Site Servicing and Stormwater Management Brief – Petrie's Landing III Block 8 Ottawa, ON

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Sign-off Sheet

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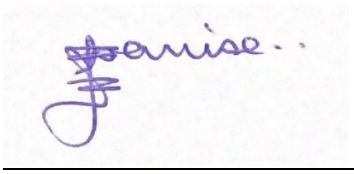

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1.0 INTRODUCTION

The following revised Site Servicing and Stormwater Management (SWM) Brief has been prepared to reflect the revised site plan and to address City comments to the first submission of December 2019. Specifically, the proposed building has been revised to a four-storey building and the parking area layout has been revised accordingly. The drawings have been revised to reflect the revised site plan and to address City comments and the results of the revised servicing analyses are summarized in this report. A summary of City comments is included in **Appendix G**.

Stantec Consulting Ltd. has been retained by Brigil Homes to prepare the following site servicing and stormwater management (SWM) brief to satisfy the City of Ottawa Site Plan Control Application process. The 0.75 ha site is located on 180 Prestige Circle, with the Highway 174 to the south, Jeanne D'Arc Boulevard to the north, Bellevue creek and a residential development to the east, and Brisebois Creek and its associated stormwater management (SWM) facility to the west in the City of Ottawa (see **Figure 1** below).

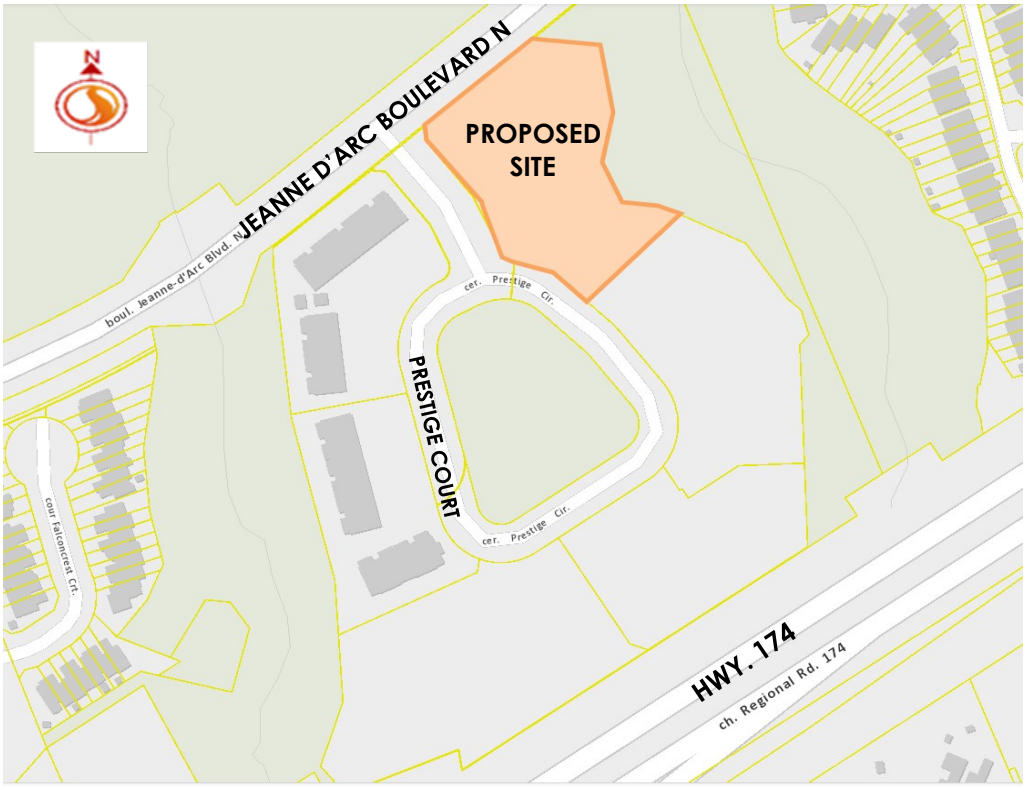


Figure 1: Site location

The proposed Block 8 is part of an existing development for which IBI prepared a servicing analysis for Blocks 1 to 5 and for which Stantec completed the detailed design of Blocks 6 and 7 and

outlined servicing criteria for Block 8 based on site plan assumptions. Block 8 is presently zoned R5 (Residential Fifth Density Zone) and consists of a four-storey residential building comprising 112 residential units comprising of studio (2 units), 1-bedroom (90 units), 2-bedroom (16 units) and 3-bedroom (4 units) apartments with associated surface and underground parking totaling 156 parking spaces consisting of 135 underground parking and 21 surface parking, communal amenity, and landscape areas. A copy of the proposed site plan prepared by Neuf Architect(e)s dated January 18th, 2021 can be found in **Appendix F**.

The intent of this report is to provide a servicing scenario for the site that is free of conflicts, provides on-site servicing in accordance with City of Ottawa design guidelines, and utilizes the existing local infrastructure in accordance with the guidelines outlined through consultation with City of Ottawa staff.

2.0 BACKGROUND

The following background studies have been referenced during the servicing design of the proposed site:

- *Design Brief Petrie's Landing II Phase 2, IBI Group., February 7, 2014*
- *Geotechnical Investigation*, Proposed Multi-Storey Buildings Block 8 – Petrie's Landing II, Ottawa, Ontario, Paterson group, July 30, 2019
- *Geotechnical Assessment*, Slope Review – Block 8, Proposed Multi-Storey Buildings, 8466 Jeanna-d'Arc Boulevard, Ottawa, Ontario, Paterson group, June 23, 2021
- *Site Servicing and Stormwater Management Brief – Petrie's Landing block 6, 7 and 8, Stantec Consulting Ltd., September 19, 2018*
- *City of Ottawa Design Guidelines – Water Distribution*, City of Ottawa, July 2010
- *City of Ottawa Sewer Design Guidelines*, City of Ottawa, October 2012
- *Technical Bulletin ISDTB-2014-01,* City of Ottawa, February 2014
- *Technical Bulletin PIEDTB -2016-01,* City of Ottawa, September 6, 2016

3.0 WATER DISTRIBUTION

3.1 BACKGROUND

The proposed Block 8 consists of a four-storey apartment building with one floor of underground parking. The proposed building has a footprint of approximately 2910.04 m^2 (0.29 ha),and is proposed to connect to the existing 200 mm diameter watermain along Prestige Circle as shown on the site servicing plan (see **Drawing SSP-1**). The building comprises 2 studio apartments, ninety (90) 1-bedroom units, sixteen (16) 2-bedroom units, and four (4) 3-bedroom apartments totaling 112 overall residential units.

A detailed hydraulic analysis for the overall Petrie's Landing Development was included in the 2014 Petrie's Landing Design Brief prepared by IBI (see **Appendix E**). However, the FUS calculations for the proposed buildings within Blocks 6 and 7 generated higher fire flow demands than the values assumed in IBI's hydraulic analysis. As a result, the hydraulic analysis for the overall development was revised as part of the detailed design for Blocks 6 and 7 which used the same boundary conditions as per IBI's model. As the proposed site plan for Block 8 has been updated, the hydraulic model has been revised accordingly. The updated results have been included in **Appendix A**. A new boundary condition has been requested from the City and will be used in subsequent submissions.

3.2 WATER DEMANDS

Water demands were calculated using the City of Ottawa Water Distribution Guidelines (July 2010) to determine the typical operating pressures to be expected at the buildings. A daily rate of 350 L/cap/day has been applied for the population of the proposed site. Population densities have been assumed as 1.4 persons/unit for studio units, 1.4 persons/unit for one-bedroom units, 2.1 persons/unit for two-bedroom units and 3.1 persons/unit for three-bedroom units. See **Appendix A** for detailed domestic water demand estimates.

The average day demand (AVDY) for the entire site was determined to be 0.7 L/s. The maximum daily demand (MXDY) is 2.5 times the AVDY for residential demand, which equates to 1.8 L/s. The peak hour demand (PKHR) is 2.2 times the MXDY for residential properties, totaling 3.9 L/s. As the average domestic demand for the site is greater than 50m^3/day, the site will require 2 service connections.

Wood frame construction has been used in the fire flow requirement calculations with a vertical fire wall splitting the building area into two sections with areas 1,756.23 m^2 and 1,153.81 m^2 respectively (see **Drawing SSP-1**). The largest area was used in the assessment of emergency fire flow requirements in accordance with FUS methodology and Ontario Building Code. The FUS Guidelines indicate that low hazard occupancies include apartments, dwellings, dormitories, hotels, and schools, and as such, a low hazard occupancy/ limited combustible building

contents credit was applied. A sprinkler system conforming to NFPA 13 was considered, and a credit applied per FUS Guidelines. Based on calculations per the FUS Guidelines (see **Appendix A**), the required fire flow for the proposed Block 8 is 283.3 L/s (17,000 L/min).

3.3 HYDRAULIC MODEL RESULTS

A hydraulic analysis was previously prepared as part of the detailed design of Blocks 6 and 7 of the development which included preliminary assumptions for Block 8. The hydraulic analysis has now been revised to include water demands and fire flow requirements based on the proposed site plan for Block 8.

The boundary conditions listed below were provided by the City of Ottawa to IBI Group and used in their 2014 hydraulic analysis for the overall development, which included Blocks One to Eight. The same boundary conditions were used in the hydraulic analysis as part of the design of Block 6 and 7 and were used in the revised hydraulic analysis for the proposed Block 8 (see model results in **Appendix A**). New boundary conditions have been requested to the City and will be used in subsequent submissions.

Peak Hour = 108.0m

Max Day + Fire Flow = 110.0m

Average Day = 115.0m

The desired normal operating pressure range as per the City of Ottawa 2010 Water Distribution Design Guidelines is **345 kPa (50 psi)** to **552kPa (80 psi)** and **no *less than 276kPa (40 psi)*** at ground elevation. Furthermore, the maximum pressure at any point in the water distribution should not exceed 100 psi as per the Ontario Building/Plumbing Code; pressure reducing measures are required to service areas where pressures *greater than 552kPa (80 psi)* are anticipated.

A hydraulic model of the water supply system was created in H2O Map based on the provided boundary conditions to assess the proposed watermain layout under the above demands and during the fire flow scenario. Results of the hydraulic modeling show that pressures for Block 8 range from **79.31psi** to **89.27psi** under normal operating conditions. These values are outside the normal operating pressure range as defined by MECP and City of Ottawa design guidelines. As a result, it is recommended that a pressure reducing valve be installed immediately downstream of the isolation valve of the proposed building. Since the proposed building is a 4-storey building, an additional 34 kPa (5 psi) for every additional storey over two storeys is required to account for the change in elevation head and additional head loss. Given that the lowest pressure is expected to be **547kPa (79.31 psi)** at ground level, the resultant equivalent pressure at the 4th floor will be approximately **478 kPa (69.31 psi)** and above the City's objective pressures of 40 psi.

As a result, a booster pump will not be required to maintain an acceptable level of service on the higher floors. Results of the hydraulic model analysis can be found in **Appendix A**.

A fire flow analysis was carried out using H2O MAP hydraulic model to determine the anticipated amount of flow that could be provided for the proposed development under maximum day demands and fire flow requirements per the FUS methodology. A fire flow demand of 283.3 L/s was assumed for the proposed Block 8, identified as node "16". Results of the modeling analysis indicate that flows of approximately 1,051 L/s can be delivered to Block 8 while still maintaining a residual pressure of **140 kPa (20 psi)**. Results of the hydraulic modeling are included for reference in **Appendix A**.

3.4 SUMMARY OF FINDINGS

Based on the results of the hydraulic analysis, it is recommended that a pressure reducing valve be installed to ensure normal operating pressures remain within City of Ottawa required limits. The service connection will be capable of providing anticipated demands to all storeys, no booster pump will be required to maintain minimum pressures of 276 KPa (40 psi) on the higher floors. The hydraulic model also indicates that fire flow requirements can be achieved at the proposed building location while still maintaining the minimum residual pressure per City requirements.

4.0 SANITARY SEWER

The site will be serviced via an existing 300 mm diameter sanitary sewer situated within the Prestige Circle ROW at the southern boundary of the site (see **Drawing SSP-1**). It is proposed to connect a 200mm diameter sanitary service lateral directly to the existing sewer to service the proposed site.

The anticipated wastewater peak flows generated from the proposed development are summarized in **Table 1** below:

Table 1: Estimated Wastewater Peak Flow

Block	Residential Units				Infiltration Flow (L/s)	Total Peak Flow (L/s)
	# of Units	Population	Peak Factor	Peak Flow (L/s)		
Block 8	112	175	4.0	2.27	0.25	2.51

1. Average residential flow based on 280 L/p/day
2. Peak factor for residential units calculated using Harmon's formula
3. Three- bedroom apartments assumed at 3.1 persons/unit, two-bedroom apartments assumed at 2.1 persons/unit, one-bedroom & studio apartments assumed at 1.4 persons/unit.
4. Infiltration flow based on 0.33 L/s/ha.

The Prestige Circle preliminary sanitary sewer design was completed as part of IBI's design (see **Appendix E**) and was based on the applicable City of Ottawa Design Guidelines at the time of the report. A preliminary concept plan for Block 8 which consisted of 81 units totaling a population of 146 people and allowing a sanitary discharge of 2.52 L/s was assumed during detailed design of Blocks 6 and 7 which is sufficient for the site based on the current site plan.

4.1 SANITARY SEWER DESIGN CRITERIA

As outlined in the City of Ottawa Sewer Design Guidelines and the Ministry of the Environment, Conservation and Parks (MECP) Design Guidelines for Sewage Works, the following criteria were used to calculate estimated wastewater flow rates and to size the sanitary sewers:

- Minimum Velocity – 0.6 m/s (0.8 m/s for upstream sections)
- Maximum Velocity – 3.0 m/s
- Manning roughness coefficient for all smooth wall pipes – 0.013
- Minimum size – 200mm dia. for residential areas
- Average Wastewater Generation – 280L/cap/day
- Peak Factor – 4.0 (Harmon's)
- Extraneous Flow Allowance – 0.33 L/s/ha (conservative value)
- Manhole Spacing – 120 m
- Minimum Cover – 2.50 m
- Population density for single-bedroom and bachelor apartments – 1.4 pers./apartment

- Population density for two-bedroom apartments – 2.1 pers./apartment
- Population density for three-bedroom apartments – 3.1 pers./apartment

4.2 PROPOSED SERVICING

The proposed site will be serviced by gravity sewers which will direct the wastewater flows (approx. 2.51 L/s with allowance for infiltration) to the existing 300 mm diameter sanitary sewer on Prestige Circle. A sanitary sewer design sheet for the proposed sanitary sewers is included in **Appendix B**. A full port backwater valve is to be installed on the proposed sanitary service to prevent any surcharge from the downstream sewer main from impacting the proposed property. All underground parking drains should be connected to the internal building plumbing and discharged through gravity into SAN 100 sanitary sewer stub as shown in **Drawing SAN-1** in **Appendix H .**

5.0 STORMWATER MANAGEMENT

5.1 OBJECTIVES

The objective of this stormwater management (SWM) plan is to determine the measures necessary to control the quantity of stormwater released from the proposed development to the required levels, and to provide sufficient detail for approval and construction.

5.2 SWM CRITERIA AND CONSTRAINTS

The stormwater management criteria for the proposed site are based on Stantec's 2018 Site Servicing and Stormwater Management Brief for Blocks 6 to 8 and City of Ottawa Sewer Design Guidelines. The following summarizes the criteria used in the preparation of this stormwater management plan:

- Stormwater runoff from the proposed Block 8 up to and including the 100-year event to be stored on site and released into the minor system at a maximum rate of 99.5 L/s
- Maximum 100-year water depth of 0.3 m in parking and access areas
- Provide adequate emergency overflow conveyance (overland flow route) off-site
- Size storm sewers in parking areas to convey a 2-year storm event, assuming the use of inlet control devices and sub-surface pipe storage to provide capacity for the system while meeting the target release from the site.
- Size storm sewers to convey 100-year storm from ramp, and parking deck areas.
- Size storm sewers using an inlet time of concentration (Tc) of 10 minutes
- Quality control of runoff from the proposed development to be provided in the downstream Brisebois Creek SWM Facility prior to discharge into the Ottawa River
- Post-development runoff coefficient (C) value based on proposed impervious areas as per site plan drawing (see **Appendix H**)

5.3 STORMWATER MANAGEMENT DESIGN

The proposed 0.75ha residential development consists of a four-storey building with underground and surface parking, and associated servicing infrastructure. The new overall imperviousness of the site is 60% (C = 0.62) based on the current site plan.

Stormwater runoff from the proposed development will be directed to the existing storm sewers on Prestige Circle which ultimately discharge into the Brisebois Creek SWM Facility. A sump pump and backwater valve will be provided for foundation drainage of the proposed building. The proposed site plan and existing storm sewer infrastructure on Prestige Circle are shown on **Drawing SSP-1**.

5.3.1 Design Methodology

The proposed stormwater management plan is designed to detain runoff on the rooftops, underground storage pipe and on surface areas to ensure that peak flows after construction will not exceed the target release rate for the site.

Due to the modified site plan layout and grading restrictions, part of the landscaped portion of the site backing into the existing ravine east of the site could not be graded to enter the site's storm system and as such it will sheet drain uncontrolled. Runoff from this uncontrolled area is included in the overall site discharge calculations. The parking deck and ramp are to be connected to the building's internal plumbing system discharging to a 250 mm diameter stub as shown in **Drawing SSP-1** in **Appendix H**

5.3.2 Water Quantity Control

The Modified Rational Method was used to assess the quantity and volume of runoff generated during post development conditions. The site was subdivided into eight subcatchments (subareas) tributary to storm sewer inlets, as defined by the location of catchbasins / inlet grates and used in the storm sewer design (see **Appendix C**). A summary of subareas and runoff coefficients is provided in **Appendix C**, and **Drawing SD-1** indicates the stormwater management subcatchments.

5.3.3 Allowable Release Rate

Stantec's Site Serving and Stormwater Management Brief for Blocks 6, 7 and 8 outlines the quantity control criteria for the overall site. The report for the three blocks is based on IBI's 2014 Petrie's Landing II Phase 2 Site Servicing Report which outlines the quality control criteria. The report outlines that the overall system target criteria for Block 8 is 99.5 L/s.

5.3.4 Storage Requirements

The site requires quantity control measures to meet the stormwater release criteria. It is proposed that the restricted release rooftop drains be used to reduce the peak outflow from the site. Additionally, underground storage pipe and surface storage on parking areas will be provided. **Drawing SD-1** indicates the design release rate from the rooftop. Stormwater management calculations are provided in **Appendix C**.

5.3.4.1 Rooftop Storage

It is proposed to retain stormwater on the rooftop (subcatchment R1002A) by installing restricted flow roof drains. The following calculations assume the roof will be equipped with eleven (11) Watts drains 50% open, see **Appendix C** for details.

Watts roof drain data has been used to calculate a practical roof release rate and detention storage volume for the rooftops. It should be noted that the "Watts" roof drain has been used as an example only and that other products may be specified for use, provided that the roof release rate is restricted to match the maximum rate of release indicated in **Table 2** and that sufficient roof storage is provided to meet (or exceed) the resulting volume of detained stormwater.

Table 2 provide details regarding the retention of stormwater on the proposed rooftop during the 2 and 100-year storm events. Refer to **Appendix C** for details.

Table 2: Peak Controlled (Rooftop) 2-Year and 100-Year Release Rate

Area ID	Return period	Area (ha)	Head (m)	$Q_{release}$ (L/s)	V_{stored} (m^3)
R1002A	2 Year	0.291	0.10	10.35	33.84
	100 Year		0.15	13.79	113.84

Roof subcatchment areas R1002B and R1002C will flow uncontrolled.

5.3.4.2 Surface and Pipe Storage

In addition to rooftop storage, it is proposed to detain stormwater on the surface parking lot areas (F1002A and F1002B) and in one pipe section using inlet control devices (ICDs) in the proposed drainage structures. An ICD (Vortex LMF 70) has also been sized to restrict peak flows from area F1002A through the use of surface storage. Similarly, surface storage and 5.73 m^3 of pipe storage is provided in area F1002B through 9m of 900 mm diameter HDPE Boss 2000 pipe connected to CBMH 1002 which will be fitted with a Vortex LMF 70 or equivalent to restrict post development peak flows from this area as shown on **Drawing SD-1**. The modified rational method was used to determine the peak flow, ponding depth and required storage volume for the proposed site. **Table 3**: summarizes the proposed ICD characteristics.

Table 3: 100-Year ICD Characteristics

Area ID	Structure ID	Orifice Type	Head (m)	Peak Release Rate (L/s)	Storage Volume Required (m^3)	Storage Volume Available (m^3)
F1002A	CB 1002A	Vortex LMF 70	2.00	6.10	13.8	30.3
F1002B	CBMH 1002B	Vortex LMF 65	2.82	6.09	6.9	7.1

5.3.5 Uncontrolled Area

A portion of the site fronting Prestige Circle and backing onto the ravine (see area UNC-1 on **Drawing SD-1**) could not be graded to enter the site's storm system and as such, it will sheet drain uncontrolled. For conservatism, runoff from this uncontrolled area is included in the overall site discharge calculations. **Table 4** summarize the 2 and 100-year uncontrolled release rates from the proposed development.

Table 4: Peak Uncontrolled (Non-tributary) 2-Year and 100-Year Release Rates

Storm Event	Area (ha)	Runoff 'C'	Tc (min)	$Q_{release}$ (L/s)
2-Year	0.234	0.26	10	13.0
100-Year		0.33		37.7

5.3.6 Results

The proposed building will have one level of underground parking and as such, it is proposed that the proposed parking ramp be equipped with a trench drain connected to the internal plumbing of the building to capture the 100-year runoff. Similarly, the proposed parking deck area F1002B will have a catchbasin connected to the internal plumbing of the building to capture the 100-year runoff.

It is recommended that the proposed building be equipped with a sump pump and a backwater valve for foundation drainage. **Table 5** and **Table 6** demonstrate that the proposed stormwater management plan provides adequate attenuation storage to meet the target peak outflows for the site.

Table 5: Estimated Discharge from Site (2-Year)

Block	Area Type	Area ID	$V_{required}$ (m^3)	$V_{available}$ (m^3)	$Q_{release}$ (L/s)	Target (L/s)
BLOCK 8	Controlled – Surface	F1002A & F1002B	8.2	37.4	8.2	**99.5**
	Roof Areas (Both Controlled and Uncontrolled)	R1002A, R1002B & R1002C	33.8	116.4	18.1	
	Parking Ramp Area	F1002C	-	-	4.6	
	Parking Deck	F1002D	-	-	4.1	
	Uncontrolled Areas	UNC-1	-	-	13.0	
		Total Block 8	**42.0**	**153.8**	**48.8**	

Table 6: Estimated Discharge from Site (100-Year)

Block	Area Type	Area ID	$V_{required}$ (m^3)	$V_{available}$ (m^3)	$Q_{release}$ (L/s)	Target (L/s)
BLOCK 8	Controlled – Surface	F1002A & F1002B	19.5	37.4	12.2	**99.5**
	Roof Areas (Both Controlled and Uncontrolled)	R1002A, R1002B & R1002C	113.8	116.4	28.7	
	Parking Ramp Area	F1002C	-	-	11.9	
	Parking Deck	F1002D	-	-	11.9	
	Uncontrolled Areas	UNC-1	-	-	37.6	
		Total Block 8	**133.3**	**150.2**	**102.4**	

As can be seen in the above tables, the proposed ICDs and storage provided restrict post development peak flows from site areas to 49.1 L/s and 105.0 L/s in the 2-year and 100-year storm events respectively. The 99.5 L/s target release is exceeded by 2.9 L/s in a 100-year event, which is considered negligible.

6.0 GRADING AND DRAINAGE

The proposed development site measures approximately 0.75 ha in area. The site has significant grade change from the southwestern to the northeastern boundary of the site. A detailed grading plan (see **Drawing GP-1**) has been provided to satisfy the stormwater management requirements, to meet minimum cover requirements for storm and sanitary sewers, and to provide sufficient cover over top of the underground parking garage. Site grading has been established to provide emergency overland flow routes for stormwater management in accordance with City of Ottawa requirements.

The subject site maintains emergency overland flow routes to the existing Prestige Circle ROW and to the existing ravine as depicted on **Drawings GP-1** and **SD-1**.

7.0 UTILITIES

The subject site has existing plants within Prestige Circle to provide Hydro, Bell, Gas and Cable servicing for the proposed development as existing residential development to the west was constructed as part of Phase 1 and Phase 2. It is anticipated that existing infrastructure will be sufficient to provide the means of distribution for the proposed site. Detailed design of the required utility services will be further investigated as part of the composite utility planning process following design circulation.

8.0 APPROVALS

Ontario Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECAs, formerly Certificates of Approval C of A) under the Ontario Water Resources Act are not expected to be a requirement for the development to proceed as the site will have a separate drainage and storm sewer system discharging to a pre-existing sewer system.

The proposed site is situated 120 m of the Petrie Island Provincially Significant Wetland, and as such, it is within the RVCA's regulatory jurisdiction. As a result, written approval from the RVCA is required under Ontario Regulation 174/06 "Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation" under Section 28 of the Conservation Authorities Act.

Requirement for an MECP Permit to Take Water (PTTW) for pumping during construction of the underground parking levels will be confirmed by the geotechnical consultant.

9.0 EROSION CONTROL DURING CONSTRUCTION

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

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit extent of exposed soils at any given time.
3. Re-vegetate exposed areas as soon as possible.
4. Minimize the area to be cleared and grubbed.
5. Protect exposed slopes with plastic or synthetic mulches.
6. Provide sediment traps and basins during dewatering.
7. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
8. Plan construction at proper time to avoid flooding.
9. Installation of a mud matt to prevent mud and debris from being transported off site.
10. Installation of a silt fence to prevent sediment runoff.

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

1. Verification that water is not flowing under silt barriers.
2. Clean and change silt traps at catch basins.

Refer to **Drawing EC-DS** for the proposed location of silt fences, and other erosion control structures.

10.0 GEOTECHNICAL INVESTIGATION

A geotechnical investigation was completed by Paterson Group Ltd. in July 30, 2019. The report summarizes the existing soil conditions within the subject area and construction recommendations. For details which are not summarized below, please see the original Paterson report (Excerpts included in **Appendix D**).

Subsurface soil conditions within Block 8 were determined from 6 boreholes distributed across the proposed site. In general soil stratigraphy consisted of topsoil or fill underlain by a brown silty clay crust over a deposit of grey silty clay layer.

Groundwater levels were measured on July 29, 2019 and on May 1, 2017 and vary in elevation from 4.0m to 6.5m below the original ground surface.

A permissible grade raise restriction of 2m is recommended within the Paterson Group report. The grade raise restrictions has been exceeded in some spots of the proposed development due to grading constraints and as a result, the proposed grading plan has been submitted to Paterson Group.

The required pavement structure for the local roadways is outlined in Table 7 and Table 8 below:

Table 7: Pavement Structure – Car Only Parking Areas

Thickness (mm)	Material Description
50	Wear Course – HL-3 or Superpave 12.5 Asphaltic Concrete
150	Base – OPSS Granular A Crushed Stone
300	Subbase - OPSS Granular B Type II
-	Subgrade – Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill.

Table 8: Pavement Structure – Access Lanes and Heavy Truck Parking Areas

Thickness (mm)	Material Description
40	Wear Course –Superpave 12.5 Asphaltic Concrete
50	Binder Course –Superpave 19.0 Asphaltic Concrete
150	Base – OPSS Granular A Crushed Stone
450	Subbase - OPSS Granular B Type II
-	Subgrade – Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill.

11.0 CONCLUSIONS

11.1 WATER SERVICING

The 200 mm diameter watermain on Prestige Circle provides adequate fire flow capacity as per the Fire Underwriters Survey. The service connections will also be capable of providing anticipated demand but exceeds the maximum objective pressure of 552 kPa (80 psi). Therefore, pressure reducing measures, such as a pressure reducing valve, will be required to service the proposed building per the Ontario Plumbing Code. The building will not require a booster pump to provide pressures greater than 40psi to the higher floors.

11.2 SANITARY SERVICING

The proposed sanitary sewer lateral is sufficiently sized to provide gravity drainage for the site. The proposed site will be serviced by a 200 mm diameter service lateral directing wastewater flows to the existing 300 mm dia. Prestige Circle sanitary sewer. A backflow preventer will be required for the proposed building in accordance with the Ottawa sewer design guidelines and will be coordinated with building mechanical engineers. The proposed sanitary drainage pattern is in accordance with the City of Ottawa Sewer Design guidelines.

