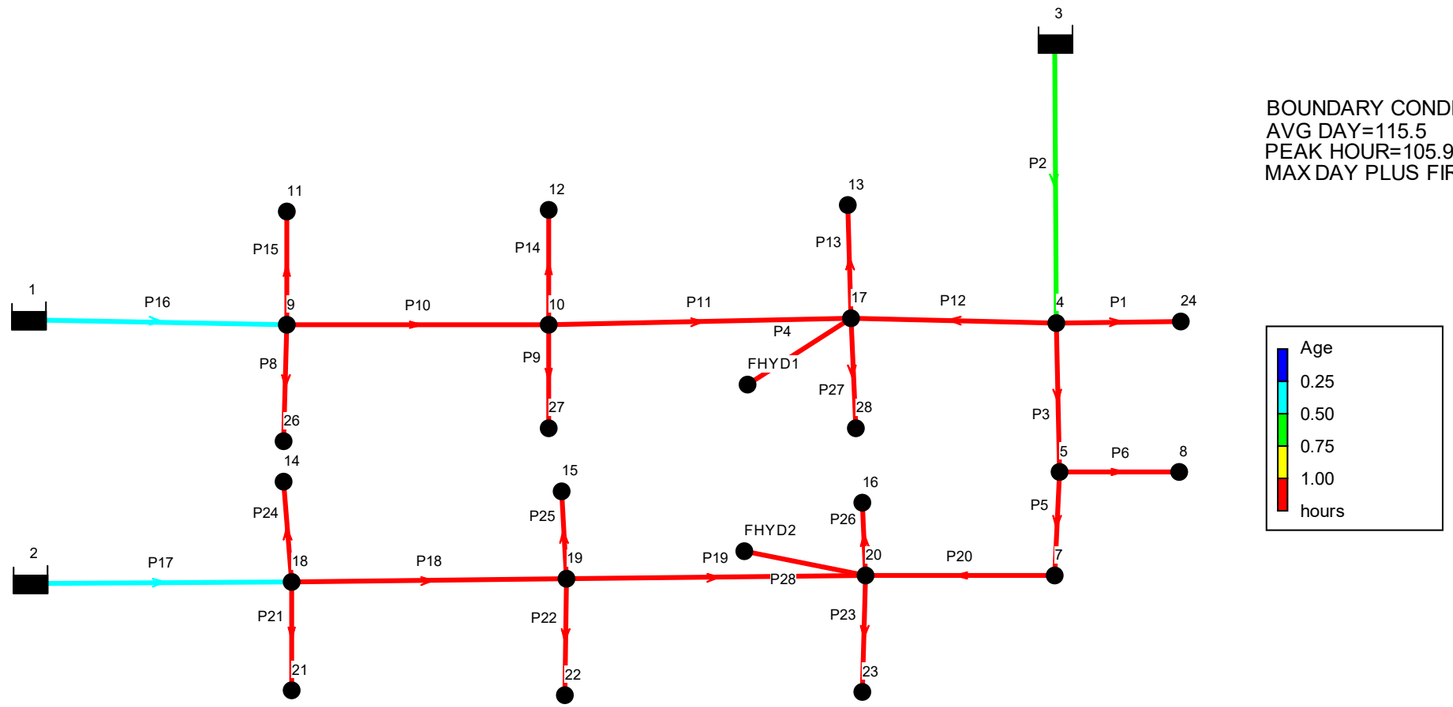
Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
P18	50.99	0.03	0.01	Open
P19	8.31	0.00	0.00	Open
P20	-37.93	0.02	0.01	Open
P21	3.56	0.21	8.01	Open
P22	3.56	0.21	8.01	Open
P23	3.56	0.21	8.01	Open
P24	3.56	0.21	8.32	Open
P25	3.56	0.21	8.32	Open
P26	3.56	0.21	8.32	Open
P1	3.56	0.21	8.26	Open
P8	3.56	0.21	8.01	Open
P9	3.56	0.21	8.01	Open
P27	3.56	0.21	8.01	Open
P28	0.00	0.00	0.00	Open
P6	-3.56	0.21	8.26	Open

2710 DRAPER AVENUE PHASE III - AVERAGE DAY DEMAND (WATER AGE)

Day 2, 12:00 AM

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=94.5

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=95.5



BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=94.0

Age
0.25
0.50
0.75
1.00
hours

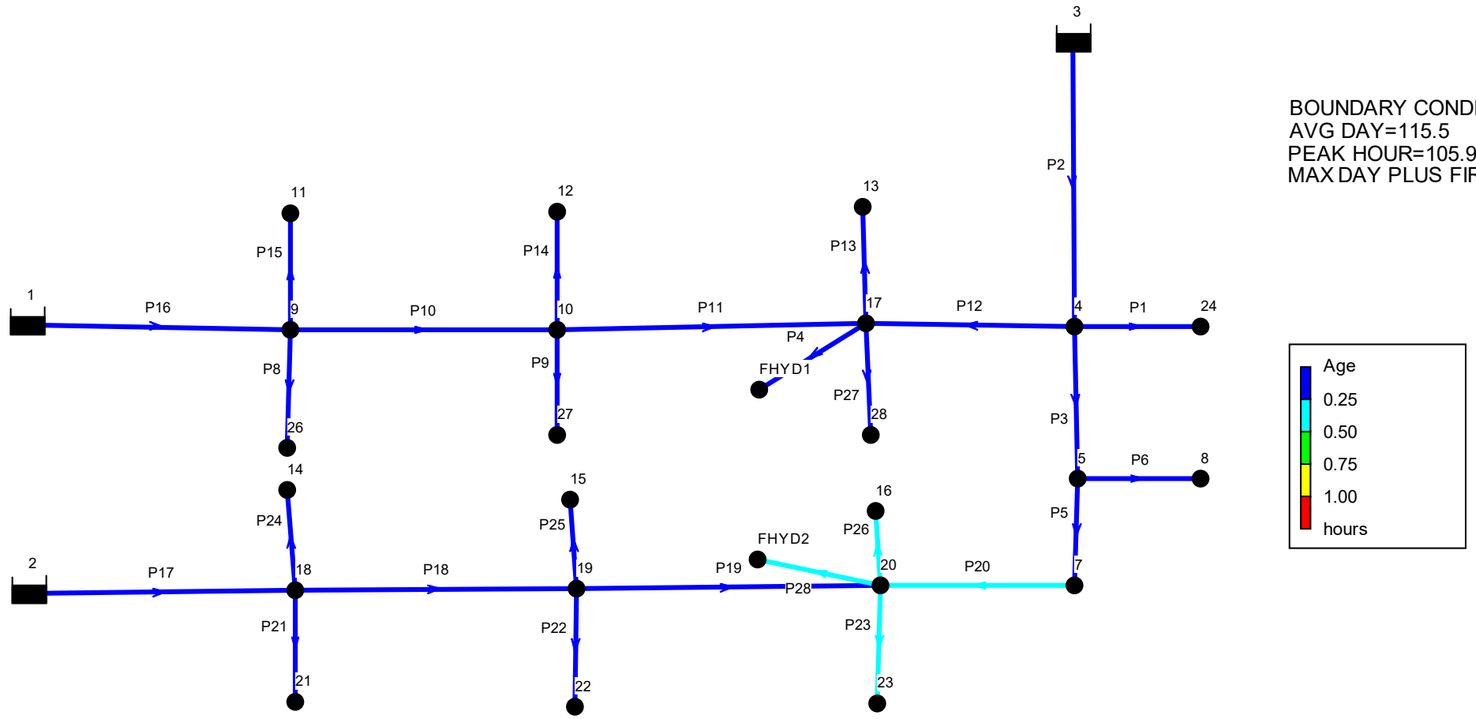
2710 DRAPER AVENUE PHASE III - MAX DAY + FIRE FLOW DEMAND (WATER AGE)

Day 2, 12:00 AM

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=94.5

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=95.5

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=94.0



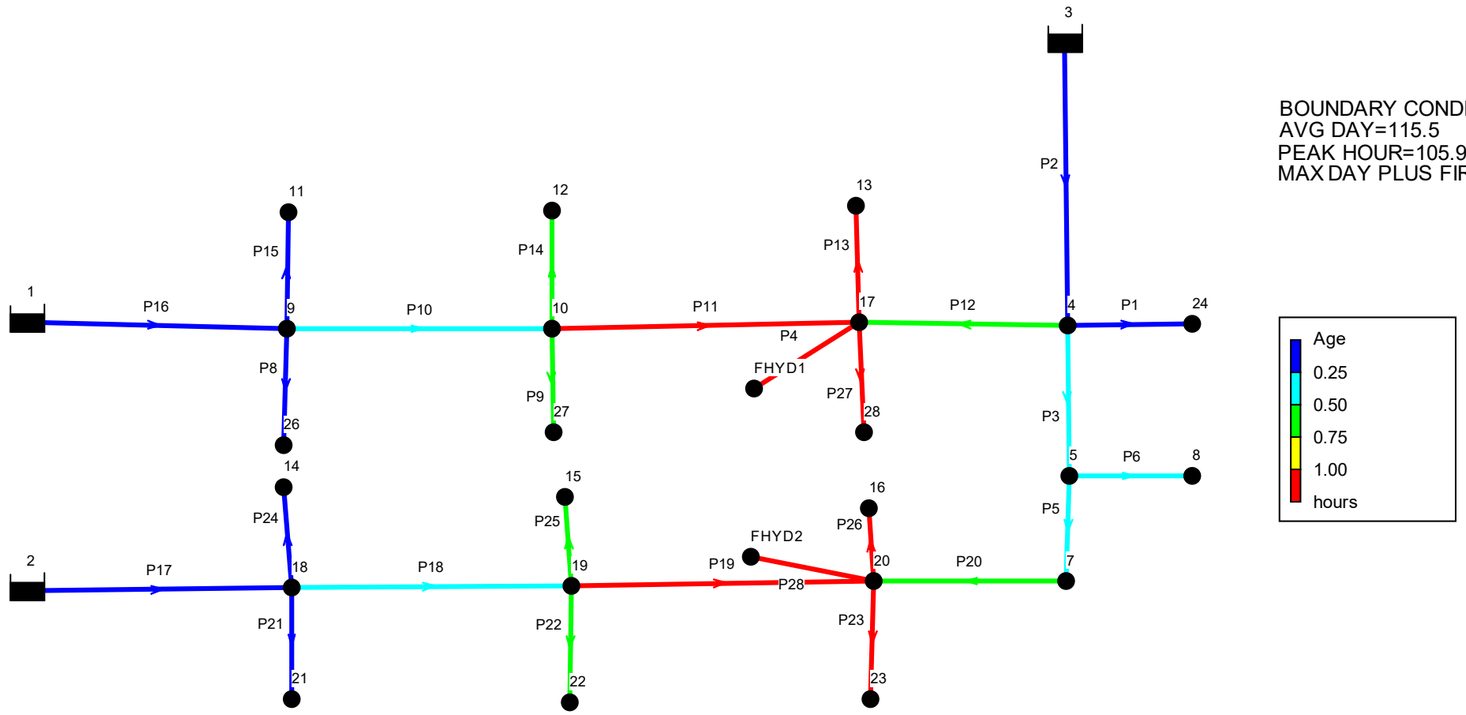
2710 DRAPER AVENUE PHASE III - PEAK HOUR DEMAND (WATER AGE)

Day 2, 12:00 AM

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=94.5

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=94.0

BOUNDARY CONDITIONS
AVG DAY=115.5
PEAK HOUR=105.9
MAX DAY PLUS FIRE FLOW=95.5

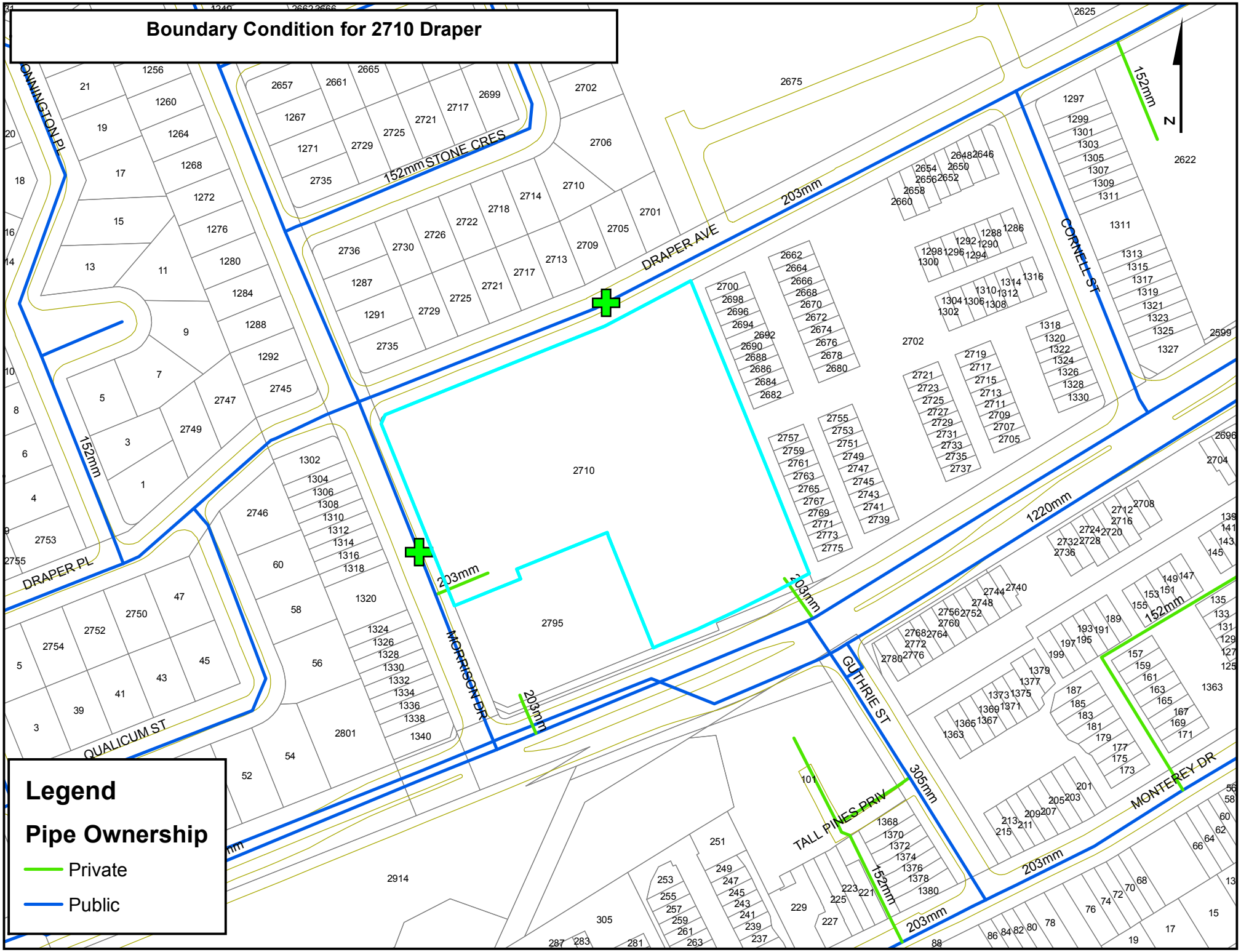


Please update the hydraulic analysis based on the below updated boundary conditions which are based on the proposed water demand requirements presented in Appendix B. **The boundary conditions have been provided in advance of a formal request to expedite to the update.**

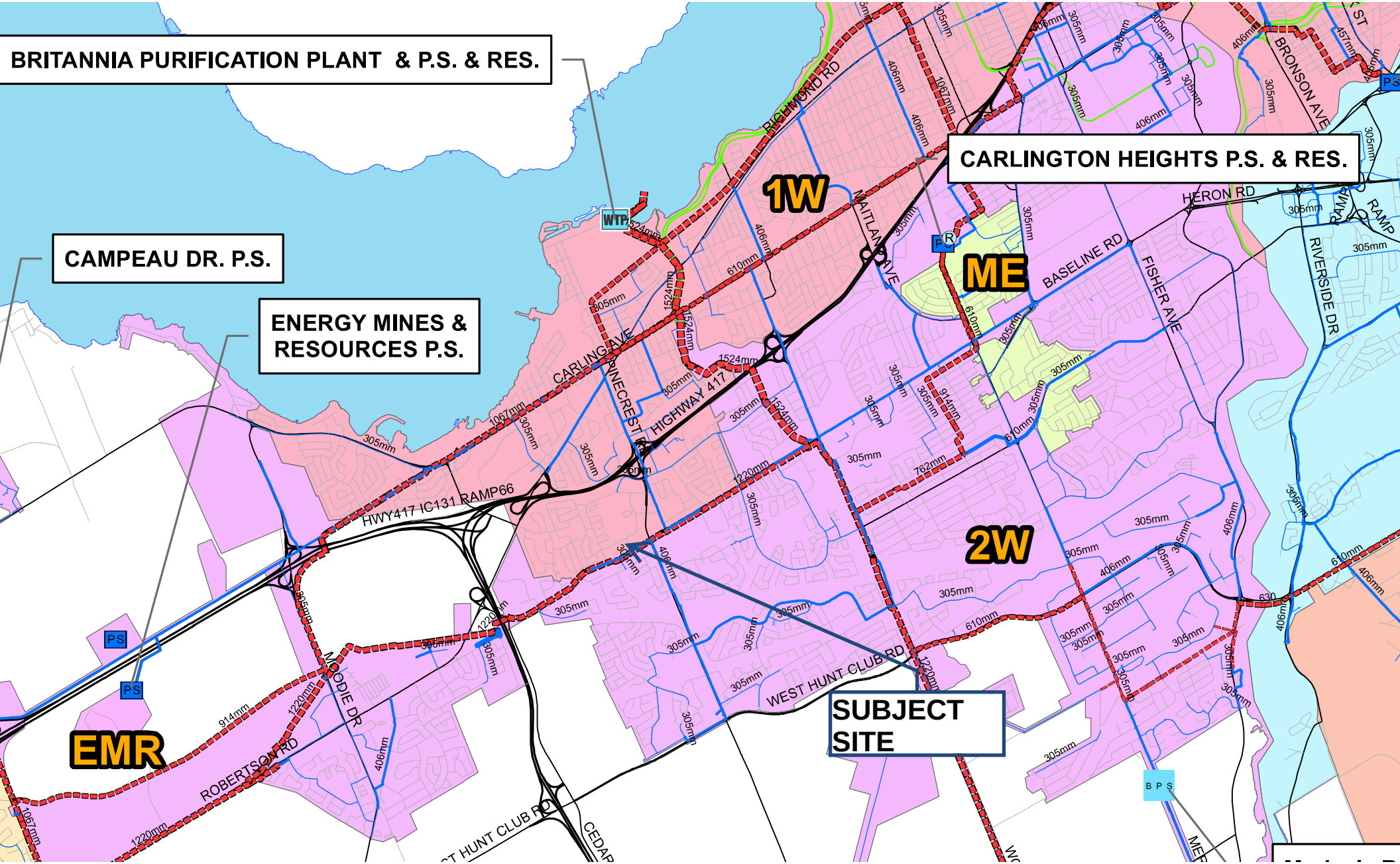
Interim Site Conditions – Phase 3-1
Average Day Demand: 0.35 L/s (21.1 L/min)
Maximum Daily Demand: 1.26 L/s (76.1 L/min)
Maximum Hourly Demand: 1.90 L/s (114.2 L/min)
Fire Flow: 10,000 L/min
Minimum HGL = 106.2m, same at all connections
Maximum HGL = 115.5m, same at all connections
Max Day + Fire Flow (167L/s) = 97.8m, southern connection on Morrison
Max Day + Fire Flow (167L/s) = 97.0m, northern connection on Morrison
Max Day + Fire Flow (167L/s) = 96.5m, Draper connection

Ultimate Site Conditions – Phase 3-1 & Phase 3-2
Average Day Demand: 0.94 L/s (56.6 L/min)
Maximum Daily Demand: 3.40 L/s (203.9 L/min)
Maximum Hourly Demand: 5.09 L/s (305.8 L/min)
Fire Flow: 11,000 L/min
Minimum HGL = 105.9m, same at all connections
Maximum HGL = 115.5m, same at all connections
Max Day + Fire Flow (183L/s) = 95.5m, southern connection on Morrison
Max Day + Fire Flow (183L/s) = 94.5m, northern connection on Morrison
Max Day + Fire Flow (183L/s) = 94.0m, Draper connection

Boundary Condition for 2710 Draper



City of Ottawa - Water Distribution System



rla/architecture

June1, 2018

Mr. Steam Shen MCIP RPP
Planner II
Development Review West
City of Ottawa

Re: **Site Plan Control Application -2710 Draper Ave.**
Fourth Round Comments dated May 18, 2018
City of Ottawa File no. D07-12-17-0076

Dear Mr. Shen,

In response to **Reports: Functional Servicing and Stormwater Management Report by DSEL**, specifically Item 7, Roderick Lahey Architect offers the following proposed revisions to the plans as filed as a companion document to DSEL's comments.

With reference to **ISO's Guide for Determination of Needed Fire Flow**, we understand the following definitions are intended to support the Construction Class of a building:

A Under **Construction Materials and Assemblies**
1 a) (8) essentially defines that an assembly that has a one hour rating or better is considered not to be combustible (non-combustible).

B Under **Classification of Basic Construction Types**
2.c) **Non-Combustible (Construction Class 3) –** the class is defined as buildings with exterior walls, floors and roof of *(assemblies considered to be)*non-combustible…supported by *(assemblies considered to be)* non-combustible etc.

Together with this letter please find our proposed assemblies to satisfy the above-referenced criteria. The assemblies reference OBC SB-3 as the authority in defining the fire resistance rating. Structural and demising fire separation walls, floor and roof assemblies will be revised to have a minimum 1 hr. fire resistance rating.

It is our understanding that this proposed revision would then comply with the individual buildings in question being Classified as Construction Class 3.

Trusting the above and the attached, together with DSEL's comments regarding this matter are sufficient to satisfy compliance with City of Ottawa's comment 7.

Best Regards,

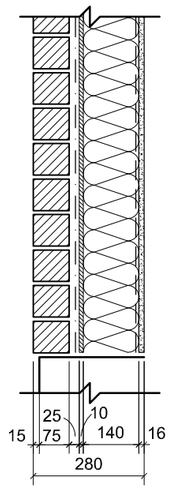
Glen Vaillancourt B.Arch.
Partner, Roderick Lahey Architect Inc.

WALL TYPE - W3

EXTERIOR BRICK WALL.
(1HR. F.R.R. AS PER OBC SB-3 EW1a R=22)

- BRAMPTON BRICK VENEER, PREMIER SIZE - BEAUPORT, REFER TO ELEVATIONS (H-79mm x D-90mm x L-257mm) c/w ADJUSTABLE UNIT TIES @ 400mm O.C. HORIZ. & 600mm O.C. VERT. & WEEPHOLES @ 600mm O.C @ BOTTOM. BLUESKIN THROUGH WALL FLASHING MIN.150mm HIGH
- 25mm AIR SPACE
- TYVEK AIR/WEATHER BARRIER - ALL JOINTS SEALED.
- 10mm OSB SHEATHING
- 140mm WOOD STUDS @400mm O.C.
- 140 mm R22 BATT INSULATION.
- 6 mil POLY VAPOUR BARRIER.
- 16mm TYPE 'X' GYPSUM BOARD, PRIME & PAINT FINISH.

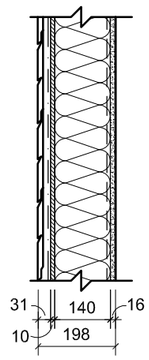
NOTE: TYPICAL 15mm OVERHANG FROM EXTERIOR FACE OF CONCRETE FOUNDATION WALLS.



WALL TYPE - W4

SAGIPER SAGIWALL
(1HR. F.R.R. AS PER OBC SB-3 EW1a R=22)

- SAGIPER SAGIWALL SIDING (KNOTTY MAPLE REF #79) c/w ALUM. TRIM PIECES
- 19mm WOOD STRAPPING
- TYVEK AIR/WEATHER BARRIER - SHINGLED AND ALL JOINTS SEALED. BLUESKIN THROUGH WALL FLASHING MIN.150mm HIGH AT BASE OF ASSEMBLY
- 10mm OSB SHEATHING
- 140mm WOOD STUDS @400mm O.C.
- 140 mm R22 BATT INSULATION
- 6 mil POLY VAPOUR BARRIER
- 16mm TYPE 'X' GYPSUM BOARD, PRIME & PAINT FINISH

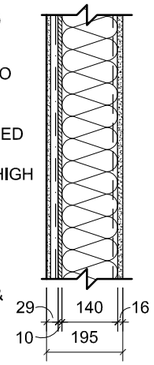


WALL TYPE - W5

W5 - HARDIE BOARD PANELS
(1HR. F.R.R. AS PER OBC SB-3 EW1a R=24)

- HARDIE BOARD PANEL SIDING (REFER TO ELEVATIONS FOR COLOR / PATTERN)
- 19mm WOOD STRAPPING
- TYVEK AIR/WEATHER BARRIER - SHINGLED AND ALL JOINTS SEALED. BLUESKIN THROUGH WALL FLASHING MIN.150mm HIGH AT BASE OF ASSEMBLY
- 10mm OSB SHEATHING
- 140mm WOOD STUDS @400mm O.C.
- 140 mm R22 BATT INSULATION
- 6 mil POLY VAPOUR BARRIER
- 16mm TYPE 'X' GYPSUM BOARD, PRIME & PAINT FINISH

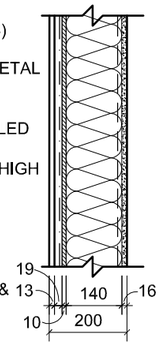
NOTE: ALL CUT JH EDGES TO BE PAINTED PRIOR TO USE. FOLLOW MANUFACTURER INSTALLATION DETAILS



WALL TYPE - W7

PAINTED METAL PANEL
(1HR. F.R.R. AS PER OBC SB-3 EW1a R=24)

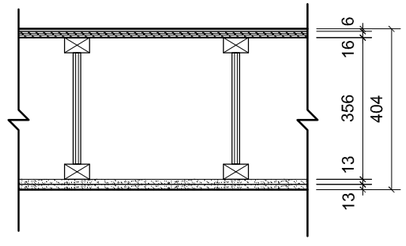
- PAINTED METAL PANEL C/W PAINTED METAL TRIM PIECES
- 19mm WOOD STRAPPING
- TYVEK AIR/WEATHER BARRIER - SHINGLED AND ALL JOINTS SEALED. BLUESKIN THROUGH WALL FLASHING MIN.150mm HIGH AT BASE OF ASSEMBLY
- 10mm OSB SHEATHING
- 140mm WOOD STUDS @400mm O.C.
- 140 mm R22 BATT INSULATION
- 6 mil POLY VAPOUR BARRIER
- 13mm TYPE 'X' GYPSUM BOARD, PRIME & PAINT FINISH



FLOOR TYPE - F3

TYPICAL FLOOR CONSTRUCTION
(1HR. F.R.R.; AS PER SB-3 TABLE 2 F4e)

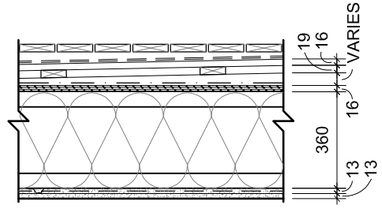
- FLOOR FINISH AS NOTED ON FLOOR PLANS
- 6mm FOAM IMPACT ISOLATION BARRIER
- 16mm OSB SHEATHING (GLUED AND SCREWED)
- 356mm PRE-ENGINEERED FLOOR JOISTS @ 400 O.C.
- 2 LAYERS - 13mm TYPE 'X' GYPSUM BOARD c/w PRIME & PAINT FINISH



ROOF TYPE - R2

FLAT ROOF w/ SLEEPERS (OBC SB-12 - R31 min)
(1HR. F.R.R.; AS PER SB-3 TABLE 2 F4e)

- PRESSURE TREATED WOOD DECKING ON SLEEPERS
- 2-PLY MODIFIED BITUMEN ROOFING SYSTEM
- 16mm CEMENT BOARD
- 19x64mm STRAPPING @ 400mm O.C.
- SLEEPERS SLOPED TO ROOF DRAINS (MIN 2%)
- BLACK BUILDING PAPER
- 16mm OSB SHEATHING (GLUED AND SCREWED) 360mm PRE-ENGINEERED FLOOR JOISTS @ 400mm O.C.
- FILL VOID WITH MINERAL FIBER BATT INSULATION
- 6mil POLY VAPOUR BARRIER
- 2 LAYERS - 13mm TYPE 'X' GYPSUM BOARD c/w PRIME & PAINT FINISH



STAMP:

ONTARIO ASSOCIATION OF ARCHITECTS
RODERICK I. LAHEY
LICENCE
4375

ARCHITECT:

RODERICKLAHEY
ARCHITECT INC
56 Beech Street, Ottawa, Ontario K1S 3J6
t.613.724.9932 f.613.724.1209 www.rodericklahey.ca

PROJECT TITLE:
FRESH TOWN BLOCK 5
OTTAWA ONTARIO

SHEET TITLE:
EXTERIOR WALLS & FLOOR ASSEMBLY REVISIONS

DRAWN: EJ
CHECKED: GV
SCALE: AS SHOWN
SHEET No. ASK-10 R.000
PROJECT No. 1733

FRESH TOWNS
MODERN URBAN LIVING

APPENDIX C

Wastewater Collection

Servicing and Stormwater Management Report
2710 Draper Avenue – Fresh Towns – Phase 3-1

Wastewater Calculations

2710 Draper Avenue
Proposed Site Conditions - Phase 3-1 Phase 3-2

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

Site Area	1.33	**ha**

Extraneous Flow Allowances

Infiltration / Inflow (Dry)	0.07	L/s
Infiltration / Inflow (Wet)	0.37	L/s
Infiltration / Inflow (Total)	**0.44**	**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	86	233
Stacked Townhouse	2.3		0
Apartment			
1 Bedroom	1.4		0
2 Bedroom	2.1		0
		Total Pop	**233**

Average Domestic Flow	**0.76**	**L/s**
Peaking Factor	**3.50**	
Peak Domestic Flow	**2.64**	**L/s**

Total Estimated Average Dry Weather Flow Rate	**0.76**	**L/s**
Total Estimated Peak Dry Weather Flow Rate	**2.71**	**L/s**
Total Estimated Peak Wet Weather Flow Rate	**3.15**	**L/s**

Residential demands, Harmon's Correction Factor, Extraneous Flow Rates and Commercial Peaking Factor established by the City of Ottawa Technical Bulletin ISTB-2018-01. Commercial demands established by City of Ottawa Sewer Design Guidelines Appendix 4A.