11.3 STORMWATER SERVICING

The proposed stormwater management plan is in compliance with the goals specified through the stormwater management section of IBI Group's Design Brief for Petrie's Landing and with the City of Ottawa Design guidelines. Rooftop, underground pipe, and surface storage in combination with ICDs are proposed to limit inflow from the site area into the minor system to the required target release rate.

The proposed building will have underground parking and as such, it is recommended that the proposed parking ramp be equipped with trench drains to capture the 100-year runoff. The proposed parking deck area F1002D will have a catchbasin connected to the internal plumbing of the building to capture the 100-year runoff In addition, it is recommended that the proposed building be equipped with a sump pump and a backwater valve.

11.4 GRADING

Grading for the site has been designed to provide an emergency overland flow route as per City requirements and reflects the overall recommendations provided in the Geotechnical Investigation. Further geotechnical recommendations will be included in the next submission.

Erosion and sediment control measures will be implemented during construction to reduce the impact on existing infrastructure.

11.5 UTILITIES

All utilities (Hydro Ottawa, Bell Canada, Rogers Ottawa, and Enbridge Gas) have existing plants in the subject area. Exact size, location and routing of utilities will be finalized after design circulation.

11.6 APPROVAL / PERMITS

Ontario Ministry of the Environment, Conservation and Parks (MOECP) Environmental Compliance Approvals (ECA) are not expected to be required for the subject development as the site will have a separate drainage and storm sewer system discharge to a pre-existing sewer system. Written approval from the Rideau Valley Conservation Authority (RVCA) is required under Ontario Regulation 174/06 "Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation" under Section 28 of the Conservation Authorities Act for the portion of the site within 120 m of a significant wetland. A Permit to Take Water may be required for pumping requirements for construction of underground parking levels. No other approval requirements from other regulatory agencies are anticipated.

APPENDICES

Appendix A POTABLE WATER SERVICING ANALYSIS

Block 8 Petries Landing - Domestic Water Demand Estimates

Based on Site Statistics provided by Neuf Architectes Sencrl (2021-03-12)

Building ID	Units	Persons per unit[1]	Population	Daily Rate of Demand (L/p/d)	Avg Day Demand[2]		Max Day Demand[3]		Peak Hour Demand[3]	
					(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)
Studio	2	1.4	3	350	0.7	0.01	1.7	0.03	3.7	0.06
1 Bedroom	90	1.4	126	350	30.6	0.51	76.6	1.28	168.4	2.81
2 Bedrooms	16	2.1	34	350	8.2	0.14	20.4	0.34	44.9	0.75
3 Bedrooms	4	3.1	12	350	3.0	0.05	7.5	0.13	16.6	0.28
Total Site :	**112.0**		**175**		**42.5**	**0.7**	**106.2**	**1.8**	**233.7**	**3.9**

1 Population counts based on a conversion factor of 1.4 persons/ 1 Bedroom Apt., 2.1 Persons/ 2 Bedroom Apt, 3.1 Persons/ 3 Bedroom Apt.

2 Average day water demand for residential areas equal to 350 L/cap/d

3 The City of Ottawa water demand criteria used to estimate peak demand rates for residential areas are as follows:

maximum day demand rate = 2.5 x average day demand rate

peak hour demand rate = 2.2 x maximum day demand rate

Referenced from the City of Ottawa Sewer Design Guidelines (October 2012) and the Ottawa Design Guidelines: Water Distribution (July 2010)

FUS Fire Flow Calculation Sheet

Stantec Project #: 160401331
Project Name: Petries Landing Block 8
Date: 3/24/2021
Fire Flow Calculation #: 2
Description: Residential low rise

Notes:
1. 4-storey residential low-rise with 112 Residential units as provided by Neuf Architect(e)s dated Mar. 12, 2021.
2. A Firewall was provided dividing the building into two segments; Segment A (North) = 1756.23m^2, Segment B (South) = 1153.81m^2. The largest area has been adopted in the analysis below.

Step	Task	Notes						Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Wood Frame						1.5	-
2	Determine Ground Floor Area of One Unit	-						1756	-
	Determine Number of Adjoining Units	Includes adjacent wood frame structures separated by 3m or less						1	-
3	Determine Height in Storeys	Does not include floors >50% below grade or open attic space						4	-
4	Determine Required Fire Flow	(F = 220 x C x A$^{1/2}$). Round to nearest 1000 L/min						-	28000
5	Determine Occupancy Charge	Limited Combustible						-15%	23800
6	Determine Sprinkler Reduction	Conforms to NFPA 13						-30%	-9520
		Standard Water Supply						-10%	
		Not Fully Supervised or N/A						0%	
		% Coverage of Sprinkler System						100%	
7	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	-	-
		North	> 45	0	0	0-30	Wood Frame or Non-Combustible	0%	2380
		East	> 45	32	2	61-90	Wood Frame or Non-Combustible	0%	
		South	30.1 to 45	23	4	91-120	Wood Frame or Non-Combustible	5%	
		West	30.1 to 45	14	4	31-60	Wood Frame or Non-Combustible	5%	
8	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**							**17000**
		Total Required Fire Flow in L/s							**283.3**
		Required Duration of Fire Flow (hrs)							**3.50**
		Required Volume of Fire Flow (m^3)							**3570**

Hydraulic Model Results - Average Day Analysis

Junction Results

ID	Demand	Elevation	Head	Pressure	
	(L/s)	(m)	(m)	(psi)	(Kpa)
10.00	0.00	52.00	115.00	89.56	617.50
11.00	0.00	55.06	115.00	85.21	587.51
12.00	0.00	55.06	115.00	85.21	587.51
13.00	0.00	51.90	115.00	89.70	618.46
14.00	0.00	52.10	115.00	89.42	616.53
16.00	0.70	52.20	115.00	89.27	615.50
BLDG1	0.29	55.71	115.00	84.28	581.09
BLDG2	0.29	56.60	115.00	83.02	572.41
BLDG3	0.67	56.70	115.00	82.87	571.37
BLDG6	0.49	57.30	115.00	82.02	565.51
BLDG7	0.57	56.50	115.00	83.16	573.37

Pipe Results

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	(mm)		(L/s)	(m/s)
1	1000	14	25.84	393	120	3.01	0.02
11	12	11	7.05	204	110	-0.06	0.00
12	12	16	78.14	204	110	-1.08	0.03
13	13	10	7.80	393	120	-1.78	0.01
15	16	13	10.83	204	110	-1.78	0.06
2	14	10	19.33	393	120	3.01	0.02
3	10	11	84.72	204	110	1.23	0.04
4	BLDG1	11	51.80	204	110	-1.17	0.04
5	BLDG2	BLDG1	32.66	204	110	-0.88	0.03
6	BLDG3	BLDG2	62.45	204	110	-0.59	0.02
7	BLDG3	BLDG6	72.85	204	110	-0.08	0.00
8	BLDG6	BLDG7	34.69	204	110	-0.57	0.02
9	BLDG7	12	82.99	204	110	-1.14	0.03

Hydraulic Model Results - Peak Hour Analysis

Junction Results

ID	Demand	Elevation	Head	Pressure	
	(L/s)	(m)	(m)	(psi)	(Kpa)
10.00	0.00	52.00	108.00	79.60	548.83
11.00	0.00	55.06	107.96	75.21	518.56
12.00	0.00	55.06	107.96	75.21	518.56
13.00	0.00	51.90	108.00	79.75	549.86
14.00	0.00	52.10	108.00	79.46	547.86
16.00	3.90	52.20	107.99	79.31	546.83
BLDG1	1.60	55.71	107.95	74.26	512.01
BLDG2	1.60	56.60	107.94	72.98	503.18
BLDG3	3.69	56.70	107.93	72.83	502.15
BLDG6	2.71	57.30	107.93	71.98	496.29
BLDG7	3.12	56.50	107.94	73.12	504.15

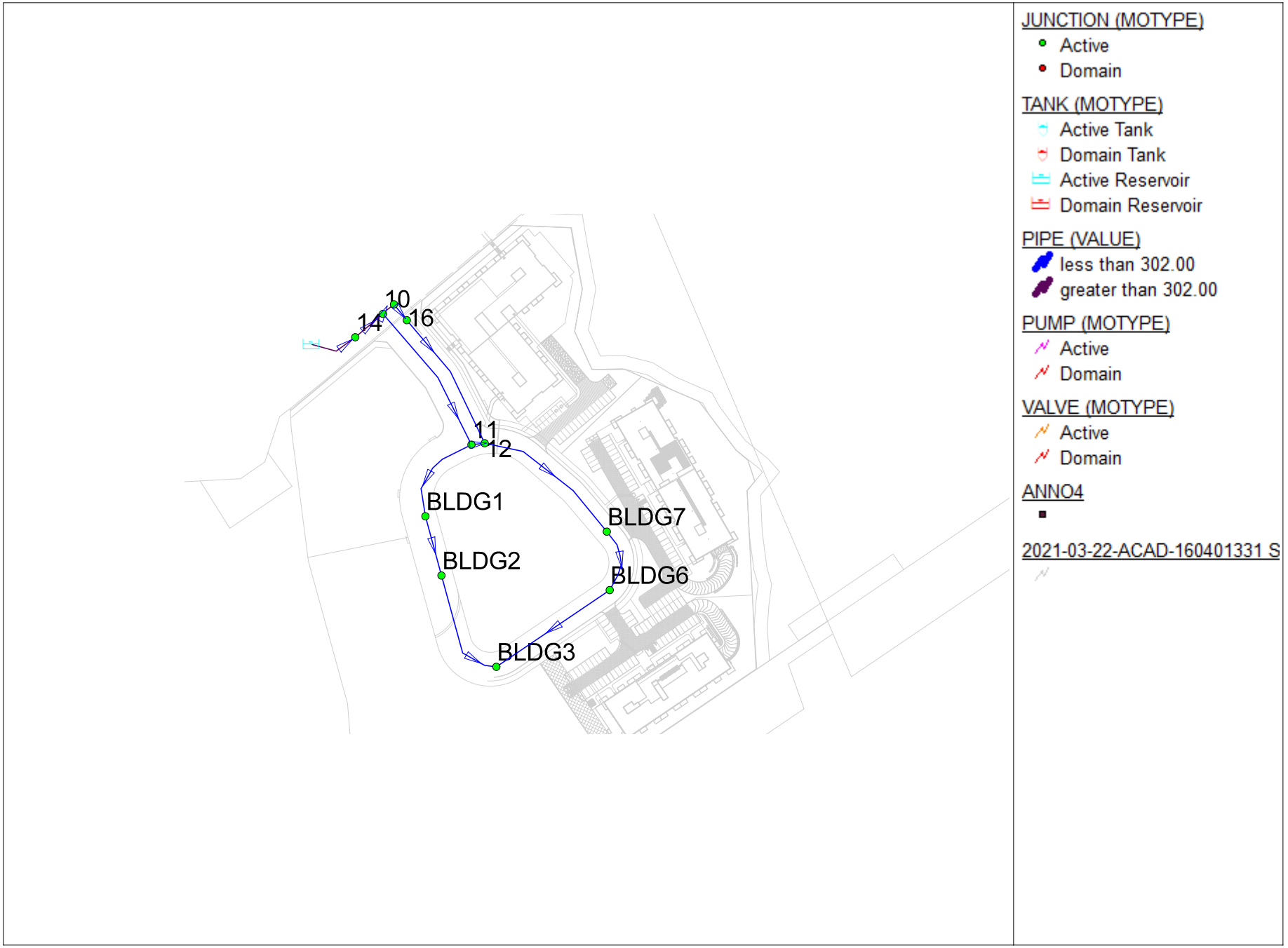
Pipe Results

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	(mm)		(L/s)	(m/s)
1	1000	14	25.84	393	120	16.62	0.14
11	12	11	7.05	204	110	-0.30	0.01
12	12	16	78.14	204	110	-5.97	0.18
13	13	10	7.80	393	120	-9.87	0.08
15	16	13	10.83	204	110	-9.87	0.30
2	14	10	19.33	393	120	16.62	0.14
3	10	11	84.72	204	110	6.75	0.21
4	BLDG1	11	51.80	204	110	-6.45	0.20
5	BLDG2	BLDG1	32.66	204	110	-4.85	0.15
6	BLDG3	BLDG2	62.45	204	110	-3.25	0.10
7	BLDG3	BLDG6	72.85	204	110	-0.44	0.01
8	BLDG6	BLDG7	34.69	204	110	-3.15	0.10
9	BLDG7	12	82.99	204	110	-6.27	0.19

Hydraulic Model Results -Fire Flow Analysis

ID	Static Demand	Static Pressure		Static Head	Fire-Flow Demand	Residual Pressure		Available Flow at Hydrant	Available Flow Pressure	
	(L/s)	(psi)	(Kpa)	(m)	(L/s)	(psi)	(Kpa)	L/s	(psi)	(Kpa)
16	1.8	82.16	566.48	110	283	76.54	527.73	1050.82	20	137.90
BLDG1	0.73	77.16	532.00	109.99	335	35.02	241.46	396.50	20	137.90
BLDG2	0.73	75.89	523.25	109.99	289	38.08	262.55	358.66	20	137.90
BLDG3	1.68	75.75	522.28	109.98	182	57.17	394.18	334.64	20	137.90
BLDG6	1.23	74.9	516.42	109.98	250	43.08	297.03	338.39	20	137.90
BLDG7	1.42	76.03	524.21	109.98	250	47.11	324.81	360.68	20	137.90

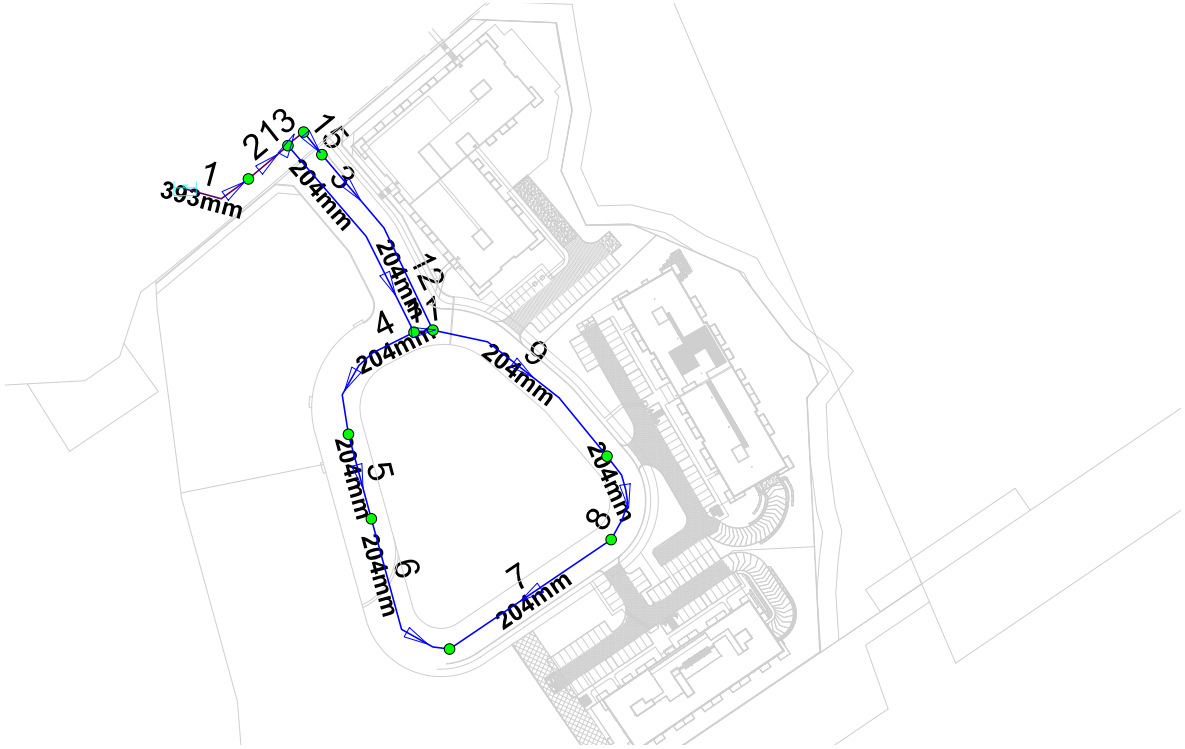
16041331-Blk8



Prepared By: N.Nwanise

Date: Wednesday, March 24, 2021

16041331-Blk8



JUNCTION (MOTYPE)
- Active
- Domain

TANK (MOTYPE)
- Active Tank
- Domain Tank
- Active Reservoir
- Domain Reservoir

PIPE (VALUE)
- less than 302.00
- greater than 302.00

PUMP (MOTYPE)
- Active
- Domain

VALVE (MOTYPE)
- Active
- Domain

ANNO3

2021-03-22-ACAD-160401331 S

ANNO5

Prepared By: N.Nwanise

Date: Wednesday, March 24, 2021

Appendix B SANITARY SEWER CALCULATIONS

Stantec

SUBDIVISION:

Petries Landing Block 8

DATE: Sept 16, 2021
REVISION: 3
DESIGNED BY: NN
CHECKED BY: TR

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160401331

XML Conversion

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	280	L/p/day	MINIMUM VELOCITY	0.60	m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	28,000.00	L/ha/day	MAXIMUM VELOCITY	3.00	m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL	55,000.00	L/ha/day	MANNINGS n	0.013	
PEAKING FACTOR (COMM., INST.):	1.5	INSTITUTIONAL	50,000.00	L/ha/day	BEDDING CLASS	C	
PERSONS / 3 Bedroom apt.	3.1	INFILTRATION	0.33	L/s/ha	MINIMUM COVER	2.50	m
PERSONS / 2 bedroom apt.	2.1						
PERSONS /1 Bedroom apt.	1.4						

LOCATION			RESIDENTIAL AREA AND POPULATION									COMM		INDUST		INSTIT		GREEN / UNUSED		C+I+I	INFILTRATION				PIPE								
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	UNITS 3 Bed	2 bed	1 bed	Studio	POP.	CUMULATIVE AREA	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	**TOTAL FLOW**	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)	VEL. (ACT.)
			(ha)						(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(m)	(mm)			(%)	(L/s)	(%)	(m/s)	(m/s)
R100A, G100A	BLK 8	SAN100	0.460	4	16	90	2	175	0.46	175	4.00	2.27	0.00	0.00	0.00	0.00	0.00	0.00	0.290	0.29	0.00	0.750	0.75	0.25	2.51	3.2	200	PVC	SDR-35	1.00	33.31	7.55	1.05	0.52
	SAN100	EX. MH6	0.000	0	0	0	0	0	0.46	175	4.00	2.27	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.29	0.00	0.000	0.75	0.25	2.51	11.5	200	PVC	SDR-35	1.00	33.31	7.55	1.05	0.52
																											300							

Appendix C STORMWATER MANAGEMENT CALCULATIONS

Stantec

Petries Landing Block 8

DATE: 2021-09-16
REVISION: 1
DESIGNED BY: MJS
CHECKED BY: TR

FILE NUMBER: **160401331**

STORM SEWER DESIGN SHEET
(City of Ottawa)

DESIGN PARAMETERS

$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:5 yr	1:10 yr	1:100 yr
a =	732.951	998.071	1174.184	1735.688
b =	6.199	6.053	6.014	6.014
c =	0.810	0.814	0.816	0.820

MANNING'S n = 0.013 BEDDING CLASS = B
MINIMUM COVER: 2.00 m
TIME OF ENTRY 10 min

LOCATION			DRAINAGE AREA																						PIPE SELECTION											
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{2\text{-YEAR}}$ (mm/h)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$I_{100\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETE (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	VEL. (ACT) (m/s)	TIME OF FLOW (min)
R1002A, R1002B, R1002C, F1002C, F1002D	Bldg 8 Stm	1001	0.09	0.00	0.00	0.02	0.33	0.45	0.00	0.00	0.90	0.041	0.041	0.000	0.000	0.000	0.000	0.022	0.022	10.00	76.81	104.19	122.14	178.56	30.8	30.8	50.2	7.5	250	250	CIRCULAR	PVC	-	1.00	60.4	**83.06%**	1.22	1.21	0.10
																				10.10																		
F1002B	1002B	1002	0.04	0.00	0.00	0.00	0.00	0.71	0.00	0.00	0.00	0.028	0.028	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	6.0	10.2	200	200	CIRCULAR	PVC	-	1.00	33.3	**18.05%**	1.05	0.66	0.26
F1002A	1002	1001	0.06	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.00	0.040	0.068	0.000	0.000	0.000	0.000	0.000	0.000	10.26	75.83	102.85	120.55	176.23	0.0	0.0	14.4	26.7	250	250	CIRCULAR	PVC	-	0.50	42.7	**33.66%**	0.86	0.65	0.68
																				10.94																		
	1001	1000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.109	0.000	0.000	0.000	0.000	0.000	0.022	10.94	73.37	99.47	116.58	170.40	0.0	30.8	63.2	11.7	300	300	CIRCULAR	PVC	-	1.00	96.2	**65.73%**	1.37	1.27	0.15
																				11.09									375	375								

Stormwater Management Calculations

Project #160401331, Petries Landing - Block 8
Modified Rational Method Calculatons for Storage

2 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	732.951
b =	6.199
c =	0.81

t (min)	I (mm/hr)
10	76.81
20	52.03
30	40.04
40	32.86
50	28.04
60	24.56
70	21.91
80	19.83
90	18.14
100	16.75
110	15.57
120	14.56

100 YEAR Target Release from Block 8

SWM Appoach: Limit site to 99.5 L/s
Area (ha): 0.748
C: 0.55

Qtarget(100 yr) (L/s)
99.50

2 YEAR Modified Rational Method for Entire Site

Subdrainage Area: R1002B — Uncontrolled - Tributary
Area (ha): 0.00
C: 0.90

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
5	103.57	1.14	1.14		
10	76.81	0.84	0.84		
15	61.77	0.68	0.68		
20	52.03	0.57	0.57		
25	45.17	0.49	0.49		
30	40.04	0.44	0.44		
35	36.06	0.40	0.40		
40	32.86	0.36	0.36		
45	30.24	0.33	0.33		
50	28.04	0.31	0.31		
55	26.17	0.29	0.29		
60	24.56	0.27	0.27		

Subdrainage Area: R1002C — Uncontrolled - Tributary
Area (ha): 0.03
C: 0.90

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
5	103.57	6.63	6.63		
10	76.81	4.92	4.92		
15	61.77	3.96	3.96		
20	52.03	3.33	3.33		
25	45.17	2.89	2.89		
30	40.04	2.56	2.56		
35	36.06	2.31	2.31		
40	32.86	2.10	2.10		
45	30.24	1.94	1.94		
50	28.04	1.80	1.80		
55	26.17	1.68	1.68		
60	24.56	1.57	1.57		

Subdrainage Area: F1002A — Controlled - Tributary
Area (ha): 0.063
C: 0.67

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	9.03	2.94	6.09	3.65
20	52.03	6.12	2.94	3.17	**3.81**
30	40.04	4.71	2.94	1.76	3.18
40	32.86	3.86	2.94	0.92	2.21
50	28.04	3.30	2.94	0.35	1.06
60	24.56	2.89	2.89	0.00	0.00
70	21.91	2.58	2.58	0.00	0.00
80	19.83	2.33	2.33	0.00	0.00
90	18.14	2.13	2.13	0.00	0.00
100	16.75	1.97	1.97	0.00	0.00
110	15.57	1.83	1.83	0.00	0.00
120	14.56	1.71	1.71	0.00	0.00

Storage: Surface Storage Above CB

Orifice Equation: Vortex LMF 50
Invert Elevation 52.95 m
T/G Elevation 54.65 m
Max Ponding Depth 0.00 m
Downstream W/L 51.33 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	54.65	1.70	2.94	3.81	30.30	OK

Subdrainage Area: F1002B — Controlled - Tributary
Area (ha): 0.040
C: 0.71

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	6.06	6.06	0.00	**0.00**
20	52.03	4.11	4.11	0.00	**0.00**
30	40.04	3.16	3.16	0.00	**0.00**
40	32.86	2.59	2.59	0.00	**0.00**
50	28.04	2.21	2.21	0.00	**0.00**
60	24.56	1.94	1.94	0.00	**0.00**
70	21.91	1.73	1.73	0.00	**0.00**
80	19.83	1.57	1.57	0.00	**0.00**
90	18.14	1.43	1.43	0.00	**0.00**
100	16.75	1.32	1.32	0.00	**0.00**
110	15.57	1.23	1.23	0.00	**0.00**
120	14.56	1.15	1.15	0.00	**0.00**

Storage: Surface Storage Above CB

LMF: Vortex LMF 65
Invert Elevation 51.56 m
T/G Elevation 54.36 m
Max Ponding Depth 0.00 m
Downstream W/L 51.43 m

Project #160401331, Petries Landing - Block 8
Modified Rational Method Calculatons for Storage

100 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	1735.688
b =	6.014
c =	0.820

t (min)	I (mm/hr)
10	178.56
20	119.95
30	91.87
40	75.15
50	63.95
60	55.89
70	49.79
80	44.99
90	41.11
100	37.90
110	35.20
120	32.89

100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: R1002B — Uncontrolled - Tributary
Area (ha): 0.00
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	2.17	2.17		
20	119.95	1.46	1.46		
30	91.87	1.12	1.12		
40	75.15	0.91	0.91		
50	63.95	0.78	0.78		
60	55.89	0.68	0.68		
70	49.79	0.61	0.61		
80	44.99	0.55	0.55		
90	41.11	0.50	0.50		
100	37.90	0.46	0.46		
110	35.20	0.43	0.43		
120	32.89	0.40	0.40		

Subdrainage Area: R1002C — Uncontrolled - Tributary
Area (ha): 0.03
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	12.71	12.71		
20	119.95	8.54	8.54		
30	91.87	6.54	6.54		
40	75.15	5.35	5.35		
50	63.95	4.55	4.55		
60	55.89	3.98	3.98		
70	49.79	3.54	3.54		
80	44.99	3.20	3.20		
90	41.11	2.93	2.93		
100	37.90	2.70	2.70		
110	35.20	2.51	2.51		
120	32.89	2.34	2.34		

Subdrainage Area: F1002A — Controlled - Tributary
Area (ha): 0.063
C: 0.84

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	26.23	6.10	20.13	12.08
20	119.95	17.62	6.10	11.52	**13.83**
30	91.87	13.50	6.10	7.40	13.31
40	75.15	11.04	6.10	4.94	11.85
50	63.95	9.40	6.10	3.29	9.88
60	55.89	8.21	6.10	2.11	7.60
70	49.79	7.31	6.10	1.21	5.10
80	44.99	6.61	6.10	0.51	2.44
90	41.11	6.04	6.04	0.00	0.00
100	37.90	5.57	5.57	0.00	0.00
110	35.20	5.17	5.17	0.00	0.00
120	32.89	4.83	4.83	0.00	0.00

Storage: Surface Storage Above CB

LMF: Vortex LMF 70
Invert Elevation 52.95 m
T/G Elevation 54.65 m
Max Ponding Depth 0.30 m
Downstream W/L 51.33 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	54.95	2.00	6.10	13.83	30.30	OK
					16.47	

Subdrainage Area: F1002B — Controlled - Tributary
Area (ha): 0.040
C: 0.89

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	17.62	6.09	11.53	**6.92**
20	119.95	11.84	6.09	5.74	6.89
30	91.87	9.07	6.09	2.97	5.35
40	75.15	7.42	6.09	1.32	3.17
50	63.95	6.31	6.09	0.22	0.65
60	55.89	5.52	5.52	0.00	0.00
70	49.79	4.91	4.91	0.00	0.00
80	44.99	4.44	4.44	0.00	0.00
90	41.11	4.06	4.06	0.00	0.00
100	37.90	3.74	3.74	0.00	0.00
110	35.20	3.47	3.47	0.00	0.00
120	32.89	3.25	3.25	0.00	0.00

Storage: Surface Storage Above CB

LMF: Vortex LMF 65
Invert Elevation 51.56 m
T/G Elevation 54.36 m
Max Ponding Depth 0.02 m
Downstream W/L 51.43 m

Pipe Storage:
Diameter (mm): 900
Length (m): 9.00
Area (m2): 0.64
Volume (m3): 5.73
CB and MH Vol (m3): 1.34