Greatwise Developments
2710 Draper Avenue
Existing Site Conditions

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

Site Area 2.130 **ha**

Extraneous Flow Allowances

Infiltration / Inflow (Dry)	0.11	L/s
Infiltration / Inflow (Wet)	0.60	L/s
Infiltration / Inflow (Total)	**0.70**	**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	86	233	*Phase 3 Townhomes*
Stacked Townhouse	2.3		0	
Apartment				
Existing CCC 994 Lands (Building E)				
1 Bedroom	1.4	56	79	
2 Bedroom	2.1	24	51	
Townhomes	2.7			
1 Bedroom	2.7	32	87	
2 Bedroom				*87 pop*
		Total Pop	**450**	

Average Domestic Flow **1.46** **L/s**

Peaking Factor **3.40**

Peak Domestic Flow **4.96** **L/s**

Institutional / Commercial / Industrial Contributions

Property Type	**Unit Rate**		**No. of Units**	**Avg Wastewater (L/s)**
Commercial floor space*	5	$L/m^2/d$	598	0.07
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 **0.07**

Peak Institutional / Commercial Flow 0.07
Peak Industrial Flow** 0.00
Peak I/C/I Flow **0.07**

** assuming a 12 hour commercial operation*

Total Estimated Average Dry Weather Flow Rate	**1.53 L/s**
Total Estimated Peak Dry Weather Flow Rate	**5.13 L/s**
Total Estimated Peak Wet Weather Flow Rate	**5.83 L/s**

Residential demands, Harmon's Correction Factor, Extraneous Flow Rates and Commercial Peaking Factor established by the City of Ottawa Technical Bulletin ISTB-2018-01. Commercial demands established by City of Ottawa Sewer Design Guidelines Appendix 4A.

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)
Cherry Blossom Private																											
						0.00								0.06	0.06		0.06	0.06		0.00168							
	5A	6A	0.19	13.00	35.00	0.19	35.00	4.00	0.45						0.06	0.01	0.19	0.25	0.08	0.54	54.2	250	0.30	32.57	0.02	0.66	0.04
	6A	7A	0.19	14.00	38.00	0.38	73.00	4.00	0.95						0.06	0.01	0.19	0.44	0.15	1.10	61.6	250	0.30	32.57	0.03	0.66	0.06
To Purple Martin Private, Pipe 7A - 8A						0.38	73.00								0.06			0.44		0.00							
Foliage Private																											
	2A	3A	0.26	17.00	46.00	0.26	46.00	4.00	0.60								0.26	0.26	0.09	0.68	57.9	250	0.30	32.57	0.02	0.66	0.06
	3A	4A	0.24	20.00	54.00	0.50	100.00	4.00	1.30								0.24	0.50	0.17	1.46	57.9	250	0.30	32.57	0.04	0.66	0.08
To Purple Martin Private, Pipe 4A - 70A						0.50	100.00											0.50									
Purple Martin Private																											
Contribution From Foliage Private, Pipe 3A - 4A						0.50	100.00										0.50	0.50									
	4A	7A	0.16	4.00	8.00	0.66	108.00	4.00	1.40								0.16	0.66	0.22	1.62	31.4	250	0.30	32.57	0.05	0.66	0.08
Contribution From Cherry Blossom Private, Pipe 6A - 7A						0.38	73.00								0.06		0.44	1.10		0.00							
	7A	8A	0.09	4.00	11.00	1.13	192.00	4.00	2.49						0.06	0.01	0.09	1.19	0.39	2.89	29.6	250	0.30	32.57	0.09	0.66	0.09
	8A	9A				1.13	192.00	4.00	2.49						0.06	0.01	0.00	1.19	0.39	2.89	10.6	250	0.30	32.57	0.09	0.66	0.09

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha				
Average Daily Flow =	280	l/p/day			Industrial Peak Factor =	as per MOE Graph		
Comm/Inst Flow =	50000	L/ha/da	0.5787	l/s/Ha	Extraneous Flow =	0.330	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	1.00				Townhouse coeff=	2.7		
Institutional =	0.58	l/s/Ha			Single house coeff=	3.4		

Designed:

Checked:

Dwg. Reference: 3 of 3
Sanitary Drainage Plan, Dwgs. No. SAN-1

PROJECT: **2710 DRAPER AVENUE - PHASE 3-1**

LOCATION: **City of Ottawa**

File Ref: 17-927 | Date: 2018-09-18 | Sheet No. 1.000 of 1

SANITARY SEWER CALCULATION SHEET

CLIENT: **GREATWISE DEVELOPMENTS**
LOCATION: **2710 DRAPER AVENUE - PHASE 3-2**
FILE REF: **17-927**
DATE: **9-Apr-19**

DESIGN PARAMETERS

Avg. Daily Flow Res.	350	L/p/d	Peak Fact Res. Per Harmons:	Min = 2.0, Max =4.0	Infiltration / Inflow	0.28	L/s/ha
Avg. Daily Flow Comn	50,000	L/ha/d	Peak Fact. Comm.	1.5	Min. Pipe Velocity	0.60	m/s full flowing
Avg. Daily Flow Instit.	50,000	L/ha/d	Peak Fact. Instit.	1.5	Max. Pipe Velocity	3.00	m/s full flowing
Avg. Daily Flow Indus	35,000	L/ha/d	Peak Fact. Indust. per MOE graph		Mannings N	0.013	

Location			Residential Area and Population									Commercial		Institutional		Industrial			Infiltration				Pipe Data							
Area ID	Up	Down	Area	Number of Units by type				Pop.	Cumulative Area	Cumulative Pop.	Peak. Fact.	Q_{res}	Area	Accu. Area	Area	Accu. Area	Area	Accu. Area	Q_{C+I+I}	Total Area	Accu. Area	Infiltration Flow	Total Flow	DIA	Slope	Length	$A_{hydraulic}$	R	Velocity	Q_{cap}	Q / Q full
			(ha)	Singles	Semi's	Town's	Apt's		(ha)		(-)	(L/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(mm)	(%)	(m)	(m^2)	(m)	(m/s)	(L/s)	(-)
FOLIAGE PRIVATE	SAN MH 4B	SAN MH 4B	0.558			2		5.0	0.558	5.0	4.00	0.08		0.00		0.00		0.00	0.0	0.558	0.558	0.156	0.24	200	1.00	5.5	0.031	0.050	1.04	32.8	0.01

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**

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

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: 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

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

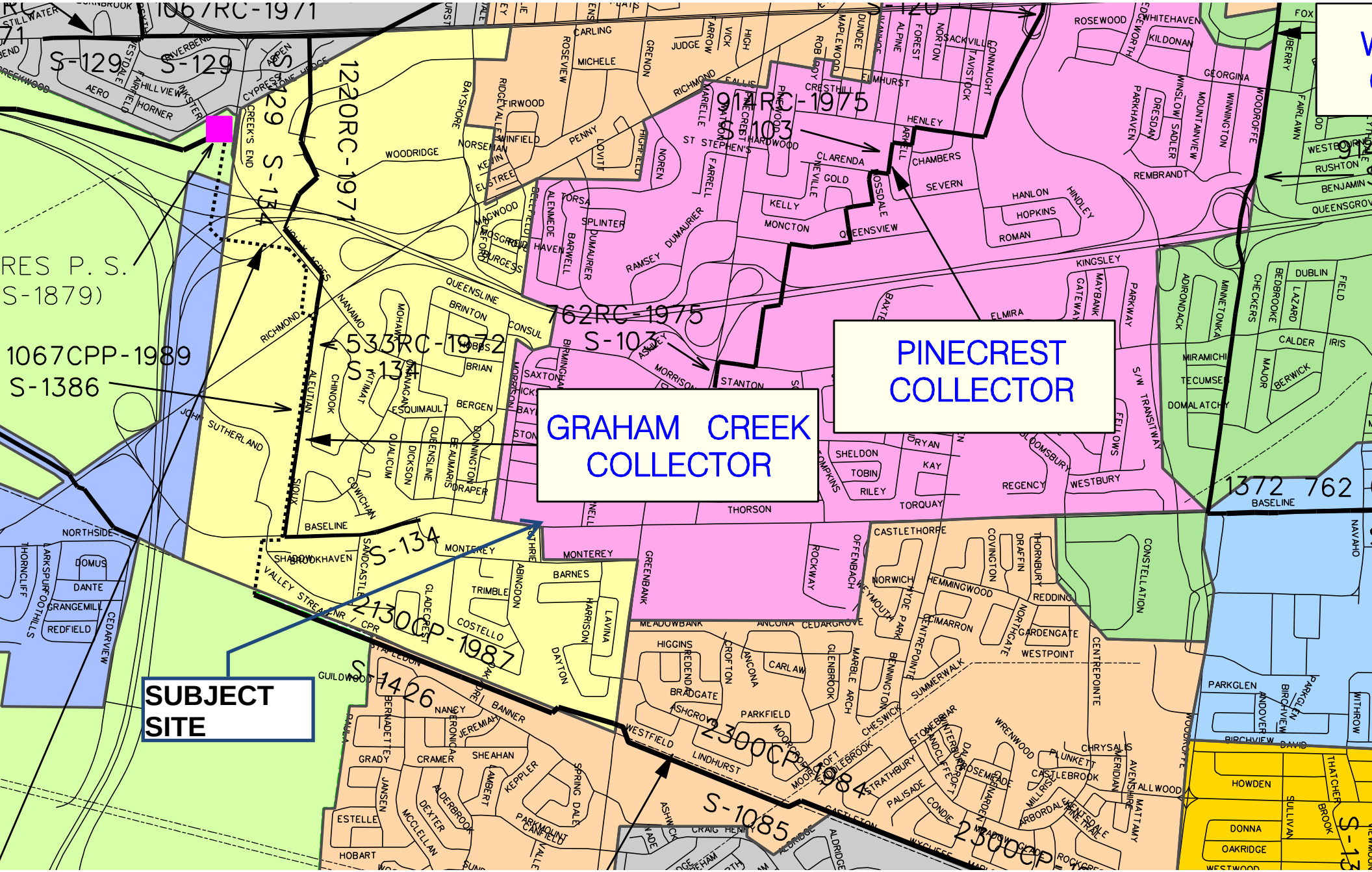
From: Leslie, Jamie [mailto:Jamie.Leslie@stantec.com]
Sent: Friday, August 10, 2012 11:10 AM
To: Andrew Finnson (afinnson@dsel.ca)
Subject: Morrison Drive MH's

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

TRUNK SANITARY SEWERS & COLLECTION AREAS



APPENDIX D

Stormwater Management

Greatwise Developments
2710 Draper Avenue - Phase 3
Target Release Rate

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

	2-year	
i	68.2	mm/hr
Q	126.3	L/s

Greatwise Developments
2710 Draper Avenue - Phase 3
Storm Sewer Calculation Sheet - 5-Year Storm Event

										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)**	**(-)**
Cherry Blossom Private			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	600	0.14	58.0	0.283	0.150	0.81	229.7	1.2	0.21
	MH 6	MH 7	0.19	0.75	0.14	0.31	11.2	98.1	84.5	675	0.15	61.6	0.358	0.169	0.91	325.6	1.1	0.26
							12.4											
Foliage Private	MH 2	MH 3	0.33	0.75	0.25	0.25	10.0	104.2	71.6	600	0.16	58.1	0.283	0.150	0.87	245.6	1.1	0.29
	MH 3	MH 4			0.00	0.25	11.1	98.7	67.8	600	0.16	59.6	0.283	0.150	0.87	245.6	1.1	0.28
							12.3											
Purple Martin Private			0.25	0.75	0.19	0.44												
	MH 4	MH7	0.08	0.75	0.06	0.50	12.3	93.6	128.7	600	0.14	31.4	0.283	0.150	0.81	229.7	0.6	0.56
							12.9											
	MH 7	MH 8	0.10	0.75	0.08	0.88	12.9	91.0	222.5	675	0.15	29.7	0.358	0.169	0.91	325.6	0.5	0.68
	MH 8**	OGS			0.00	0.88	13.4	88.9	125.5	450	3.40	0.3	0.159	0.113	3.31	525.7	0.0	0.24
	OGS	MH 9			0.00	0.88	13.4	88.9	125.5	450	0.30	13.8	0.159	0.113	0.98	156.2	0.2	0.80
							13.7											

***** Controlled flow rate based on EPASWMM Model*** 125.49

Greatwise Developments
2710 Draper Avenue - Phase 3
Storm Sewer Calculation Sheet - 2-Year Storm Event

										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)**	**(-)**
Cherry Blossom Private			0.05	0.50	0.03	0.03	10.0	76.8	5.3	300	1.00	3.5	0.071	0.075	1.37	96.7	0.0	0.06
	MH 5	MH 6	0.19	0.75	0.14	0.17	10.0	76.6	35.7	600	0.14	58.0	0.283	0.150	0.81	229.7	1.2	0.16
	MH 6	MH 7	0.19	0.75	0.14	0.31	11.2	72.4	62.3	675	0.15	61.6	0.358	0.169	0.91	325.6	1.1	0.19
							12.4											
Foliage Private	MH 2	MH 3	0.33	0.75	0.25	0.25	10.0	76.8	52.8	600	0.16	58.1	0.283	0.150	0.87	245.6	1.1	0.21
	MH 3	MH 4			0.00	0.25	11.1	72.8	50.0	600	0.16	59.6	0.283	0.150	0.87	245.6	1.1	0.20
							12.3											
Purple Martin Private			0.25	0.75	0.19	0.19												
	MH 4	MH7	0.08	0.75	0.06	0.25	12.3	69.1	47.5	600	0.14	31.4	0.283	0.150	0.81	229.7	0.6	0.21
							12.9											
	MH 7	MH 8	0.10	0.75	0.08	0.63	12.9	67.2	118.1	675	0.15	29.7	0.358	0.169	0.91	325.6	0.5	0.36
	MH 8**	OGS			0.00	0.63	13.4	65.7	125.5	450	3.40	0.3	0.159	0.113	3.31	525.7	0.0	0.24
	OGS	MH 9			0.00	0.63	13.4	65.7	125.5	450	0.30	13.8	0.159	0.113	0.98	156.2	0.2	0.80
							13.7											

***** Controlled flow rate based on EPASWMM Model*** 125.49

Greatwise Developments
2710 Draper Avenue - Phase 3
Stormwater Ditch Analysis - Block 11

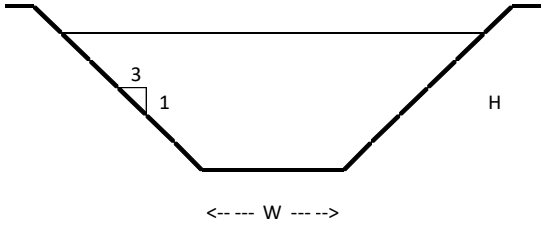
									Ditch Data												
Up	Down	Area	C	Indiv AxC	Acc AxC	T_C	I	Q	depth	Side Slope	Bot. Width	Mannings	Slope	Length	A_{flow}	Wet. Per.	R	Velocity	Qcap	Time Flow	Q / Q full
		(ha)	(-)			(min)	(mm/hr)	(L/s)	(mm)	(X:1)	(m)	n	(%)	(m)	(m^2)	(m)	(m)	(m/s)	(L/s)	(min)	(-)
CB 'L' 1	CB16	0.151	0.75	0.11	0.11	10.0	104.2	32.8	25	3	2.33	0.025	6.38	40.7	0.060	2.488	0.02	0.84	50.8	0.8	0.65

Refer to drawing FIG-1 included in Appendix D of the report.

Mannings Calculator for Ditch Flow CB 'L' 1 to CB 16

Ditch Dimensions

Side Slope	3	:1
Depth	0.025	m
Bottom Width	2.33	m
n	0.025	Mannings, n
Slope	6.38	%



Capacity Table

Depth	Area of Flow	Wetted Perimeter	R	Q
	(m^2)	(m)	(m)	(L/s)
0.002	0.00	2.34	0.00	0.55
0.003	0.01	2.35	0.00	1.75
0.005	0.01	2.36	0.00	3.45
0.007	0.02	2.37	0.01	5.57
0.008	0.02	2.38	0.01	8.09
0.010	0.02	2.39	0.01	10.96
0.012	0.03	2.40	0.01	14.19
0.013	0.03	2.41	0.01	17.73
0.015	0.04	2.42	0.01	21.59
0.017	0.04	2.44	0.02	25.75
0.018	0.04	2.45	0.02	30.20
0.020	0.05	2.46	0.02	34.94
0.022	0.05	2.47	0.02	39.95
0.023	0.06	2.48	0.02	45.23
0.025	0.06	2.49	0.02	50.77

***Refer to drawing FIG-1 included in Appendix D of the report.**

Manning Roughness Coefficient for Grassed Channels and Swales

Type of vegetation

	Depth of flow up to 0.20m and velocities 0.60 to 1.80m/s	Depth of flow between 0.20 and 0.50m and velocities 0.60 to 1.8m/s
Kentucky bluegrass:		
1. Mowed to 0.05m	0.070 to 0.045	0.050 to 0.035
2. Length 0.10 to 0.15m	0.090 to 0.060	0.060 to 0.040
Good Stand, any grass		
1. Length 0.30m	0.180 to 0.090	0.120 to 0.070
2. Length 0.60m	0.300 to 0.190	0.200 to 0.100
Fair Stand, any grass:		
1. Length 0.30m	0.140 to 0.080	0.100 to 0.060
2. Length 0.60m	0.250 to 0.130	0.170 to 0.090

Manning Roughness Coefficient for Various Surfaces

Lined Open Channels	
Concrete	0.013 to 0.022
Asphalt	0.013 to 0.016
Rip-Rap	0.035 to 0.040
Rock cut	0.025 to 0.045
Unlined Open Channels	
Earth, uniform section	0.016 to 0.025
Earth, fairly uniform section	0.022 to 0.040
Dragline, Excavated, or Dredged	
No Vegetation	0.028 to 0.033
Light brush on banks	0.035 to 0.050
Channels not maintained, vegetation uncut	
Dense weeds, high as flow depth	0.080 to 0.120
Clean bottom, brush on sides	0.050 to 0.080

source: MTO Drainage Manual - Section C

LEGEND:

EMERGENCY FLOW ROUTE

DRAINAGE DIVIDE

BLD 2 / 2.78 / 0.75 — DRAINAGE AREA ID / AREA IN Ha / RATIONAL METHOD RUNOFF COEFFICIENT

MH 5A
MH 5
EX. 600Ø CONC STM 58.0 @ 0.140%
MH 6A
MH 6
CHERRY BLOSSOM PRIVATE
EX. 675Ø CONC STM 61.6 @
CMB
CMB
PHASE 3-1 BLOCK 3
PHASE 3-1 BLOCK 4
74.05
73.23
73.01
74.65
74.03
73.81
BLOCK 7 (SOG)
74.65
74.03
73.81
PURPL
EX. 6
BLOCK 10 (SOG)
MH 4A
MH 4B
MH 2A
MH 2
EX. 600Ø PVC STM 58.1 @ 0.160%
MH 3A
MH 3
FOLIAGE PRIVATE
EX. 600Ø PVC STM 59.6 @ 0.160%
BLOCK 11 (SOG)
76.90
73.95
BLOCK 5 (SOG)
76.90
73.95
76.76
73.81
BLOCK 8 (SOG)
1.5m ACCESS EASEMENT
SWALE 'A'
0.151
0.75
Limit of Underground Parking Garage
Limit of Underground Parking Garage
1.5m ACCESS EASEMENT
1.5m ACCESS EASEMENT
1.5m ACCESS EASEMENT
Hydro Transformer on Concrete Pad
2.5m NOISE BARRIER TW=79.08 MATERIAL SURFACE DENSITY OF 20 kg/m2 (STC RATING OF 30) PER TRAFFIC NOISE ASSESSMENT
TRANSITION TO 2.08m NOISE BARRIER TW=79.08 MATERIAL SURFACE DENSITY OF 20 kg/m2 (STC RATING OF 30) PER TRAFFIC NOISE ASSESSMENT
Concrete Sidewalk
Pillar
BRW
MF
Interlock Steps
Concrete
Bike Rack
Bike Rack
BRW
Pillar
Grass
Concrete Sidewalk
LS
BRW
Grass
Gravel
BLOCK G REGISTERED PLAN
PART 1 PLAN 4R-29460
PHASE 1 & 2
2795 BASELINE ROAD
2785 BASELINE ROAD
CPP 0.3ø T/P=75.68
CABLE
GAS
Hedge
Hedge

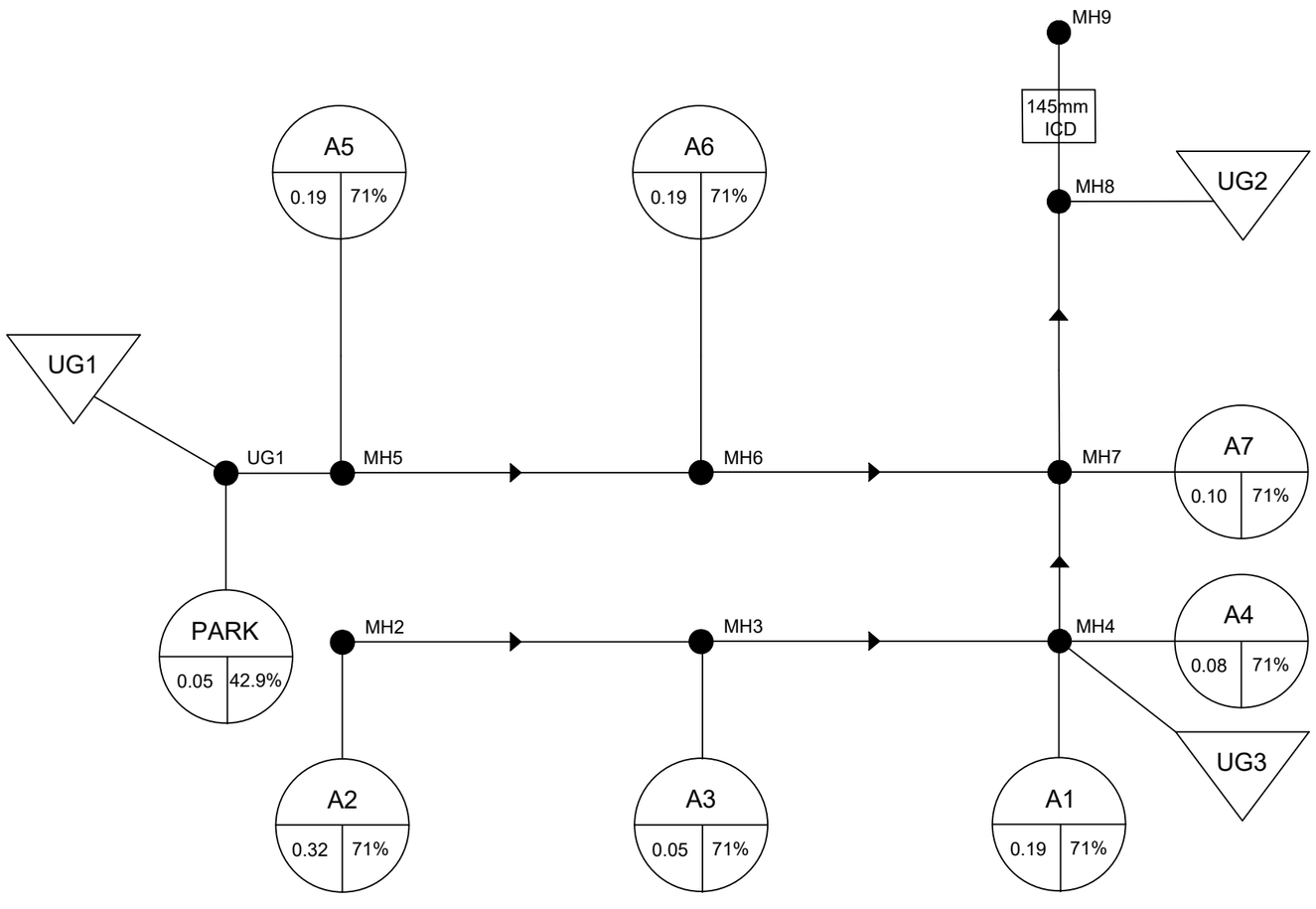
DSEL
david schaeffer engineering ltd.
SMART SUBDIVISIONS™
120 Iber Road Unit 103
Stittsville, Ontario, K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

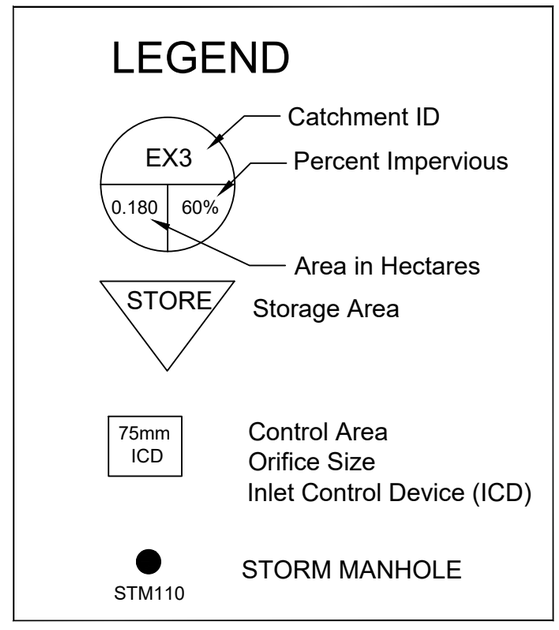
POST-DEVELOPMENT REAR YARD DRAINAGE AREA PLAN

PROJ NO.:	17-927
DRAWN BY:	CMK
DATE:	2019-06-10
SCALE:	NTS
FIGURE NO.:	FIG-1

z:\projects\17-927_greatwise-2781_baseline-towns\b_design\b2_drawings\b2-2_main (dsel)\base - phil\cad\2019-06-10_927_spa_ajg.dwg