Stormwater Management Calculations

Project #160401331, Petries Landing - Block 8
Modified Rational Method Calculatons for Storage

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
5-year Water Level	54.36	2.80	6.07	0.00	7.07	OK

Subdrainage Area: F1002C — RAMP - Bldg
Area (ha): 0.024
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	4.61	4.61		
20	52.03	3.12	3.12		
30	40.04	2.40	2.40		
40	32.86	1.97	1.97		
50	28.04	1.68	1.68		
60	24.56	1.47	1.47		
70	21.91	1.32	1.32		
80	19.83	1.19	1.19		
90	18.14	1.09	1.09		
100	16.75	1.01	1.01		
110	15.57	0.93	0.93		
120	14.56	0.87	0.87		

Subdrainage Area: F1002D — Parking Deck - Bldg
Area (ha): 0.066
C: 0.29

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	4.09	4.09		
20	52.03	2.77	2.77		
30	40.04	2.13	2.13		
40	32.86	1.75	1.75		
50	28.04	1.49	1.49		
60	24.56	1.31	1.31		
70	21.91	1.17	1.17		
80	19.83	1.06	1.06		
90	18.14	0.97	0.97		
100	16.75	0.89	0.89		
110	15.57	0.83	0.83		
120	14.56	0.77	0.77		

Subdrainage Area: R1002A — Roof
Area (ha): 0.291
C: 0.900
Maximum Storage Depth: 150 mm

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	55.92	9.82	46.10	27.66	91.4	0.00
20	52.03	37.88	10.29	27.59	33.11	98.3	0.00
30	40.04	29.15	10.35	18.80	**33.84**	99.2	0.00
40	32.86	23.93	10.26	13.67	32.80	97.9	0.00
50	28.04	20.42	10.10	10.31	30.94	95.6	0.00
60	24.56	17.88	9.91	7.97	28.70	92.7	0.00
70	21.91	15.95	9.70	6.26	26.28	89.7	0.00
80	19.83	14.44	9.48	4.96	23.80	86.6	0.00
90	18.14	13.21	9.26	3.95	21.31	83.5	0.00
100	16.75	12.19	9.05	3.14	18.86	80.4	0.00
110	15.57	11.34	8.84	2.49	16.46	77.4	0.00
120	14.56	10.60	8.62	1.98	14.25	74.3	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
5-year Water Level	99.19	0.10	10.35	33.84	116.40	0.00

Subdrainage Area: UNC-1 — Uncontrolled - Non-Tributary
Area (ha): 0.234
C: 0.26

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	12.97	12.97		
20	52.03	8.79	8.79		
30	40.04	6.76	6.76		
40	32.86	5.55	5.55		
50	28.04	4.74	4.74		
60	24.56	4.15	4.15		
70	21.91	3.70	3.70		
80	19.83	3.35	3.35		
90	18.14	3.06	3.06		
100	16.75	2.83	2.83		
110	15.57	2.63	2.63		
120	14.56	2.46	2.46		

SUMMARY TO OUTLET

Tributary Area	0.484	ha
Total 2yr Flow to Sewer	35.8	L/s
Non-Tributary Area	0.264	ha
Total Uncontrolled 2yr Flow	13.0	L/s
Total 2year Flow	48.8	L/s
Target	99.5	L/s

Project #160401331, Petries Landing - Block 8
Modified Rational Method Calculatons for Storage

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	54.38	2.82	6.09	6.92	7.07	OK
					0.15	

Subdrainage Area: F1002C — RAMP - Bldg
Area (ha): 0.024
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	11.91	11.91		
20	119.95	8.00	8.00		
30	91.87	6.13	6.13		
40	75.15	5.01	5.01		
50	63.95	4.27	4.27		
60	55.89	3.73	3.73		
70	49.79	3.32	3.32		
80	44.99	3.00	3.00		
90	41.11	2.74	2.74		
100	37.90	2.53	2.53		
110	35.20	2.35	2.35		
120	32.89	2.19	2.19		

Subdrainage Area: F1002D — Parking Deck - Bldg
Area (ha): 0.066
C: 0.3625

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	11.88	11.88		
20	119.95	7.98	7.98		
30	91.87	6.11	6.11		
40	75.15	5.00	5.00		
50	63.95	4.25	4.25		
60	55.89	3.72	3.72		
70	49.79	3.31	3.31		
80	44.99	2.99	2.99		
90	41.11	2.73	2.73		
100	37.90	2.52	2.52		
110	35.20	2.34	2.34		
120	32.89	2.19	2.19		

Warning, max. volume may not have been reached.

Subdrainage Area: R1002A — Roof
Area (ha): 0.291
C: 1.00
Maximum Storage Depth: 150 mm

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	144.45	12.56	131.89	79.13	131.0	0.00
20	119.95	97.04	13.32	83.72	100.47	141.9	0.00
30	91.87	74.32	13.53	60.79	109.42	145.0	0.00
40	75.15	60.79	13.76	47.04	112.89	148.2	0.00
50	63.95	51.74	13.79	37.95	**113.84**	148.7	0.00
60	55.89	45.22	13.77	31.45	113.22	148.4	0.00
70	49.79	40.28	13.71	26.57	111.59	147.5	0.00
80	44.99	36.40	13.63	22.77	109.29	146.4	0.00
90	41.11	33.26	13.53	19.73	106.53	145.0	0.00
100	37.90	30.66	13.42	17.24	103.45	143.4	0.00
110	35.20	28.48	13.30	15.17	100.14	141.7	0.00
120	32.89	26.61	13.18	13.43	96.69	140.0	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	148.70	0.15	13.79	113.84	116.40	0.00

Subdrainage Area: UNC-1 — Uncontrolled - Non-Tributary
Area (ha): 0.234
C: 0.33

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	37.70	37.70		
20	119.95	25.33	25.33		
30	91.87	19.40	19.40		
40	75.15	15.87	15.87		
50	63.95	13.50	13.50		
60	55.89	11.80	11.80		
70	49.79	10.51	10.51		
80	44.99	9.50	9.50		
90	41.11	8.68	8.68		
100	37.90	8.00	8.00		
110	35.20	7.43	7.43		
120	32.89	6.95	6.95		

SUMMARY TO OUTLET

Tributary Area	0.484	ha
Total 100yr Flow to Sewer	64.7	L/s
Non-Tributary Area	0.264	ha
Total Uncontrolled 100yr Flow	37.7	L/s
Total 100year Flow	102.4	L/s
Target	99.5	L/s

Appendix D GEOTECHNICAL INVESTIGATION

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

patersongroup

Supplemental Geotechnical Investigation

Proposed Multi-Storey Buildings
Blocks 8 - Petrie's Landing II
8466 Jeanne D'Arc Boulevard
Ottawa, Ontario

Prepared For

Construction Brigil

July 30,2019

Report: PG4112-2

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Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Construction Brigil to conduct a supplemental geotechnical investigation for Blocks 8 at Petrie's Landing II residential development located at 8466 Jeanne D'Arc Boulevard in the City of Ottawa (refer to Figure 1 - Key Plan presented in Appendix 2).

The objective of the investigation was to:

- ❏ determine the subsoil and groundwater conditions at this site by means of test holes and existing soils information.
- ❏ provide geotechnical recommendations for the design of the proposed development including construction considerations which may affect the design.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

2.0 Proposed Development

It is understood that Block 8 of the residential development will consist of a 10 storey residential building with 2 levels of underground parking with pathways, landscaping and paved parking areas with local access roadways and will be serviced by municipal services.

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The field program for the supplemental geotechnical investigation was carried out on July 9 and 10, 2019, at that time 3 boreholes (BH1-19 to BH3-19) were drilled to a maximum depth of 42.9 m. A initial geotechnical investigation was carried out, for the subject block, on April 24 and 25, 2017 which consisted of extending a total of 3 boreholes (BH 4-17 to BH 6-17) to a maximum depth of 9.8 m below the existing grade. The borehole locations were distributed in a manner to provide general coverage of the subject site at the proposed buildings footprints area and taking into consideration site features. Borehole locations are illustrated on Drawing PG4112-2 - Test Hole Location Plan included in Appendix 2.

The boreholes were drilled using a track-mounted auger drill rig operated by a two-person crew. All fieldwork was conducted under the full-time supervision of Paterson personnel under the direction of a senior engineer. The drilling procedure consisted of augering to the required depths at the selected locations, sampling and testing the overburden.

Sampling and In Situ Testing

Soil samples were recovered from a 50 mm diameter split-spoon or the auger flights. The split-spoon and auger samples were classified on site and placed in sealed plastic bags. All samples were transported to our laboratory. The depths at which the split-spoon and auger samples were recovered from the boreholes are presented as SS and AU, respectively, on the Soil Profile and Test Data sheets.

Standard Penetration Tests (SPT) were conducted and recorded as "N" values on the Soil Profile and Test Data sheets. The "N" value is the number of blows required to drive the split-spoon sample 300 mm into the soil after the initial penetration of 150 mm using a 63.5 kg hammer falling from a height of 760 mm.

Undrained shear strength testing, using a vane apparatus, was carried out at regular intervals of depth in cohesive soils.

The overburden thickness was evaluated by a dynamic cone penetration test (DCPT) completed on all 3 boreholes of the current investigation. The DCPT consists of driving a steel drill rod, equipped with a 50 mm diameter cone at the tip, using a 63.5 kg hammer falling from a height of 760 mm. The number of blows required to drive the cone into the soil is recorded for each 300 mm increment.

Subsurface conditions observed in the test holes were recorded in detail in the field. Reference should be made to the Soil Profile and Test Data sheets presented in Appendix 1 for specific details of the soil profile encountered at the test hole locations.

Groundwater

Flexible polyethylene standpipes were installed in boreholes to permit monitoring of the groundwater levels subsequent to the completion of the sampling program.

3.2 Field Survey

The borehole locations and ground surface elevations at the borehole locations were provided by Annis, O'Sullivan Vollebekk Ltd. The borehole locations and the ground surface elevation at the borehole locations are presented on Drawing PG4112-2 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

Soil samples recovered from the subject site were visually examined in our laboratory to review the field logs.

One representative soil sample was submitted for Atterberg limits testing and hydrometer sieve analysis as part of the current investigation. The results are presented in Subsection 6.8.

3.4 Analytical Testing

One soil sample was submitted for analytical testing to assess the potential for exposed ferrous metals and the sulphate potential against subsurface concrete structures. The sample was submitted to determine the concentration of sulphate and chloride, the resistivity and the pH of the soil. The results are discussed further in Subsection 6.7.

4.0 Observations

4.1 Surface Conditions

The subject property is bordered to the north by Jeanne D'Arc Boulevard North, to the east by a treed area and Taylor Creek, to the south by parcel currently in development by the same owner, and to the west by Prestige Circle and residential dwellings.

The site is relatively flat and grass covered. Some existing fill piles containing organic and construction debris were observed near the south portion of the site near the current construction project

4.2 Subsurface Profile

Generally, the soil conditions encountered at the test holes locations consist of topsoil or fill overlying a brown silty clay crust over a deep deposit of grey silty clay.

Based on available geological mapping and previous investigations conducted by Paterson in the area, interbedded limestone and dolomite bedrock of the Gull River formation is present in this area with a drift thickness of 40 to 50 m.

Reference should be made to the Soil Profile and Test Data sheets in Appendix 1 for the details of the soil profiles encountered at each test hole location.

Silty Clay

A weathered silty clay crust varying in depths between 0.3 and 3 m was encountered at the borehole locations. In situ shear vane field testing was carried out in the lower portion of the weathered crust yielded undrained shear strength values ranging from approximately 90 to 105 kPa. These values are indicative of a stiff to very stiff consistency.

Grey silty clay was encountered below the weathered crust at all borehole locations. In situ shear vane field testing carried out in the grey silty clay yielded undrained shear strength values ranging between 38 and 60 kPa. These values are indicative of a firm to stiff consistency.

4.3 Groundwater

The measured groundwater levels in the boreholes are presented in Table 1 below.

Table 1
Summary of Groundwater Level Readings

Borehole Number	Ground Elevation (m)	Groundwater Levels (m)		Recording Date
		Depth	Elevation	
BH 1-19	54.29	4.04	50.25	July 29, 2019
BH 2-19	52.71	6.53	46.18	July 29, 2019
BH 3-19	52.57	6.10	46.47	July 29, 2019
BH 4-17	53.84	dry	-	May 1, 2017
BH 5-17	52.45	4.35	48.10	May 1, 2017
BH 6-17	52.59	5.48	47.11	May 1, 2017

Note: The groundwater level at each current borehole location is referenced to the borehole ground surface elevation, as provided by Annis, O'Sullivan Vollebekk Ltd.

It should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater level could vary at the time of construction. The long term groundwater level is expected to be at a depth of 4 to 6 m below the existing grade.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is considered satisfactory for the proposed multi-storey building. Based on the results of the field program, it's expected that the proposed building will be founded on a raft foundation placed on the undisturbed stiff silty clay bearing surface. Where design building loads exceed the given bearing resistance values, consideration may be given to placing the building footprint on end bearing piles and the building garage footprint extending beyond the building would be placed on conventional spread footings.

A permissible grade raise restriction is required for the subject site due to the presence of a deep silty clay deposit. It's expected that final grades will be close to the existing grades.

The above and other considerations are further discussed in the following sections.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and deleterious fill, such as those containing organics, should be stripped from under any buildings, paved areas, pipe bedding and other settlement sensitive structures.

Fill Placement

Fill used for grading beneath the building footprints, unless otherwise specified, should consist of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. The fill should be tested and approved prior to delivery to the site. It should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the building area should be compacted to at least 98% of its standard Proctor maximum dry density (SPMDD).

Site-excavated soil can be used as general landscaping fill where settlement of the ground surface is of minor concern. These materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If these materials are to be used to build up the subgrade level for areas to be paved, they should be compacted in thin lifts to a minimum density of 95% of their respective SPMDD. Site-excavated soils are not suitable for use as backfill against foundation walls due to the frost heave potential of the site excavated soils below settlement sensitive areas, such as concrete sidewalks and exterior concrete entrance areas.

5.3 Foundation Design

Raft Foundation

Consideration can be given to a raft foundation if the building loads are acceptable. It's expected that a raft foundation will be founded at a depth of approximately 7 to 8 m below the existing grade. The following parameters may be used for a raft foundation design:

- For design purposes, the factored bearing resistance at ULS can be taken as **250 kPa**. A geotechnical resistance factor of 0.5 was applied to the bearing resistance value at ULS.

- The amount of settlement of the raft slab will be dependent on the sustained raft contact pressure. A bearing resistance value at SLS (contact pressure) of **175 kPa** can be used. The loading conditions for the contact pressure are based on sustained loads, that are generally taken to be 100% Dead Load and 50% Live Load.

- The modulus of subgrade reaction was calculated to be **5 MPa/m** for a contact pressure of **150 kPa**. The design of the raft foundation is required to consider the relative stiffness of the reinforced concrete slab and the supporting bearing medium.

- The proposed building can be designed using the above parameters and a total and differential settlement of 25 and 20 mm, respectively.

Deep Foundation

For support of the proposed multi-storey building consideration could be given to using concrete filled steel pipe piles driven to refusal on the bedrock surface.

For deep foundations, concrete-filled steel pipe piles are generally utilized in the Ottawa area. Applicable pile resistance at SLS values and factored pile resistance at ULS values are given in Table 2. A resistance factor of 0.4 has been incorporated into the factored ULS values. Note that these are all geotechnical axial resistance values.

The geotechnical pile resistance values were estimated using the Hiley dynamic formula, to be confirmed during pile installation with a program of dynamic monitoring. For this project, the dynamic monitoring of two to four piles would be recommended. As a minimum, the pipe piles should be equipped with a base plate having a thickness of at least 20 mm to minimize damage to the pile tip during driving. Re-striking of all piles at least once will also be required after at least 48 hours have elapsed since initial driving.

Table 2 - Pile Foundation Design Data

Pile Outside Diameter (mm)	Pile Wall Thickness (mm)	Geotechnical Axial Resistance		Final Set (blows/12 mm)	Transferred Hammer Energy (kJ)
		SLS (kN)	Factored at ULS (kN)		
245	9	940	1130	10	29
245	11	1175	1410	10	35
245	13	1375	1650	10	42

Permissible Grade Raise Restriction

Due to the presence of the silty clay layer, the subject site will be subjected to a permissible grade restriction. A permissible grade raise restriction of **2 m** is recommended for the subject site.

5.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class E** as defined in the Ontario Building Code 2012 (OBC 2012; Table 4.1.8.4.A) for the foundations considered at this site. The soil underlying the proposed shallow foundations are not susceptible to liquefaction for the local seismicity. It may be possible that the seismic site classification could be a Class D. To confirm this better site classification, a site specific shear wave velocity test will be required.

5.5 Slab-on-Grade Construction

With the removal of all topsoil and deleterious materials, within the footprint of the proposed buildings, the native soil or engineered fill surface will be considered to be an acceptable subgrade surface on which to commence backfilling for the floor slab. The upper 150 mm of sub-slab fill should consist of an OPSS Granular A crushed stone. All backfill material within the footprint of the proposed buildings should be placed in maximum 300 mm thick loose lifts and compacted to at least 98% of its SPMDD.

Any soft areas should be removed and backfilled with appropriate backfill material. OPSS Granular B Type II, with a maximum particle size of 50 mm, are recommended for backfilling below the floor slab.

5.6 Pavement Design

Car only parking areas, access lanes and heavy truck parking areas are anticipated at this site. The proposed pavement structures are shown in Tables 3 and 4.

Table 3 - Recommended Pavement Structure - Car Only Parking Areas

Thickness (mm)	Material Description
50	**Wear Course -** HL-3 or Superpave 12.5 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
300	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill	

Table 4 - Recommended Pavement Structure
Access Lanes and Heavy Truck Parking Areas

Thickness (mm)	Material Description
40	**Wear Course** - Superpave 12.5 Asphaltic Concrete
50	**Binder Course** - Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
450	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill	

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type II material. The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 98% of the material's SPMDD using suitable vibratory equipment.

Pavement Structure Drainage

Satisfactory performance of the pavement structure is largely dependent on keeping the contact zone between the subgrade material and the base stone in a dry condition. Failure to provide adequate drainage under conditions of heavy wheel loading can result in the fine subgrade soil being pumped into the voids in the stone subbase, thereby reducing its load carrying capacity.

Due to the impervious nature of the subgrade materials consideration should be given to installing subdrains during the pavement construction. These drains should be installed at each catch basin, be at least 3 m long and should extend in four orthogonal directions or longitudinally when placed along a curb. Along local streets, the drains should be placed along the edges of the pavement. The subdrain inverts should be approximately 300 mm below subgrade level. The subgrade surface should be crowned to promote water flow to the drainage lines.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

It is recommended that a perimeter foundation drainage system be provided for the proposed structures. The system should consist of a 150 mm diameter perforated corrugated plastic pipe, surrounded on all sides by 150 mm of 19 mm clear crushed stone, placed at the footing level around the exterior perimeter of the structures. The pipe should have a positive outlet, such as a gravity connection to the storm sewer.

Backfill against the exterior sides of the foundation walls should consist of free-draining non frost susceptible granular materials, such as clean sand or OPSS Granular B Type I granular material. The greater part of the site excavated materials will be frost susceptible and, as such, are not recommended for re-use as backfill against the foundation walls. A drainage geocomposite, such as Miradrain G100N or Delta Drain 6000, connected to the perimeter foundation drainage system is recommended.

6.2 Protection of Footings, Pile Caps and Grade Beams Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effect of frost action. A minimum of 1.5 m thick soil cover (or equivalent) should be provided in this regard.

Exterior unheated footings, such as those for isolated exterior piers, are more prone to deleterious movement associated with frost action than the exterior walls of the structure proper and require additional protection, such as soil cover of 2.1 m or a combination of soil cover and foundation insulation.

6.3 Excavation Side Slopes

The side slopes of excavations in the soil and fill overburden materials should either be cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. It is assumed that sufficient room will be available for the greater part of the excavation to be undertaken by open-cut methods (i.e. unsupported excavations).

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. The subsoil at this site is considered to be mainly a Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept away from the excavation sides.

Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

It is recommended that a trench box be used at all times to protect personnel working in trenches with steep or vertical sides. 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.

6.4 Pipe Bedding and Backfill

Bedding and backfill materials should be in accordance with the most recent Material Specifications & Standard Detail Drawings from the Department of Public Works and Services, Infrastructure Services Branch of the City of Ottawa.

At least 150 mm of OPSS Granular A should be used for bedding for sewer and water pipes when placed on soil subgrade. The bedding should extend to the spring line of the pipe. Cover material, from the spring line to at least 300 mm above the obvert of the pipe should consist of OPSS Granular A (concrete or PSM PVC pipes) or sand (concrete pipe). The bedding and cover materials should be placed in maximum 225 mm thick lifts compacted to a minimum of 95% of the material's SPMDD.

Generally, it should be possible to re-use the moist, not wet, silty clay above the cover material if the excavation and filling operations are carried out in dry weather conditions. The wet silty clay should be given a sufficient drying period to decrease its moisture content to an acceptable level to make compaction possible prior to being re-used.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) should match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the material's SPMDD.

6.5 Groundwater Control

Groundwater Control for Building Construction

It is anticipated that groundwater infiltration into the excavations should be low to moderate and controllable using open sumps. Pumping from open sumps should be sufficient to control the groundwater influx through the sides of shallow excavations.

The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium.

Permit to Take Water

A temporary Ministry of the Environment, Conservation and Parks (MECP) Category permit to take water (PTTW) may be required for this project if more than 400,000 L/day of ground and/or surface water is to be pumped during the construction phase. A minimum of 4 to 5 months should be allowed for completion of the PTTW application package and issuance of the permit by the MECP.

For typical ground or surface water volumes being pumped during the construction phase, between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16. If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MECP review of the PTTW application.

6.6 Winter Construction

Precautions must be taken if winter construction is considered for this project.

The subsoil conditions at this site consist of frost susceptible materials. In the presence of water and freezing conditions, ice could form within the soil mass. Heaving and settlement upon thawing could occur.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the use of straw, propane heaters and tarpaulins or other suitable means. In this regard, the base of the excavations should be insulated from sub-zero temperatures immediately upon exposure and until such time as heat is adequately supplied to the building and the footings are protected with sufficient soil cover to prevent freezing at founding level.

Trench excavations and pavement construction are also difficult activities to complete during freezing conditions without introducing frost in the subgrade or in the excavation walls and bottoms. Precautions should be taken if such activities are to be carried out during freezing conditions. Additional information could be provided, if required.

6.7 Corrosion Potential and Sulphate

The results of analytical testing show that the sulphate content is less than 0.1%. This result is indicative that Type 10 Portland cement (normal cement) would be appropriate for this site. The chloride content and the pH of the sample indicate that they are not significant factors in creating a corrosive environment for exposed ferrous metals at this site, whereas the resistivity is indicative of a non aggressive to slightly aggressive corrosive environment.

6.8 Landscaping Considerations

Tree Planting Restrictions

In accordance with the City of Ottawa Tree Planting in Sensitive Marine Clay Soils(2017 Guidelines), Paterson completed a soil review of the site to determine applicable tree planting setbacks. Atterberg limits testing was completed for recovered silty clay samples at selected locations throughout the subject site. A shrinkage limit test and sieve analysis testing was also completed on selected soil samples. The shrinkage limit testing indicates a shrinkage limit of 15% with a shrinkage ratio of 1.99. The results of our Atterberg limit and sieve testing are presented in Appendix 1.

Based on the results of our testing, the clay on site can be defined as low to medium plasticity silty clay (Plasticity index < 40%). In accordance with the city of Ottawa guidelines, the tree planting setback limits may be reduced to 4.5 m for small (mature tree height up to 7.5m) and medium size trees (mature tree height 7.5 m to 14 m) provided that the following conditions are met.

- ❏ The underside of footing (USF) is 2.1 m or greater below the lowest finished grade must be satisfied for footings within 10 m from the tree, as measured from the centre of the tree trunk and verified by means of the Grading Plan as indicated procedural changes below.

- ❏ A small tree must be provided with a minimum of 25 m^3 of available soil volume while a medium tree must be provided with a minimum of 30 m^3 of available soil volume, as determined by the Landscape Architect. The developer is to ensure that the soil is generally un-compacted when backfilling in street tree planting locations.

- ❏ The tree species must be small (mature tree height up to 7.5 m) to medium size (mature tree height 7.5 m to 14 m) as confirmed by the Landscape Architect. The foundation walls are to be reinforced at least nominally (minimum of two upper and two lower 15M bars in the foundation wall).

- ❏ Grading surround the tree must promote drainage to the tree root zone (in such a manner as not to be detrimental to the tree), as noted on the subdivision Grading Plan.

7.0 Recommendations

It is a requirement for the foundation design data provided herein to be applicable that the following material testing and observation program be performed by the geotechnical consultant.

- ❑ Review of the grading plan once available
- ❑ Observation of all subgrades prior to backfilling.
- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ Sampling and testing of the concrete and fill materials used.
- ❑ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- ❑ Observation of all subgrades prior to backfilling.
- ❑ Field density tests to determine the level of compaction achieved.
- ❑ Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming that these works have been conducted in general accordance with our recommendations could be issued upon the completion of a satisfactory inspection program by the geotechnical consultant.

8.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. We request that we be permitted to review the grading plan once available and our recommendations when the drawings and specifications are complete.

A geotechnical investigation of this nature is a limited sampling of a site. The recommendations are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around the test locations. The extent of the limited area depends on the soil, bedrock and groundwater conditions, as well the history of the site reflecting natural, construction, and other activities. Should any conditions at the site be encountered which differ from those at the test locations, we request notification immediately in order to permit reassessment of our recommendations.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Construction Brigil or their agent(s) is not authorized without review by Paterson Group for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

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

Carlos P. Da Silva, P.Eng., ing., QP_{ESA}

Report Distribution

- ❏ Construction Brigil
- ❏ Paterson Group

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

ATTERBERG LIMITS RESULTS

HYDROMETER SIEVE ANALYSIS RESULTS

ANALYTICAL TESTING RESULTS

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

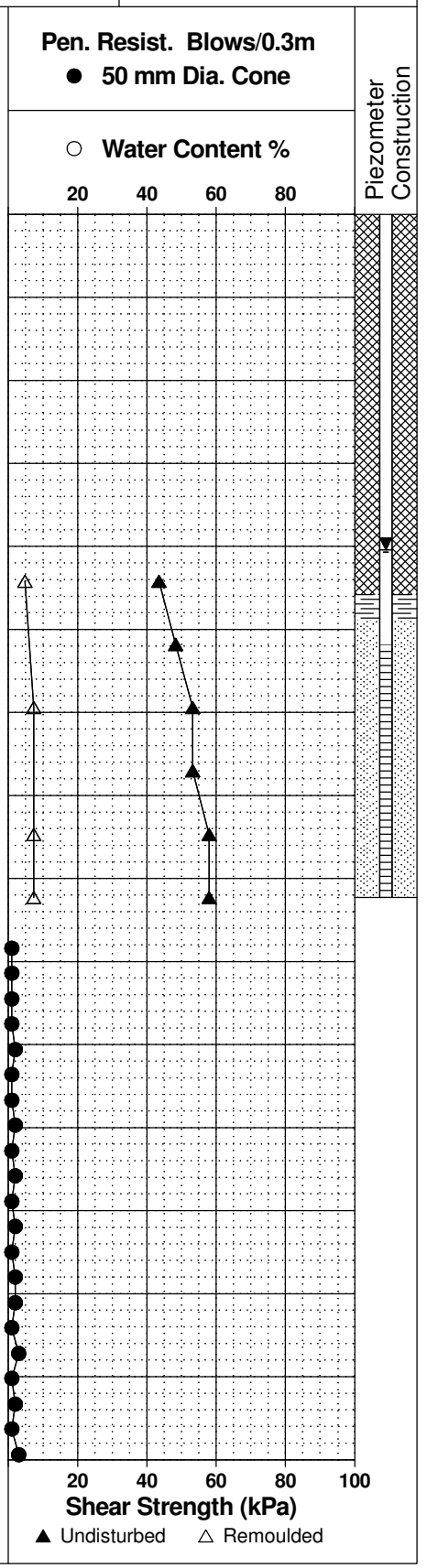
FILE NO. PG4112

REMARKS

HOLE NO. BH 1-19

BORINGS BY CME 55 Power Auger **DATE** 2019 July 9

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	54.29
FILL: Brown silty sand, some gravel and organics 0.28		AU	1				
Brown **SILTY CLAY** with organics		SS	2	58	8	1	53.29
1.37		SS	3	88	15	2	52.29
		SS	4	100	9	3	51.29
Very stiff to stiff, brown **SILTY CLAY**		SS	5	100	3	4	50.29
- grey by 3.0m depth		SS	6	100	W	5	49.29
						6	48.29
						7	47.29
8.23						8	46.29
Dynamic Cone Penetration Test commenced at 8.23m depth.						9	45.29
						10	44.29
						11	43.29
						12	42.29
						13	41.29
						14	40.29
						15	39.29



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

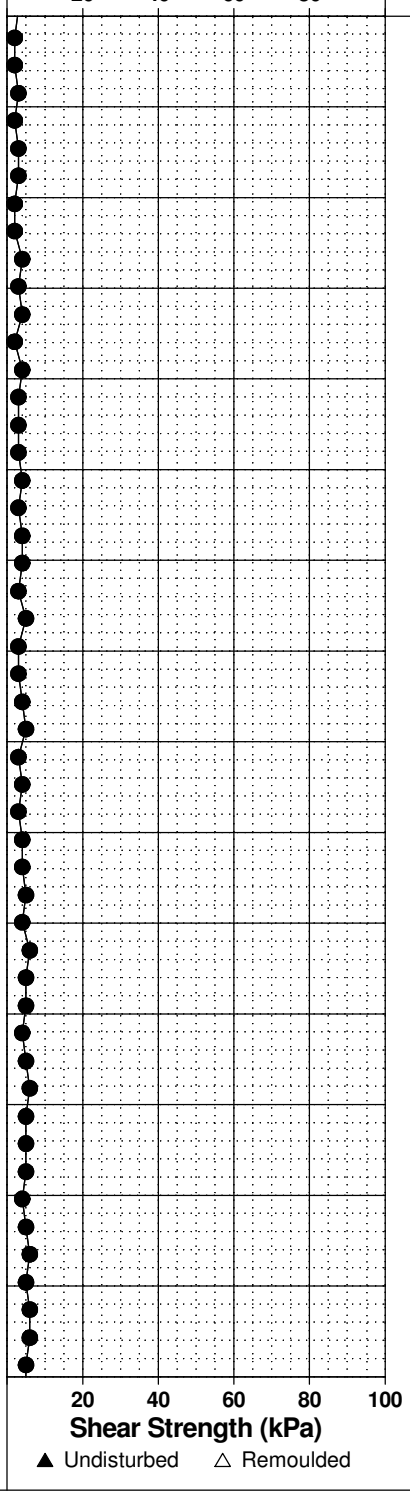
FILE NO. PG4112

REMARKS

HOLE NO. BH 1-19

BORINGS BY CME 55 Power Auger **DATE** 2019 July 9

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						15	39.29		
						16	38.29		
						17	37.29		
						18	36.29		
						19	35.29		
						20	34.29		
						21	33.29		
						22	32.29		
						23	31.29		
						24	30.29		
						25	29.29		
						26	28.29		
						27	27.29		
						28	26.29		
						29	25.29		
						30	24.29		



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

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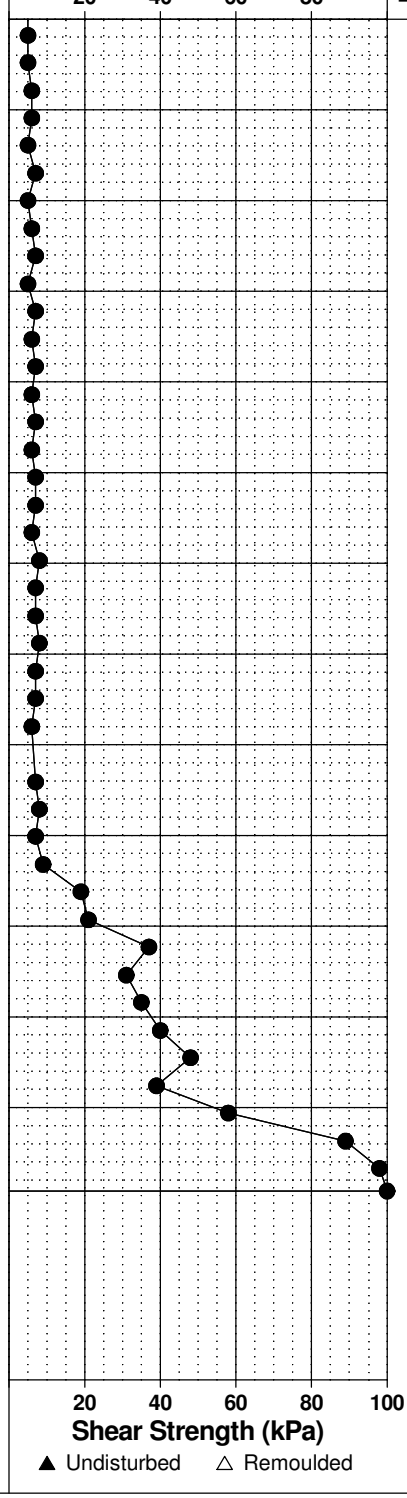
SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						30	24.29		
						31	23.29		
						32	22.29		
						33	21.29		
						34	20.29		
						35	19.29		
						36	18.29		
						37	17.29		
						38	16.29		
						39	15.29		
						40	14.29		
						41	13.29		
						42	12.29		
42.92									
End of Borehole									

Practical DCPT refusal at 42.92m depth.

(GWL @ 4.04m - July 29, 2019)



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

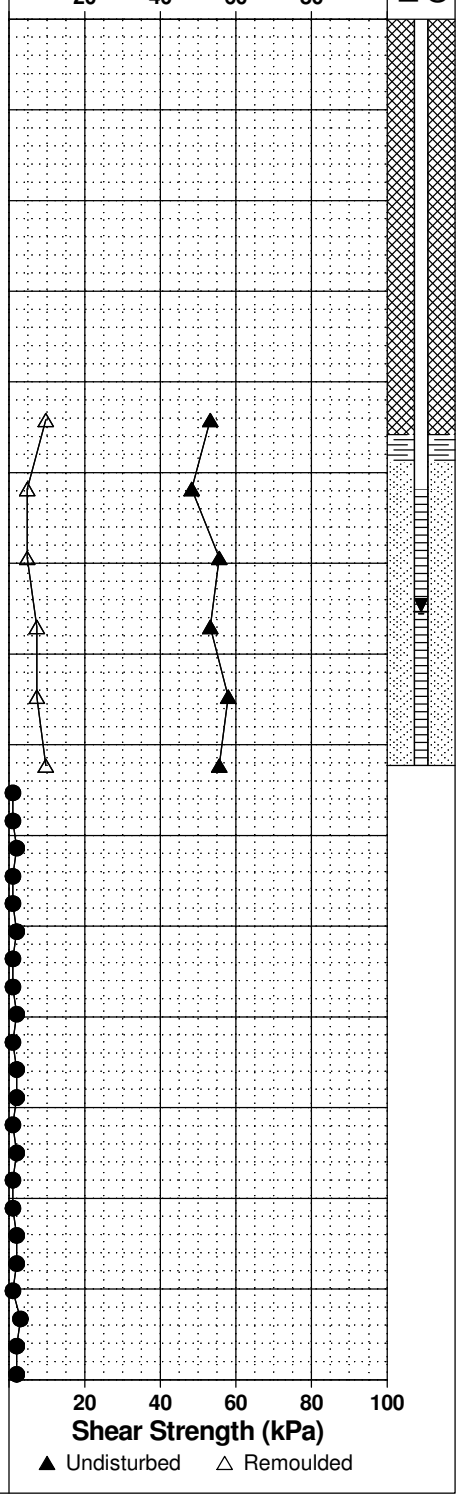
FILE NO. PG4112

REMARKS

HOLE NO. BH 2-19

BORINGS BY CME 55 Power Auger **DATE** 2019 July 9

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	52.71
FILL: Brown silty sand, some gravel and organics (0.33)		AU	1				
		SS	2	17	13	1	51.71
		SS	3	100	7	2	50.71
Very stiff to stiff, brown **SILTY CLAY**		SS	4	33	4	3	49.71
- grey by 3.0m depth		SS	5	100	W	4	48.71
						5	47.71
						6	46.71
						7	45.71
(8.23)						8	44.71
Dynamic Cone Penetration Test commenced at 8.23m depth.						9	43.71
						10	42.71
						11	41.71
						12	40.71
						13	39.71
						14	38.71
						15	37.71



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

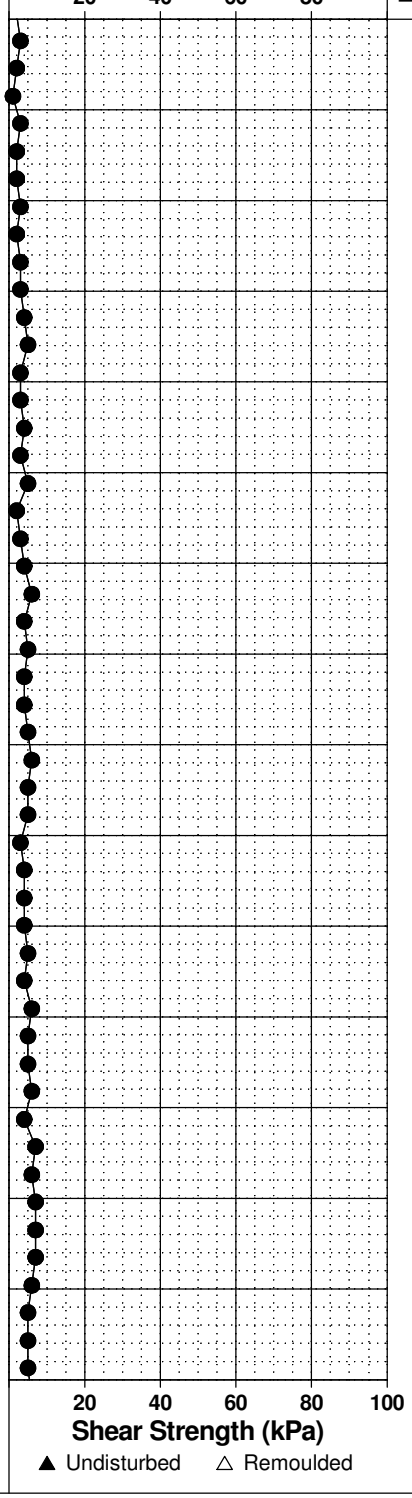
FILE NO. PG4112

REMARKS

HOLE NO. BH 2-19

BORINGS BY CME 55 Power Auger **DATE** 2019 July 9

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						15	37.71		
						16	36.71		
						17	35.71		
						18	34.71		
						19	33.71		
						20	32.71		
						21	31.71		
						22	30.71		
						23	29.71		
						24	28.71		
						25	27.71		
						26	26.71		
						27	25.71		
						28	24.71		
						29	23.71		
						30	22.71		



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

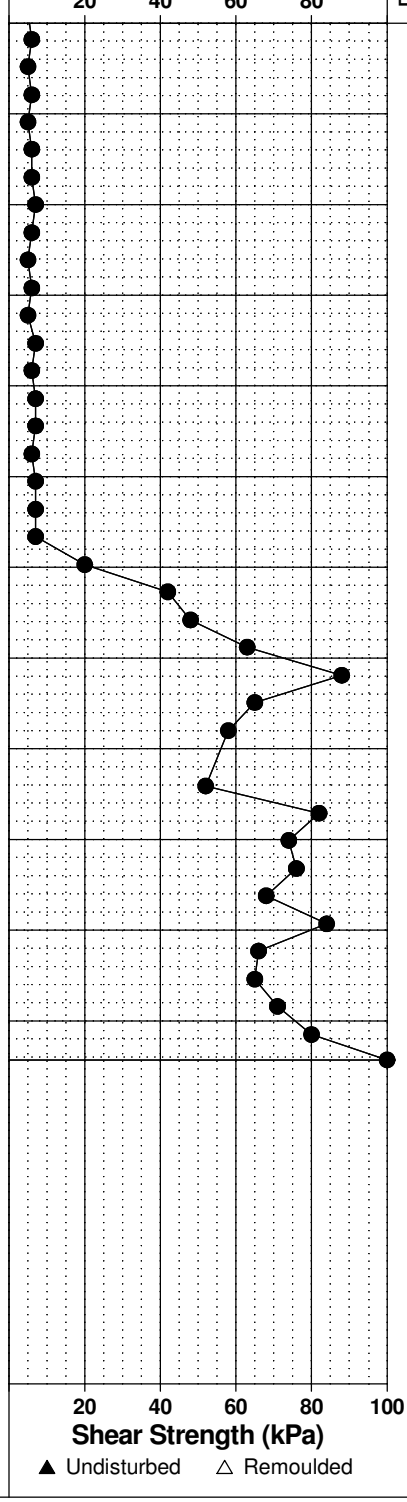
FILE NO. PG4112

REMARKS

HOLE NO. BH 2-19

BORINGS BY CME 55 Power Auger **DATE** 2019 July 9

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						30	22.71		
						31	21.71		
						32	20.71		
						33	19.71		
						34	18.71		
						35	17.71		
						36	16.71		
						37	15.71		
						38	14.71		
						39	13.71		
						40	12.71		
						41	11.71		
41.43									
End of Borehole									
Practical DCPT refusal at 41.43m depth.									
(GWL @ 6.53m - July 29, 2019)									



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

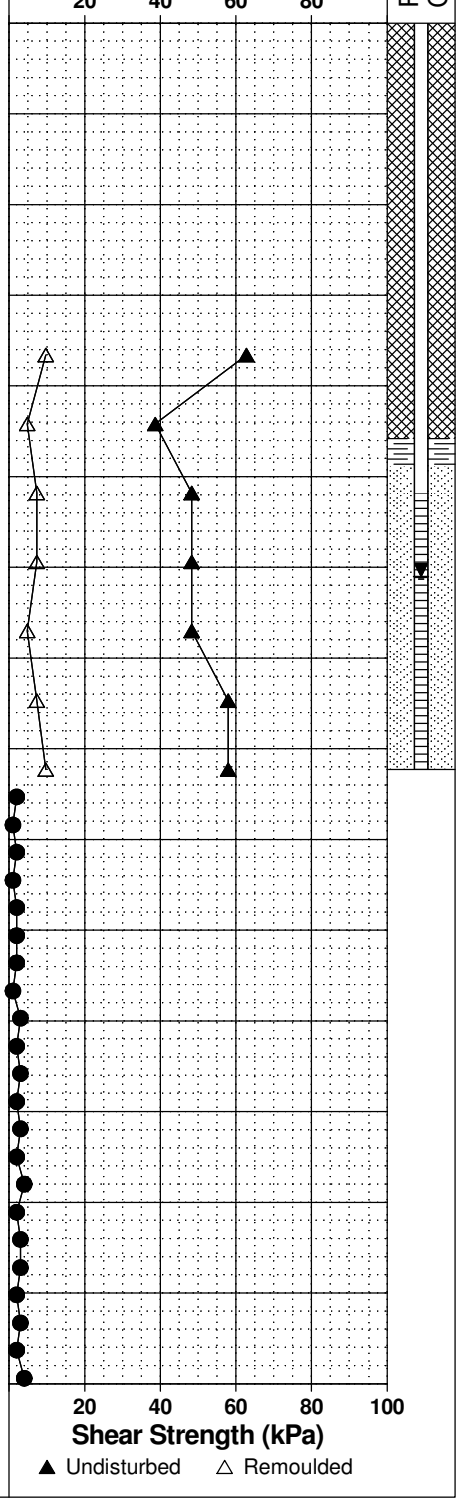
FILE NO. PG4112

REMARKS

HOLE NO. BH 3-19

BORINGS BY CME 55 Power Auger **DATE** 2019 July 10

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	52.57
FILL: Brown silty sand, some gravel and organics (0.33)		AU	1				
		SS	2	54	14	1	51.57
		SS	3	100	9	2	50.57
Very stiff to stiff, brown **SILTY CLAY**		SS	4	38	5	3	49.57
- grey by 3.0m depth						4	48.57
						5	47.57
						6	46.57
						7	45.57
(8.23)						8	44.57
Dynamic Cone Penetration Test commenced at 8.23m depth.						9	43.57
						10	42.57
						11	41.57
						12	40.57
						13	39.57
						14	38.57
						15	37.57



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

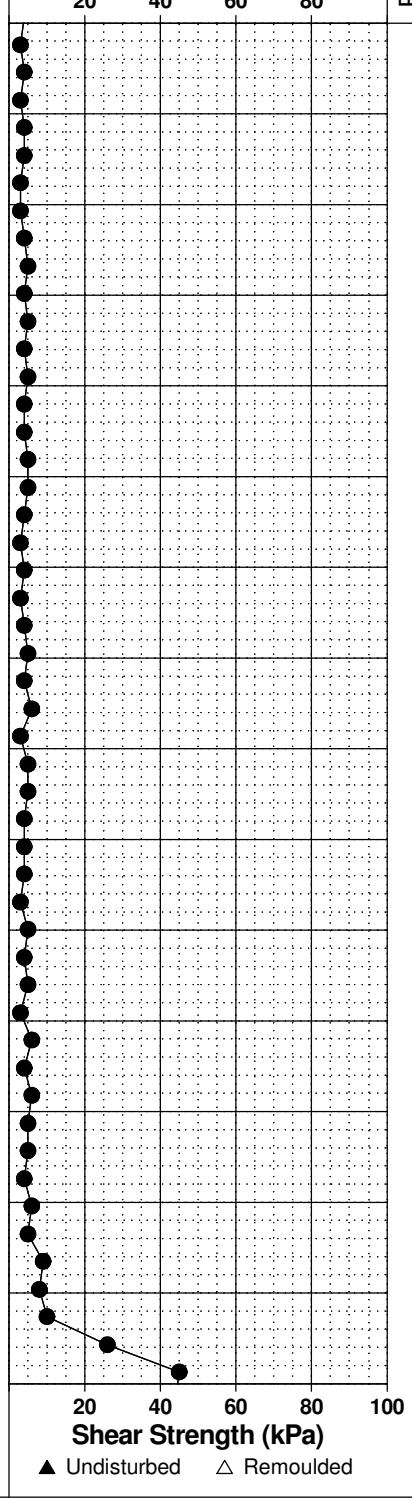
FILE NO. PG4112

REMARKS

HOLE NO. BH 3-19

BORINGS BY CME 55 Power Auger **DATE** 2019 July 10

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						15	37.57		
						16	36.57		
						17	35.57		
						18	34.57		
						19	33.57		
						20	32.57		
						21	31.57		
						22	30.57		
						23	29.57		
						24	28.57		
						25	27.57		
						26	26.57		
						27	25.57		
						28	24.57		
						29	23.57		
						30	22.57		



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

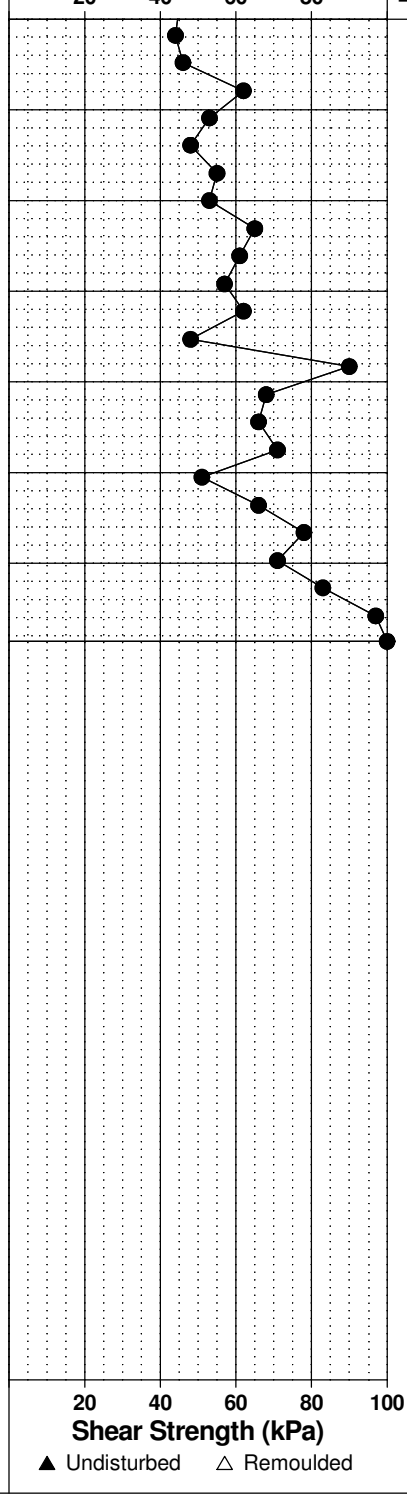
FILE NO. PG4112

REMARKS

HOLE NO. BH 3-19

BORINGS BY CME 55 Power Auger **DATE** 2019 July 10

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
						30	22.57		
						31	21.57		
						32	20.57		
						33	19.57		
						34	18.57		
						35	17.57		
						36	16.57		
36.86									
End of Borehole Practical DCPT refusal at 36.86m depth. (GWL @ 6.10m - July 29, 2019)									



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Multi-Storey Building - 8466 Jean D'Arc Boulevard
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis, O'Sullivan, Vollebekk Limited.

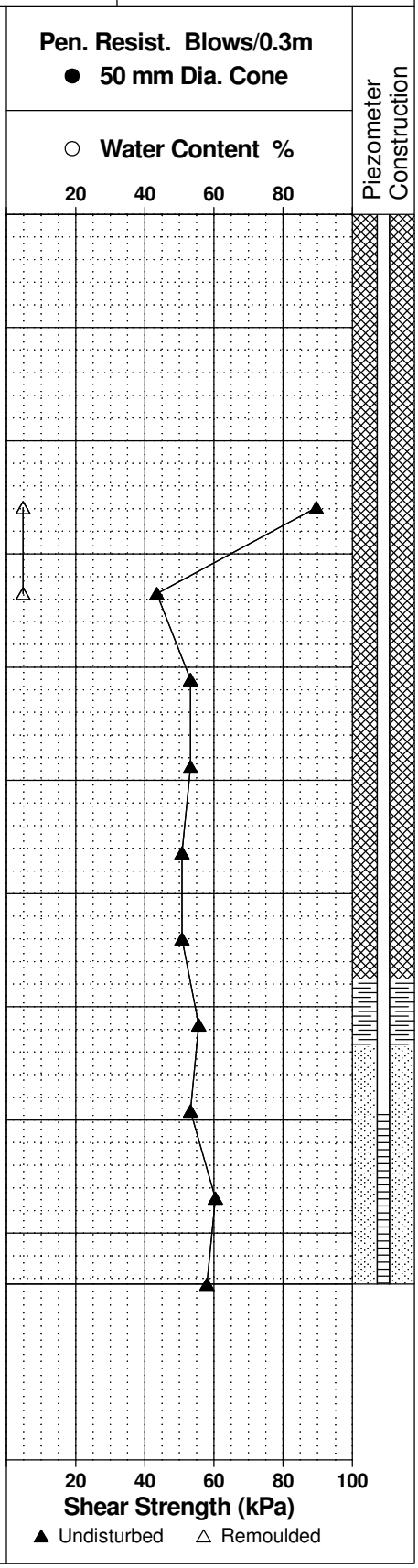
FILE NO. PG4112

REMARKS

HOLE NO. BH 4-17

BORINGS BY CME 55 Power Auger **DATE** April 24, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	53.84
FILL: Brown silty clay with sand and topsoil, trace gravel, cobbles, boulders, crushed stone and organics		AU	1				
0.69							
		SS	2	83	10	1	52.84
		SS	3	83	10	2	51.84
Firm to stiff, brown **SILTY CLAY**						3	50.84
- grey by 3.0m depth						4	49.84
						5	48.84
						6	47.84
						7	46.84
						8	45.84
						9	44.84
9.45							
End of Borehole							
(BH dry and blocked at 5.46m depth - May 1, 2017)							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Multi-Storey Building - 8466 Jean D'Arc Boulevard
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis, O'Sullivan, Vollebekk Limited.

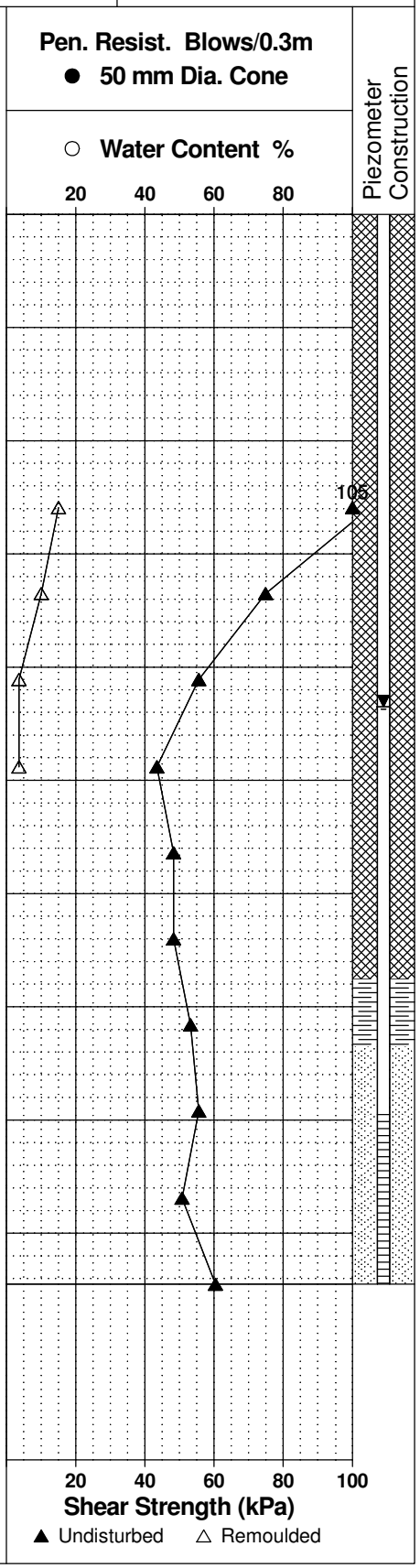
FILE NO. PG4112

REMARKS

HOLE NO. BH 5-17

BORINGS BY CME 55 Power Auger **DATE** April 24, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	52.45
FILL: Brown silty sand with clay, trace gravel, cobbles and organics 0.18		AU	1				
		SS	2	79	13	1	51.45
		SS	3	96	8	2	50.45
Very stiff to firm, brown **SILTY CLAY,** some reddish lenses						3	49.45
- grey by 3.8m depth						4	48.45
						5	47.45
						6	46.45
						7	45.45
						8	44.45
						9	43.45
9.45 End of Borehole							
(GWL @ 4.35m - May 1, 2017)							



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SOIL PROFILE AND TEST DATA

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Prop. Multi-Storey Building - 8466 Jean D'Arc Boulevard
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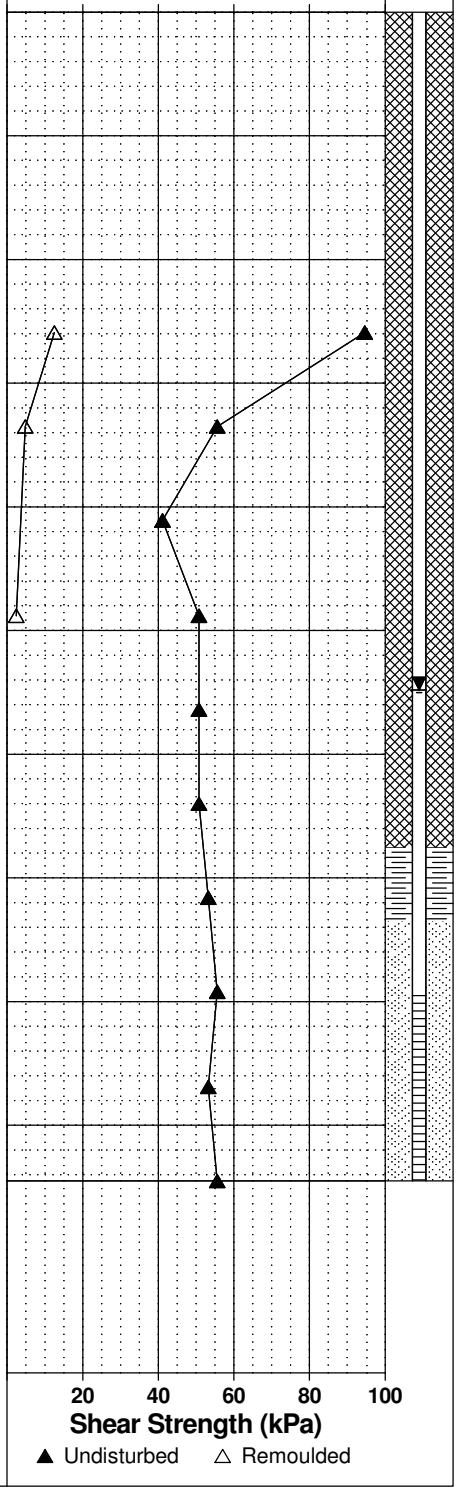
FILE NO. PG4112