FIGURE 1 - HYDROLOGIC MODEL SCHEMATIC





```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           LPS
INFILTRATION         HORTON
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0
ALLOW_PONDING        YES
SKIP_STEADY_STATE    NO

START_DATE           01/01/2000
START_TIME           00:01:00
REPORT_START_DATE    01/01/2000
REPORT_START_TIME    00:01:00
END_DATE             01/02/2000
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:01:00
DRY_STEP             00:01:00
ROUTING_STEP         0:00:02

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         1.14
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
1                INTENSITY 0:10     1.0      TIMESERIES CH6H100
```

```
[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope
  CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- --------
-------- -------- ----------------
A5               1                MH5              0.19     71       65       2.0
  0
PARK             1                UG1              0.05     42.9     21       4
  0
A6               1                MH6              0.19     71       63       2.0
  0
A2               1                MH2              0.32     71       66.6     2.0
  0
A3               1                MH3              0.05     71       60       2.0
  0
A1               1                MH4              0.19     71       27       2.0
  0
A4               1                UG3              0.08     71       33       2.0
  0
A7               1                MH7              0.1      71       34       2.0
  0
U1               1                1                0.16     71       120      5
  0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
----------
A5               0.013      0.25       1.57       4.67       0          OUTLET
PARK             0.013      0.25       1.57       4.67       0          OUTLET
A6               0.013      0.25       1.57       4.67       0          OUTLET
A2               0.013      0.25       1.57       4.67       0          OUTLET
A3               0.013      0.25       1.57       4.67       0          OUTLET
A1               0.013      0.25       1.57       4.67       0          OUTLET
A4               0.013      0.25       1.57       4.67       0          OUTLET
A7               0.013      0.25       1.57       4.67       0          OUTLET
U1               0.013      0.25       1.57       4.67       0          OUTLET

[INFILTRATION]
;;Subcatchment   MaxRate    MinRate    Decay      DryTime    MaxInfil
;;-------------- ---------- ---------- ---------- ---------- ----------
A5               76.2       13.2       4.14       7          0
PARK             76.2       13.2       4.14       7          0
A6               76.2       13.2       4.14       7          0
A2               76.2       13.2       4.14       7          0
A3               76.2       13.2       4.14       7          0
A1               76.2       13.2       4.14       7          0
A4               76.2       13.2       4.14       7          0
```

```
A7               76.2       13.2       4.14       7          0
U1               76.2       13.2       4.14       7          0

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
MH8              70.15      2.04       0          0          0
MH7              70.227     2.601      0          0          0
MH6              70.454     2.402      0          0          0
MH4              70.34      2.428      0          0          0
MH5              70.613     2.182      0          0          0
MH2              70.925     3.105      0          0          0
MH3              70.809     2.88       0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
1                69.89      FIXED      70.44            NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params
   N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ----------- ----------
---------------------------- -------- --------           -------- --------
UG1              70.67    1.8        0          TABULAR    UG1
   0        0
UG2              70.19    2          0          TABULAR    UG2
   0        0
UG3              70.52    1.8        0          TABULAR    UG3
   0        0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset
OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ----------
---------- ---------- ----------
P7-8             MH7              MH8              31.5       0.013      *
*          0          0
P2-3             MH2              MH3              58.1       0.013      *
*          0          0
P3-4             MH3              MH4              59.6       0.013      *
*          0          0
P5-6             MH5              MH6              58         0.013      *
*          0          0
P6-7             MH6              MH7              61.6       0.013      *
*          0          0
P1               MH5              UG1              3.5        0.013      *
*          0          0
P4-7             MH4              MH7              31.4       0.013      *
*          0          0
```

```
P2               UG2              MH8              10         0.013      *
*          0          0
P3               UG3              MH4              15.6       0.013      *
*          0          0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff
 Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ----------
---------- -------- ----------
ICD1             MH8              1                SIDE         *          0.61
 YES      0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4
Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ----------
---------- ----------
P7-8             CIRCULAR     0.675            0          0          0          1

P2-3             CIRCULAR     0.600            0          0          0          1

P3-4             CIRCULAR     0.600            0          0          0          1

P5-6             CIRCULAR     0.6              0          0          0          1

P6-7             CIRCULAR     0.675            0          0          0          1

P1               CIRCULAR     0.3              0          0          0          1

P4-7             CIRCULAR     0.6              0          0          0          1

P2               CIRCULAR     0.45             0          0          0          1

P3               CIRCULAR     0.3              0          0          0          1

ICD1             CIRCULAR     0.144            0          0          0

[LOSSES]
;;Link           Kentry     Kexit      Kavg       Flap Gate  Seepage
;;-------------- ---------- ---------- ---------- ---------- ----------
P7-8             0.5        0.5        0          NO         0
P2-3             0.5        0.5        0          NO         0
P3-4             0.5        1.3        0          NO         0
P5-6             1.3        0.5        0          NO         0
P6-7             0.5        1.3        0          NO         0
P1               0          1.3        0          NO         0
P4-7             1.3        0.5        0          NO         0
P2               0          1.3        0          NO         0
P3               0          1.3        0          NO         0
```

```
[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
UG1              Storage    0          110
UG1                         0.25       110
UG1                         1.8        110
UG1                         1.81       0
;
UG3              Storage    0          20
UG3                         0.25       20
UG3                         0.5        20
UG3                         1.8        20
UG3                         1.81       0
;
UG2              Storage    0          110
UG2                         1.8        110
UG2                         1.81       0
UG2                         2          0
;

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;2yr12hrS
2yr12hrS         FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\2yr12hrS.dat"
;
;5yr12hrS
5yr12hrS         FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\5yr12hrS.dat"
;
;10yr12hrS
10yr12hrS        FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\10yr12hrS.dat"
;
;25yr12hrS
25yr12hrS        FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\25yr12hrS.dat"
;
;50yr12hrS
50yr12hrS        FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\50yr12hrS.dat"
;
;100yr12hrS
100yr12hrS       FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\100yr12hrS.dat"
;
CH4H005          FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\CH4H005.dat"
```

```
;
;100-year Storm, 4 Hour Chicago Distribution
CH4H100          FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\CH4H100.dat"
;
CH6H100          FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\CH6H100.dat"
;
CH3H100          FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\CH3H100.dat"
;
;3 hour chicago storm + 20%
CH3H100x         FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\CH3H100x.dat"

[REPORT]
;;Reporting Options
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -2500.000 0.000 12500.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
MH8              7698.962           6862.745
MH7              7702.419           5120.925
MH6              3995.366           5120.051
MH4              7681.388           3238.696
MH5              -200.084           5132.687
MH2              -225.358           3237.152
MH3              4008.003           3237.152
1                7698.962           8004.614
UG1              -1130.389          4321.767
UG2              8512.907           6857.464
UG3              8591.470           3243.547

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

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
```

```
;;-------------- ------------------ ------------------
A5               -194.367           6599.074
A5               121.555            6043.051
A5               -447.105           6043.051
A5               -194.367           6624.348
PARK             -1880.792          5612.890
PARK             -1564.869          5006.318
PARK             -2221.988          4993.682
PARK             -1842.881          5650.800
A6               4008.003           6560.657
A6               4374.473           5991.997
A6               3666.807           6004.634
A6               4020.640           6548.020
A2               -210.220           2461.401
A2               143.614            1753.734
A2               -589.327           1753.734
A2               -197.583           2474.038
A3               3970.093           2314.659
A3               4450.295           1632.266
A3               3603.623           1619.629
A3               3970.093           2327.296
A1               8130.936           2507.537
A1               8585.865           1787.233
A1               7701.282           1812.507
A1               8130.936           2520.174
A4               9242.879           4272.768
A4               9672.534           3704.107
A4               8863.772           3678.833
A4               9255.516           4285.405
A7               9043.078           6011.675
A7               9472.733           5341.919
A7               8727.156           5354.556
A7               9043.078           6036.948
U1               1922.915           7394.693
U1               2327.296           6788.121
U1               1581.719           6788.121
U1               1948.189           7419.966

[SYMBOLS]
;;Gage            X-Coord            Y-Coord
;;-------------- ------------------ ------------------
1                -2358.708          8523.645
```

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

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

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

**********	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
**********	---	---
Total Precipitation	0.109	82.291
Evaporation Loss	0.000	0.000
Infiltration Loss	0.021	15.885
Surface Runoff	0.087	65.391
Final Storage	0.001	1.098
Continuity Error (%)	-0.101	

**********	Volume	Volume

Flow Routing Continuity	hectare-m	10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.087	0.870
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.083	0.834
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.004	0.039
Continuity Error (%)	-0.388	

Time-Step Critical Elements

Link P1 (5.12%)

Highest Flow Instability Indexes

Link ICD1 (10)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.96 sec
Maximum Time Step	:	2.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.02
Percent Not Converging	:	0.17

Subcatchment Runoff Summary

	Total Precip	Total Runon	Total Evap	Total Infil	Total Runoff	Total Runoff	Peak Runoff	Runoff Coeff

Subcatchment	mm	mm	mm	mm	mm	10^6 ltr	LPS
A5	82.29	0.00	0.00	15.27	65.99	0.13	87.99	0.802
PARK	82.29	0.00	0.00	30.14	51.57	0.03	21.20	0.627
A6	82.29	0.00	0.00	15.28	65.98	0.13	87.83	0.802
A2	82.29	0.00	0.00	15.42	65.82	0.21	142.97	0.800
A3	82.29	0.00	0.00	15.10	66.20	0.03	23.92	0.804
A1	82.29	0.00	0.00	15.59	65.64	0.12	81.94	0.798
A4	82.29	0.00	0.00	15.23	66.04	0.05	37.41	0.802
A7	82.29	0.00	0.00	15.28	65.99	0.07	46.29	0.802
U1	82.29	0.00	0.00	15.10	66.20	0.11	76.54	0.804

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
MH8	JUNCTION	0.46	1.79	71.94	0 02:25	1.79
MH7	JUNCTION	0.38	1.72	71.95	0 02:25	1.72
MH6	JUNCTION	0.18	1.49	71.95	0 02:25	1.49
MH4	JUNCTION	0.28	1.61	71.95	0 02:25	1.61
MH5	JUNCTION	0.14	1.33	71.95	0 02:25	1.33
MH2	JUNCTION	0.09	1.37	72.29	0 01:56	1.05
MH3	JUNCTION	0.10	1.59	72.40	0 01:56	1.14
1	OUTFALL	0.55	0.55	70.44	0 00:00	0.55
UG1	STORAGE	0.12	1.28	71.95	0 02:25	1.28
UG2	STORAGE	0.42	1.75	71.94	0 02:24	1.75
UG3	STORAGE	0.16	1.43	71.95	0 02:25	1.43

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
MH8	JUNCTION	0.00	280.87	0 01:59	0	0.926	0.266
MH7	JUNCTION	46.29	281.35	0 01:59	0.066	0.781	0.689
MH6	JUNCTION	87.83	104.79	0 01:51	0.125	0.354	-0.139
MH4	JUNCTION	81.94	248.36	0 01:59	0.125	0.429	0.314
MH5	JUNCTION	87.99	173.99	0 01:59	0.125	0.333	-0.127
MH2	JUNCTION	142.97	142.97	0 01:59	0.211	0.211	-0.299
MH3	JUNCTION	23.92	166.92	0 01:56	0.0331	0.244	-0.009
1	OUTFALL	76.54	125.22	0 01:59	0.106	0.834	0.000
UG1	STORAGE	21.20	194.77	0 01:59	0.0258	0.146	0.019
UG2	STORAGE	0.00	231.56	0 01:59	0	0.195	0.270
UG3	STORAGE	37.41	84.61	0 01:56	0.0528	0.06	-0.008

****
Node Surcharge Summary
****

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

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
MH8	JUNCTION	3.91	1.119	0.246

MH7	JUNCTION	3.54	1.045	0.881
MH6	JUNCTION	2.67	0.818	0.909
MH4	JUNCTION	3.38	1.008	0.820
MH5	JUNCTION	2.40	0.734	0.848
MH2	JUNCTION	1.59	0.767	1.738
MH3	JUNCTION	1.86	0.987	1.293

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
UG1	0.013	7	0	0	0.141	71	0 02:25	14.81
UG2	0.046	23	0	0	0.193	97	0 02:24	14.54
UG3	0.003	9	0	0	0.029	79	0 02:25	55.58

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
1	42.11	24.74	125.22	0.834

System 42.11 24.74 125.22 0.834

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
P7-8	CONDUIT	280.87	0	01:59	0.78	0.68	1.00
P2-3	CONDUIT	143.20	0	01:56	1.04	0.52	1.00
P3-4	CONDUIT	166.48	0	01:56	0.62	0.31	1.00
P5-6	CONDUIT	91.75	0	02:00	0.46	0.29	1.00
P6-7	CONDUIT	61.51	0	01:51	0.27	0.12	1.00
P1	CONDUIT	173.58	0	01:59	2.46	1.41	1.00
P4-7	CONDUIT	235.09	0	01:59	0.83	0.64	1.00
P2	CONDUIT	231.56	0	01:59	1.46	1.28	1.00
P3	CONDUIT	55.58	0	02:00	0.79	0.54	1.00
ICD1	ORIFICE	53.69	0	02:25			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
P7-8	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00
P2-3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.02	0.00
P3-4	1.00	0.02	0.20	0.00	0.78	0.00	0.00	0.00	0.82	0.00
P5-6	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.10	0.00
P6-7	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.74	0.00

P1	1.00	0.02	0.00	0.00	0.96	0.01	0.00	0.00	0.75
0.00									
P4-7	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.04
0.00									
P2	1.00	0.02	0.01	0.00	0.97	0.00	0.00	0.00	0.00
0.00									
P3	1.00	0.02	0.20	0.00	0.78	0.00	0.00	0.00	0.76
0.00									

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
P7-8	3.54	3.54	3.91	0.01	0.01
P2-3	1.59	1.59	1.86	0.01	0.01
P3-4	1.86	1.86	3.38	0.01	0.01
P5-6	2.40	2.40	2.94	0.01	0.01
P6-7	2.67	2.67	3.54	0.01	0.01
P1	3.20	3.20	3.49	0.10	0.01
P4-7	3.38	3.38	3.90	0.01	0.01
P2	4.80	4.80	5.00	0.09	0.01
P3	3.94	3.94	4.81	0.01	0.01

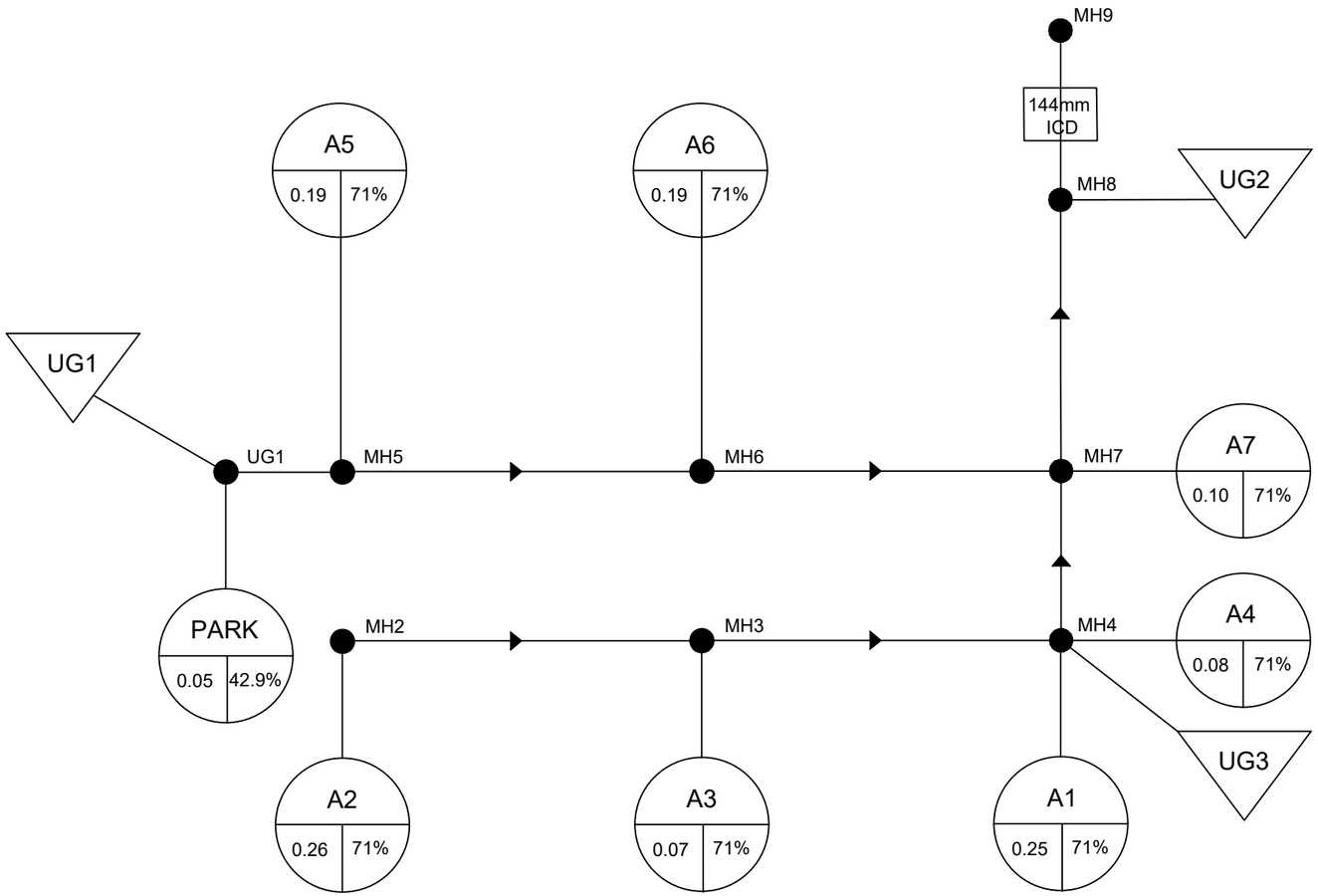
Analysis begun on: Sat Jul 20 14:06:47 2019
Analysis ended on: Sat Jul 20 14:06:48 2019
Total elapsed time: 00:00:01

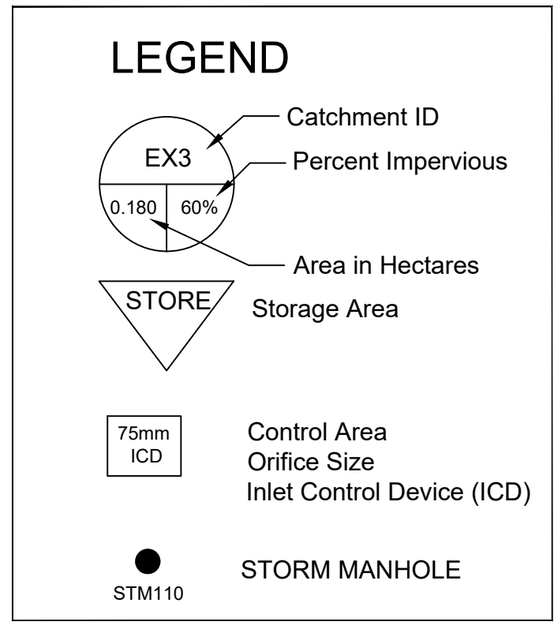
PREVIOUSLY APPROVED EPASWMM ANALYSIS

Site Servicing and Stormwater Management Report
2710 Draper Avenue – Fresh Towns – Phase 3-1

September 2018

FIGURE 1 - HYDROLOGIC MODEL SCHEMATIC





```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           LPS
INFILTRATION         HORTON
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0
ALLOW_PONDING        YES
SKIP_STEADY_STATE    NO

START_DATE           01/01/2000
START_TIME           00:01:00
REPORT_START_DATE    01/01/2000
REPORT_START_TIME    00:01:00
END_DATE             01/02/2000
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:01:00
DRY_STEP             00:01:00
ROUTING_STEP         0:00:02

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         1.14
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
1                INTENSITY 0:10     1.0      TIMESERIES CH6H100
```

```
[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope
  CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- --------
-------- -------- ----------------
A5               1                MH5              0.19     71       65       2.0
  0
PARK             1                UG1              0.05     42.9     21       4
  0
A6               1                MH6              0.19     71       63       2.0
  0
A2               1                MH2              0.26     71       66.6     2.0
  0
A3               1                MH3              0.07     71       60       2.0
  0
A1               1                MH4              0.25     71       27       2.0
  0
A4               1                UG3              0.08     71       33       2.0
  0
A7               1                MH7              0.1      71       34       2.0
  0
U1               1                1                0.16     71       120      5
  0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
----------
A5               0.013      0.25       1.57       4.67       0          OUTLET
PARK             0.013      0.25       1.57       4.67       0          OUTLET
A6               0.013      0.25       1.57       4.67       0          OUTLET
A2               0.013      0.25       1.57       4.67       0          OUTLET
A3               0.013      0.25       1.57       4.67       0          OUTLET
A1               0.013      0.25       1.57       4.67       0          OUTLET
A4               0.013      0.25       1.57       4.67       0          OUTLET
A7               0.013      0.25       1.57       4.67       0          OUTLET
U1               0.013      0.25       1.57       4.67       0          OUTLET

[INFILTRATION]
;;Subcatchment   MaxRate    MinRate    Decay      DryTime    MaxInfil
;;-------------- ---------- ---------- ---------- ---------- ----------
A5               76.2       13.2       4.14       7          0
PARK             76.2       13.2       4.14       7          0
A6               76.2       13.2       4.14       7          0
A2               76.2       13.2       4.14       7          0
A3               76.2       13.2       4.14       7          0
A1               76.2       13.2       4.14       7          0
A4               76.2       13.2       4.14       7          0
```

```
A7               76.2       13.2       4.14       7          0
U1               76.2       13.2       4.14       7          0

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
MH8              70.15      2.04       0          0          0
MH7              70.227     2.601      0          0          0
MH6              70.454     2.402      0          0          0
MH4              70.34      2.428      0          0          0
MH5              70.613     2.182      0          0          0
MH2              70.925     3.105      0          0          0
MH3              70.809     2.88       0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
1                69.89      FIXED      70.44            NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params
   N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ----------- ----------
---------------------------- -------- --------           -------- --------
UG1              70.65    1.8        0          TABULAR    UG1
   0        0
UG2              70.19    2          0          TABULAR    UG2
   0        0
UG3              70.52    1.8        0          TABULAR    UG3
   0        0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset
OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ----------
---------- ---------- ----------
P7-8             MH7              MH8              31.5       0.013      *
*          0          0
P2-3             MH2              MH3              58.1       0.013      *
*          0          0
P3-4             MH3              MH4              59.6       0.013      *
*          0          0
P5-6             MH5              MH6              58         0.013      *
*          0          0
P6-7             MH6              MH7              61.6       0.013      *
*          0          0
P1               MH5              UG1              3.5        0.013      *
*          0          0
P4-7             MH4              MH7              31.4       0.013      *
*          0          0
```

```
P2               UG2              MH8              10         0.013      *
*          0          0
P3               UG3              MH4              15.6       0.013      *
*          0          0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff
 Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ----------
---------- -------- ----------
ICD1             MH8              1                SIDE         *          0.61
 YES      0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4
Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ----------
---------- ----------
P7-8             CIRCULAR     0.675            0          0          0          1

P2-3             CIRCULAR     0.600            0          0          0          1

P3-4             CIRCULAR     0.600            0          0          0          1

P5-6             CIRCULAR     0.6              0          0          0          1

P6-7             CIRCULAR     0.675            0          0          0          1

P1               CIRCULAR     0.3              0          0          0          1

P4-7             CIRCULAR     0.6              0          0          0          1

P2               CIRCULAR     0.45             0          0          0          1

P3               CIRCULAR     0.3              0          0          0          1

ICD1             CIRCULAR     0.144            0          0          0

[LOSSES]
;;Link           Kentry     Kexit      Kavg       Flap Gate  Seepage
;;-------------- ---------- ---------- ---------- ---------- ----------
P7-8             0.5        0.5        0          NO         0
P2-3             0.5        0.5        0          NO         0
P3-4             0.5        1.3        0          NO         0
P5-6             1.3        0.5        0          NO         0
P6-7             0.5        1.3        0          NO         0
P1               0          1.3        0          NO         0
P4-7             1.3        0.5        0          NO         0
P2               0          1.3        0          NO         0
P3               0          1.3        0          NO         0
```

```
[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
UG1              Storage    0          110
UG1                         0.25       110
UG1                         1.8        110
UG1                         1.81       0
;
UG3              Storage    0          20
UG3                         0.25       20
UG3                         0.5        20
UG3                         1.8        20
UG3                         1.81       0
;
UG2              Storage    0          110
UG2                         1.8        110
UG2                         1.81       0
UG2                         2          0
;

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;2yr12hrS
2yr12hrS         FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\2yr12hrS.dat"
;
;5yr12hrS
5yr12hrS         FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\5yr12hrS.dat"
;
;10yr12hrS
10yr12hrS        FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\10yr12hrS.dat"
;
;25yr12hrS
25yr12hrS        FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\25yr12hrS.dat"
;
;50yr12hrS
50yr12hrS        FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\50yr12hrS.dat"
;
;100yr12hrS
100yr12hrS       FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\100yr12hrS.dat"
;
CH4H005          FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\CH4H005.dat"
```

```
;
;100-year Storm, 4 Hour Chicago Distribution
CH4H100          FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\CH4H100.dat"
;
CH6H100          FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\CH6H100.dat"
;
CH3H100          FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\CH3H100.dat"
;
;3 hour chicago storm + 20%
CH3H100x         FILE "P:\General Administrative\5 - DSEL Templates\Site
Plan\EPASWMM Template\rainfall\CH3H100x.dat"

[REPORT]
;;Reporting Options
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -2500.000 0.000 12500.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
MH8              7698.962           6862.745
MH7              7702.419           5120.925
MH6              3995.366           5120.051
MH4              7681.388           3238.696
MH5              -200.084           5132.687
MH2              -225.358           3237.152
MH3              4008.003           3237.152
1                7698.962           8004.614
UG1              -1130.389          4321.767
UG2              8512.907           6857.464
UG3              8591.470           3243.547

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

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
```

```
;;-------------- ------------------ ------------------
A5               -194.367           6599.074
A5               121.555            6043.051
A5               -447.105           6043.051
A5               -194.367           6624.348
PARK             -1880.792          5612.890
PARK             -1564.869          5006.318
PARK             -2221.988          4993.682
PARK             -1842.881          5650.800
A6               4008.003           6560.657
A6               4374.473           5991.997
A6               3666.807           6004.634
A6               4020.640           6548.020
A2               -210.220           2461.401
A2               143.614            1753.734
A2               -589.327           1753.734
A2               -197.583           2474.038
A3               3970.093           2314.659
A3               4450.295           1632.266
A3               3603.623           1619.629
A3               3970.093           2327.296
A1               8130.936           2507.537
A1               8585.865           1787.233
A1               7701.282           1812.507
A1               8130.936           2520.174
A4               9242.879           4272.768
A4               9672.534           3704.107
A4               8863.772           3678.833
A4               9255.516           4285.405
A7               9043.078           6011.675
A7               9472.733           5341.919
A7               8727.156           5354.556
A7               9043.078           6036.948
U1               1922.915           7394.693
U1               2327.296           6788.121
U1               1581.719           6788.121
U1               1948.189           7419.966

[SYMBOLS]
;;Gage            X-Coord            Y-Coord
;;-------------- ------------------ ------------------
1                -777.143           7405.714
```

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


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

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


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         0.111        82.291
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.021        15.898
Surface Runoff ...........         0.088        65.377
Final Storage ............         0.001         1.099
Continuity Error (%) .....        -0.100
```

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.088	0.883
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.085	0.847
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.004	0.039
Continuity Error (%)	-0.379	

Time-Step Critical Elements

Link P1 (4.89%)

Highest Flow Instability Indexes

Link ICD1 (12)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.96 sec
Maximum Time Step	:	2.00 sec
Percent in Steady State	:	-0.00
Average Iterations per Step	:	2.02
Percent Not Converging	:	0.17

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
A5	82.29	0.00	0.00	15.27	65.99	0.13	87.99	0.802
PARK	82.29	0.00	0.00	30.14	51.57	0.03	21.20	0.627
A6	82.29	0.00	0.00	15.28	65.98	0.13	87.83	0.802
A2	82.29	0.00	0.00	15.35	65.90	0.17	118.12	0.801
A3	82.29	0.00	0.00	15.13	66.17	0.05	33.39	0.804
A1	82.29	0.00	0.00	15.75	65.47	0.16	104.84	0.796
A4	82.29	0.00	0.00	15.23	66.04	0.05	37.41	0.802
A7	82.29	0.00	0.00	15.28	65.99	0.07	46.29	0.802
U1	82.29	0.00	0.00	15.10	66.20	0.11	76.54	0.804

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
MH8	JUNCTION	0.46	1.82	71.97	0 02:25	1.82
MH7	JUNCTION	0.39	1.74	71.97	0 02:25	1.74
MH6	JUNCTION	0.18	1.52	71.97	0 02:25	1.52
MH4	JUNCTION	0.28	1.63	71.97	0 02:25	1.63
MH5	JUNCTION	0.14	1.36	71.97	0 02:26	1.36
MH2	JUNCTION	0.09	1.58	72.50	0 01:56	1.05
MH3	JUNCTION	0.10	1.34	72.15	0 01:56	1.16
1	OUTFALL	0.55	0.55	70.44	0 00:00	0.55
UG1	STORAGE	0.13	1.32	71.97	0 02:26	1.32
UG2	STORAGE	0.42	1.78	71.97	0 02:25	1.78

UG3	STORAGE	0.16	1.45	71.97	0	02:25	1.45

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
MH8	JUNCTION	0.00	285.75	0 01:59	0	0.942	0.262
MH7	JUNCTION	46.29	286.11	0 01:59	0.066	0.795	0.672
MH6	JUNCTION	87.83	101.03	0 01:51	0.125	0.358	-0.101
MH4	JUNCTION	104.84	255.89	0 01:59	0.164	0.443	0.305
MH5	JUNCTION	87.99	174.76	0 01:59	0.125	0.34	-0.117
MH2	JUNCTION	118.12	118.12	0 01:59	0.171	0.171	-0.295
MH3	JUNCTION	33.39	151.90	0 01:56	0.0463	0.218	-0.114
1	OUTFALL	76.54	125.49	0 01:59	0.106	0.847	0.000
UG1	STORAGE	21.20	195.68	0 01:59	0.0258	0.151	0.018
UG2	STORAGE	0.00	236.05	0 01:59	0	0.198	0.268
UG3	STORAGE	37.41	90.73	0 01:56	0.0528	0.0604	0.000

****
Node Surcharge Summary
****

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

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
MH8	JUNCTION	3.96	1.142	0.223
MH7	JUNCTION	3.60	1.068	0.858
MH6	JUNCTION	2.73	0.841	0.886
MH4	JUNCTION	3.44	1.032	0.796
MH5	JUNCTION	2.45	0.758	0.824
MH2	JUNCTION	1.65	0.977	1.528
MH3	JUNCTION	1.91	0.744	1.536

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
UG1	0.014	7	0	0	0.145	73	0 02:26	14.93
UG2	0.046	23	0	0	0.196	98	0 02:25	14.66
UG3	0.003	9	0	0	0.029	81	0 02:25	56.00

****

Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
1	44.14	23.82	125.49	0.847
System	44.14	23.82	125.49	0.847

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
P7-8	CONDUIT	285.75	0	01:59	0.80	0.69	1.00
P2-3	CONDUIT	118.93	0	01:56	0.95	0.43	1.00
P3-4	CONDUIT	154.15	0	01:56	0.57	0.28	1.00
P5-6	CONDUIT	92.68	0	02:00	0.42	0.29	1.00
P6-7	CONDUIT	57.72	0	01:51	0.27	0.11	1.00
P1	CONDUIT	174.49	0	01:59	2.47	1.75	1.00
P4-7	CONDUIT	240.54	0	01:59	0.85	0.65	1.00
P2	CONDUIT	236.05	0	01:59	1.48	1.31	1.00
P3	CONDUIT	56.00	0	02:00	0.79	0.54	1.00
ICD1	ORIFICE	54.11	0	02:25			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl

```
-------------------------------------------------------------------------------
-
  P7-8                    1.00   0.02  0.00  0.00  0.98  0.00  0.00  0.00  0.01
0.00
  P2-3                    1.00   0.02  0.00  0.00  0.98  0.00  0.00  0.00  0.02
0.00
  P3-4                    1.00   0.02  0.27  0.00  0.71  0.00  0.00  0.00  0.81
0.00
  P5-6                    1.00   0.02  0.00  0.00  0.98  0.00  0.00  0.00  0.10
0.00
  P6-7                    1.00   0.02  0.00  0.00  0.98  0.00  0.00  0.00  0.73
0.00
  P1                      1.00   0.02  0.00  0.00  0.97  0.00  0.00  0.00  0.39
0.00
  P4-7                    1.00   0.02  0.00  0.00  0.98  0.00  0.00  0.00  0.04
0.00
  P2                      1.00   0.02  0.01  0.00  0.97  0.00  0.00  0.00  0.00
0.00
  P3                      1.00   0.02  0.19  0.00  0.79  0.00  0.00  0.00  0.75
0.00


  *************************
  Conduit Surcharge Summary
  *************************

  ------------------------------------------------------------------------------
                                                              Hours        Hours
                          --------- Hours Full --------    Above Full   Capacity
  Conduit                 Both Ends  Upstream  Dnstream    Normal Flow   Limited
  ------------------------------------------------------------------------------
  P7-8                         3.60      3.60      3.96      0.01         0.01
  P2-3                         1.65      1.65      1.91      0.01         0.01
  P3-4                         1.91      1.91      3.44      0.01         0.01
  P5-6                         2.45      2.45      2.99      0.01         0.01
  P6-7                         2.73      2.73      3.60      0.01         0.01
  P1                           3.34      3.34      3.54      0.15         0.01
  P4-7                         3.44      3.44      3.96      0.01         0.01
  P2                           4.86      4.86      5.07      0.07         0.01
  P3                           4.00      4.00      4.87      0.01         0.01