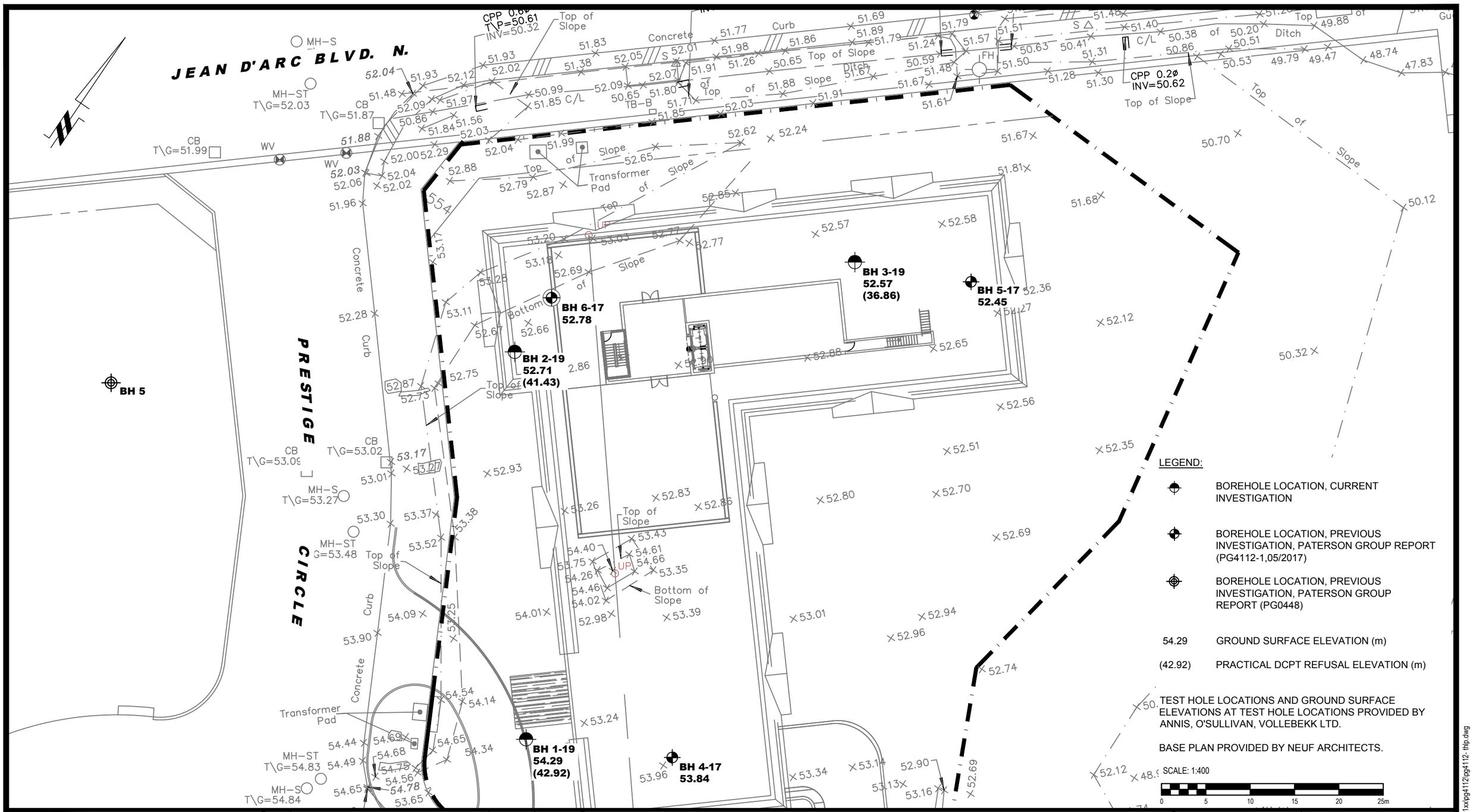
REMARKS

HOLE NO. BH 6-17

BORINGS BY CME 55 Power Auger **DATE** April 24, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	52.78
FILL: Brown silty clay with topsoil, some gravel, trace sand and organics 0.43		AU	1				
		SS	2	96	9	1	51.78
		SS	3	100	5	2	50.78
Firm to stiff, brown **SILTY CLAY** with reddish lenses						3	49.78
- grey by 3.8m depth						4	48.78
						5	47.78
						6	46.78
						7	45.78
						8	44.78
						9	43.78
9.45 End of Borehole							
(GWL @ 5.48m - May 1, 2017)							





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NO.	REVISIONS	DATE	INITIAL

BRIGIL CONSTRUCTION

GEOTECHNICAL INVESTIGATION
PETRIE`S LANDING - BLOCK 8 -2466 JEANNE D`ARC BOULEVARD
OTTAWA, ONTARIO

Title:
TEST HOLE LOCATION PLAN

Scale: 1:400	Date: 07/2019
Drawn by: YA	Report No.: PG4112-1
Checked by: JV	Dwg. No.: PG4112-2
Approved by: DJG	Revision No.:

p:\autocad drawings\geotechnical\pg41xx\pg4112\pg4112- thlp.dwg

patersongroup **Memorandum**

consulting engineers

re:	**Geotechnical Assessment - Slope Review - Block 8** **Proposed Multi-Storey Building** **8466 Jeanne-d'Arc Boulevard - Ottawa**
to:	Brigil Construction - **Mr. Jean-Luc Rivard** - jlrivard@brigil.com
to:	Brigil Construction - **Mr. Philip Thibert** - pthibert@brigil.com
date:	June 23, 2021
file:	PG4112-MEMO.02

Further to your request, Paterson Group (Paterson) completed a site visit on June 22, 2021 to review the condition of the ravine and slope running in a north-south direction along the east side of the subject site. This memo should be read in conjunction with Paterson Group Report PG0448-1 dated August 3, 2005. Relevant photographs from the site visit are attached to the current memorandum.

Field Observations

The side-slope running alongside the ravine in the vicinity of the subject site near Block 8 was observed to consist of a thin topsoil layer overlaying a brown silty clay deposit. The slope was observed to be heavily vegetated with mature trees, shrubs and grass. The height of the slope is approximately 5 m measured from the toe to the top of slope with an approximate inclination of 2.3H:1V.

The valley area of the ravine consisted of tall grass and varied in width from approximately 4 to 6 m. The main watercourse channel was noted to be approximately 1 to 1.2 m wide. At the time of our site visit, the channel was observed to be generally dry, with some moist soil and very minor water ponding near the north portion of the site at the culvert crossing beneath Jeanne-d'Arc Boulevard. No active running water was observed and no sign of erosions were noted..

Geotechnical Review and Commentary

Slope Stability Analysis

A slope stability analysis, included in the above mentioned geotechnical report, was carried out for the subject site by Paterson in 2005. Section D of the slope stability analysis was completed within the vicinity of Block 8, the slope sections for static and seismic conditions from the 2005 study area attached to the current memorandum. The test hole location plan showing the location of Section D is also attached to the current memorandum.

The results of the previous slope stability analysis yielded factors of safety for static and seismic conditions of 2.73 and 2.36, respectively, which are considered to be well within acceptable limits from a geotechnical perspective. The study recommended an toe erosion allowance of 2 m and an erosion access allowance of 6 m, for a total required setback of 8 m from the top of slope.

Based on our cursory review, no sign of sloughing or cracking were observed along the slope. The shape of the slope has remained unchanged and well vegetated since our previous review. The ravines side-slopes are considered to be stable from a geotechnical perspective

Geotechnical Recommendations

Based on our current review of the slope, there have been no significant changes to the slope condition since the 2005 slope stability assessment. Upon review of the grading plan (Grading Plan - Project No. 160401331, Drawing No. GP-1, Sheet No. 3 of 6, Revision 1 dated March 26, 2021), the development limit was set at 15 m away from the top of the slope which is much more than the Limit of Hazard Lands setback. It is understood that no changes to the grades will be made past the development limits. Existing grades will be matched at the property line.

Since no changes are proposed within the limit of hazard lands, the proposed development will have no negative impact on the slope and is considered to be acceptable from a geotechnical perspective.

We trust that this information satisfies your immediate requirements.

Paterson Group Inc.

David J. Gilbert, P.Eng.

Joey R. Villeneuve, MA.Sc., P.Eng.,ing.

Photographs from Site Visits – June 22, 2021

Photo 1: Photograph taken looking south from the road showing the location of the culvert where very minor water ponding was observed, the grass covered channel and the heavily vegetated slope adjacent to Block 8.

Photo 2: Photograph taken looking east from the bottom of the slope adjacent to Block 8 at the grass covered channel.

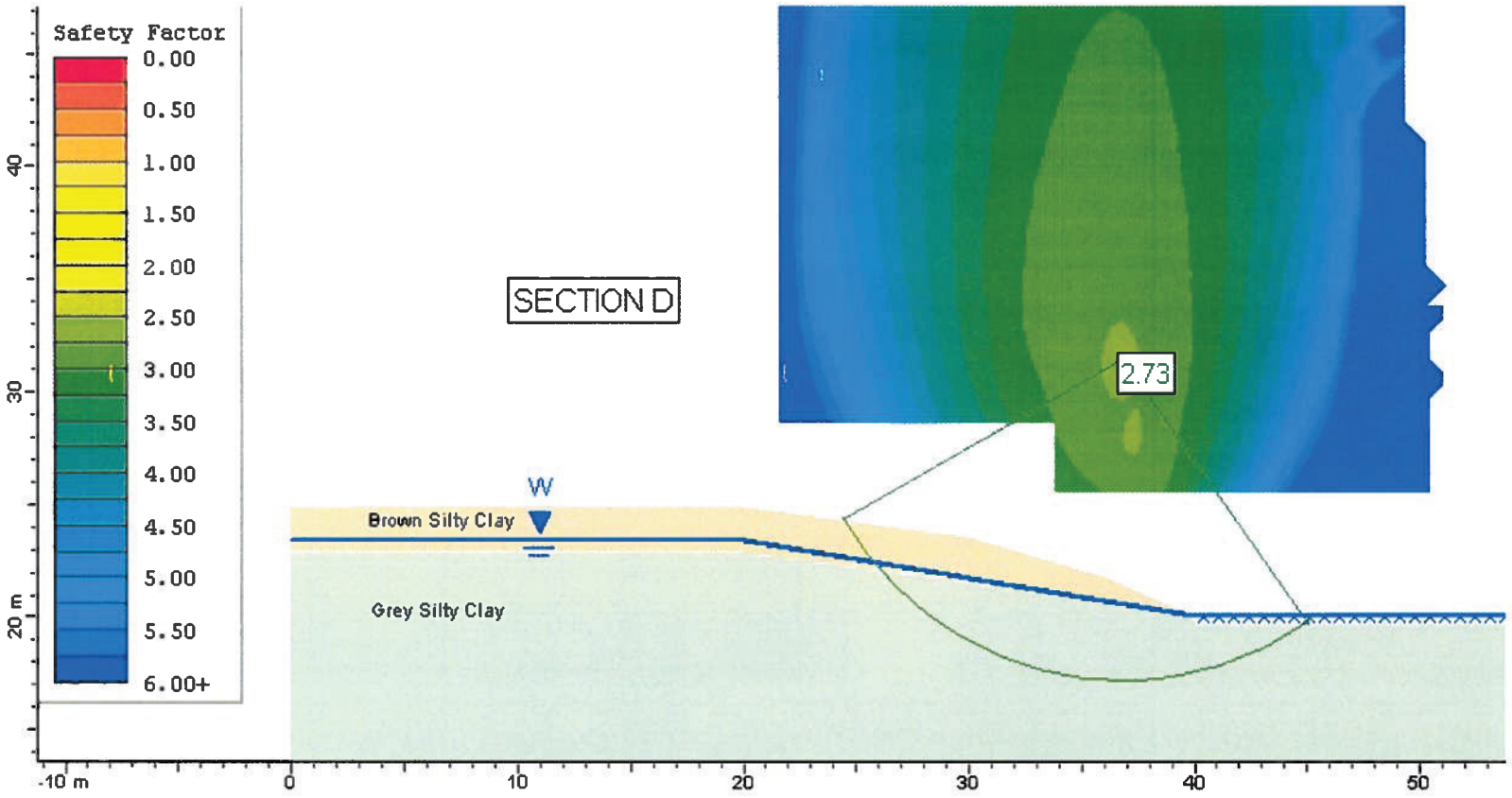


Figure 8, Section D, Effective Stress Analysis

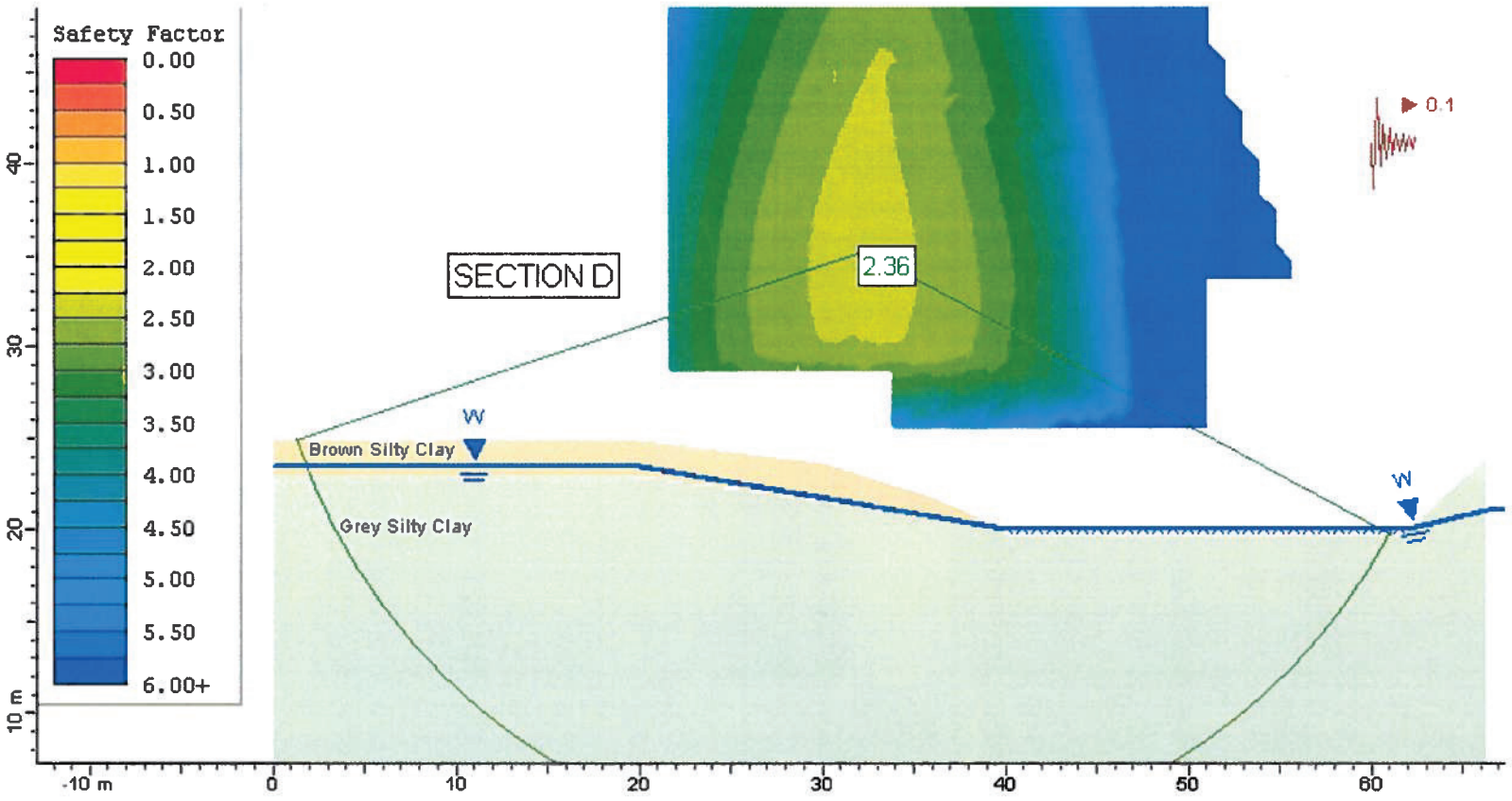
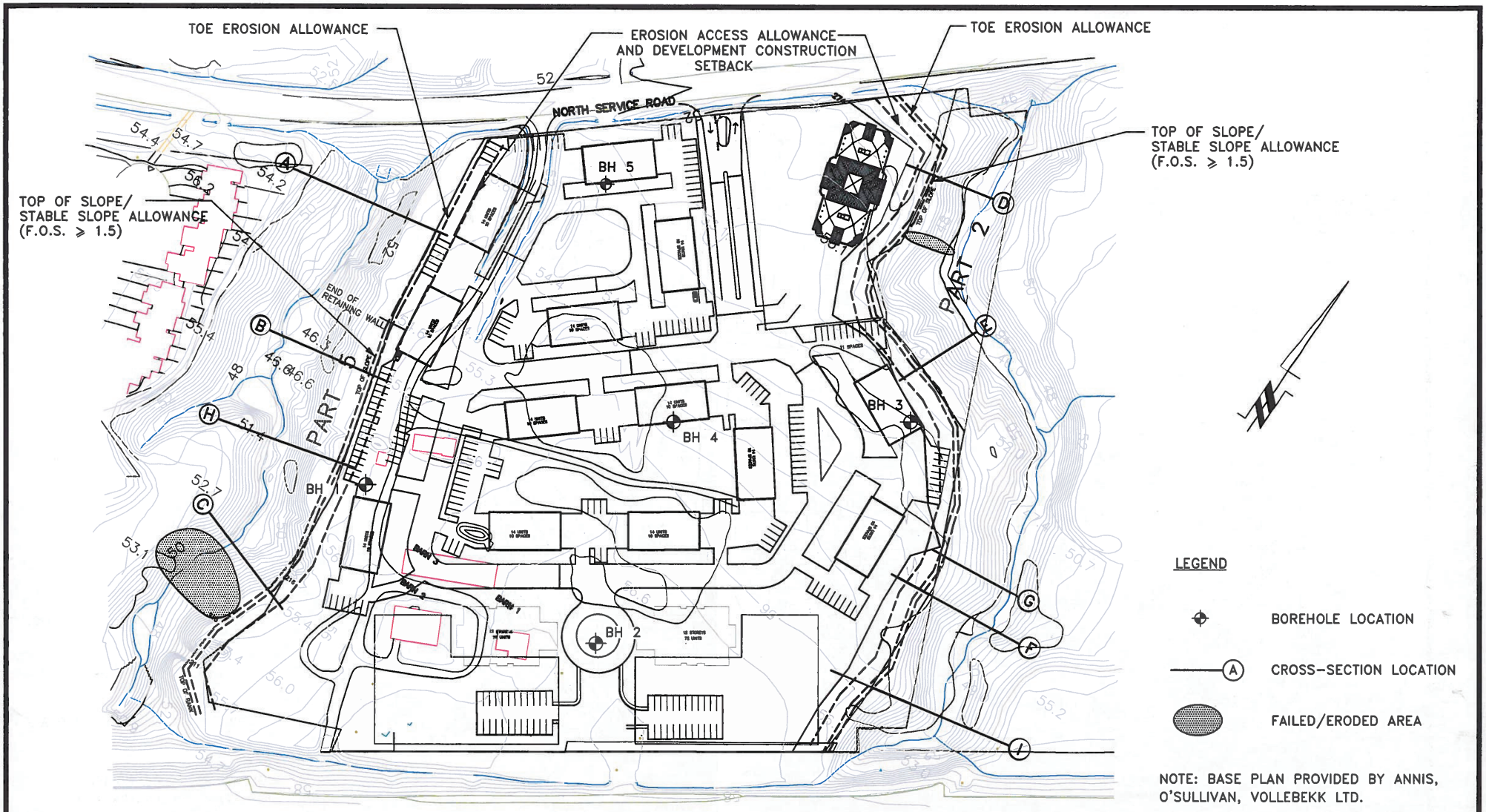


Figure 9, Section D, Seismic Conditions



paterson group consulting engineers 28 Concourse Gate, Unit 1, Ottawa, Ontario K2E 7T7	Scale: 1:1500 Des.: RG Dwn: JD Chkd: GC	BRIGIL HOMES PRELIMINARY GEOTECHNICAL INVESTIGATION 8465 NORTH SERVICE ROAD OTTAWA, ONTARIO	TEST HOLE LOCATION PLAN	Dwg. No. PG0448-1 Report No.: PG0448-01 Date: 08/2005

11x17

patersongroup **Memorandum**

consulting engineers

re:	**Grading Plan Review** **Proposed Multi-Storey Buildings** **8466 Jeanne-d'Arc Boulevard - Ottawa**
to:	Brigil Construction - **Mr. Jean-Luc Rivard** - jlrivard@brigil.com
date:	September 20, 2021
file:	PG4112-MEMO.03

Further to your request and authorization, Paterson Group (Paterson) prepared the current memorandum to provide a grading plan review for the aforementioned proposed residential development. The following memorandum should be read in conjunction with Paterson Report PG4112-2 Revision 1 dated June 21, 2021.

Grading Plan Review

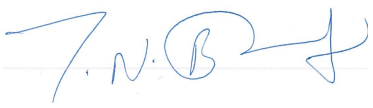
Paterson reviewed the following grading plan prepared by Stantec Consulting Ltd. regarding the aforementioned residential development:

- ❑ Grading Plan - Project No. 160401331, Drawing No. GP-1, Sheet No. 3 of 6, Revision 2 dated September 15, 2021.

Based on our review, the aforementioned grades are considered acceptable from a geotechnical perspective. Minor exceedances were observed at various locations throughout the subject site. However, Paterson has completed further review at these locations and no lightweight fill is required for the proposed building.

We trust that this information satisfies your immediate requirements.

Paterson Group Inc.



Balaji Nirmala, M.Eng.

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

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Appendix E BACKGROUND REPORTS EXCERPTS

Site Servicing and Stormwater Management Brief – Petrie's Landing Block 6, 7 and 8 (D07-12-17-0093), Ottawa, ON

File: 160401331/83

Prepared for:
Brigil Homes

Prepared by:
Stantec Consulting Ltd.

September 19, 2018

Revision Record							
Revision	Description	Prepared by		Checked by		Approved by	
0	1st submission	A. Paerez	05/24/2017	K. Kilborn	05/24/2017	A. Paerez	05/24/2017
1	2nd submission	A. Paerez	01/12/2017	K. Kilborn	01/18/2018	A. Paerez	01/22/2018
2	3rd submission	A. Paerez	03/21/2018	K. Kilborn	03/22/2018	A. Paerez	03/23/2018
3	4th submission	A. Paerez	07/05/2018	K. Kilborn	07/05/2018	A. Paerez	07/05/2018
4	5th submission	A. Paerez	07/26/2018	K. Kilborn	07/26/2018	A. Paerez	07/26/2018
5	6th submission	A. Paerez	09/04/2018	K. Kilborn	09/05/2018	A. Paerez	09/05/2018
6	7th submission	A. Paerez	09/19/2018	K. Kilborn	09/19/2018	A. Paerez	09/19/2018

Sign-off Sheet

This document entitled Site Servicing and Stormwater Management Brief – Petrie's Landing Block 6, 7 and 8 (D07-12-17-0093), Ottawa, ON was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Brigil Homes (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Approved by 

(signature)

Ana M. Paerez, P. Eng.

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LIST OF APPENDICES

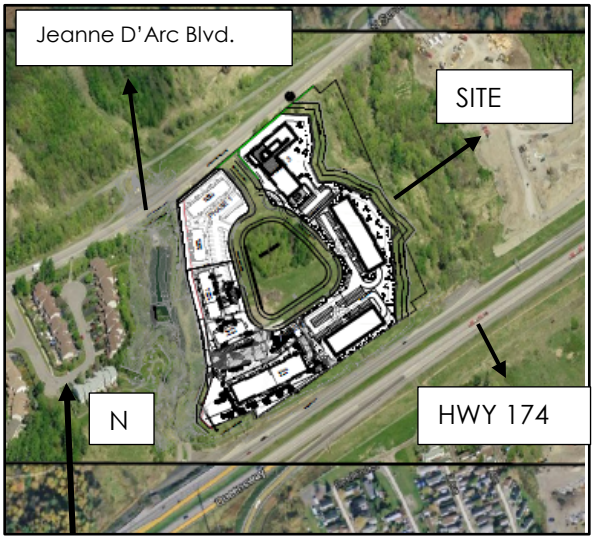
1.0 INTRODUCTION AND OBJECTIVE

The following site servicing and stormwater management (SWM) report has been revised to address City comments to the previous submission. A letter summarizing the City comments and Stantec's responses has been included in **Appendix F**. Specifically, the 4R plan has been revised to match the new property lines and a catchbasin has been added to ensure full capture of the 100-year runoff from area F201A. However, the results of the servicing analyses remain the same as those previously submitted. The drawings have been revised to reflect the revisions.

Stantec Consulting Ltd. has been retained by Brigil Homes to prepare the following site servicing and stormwater management (SWM) brief to satisfy the City of Ottawa Site Plan Control Application process. The 2.14 ha site is located on Prestige Circle, with the Highway 174 to the south, Jeanne D'Arc Boulevard to the north, a residential development to the east, and Brisebois Creek and its associated stormwater management (SWM) facility to the west in the city of Ottawa (see **Figure 1** below).

Block 6 of the proposed development makes up 0.61 ha of the proposed site and consists of a four-storey residential building with associated surface and underground parking, and landscaped areas. Block 7 of the proposed development makes up 0.76 ha of the proposed site and consists of a four-storey residential building with associated surface and underground parking, and landscaped areas. Similarly, Block 8 of the proposed development makes up 0.77 ha of the proposed site and consists of a four-storey residential building with associated surface and underground parking, and landscaped areas. A copy of the proposed site plan prepared by Neuf Architects Inc. can be found in **Appendix B**.

Figure 1: Site Location



1.1 BACKGROUND

Blocks 6 and 7 of the proposed development are within Phase 2 of the Petrie's Landing Development which was previously designed by IBI Group in February 2014 in support of a site plan application for phase 2 and subsequently approved by the City of Ottawa (see report excerpts in **Appendix E**). Phase 1 and Blocks 3, 4 and 5 within Phase 2 of the overall development have been built.

However, the site plan within Blocks 6 and 7 has changed and the proposed site plan for Block 8, previously referenced as Phase 3, has been added to the site plan application.

1.2 OBJECTIVE

This site servicing and SWM brief has been prepared to present a servicing scheme that is free of conflicts and which utilizes the existing infrastructure as obtained from available as-built drawings. Infrastructure requirements for water supply, sanitary and storm sewer services are presented in this report.

Criteria and constraints provided in the background documents have been used as a basis for the servicing design of the proposed development. Specific elements and potential development constraints to be addressed are as follows:

- Prepare a grading plan in accordance with the proposed site plan and existing grades
- Storm Sewer Servicing
    - Define major and minor conveyance systems in conjunction with the grade control plan
    - Determine the stormwater management storage requirements to meet the allowable release rates for the site
    - Size and design inlet control devices (ICDs) to restrict minor system peak flows and meet the target release rates from the site
- Wastewater Servicing
    - Size the sanitary service laterals
- Water Servicing
    - Provide feeds to the proposed buildings from the existing 200 mm diameter watermain along Prestige Circle
    - Watermain servicing for the development is to be able to provide average day and maximum day (including peak hour) demands (i.e. non-emergency conditions) at pressures within the acceptable range of 40 to 80 psi (275 to 552 kPa)
    - Provide Fire Underwriter Survey (FUS) fire demand calculations and ensure fire demands for the proposed buildings are equal or below the values assumed in the hydraulic analysis presented in the background documents

The accompanying drawings included in the back of this report illustrate the internal servicing scheme for the site.