  Analysis begun on:  Wed Sep 19 11:11:33 2018
  Analysis ended on:  Wed Sep 19 11:11:34 2018
  Total elapsed time: 00:00:01
```

Brentwood STORMTANK Module

STORMTANK® Module Volume Calculator

Inputs

Project Name:	2710 DRAPER AVENUE - UG1		
Engineer:		Date:	
Units:	SI	Shape:	Square/Rectangle
Liner:	No	Location:	N/A
Stacking:	Double	Height:	1828.8
Stone Storage:	All	Porosity:	40%

Dimensions

Module		
Length:	21.045	m
Width:	4.122	m
Excavation		
Length:	21.645	m
Width:	4.722	m
Stone		
Leveling Bed:	0.5	m
Top Backfill:	0.3	m
Compacted Fill:	0.3	m

Results

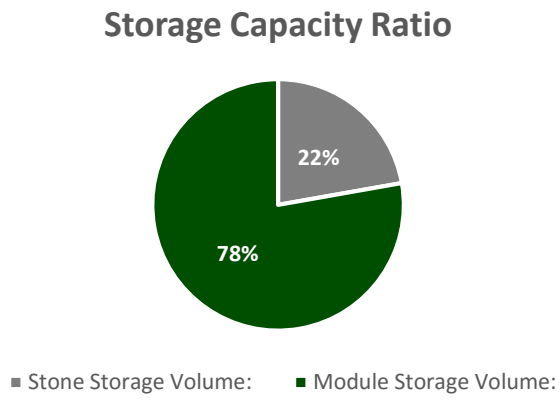
Capacity:

Stone Storage Volume:	44.02	m^3
Module Storage Volume:	154.12	m^3
Total Storage Volume:	198.13	m^3

Quantities:

Required Excavation:	299.35	m^3
Required Stone Volume:	110.04	m^3
Estimated Geotextile:	676.21	m^2
Estimated Liner:	0.00	m^2

(Estimations include 10% for scrap and overlap)

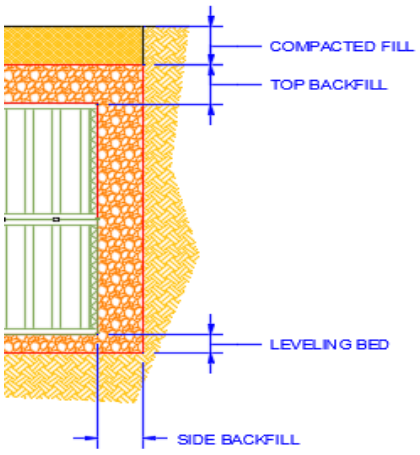


Basin Detail

Component Quantities:

	Bottom Layer	Top Layer	Total
Height	914.4	914.4	1,828.8
# of Modules	207	207	415
# of Platens	415	415	830
# of Side Panels	110	110	220
# of Columns	1,660	1,660	3,320
# of Stacking Pins	415	N/A	415

Cross-Section:



STORMTANK® Module Volume Calculator

Inputs

Project Name:	2710 DRAPER AVENUE - UG2		
Engineer:		Date:	
Units:	SI	Shape:	Square/Rectangle
Liner:	No	Location:	N/A
Stacking:	Double	Height:	1828.8
Stone Storage:	All	Porosity:	40%

Dimensions

Module		
Length:	20.13	m
Width:	4.58	m
Excavation		
Length:	20.73	m
Width:	5.18	m
Stone		
Leveling Bed:	0.5	m
Top Backfill:	0.3	m
Compacted Fill:	0.3	m

Results

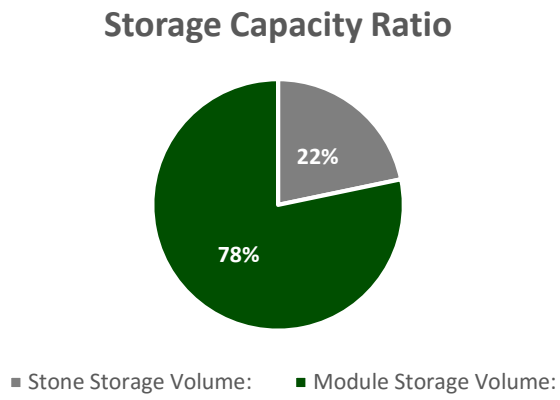
Capacity:

Stone Storage Volume:	45.47	m^3
Module Storage Volume:	163.80	m^3
Total Storage Volume:	209.27	m^3

Quantities:

Required Excavation:	314.50	m^3
Required Stone Volume:	113.68	m^3
Estimated Geotextile:	695.29	m^2
Estimated Liner:	0.00	m^2

(Estimations include 10% for scrap and overlap)

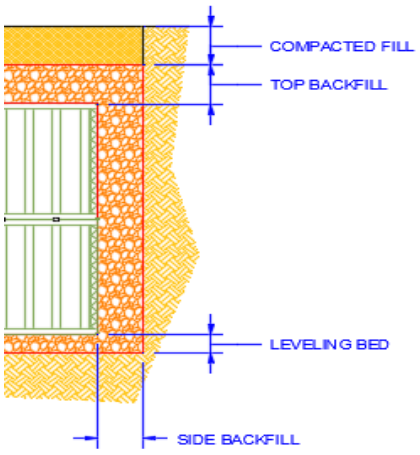


Basin Detail

Component Quantities:

	Bottom Layer	Top Layer	Total
Height	914.4	914.4	1,828.8
# of Modules	221	221	441
# of Platens	441	441	882
# of Side Panels	108	108	216
# of Columns	1,764	1,764	3,528
# of Stacking Pins	441	N/A	441

Cross-Section:



STORMTANK® Module Volume Calculator

Inputs

Project Name:	2710 DRAPER AVENUE - UG3		
Engineer:		Date:	
Units:	SI	Shape:	Square/Rectangle
Liner:	No	Location:	N/A
Stacking:	Double	Height:	1828.8
Stone Storage:	All	Porosity:	40%

Dimensions

Module		
Length:	7.32	m
Width:	2.29	m
Excavation		
Length:	7.92	m
Width:	2.89	m
Stone		
Leveling Bed:	0.5	m
Top Backfill:	0.3	m
Compacted Fill:	0.3	m

Results

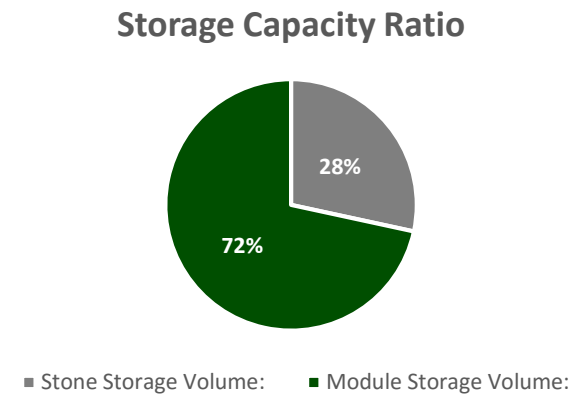
Capacity:

Stone Storage Volume:	11.81	m^3
Module Storage Volume:	29.78	m^3
Total Storage Volume:	41.59	m^3

Quantities:

Required Excavation:	67.04	m^3
Required Stone Volume:	29.51	m^3
Estimated Geotextile:	190.32	m^2
Estimated Liner:	0.00	m^2

(Estimations include 10% for scrap and overlap)

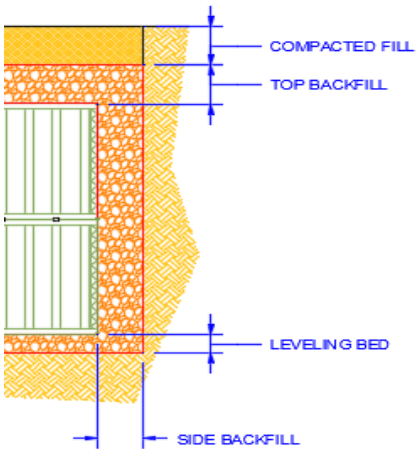


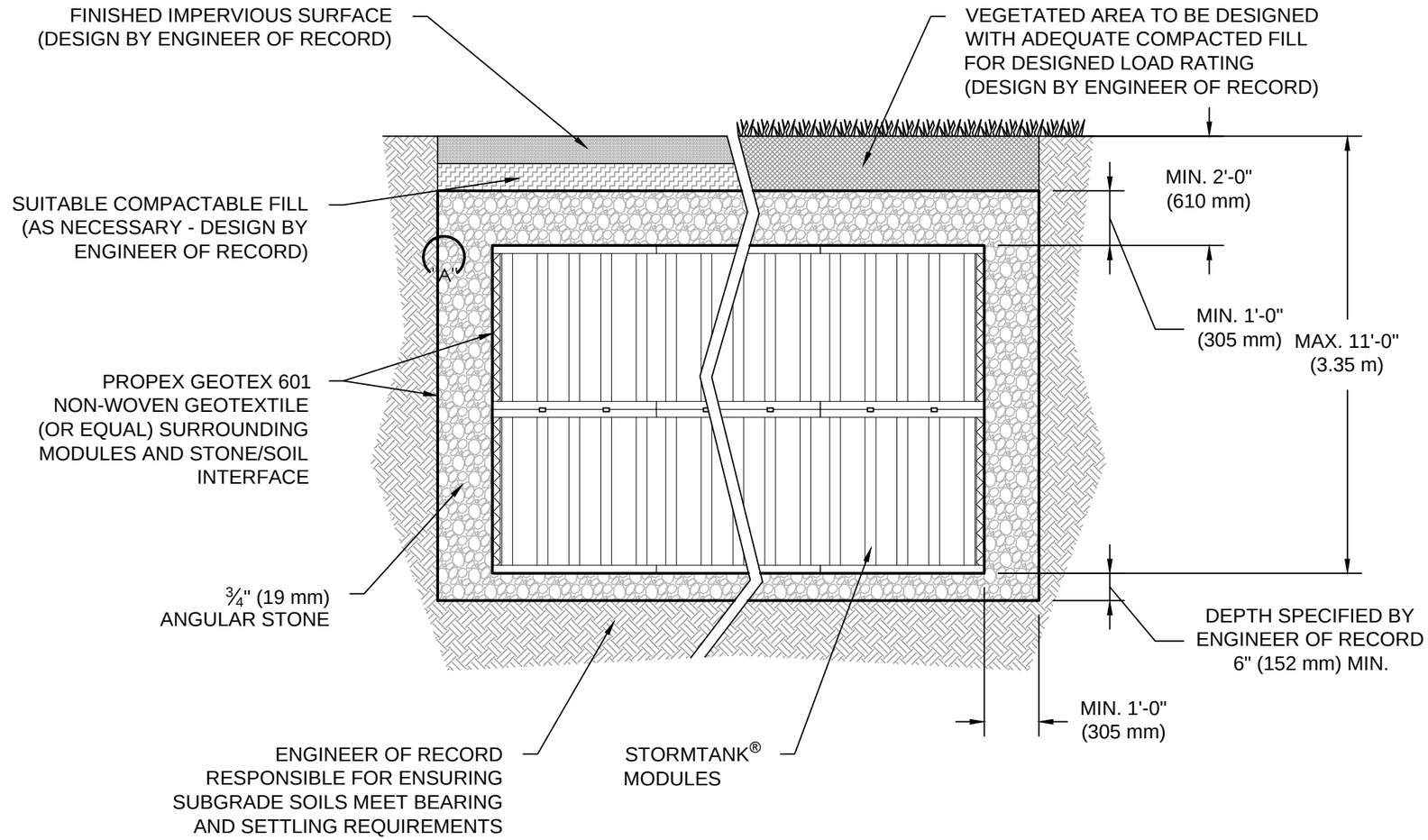
Basin Detail

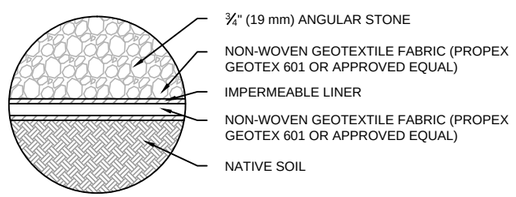
Component Quantities:

	Bottom Layer	Top Layer	Total
Height	914.4	914.4	1,828.8
# of Modules	40	40	80
# of Platens	80	80	160
# of Side Panels	42	42	84
# of Columns	321	321	641
# of Stacking Pins	80	N/A	80

Cross-Section:







DETAIL "A"

NOTES:

a. REFERENCE CURRENT INSTALLATION INSTRUCTIONS FOR PROPER INSTALLATION PRACTICES.
b. IMPERMEABLE LINER IS REQUIRED TO BE INSTALLED AROUND BOTTOM AND SIDES OF EXCAVATION ONLY

REV.	DATE	RECORD OF CHANGES	BY	APPRV.
D	11/10/14	GEOTEXTILE PRODUCT SPECIFIED	CGB	
C	9/9/13	NOTE REVISION, FORMATTING UPDATE & DWG. NO. UPDATE	JKB	JKB
B	7/6/12	FORMATTING & DWG. NO. UPDATE	JKB	FK
A	1/10/12	INITIAL RELEASE	BLL	FK

BRENTWOOD
610 Morgantown Road
Reading, PA 19611 U.S.A.
Phone: (610) 374-5109
Fax: (610) 376-6022
www.brentwoodindustries.com

Project Name
TYPICAL DOUBLE STK. DETENTION BASIN CROSS-SECTION DETAIL

Title
STORMTANK® MODULE

Drawn By		Date
B.LINE		1/10/12
Drawing No.	Sheet	Scale
STM-001-03	1 of 1	NTS

Stormceptor Oil/Grit Separator Sizing Report

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. • 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. • 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

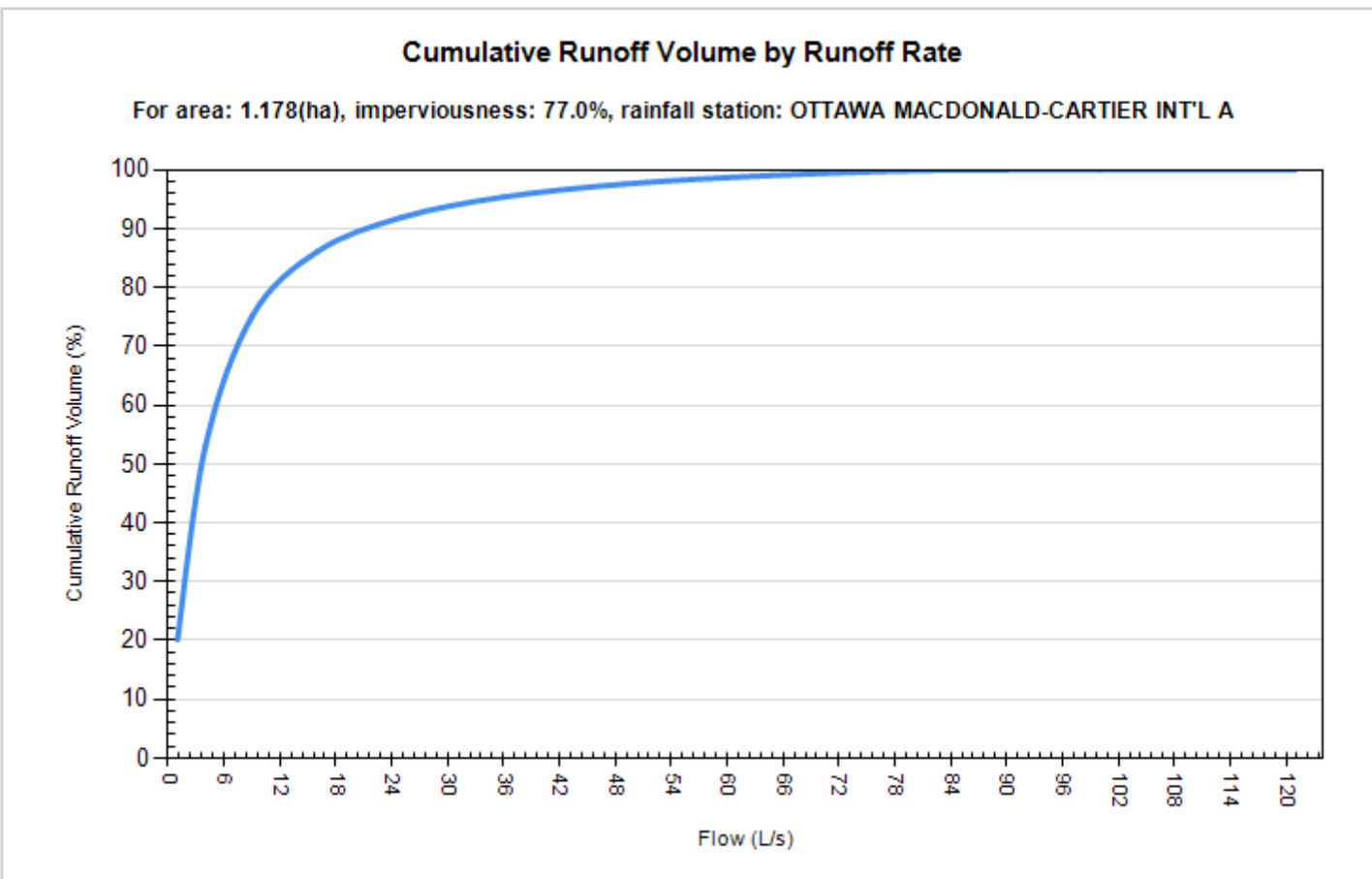
Buildup/Wash-off Parameters

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

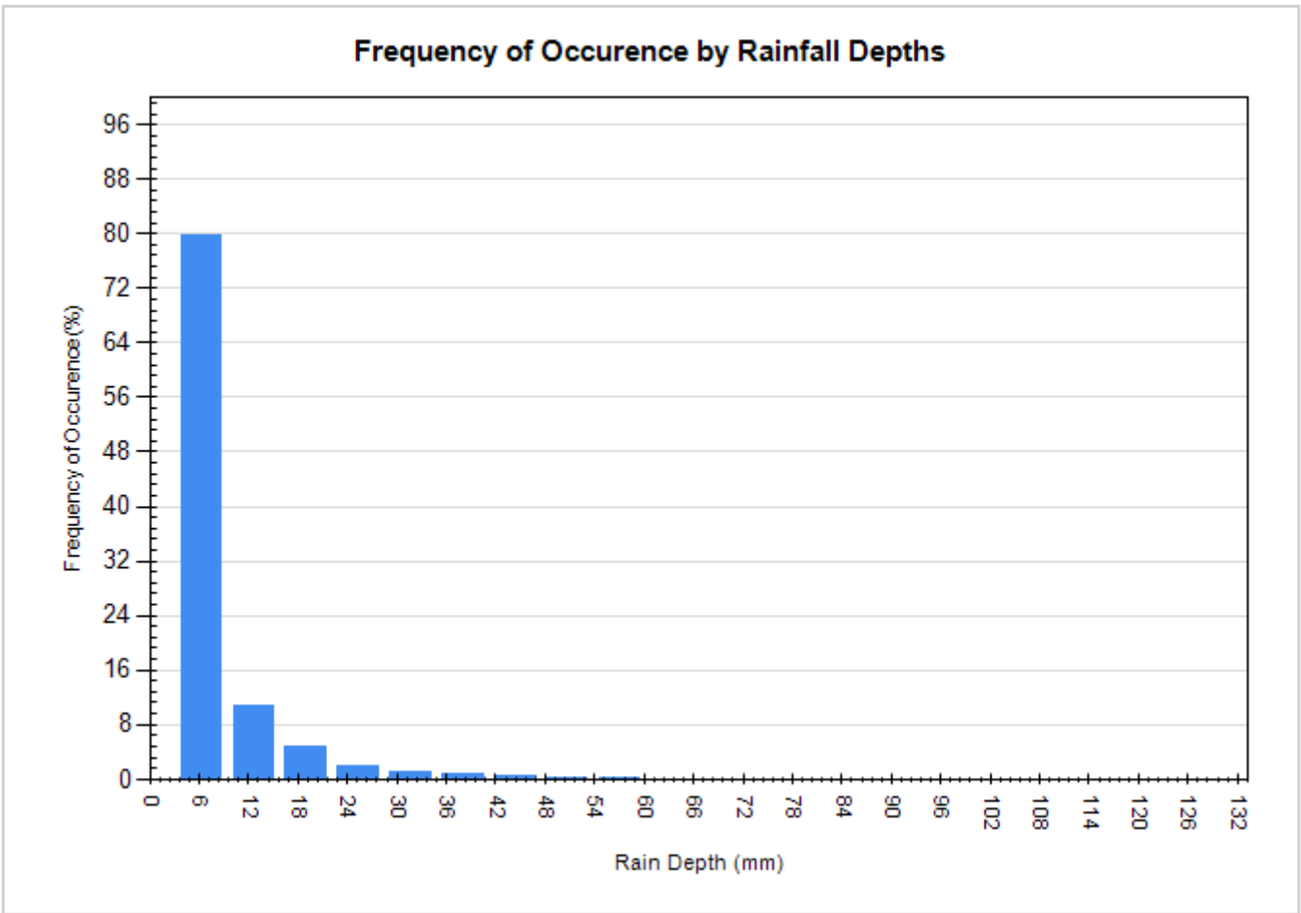
TSS Availability Parameters

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

patersongroup **memorandum**

consulting engineers

re: **Response to Engineering Comments**
Proposed Residential Development
2710 Draper Avenue - Ottawa

to: City of Ottawa - **Mr. Stream Shen** - Stream.Shen@Ottawa.ca

date: May 28, 2018

file: PGPG1630-MEMO.08

Further to your request and authorization, the current memorandum was prepared to respond to the City of Ottawa's forth round of engineering comments for the aforementioned site. This memorandum should be read in conjunction with our revised geotechnical Report PG1630-3 Revision 4 dated May 28, 2018.

Geotechnical Comments

Item 1

Comment: Section 6.8 *Underground Storage Chamber* states that based on a review of the Site Servicing Plan, Revision 2 dated November 17, 2017 the seasonally high groundwater table depth elevation is a minimum 1m below the bottom of the proposed underground storage system as per MOE requirements. Please review the most recent revision to the Site Servicing Plan prepared by DSEL (Revision 5) and confirm that the minimum separation is still being achieved and update section 6.8 accordingly. Section 6.8 shall reference the most recent drawing revision number prepared by DSEL used to determine the elevation of the base of the system. Please document how a base elevation of 71.15m was established. .

Response: Updated under Subsection 6.8 in our revised geotechnical Report PG1630-1 Revision 4, dated May 28, 2018.

Item 2

Comment: A sewer easement transferred to the owner of Building F is required to be established over the existing private 200mm dia. sanitary service and 300mm dia. storm service that crosses the subject site along Morrison Drive. Please review these private services and provide a recommended easement width.

Response: It is understood that the minimum service easement width considered adequate by the City of Ottawa is 6 m. However, a 4.5 m service easement is all that is required from a geotechnical perspective due to the method of the service installation requiring less than 4.5 m width with the use of engineered trench box. It is expected that services will be installed by "cut and cover" methods and excavations will not be left open for extended periods of time and inspected by Paterson personnel.

Item 3

Comment: Please provide an updated Grading Plan review memorandum that indicates Paterson Group has reviewed the most recent revision of the Grading Plan prepared by DSEL that verifies that there no exceedances above the recommended 1m permissible grade raise restriction and in keeping with the recommendations of the geotechnical investigation.

Response: Please refer to Appendix 3 in our revised geotechnical report for the updated grading plan review report.

We trust that this information satisfies your requirements.

Best Regards,

Paterson Group Inc.

Faisal I. Abou-Seido, P.Eng.

David J. Gilbert, P.Eng.

patersongroup **memorandum**

consulting engineers

re: **Response to Engineering Comments**
Proposed Residential Development
2710 Draper Avenue - Ottawa

to: City of Ottawa - **Ms. Amanda Marsh** - Amanda,Marsh@ottawa.ca

date: September 20, 2018

file: PG1630-MEMO.11

Further to your request and authorization, the current memorandum was prepared to respond to the engineering review comments of the City of Ottawa for the aforementioned site. This memorandum should be read in conjunction with our revised geotechnical Report PG1630-3 Revision 6 dated September 20, 2018.

Geotechnical Comments

Item 19

Comment: The geotechnical Investigation shall be updated to provide recommendations based on the latest phased proposal. The streets have been realigned to accommodate the existing underground parking garage entrance for the condo building. The block configurations has been amended.

Response: The recommendations provided in the original report still apply for the latest phased proposal based on our review of the latest drawings. It should be noted that the site plan has also been updated as per the new realigned streets and garage entrance relocation.

Item 20

Comment: Section 6.8 Underground Storage Chamber indicates that the site servicing plan prepared by DSEL Revision 5 dated May 22, 2018 was reviewed. Please review the latest site servicing plan prepared by DSEL Revision 11 dated August 8, 2018 and update the section.

Response: Updated under Subsection 6.9 in our revised Report PG1630-3 Revision 6 dated September 20, 2018.

Item 21

Comment: The site plan used as the base layer for the Test Hole Location Plan [PG1630-1] is not the current Phase 3-1 proposal.

Response: The Test Hole Location Plan was updated in our revised geotechnical Report PG1630-3 Revision 6 dated September 20, 2018.

Item 22

Comment: The global stability analysis for a future retaining wall within Phase 3-2 shall be updated as a retaining wall is no longer proposed at this location due to the realignment of the streets to accommodate the existing underground parking garage.

Response: This section has been removed from the revised geotechnical investigation report and replaced with a slope stability analysis along the east side of the parking garage entrance.

Item 23

Comment: The grading plan review memorandum included in Appendix 3 is based on the grading plan prepared by DSEL Revision 11 dated August 3, 2018. Please update as the latest grading plan prepared by DSEL is Revision 11 dated August 8, 2018. There if no revision dated August 3, 2018 as referenced in the memorandum.

Response: Updated in Report PG1630-MEMO.06 Revision 6 dated September 20, 2018 and attached in Appendix 3.

Item 24

Comment: A slope stability system report is required to be provided from the geotechnical engineer of record assessing the slopes adjacent to the underground parking garage and the slopes within the Phase 3-2. This report shall address the stability of these slopes as the overall height of the slopes exceed 2 m. .

Response: The slope stability analysis for the slope along the garage entrance is completed under Subsection 6.10 in our revised geotechnical report.

We trust that this information satisfies your requirements.

Best Regards,

Paterson Group Inc.

Faisal I. Abou-Seido, P.Eng.

patersongroup

consulting engineers

memorandum

re: **Response to Engineering Comments**
Proposed Residential Development
2710 Draper Avenue - Ottawa

to: Greatwise Developments - **Mr. Zaf Kelekvan** - zaf@greatwise.ca

date: March 21, 2019

file: PG1630-MEMO.17

Further to your request and authorization, Paterson Group (Paterson) prepared the following memorandum to respond to the current City of Ottawa engineering review comments for the aforementioned site. This memorandum should be read in conjunction with our geotechnical Report PG1630-4 Revision 1 dated February 21, 2019.

Geotechnical Comments

Item 32

Comment: *A Retaining Wall Stability Analysis Report and Retaining Wall Structural Details are required to be provided that demonstrates that the proposed retaining wall (max height 1.61 m) along the south property line has been assessed for global instability. The cross-sectional structural detail plan to be provided is to be included as part of the civil engineering drawing set as a full size drawing. No retaining wall features shall encroach onto the adjacent lands.*

Response: Refer to Drawing PG1630-4 - Stone Strong Retaining Wall Design, attached.

Item 33

Comment: *A fence is required along the top of the retaining wall. Proposed fence details shall be shown on the plan to be provided.*

Response: Proposed fence details will be shown on the retaining wall design drawing.

Item 34

Comment: *A slope stability assessment memorandum is required to be provided from the Geotechnical Engineer of record assessing the slopes adjacent to the underground parking garage. This report shall address the stability of the slope as the overall height of the slope exceeds 2m.*

Response: Please refer to Subsection 6.9 in our revised Report PG1630-4 Revision 1 dated February 21, 2019. Paterson reviewed the following drawing prepared by DSEL:

- ❑ Drawing No. GP-1 - Grading Plan - Project No. 17-927 - Revision 1 dated December 7, 2018.

It should be noted that this area was previously analyzed for slope stability; the current analysis supersedes previous slope stability analyses. Discussion regarding the proposed slope, as shown on the aforementioned grading plan has been included in Subsection 6.9 of Report PG1630-4 Revision 1 dated February 21, 2019. The proposed slope is considered stable from a geotechnical perspective.

Item 35

Comment: *There is concern regarding the proximity of the proposed slab on grade buildings to the existing underground parking for 2785 Baseline Road. Was the underground parking wall designed to take into account the additional surface load?*

Response: Based on our review of the proposed Lots with respect to the existing parking garage, no negative impacts are expected from the new construction on the garage foundation walls, from a geotechnical perspective.

We trust that this information satisfies your requirements.

Best Regards,

Paterson Group Inc.

Nathan F. S. Christie, P.Eng. Faisal I. Abou-Seido, P.Eng.

Paterson Group Inc.

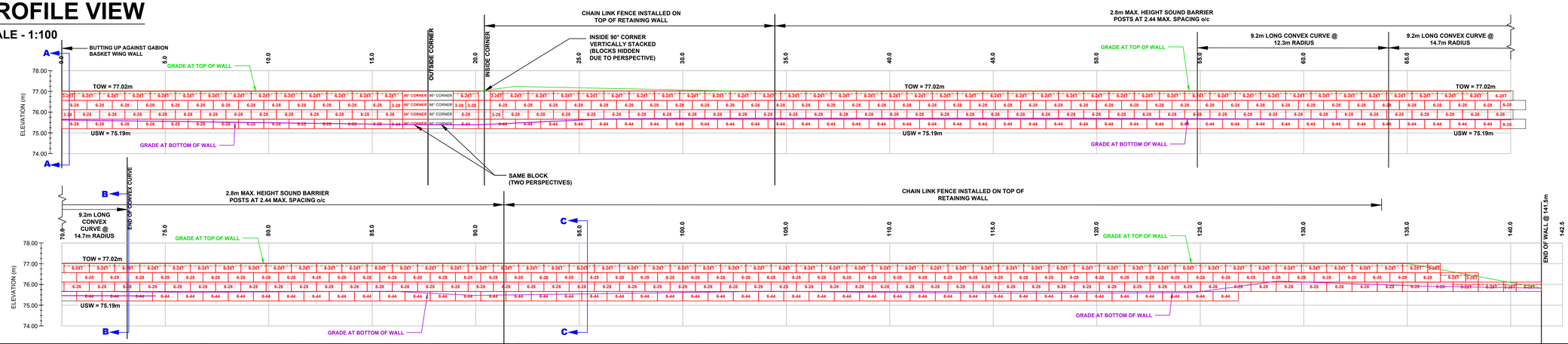
Head Office and Laboratory
154 Colonnade Road South
Ottawa - Ontario - K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

Northern Office and Laboratory
63 Gibson Street
North Bay - Ontario - P1B 8Z4
Tel: (705) 472-5331 Fax: (705) 472-2334

St. Lawrence Office
993 Princess Street
Kingston - Ontario - K7L 1H3
Tel: (613) 542-7381

PROFILE VIEW

SCALE - 1:100



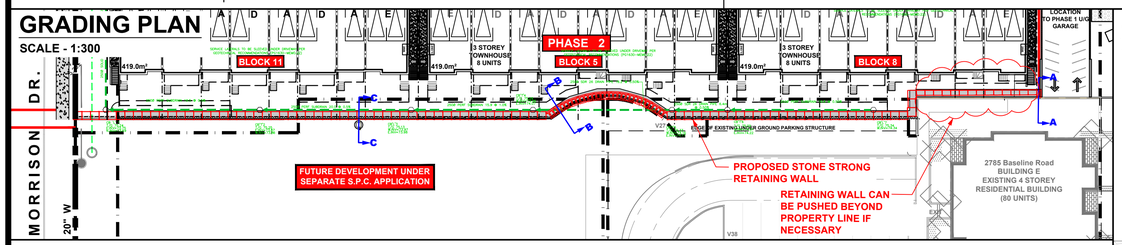
BLOCK LEGEND

SCALE - 1:50

6-44	6-44 UNIT (100 BLOCKS)
3-44	3-44 UNIT (3 BLOCKS)
6-28	6-28 UNIT (219 BLOCKS)
3-28	3-28 UNIT (5 BLOCKS)
3-28T	3-28 TOP UNIT (7 BLOCKS) (3 ARE END UNITS)
6-28T	6-28 TOP UNIT (111 BLOCKS)
E 3-28T	CORNER END UNIT (3 - 3-28 END BLOCKS)
90° CORNER	90° CORNER UNIT (8 BLOCKS)

GRADING PLAN

SCALE - 1:300



CROSS SECTION A-A

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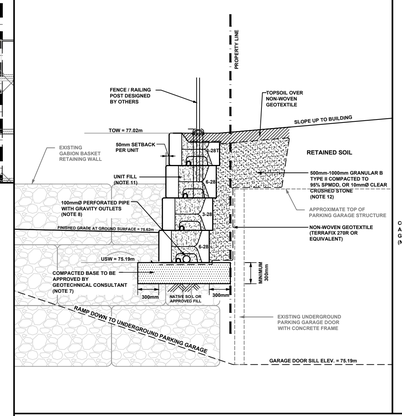
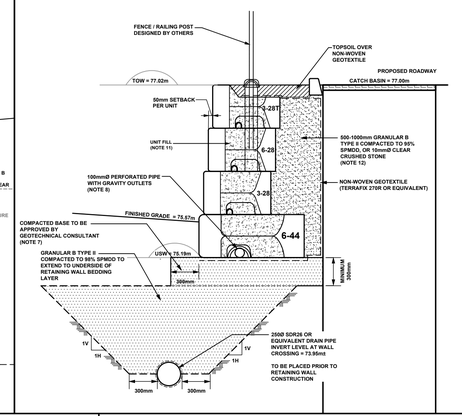
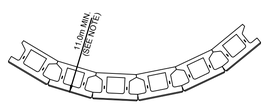


CROSS SECTION C-C

SCALE - 1:30



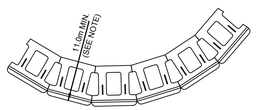
MIN. CONVEX CURVE RADIUS



NOTE: MINIMUM RADIUS OCCURS AT TOP COURSE. REQUIRED RADIUS INCREASES 51mm PER COURSE BELOW, AS SHOWN ON TABLE.

6-44 UNITS

Minimum Convex Radius		
Wall Height (m)	Total # of Courses	Reqd. Radius at Top Course
0.91	2	4.89m
1.37	3	4.95m
1.83	4	5.00m
2.29	5	5.05m
2.74	6	5.10m
3.20	7	5.15m
3.66	8	5.20m

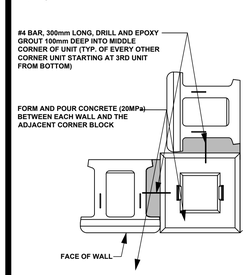


6-28 UNITS

Minimum Convex Radius		
Wall Height (m)	Total # of Courses	Reqd. Radius at First Course
0.91	2	4.93m
1.37	3	4.98m
1.83	4	5.03m
2.29	5	5.08m
2.74	6	5.13m
3.20	7	5.18m
3.66	8	5.23m

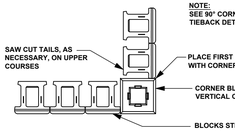
CORNER DETAILS

N.T.S

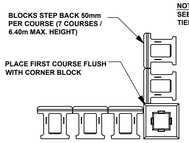


90° CORNER TIEBACK

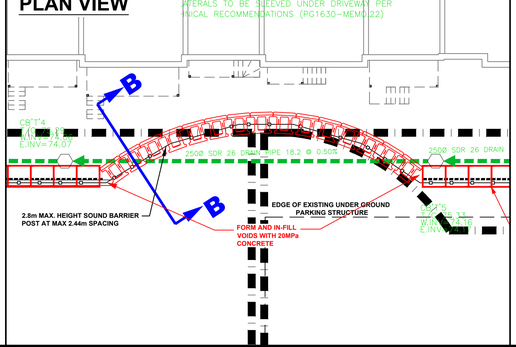
90° OUTSIDE CORNER



90° INSIDE CORNER

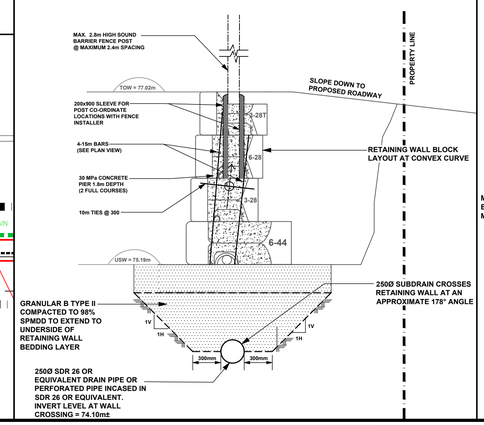


CONVEX CURVE PLAN VIEW



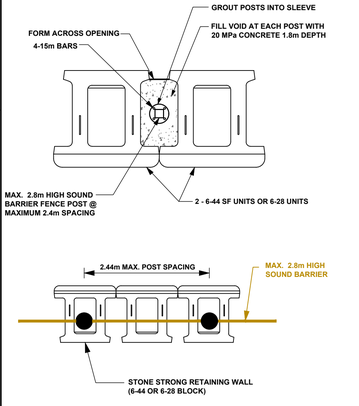
CROSS SECTION B-B

SCALE - 1:30



SOUND BARRIER DETAILS

N.T.S



NOTES:

1. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR UTILITY CLEARANCE AND CONSTRUCTION SITE SAFETY. MCON PRODUCTS INC. AND PATERSON GROUP SHALL NOT BE RESPONSIBLE FOR MEANS OR METHODS OF CONSTRUCTION OR FOR SAFETY OF WORKERS OR OF THE PUBLIC.
2. THIS DESIGN IS BASED ON THE FOLLOWING SOIL PROPERTIES:

PROPERTY	RETAINED FILL	FOUNDATION MEDIUM
FRICTION ANGLE - PHI	33	33
UNIT WEIGHT -	21 KN/m3	21 KN/m3
COHESION - C	0	0
SOIL TYPE	GRANULAR B TYPE II & NATIVE FILL	GLACIAL TILL

MATERIAL PROPERTIES ARE BASED ON SITE EVALUATION BY THE PATERSON GROUP, SEISMIC LOADING WAS EVALUATED ACCORDING TO THE ONTARIO BUILDING CODE 2012 WITH A PEAK GROUND ACCELERATION VALUE OF 0.32. NO SURCHARGE LOAD IS APPLICABLE FOR THIS WALL.

3. THE WALL BASE DESIGN ASSUMES A BEARING RESISTANCE AT SLS OF 150 kPa. THE SITE GEOTECHNICAL ENGINEER SHOULD OBSERVE THE BEARING CONDITIONS AND ADJUST THE THICKNESS OF THE GRANULAR BASE OR RECOMMEND CONCRETE BEDDING TO ACCOMMODATE THE SITE CONDITIONS, IF NECESSARY.
4. THE DESIGN IS FOR STABILITY OF THE PRECAST MODULAR RETAINING WALL SYSTEM ONLY. SITE STABILITY (GLOBAL STABILITY), IS THE RESPONSIBILITY OF THE SITE GEOTECHNICAL ENGINEER. WALL GEOMETRY AND GRADE ELEVATIONS ABOVE AND BELOW THE WALL SHOULD CONFORM WITH THE GRADING PLAN PROVIDED HERE IN IF ACTUAL SITE GRADES VARY SIGNIFICANTLY FROM THOSE SHOWN OR IF THE BACK SLOPE DOES NOT CONFORM, INSTALLATION SHALL NOT PROCEED UNTIL THE ALL DESIGN IS VERIFIED OR MODIFIED IN THE APPLICABLE AREA.
5. HORIZONTAL LAYOUT DIMENSIONS ARE MEASURED ALONG THE FACE OF THE WALL, CORRESPONDING TO A HORIZONTAL REFERENCE ESTABLISHED BY PATERSON GROUP BASED ON DRAWINGS BY DAVID SHAFFER ENGINEERING LIMITED - PROJECT NO. 17-027 - GRADING PLAN - FRESH TOWNS 2710 DRAPER AVENUE PHASE 2-3, DECEMBER 2018
6. PRECAST UNITS SHALL BE STONE STRONG RETAINING WALL UNITS MANUFACTURED UNDER LICENSE FROM STONE STRONG SYSTEMS. UNITS SHALL HAVE A MOLDED GRANITE FACE. THE BLOCKS MAY BE STAINED IN PLACE TO ACHIEVE THE DESIRED COLOR.
7. THE WALL BASE SHALL CONSIST OF A MINIMUM OF 300mm OF OPSS GRANULAR A OR GRANULAR B TYPE II. THE BASE SHALL BE COMPACTED AS TO PROVIDE A LEVEL AND HARD SURFACE ON WHICH TO PLACE THE FIRST COURSE OF UNITS. GRANULAR BASE MATERIAL SHALL BE COMPACTED TO A MINIMUM 98% OF STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD). THE BASE SHALL BE SMOOTHED TO ENSURE COMPLETE CONTACT OF RETAINING WALL UNIT WITH BASE. SURFACE OF GRANULAR BASE MAY BE DRESSED WITH FINER AGGREGATE TO AID LEVELING. ENSURE GRADATION OF DRESSING MATERIAL IS SUCH AS TO PRECLUDE LOSS OF FINES INTO BASE. THE THICKNESS OF DRESSING LAYER SHOULD NOT EXCEED 3 TIMES THE MAXIMUM PARTICLE SIZE USED. THE CONTRACTOR MAY SUBSTITUTE CONCRETE WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 20 MPa AND AIR ENTRAINMENT FOR THE GRANULAR BASE MATERIAL. FOR WALL SS2A, THE WALL BASE SHALL CONSIST THE 200mm CONCRETE CAP ABOVE THE PROPOSED HELICAL PILES.
8. INSTALL 100 MM DIAMETER PERFORATED PIPE DRAIN UNDER LOWER COURSE OF WALL (OR ALTERNATIVELY BEHIND HEEL OF WALL). PROVIDE CLEAR STONE SURROUNDING THE DRAIN PIPE TO PROTECT PIPE FROM CLOGGING AND DAMAGE. PROVIDE OUTLETS THROUGH WALL BASE LAYER AT LOW AREAS, NO FURTHER APART THAN 15m CENTRES.
9. WALL IS DESIGNED FOR A MINIMUM OF 300 mm TOE EMBEDMENT WITH A MINIMUM HORIZONTAL LEDGE OF 300mm BEYOND THE FACE AND REAR OF BASE BLOCK. WHERE GRANULAR BEDDING WILL NOT BE SUFFICIENT, THE USE OF CONCRETE BEDDING MAY BE REQUIRED. EXTRA PRECAUTIONS MUST BE TAKEN TO PROVIDE TOE EMBEDMENT IN AREAS WHERE BASE OF WALL STEPS.
10. THE RETAINING WALLS ARE BATTERED WALLS. ALIGNMENT OF THE BOTTOM WALL UNIT COURSE SHOULD BE PLANNED TO CONSIDER THAT A NOMINAL 100 mm AUTOMATIC SETBACK WILL OCCUR WITH EACH 0.91 m HIGH UNIT, AS SUCH, THE LOWEST WALL BASE WITHIN A CONTINUOUS SECTION SHOULD BE WITHIN WALL CORRIDOR, INCLUDING REQUIREMENT FOR BASE EXTENT IN FRONT OF WALL. SIMILARLY, THE FACE OF THE HIGHEST WALL (TW LEVEL) WITHIN THE SECTION SHOULD ALSO BE AT LEAST WITHIN 0.5 m WITHIN THE WALL CORRIDOR (OR AS REQUIRED BY OWNER).
11. UNIT FILL SHALL BE A CLEAN, COURSE GRANULAR MATERIAL. UNIT FILL SHALL BE 19mmØ CLEAR STONE MEETING THE SATISFACTION OF THE GEOTECHNICAL ENGINEER. UNIT FILL SHALL FILL CAVITIES WITHIN AND BETWEEN THE UNITS AND MAY EXTEND BEHIND THE FACING UNITS FOR THE CONTRACTOR'S CONVENIENCE.
12. BACKFILL MATERIAL SHALL BE APPROVED BY THE SITE GEOTECHNICAL ENGINEER PRIOR TO USE AND SHOULD CONSIST OF OPSS GRANULAR B TYPE II BUFFER OF 500mm TO 1000mm(AS SHOWN) WIDTH. ALL FILL WITHIN A 1H:1V ZONE UP AND BACK FROM THE HEEL SHOULD ALSO BE COMPACTED. BACKFILL SHALL BE PLACED IN MAXIMUM 300 mm LOOSE LIFTS AND COMPACTED TO A MINIMUM OF 95% OF THE MATERIAL'S SPMDD. MOISTURE CONTENT SHOULD BE CONTROLLED AND MAINTAINED WITHIN -3 TO +4 PERCENT OF OPTIMUM.
13. ENSURE EACH COURSE IS COMPLETELY FILLED AND BACKFILL IS PLACED TO THE SAME LEVEL PRIOR TO PROCEEDING TO THE NEXT COURSE. ENSURE ADJACENT UNITS ARE IN CONTACT SO THAT UNIT FILL MAY NOT ESCAPE THROUGH THE JOINT BETWEEN UNITS. GAPS GREATER THAN 6 mm BETWEEN UNITS (AT THE FACE) SHALL NOT BE ALLOWED. AT THE INTERSECTIONS WITH STRUCTURES, CUT UNITS TO OBTAIN A NEAT FIT. PULL BLOCK UNITS FORWARD TO ENGAGE THE ALIGNMENT LOOPS ON THE UNIT BELOW BEFORE INFILLING IN ALL CASES.
14. MAINTAIN TEMPORARY GRADES TO DIVERT SURFACE WATER AWAY FROM THE RETAINING WALL EXCAVATION. SLOPE FINAL BACKFILL TO PROVIDE POSITIVE DRAINAGE AND TO ELIMINATE PONDING. WHERE APPLICABLE, THE UPPER COURSE FOR THE RETAINING WALL CONSISTS OF DUAL FACE (DF) BLOCKS WHICH ALLOW FOR THE GRADE BEHIND THE TOP OF THE WALL TO VARY, WHILE PRESENTING A FINISHED REAR WALL FACE.
15. IF WINTER CONSTRUCTION IS CONSIDERED, HEAT MUST BE MAINTAINED WHEN THE BASE IS EXPOSED. THE WALL BASE MUST BE COVERED WITH INSULATION TARPS TO MAINTAIN HEAT AND PROTECT THE BASE FROM POTENTIAL FROST HEAVE. ONCE THE BASE IS BACKFILLED, THE TOP OF WALL MUST BE COVERED WITH INSULATION TARPS OVERNIGHT UNTIL THE WALL CONSTRUCTION IS COMPLETED.
16. THE GEOTECHNICAL CONSULTANT SHOULD BE NOTIFIED IN THE BEGINNING OF THE WALL CONSTRUCTIONS TO COMPLETE PERIODIC INSPECTIONS AND PROVIDE GEOTECHNICAL RECOMMENDATIONS AS THE WALL CONSTRUCTION PROGRESSES.
17. DURING THE CONSTRUCTION OF THE RETAINING WALL, THE CONTRACTOR MUST ENSURE THAT A SAFE SLOPE IS PROVIDED BEHIND THE RETAINING WALL. PATERSON GROUP SHOULD COMPLETE PERIODIC INSPECTIONS TO ENSURE A PROPER SLOPE IS PROVIDED AS PER THE SITE GEOTECHNICAL RECOMMENDATIONS.
18. ANY INADEQUATE PERFORMING SUBGRADE SHOULD BE SUB-EXCAVATED AND REPLACED WITH OPSS GRANULAR B TYPE II, COMPACTED TO 98% OF THE MATERIALS SPMDD.
19. ANY RYCB AND PREFORATED PIPE PROPOSED ALONG THE WALL ARE TO BE INSTALLED SIMULTANEOUSLY OR PRIOR TO PLACEMENT OF BASE BLOCKS TO AVOID UNDERMINING THE WALL.
20. ANY CUTTING OF BLOCKS TO SUIT SITE CONDITIONS OR WALL DESIGN WILL BE THE RESPONSIBILITY OF THE CONTRACTOR. REMOVAL/CUTTING OF LIFTING LOOPS ON THE FINAL ROW OF BLOCKS WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.
21. WHEN THE PROPOSED RETAINING WALL BUTTS UP AGAINST THE EXISTING GABION BASKET WALL ALONG THE GARAGE ENTRANCE, CONSIDERATIONS SHOULD BE GIVEN TO CAUTIOUSLY PERFORM COMPACTION WITHIN 300mm OF THE EXISTING WALL TO AVOID PUSHING THE EXISTING BLOCKS FORWARD
22. REAR YARD SUBDRAIN AND CATCH BASINS TO BE INSTALLED PRIOR OR AT THE SAME TIME AS THE RETAINING WALL

paterson group
consulting engineers
154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
4	REVISED AS PER NEW BASE PLAN	12/08/2019	FA
3	REVISED CROSS SECTION A-A	26/07/2019	FA
2	REVISED AS PER NEW WALL LAYOUT	22/07/2019	FA
1	ISSUED FOR CONSTRUCTION	11/06/2019	FA

GREATWISE DEVELOPMENTS

PROPOSED RETAINING WALL
PROPOSED RESIDENTIAL DEVELOPMENT - PHASE 3-2- 2795 BASELINE ROAD
OTTAWA, ONTARIO

Title:

STONE STRONG RETAINING WALL DESIGN

Stamp: LICENSED PROFESSIONAL ENGINEER 12/08/2019 F. I. ABOU-SEIDO 100156744 PROVINCE OF ONTARIO

Scale:	AS SHOWN
Drawn by:	RCG
Checked by:	FA
Approved by:	FA
Date:	03/2019
Report No.:	PG1630
Drawing No.:	PG1630-4
Revision No.:	4

D07-12-18-0184

PLAN NO. : #17529

patersongroup **memorandum**

consulting engineers

to:	Lloyd Phillips & Associates Ltd. - **Jessica D'Aoust** - jessica@lloydphillips.com
re:	Geotechnical Design Summary Details **Proposed Residential Development** **2710 Draper Avenue - Phase 3-2 - Ottawa**
date:	February 27, 2019
file:	PG1630-MEMO.18
from:	Faisal Abou-Seido

Further to your request and authorization, Paterson Group (Paterson) prepared the current memorandum to provide a grading plan review for the proposed commercial buildings at the aforementioned development. The following memorandum should be read in conjunction with Paterson Report PG1630-4 Revision 1 dated February 21, 2019.

Grading Plan Review

Paterson reviewed the following grading plan prepared by David Schaeffer Engineering Ltd. for the aforementioned development:

- ❏ Grading Plan Fresh Towns - 2710 Draper Avenue Phase 3-2 - Project No. 17-927 - Sheet 2 of 6 - Drawing No. GP-1 - Revision 1 dated December 7, 2018.

Based on our review of the above noted grading plan, no exceedances were noted above the permissible grade raise. The proposed grades are considered acceptable from a geotechnical perspective. Therefore, no lightweight fill is required at the subject site. Refer to the attached Table 1 - Summary of Lot Grading for further details.

Outdoor Structures

The following is recommended for setbacks regarding outdoor structures:

Swimming Pools

The in-situ soils are considered to be acceptable for swimming pools. Above ground swimming pools must be placed a minimum of 5 m away from the residence and neighbouring foundations. Otherwise, pool construction is considered routine, and should be constructed in accordance with the manufacturer`s requirements.

Aboveground Hot Tubs

Additional grading around the hot tub should not exceed permissible grade raises. Otherwise, hot tub construction is considered routine, and can be constructed in accordance with the manufacturer's specifications.

Installation of Decks or Additions

Additional grading around proposed deck or addition should not exceed permissible grade raises. Otherwise, standard construction practices are considered acceptable.

Tree Planting Restrictions

The proposed development is located in an area of low to medium sensitive silty clay deposits for tree planting. Based on our knowledge of the general site area, the plasticity index is expected to be lower than 40%. It should be further be noted that stiff to hard silty clay crust extending to 5 to 7 m below existing grade was present where silty clay was encountered. As such, the brown silty clay crust extends 2-3 m below design footing level should be considered low to medium sensitivity clay and should not be considered a sensitive marine clay.

Based on the above discussion, it is recommended that trees placed within 5 m of the foundation wall consist of street trees with shallow roots systems that extend less than 1.5 m below ground surface. Trees placed greater than 5 m from the foundation wall may consist of moderate water demanding trees with roots extending to a maximum 2 m depth. It should be noted that shrubs and other small plantings are permitted within the 5 m setback area.

It is well documented in the literature, and is our experience, that fast-growing trees located near buildings founded on cohesive soils that shrink on drying can result in long-term differential settlements of the structures. Tree varieties that have the most pronounced effect on foundations are seen to consist of poplars, willows and some maples (i.e. Manitoba Maples) and, as such, they should not be considered in the landscaping design.

It is well documented in the literature, and is our experience, that fast-growing trees located near buildings founded on cohesive soils could result in long-term differential settlements of the structures. Tree varieties with most pronounced effect on foundations are seen to consist of poplars, willows and some maples (i.e. Manitoba Maples) and are not recommended for the landscape design.

We trust that this information satisfies your immediate requirements.

Paterson Group Inc.

Nathan F. S. Christie, P.Eng.

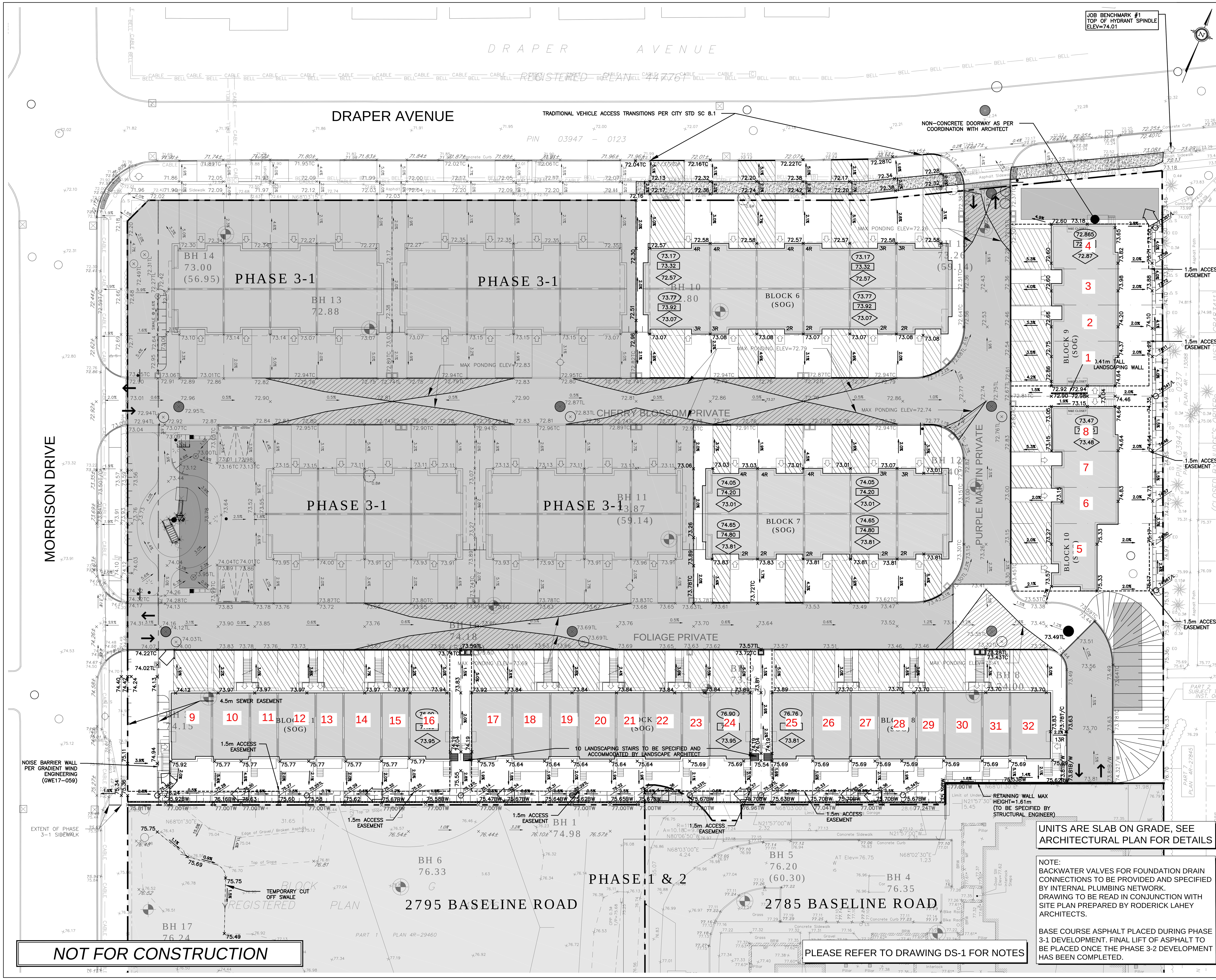
Faisal I. Abou-Seido, P.Eng.

Table 1 - Summary of Lot Grading - Fresh Towns Phase 3-2 - 2710 Draper Avenue

Block Number	Civic Address	TH/SOG End Units	Bearing Resistance Value at SLS	Original Front Grade	Proposed GS Front	Original Side Grade	Proposed GS Side	Original Back Grade	Proposed GS Back	USF	Finished Floor Elevation	Permissible Grade Raise Elevation Front	Permissible Grade Raise Elevation Side	Permissible Grade Raise Elevation Back	Above Permissible Grade Raise Front	Above Permissible Grade Raise Side	Above Permissible Grade Raise Back	Seismic Site Class	Miniumum Thickness LWF at Front of Lot	Miniumum Thickness LWF at Side of Lot
		(m)	(kPa)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)			
Block 5	17*	End	150	74.92	73.92	75.10	74.20	75.31	75.75	73.95	77.43	75.92	76.10	76.31	n/a	n/a	n/a	Class D	n/a	n/a
	18*	-	150	74.92	73.84	n/a	n/a	75.31	75.64	73.95	77.43	75.92	n/a	76.31	n/a	n/a	n/a	Class D	n/a	n/a
	19*	-	150	74.07	73.84	n/a	n/a	75.38	75.64	73.95	77.43	75.07	n/a	76.38	n/a	n/a	n/a	Class D	n/a	n/a
	20*	-	150	74.07	73.84	n/a	n/a	75.38	75.64	73.95	77.43	75.07	n/a	76.38	n/a	n/a	n/a	Class D	n/a	n/a
	21*	-	150	75.08	73.84	n/a	n/a	75.53	75.64	73.95	77.43	76.08	n/a	76.53	n/a	n/a	n/a	Class D	n/a	n/a
	22*	-	150	75.10	73.84	n/a	n/a	75.86	75.64	73.95	77.43	76.10	n/a	76.86	n/a	n/a	n/a	Class D	n/a	n/a
	23*	-	150	74.52	73.84	n/a	n/a	75.86	75.69	73.95	77.43	75.52	n/a	76.86	n/a	n/a	n/a	Class D	n/a	n/a
	24*	End	150	74.42	73.89	74.38	74.05	76.85	75.69	73.95	77.43	75.42	75.38	77.85	n/a	n/a	n/a	Class D	n/a	n/a
Block 6	2712 Draper Avenue	End	150	73.67	72.57	73.18	72.30	n/a	n/a	72.57	73.32	74.67	74.18	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	67 Cherry Blossom Private	End	150	73.83	73.07	73.25	72.96	n/a	n/a	73.07	73.92	74.83	74.25	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	2710 Draper Avenue	-	150	73.80	72.58	n/a	n/a	n/a	n/a	72.57	73.32	74.80	n/a	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	69 Cherry Blossom Private	-	150	73.83	73.08	n/a	n/a	n/a	n/a	73.07	73.92	74.83	n/a	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	2708 Draper Avenue	-	150	73.80	72.58	n/a	n/a	n/a	n/a	72.57	73.32	74.80	n/a	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	71 Cherry Blossom Private	-	150	73.90	73.08	n/a	n/a	n/a	n/a	73.07	73.92	74.90	n/a	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	2706 Draper Avenue	-	150	73.93	72.57	n/a	n/a	n/a	n/a	72.57	73.32	74.93	n/a	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	73 Cherry Blossom Private	-	150	73.92	73.07	n/a	n/a	n/a	n/a	73.07	73.92	74.92	n/a	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	2704 Draper Avenue	-	150	73.77	72.57	n/a	n/a	n/a	n/a	72.57	73.32	74.77	n/a	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	75 Cherry Blossom Private	-	150	73.92	73.07	n/a	n/a	n/a	n/a	73.07	73.92	74.92	n/a	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	2702 Draper Avenue	End	150	73.76	72.58	73.90	72.51	n/a	n/a	72.57	73.32	74.76	74.90	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	77 Cherry Blossom Private	End	150	73.90	73.08	73.84	72.64	n/a	n/a	73.07	73.92	74.90	74.84	n/a	n/a	n/a	n/a	Class D	n/a	n/a
Block 7	74 Cherry Blossom Private	End	150	73.70	73.03	74.29	73.06	n/a	n/a	73.01	74.20	74.70	75.29	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	325 Foliage Private	End	150	74.47	73.83	74.43	73.89	n/a	n/a	73.81	74.80	75.47	75.43	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	76 Cherry Blossom Private	-	150	73.74	73.01	n/a	n/a	n/a	n/a	73.01	74.20	74.74	n/a	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	327 Foliage Private	-	150	74.47	73.83	n/a	n/a	n/a	n/a	73.81	74.80	75.47	n/a	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	78 Cherry Blossom Private	-	150	73.74	73.01	n/a	n/a	n/a	n/a	73.01	74.20	74.74	n/a	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	329 Foliage Private	-	150	74.49	73.81	n/a	n/a	n/a	n/a	73.81	74.80	75.49	n/a	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	80 Cherry Blossom Private	-	150	73.80	73.07	n/a	n/a	n/a	n/a	73.01	74.20	74.80	n/a	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	331 Foliage Private	-	150	74.50	73.81	n/a	n/a	n/a	n/a	73.81	74.80	75.50	n/a	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	82 Cherry Blossom Private	End	150	73.80	73.01	73.89	73.15	n/a	n/a	73.01	74.20	74.80	74.89	n/a	n/a	n/a	n/a	Class D	n/a	n/a
	333 Foliage Private	End	150	74.47	73.81	74.47	73.30	n/a	n/a	73.81	74.80	75.47	75.47	n/a	n/a	n/a	n/a	Class D	n/a	n/a
Block 8	25*	End	150	74.44	73.89	74.38	74.19	75.86	75.59	73.81	76.91	75.44	75.38	76.86	n/a	n/a	n/a	Class D	n/a	n/a
	26*	-	150	74.46	73.70	n/a	n/a	75.86	75.69	73.81	76.91	75.46	n/a	76.86	n/a	n/a	n/a	Class D	n/a	n/a
	27*	-	150	74.46	73.70	n/a	n/a	75.86	75.69	73.81	76.91	75.46	n/a	76.86	n/a	n/a	n/a	Class D	n/a	n/a
	28*	-	150	74.42	73.70	n/a	n/a	75.86	75.69	73.81	76.91	75.42	n/a	76.86	n/a	n/a	n/a	Class D	n/a	n/a
	29*	-	150	74.41	73.70	n/a	n/a	75.86	75.69	73.81	76.91	75.41	n/a	76.86	n/a	n/a	n/a	Class D	n/a	n/a
	30*	-	150	74.41	73.70	n/a	n/a	75.86	75.69	73.81	76.91	75.41	n/a	76.86	n/a	n/a	n/a	Class D	n/a	n/a
	31*	-	150	74.48	73.70	n/a	n/a	75.86	75.69	73.81	76.91	75.48	n/a	76.86	n/a	n/a	n/a	Class D	n/a	n/a