2.0 REFERENCES

The following background studies have been referenced during the servicing design of the proposed site:

- *Design Brief Petrie's Landing II Phase 2, IBI Group., February 7, 2014*
- *Geotechnical Investigation*, Proposed Multi-Storey Buildings Block 6, 7 and 8 – Petrie's Landing II, Ottawa, Ontario, Paterson group, May 24, 2017
- *City of Ottawa Design Guidelines – Water Distribution*, City of Ottawa, July 2010
- *City of Ottawa Sewer Design Guidelines*, City of Ottawa, October 2012
- *Technical Bulletin ISDTB-2014-01,* City of Ottawa, February 2014
- *Technical Bulletin PIEDTB -2016-01,* City of Ottawa, September 6, 2016

3.0 WATER DISTRIBUTION

Given that the revised site plan has nearly the same proposed population (two units less in Block 7), same building floor space and water servicing layout, it is expected that the resulting water demands, and pressures will be practically the same as outlined in the previous submissions which are summarized in the sub-sections below.

3.1 BACKGROUND

The four-storey buildings within Blocks 6, 7 and 8 are proposed to be apartment buildings with underground parking. The proposed buildings in Block 6, 7 and 8 have total floor space of approximately 1,530 m^2 (0.15 ha), 1,970 m^2 (0.20 ha), and 2,360 m^2 (0.24 ha) respectively, and are proposed to connect to the existing 200 mm diameter watermain along Prestige Circle as shown on the Site Plan (see **Drawing SSP-1**).

A detailed hydraulic analysis for the overall Petrie's Landing Development was included in the 2014 Petrie's Landing Design Brief prepared by IBI (see **Appendix E**). However, the FUS calculations for the proposed buildings generated higher fire flow demands than the values assumed in IBI's hydraulic analysis. As a result, the hydraulic analysis for the overall development was revised using the same boundary conditions as per IBI's model, but with the revised water and fire flow demands for the proposed Blocks 6, 7 and 8 as shown in the following sections. Detailed calculations and the revised hydraulic model results have been included in **Appendix A**.

3.2 WATER DEMANDS

Water demands were calculated using the City of Ottawa Water Distribution Guidelines (July 2010) to determine the typical operating pressures to be expected at the buildings. A daily rate of 350 L/cap/day has been applied for the population of the proposed site. Population densities have been assumed as 1.4 persons/unit for one-bedroom units and 2.1 persons/unit for two-bedroom units. The Maximum Day (MXDY) residential demand was determined by multiplying the Average Day (AVDY) demand by a factor of 2.5 and the Peak Hour (PKHR) residential demand was determined by multiplying the MXDY demand by a factor of 2.2. The estimated demands are summarized in **Table 1**.

Table 1: Estimated Water Demands

Building ID	Population	AVDY (L/s)	MXDY (L/s)	PKHR (L/s)
Block 6	122	0.49	1.23	2.17
Block 7	140	0.57	1.42	3.12
Block 8	141	0.57	1.43	3.15
Total	**403**	**1.63**	**4.08**	**8.98**

The fire flow requirements were calculated in accordance with the Fire Underwriters Survey (FUS) and determined to be approximately 15,000 L/min (250 L/s) for Block 6, 15,000 L/min (250 L/s) for Block 7, and 20,000 L/min (333 L/s) for Block 8. Wood frame construction was considered in the assessment for fire flow requirements according to the FUS Guidelines. The FUS Guidelines indicate that low hazard occupancies include apartments, dwellings, dormitories, hotels, and schools, and as such, a low hazard occupancy/ limited combustible building contents and sprinkler systems was applied to the calculations. A two-hour fire separation has been considered at the center of block 7 to reduce the fire flow requirements.

The boundary conditions listed below were provided by the City of Ottawa to IBI Group and used in their 2014 hydraulic analysis for the overall development, which included buildings one to eight. Since the number of apartment units has not drastically increased in the proposed site plan, the previous boundary conditions were considered reasonable and a conservative estimate and were used in the revised hydraulic analysis for the overall site (see model results in **Appendix A**).

Peak Hour = 108.0m

Max Day + Fire Flow = 110.0m

Average Day = 115.0m

3.3 HYDRAULIC MODEL RESULTS

The desired normal operating pressure range as per the City of Ottawa 2010 Water Distribution Design Guidelines is 345 kPa (50 psi) to 552kPa (80 psi) and no *less than 276kPa (40 psi)* at ground elevation. Furthermore, the maximum pressure at any point in the water distribution should not exceed 100 psi as per the Ontario Building/Plumbing Code; pressure reducing measures are required to service areas where pressures *greater than 552kPa (80 psi)* are anticipated.

A hydraulic model of the water supply system was created by Stantec to assess the proposed watermain layout under the above demands and during fire flow scenarios. Results of the hydraulic modeling demonstrate that adequate flows are available for the proposed buildings as shown in **Table 2**.

Table 2: Hydraulic Model Results Summary

Model Node ID	Average Day Analysis Pressure (psi)	Peak Hour Analysis Pressure (psi)
BLDG6	82.02	71.94
BLDG7	83.16	73.08
BLDG8	85.16	75.11

The above table shows that under normal operating conditions, pressures at ground level of the proposed buildings range from **72 psi** to **85 psi**. These values exceed the desired pressure range

of 80 psi as defined by MOECC and City of Ottawa design guidelines. As a result, it is recommended that pressure reducing valves be installed. Results of the hydraulic model analysis can be found in **Appendix A**.

A fire flow analysis was carried out using the hydraulic model to determine the anticipated amount of flow that could be provided for the proposed development under maximum day demands and fire flow requirements per the FUS methodology. Results of the modeling analysis indicate that flows in excess of the required fire flow rate can be delivered while still maintaining a residual pressure of 140 kPa (20 psi). Results of the hydraulic modeling are included for reference in **Appendix A**.

3.4 SUMMARY OF FINDINGS

Based on the results of the hydraulic analysis, it is recommended that pressure reducing valves be installed at each building to ensure normal operating pressures remain within City of Ottawa required limits. The hydraulic model also indicates that fire flow requirements can be achieved at all locations while still maintaining the minimum residual pressure per City requirements.

4.0 SANITARY SEWER

As illustrated on **Drawing SSP-1**, sanitary servicing for the proposed development will be provided through the existing 300 mm diameter sanitary sewer along Prestige Circle.

The proposed 2.14 ha development will consist of three four-storey apartment buildings, surface parking, underground parking, and associated access infrastructure. The anticipated wastewater peak flows generated from the proposed development are summarized in **Table 3** below:

Table 3: Estimated Wastewater Peak Flow

Block	Residential Units				Infiltration Flow (L/s)	Total Peak Flow (L/s)
	# of Units	Population	Peak Factor	Peak Flow (L/s)		
Block 6	79	142	4.0	2.30	0.16	2.46
Block 7	90	162	4.0	2.63	0.23	2.86
Block 8	93	167	4.0	2.71	0.21	2.92
				Overall Site Peak Flow:		**8.24**

1. Average residential flow based on 350 L/p/day
2. Peak factor for residential units calculated using Harmon's formula
3. The exact number of one and two-bedroom apartments is not available at this time and as such, an average population of 1.8 persons/unit was used in the calculations
4. Infiltration flow based on 0.28 L/s/ha.

The Prestige Circle sanitary sewer design was based on the applicable City of Ottawa Design Guidelines and a preliminary concept plan for the overall Prestige Circle Development which consisted of 248 apartments and 170 retirements units for a total of 418 units.

The current concept plan for the overall development consists of 418 units, broken-down as follows:

- Existing Phase 1: 40 units
- Existing Phase 2: 116 units
- Proposed Block 6: 79 units
- Proposed Block 7: 90 units
- Proposed Block 8: 93 units

A detailed sanitary sewer design sheet for the proposed development is included in **Appendix C**. A backflow preventer will be required for the proposed buildings in accordance with the Ottawa sewer design guidelines and will be coordinated with building mechanical engineers.

All underground parking drains should be connected to the internal building plumbing.

4.1 SANITARY SEWER DESIGN CRITERIA

As outlined in the City of Ottawa Sewer Design Guidelines and the Ministry of the Environment and Climate Change's (MOECC) Design Guidelines for Sewage Works, the following criteria were used to calculate estimated wastewater flow rates and to size the sanitary sewers:

- Minimum Velocity – 0.6 m/s (0.8 m/s for upstream sections)
- Maximum Velocity – 3.0 m/s
- Manning roughness coefficient for all smooth wall pipes – 0.013
- 1.4 persons/residential unit (1 bedroom)
- 2.1 persons/residential unit (2 bedroom)
- 1.8 person/residential unit (when number of bedroom not available)
- Harmon's Formula for Peak Factor – Max = 4.0
- Extraneous Flow Allowance – 0.28 L/s/ha (conservative value)
- Manhole Spacing – 120 m
- Minimum Cover – 2.5 m

5.0 STORMWATER MANAGEMENT

5.1 OBJECTIVES

The objective of this stormwater management (SWM) plan is to determine the measures necessary to control the quantity of stormwater released from the proposed development to the required levels, and to provide sufficient detail for approval and construction.

5.2 SWM CRITERIA AND CONSTRAINTS

The stormwater management criteria for the proposed site are based on IBI's 2014 Petrie's Landing II Phase 2 Site Servicing Report and City of Ottawa Sewer Design Guidelines. The following summarizes the criteria used in the preparation of this stormwater management plan:

- Stormwater runoff from the proposed Blocks 6, 7, and 8 up to and including the 100-year event to be stored on site and released into the minor system at a maximum rate of 290.6 L/s
- Maximum 100-year water depth of 0.3 m in parking and access areas
- Provide adequate emergency overflow conveyance (overland flow route) off-site
- Size storm sewers to convey 2-year storm event, assuming only roof controls are imposed (i.e. provide capacity for system without inlet control devices installed)
- Size storm sewers using an inlet time of concentration (Tc) of 10 minutes
- Quality control of runoff from the proposed development to be provided in the downstream Brisebois Creek SWM Facility prior to discharge into the Ottawa River
- Post-development runoff coefficient (C) value based on proposed impervious areas as per site plan drawing (see **Appendix B**)

5.3 STORMWATER MANAGEMENT DESIGN

The proposed 2.14 ha residential development consists of three (3) four-storey buildings with underground parking, landscaped areas and associated servicing infrastructure. The overall imperviousness of the site is 54% (C = 0.58).

Stormwater runoff from the proposed development will be directed to the existing storm sewers on Prestige Circle which ultimately discharge into the Brisebois Creek SWM Facility. Sump pumps and backwater valves will be provided for foundation drainage of the proposed buildings. The

proposed site plan and existing storm sewer infrastructure on Prestige Circle are shown on **Drawing SSP-1**.

5.3.1 Design Methodology

The proposed stormwater management plan is designed to detain runoff on the rooftops, underground and on surface areas to ensure that peak flows after construction will not exceed the target release rates for the site.

Due to the proposed site plan layout and grading restrictions, a landscaped portion of the site backing into the existing ravine east of the site could not be graded to enter the site's storm system and as such it will sheet drain uncontrolled. Runoff from this uncontrolled area is included in the overall site discharge calculations.

5.3.2 Water Quantity Control

The Modified Rational Method was used to assess the quantity and volume of runoff generated during post development conditions. The site was subdivided into subcatchments (subareas) tributary to storm sewer inlets, as defined by the location of catchbasins / inlet grates and used in the storm sewer design (see **Appendix D**). A summary of subareas and runoff coefficients is provided in **Appendix D**, and **Drawing SD-1** indicates the stormwater management subcatchments.

5.3.3 Allowable Release Rate

IBI's 2014 Petrie's Landing II Phase 2 Site Servicing Report outlines the quantity control criteria for the overall site. The report outlines that the minor system target criteria for Phase 2 is 361.87 L/s and 99.5 L/s for Phase 3.
The existing portion of Phase 2 discharges 170.77 L/s in the 100-year storm based on the ICD schedule, 100-year minor system capture from a parking ramp area, and runoff from 0.35 ha of uncontrolled area. As a result, the minor system peak flow target from Block 6 and 7 which are within Phase 2 is 191.1 L/s (140 L/s/ha). Similarly, the minor system peak flow target for the proposed Block 8 which corresponds to Phase 3 is 99.5 L/s. Minor system peak flows from the overall proposed development will be restricted to 290.6 L/s.

5.3.4 Storage Requirements

The site requires quantity control measures to meet the stormwater release criteria. It is proposed that restricted release rooftop drains be used to reduce the peak outflow from the site. Additionally, pipe storage and surface storage on parking areas will be provided. **Drawing SD-1** indicates the design release rate from the rooftops. Stormwater management calculations are provided in **Appendix D**.

5.3.4.1 Rooftop Storage

It is proposed to retain stormwater on the rooftops by installing restricted flow roof drains. The following calculations assume the roof will be equipped with Watts drains fully open, see **Appendix D** for details.

Watts roof drain data has been used to calculate a practical roof release rate and detention storage volume for the rooftops. It should be noted that the "Watts" roof drain has been used as an example only and that other products may be specified for use, provided that the roof release rate is restricted to match the maximum rate of release indicated in **Table 4** and **Table 5** and that sufficient roof storage is provided to meet (or exceed) the resulting volume of detained stormwater.

Table 4 and **Table 5** provide details regarding the retention of stormwater on the proposed rooftop during the 2 and 100-year storm events. Refer to **Appendix D** for details.

Table 4: Peak Controlled (Rooftop) 2-Year Release Rate

Area ID	Area (ha)	Head (m)	$Q_{release}$ (L/s)	V_{stored} (m^3)
BLDG Block 6	0.153	0.10	6.23	16.5
BLDG Block 7	0.197	0.10	8.63	20.4
BLDG Block 8	0.236	0.09	10.67	24.1

Table 5: Peak Controlled (Rooftop) 100-Year Release Rate

Area ID	Area (ha)	Head (m)	$Q_{release}$ (L/s)	V_{stored} (m^3)
BLDG Block 6	0.153	0.15	9.28	54.6
BLDG Block 7	0.197	0.15	12.89	67.8
BLDG Block 8	0.236	0.14	16.00	79.9

5.3.4.2 Surface Storage

In addition to rooftop storage, it is proposed to detain stormwater on the surface parking lot areas and in two pipe sections using inlet control devices (ICDs) in the proposed drainage structures. The modified rational method was used to determine the peak volume requirement for the parking areas. **Table 6** and **Table 7** summarize the proposed ICD characteristics.

Table 6: 2-Year ICD Characteristics

Area ID	Structure ID	Orifice Type	Head (m)	Release Rate (L/s)
F100B	STM100A	120mm Diameter Orifice	1.70	35.39
F102B	CB102A	83mm Diameter Orifice	2.34	7.09

Area ID	Structure ID	Orifice Type	Head (m)	Release Rate (L/s)
F201A	CB200B	102mm Diameter Orifice	1.75	9.20
F201B	CBMH200C	LMF 105	1.71	12.80
F202B	CB202A	83mm Diameter Orifice	1.36	1.84
F200B	CB200A	LMF70	1.92	5.98
F300A	CB300A	LMF70	1.90	5.94

1. 2-year runoff from F100B, F102B, F201A and F202B is less than the ICD release rate at the shown head (i.e. the release rate shown is the uncontrolled 100-year runoff).

Table 7: 100-Year ICD Characteristics

Area ID	Structure ID	Orifice Type	Head (m)	Release Rate (L/s)
F100B	STM100A	120mm Diameter Orifice	1.92	42.34
F102B	CB102A	83mm Diameter Orifice	2.42	20.60
F201A	CB200B	102mm Diameter Orifice	1.75	26.72
F201B	CBMH200C	LMF 105	1.92	13.57
F202B	CB202A	83mm Diameter Orifice	1.36	5.34
F200B	CB200A	LMF70	2.12	6.28
F300A	CB300A	LMF70	2.10	6.25

1. 100-year runoff from F102B, F201A and F202B is less than the ICD release rate at the shown head (i.e. the release rate shown is the uncontrolled 100-year runoff from the catchment).

5.3.4.3 Pipe Storage

14.0 m^3 of pipe storage will be provided in area F100B through 20.4m of 900 mm diameter pipe connected to STM100A as shown on **Drawing SD-1**. Similarly, 13.4 m^3 of pipe storage will be provided in area F201B through 25.0m of 825 mm diameter pipe connected to CBMH200C as shown on **Drawing SD-1.**

5.3.5 Uncontrolled Area

A small portion of the site fronting Prestige Circle and backing onto the ravine (see areas UNC-1, UNC-2, and UNC-3 on **Drawing SD-1**) could not be graded to enter the site's storm system and as such it will sheet drain uncontrolled. However, as can be seen on the storm drainage plan prepared by IBI for the entire site in 2014 (see report excerpts in **Appendix E**), the area behind the proposed buildings was not included in the SWM calculations and was assumed to drain towards the ravine. **Table 8** and **Table 9** summarize the 2 and 100-year uncontrolled release rates from the proposed development.

Table 8: Peak Uncontrolled (Non-tributary) 2-Year Release Rate

Area ID	Area (ha)	Runoff 'C'	Tc (min)	$Q_{release}$ (L/s)
UNC-1	0.203	0.20	10	8.7
UNC-2	0.028	0.20	10	1.2
UNC-3	0.368	0.20	10	15.7

Table 9: Peak Uncontrolled (Non-tributary) 100-Year Release Rate

Area ID	Area (ha)	Runoff 'C'	Tc (min)	$Q_{release}$ (L/s)
UNC-1	0.203	0.25	10	25.2
UNC-2	0.028	0.25	10	3.5
UNC-3	0.368	0.25	10	45.7

5.3.6 Results

The proposed buildings will have underground parking and as such, it is proposed that the proposed parking ramps be equipped with trench drains to capture the 100-year runoff. In addition, it is recommended that the proposed buildings be equipped with sump pumps and backwater valves. **Table 10** and **Table 11** demonstrate that the proposed stormwater management plan provides adequate attenuation storage to meet the target peak outflows for the site.

Table 10: Estimated Discharge from Site (2-Year)

Block	Area Type	Area ID	V_{stored} (m^3)	$Q_{release}$ (L/s)	Target (L/s)
BLOCK 6	Controlled – Surface (Includes Roof area)	F100B, F102B, R100A	16.5	48.7	**290.6**
	Parking Ramp Area	F102A	-	6.3	
	Total Block 6		**16.5**	**55.0**	
BLOCK 7	Controlled – Surface (Includes Roof area)	F201A, F201B, F200B, F202B, R200A	25.3	38.4	
	Parking Ramp Area	F202A	-	9.4	
	Uncontrolled Areas	UNC-1, UNC-2	-	9.9	
	Total Block 7		**25.3**	**57.7**	

Block	Area Type	Area ID	V_{stored} (m^3)	$Q_{release}$ (L/s)	Target (L/s)
BLOCK 8	Controlled – Surface (Includes Roof area)	F300A, R300A	36.2	16.6	
	Parking Ramp Area	F300B	-	5.8	
	Uncontrolled Areas	UNC-3	-	15.7	
	Total Block 8		**36.2**	**38.1**	

Table 11: Estimated Discharge from Site (100-Year)

Block	Area Type	Area ID	V_{stored} (m^3)	$Q_{release}$ (L/s)	Target (L/s)
BLOCK 6	Controlled – Surface (Includes Roof area)	F100B, F102B, R100A	90.9	72.2	**290.6**
	Parking Ramp Area	F102A	-	16.4	
	Total Block 6		**90.9**	**88.6**	
BLOCK 7	Controlled – Surface (Includes Roof area)	F201A, F201B, F200B, F202B, R200A	107.2	64.8	
	Parking Ramp Area	F202A	-	25.8	
	Uncontrolled Areas	UNC-2, UNC-3	-	28.7	
	Total Block 7		**107.2**	**119.3**	
BLOCK 8	Controlled – Surface (Includes Roof area)	F300A, R300A	128.8	22.3	
	Parking Ramp Area	F300B	-	14.9	
	Uncontrolled Areas	UNC-3	-	45.7	
	Total Block 8		**128.8**	**82.9**	

As can be seen in the above tables, the proposed ICDs and storage provided restrict post development peak flows from site areas to 150.8 L/s and 290.8 L/s in the 2-year and 100-year storm events respectively. It is important to note that the ICDs have been sized to keep the minimum release rate at 6 L/s as per previous City comments.

6.0 GRADING AND DRAINAGE

The proposed development site measures approximately 2.14 ha in area. The site has significant grade change from the southwestern property limit adjacent to Brisebois Creek to the northeastern limit adjacent to Jeanne D'Arc Boulevard. A detailed grading plan (see **Drawing GP-1**) has been provided to satisfy the stormwater management requirements, to meet minimum cover requirements for storm and sanitary sewers, and to provide sufficient cover over top of the underground parking garage. Site grading has been established to provide emergency overland flow routes for stormwater management in accordance with City of Ottawa requirements.

The subject site maintains emergency overland flow routes to the existing Prestige Circle ROW and to the existing ravine the east of the proposed development as depicted on **Drawings GP-1** and **SD-1**.

7.0 UTILITIES

The subject site has existing plants within Prestige Circle to provide Hydro, Bell, Gas and Cable servicing for the proposed development as existing residential development to the west was constructed as part of Phase 1. It is anticipated that existing infrastructure will be sufficient to provide the means of distribution for the proposed site. Detailed design of the required utility services will be further investigated as part of the composite utility planning process following design circulation.

8.0 APPROVALS

As each proposed block will fall under separate plan of condominium with one owner and will have a separate drainage and storm sewer system discharging to a pre-existing sewer system, Ontario Ministry of the Environment, Conservation and Parks (MOECP) Environmental Compliance Approval (ECAs, formerly Certificates of Approval (CofA) under the Ontario Water Resources Act are not expected to be a requirement for the development to proceed.

A portion of the proposed Block 8 is within 120 m of the Petrie Island Provincially Significant Wetland, and as such, it is within the RVCA's regulatory jurisdiction. As a result, written approval from the RVCA is required under Ontario Regulation 174/06 "Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation" under Section 28 of the Conservation Authorities Act.

Requirement for an MOECP Permit to Take Water (PTTW) for pumping during construction of the underground parking levels will be confirmed by the geotechnical consultant.

9.0 EROSION CONTROL DURING CONSTRUCTION

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

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit extent of exposed soils at any given time.
3. Re-vegetate exposed areas as soon as possible.
4. Minimize the area to be cleared and grubbed.
5. Protect exposed slopes with plastic or synthetic mulches.
6. Provide sediment traps and basins during dewatering.
7. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
8. Plan construction at proper time to avoid flooding.
9. Installation of a mud matt to prevent mud and debris from being transported off site.
10. Installation of a silt fence to prevent sediment runoff.

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

1. Verification that water is not flowing under silt barriers.
2. Clean and change silt traps at catch basins.

Refer to **Drawing EC-DS** for the proposed location of silt fences, and other erosion control structures.

10.0 GEOTECHNICAL INVESTIGATION

A geotechnical investigation was completed by Paterson Group Ltd. in May 24, 2017. The report summarizes the existing soil conditions within the subject area and construction recommendations. For details which are not summarized below, please see the original Paterson report (Excerpts included in **Appendix E**).

Subsurface soil conditions within the subject area were determined from 6 boreholes distributed across the proposed site. In general soil stratigraphy consisted of topsoil or fill underlain by a silty clay deposit layer.

Groundwater levels were measured on July 16, 2007 and on May 1, 2017 and vary in elevation from 1.6 to 5.5 m below the original ground surface.

A permissible grade raise restriction is recommended within the Paterson Group report due to the encounter of deep silty clay deposits of up to a maximum depth of 30.4 m. A 2.0m grade raise restrictions was accounted for in the grading design of the property.

The required pavement structure for the local roadways is outlined in Error! Reference source not found. and Error! Reference source not found. below:

Table 12: Pavement Structure – Car Only Parking Areas

Thickness (mm)	Material Description
50	Wear Course – HL-3 or Superpave 12.5 Asphaltic Concrete
150	Base – OPSS Granular A Crushed Stone
300	Subbase - OPSS Granular B Type II
-	Subgrade – Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill.

Table 13: Pavement Structure – Access Lanes and Heavy Truck Parking Areas

Thickness (mm)	Material Description
40	Wear Course –Superpave 12.5 Asphaltic Concrete
50	Binder Course –Superpave 19.0 Asphaltic Concrete
150	Base – OPSS Granular A Crushed Stone
400	Subbase - OPSS Granular B Type II
-	Subgrade – Either fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill.

11.0 CONCLUSIONS

11.1 WATER SERVICING

The 200 mm diameter watermain on Prestige Circle provides adequate fire flow capacity as per the Fire Underwriters Survey. The service connections will also be capable of providing anticipated demand but exceeds the maximum objective pressure of 552 kPa (80 psi). Therefore, pressure reducing measures, such as a pressure reducing valve, will be required to service the proposed buildings per the Ontario Plumbing Code. The minimum anticipated pressure of 496 kPa (72 psi) is sufficient to provide the highest floors with an acceptable equivalent pressure provided the internal plumbing is sized to minimize head loss, otherwise a booster pump could be required.

11.2 SANITARY SERVICING

The proposed sanitary sewer lateral is sufficiently sized to provide gravity drainage for the site. The proposed blocks will be serviced by a 200 mm diameter service lateral directing wastewater flows to the existing 300 mm dia. Prestige Circle sanitary sewer. A backflow preventer will be required for the proposed building in accordance with the Ottawa sewer design guidelines and will be coordinated with building mechanical engineers. The proposed sanitary drainage pattern is in accordance with the wastewater section of IBI Group's Design Brief for Petrie's Landing II Phase 2 and with the City of Ottawa Sewer Design guidelines.

11.3 STORMWATER SERVICING

The proposed stormwater management plan is in compliance with the goals specified through the stormwater management section of IBI Group's Design Brief for Petrie's Landing and with the City of Ottawa Design guidelines. Rooftop, pipe, and surface storage in combination with ICDs are proposed to limit inflow from the site area into the minor system to the required target release rates.

The proposed buildings will have underground parking and as such, it is recommended that the proposed parking ramps be equipped with trench drains to capture the 100-year runoff. In addition, it is recommended that the proposed buildings be equipped with sump pumps and backwater valves.

11.4 GRADING

Grading for the site has been designed to provide an emergency overland flow route as per City requirements and reflects the overall recommendations provided in the Geotechnical Investigation. Erosion and sediment control measures will be implemented during construction to reduce the impact on existing infrastructure.

11.5 UTILITIES

All utilities (Hydro Ottawa, Bell Canada, Rogers Ottawa, and Enbridge Gas) have existing plants in the subject area. Exact size, location and routing of utilities will be finalized after design circulation.

11.6 APPROVAL / PERMITS

Ontario Ministry of the Environment, Conservation and Parks (MOECP) Environmental Compliance Approvals (ECA) are not expected to be required for the subject site as each proposed block will fall under separate plan of condominium with one owner and will have a separate drainage and storm sewer system discharging to a pre-existing sewer system. Written approval from the Rideau Valley Conservation Authority (RVCA) is required under Ontario Regulation 174/06 "Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation" under Section 28 of the Conservation Authorities Act for the portion of the site within 120 m of a significant wetland. A Permit to Take Water may be required for pumping requirements for construction of underground parking level. No other approval requirements from other regulatory agencies are anticipated.