	32*	End	150	94.95	73.70	76.37	73.83	75.86	75.69	73.81	76.91	95.95	77.37	76.86	n/a	n/a	n/a	Class D	n/a	n/a
Block 9	1*	End	150	73.84	72.60	73.91	72.94	74.10	74.37	72.87	72.87	74.84	74.91	75.10	n/a	n/a	n/a	Class D	n/a	n/a
	2*	-	150	73.63	72.60	n/a	n/a	73.80	74.20	72.87	72.87	74.63	n/a	74.80	n/a	n/a	n/a	Class D	n/a	n/a
	3*	-	150	73.43	72.60	n/a	n/a	73.61	73.98	72.87	72.87	74.43	n/a	74.61	n/a	n/a	n/a	Class D	n/a	n/a
	4*	End	150	73.23	72.60	73.11	73.18	73.37	73.82	72.87	72.87	74.23	74.11	74.37	n/a	n/a	n/a	Class D	n/a	n/a
Block 10	5*	End	150	74.56	73.27	75.04	73.60	74.94	75.33	73.48	73.48	75.56	76.04	75.94	n/a	n/a	n/a	Class D	n/a	n/a
	6*	-	150	74.30	73.15	n/a	n/a	74.65	75.33	73.48	73.48	75.30	n/a	75.65	n/a	n/a	n/a	Class D	n/a	n/a
	7*	-	150	74.17	73.15	n/a	n/a	74.47	74.83	73.48	43.48	75.17	n/a	75.47	n/a	n/a	n/a	Class D	n/a	n/a
	8*	End	150	74.00	73.05	74.11	73.15	74.27	74.64	73.48	43.48	75.00	75.11	75.27	n/a	n/a	n/a	Class D	n/a	n/a
Block 11	9*	End	150	74.71	74.12	74.98	74.94	75.08	75.92	73.95	77.05	75.71	75.98	76.08	n/a	n/a	n/a	Class D	n/a	n/a
	10*	-	150	74.88	73.97	n/a	n/a	75.08	75.77	73.95	77.05	75.88	n/a	76.08	n/a	n/a	n/a	Class D	n/a	n/a
	11*	-	150	74.88	73.97	n/a	n/a	75.08	75.77	73.95	77.05	75.88	n/a	76.08	n/a	n/a	n/a	Class D	n/a	n/a
	12*	-	150	74.80	73.97	n/a	n/a	75.06	75.77	73.95	77.05	75.80	n/a	76.06	n/a	n/a	n/a	Class D	n/a	n/a
	13*	-	150	74.80	73.97	n/a	n/a	75.08	75.77	73.95	77.05	75.80	n/a	76.08	n/a	n/a	n/a	Class D	n/a	n/a
	14*	-	150	74.82	73.97	n/a	n/a	75.10	75.77	73.95	77.05	75.82	n/a	76.10	n/a	n/a	n/a	Class D	n/a	n/a
	15*	-	150	74.85	73.97	n/a	n/a	75.11	75.77	73.95	77.05	75.85	n/a	76.11	n/a	n/a	n/a	Class D	n/a	n/a
	16*	End	150	74.97	73.94	74.96	74.19	75.11	75.77	73.95	77.05	75.97	75.96	76.11	n/a	n/a	n/a	Class D	n/a	n/a

The grading calculations were based on Grading Plan Fresh Towns - 2710 Draper Avenue Phase 3-2 - Project No. 17-927 - Sheet 2 of 6 - Drawing No. GP-1 - Revision 1 dated December 7, 2018.

***Address unavailable at the time of writing, refer to attached plan for assigned lot number**

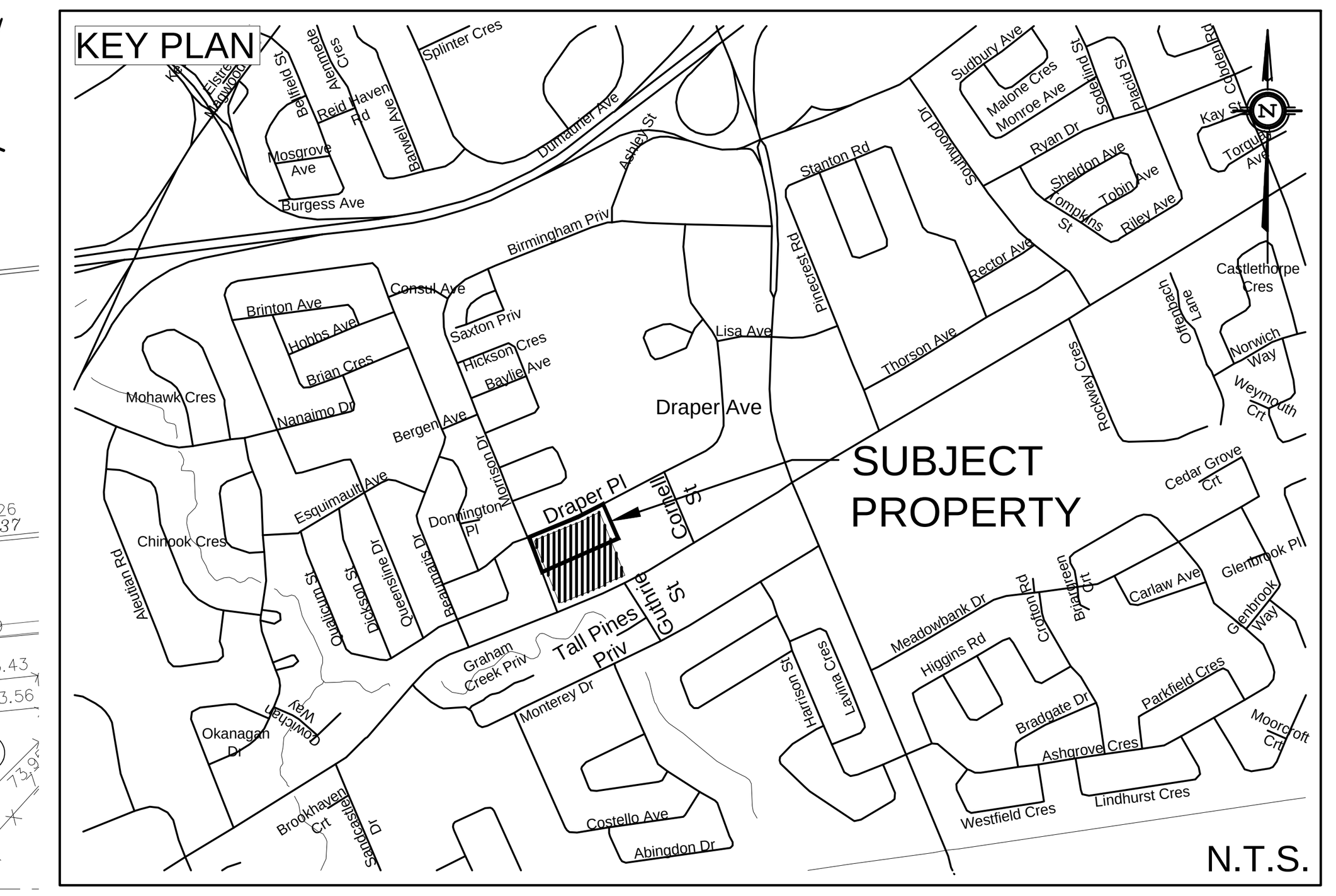


UNITS ARE SLAB ON GRADE, SEE ARCHITECTURAL PLAN FOR DETAILS

NOTE:
BACKWATER VALVES FOR FOUNDATION DRAIN CONNECTIONS TO BE PROVIDED AND SPECIFIED BY INTERNAL PLUMBING NETWORK.
DRAWING TO BE READ IN CONJUNCTION WITH SITE PLAN PREPARED BY RODERICK LAHEY ARCHITECTS.

BASE COURSE ASPHALT PLACED DURING PHASE 3-1 DEVELOPMENT. FINAL LIFT OF ASPHALT TO BE PLACED ONCE THE PHASE 3-2 DEVELOPMENT HAS BEEN COMPLETED.

KEY PLAN



LEGEND

Symbol	Description
	PROPERTY LINE
	PROPOSED SWALE
100.00	EXISTING SPOT ELEVATION
100.00	PROPOSED SPOT ELEVATION
100.00TC	PROPOSED TOP OF CURB ELEVATION
100.00BW	PROPOSED BOTTOM OF WALL ELEVATION
100.00TW	PROPOSED TOP OF WALL ELEVATION
100.00TL	PROPOSED TOP OF LID ELEVATION
1.0%	EXISTING GRADE AND DIRECTION
1.0%	PROPOSED GRADE AND DIRECTION
3:1 SLOPE	PROPOSED 3:1 TERRACING
100.00 / 100.00	PROPOSED/EXISTING SPOT ELEVATION
2R	RISERS
	NOISE BARRIER WALL PER TRAFFIC NOISE ASSESSMENT REPORT, PREPARED BY GRADIENT WIND ENGINEERING, GWE17-059
(SOG)	SLAB ON GRADE
	WALL
	PROPOSED LIGHT DUTY ASPHALT
	PROPOSED CONCRETE SIDEWALK
	MAXIMUM PONDING LEVEL
	PROPOSED STORM MANHOLE
	PROPOSED SANITARY MANHOLE
	PROPOSED CATCH BASIN
	PROPOSED CB 'T' OR CB 'L'
	PROPOSED FIRE HYDRANT
	EMERGENCY FLOW ROUTE
	DEPRESSED CURB
100.00	FINISHED FLOOR ELEVATION
100.00	TOP OF FOUNDATION
100.00	SLAB ELEVATION
100.00	2785 BASELINE SPOT ELEVATION
100.00	EXISTING PH3-1 SPOT ELEVATION

TOPOGRAPHIC INFORMATION
TOPOGRAPHIC INFORMATION PROVIDED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
PROJ. NO. 19336-17
DATED MAY 16, 2017

SITE PLAN INFORMATION
SITE PLAN PROVIDED BY RODERICK LAHEY ARCHITECTS
PROJ. NO. 1020
ISSUED NOVEMBER 30, 2018

GEOTECHNICAL STUDY
GEOTECHNICAL RECOMMENDATIONS PROVIDED BY PATERSON GROUP INC.
PROJ. NO. PG1630-3
DATED SEPTEMBER 20, 2018 REVISION 6

SITE SERVICING AND STORMWATER MANAGEMENT STUDY
SERVICING AND STORMWATER MANAGEMENT RECOMMENDATIONS PROVIDED BY DSEL
PROJ. NO. 17-927
DATED DECEMBER 2018

BENCH MARK
TOP OF FIRE SPINDLE LOCATED NORTH EAST OF THE SUBJECT SITE
ELEV=74.01m

No.	BY	YY.MM.DD	DESCRIPTION
1	A.J.G.	18.12.07	ISSUED FOR MUNICIPAL REVIEW

PROJECT No. 17-927

LICENSED PROFESSIONAL ENGINEER R. D. FREEL 100163197 2018-12-07 17-927 PROVINCE OF ONTARIO

REVIEWED BY

GRADING PLAN

FRESH TOWNS - 2710 DRAPER AVENUE PHASE 3-2 © DSEL

GREATWISE DEVELOPMENTS
333 Wilson Avenue, Suite 200
Toronto, Ontario, M3H 1T2

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

DRAWN BY:	R.D.F.	CHECKED BY:	R.D.F.	DRAWING NO.	SHEET NO.
DESIGNED BY:	R.D.F.	CHECKED BY:	R.D.F.	GP-1	2 of 6
SCALE:	1:250	DATE:	DECEMBER 2018		

D07-12-17-0076

PLAN NO.:#17529

patersongroup

consulting engineers

memorandum

re: **Response to City Comments**
Proposed Residential Development
2710 Draper Avenue - Ottawa

to: Greatwise Developments - **Mr. Zaf Kelekvan** - zaf@greatwise.ca

date: June 3, 2019

file: PG1630-MEMO.22

Further to your request and authorization, Paterson Group (Paterson) prepared the following memorandum to respond to the current City of Ottawa engineering review comments for the aforementioned site. This memorandum should be read in conjunction with our geotechnical Report PG1630-4 Revision 1 dated February 21, 2019.

Geotechnical Comments

Item 1 - Site Servicing Plan

Comment: *Service laterals installed below driveways are not ideal however it appears to be unavoidable for this case. Please include a detail of the services laterals sleeved below the driveway on the plan. All agreements of purchase and sale or lease agreements shall contain a clause that informs the purchaser/lessee that the service laterals for the unit are located below the driveway.*

Response: All residential service laterals to be connected to the main service lines along Cherry Blossom Private, Purple Martin Private and Foliage Private are recommended to be placed through PVC sleeves where the service laterals will be placed below a driveway. Placement of the service lateral pipes through PVC sleeves should be prior to construction of the driveways. All backfill material to be used below the footprint of each driveway should consist of engineered fill such as OPSS Granular A or Granular B Type II or an approved alternative. The PVC sleeves should be slightly larger than the corresponding service pipe and be placed along the entire length of the driveway. The pipe should consist of DR25 PVC pipe or an approved equivalent. The backfill material should be placed in maximum 300 mm thick loose lifts and compacted to 98% of the material's SPMDD, and approved by Paterson at the time of construction.

Item 2 - Footing Adjacent to Underground Storage Tank

Comment: *The footing at the north end of the Block 9 townhouses adjacent to the underground storage systems is required to be lowered to the same depth of the underside of the underground storage tank as per the recommendations of the geotechnical engineer dated March 22, 2019.*

Response: It is recommended that the footing at the north end of Block 9 be constructed over a lean concrete in-filled trench. The depth of the trench should match the elevation of the underside of the underground storage tank and extend the full length of the north side footing. The trench should extend a minimum of 300 mm from the edge of the footing on both sides to ensure proper support is provided to the footing. Also, the trench should extend a minimum of 2 m beyond the north edge of the proposed building footings and be tapered to a minimum 3H:1V back to ground surface. The trench should be inspected by Paterson at the time of excavation and prior to placement of concrete to confirm the bearing surface. It is recommended that minimum 17 MPa (28-day strength) lean concrete be used to fill the trench. Conventional footing construction may be completed over the lean concrete after curing. The above recommended program is considered sufficient from a geotechnical perspective to protect the footing from potential undermining due to future maintenance on the storage tank.

We trust that this information satisfies your requirements.

Best Regards,

Paterson Group Inc.

Nathan F. S. Christie, P.Eng.

Faisal I. Abou-Seido, P.Eng.

Paterson Group Inc.

Head Office and Laboratory
154 Colonnade Road South
Ottawa - Ontario - K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

Northern Office and Laboratory
63 Gibson Street
North Bay - Ontario - P1B 8Z4
Tel: (705) 472-5331 Fax: (705) 472-2334

St. Lawrence Office
993 Princess Street
Kingston - Ontario - K7L 1H3
Tel: (613) 542-7381

patersongroup **memorandum**

consulting engineers

re: **Response to City Comments**
Proposed Residential Development
2710 Draper Avenue - Ottawa

to: Greatwise Developments - **Mr. Zaf Kelekvan** - zaf@greatwise.ca

date: July 22, 2019

file: PG1630-MEMO.25

Further to your request and authorization, Paterson Group (Paterson) prepared the following memorandum to respond to the current City of Ottawa engineering review comments for the aforementioned site. This memorandum should be read in conjunction with our geotechnical Report PG1630-4 Revision 1 dated February 21, 2019 and the stone strong retaining wall revised design PG1630-4 Revision 2 dated July 18, 2019.

Geotechnical Comments

Stone Strong Retaining Wall Design, Proposed Retaining Wall

Comment 12: *As per an email from Jessica D'Aoust (Lloyd Phillips & Associated Ltd.) Dated June 21, 2019 the intention is for the proposed stone strong retaining wall to follow the property line and go around the future "turning circle" at the rear of Block 5. The current proposal does not have the retaining wall following the property line as it is going through the "turning circle". Please discuss with Lloyd Phillips & Associated Ltd. And update the stone strong retaining wall design accordingly.*

Response: Stone Strong Retaining wall design was updated to follow property line and future turning circle.

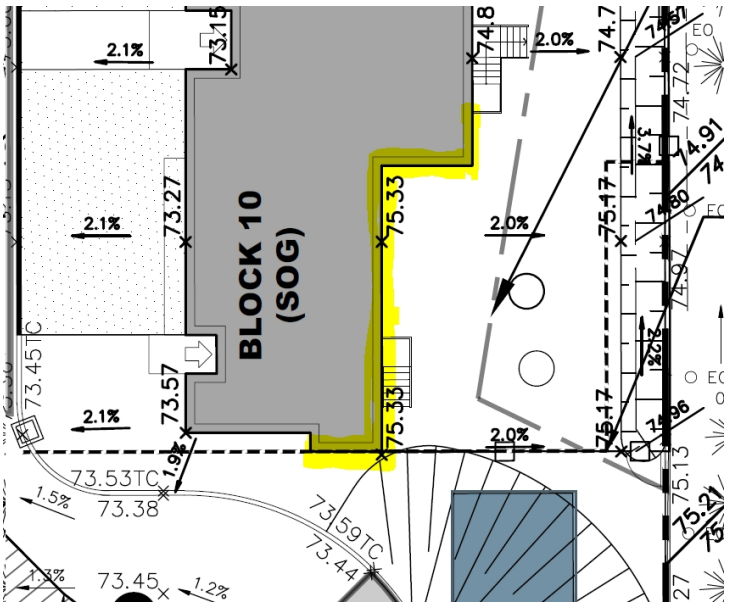
Comment 14: *Please document on the plans the noise wall proposed along the top of the wall as per the Gradient Wind Traffic Noise Assessment.*

Response: The position of the proposed sound barrier was incorporated into the retaining wall design and comments have been noted for design and construction purposes. The extent of the noise barrier wall is also shown on the plan view in the referenced wall design drawing.

Site Servicing Plan

Comment 18: *In accordance with the SPA for Phase 3-1, the Owner is required to coordinate with the adjacent property owner of 2702 Draper Ave. for the realignment of the existing private storm and sanitary services that currently occupy Phase 3-2 Block 10 or shall grant an unencumbered easement for the protection of these services. It is acknowledged that an approximate 4.5 metre easement is now shown on the plan to the granted. Please provide confirmation that any further excavation of these private services will not undermine or impact the adjacent Blocks. A condition within the subject approval will be included to confirm this requirement.*

Response: Upon review of drawing of the following drawings by DSEL: Existing Condition Plan 2781 Baseline Rd, Drawing No. EX-1, Revision 7 dated April 5, 2016 and Grading Plan Fresh Towns - 2710 Draper Avenue Phase 3-2, Drawing No. GP-1, Revision 4 dated July 22, 2019, the existing underside of manholes STMMH-3 and SANMH-161 was estimated to be 70.68 m and 70.41 m respectively. Based on our review, the footings along the southeast corner of Block 10 as shown below should be constructed over a zero entry lean concrete (15MPa) in-filled trench extending to a depth of 72.75 m or lowered to the same elevation to avoid undermining the subject footings during excavation for services.



Comment 23: *Please provide thermal insulation along the side of the existing catch basin within Draper Avenue as protection for the proposed services for Block 6.*

Response: A minimum 50 mm thick layer of SM rigid insulation should be placed between the catch basin and the proposed service laterals. The insulation should extend vertically to cover the entirety of the catch basin structure an horizontally 1 m beyond the catch basin structure edges.

Comment 25: *The rear-yard drainage proposal does not respect the current property line as minor and major system flows are proposed to be conveyed across the condominium lands. As per an email from Jessica D'Aoust (Lloyd Phillips & Associated Ltd.) Dated June 21, 2019 the intention is for the proposed stone strong retaining wall to follow the property line at the rear of Block 5 in order to allow for a future "turning circle" in order to maintain the original approved design for the condominium lands. If this is the intention the rear yard drainage system will be compromised and therefore will have to be designed and will be subject to additional reviews. If the intention is to proceed with the traffic circle to maintain the original approved design for the condominium lands which will require additional modification to Phase 3-2 lands it shall be communicated to DSEL to ensure the rear yard drainage system is design accordingly otherwise it will be difficult to accommodate such changes at a later date.* The perforated pipe will not be permitted to be installed below the retaining wall.

Response: From a geotechnical perspective it is acceptable for the proposed drainage to pass under the proposed stone strong retaining wall provided that SDR Grade 26 or equivalent is used where the drainage is crossing under the wall and the future turning circle. Alternatively, the perforated sub-drain pipe can be encased in a SDR Grade 26 or equivalent pipe where crossing under the wall and the future turning circle. Please refer to our revised retaining wall design drawing PG1630-4 Revision 2 dated July 18, 2019. The installation of the sub-drain pipe can rear yard catch basin will have to be completed prior or at the time of wall construction to avoid undermining the precast block units.

We trust that this information satisfies your requirements.

Best Regards,

Paterson Group Inc.

Joey R. Villeneuve, M.A.Sc, EIT

Faisal I. Abou-Seido, P.Eng.

patersongroup **memorandum**

consulting engineers

re: **Geotechnical Recommendations - Service Pipe Crossing**
Proposed Residential Development
2710 Draper Avenue - Ottawa

to: Greatwise Developments - **Mr. Zaf Kelekvan** - zaf@greatwise.ca

date: August 12, 2019

file: PG1630-MEMO.26

Further to your request and authorization, Paterson Group (Paterson) prepared the following memorandum to provide geotechnical recommendation for drainage service pipes proposed to cross under the proposed retaining wall for the aforementioned site. This memorandum should be read in conjunction with our geotechnical Report PG1630-4 Revision 1 dated February 21, 2019 and the stone strong retaining wall revised design PG1630-4 Revision 4 dated August 12, 2019.

Stone Strong Retaining Wall Design, Proposed Retaining Wall

Paterson reviewed the following grading plan prepared by David Schaeffer Engineering Ltd. for the aforementioned development:

- ❏ Grading Plan Fresh Towns - 2710 Draper Avenue Phase 3-2 - Project No. 17-927 - Sheet 2 of 8 - Drawing No. GP-1 - Revision 5 dated July 25, 2019.

Based on our review of the above noted plans and discussions with the design team, it is understood that a service pipe is proposed to extend below the proposed retaining walls and future turning circle. To ensure a long service life for the subject service pipes and to avoid undermining the retaining walls during excavation for any required maintenance, the pipe is recommended to be encased with a slightly larger steel or higher grade PVC casing at each retaining wall crossing. This methodology is considered acceptable from a geotechnical perspective provided the following is implemented:

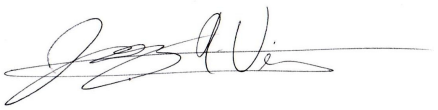
- ❏ All backfill material to be used between each retaining wall and the service running below, should consist of engineered fill such as OPSS Granular A or Granular B Type II or an approved alternative. The granular Material should be completed to a minimum 98% of the material's SPMDD.
- ❏ The steel encasement should be slightly larger than the corresponding service line and should extend a minimum of 1 m beyond the lateral support zone of the retaining wall (1.5H:1V). Based on the proposed grading plan the steel sleeve should **extend 2.2 m** from the face and back of the walls base block. It should be noted that the lateral support zone of the wall will is measured from the toe of the bedding layer.

- ❑ It is recommended that the steel casing be plugged with lean concrete on both ends. The extent of the concrete should be a minimum of 600 mm beyond the edge of the steel pipe. This will protect the encased pipe during backfilling operations.
- ❑ All field work regarding encasing the subject pipes should be inspected and approved by Paterson at the time of construction.

We trust that this information satisfies your requirements.

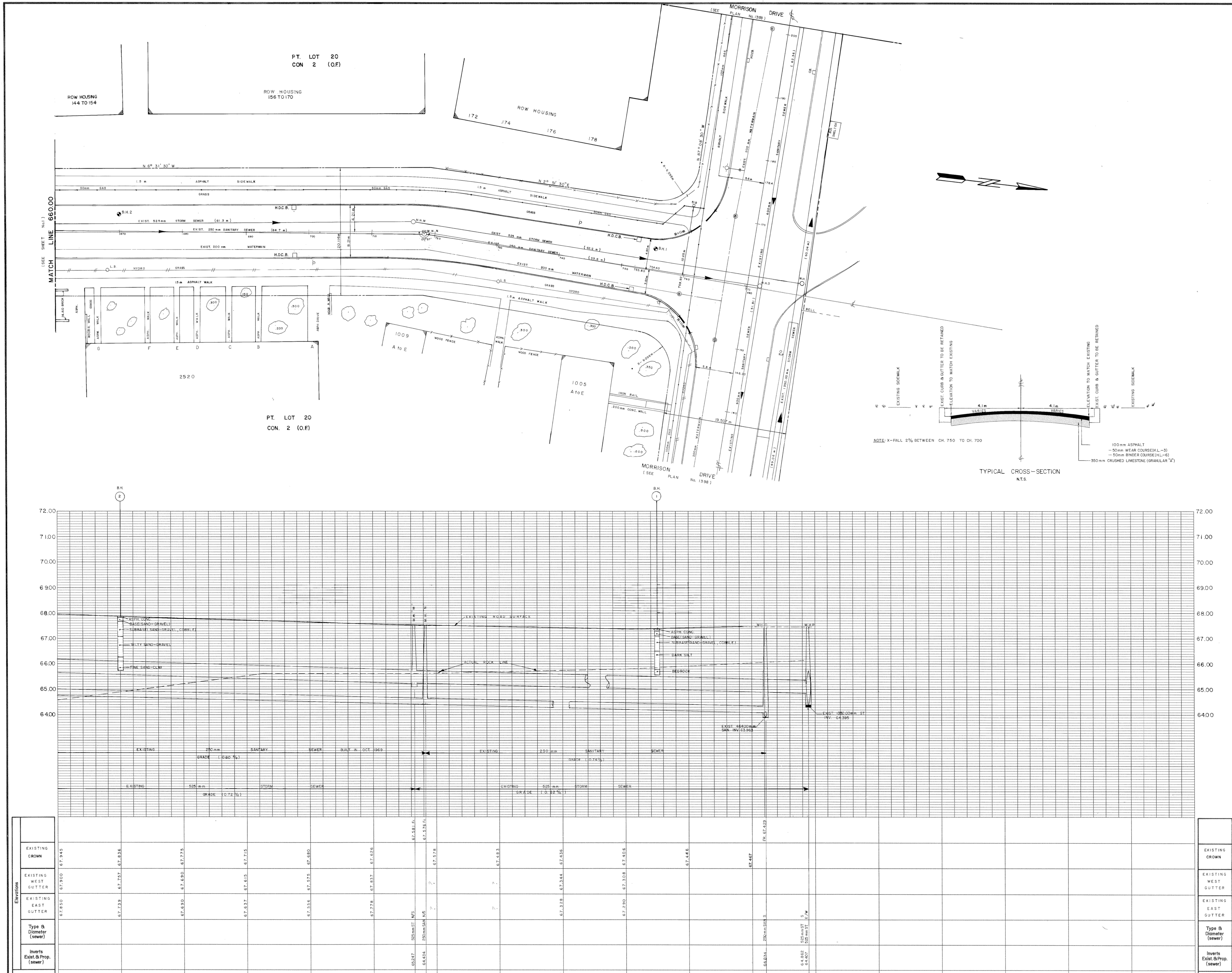
Best Regards,

Paterson Group Inc.



Joey R. Villeneuve, M.A.Sc, P.Eng

Faisal I. Abou-Seido, P.Eng.



City Of Ottawa

Department Of Physical Environment

Engineering And Surveys Branch

Notes:

- Utilities shown are taken from best available records. Contractor is requested to check with all utility companies before digging.
- Soil information shown is not guaranteed and contractors are advised to collect additional soils information as deemed necessary.
- Reference bench mark:

Notes: (Sewer Construction Only)

- A minimum of 460 mm vertical clearance to be maintained between sewers and watermains where practical.
- Borehole soil descriptions are not based on sieve analysis but on visual inspection only, except where otherwise noted.
- Soil information taken from:
- Date of television inspection:
- This plan supercedes (in whole or in part) plan no:
- Actual rock line recorded during construction of existing sewer.
- Registered plan no.:
- See additional notes on sheet #1.
- Proposed storm and sanitary sewers may be constructed in a common trench provided that a minimum horizontal distance of 460mm is maintained between outside barrels of pipe.

Legend: EXISTING / PROPOSED

- STORM SEWER
- SANITARY SEWER
- STREET LINE
- LOT LINE
- ROADS & DRIVEWAYS: Curb; Asphalt or Concrete; Surface Treated
- WALKS: Concrete or Asphalt; Gravel, Cinder or Dirt
- DEPRESSED ACCESS: On Curb; On Sidewalk
- WATERMAIN
- GASMAIN & VALVE
- BELL
- HYDRO
- TRAFFIC
- FIRE ALARM
- CABLEVISION
- STEAM LINE
- HYDRANT
- WATER VALVE
- STAND PIPE
- WATER VALVE CHAMBER
- SEWER, TRAFFIC, HYDRO & BELL MANHOLES (may be labelled for clarification)
- TRAFFIC HANDHOLE
- GUARD RAIL
- RETAINING WALL
- FENCE
- HYDRO POLE
- HYDRO POLE & LIGHT
- BELL POLE
- TRAFFIC LIGHT
- LIGHT STANDARD
- TRAFFIC SIGN
- STREET SIGN
- CULVERT & DITCH
- STANDARD CATCH BASIN & LEAD
- HEAVY DUTY CATCH BASIN & LEAD
- CATCH BASIN TO BE REMOVED & REPLACED WITH STANDARD C.B.
- HEAVY DUTY CATCH BASIN TO BE REMOVED & REPLACED WITH HEAVY DUTY CATCH BASIN
- HOUSE or CATCH BASIN CONNECTION TAKEN FROM TV. INSPECTION
- HOUSE or CATCH BASIN CONNECTION TAKEN FROM RECORDS
- RELOCATION
- REMOVAL
- SQUARE IRON BAR
- STANDARD IRON BAR
- ROUND IRON BAR
- TREE, SHRUB & HEDGE
- BOREHOLE
- ROCK

- IN PLAN SEWERS 600mm & ABOVE ARE SHOWN AS DOUBLE LINE, TO SCALE, USING SAME LINE WEIGHT.
- UTILITIES X-OUT ARE ABANDONED, BELL PLANT SO MARKED MAY BECOME ACTIVE

Revisions:

No	Date	Description	Drawn By	Appr'd By
	MAY 1986	50mm GAS ADDED W/S DRAPER AS REQST. 314 R	D. GOW	
	MAY 1986	100mm GAS ADDED S/S MORRISON DR.	D. GOW	

REGISTERED PROFESSIONAL ENGINEER I. BHATIA PROVINCE OF ONTARIO

June 27/85

Designed By	Date 85-6-26	Structural Check By I. Bhatia	Date June 27, 85
Survey Detail By H. SIMS	Date NOV. 84	Checked By	Date /85
Drafting By L.VIAU, G. POY, C. DULUDE	Date MAY 85	Checked By	Date July/85

Final Measurements :

Construction Type	Inspector
Work Commenced	Instrumentman
Work Completed	Field Book #
Designer	Date
Drafting Revisions	Checked By

Design And Construction Division

C. Sim P. Eng. — Commissioner

D.K. Donaldson P.Eng. — Branch Director

Chief Design & Constr. Eng. | Senior Design & Constr. Eng. | Senior Const. Coord.

EXISTING ROAD RECONSTRUTION

DRAPER AVENUE

FROM CH. 660.00 TO MORRISON DRIVE

MORRISON DRIVE
NOTES
BENCH MARK
INFORMATION TAKEN FROM PRELIM PLAN 9587
STORM M.H'S WITH 1-2 SUMP
12" EXTRA STRENGTH (2250) VITRIFIED CLAY PIPE PLAIN END WITH FLEXIBLE RUBBER COUPLINGS MAY BE USED IN PLACE OF 12" A.C. PIPE, FROM CH. 19+14 TO CH. 21+12
10" EXTRA STRENGTH (2000) VITRIFIED CLAY PIPE PLAIN END WITH FLEXIBLE RUBBER COUPLINGS MAY BE USED IN PLACE OF 10" A.C. PIPE FROM CH 19+14 TO 11+34
BASE LINE ROAD
BLOCK E
BLOCK G
BLOCK J
BLOCK B
AVENUE
DRAPER
MORRISON COURT
STONE CRESC.
HICKSON CRESC.
BERGEN AVE.
BAYLIE AVE.
TILLBURY
WEST HILLCREST
UTILITY POLE LINE
REVISIONS
12" STD. STR. STORM SEWER
21" CL. II R.C. STORM SEWER
24" CL. IV R.C. STORM SEWER
30" CL. IV R.C. STORM SEWER
36" R.C. STORM SEWER CL. IV
8" STD. STR. SANITARY SEWER WITH APP. RUBBER GASKETS
10" ASB. CEMENT CL. 2400 SAN. SEWER WITH APP. RUBBER GASKETS
ROAD GRADE
SURFACE
INVERT
ELEVATIONS
STATION
DESIGN BY DATE
CITY OF OTTAWA
PLANNING AND WORKS DEPARTMENT
SEWERAGE AND DRAINAGE BRANCH
MORRISON DRIVE
BASE LINE RD. TO CH. 20+43.6
DRAWN BY K.C.S.
SCALES HOR. 1"=40' VER. 1"=6'
DATE JAN. 30/62
SURVEY BOOK 3092
PLAN NO. J-32
F.E. AYERS P.Eng.
DIR. OF PLANNING AND WORKS
648+649

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

BASE LINE ROAD

BLOCK E

BLOCK G

BLOCK G

MORRISON COURT & W.M. ABANDONED - HYD. RELOCATED OCT. '64

DRAPER AVENUE

STONE CRESCENT

STONE CRESCENT

HICKSON CRESCENT

BERGEN AVE.

BAYLIE AVE.

HICKSON CRESCENT

BLOCK J

BLOCK B

SURFACE AT TRENCH

TOP OF 8" W.M.

15" STORM SEWER

PROPOSED ROAD GRADE

SURFACE AT TRENCH

PROPOSED ROAD GRADE

15" STORM SEWER

TOP OF 8" W.M.

SURFACE AT TRENCH

PROPOSED ROAD GRADE

15" STORM SEWER

TOP OF 8" W.M.

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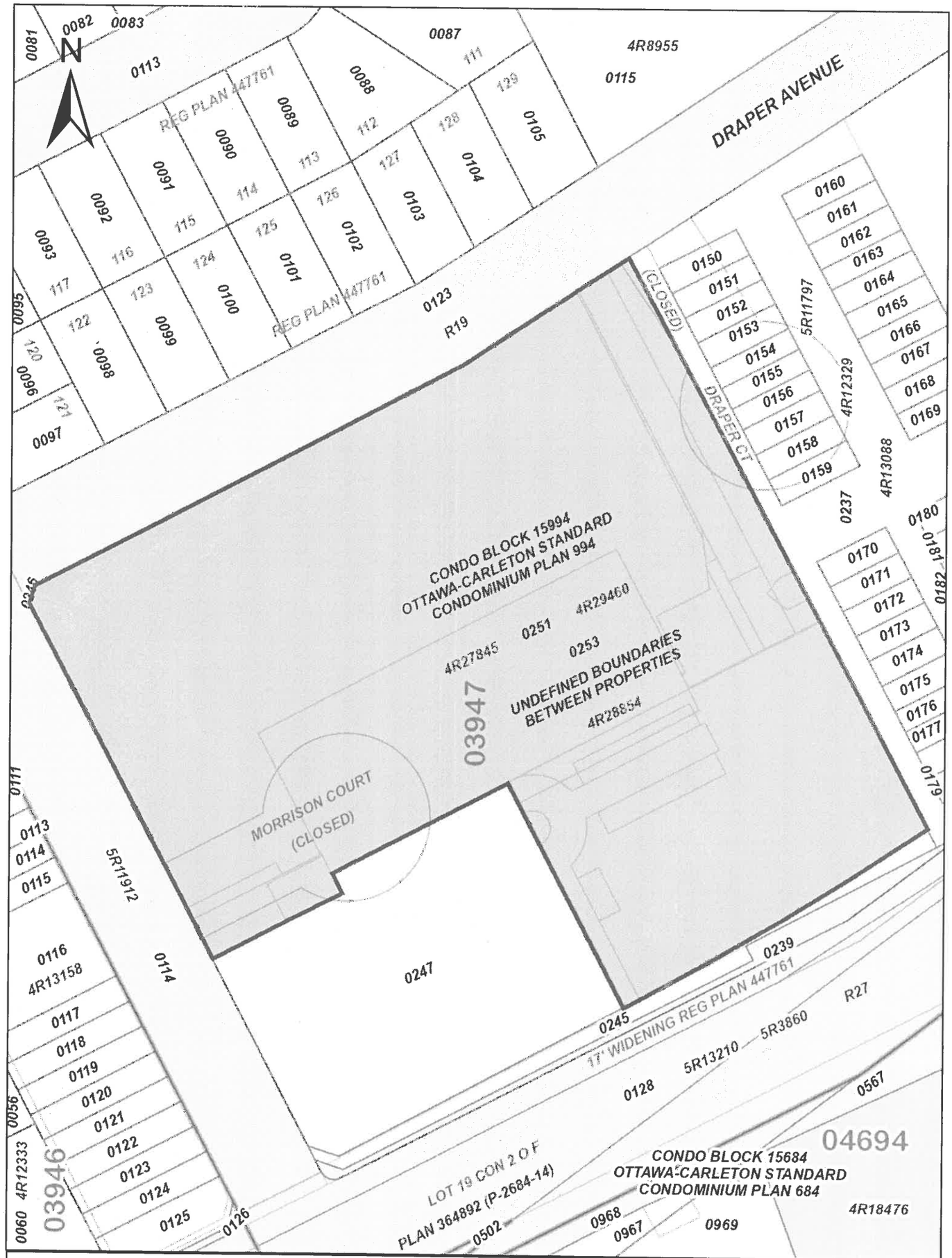


ServiceOntario

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

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 THE HYDRO ELECTRIC COMMISSION OFTHE CITY OF OTTAWA 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

ENVIRONMENTAL COMPLIANCE APPLICATION

Number 3760-BBVR23

ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 3760-BBVR23
Issue Date: May 12, 2019

Redwood Residences Limited
333 Wilson Ave, No. 200
Toronto, Ontario
M3H 1T2

Site Location: 2710 Draper Avenue
City of Ottawa,
K2H 8V3

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

establishment of wastewater infrastructure Works for the proposed 1.3 ha residential development located in the City of Ottawa and bounded by Morrison Drive to the west, Draper Avenue to the north, and existing residential development to the east, for the collection and conveyance of sanitary sewage and for the collection, treatment and disposal of stormwater run-off from contributing areas within the development as identified in the Servicing and Stormwater Management Report for the development, to provide Enhanced Level water quality control and to attenuate post-development peak flows to allowable release rates of 126.3 L/s, discharging to existing municipal storm sewer located below Draper Avenue, and ultimately to Graham Creek, consisting of the following:

Sanitary sewers within the proposed development, on Cherry Blossom Private (from MH5A to MH6A, from MH6A to MH7A), on Foliage Private (from MH 2A to MH3A, from MH3A to MH4A), on Purple Martin Private (from MH4A to MH7A, from MH7A to MH8A), on Draper Avenue (from MH8A to MH9A), discharging to the existing 225 mm diameter municipal sanitary sewer on Draper Avenue;

Storm sewers within the proposed development, on Cherry Blossom Private (from MH5 to MH6, from MH6 to MH7), on Foliage Private (from MH 2 to MH3, from MH3 to MH4), on Purple Martin Private (from MH4 to MH7, from MH7 to MH8, from MH8 to OGS), on Draper Avenue (from OGS to MH9), discharging to the existing 450 mm diameter municipal storm sewer on Draper Avenue right-of-way;

an oil & grit separator (Stormceptor OSR 750 or approved equivalent) installed downstream of the MH8 near Draper Avenue, servicing an upstream drainage area of 1.18 ha, having a sediment storage capacity of 3,000 L, oil storage volume of 880 L, and total storage volume of 4,070 L, receiving flows from MH8 and discharging via MH9 to the 450 mm diameter municipal storm sewer on Draper Avenue right-of-way;

three (3) underground stormwater storage units (Brentwood ST-36 storage systems or approved equivalent) located at the north-east corner of the site, servicing a contributing area of 1.18 hectares for providing quantity control for all storm events up to and including 100 year storm event, having a storage volume of approximately 449.0 cubic meters, to attenuate post-development peak flows to allowable release rate of 126.3 L/s for 100-year storm, equipped with a 144 mm Plug Style ICD at the outlet side of MH8 and a Checkmate Ultraflex inline backwater valve at MH9 connecting to the existing municipal sewer, discharging via MH8, OGS and MH9 to the existing 450 mm diameter municipal storm sewer on Draper Avenue right-of-way;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the submitted application and supporting documents listed in Schedule "A" forming part of this approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this entire document and any schedules attached to it, and the application;

2. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

3. "District Manager" means the District Manager of the appropriate local District Office of the Ministry, where the Works are geographically located;

4. "EPA" means the *Environmental Protection Act,* R.S.O. 1990, c.E.19, as amended;

5. "Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

6. "Owner" means Redwood Residences Limited, and includes its successors and assignees;

7. "OWRA" means the *Ontario Water Resources Act, R.S.O. 1990, c. O.40* , as amended;

8. "Wet Event" means a rainfall event with a minimum of 15 millimetres of rain in a 24 hour period;

9. "Works" means the sewage Works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

2. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.

3. Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.

4. Where there is a conflict between the documents listed in Schedule "A" and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

5. The conditions of this Approval are severable. If any condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

6. The issuance of, and compliance with the Conditions of this Approval does not:

    a. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority necessary to construct or operate the sewage Works; or

    b. limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. EXPIRY OF APPROVAL

1. This Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.

2. In the event that completion and commissioning of any portion of the Works is anticipated to be delayed beyond the specified expiry period, the Owner shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of Approval of the Works are still applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. CHANGE OF OWNER

1. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

    a. change of Owner;

    b. change of address of the Owner;

    c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act,* R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; or

    d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the *Corporations Information Act,* R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

2. In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.

3. The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this Approval.

4. OPERATION AND MAINTENANCE

1. If applicable, any proposed storm sewers or other stormwater conveyance in this Approval can be constructed but not operated until the proposed stormwater management facilities in this Approval or any other Approval that are designed to service the storm sewers or other stormwater conveyance are in operation.

2. The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the Works do not constitute a safety or health hazard to the general public.

3. The Owner shall inspect and ensure that the design minimum liquid retention volume is maintained in the Works at all times, except when maintenance is required.

4. The Owner shall undertake an inspection of the condition of the Works, at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the Works to prevent the excessive build-up of sediment, oil/grit, debris and/or decaying vegetation, to avoid reduction of the capacity and/or permeability of the Works, as applicable. The Owner shall also regularly inspect and clean out the inlet to and outlet from the Works to ensure that these are not obstructed.

5. The Owner shall construct, operate and maintain the Works with the objective that the effluent from

the Works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen, foam or discoloration on the receiving waters.

6. The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Owner's administrative office for inspection by the Ministry. The logbook shall include the following:

   a. the name of the Works; and

   b. the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed and method of clean-out of the Works.

7. The Owner shall prepare an operations manual prior to the commencement of operation of the Works that includes, but is not necessarily limited to, the following information:

   a. operating and maintenance procedures for routine operation of the Works;

   b. inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

   c. repair and maintenance programs, including the frequency of repair and maintenance for the Works;

   d. contingency plans and procedures for dealing with potential spills and any other abnormal situations and for notifying the District Manager; and

   e. procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

8. The Owner shall maintain the operations manual current and retain a copy at the Owner's administrative office for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

5. TEMPORARY EROSION AND SEDIMENT CONTROL

1. The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every two (2) weeks and after each significant storm event (a significant storm event is defined as a minimum of 25 millimetre of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.

2. The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of

inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

6. RECORD KEEPING

1. The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation, maintenance and monitoring activities required by this Approval.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

4. Condition 4 is included as regular inspection and necessary removal of sediment and excessive decaying vegetation from the Works are required to mitigate the impact of sediment, debris and/or decaying vegetation on the treatment capacity of the Works. The Condition also ensures that adequate storage is maintained in the Works at all times as required by the design. Furthermore, this Condition is included to ensure that the Works are operated and maintained to function as designed.

5. Condition 5 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction until they are no longer required.

6. Condition 6 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

Schedule A

1. Application for Environmental Compliance Approval submitted by Natan Ary, Project Manager of Redwood Residences Limited, dated January 22, 2019 and received on January 30, 2019;

2. Servicing and Stormwater Management Report along with drawings, dated September 2018, prepared by David Schaeffer Engineering Ltd.;

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of
Part II.1 of the Environmental Protection Act
Ministry of the Environment,
Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 12th day of May, 2019

A. Ahmed

Aziz Ahmed, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

YZ/

c: District Manager, MECP Ottawa District Office
Robert Freel, David Schaeffer Engineering Ltd.

July 24, 2019

Natan Ary
Greatwise Developments
333 Wilson Avenue, Suite 200
North York, Ontario M3H 1T2

Dear Mr. Ary:

Re: Traffic Noise Assessment Cover Letter
2710 Draper Avenue, Ottawa ON
GWE File No.: 17-059- Cover Letter- July 24 2019

Following our submission of a traffic noise study for the proposed residential subdivision located at 2710 Draper Avenue in Ottawa, Ontario (ref. Gradient Wind report #17-059 - Traffic Noise Final R2, dated November 2, 2018), this brief letter addresses comments from the City of Ottawa regarding the proposed noise barrier located within the rear yard of Block 11.