APPENDICES

Appendix A POTABLE WATER SERVICING ANALYSIS

Block 6-8 Petries Landing - Domestic Water Demand Estimates

Building ID	Units	Population	Daily Rate of Demand [1]	Avg Day Demand [2]		Max Day Demand [3]		Peak Hour Demand [3]	
				(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)
Block 6	79	122	350	29.6	0.49	74.0	1.23	162.8	2.71
Block 7	92	140	350	34.0	0.57	85.1	1.42	187.2	3.12
Block 8	93	141	350	34.4	0.57	85.9	1.43	189.0	3.15
Total Site :				**98.0**	**1.63**	**245.0**	**4.08**	**539.0**	**8.98**

Water demand criteria used to estimate peak demand rates for residential areas are as follows:

1 maximum day demand rate = 2.5 x average day demand rate

2 maximum hour demand rate = 2.2 x maximum day demand rate

FUS Fire Flow Calculation

Calculations based on: "*Water Supply for Public Fire Protection*" by Fire Underwriters' Survey, 1999

Stantec Project #: 1604-01331
Project Name: Petries Landing
Date: June 12, 2017
Data input by: Thakshika Rathnasooriya
Notes:

Fire Flow Calculation #: 1
Building Type/Description/Name: Apartment Building - Block 6

Table A: Fire Underwriters Survey Determination of Required Fire Flow - Long Method

Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)
		Framing Material						
1	**Choose Frame Used for Construction of Unit**	Coefficient related to type of construction (C)	Wood Frame	1.5	Wood Frame	1.5	-	
			Ordinary construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (> 3 hrs)	0.6				
		Floor Space Area						
2	**Choose Type of Housing (if TH, Enter Number of Units Per TH Block)**	Type of Housing	Single Family	0	Other (Comm, Ind, Apt etc.)	1	Units	
			Townhouse - indicate # of units	0				
			Other (Comm, Ind, Apt etc.)	1				
2.2	**# of Storeys**	Number of Floors/Storeys in the Unit (do not include basement):			4	4	Storeys	
3	**Enter Ground Floor Area of One Unit**	Average Floor Area (A) based on fire resistive building design when vertical openings are inadequately protected:			1,533 Square Metres (m2)	6,132	Area in Square Meters (m^2)	
4	**Obtain Required Fire Flow without Reductions**	Required Fire Flow (without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1000L/min						**26,000**
5	**Apply Factors Affecting Burning**	**Reductions/Increases Due to Factors Affecting Burning**						
5.1	**Choose Combustibility of Building Contents**	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15	N/A	**22,100**
			Limited combustible	-0.15				
			Combustible	0				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	**Choose Reduction Due to Presence of Sprinklers**	Sprinkler reduction	Adequate Sprinkler conforms to NFPA13	-0.3	Adequate Sprinkler conforms to NFPA13	-0.3	N/A	**-6,630**
			None	0				
		Water Supply Credit	Water supply is standard for sprinkler and fire dept. hose line	-0.1	Water supply is standard for sprinkler and fire dept. hose line	-0.1	N/A	**-2,210**
			Water supply is not standard or N/A	0				
		Sprinkler Supervision Credit	Sprinkler system is fully supervised	-0.1	Sprinkler not fully supervised or N/A	0	N/A	**0**
			Sprinkler not fully supervised or N/A	0				
5.3	**Choose Separation Distance Between Units**	Exposure Distance Between Units	North Side	45.1m or greater	0	0.1	m	**2,210**
			East Side	30.1 to 45.0m	0.05			
			South Side	45.1m or greater	0			
			West Side	30.1 to 45.0m	0.05			
6	**Obtain Required Fire Flow, Duration & Volume**	***Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:***						**15,000**
		Total Required Fire Flow (above) in L/s:						**250**
		Required Duration of Fire Flow (hrs)						**3.25**
		Required Volume of Fire Flow (m^3)						**2,925**

FUS Fire Flow Calculation

Calculations based on: "*Water Supply for Public Fire Protection*" by Fire Underwriters' Survey, 1999

Stantec Project #: 1604-01331
Project Name: Petries Landing
Date: June 12, 2017
Data input by: Thakshika Rathnasooriya
Notes:

Fire Flow Calculation #: 1
Building Type/Description/Name: Apartment Building - Block 7 - 1

Table A: Fire Underwriters Survey Determination of Required Fire Flow - Long Method

Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)
		Framing Material						
1	**Choose Frame Used for Construction of Unit**	Coefficient related to type of construction (C)	Wood Frame	1.5	Wood Frame	1.5	-	
			Ordinary construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (> 3 hrs)	0.6				
		Floor Space Area						
2	**Choose Type of Housing (if TH, Enter Number of Units Per TH Block)**	Type of Housing	Single Family	0	Other (Comm, Ind, Apt etc.)	1	Units	
			Townhouse - indicate # of units	0				
			Other (Comm, Ind, Apt etc.)	1				
2.2	**# of Storeys**	Number of Floors/Storeys in the Unit (do not include basement):			4	4	Storeys	
3	**Enter Ground Floor Area of One Unit**	Average Floor Area (A) based on fire resistive building design when vertical openings are inadequately protected:			1,178 Square Metres (m2)	4,712	Area in Square Meters (m^2)	
4	**Obtain Required Fire Flow without Reductions**	Required Fire Flow (without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1000L/min						**23,000**
5	**Apply Factors Affecting Burning**	**Reductions/Increases Due to Factors Affecting Burning**						
5.1	**Choose Combustibility of Building Contents**	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15	N/A	**19,550**
			Limited combustible	-0.15				
			Combustible	0				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	**Choose Reduction Due to Presence of Sprinklers**	Sprinkler reduction	Adequate Sprinkler conforms to NFPA13	-0.3	Adequate Sprinkler conforms to NFPA13	-0.3	N/A	**-5,865**
			None	0				
		Water Supply Credit	Water supply is standard for sprinkler and fire dept. hose line	-0.1	Water supply is standard for sprinkler and fire dept. hose line	-0.1	N/A	**-1,955**
			Water supply is not standard or N/A	0				
		Sprinkler Supervision Credit	Sprinkler system is fully supervised	-0.1	Sprinkler not fully supervised or N/A	0	N/A	**0**
			Sprinkler not fully supervised or N/A	0				
5.3	**Choose Separation Distance Between Units**	Exposure Distance Between Units	North Side	Fire Wall	0.1	0.15	m	**2,933**
			East Side	45.1m or greater	0			
			South Side	30.1 to 45.0m	0.05			
			West Side	45.1m or greater	0			
6	**Obtain Required Fire Flow, Duration & Volume**	***Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:***						**15,000**
		Total Required Fire Flow (above) in L/s:						**250**
		Required Duration of Fire Flow (hrs)						**3.25**
		Required Volume of Fire Flow (m^3)						**2,925**

FUS Fire Flow Calculation

Calculations based on: "*Water Supply for Public Fire Protection*" by Fire Underwriters' Survey, 1999

Stantec Project #: 1604-01331
Project Name: Petries Landing
Date: June 12, 2017
Data input by: Thakshika Rathnasooriya

Fire Flow Calculation #: 1
Building Type/Description/Name: Apartment Building - Block 7-2

Notes:

Table A: Fire Underwriters Survey Determination of Required Fire Flow - Long Method

Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)
1	**Choose Frame Used for Construction of Unit**	**Framing Material**						
		Coefficient related to type of construction (C)	Wood Frame	1.5	Wood Frame	1.5	-	
			Ordinary construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (> 3 hrs)	0.6				
2	**Choose Type of Housing (if TH, Enter Number of Units Per TH Block)**	**Floor Space Area**						
		Type of Housing	Single Family	0	Other (Comm, Ind, Apt etc.)	1	Units	
			Townhouse - indicate # of units	0				
			Other (Comm, Ind, Apt etc.)	1				
2.2	**# of Storeys**	Number of Floors/Storeys in the Unit (do not include basement):			4	4	Storeys	
3	**Enter Ground Floor Area of One Unit**	Average Floor Area (A) based on fire resistive building design when vertical openings are inadequately protected:			806 Square Metres (m2)	3,224	Area in Square Meters (m^2)	
4	**Obtain Required Fire Flow without Reductions**	Required Fire Flow (without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1000L/min						**19,000**
5	**Apply Factors Affecting Burning**	**Reductions/Increases Due to Factors Affecting Burning**						
5.1	**Choose Combustibility of Building Contents**	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15	N/A	**16,150**
			Limited combustible	-0.15				
			Combustible	0				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	**Choose Reduction Due to Presence of Sprinklers**	Sprinkler reduction	Adequate Sprinkler conforms to NFPA13	-0.3	Adequate Sprinkler conforms to NFPA13	-0.3	N/A	**-4,845**
			None	0				
		Water Supply Credit	Water supply is standard for sprinkler and fire dept. hose line	-0.1	Water supply is standard for sprinkler and fire dept. hose line	-0.1	N/A	**-1,615**
			Water supply is not standard or N/A	0				
		Sprinkler Supervision Credit	Sprinkler system is fully supervised	-0.1	Sprinkler not fully supervised or N/A	0	N/A	**0**
			Sprinkler not fully supervised or N/A	0				
5.3	**Choose Separation Distance Between Units**	Exposure Distance Between Units	North Side	30.1 to 45.0m	0.05	0.15	m	**2,423**
			East Side	45.1m or greater	0			
			South Side	Fire Wall	0.1			
			West Side	45.1m or greater	0			
6	**Obtain Required Fire Flow, Duration & Volume**	***Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:***						**12,000**
		Total Required Fire Flow (above) in L/s:						**200**
		Required Duration of Fire Flow (hrs)						**2.50**
		Required Volume of Fire Flow (m^3)						**1,800**

FUS Fire Flow Calculation

Calculations based on: "*Water Supply for Public Fire Protection*" by Fire Underwriters' Survey, 1999

Stantec Project #: 1604-01331
Project Name: Petries Landing
Date: June 12, 2017
Data input by: Thakshika Rathnasooriya
Notes:

Fire Flow Calculation #: 1
Building Type/Description/Name: Apartment Building - Block 8

Table A: Fire Underwriters Survey Determination of Required Fire Flow - Long Method

Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)
		Framing Material						
1	**Choose Frame Used for Construction of Unit**	Coefficient related to type of construction (C)	Wood Frame	1.5	Wood Frame	1.5	-	
			Ordinary construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (> 3 hrs)	0.6				
		Floor Space Area						
2	**Choose Type of Housing (if TH, Enter Number of Units Per TH Block)**	Type of Housing	Single Family	0	Other (Comm, Ind, Apt etc.)	1	Units	
			Townhouse - indicate # of units	0				
			Other (Comm, Ind, Apt etc.)	1				
2.2	**# of Storeys**	Number of Floors/Storeys in the Unit (do not include basement):			4	4	Storeys	
3	**Enter Ground Floor Area of One Unit**	Average Floor Area (A) based on fire resistive building design when vertical openings are inadequately protected:			2,484 Square Metres (m2)	9,936	Area in Square Meters (m^2)	
4	**Obtain Required Fire Flow without Reductions**	Required Fire Flow (without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1000L/min						**33,000**
5	**Apply Factors Affecting Burning**	**Reductions/Increases Due to Factors Affecting Burning**						
5.1	**Choose Combustibility of Building Contents**	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Limited combustible	-0.15	N/A	**28,050**
			Limited combustible	-0.15				
			Combustible	0				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	**Choose Reduction Due to Presence of Sprinklers**	Sprinkler reduction	Adequate Sprinkler conforms to NFPA13	-0.3	Adequate Sprinkler conforms to NFPA13	-0.3	N/A	**-8,415**
			None	0				
		Water Supply Credit	Water supply is standard for sprinkler and fire dept. hose line	-0.1	Water supply is standard for sprinkler and fire dept. hose line	-0.1	N/A	**-2,805**
			Water supply is not standard or N/A	0				
		Sprinkler Supervision Credit	Sprinkler system is fully supervised	-0.1	Sprinkler not fully supervised or N/A	0	N/A	**0**
			Sprinkler not fully supervised or N/A	0				
5.3	**Choose Separation Distance Between Units**	Exposure Distance Between Units	North Side	45.1m or greater	0	0.1	m	**2,805**
			East Side	45.1m or greater	0			
			South Side	30.1 to 45.0m	0.05			
			West Side	30.1 to 45.0m	0.05			
6	**Obtain Required Fire Flow, Duration & Volume**	***Total Required Fire Flow, rounded to nearest 1000 L/min, with max/min limits applied:***						**20,000**
		Total Required Fire Flow (above) in L/s:						**333**
		Required Duration of Fire Flow (hrs)						**4.50**
		Required Volume of Fire Flow (m^3)						**5,400**

Hydraulic Model Results - Average Day Analysis

Junction Results

ID	Demand	Elevation	Head	Pressure	
	(L/s)	(m)	(m)	(psi)	(Kpa)
10	0.00	52.00	115	89.56	617.50
11	0.00	55.06	115	85.21	587.51
12	0.00	55.06	115	85.21	587.51
13	0.00	51.90	115	89.7	618.46
14	0.00	52.10	115	89.42	616.53
BLDG1	0.29	55.71	115	84.28	581.09
BLDG2	0.29	56.60	115	83.02	572.41
BLDG3	0.67	56.70	115	82.87	571.37
BLDG6	0.49	57.30	115	82.02	565.51
BLDG7	0.57	56.50	115	83.16	573.37
BLDG8	0.57	55.09	115	85.16	587.16

Pipe Results

ID	From Node	To Node	Length	Diameter	Roughness	Flow	Velocity
			(m)	(mm)		(L/s)	(m/s)
1	1000	14	25.84	900	130	2.88	0.00
10	BLDG8	12	28.03	200	110	-1.63	0.05
11	12	11	7.05	200	110	-0.20	0.01
12	12	13	88.97	200	110	-1.42	0.05
13	13	10	7.80	400	120	-1.42	0.01
2	14	10	19.33	400	120	2.88	0.02
3	10	11	84.72	200	110	1.46	0.05
4	BLDG1	11	51.80	200	110	-1.25	0.04
5	BLDG2	BLDG1	32.66	200	110	-0.96	0.03
6	BLDG3	BLDG2	62.45	200	110	-0.67	0.02
7	BLDG3	BLDG6	72.85	200	110	0.00	0.00
8	BLDG6	BLDG7	34.69	200	110	-0.49	0.02
9	BLDG7	BLDG8	55.50	200	110	-1.06	0.03

Hydraulic Model Results -Peak Hour Analysis

Junction Results

ID	Demand	Elevation	Head	Pressure	
	(L/s)	(m)	(m)	(psi)	(Kpa)
10	0.00	52.00	108.00	79.61	548.90
11	0.00	55.06	107.95	75.19	518.42
12	0.00	55.06	107.95	75.19	518.42
13	0.00	51.90	108.00	79.75	549.86
14	0.00	52.10	108.00	79.47	547.93
BLDG1	1.60	55.71	107.93	74.23	511.80
BLDG2	1.60	56.60	107.92	72.95	502.98
BLDG3	3.69	56.70	107.91	72.80	501.94
BLDG6	2.71	57.30	107.91	71.94	496.01
BLDG7	3.12	56.50	107.91	73.08	503.87
BLDG8	3.15	55.09	107.93	75.11	517.87

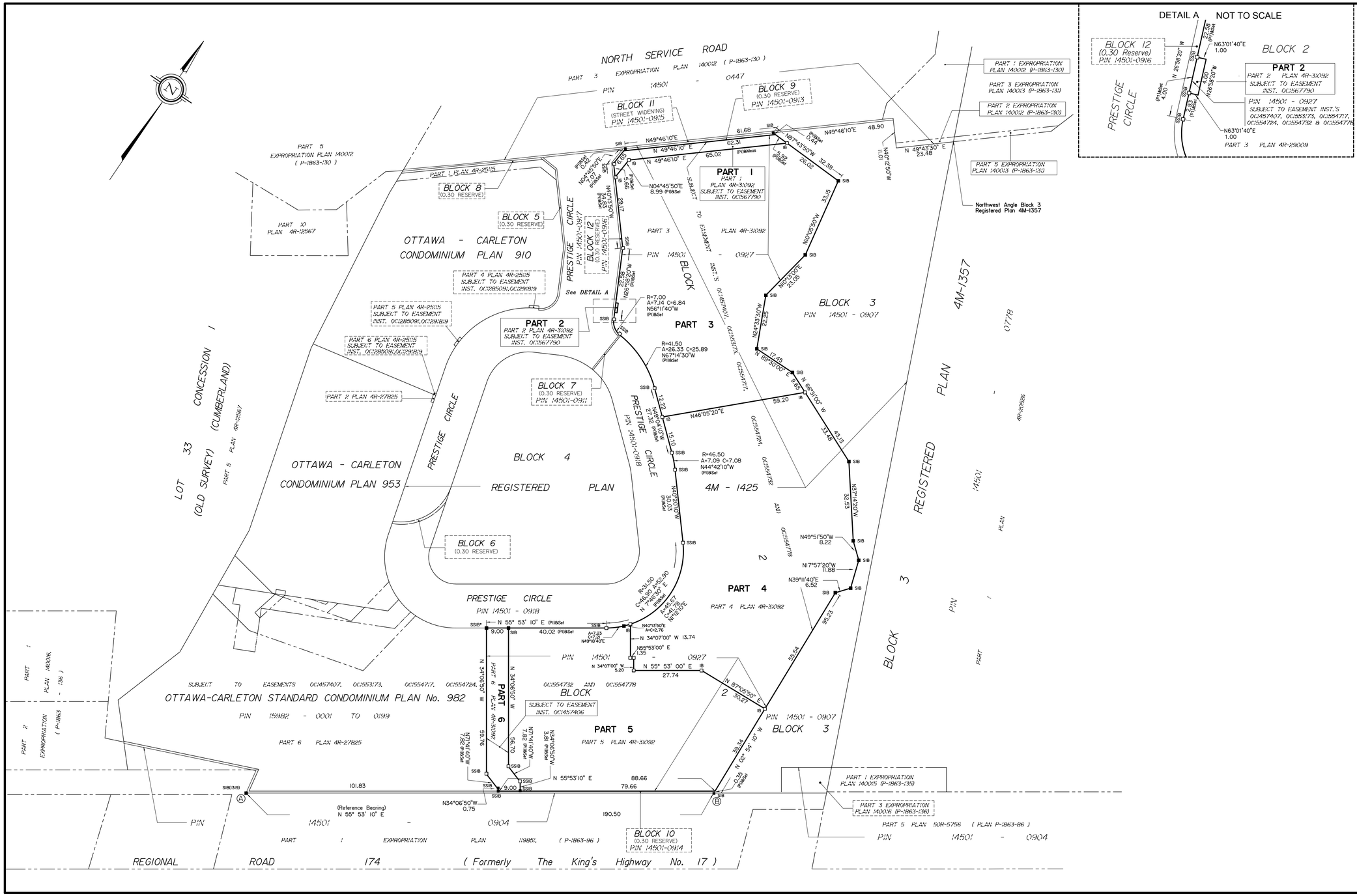
Pipe Results

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)
1	1000	14	25.84	900	130	15.87	0.02
10	BLDG8	12	28.03	200	110	-8.95	0.29
11	12	11	7.05	200	110	-1.13	0.04
12	12	13	88.97	200	110	-7.83	0.25
13	13	10	7.80	400	120	-7.83	0.06
2	14	10	19.33	400	120	15.87	0.13
3	10	11	84.72	200	110	8.04	0.26
4	BLDG1	11	51.80	200	110	-6.92	0.22
5	BLDG2	BLDG1	32.66	200	110	-5.32	0.17
6	BLDG3	BLDG2	62.45	200	110	-3.72	0.12
7	BLDG3	BLDG6	72.85	200	110	0.03	0.00
8	BLDG6	BLDG7	34.69	200	110	-2.68	0.09
9	BLDG7	BLDG8	55.50	200	110	-5.80	0.18

Hydraulic Model Results -Fire Flow Analysis

ID	Static Demand	Static Pressure		Static Head	Fire-Flow Demand	Residual Pressure		Available Flow at Hydrant	Available Flow Pressure	
	(L/s)	(psi)	(Kpa)	(m)	(L/s)	(psi)	(Kpa)	(L/s)	(psi)	(Kpa)
BLDG1	0.73	77.15	531.93	109.98	335	31.59	217.81	380.02	20	137.90
BLDG2	0.73	75.89	523.25	109.98	289	34.86	240.35	343.11	20	137.90
BLDG3	1.68	75.74	522.21	109.98	182	55.49	382.59	319.67	20	137.90
BLDG6	1.23	74.89	516.35	109.98	250	40.23	277.38	323.11	20	137.90
BLDG7	1.42	76.03	524.21	109.98	250	44.52	306.96	344.5	20	137.90
BLDG8	1.43	78.04	538.07	109.98	333	41.23	284.27	428.91	20	137.90

Appendix B PROPOSED SITE PLAN



I RE□UIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.

DATE:□□□□□□□□□□□□□

□□□□□□□□□□□□□□□□□□□□

RICHARD R. GAUTHIER
ONTARIO LAND SURVE□OR

PLAN 4R□

RECEIVED AND DEPOSITED
DATE: □□□□□□□□□□□□□□

□□□□□□□□□□□□□□□□□□□□

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

SCHEDULE

PART	BLOCK	PLAN	PIN
1			
2	PART OF 2	4M□1425	ALL OF 14501□0□2□
3			
4			
5			
6			

Parts 1 and 2: S□□ject to Ease□ent Inst. OC156□□□0.
Part 6: S□□ject to Ease□ent Inst. OC145□406.
Parts 1 to 6 incl□si□e: S□□ject to Ease□ent Inst.'s OC145□40□□ OC15531□3□OC1554□1□□OC1554□24□OC1554□32 and OC1554□□□.

PLAN OF SURVEY OF

PART OF BLOCK 2
REGISTERED PLAN 4M-1425
CITY OF OTTAWA

S□r□eyed □y Annis □O'S□lli□an □Volle□ekk Ltd.

Scale 1 : □50

30 22.5 15 □5 0 15 30 Metres

Metric

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

S□r□eyor's Certi□icate

I CERTIF□ THAT :

1. This s□r□ey and □lan are correct and in accordance with the S□r□eys Act□ the S□r□eyors Act and the Land Titles Act and the reg□lations □ade □nder the□.
2. The s□r□ey was co□□□leted on the □th day o□ Se□te□□e□ 201□.

□□□□□□□□□□ Date

□□□□□□□□□□□□□□□□□□□□ Richard R. Ga□thier Ontario Land S□r□eyor

NOTES AND LEGEND

—□—	denotes	S□r□ey Mon□□ent Planted
—■—	"	S□r□ey Mon□□ent Fo□nd
SIB	"	Standard Iron Bar
SSIB	"	Short Standard Iron Bar
SSIB□	"	Short Standard Iron Bar 0.3 □etres Long
IB	"	Iron Bar
CLF	"	Chain Link Fence
BF	"	Board Fence
□AOG□□	"	Annis□O'S□lli□an□Volle□ekk Ltd.
□P1□	"	Plan 4R□2□00□

All □o□nd s□r□ey □on□□ents are □AOG□□nless otherwise noted.

All □earing and distances □etween □o□nd s□r□ey □on□□ents are □P1□□Meas □nless otherwise noted.

Distances shown on this □lan are gro□nd distances and can □e con□erted to grid distances □y □□lti□lying □y the co□□□ined scale □actor o□ 0.□□□□6□.

Bearings are grid□deri□ed fro□ Can□Net 3.0 Real Ti□e Network GPS o□ser□ations on re□erence □oints A and B□ shown hereon□ha□ing a bearing of N55°53'10"E and are referenced to Specified Control Points 01919680184 and 01919843476 1, MTM Zone 9 (76°30' West Longitude) NAD□3 □original□.

Coordinates are deri□ed fro□ Can□Net 3.0 Real Ti□e Network GPS o□ser□ations re□erenced to S□eci□ied Control Points 01□1□6□01□4 and 01919843476 1, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

Coordinate □all□es are to □r□an acc□racy in accordance with O. Reg. 216/10.

□01□1□6□01□4	Northing	5040610.16	Easting	3□4□36.56
□01□1□□434□61	Northing	50361□□12	Easting	3□2436.11
□Point A	Northing	503□31□□2	Easting	3□3314.2□
□Point B	Northing	503□424.□1	Easting	3□34□2.21

Ca□tion□ Coordinates cannot□in the□sel□es□e □sed to re□esta□lish corners or □o□ndaries shown on this □lan.

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

Job No. 16109-15 Brigl PlBk 2 4M-1425 R D5 Sept10 2018 PL/dg

KEY PLAN

SCALE: 1:5000

2
A100

LEGEND

PROPERTY LINE

BOUNDARY OF PHASES

NOTE 1:
- Exterior lighting fixtures from Keene Conlyte, model: Silhouette Roadway Luminaire Types: A; A2 and A3. Metal Hollide (MA) 70W.
- To be installed on 18' poles (see plan for locations)

Informations herein as per Electrical Eng. preliminary documents. Please refer to annexe thechnical data sheets for further information.

Appendix A
PLZ Stage 2: RSAQ 6490 Zoning Compliance Chart
Site Plan : 79 units - BLOCK 6, 140 Prestige Circle

Applicable sections from Bylaw 2008-250	Requirement	Provided
Assumes that Prestige Circle is front lot line.		
Property area Phase 2		**20 006,9 m²**
Property area Block 6		**6 136,5 m²**
Table 164A - Apartment dwelling, low rise, Stacked		
Minimum Lot Width (m)	18,0	> 18,0 m
Minimum Lot Area (m²)	5402,0 m²	> 540 m²
Maximum Building Height (storeys) - exception RSAQ 4090	60	6
Minimum Front Yard Setback (m)	6,0 m	> 6,0 m
Minimum Corner Yard Setback (m)	4,5 m	n.a. m
Minimum Interior Side Yard Setback (m)	3,0 m	> 3,0 m
Minimum Rear Yard Setback (m) - exception RSAQ 4090	7,5 m	> 7,5 m
Minimum Setback from North Service Road (m) - exception RSAQ 4090	100,0 m	n.a. m
Minimum distance between apartment dwellings under 7 storeys and OSL zone (m)	7,5 m	> 7,5 m
Minimum required building spacing - exception RSAQ 4090	3,0	> 3,0 m
Table 164A - 'H' Planed unit development		
Minimum Lot Width (m)	18,0	> 18,0 m
Minimum Lot Area (m²)	1400,0 m²	> 1400,0 m²
Maximum Building Height (storeys) - exception RSAQ 4090	60	6
Minimum Front Yard Setback (m)	6,0 m	> 6,0 m
Minimum Corner Yard Setback (m)	4,5 m	n.a. m
Minimum Interior Side Yard Setback (m) *	3,0 m	> 3,0 m
Minimum Rear Yard Setback (m) - exception RSAQ 4090	7,5 m	> 7,5 m
Minimum Setback from North Service Road (m) - exception RSAQ 4090	100,0 m	n.a. m
Minimum distance between apartment dwellings under 7 storeys and OSL zone (m)	7,5 m	> 7,5 m
Minimum required building spacing - exception RSAQ 4090	3,0	> 3,0 m
Section 163(9)		
Minimum landscape area (% of site)	30,0%	47,0%
Section 101 and 102		
Minimum No. of parking spaces (total)	(ratio = 1,2) = 95	95
Minimum No. of visitor parking spaces (total)	(ratio = 0,1) = 16	16
Section 106		
Parking space width (m) per section 106 (3)(a)ii - applicable to 50% of resident spaces	2,4 min	2,4 min
Parking space width (m)	2,6 min 2,75 max	2,6
Minimum parking space depth (m)	5,2	5,2
Section 107		
Driveway access - min width (m) one way	3,0 m	n.a. m
Driveway access - min width (m) two way	6,7 m	6,7 m
Section 110		
Minimum landscape area of parking lot (15%)	15 %	34,1%
Minimum landscape buffer width of parking lot not abutting street (m)	3,0 m	3,0 m
...1.5 if fewer than 100 spaces; 3 meters if more than 100 spaces	1,5/3 m	3,0 m
Minimum landscape buffer width of parking lot abutting street (m)	3,0 m	3,0 m
Section 111		
Bicycle Parking Space Requirement (Total)	(ratio =0,5) = 39	39
Section 131 (PUD)		
Min. width of private way Table 131 (1)	6,0 m	6,0 m
Min. setback of res. building to private way Table 131 (2)	1,8 m	n.a. m
Min. setback for any garage Table 131 (3)	5,2 m	n.a. m
Min. sep distance between bldgs less than 7 storeys in height Table 131 (4)	1,2 m	n.a. m
Section 137		
Total amenity area (n.sq. m per unit) (min 6m²/unit)	474 m²	1054,5 m²
Communal amenity area: 50% of total required Total amenity area (m sq.m.) Total	237 m²	270,6 m² rooftop terrace
Section 55 (Accessory Buildings)		
Min. Required Setback from an Int. Side Lot Line or Rear Lot Line not abutting a street		
- rear yard (m)	0,6 m	0,6 m

Appendix A
PLZ Stage 2: RSAQ 6490 Zoning Compliance Chart
Site Plan : 93 units - BLOCK 8, 180 Prestige Circle