A summary is provided on the following pages explaining how each of the comments relating to the traffic noise study have been addressed. The number sequences and text in bold are in reference to each of the numbered comments continued in the City's correspondence.

1. TRAFFIC NOISE STUDY

1. *As per the Traffic Noise Assessment prepared by Gradient Wind Engineering Inc. dated November 2, 2018 a 2.82m noise barrier is located within the rear yard of Block 11. Rear yard drainage and the rear yard overland flow route is impacted by the location of this proposed noise barrier. No details have been provided on the plan. As per the Environmental Noise Control Guidelines (January 2016) acoustic barriers should have no gaps or opening in a noise barrier. If a gap or small opening is being proposed to accommodate rear yard overland flow this would be considered a deviation requiring cover letter to be submitted from the noise consultant for review and approval stating the deviation, the reason/justification for the deviation and further analysis completed with a gap modelled within the noise barrier. Noise barrier details are required be provided on the plan.*

GWE Response: Without the wall along the west property line of Block 11 sound levels at the rear yard will be 59 dBA assuming Phase 3 massing or a noise wall to the south, see Figure 1. The STAMPSON output file for this calculation is attached to the end of this letter and Figure 2 illustrates the source to receiver distances and angles. The primary sound source at this location is roadway traffic along Morrison Drive situated to the west of the site. According to the City of Ottawa's Environmental Noise Control Guidelines (ENCG) as well as the Provincial Environmental Noise Control Guidelines (NPC-300), the sound level criterion for outdoor living areas is 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 55 dBA but are within 60 dBA, mitigation is recommended to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion.

Gradient Wind has considered the requirements of easement access and overland drainage with the project architect and civil engineer. Given the requirement for access to the rear yards via a gate, or similar opening, a noise wall spanning the entire west side of the rear yard of Block 11 is unfeasible at this location. Any gate in an acoustic wall would significantly reduce the effect of the wall on the west side of Block 11. In addition to a gate the overland flow of the site slopes down toward the proposed wall and small gaps would be required to allow proper drainage. While small gaps of less than 20 cm at the base will not have a significant impact[1] on the performance of a noise wall, the combined effect further reduces the acoustic properties of the noise wall at this location. Since noise levels without the wall are less than 60 dBA this section of the wall can be deleted. Figure 1 outlines the location of the 2.82 meter noise wall in addition to the section of the wall replaced by a gate.

Great Wise is also proposing a third Phase of townhomes under a separate application. Should construction of this Phase begin prior to occupancy of Block 11, the portion of wall along the south property line would not be required and can be substituted with privacy fencing, as illustrated in Figure 3.

Subsequently since submitting our addendum letter dated May 31, 2019, the City in their comment letter dated July 3, 2019 have since asked for barrier details and modified warning clauses as related to comments 41 and 42.

[1] https://www.fhwa.dot.gov/ENVIRonment/noise/noise_barriers/design_construction/design/design07.cfm#sec7.1.2

Below is the modified warning clause for Block 11 and conceptual details of the noise barrier are provide in Figure 4. The structural details of the noise wall will need to be reviewed by a qualified structural engineer prior to construction of the wall. Shop drawing of the noise wall should be provided to Gradient Wind for approval prior to construction.

> *"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing roadway traffic may, on occasion, interfere with some activities of the dwelling occupants, as the sound levels exceed the sound level limits of the City and the Ministry of the Environment and Climate Change.*
>
> *This dwelling unit has also been designed with forced air heating with provision for air conditioning. Air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment and Climate Change.*

This concludes our addendum. Should you have any questions, or wish to discuss our findings further, please call us (613) 836-0934 or contact us by e-mail at joshua.foster@gradientwind.com. In the interim, we thank you for the opportunity to be of service.

Sincerely,

Gradient Wind Engineering Inc.

Giuseppe Garro, MASc.
Junior Environmental Scientist

Joshua Foster, P.Eng
Principal

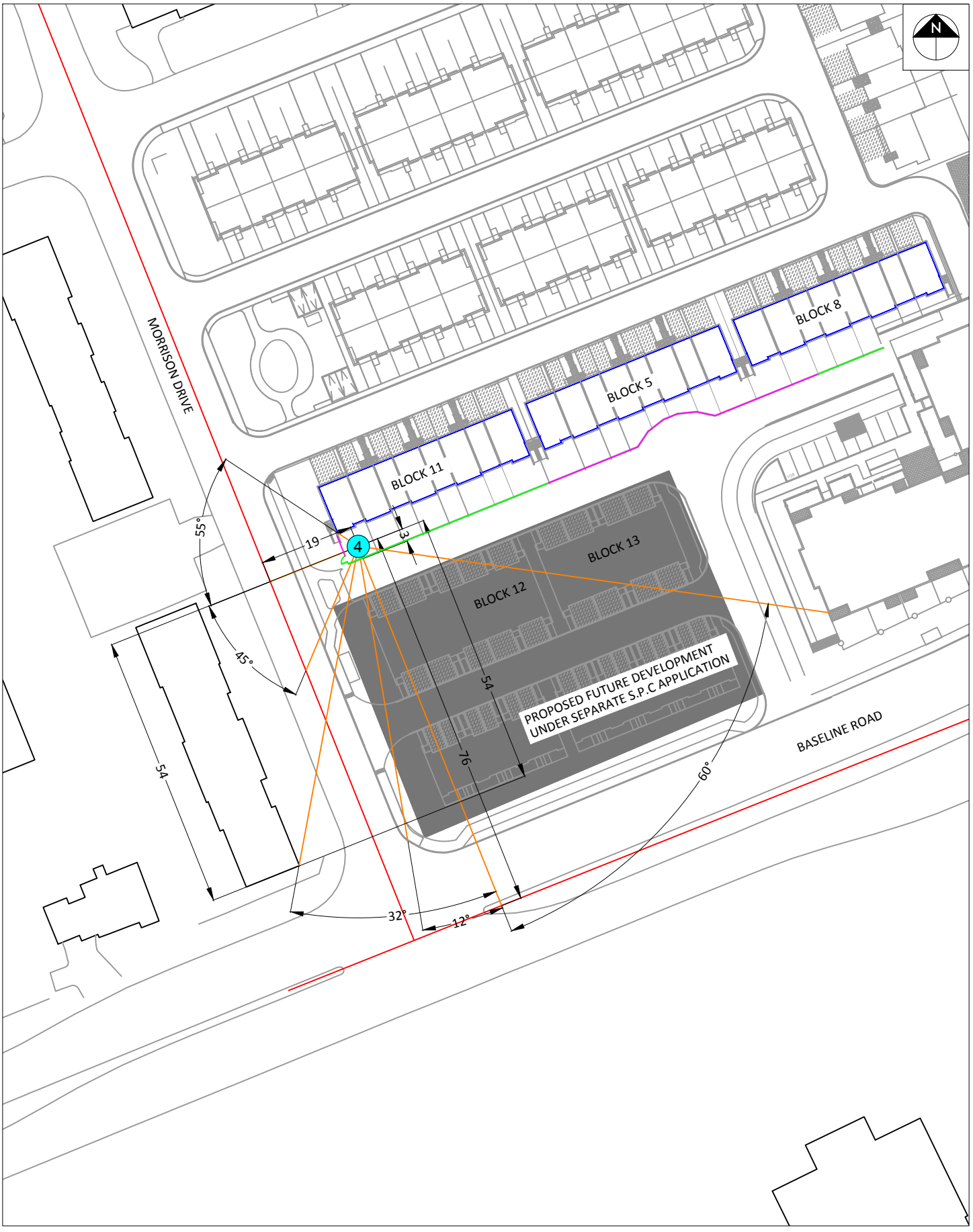
Gradient Wind File #17-059 – Cover Letter – July 24 2019

GRADIENTWIND
ENGINEERS & SCIENTISTS
127 WALGREEN ROAD , OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	2710 DRAPER AVENUE, OTTAWA TRAFFIC NOISE ASSESSMENT
SCALE	1:500 (APPROX.)
DRAWING NO.	GWE17-059-1
DATE	JULY 18, 2019
DRAWN BY	G.G.

DESCRIPTION

FIGURE 1:
REQUIRED GAP LOCATION FOR OVERLAND FLOW



GRADIENTWIND
ENGINEERS & SCIENTISTS

127 WALGREEN ROAD , OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	2710 DRAPER AVENUE, OTTAWA TRAFFIC NOISE ASSESSMENT		
SCALE	1:1000 (APPROX.)	DRAWING NO.	GWE17-059-2
DATE	JULY 18, 2019	DRAWN BY	G.G.

DESCRIPTION

FIGURE 2:
BLOCK 11 REAR YARD STAMSON INPUT PARAMETERS

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ENGINEERS & SCIENTISTS

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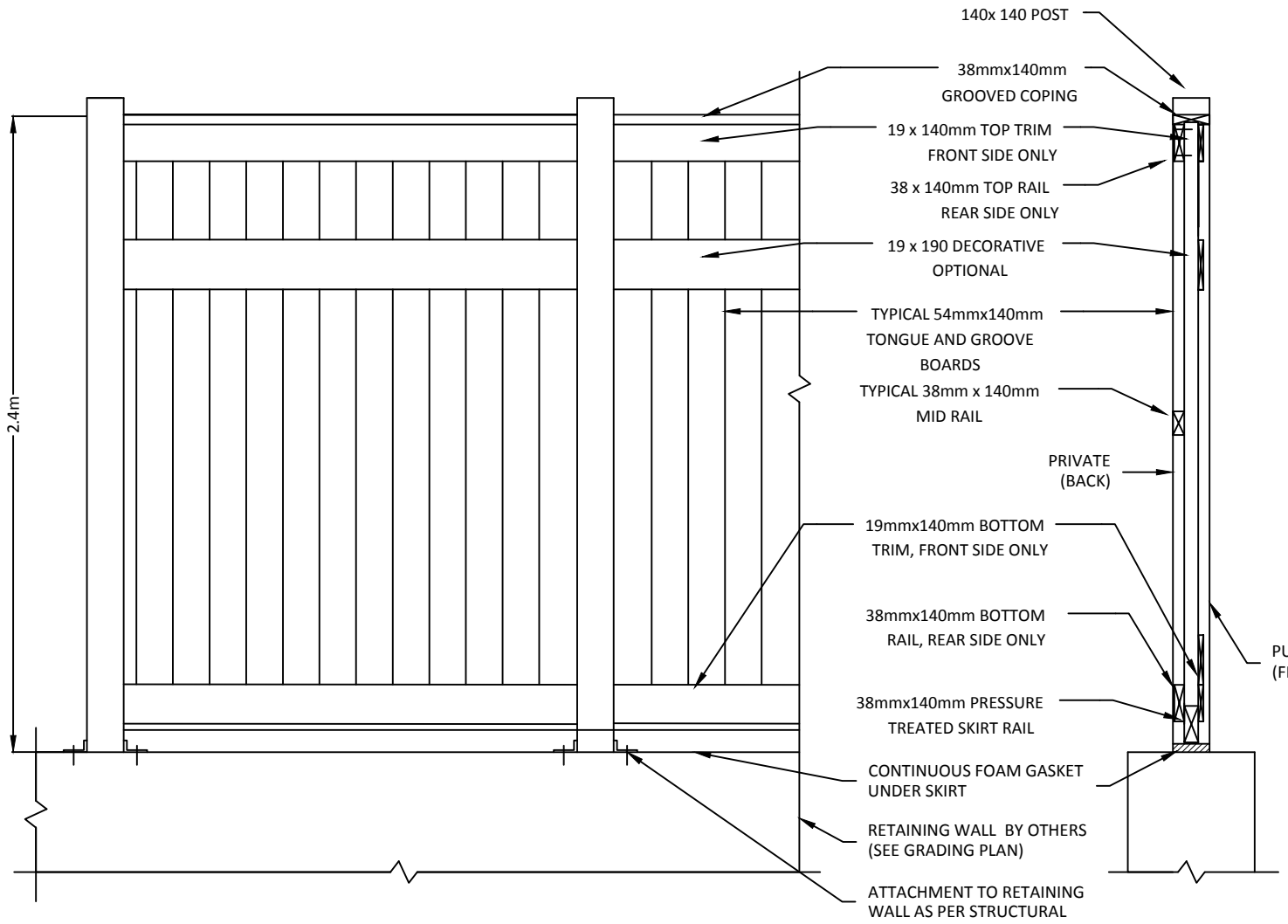
PROJECT	2710 DRAPER AVENUE, OTTAWA TRAFFIC NOISE ASSESSMENT
SCALE	1:500 (APPROX.)
DRAWING NO.	GWE17-059-3
DATE	JULY 18, 2019
DRAWN BY	G.G.

DESCRIPTION

FIGURE 3:
PROPOSED NOISE BARRIER LOCATION ALONG SOUTHERN PROPERTY LINE



NOTES:

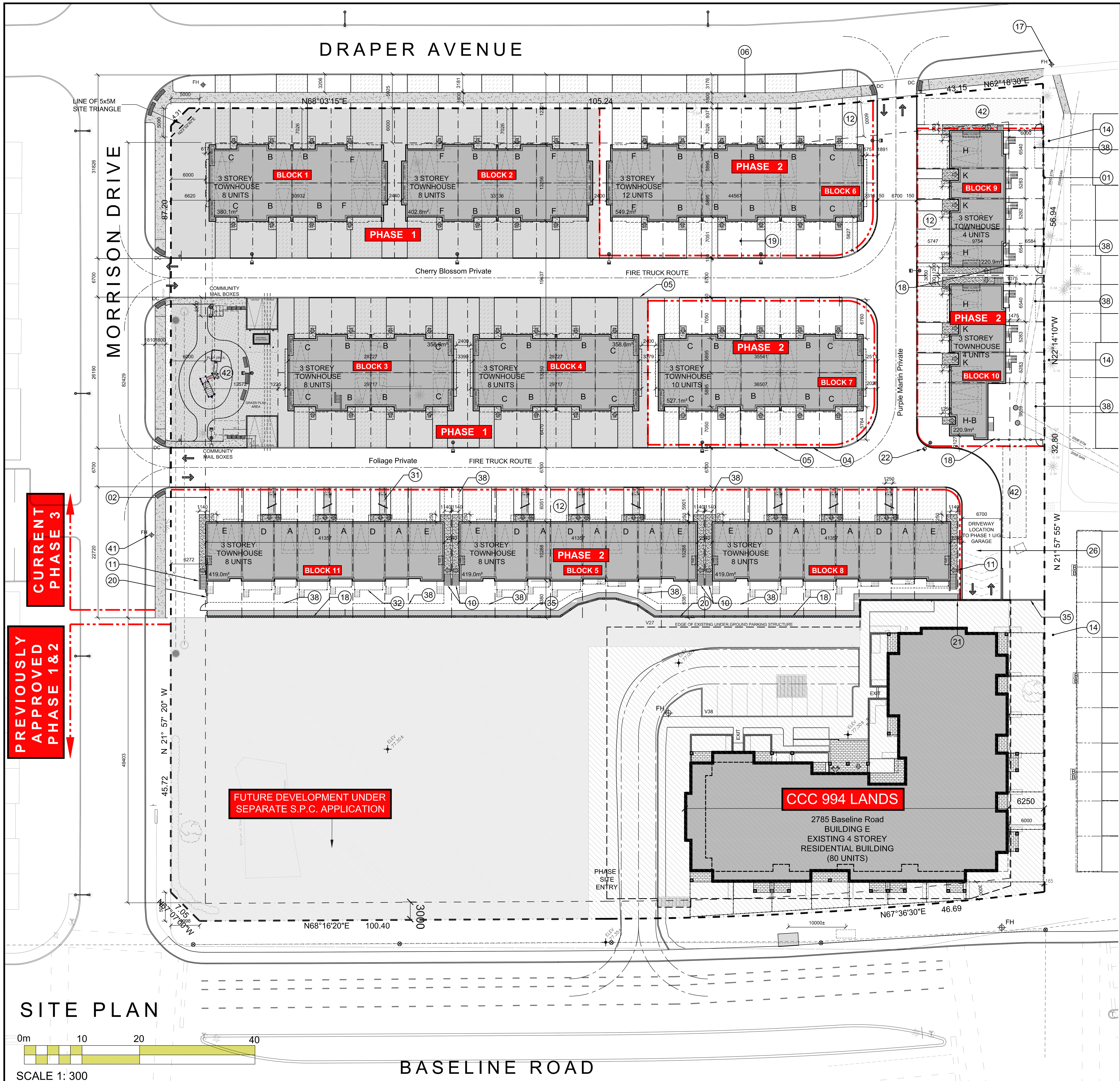
1. ALL WOOD COMPONENTS SHALL BE PRESSURE-TREATED WOOD.
2. ALL WOOD COMPONENTS SHALL BE TREATED WITH 2 COATS OF STAIN. COLOUR TO BE APPROVED BY THE OWNER AND LANDSCAPE ARCHITECT.
3. USE GALVANIZED FASTENERS AND HARDWARE THROUGHOUT.
4. ACOUSTIC FENCE SHALL BE CONTINUOUS WITH NO GAPS AND HAVE A MINIMUM SURFACE DENSITY OF 20 kg/m2
5. ACOUSTIC FENCE TO CONFORM TO APPROVED NOISE REPORT

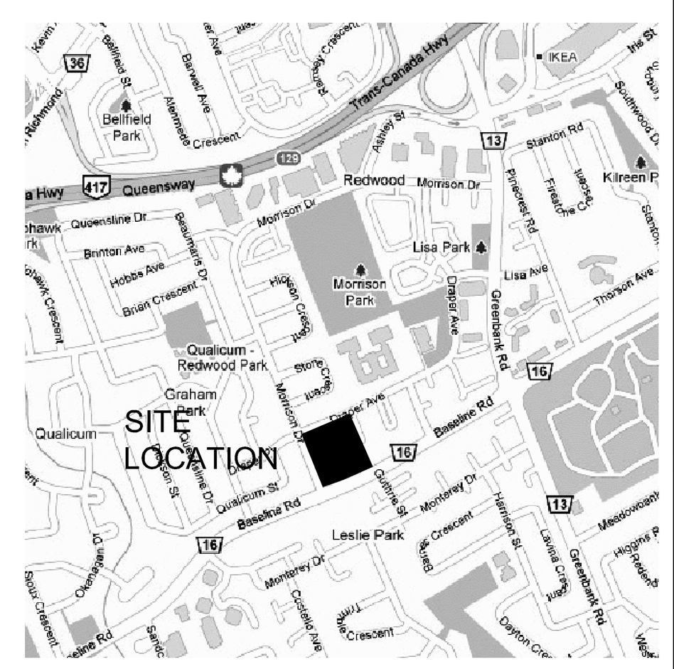
NOT FOR CONSTRUCTION

GRADIENTWIND
ENGINEERS & SCIENTISTS
127 WALGREEN ROAD , OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	2710 DRAPER AVENUE, OTTAWA TRAFFIC NOISE ASSESSMENT
SCALE	NTS
DRAWING NO.	GWE17-059-4
DATE	JULY 24, 2019
DRAWN BY	M.L.
DESCRIPTION	FIGURE 4: NOISE BARRIER DETAILS

DRAWINGS / FIGURES





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 COLLECTION BY CITY OF OTTAWA AT UNIT DRIVEWAYS

SNOW CLEARING AND STORAGE WILL BE BY PRIVATE CONTRACTOR

DRAWING NOTES

1. PROPERTY LINE (REFER TO SURVEY DRAWING FOR INTERNAL PROPERTY LINES AND PARTS)
2. 6.0M ZONING YARD SETBACK
3. --
4. TYPICAL 150mm WIDE BARRIER CURB
5. TYPICAL 150mm WIDE MOUNTABLE CURB
6. 1800mm WIDE CITY SIDEWALK, AS PER CITY OF OTTAWA STANDARDS, BUILT UNDER PHASE 1
7. --
8. --
9. --
10. LANDSCAPING STAIRS TO BE SPECIFIED AND ACCOMMODATED BY LANDSCAPE ARCHITECT
11. RETAINING WALL WITH STEPS AS REQUIRED, SEE LANDSCAPE AND CIVIL DRAWINGS
12. PRIVATE DRIVEWAY
13. --
14. EXISTING TREES TO REMAIN, PROTECT AS REQUIRED
15. --
16. --
17. EXISTING FIRE HYDRANT
18. PRIVACY FENCING
19. PROPOSED LOT LINE
20. 2.4 TO 2.82 M HT. SOUND BARRIER
21. RETAINING WALL / EXPOSED EXTERIOR WALL OF PHASE 1 PARKING GARAGE
22. SITE LIGHTING; EXACT LOCATION TO BE DETERMINED BY ELECTRICAL ENGINEER
23. --
24. --
25. --
26. EXISTING PHASE 1 PARKING GARAGE ENTRY RAMP TO REMAIN
27. --
28. --
29. --
30. --
31. METAL FRAMED STAIRS TO MAIN LEVEL
32. WOODEN DECK OFF MAIN LEVEL, STEPS VARY
33. --
34. --
35. RETAINING WALL, HEIGHT VARIES SEE PATERSON STONE STRONG WALL DRAWING
36. --
37. --
38. REAR YARD ACCESS EASEMENTS (TO BE CONFIRMED ON SURVEY DRAWING)
39. --
40. --
41. EXISTING FIRE HYDRANT TO BE RELOCATED
42. BELOW GROUND WATER STORAGE SYSTEM

PROJECT INFORMATION

ZONING Zoning By-Law 2008-250 R5A[1700] S247, S282

SITE AREA INCLUDING ORIGINAL PHASES 21,252.5 sq. m. (228,760) sq. ft.

BUILDING HEIGHT 5 STOREY 18.0 M

OVERALL SITE SETBACK (PHASE 1 & 2)	PROVODED	REQUIRED
FRONT YARD SETBACK (BASELINE ROAD)	3.0 M	3.0 M
MORRISON DRIVE SETBACK	6.0 M	6.0 M
DRAPER AVENUE SETBACK	6.0 M	6.0 M
INTERIOR SIDE YARD SETBACK	6.0 M	6.0 M

PROJECT INFORMATION - PHASE 2 (TOWNHOUSE)

ZONING Zoning By-Law 2008-250 R5A[1700] S247, S282

SITE AREA - PHASE 2 6,737.4 sq. m. (72,520) 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 2

BUILDING HEIGHT	3 STOREY	12.0 M
BUILDING AREA (54 UNITS)		4,234.3 sq. m. (45,578) sq. ft.
FRONT YARD SETBACK (TYPICAL)		6.0 M
CORNER YARD SETBACK (TYPICAL)		6.0 M
INTERIOR YARD SETBACK (TYPICAL)		6.0 M

LOT COVERAGE

PAVED SURFACE (ROADS) =	0.0 sq. m.	0.0%
PAVED SURFACE (DRIVEWAY) =	1,124.3 sq. m.	16.7%
BUILDING FOOTPRINT =	2,775.1 sq. m.	41.2%
LANDSCAPE OPEN SPACE =	2,838.0 sq. m.	42.1%
LANDSCAPE PARK =	0.0 sq. m.	0.0%
TOTAL =	6,737.4 sq. m.	100.0%

BUILDING STATISTICS

		UNIT COUNT	TOTAL UNIT AREA	
TOWNHOUSE TYPE 'A' (WITH GARAGE)	1,081 sq. ft.	9	9,729 sq. ft.	903.0 m²
TOWNHOUSE TYPE 'B' (WITH GARAGE)	1,282 sq. ft.	14	17,948 sq. ft.	1,667.4 m²
TOWNHOUSE TYPE 'C' (WITH GARAGE)	1,439 sq. ft.	6	8,634 sq. ft.	802.1 m²
TOWNHOUSE TYPE 'D' (WITH GARAGE)	1,500 sq. ft.	9	13,500 sq. ft.	1,254.2 m²
TOWNHOUSE TYPE 'E' (WITH GARAGE)	1,655 sq. ft.	6	9,930 sq. ft.	922.5 m²
TOWNHOUSE TYPE 'F' (WITH GARAGE)	1,663 sq. ft.	2	3,326 sq. ft.	309.0 m²
TOWNHOUSE TYPE 'H' (WITH GARAGE)	1,446 sq. ft.	4	5,784 sq. ft.	537.4 m²
TOWNHOUSE TYPE 'H-B' (WITH GARAGE)	1,700 sq. ft.	1	1,700 sq. ft.	157.9 m²
TOWNHOUSE TYPE 'K' (WITH GARAGE)	1,645 sq. ft.	3	4,935 sq. ft.	458.5 m²
TOTAL UNITS		54	75,486 sq. ft./	7,012.9 m²

CAR PARKING

REQUIRED

RESIDENCE	- 1.0 PER UNIT (54 UNITS)	54
VISITOR	- NOT REQUIRED	0
TOTAL		54

PROVIDED

RESIDENCE	- PRIVATE GARAGE	66
VISITOR	- PRIVATE IN DRIVEWAY	66
VISITOR	- COMMUNAL AT PARK (PHASE 1)	4
TOTAL		136

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.
- 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
35	ISSUED FOR SPC - PHASE 3-2 COMMENT RESPONSE	Aug. 14,19
34	ISSUED FOR SPC - PHASE 3-2 COMMENT RESPONSE	Jul. 25, 19
33	ISSUED FOR COORDINATION	Jul. 23, 19
32	ISSUED FOR COORDINATION	Jul. 16, 19
31	ISSUED FOR SPC - PHASE 3-2 COMMENT RESPONSE	Jun. 12, 19
30	ISSUED FOR COORDINATION	Jun. 11, 19
29	ISSUED FOR COORDINATION	Jun. 6, 19
28	ISSUED FOR SPC - PHASE 3-2 COMMENT RESPONSE	Apr. 9, 19
27	ISSUED FOR SPC - PHASE 2	Dec. 6, 18
26	ISSUED FOR SPC - PHASE 2 REVISED CONCEPT	Oct. 31, 18
25	ISSUED PHASE 2 REVISED CONCEPT	Sept. 4, 18
24	ISSUED FOR SPC - CITY COMMENTS 4 RESPONSE	Aug. 7, 18
23	ISSUED FOR SPC - CITY COMMENTS 4 RESPONSE	June 18, 18
22	ISSUED FOR SPC - CITY COMMENTS RESPONSE	Apr. 25, 18
21	ISSUED FOR SPC - CITY COMMENTS RESPONSE	Mar. 14,18
20	ISSUED FOR PRIVATE ROAD NAMING APPLICATION	Jan 31,18
19	ISSUED FOR PERMIT - BLOCK 1 & 2	Jan 24,18
18	ISSUED FOR SPC - PHASE 3 REVISED CONCEPT	Nov 27,17
17	ISSUED FOR SITE PLAN APPROVAL - PHASE 3	June 12,17

REVISIONS:

ARCHITECT SEAL:
ONTARIO ASSOCIATION OF ARCHITECTS
RODERICK LAHEY LICENCE 4375
SEAL DATE: STAMP DATE

NORTH ARROW:

CLIENT:
Greatwise DEVELOPMENTS

ARCHITECT:
rla/architecture
roderick lahey architect inc.
56 beech street, ottawa, ontario K1S 3J6
t 613.724.9932 f 613.724.1209 rlaarchitecture.ca

PROJECT TITLE:
FRESH TOWNS
2710 DRAPER AVENUE
OTTAWA ONTARIO

SHEET TITLE:
SITE PLAN - PHASE 3-2

DRAWN:	CHECKED:
R.V.	R.V.
SCALE: 1:300	SHEET No. SP-2
PROJECT No. 1733	

D07-12-18-0184

PROJECT DEVELOPER
GreatWise Developments
333 Wilson Avenue
Toronto, ON, M3H 1T2
Phone: (416) 630-6767
Fax: (416) 630-6304

SURVEYOR
Annis O'Sullivan Vollebekk Ltd.
Ontario Land Surveyors
14 Concourse Gate, Suite 500,
Nepean, Ontario K2E 7S6
Tel: (613) 727-0850
Fax: (613) 727-1079

LANDSCAPE ARCHITECT
Larocque Levstek
5871 Hugh Crescent
Ottawa, (Osgoode) ON K0A 2W0
Tel: (613) 826-0518

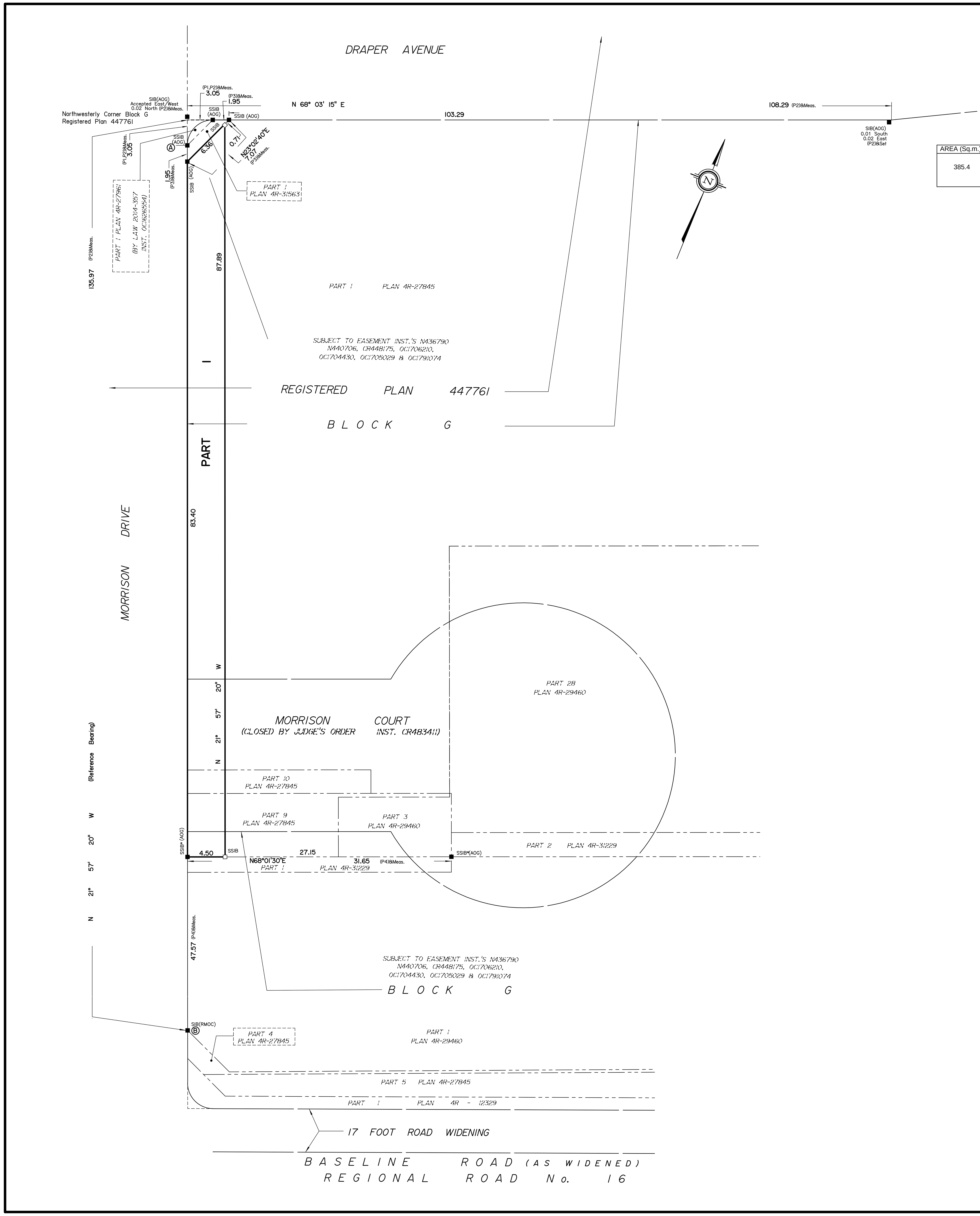
CIVIL ENGINEER
David Schaeffer Engineering Ltd.
120 Iber Road, Unit 203
Stittsville . Ontario . Canada . K2S 1E9
Tel: (613) 836-0856
Fax: (613) 836-7183

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
- FH FIRE HYDRANT
- DC DEPRESSED CURB
- STOP SIGN

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

PLOT DATE: Wednesday, August 14, 2019

Plan No.: #17529



I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.

DATE:_____________

____
V. ANDREW SHELP
ONTARIO LAND SURVEYOR

PLAN 4R-

RECEIVED AND DEPOSITED
DATE: _____________

____
REPRESENTATIVE FOR LAND REGISTRAR FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON NO. 4.

SCHEDULE

AREA (Sq.m.)	PART	BLOCK	PLAN	PIN
385.4	1	PART OF G PART OF MORRISON COURT (Closed by Judge's Order CR483411)	447761	PART OF 03947-0253

Part 1 : Subject to easement Inst.'s N436790, N440706, CR448175, OC1706210, OC1704430, OC1705029 & OC1791074.

DRAFT PLAN OF SURVEY OF

PART OF MORRISON COURT
(Closed by Judge's Order CR483411)
AND
PART OF BLOCK G
REGISTERED PLAN 447761
CITY OF OTTAWA

Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

Scale 1 : 250

10 7.5 5.0 2.5 0 5 10 Metres

Metric

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

Surveyor's Certificate

I CERTIFY THAT :

1. This survey and plan are correct and in accordance with the Surveys Act, the Surveyors Act and the Land Titles Act and the regulations made under them.
2. The survey was completed on the ____ day of ___________, 2019.

__________ Date

__________ V. Andrew Shelp
Ontario Land Surveyor

Notes & Legend

—□— Denotes		Survey Monument Planted
—■—	"	Survey Monument Found
SIB	"	Standard Iron Bar
SSIB	"	Short Standard Iron Bar
IB	"	Iron Bar
*	"	Survey Monument 0.3 metres Long
(WIT)	"	Witness
(AOG)	"	Annis, O'Sullivan, Vollebekk Ltd.
Meas.	"	Measured
(P1)	"	Plan 4R-27961
(P2)	"	Plan 4R-27845
(P3)	"	Plan 4R-31563
(P4)	"	Plan 4R-31229

Distances shown on this plan are ground distances and can be converted to grid distances by multiplying by the combined scale factor of 0.99997.

Bearings are grid, derived from the easterly limit of Morrison Drive, shown to be N21°57'20"W on Plan 4R-29460 and are referred to the Central Meridian of MTM Zone 9 (76°30' West Longitude) MTM NAD-83 (original).

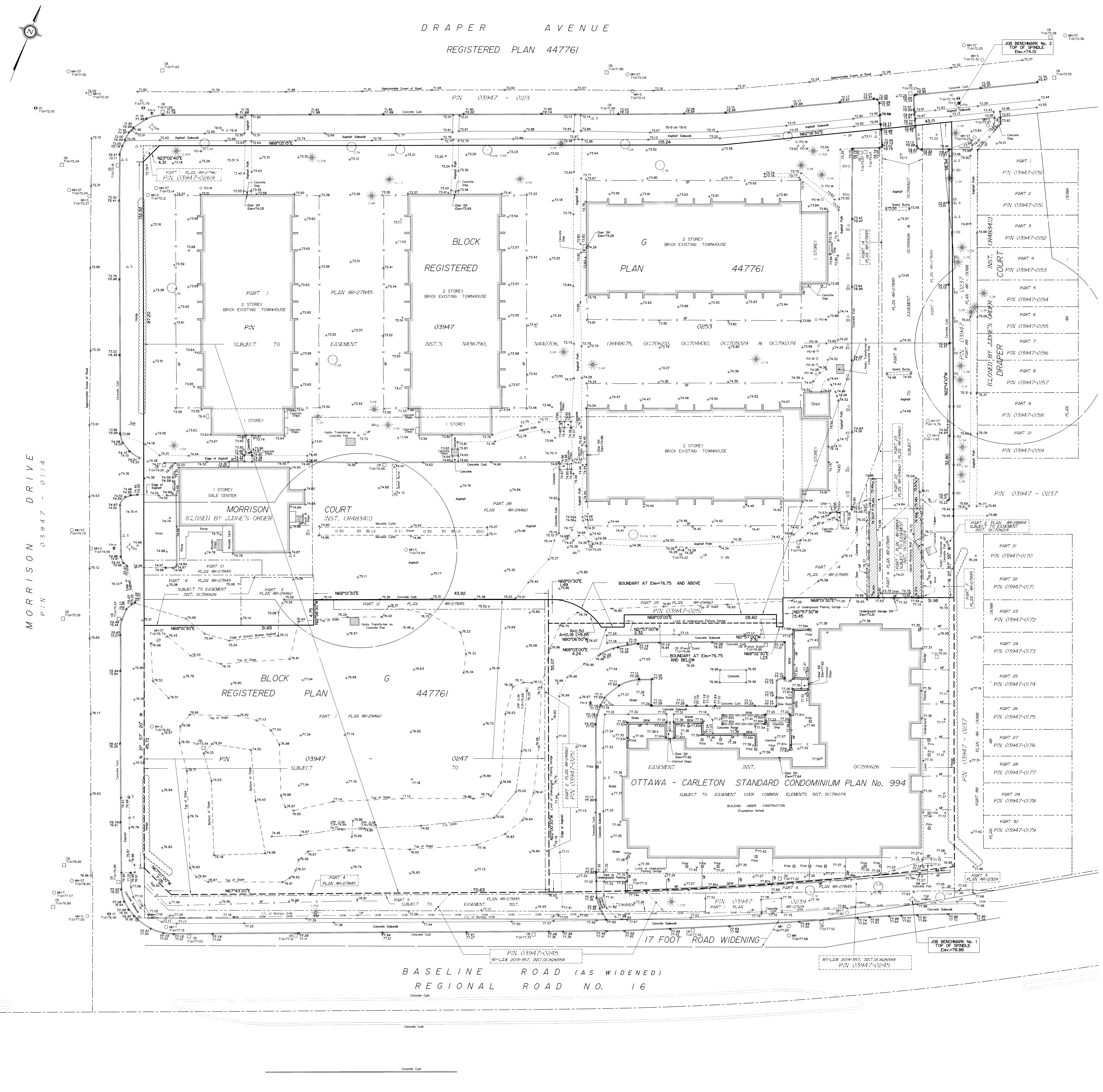
Coordinates are derived from Can-Net 3.0 Real Time Network GPS observations referenced to Specified Control Points 01919680005 and 01919750705, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

Coordinate values are to urban accuracy in accordance with O. Reg. 216/10.

01919680005	Northing	5027191.26	Easting	361496.76
01919750705	Northing	5016816.93	Easting	360806.84
Point A	Northing	5022458.59	Easting	360051.73
Point B	Northing	5022335.31	Easting	360101.42

Caution: Coordinates cannot, in themselves, be used to re-establish corners or boundaries shown on this plan.

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovltd.com
Ontario Land Surveyors
Job No. 17960-18 Greof-Wise PtBlkG RP447761 R2 D1



TOPOGRAPHICAL SKETCH OF

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

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

Scale 1 : 250

10 7.5 5.0 2.5 0 5 10 Metres

Metric

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

Notes & Legend

	Denotes	
MH-ST	"	Maintenance Hole (Storm Sewer)
MH-S	"	Maintenance Hole (Sanitary)
MH-T	"	Maintenance Hole (Traffic)
MH	"	Maintenance Hole (Unidentified)
CB	"	Catch Basin
CBI	"	Catch Basin Inlet
VC	"	Valve Chamber (Watermain)
FH	"	Fire Hydrant
WV	"	Water Valve
GV	"	Gas Valve
GM	"	Gas Meter
TSP	"	Traffic Signal Post
S	"	Sign
CPP	"	Corrugated Plastic Pipe
T/P	"	Top of Pipe
T/G	"	Top of Grate
	"	Deciduous Tree
	"	Coniferous Tree
MF	"	Metal Fence
BF	"	Board Fence
UP	"	Utility Pole
AN	"	Anchor
LS	"	Light Standard
PO-W	"	Wood Pole
EO	"	Electrical Outlet
TB-B	"	Bell Terminal Box
Ø	"	Diameter
+ 65.00	"	Location of Elevations
+ 65.00*	"	Top of Wall Elevations
+ 65.00	"	Top of Concrete Curb Elevation
C/L	"	Centreline
———	"	Property Line
BRW	"	Brick Retaining Wall
CRW	"	Concrete Retaining Wall

BOUNDARY INFORMATION SHOWN HEREON HAS BEEN COMPILED FROM FIELD SURVEY AND EXISTING DOCUMENTS.

ELEVATION NOTES

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

UTILITY NOTES

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

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

Job No. 19336-17 GWD PtBlk G PL 447761 T F | ig