Applicable sections from Bylaw 2008-250	Requirement	Provided
Assumes that Prestige Circle is front lot line.		
Property area Phase 3		**7 498,2 m²**
Property area Block 8		**7 498,2 m²**
Table 164A - Apartment dwelling, low rise, Stacked		
Minimum Lot Width (m)	18,0	> 18,0 m
Minimum Lot Area (m²)	5402,0 m²	> 540 m²
Maximum Building Height (storeys) - exception RSAQ 4090	60	6
Minimum Front Yard Setback (m)	6,0 m	> 6,0 m
Minimum Corner Yard Setback (m)	4,5 m	n.a. m
Minimum Interior Side Yard Setback (m)	3,0 m	> 3,0 m
Minimum Rear Yard Setback (m) - exception RSAQ 4090	7,5 m	> 7,5 m
Minimum Setback from North Service Road (m) - exception RSAQ 4090	100,0 m	> 100 m
Minimum distance between apartment dwellings under 7 storeys and OSL zone (m)	7,5 m	> 7,5 m
Minimum required building spacing - exception RSAQ 4090	3,0	> 3,0 m
Table 164A - 'H' Planed unit development		
Minimum Lot Width (m)	18,0	> 18,0 m
Minimum Lot Area (m²)	1400,0 m²	> 1400,0 m²
Maximum Building Height (storeys) - exception RSAQ 4090	60	6
Minimum Front Yard Setback (m)	6,0 m	> 6,0 m
Minimum Corner Yard Setback (m)	4,5 m	n.a. m
Minimum Interior Side Yard Setback (m) *	3,0 m	> 3,0 m
Minimum Rear Yard Setback (m) - exception RSAQ 4090	7,5 m	> 7,5 m
Minimum Setback from North Service Road (m) - exception RSAQ 4090	100,0 m	> 100 m
Minimum distance between apartment dwellings under 7 storeys and OSL zone (m)	7,5 m	> 7,5 m
Minimum required building spacing - exception RSAQ 4090	3,0	> 3,0 m
* For a yard abutting a lot, the yard setback is 6 m for the first 21 m back from a street lot line. In all other circumstances, the yard setback is 3 m. Notwithstanding the foregoing, for any yard adjacent to an apartment dwelling, mid-high rise and apartment dwelling, low rise or stacked dwelling within a planned unit development, the yard setback provisions for that use apply.		
Section 163(9)		
Minimum landscape area (% of site)	30,0%	51,6%
Section 101 and 102		
Minimum No. of parking spaces (total)	(ratio = 1,2) = 108	108
Minimum No. of visitor parking spaces (total)	(ratio = 0,1) = 18	18
Section 106		
Parking space width (m) per section 106 (3)(a)ii - applicable to 50% of resident spaces	2,4 min	2,4 min
Parking space width (m)	2,6 min 2,75 max	2,6
Minimum parking space depth (m)	5,2	5,2
Section 107		
Driveway access - min width (m) one way	3,0 m	n.a. m
Driveway access - min width (m) two way	6,7 m	6,7 m
Section 110		
Minimum landscape area of parking lot (15%)	15 %	37,6%
Minimum landscape buffer width of parking lot not abutting street (m)	3,0 m	3,0 m
...1.5 if fewer than 100 spaces; 3 meters if more than 100 spaces	1,5/3 m	3,0 m
Minimum landscape buffer width of parking lot abutting street (m)	3,0 m	3,0 m
Section 111		
Bicycle Parking Space Requirement (Total)	(ratio =0,5) = 46	46
Section 131 (PUD)		
Min. width of private way Table 131 (1)	6,0 m	6,0 m
Min. setback of res. building to private way Table 131 (2)	1,8 m	n.a. m
Min. setback for any garage Table 131 (3)	5,2 m	n.a. m
Min. sep distance between bldgs less than 7 storeys in height Table 131 (4)	1,2 m	n.a. m
Section 137		
Total amenity area (n.sq. m per unit) (min 6m²/unit)	552 m²	1187,1 m²
Communal amenity area: 50% of total required Total amenity area (m sq.m.) Total	276 m²	596,6 m² common lounge and terrace
Section 55 (Accessory Buildings)		
Min. Required Setback from an Int. Side Lot Line or Rear Lot Line not abutting a street		
- rear yard (m)	0,6 m	0,6 m

Appendix A
PLZ Stage 2: RSAQ 6490 Zoning Compliance Chart
Site Plan : 90 units - BLOCK 7, 160 Prestige Circle

Applicable sections from Bylaw 2008-250	Requirement	Provided
Assumes that Prestige Circle is front lot line.		
Property area Phase 2		**20 006,9 m²**
Property area Block 7		**7 858,8 m²**
Table 164A - Apartment dwelling, low rise, Stacked		
Minimum Lot Width (m)	18,0	> 18,0 m
Minimum Lot Area (m²)	5402,0 m²	> 540 m²
Maximum Building Height (storeys) - exception RSAQ 4090	60	6
Minimum Front Yard Setback (m)	6,0 m	> 6,0 m
Minimum Corner Yard Setback (m)	4,5 m	n.a. m
Minimum Interior Side Yard Setback (m)	3,0 m	> 6,0 m
Minimum Rear Yard Setback (m) - exception RSAQ 4090	7,5 m	> 7,5 m
Minimum Setback from North Service Road (m) - exception RSAQ 4090	100,0 m	n.a. m
Minimum distance between apartment dwellings under 7 storeys and OSL zone (m)	7,5 m	> 7,5 m
Minimum required building spacing - exception RSAQ 4090	3,0	> 3,0 m
Table 164A - 'H' Planed unit development		
Minimum Lot Width (m)	18,0	> 18,0 m
Minimum Lot Area (m²)	1400,0 m²	> 1400,0 m²
Maximum Building Height (storeys) - exception RSAQ 4090	60	6
Minimum Front Yard Setback (m)	6,0 m	> 6,0 m
Minimum Corner Yard Setback (m)	4,5 m	n.a. m
Minimum Interior Side Yard Setback (m) *	3,0 m	> 6,0 m
Minimum Rear Yard Setback (m) - exception RSAQ 4090	7,5 m	> 7,5 m
Minimum Setback from North Service Road (m) - exception RSAQ 4090	100,0 m	> 100 m
Minimum distance between apartment dwellings under 7 storeys and OSL zone (m)	7,5 m	> 7,5 m
Minimum required building spacing - exception RSAQ 4090	3,0	> 3,0 m
* For a yard abutting a lot, the yard setback is 6 m for the first 21 m back from a street lot line. In all other circumstances, the yard setback is 3 m. Notwithstanding the foregoing, for any yard adjacent to an apartment dwelling, mid-high rise and apartment dwelling, low rise or stacked dwelling within a planned unit development, the yard setback provisions for that use apply.		
Section 163(9)		
Minimum landscape area (% of site)	30,0%	51,6%
Section 101 and 102		
Minimum No. of parking spaces (total)	(ratio = 1,2) = 108	108
Minimum No. of visitor parking spaces (total)	(ratio = 0,1) = 18	18
Section 106		
Parking space width (m) per section 106 (3)(a)ii - applicable to 50% of resident spaces	2,4 min	2,4 min
Parking space width (m)	2,6 min 2,75 max	2,6
Minimum parking space depth (m)	5,2	5,2
Section 107		
Driveway access - min width (m) one way	3,0 m	n.a. m
Driveway access - min width (m) two way	6,7 m	6,7 m
Section 110		
Minimum landscape area of parking lot (15%)	15 %	37,6%
Minimum landscape buffer width of parking lot not abutting street (m)	3,0 m	3,0 m
...1.5 if fewer than 100 spaces; 3 meters if more than 100 spaces	1,5/3 m	3,0 m
Minimum landscape buffer width of parking lot abutting street (m)	3,0 m	3,0 m
Section 111		
Bicycle Parking Space Requirement (Total)	(ratio =0,5) = 46	46
Section 131 (PUD)		
Min. width of private way Table 131 (1)	6,0 m	6,0 m
Min. setback of res. building to private way Table 131 (2)	1,8 m	n.a. m
Min. setback for any garage Table 131 (3)	5,2 m	n.a. m
Min. sep distance between bldgs less than 7 storeys in height Table 131 (4)	1,2 m	n.a. m
Section 137		
Total amenity area (n.sq. m per unit) (min 6m²/unit)	552 m²	1187,1 m²
Communal amenity area: 50% of total required Total amenity area (m sq.m.) Total	276 m²	596,6 m² common lounge and terrace
Section 55 (Accessory Buildings)		
Min. Required Setback from an Int. Side Lot Line or Rear Lot Line not abutting a street		
- rear yard (m)	0,6 m	0,6 m

ENTIRE SITE STATISTICS - BRIGIL

UNIT STATISTICS		
Phase 1 Block 1 & 2	40	
Phase 2 Block 3 & 4	96	
Phase 2 Block 5	79	
Phase 2 Block 6	93	
Phase 2 Block 7	92	
Phase 3	93	
TOTAL:	420	Units

Area of Entire site m²	42 834	m²
Unit Density - Provided	98,00	units/ha
Unit Density - Minimum	78,00	units/ha
Unit Density - Maximum	100,00	units/ha

CAR PARKING / Ratio min 1:1.4	Requirement		Provided	
	Ratio	Qty.	Ratio	Qty.
Phase 1 Block 1 & 2	1,40	56	1,5	58
Phase 2 Block 3 & 4	1,40	96	1,5	68
Phase 2 Block 5	1,40	111	1,7	134
Phase 2 Block 6	1,40	130	1,4	130
Phase 2 Block 7	1,40	129	1,4	130
Phase 3 Block 8	0,93	87	0,92	86
TOTAL		609		571

BIKE PARKING / Ratio min 0.5 PHA SE 2	Requirement	Provided
Phase 2 Block 3 & 4	20	21
Phase 2 Block 5	39	39
Phase 2 Block 6	39,5	39
Phase 2 Block 7	46	46
Phase 3	23,25	34
TOTAL	167	178

Echelle/Scale 1:500

0 5 25 50 75 p/ft

0 1 5 10 15 20 25 m

LEGEND
- Bicycle parking
- New fence
- New stone retaining wall
- Fire truck path

PROPERTY INFORMATION
PIN 14501-0605
PART OF BLOCK 2
REGISTERED PLAN 4M-1425
CITY OF OTTAWA
Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

SITE PLAN

SCALE: 1:500

1
A100

NOTES GÉNÉRALES General Notes

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4. Les dimensions sur ces documents doivent être lues et non mesurées. / The dimensions on these documents must be read and not measured.

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COUSINEAU
LICENCE
6219

NEUF
ARCHITECT(E)S

BRIGIL

CLIENT Client

OUVRAGE Project

PETRIES LANDING
BLOCK 6, 7 & 8

EMPLACEMENT Location
ORLEANS ON

NO PROJET No.
104 03

NO	RÉVISION	DATE aa
A	CIT VALIDATION	2016 12 15
B	Site lan re ision	2017 03 2
C	Site Plan A lication	2017 06 13
D	For client re iew	2017 0 20
E	Site lan control 1st re iew	2017 01 23
F	Site lan control 2nd re iew	2017 03 23
G	Iss ed or lding er it	2017 06 01
H	Site Plan A lication 3rd re iew	2017 06 06
J	Re angled arking 3 set ack	2017 0 16
K	Radi s or arking island od.	2017 1
L	Site Plan A lication 4th re iew	2017 0 0

DESSINÉ PAR Drawn by
A.B.

VERIFIÉ PAR Checked by
ANT. C.

DATE aa
1 0 0

ÉCHELLE Scale
INDIQUÉE

TITRE DU DESSIN Drawing Title

Site Plan

RÉVISION Revision
L

NO. DESSIN Dwg N er
A100

CITY OF OTTAWA FILE NUMBER: D0 12 1 00 3

15546

I:\P 10400 104 03 CAD 104 03 A100 Site Plan.dwg

Appendix C SANITARY SEWER CALCULATIONS

Stantec

SUBDIVISION:

SUBDIVISION: Petries Landing Block 6-8

DATE: September 4, 2018
REVISION: 4
DESIGNED BY: MJS
CHECKED BY: AP

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 1604-01331

XML Conversion

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	350	L/p/day	MINIMUM VELOCITY	0.60	m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	0.60	L/s/ha	MAXIMUM VELOCITY	3.00	m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL	0.40	L/s/ha	MANNINGS n	0.013	
PEAKING FACTOR (COMM., INST.):	1.5	INSTITUTIONAL	0.60	L/s/ha	BEDDING CLASS	C	
PERSONS / 2 Bedroom apt.	2.1	INFILTRATION	0.28	L/s/ha	MINIMUM COVER	2.50	m
PERSONS / 1 bedroom apt.	1.4						
PERSONS / average apt.	1.8						

LOCATION			RESIDENTIAL AREA AND POPULATION									COMM		INDUST		INSTIT		GREEN / UNUSED		C+I+I	INFILTRATION				PIPE								
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	UNITS 2 bed	1 bed	avg	POP.	CUMULATIVE AREA	POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	TOTAL FLOW	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)	VEL. (ACT.)
			(ha)					(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(m)	(mm)			(%)	(L/s)	(%)	(m/s)	(m/s)
R1A , G1A	BLK 6	SAN1	0.153	0	0	79	142	0.15	142	4.00	2.30	0.00	0.00	0.00	0.00	0.00	0.00	0.404	0.40	0.00	0.557	0.56	0.16	2.46	4.8	200	PVC	SDR-28	1.00	33.31	7.39	1.05	0.52
	SAN1	PROP.MH	0.000	0	0	0	0	0.15	142	4.00	2.30	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.40	0.00	0.000	0.56	0.16	2.46	27.0	200	PVC	SDR-35	1.00	33.31	7.39	1.05	0.52
R2A , G2A	BLK 7	SAN2	0.197	0	0	90	162	0.20	162	4.00	2.63	0.00	0.00	0.00	0.00	0.00	0.00	0.640	0.64	0.00	0.837	0.84	0.23	2.86	3.2	200	PVC	SDR-28	1.00	33.31	8.58	1.05	0.54
	SAN2	EX.MH21A	0.000	0	0	0	0	0.20	162	4.00	2.63	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.64	0.00	0.000	0.84	0.23	2.86	15.7	200	PVC	SDR-35	1.00	33.31	8.58	1.05	0.54
R3A , G3A	BLK 8	SAN3	0.236	0	0	93	167	0.24	167	4.00	2.71	0.00	0.00	0.00	0.00	0.00	0.00	0.511	0.51	0.00	0.747	0.75	0.21	2.92	8.5	200	PVC	SDR-28	1.00	33.31	8.77	1.05	0.54
	SAN3	EX.MH6A	0.000	0	0	0	0	0.24	167	4.00	2.71	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.51	0.00	0.000	0.75	0.21	2.92	22.9	200	PVC	SDR-35	1.00	33.31	8.77	1.05	0.54

Appendix D STORMWATER MANAGEMENT CALCULATIONS

Stantec

Brigil - Petrie's Landing II - Block 6, 7, and 8

DATE: 5-Sep-2018
REVISION: 5
DESIGNED BY: MJS
CHECKED BY: AMP

STORM SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 1604-01231

DESIGN PARAMETERS

$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:100 yr
a =	732.951	1735.688
b =	6.199	6.014
c =	0.810	0.820

MANNING'S n = 0.013
MINIMUM COVER: 2.00 m
TIME OF ENTRY 10 min
BEDDING CLASS = B

LOCATION			DRAINAGE AREA															PIPE SELECTION										
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (-)	ACCUM. AREA (2YR) (ha)	A x C (2-YEAR)	ACCUM. AxC (2YR) (ha)	ACCUM. AREA (100YR) (ha)	A x C (100-YEAR)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{2\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ ROOF (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETE (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	VEL. (ACT) (m/s)	TIME OF FLOW (min)
BLOCK 6																														
F100B	STM100A	STM 100	0.255	0.000	0.000	0.65	0.255	0.166	0.166	0.000	0.000	0.000	10.00	76.81	178.56	0.0	0.0	35.4	23.8	300	300	CIRCULAR	PVC	-	1.00	96.2	**36.8%**	1.37	1.06	0.37
													10.37																	
F102B	CB102A	STM 102	0.166	0.000	0.000	0.20	0.166	0.033	0.033	0.000	0.000	0.000	10.00	76.81	178.56	0.0	0.0	7.1	14.3	200	200	CIRCULAR	PVC	-	1.00	33.3	**21.3%**	1.05	0.69	0.34
F102A	STM102	STM 101	0.000	0.033	0.000	0.90	0.166	0.000	0.033	0.033	0.030	0.030	10.34	75.51	175.47	0.0	0.0	21.4	29.7	300	300	CIRCULAR	PVC	-	0.35	56.9	**37.7%**	0.81	0.64	0.78
	STM101	STM 100	0.000	0.000	0.000	0.00	0.166	0.000	0.033	0.033	0.000	0.030	11.12	72.74	168.90	0.0	0.0	20.6	36.0	300	300	CIRCULAR	PVC	-	0.35	56.9	**36.3%**	0.81	0.63	0.95
													12.08																	
R100A	BLOCK 6	STM 100	0.000	0.000	0.153	0.90	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	178.56	9.3	9.3	9.3	2.3	250	250	CIRCULAR	PVC	-	1.00	60.4	**15.4%**	1.22	0.74	0.05
													10.05																	
	STM 100	STM 1A	0.000	0.000	0.000	0.00	0.421	0.000	0.199	0.033	0.000	0.030	12.08	69.65	161.56	0.0	9.3	61.1	27.8	300	300	CIRCULAR	PVC	-	0.50	68.0	**89.9%**	0.97	0.99	0.47
													12.55																	
BLOCK 7																														
F202B	CB202A	STM 202	0.043	0.000	0.000	0.20	0.043	0.009	0.009	0.000	0.000	0.000	10.00	76.81	178.56	0.0	0.0	1.8	13.2	200	200	CIRCULAR	PVC	-	1.00	33.3	**5.5%**	1.05	0.46	0.48
F202A	STM 202	STM 201	0.000	0.052	0.000	0.85	0.043	0.000	0.009	0.052	0.044	0.044	10.48	75.02	174.32	0.0	0.0	23.2	28.6	200	200	CIRCULAR	PVC	-	0.80	29.8	**77.9%**	0.94	0.92	0.52
F201A, F201B	STM 201	STM 200	0.166	0.000	0.000	0.73	0.209	0.121	0.130	0.052	0.000	0.044	11.00	73.18	169.95	0.0	0.0	47.2	50.2	375	375	CIRCULAR	PVC	-	0.25	87.7	**53.9%**	0.79	0.69	1.21
													12.21																	
F200B	CB 200A	STM 200	0.071	0.000	0.000	0.68	0.071	0.048	0.048	0.000	0.000	0.000	10.00	76.81	178.56	0.0	0.0	10.3	16.4	200	200	CIRCULAR	PVC	-	1.00	33.3	**30.9%**	1.05	0.78	0.35
													10.35																	
R200A	BLOCK 7	STM 200	0.000	0.000	0.197	0.90	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	178.56	12.9	12.9	12.9	1.7	250	250	CIRCULAR	PVC	-	1.00	60.4	**21.4%**	1.22	0.80	0.04
													10.04																	
	STM 200	STUB	0.000	0.000	0.000	0.00	0.280	0.000	0.178	0.052	0.000	0.044	12.21	69.26	160.63	0.0	12.9	66.9	9.8	375	375	CIRCULAR	PVC	-	1.00	175.3	**38.1%**	1.59	1.25	0.13
													12.34																	
BLOCK 8																														
F300B	TRENCH DRAIN 8	STM 301	0.000	0.030	0.000	0.90	0.000	0.000	0.000	0.030	0.027	0.027	10.00	76.81	178.56	0.0	0.0	13.4	17.6	200	200	CIRCULAR	PVC	-	1.00	33.3	**40.2%**	1.05	0.83	0.35
	STM 301	STM 300	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.030	0.000	0.027	10.35	75.48	175.41	0.0	0.0	13.2	18.0	250	250	CIRCULAR	PVC	-	0.50	42.7	**30.8%**	0.86	0.64	0.47
													10.82																	
F300A	CB 300A	STM 300	0.139	0.000	0.000	0.80	0.139	0.111	0.111	0.000	0.000	0.000	10.00	76.81	178.56	0.0	0.0	23.7	15.8	200	200	CIRCULAR	PVC	-	1.00	33.3	**71.2%**	1.05	0.99	0.26
													10.26																	
R300A	BLOCK 8	STM 300	0.000	0.000	0.236	0.90	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	178.56	16.0	16.0	16.0	6.8	250	250	CIRCULAR	PVC	-	1.00	60.4	**26.5%**	1.22	0.85	0.13
													10.13																	
	STM 300	EX.MH	0.000	0.000	0.000	0.00	0.139	0.000	0.111	0.030	0.000	0.027	10.82	73.78	171.37	0.0	16.0	51.6	22.4	375	375	CIRCULAR	PVC	-	1.00	175.3	**29.5%**	1.59	1.16	0.32
													11.15																	

Stormwater Management Calculations

File No: **160401331**
Project: **Petries Landing - Block 6, 7 and 8**

Date: **05-Sep-18**

SWM Approach:

Limit site to 191.1 L/s for Blocks 6 and 7 and 99.5 L/s for Block 8

Post-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Block ID	Runoff Coefficient Table								
	Catchment Type	Sub-catchment Area ID / Description		Area (ha) "A"		Runoff Coefficient "C"	"A x C"		Overall Runoff Coefficient
Phase 2 - Block 6	Controlled - Tributary	Parking Block 6 (F100B)	Hard	0.164		0.9	0.148		
			Soft	0.091		0.2	0.018		
			Subtotal		0.255			0.166	0.65
	100-year Capture - Tributary	Parking Ramp Block 6 (F102A)	Hard	0.033		0.9	0.030		
			Soft	0.000		0.2	0.000		
			Subtotal		0.033			0.030	0.90
	Roof - Tributary	BLDG Block 6 (R100A)	Hard	0.153		0.9	0.138		
			Soft	0.000		0.2	0.000		
			Subtotal		0.153			0.138	0.90
	Controlled - Tributary	Landscaped Area Block 6 (F102B)	Hard	0.000		0.9	0.000		
			Soft	0.166		0.2	0.033		
			Subtotal		0.166			0.033	0.20
		Total Block 6 =		**0.607 ha**		**0.60**			
Phase 2 - Block 7	Controlled - Tributary	Parking Block 7 (F201A)	Hard	0.045		0.9	0.040		
			Soft	0.014		0.2	0.003		
			Subtotal		0.059			0.043	0.73
	Controlled - Tributary	Parking Block 7 (F201B)	Hard	0.081		0.9	0.073		
			Soft	0.026		0.2	0.005		
			Subtotal		0.107			0.078	0.73
	Controlled - Tributary	Parking Block 7 (F200B)	Hard	0.049		0.9	0.044		
			Soft	0.022		0.2	0.004		
			Subtotal		0.071			0.048	0.68
	100-year Capture - Tributary	Parking Ramp Block 7 (F202A)	Hard	0.048		0.9	0.043		
			Soft	0.004		0.2	0.001		
			Subtotal		0.052			0.044	0.85
	Roof - Tribuatry	BLDG Block 7 (R200A)	Hard	0.197		0.9	0.177		
			Soft	0.000		0.2	0.000		
			Subtotal		0.197			0.177	0.90
	Controlled - Tributary	Landscaped Area Block 7 (F202B)	Hard	0.000		0.9	0.000		
			Soft	0.043		0.2	0.009		
			Subtotal		0.043			0.009	0.20
	Uncontrolled - Non Tributary	Uncontrolled Block 7 (UNC-1)	Hard	0.000		0.9	0.000		
		Subtotal	Soft	0.203		0.2	0.041		
					0.203			0.041	0.20
	Uncontrolled - Non Tributary	Uncontrolled Block 7 (UNC-2)	Hard	0.000		0.9	0.000		
		Subtotal	Soft	0.028		0.2	0.006		
					0.028			0.006	0.20
		Total Block 7 =		**0.760 ha**		**0.59**			
Phase 3 - Block 8	Controlled - Tributary	Parking Block 8 (F300A)	Hard	0.119		0.9	0.107		
			Soft	0.020		0.2	0.004		
			Subtotal		0.139			0.111	0.80
	100-year Capture - Tributary	Parking Ramp Block 8 (F300B)	Hard	0.030		0.9	0.027		
			Soft	0.000		0.2	0.000		
			Subtotal		0.030			0.027	0.90
	Roof	BLDG Block 8 (R300A)	Hard	0.236		0.9	0.212		
			Soft	0.000		0.2	0.000		
			Subtotal		0.236			0.212	0.90
	Uncontrolled - Non Tributary	Uncontrolled Block 8 (UNC-3)	Hard	0.000		0.9	0.000		
		Subtotal	Soft	0.368		0.2	0.074		
					0.368			0.074	0.20
		Total Block 8 =		**0.773 ha**		**0.55**			
	Total				**2.140**			**1.237**	
	Overall Runoff Coefficient= C:								**0.58**

Total Roof Areas	**0.586 ha**
Total Parking Ramp Areas	**0.115 ha**
Total Surface Areas (Controlled)	**0.840 ha**
Total Surface Areas (Uncontrolled)	**0.599 ha**
Total Site Area	**2.140 ha**
Area to Sewer	**1.541 ha**

Stormwater Management Calculations

Project #160401331, Petries Landing - Block 6, 7 and 8
Modified Rational Method Calculatons for Storage

2 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	732.951
b =	6.199
c =	0.810

t (min)	I (mm/hr)
5	103.57
10	76.81
15	61.77
20	52.03
25	45.17
30	40.04
35	36.06
40	32.86
45	30.24
50	28.04
55	26.17
60	24.56

Target Release from Blocks 6 and 7

SWM Approach: Limit site to 191.1 L/s for Blocks 6 and 7 and 99.5 L/s for Block 8

Area (ha): 1.367
C: 0.59

Qtarget (L/s)	Qtarget (L/s/ha)
191.10	**140**

2 YEAR Modified Rational Method for Entire Site

Subdrainage Area: BLDG Block 6 (R100A) — Roof - Tributary
Area (ha): 0.153 — Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	29.45	5.86	23.60	14.16	92.8	0.00
20	52.03	19.95	6.23	13.72	**16.47**	98.7	0.00
30	40.04	15.35	6.22	9.13	16.44	98.6	0.00
40	32.86	12.60	6.09	6.51	15.62	96.6	0.00
50	28.04	10.75	5.91	4.84	14.52	93.7	0.00
60	24.56	9.42	5.72	3.70	13.31	90.7	0.00
70	21.91	8.40	5.52	2.88	12.09	87.6	0.00
80	19.83	7.60	5.33	2.27	10.90	84.5	0.00
90	18.14	6.96	5.15	1.81	9.76	81.6	0.00
100	16.75	6.42	4.98	1.45	8.68	78.9	0.00
110	15.57	5.97	4.81	1.16	7.65	76.2	0.00
120	14.56	5.58	4.63	0.95	6.85	73.4	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	98.70	0.10	6.23	16.47	57.30	0.00

Subdrainage Area: Parking Block 6 (F100B) — Controlled - Tributary
Area (ha): 0.255
C: 0.65

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	76.81	35.39	35.39	0.00	0.00	
20	52.03	23.98	35.39	0.00	0.00	
30	40.04	18.45	35.39	0.00	0.00	
40	32.86	15.14	35.39	0.00	0.00	
50	28.04	12.92	35.39	0.00	0.00	
60	24.56	11.32	35.39	0.00	0.00	
70	21.91	10.10	35.39	0.00	0.00	
80	19.83	9.14	35.39	0.00	0.00	
90	18.14	8.36	35.39	0.00	0.00	
100	16.75	7.72	35.39	0.00	0.00	
110	15.57	7.17	35.39	0.00	0.00	
120	14.56	6.71	35.39	0.00	0.00	

Storage: Surface Storage Above CB100AA

Orifice Equation: $Q = CdA(2gh)^{0.5}$

Invert Elevation	120.00	m
Invert Elevation	55.33	m
T/G Elevation	56.98	m
Max Ponding Depth	0.05	m
Downstream W/L	53.91	m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
2-year Water Level	57.03	1.70	35.39	0.00	37.18	OK

Project #160401331, Petries Landing - Block 6, 7 and 8
Modified Rational Method Calculatons for Storage

100 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	1735.688
b =	6.014
c =	0.820

t (min)	I (mm/hr)
5	242.70
10	178.56
15	142.89
20	119.95
25	103.85
30	91.87
35	82.58
40	75.15
45	69.05
50	63.95
55	59.62
60	55.89

Target Release from Block 8

SWM Approach: Limit site to 191.1 L/s for Blocks 6 and 7 and 99.5 L/s for Block 8

Area (ha): 0.773
C: 0.55

Qtarget (L/s)	Qtarget (L/s/ha)
99.50	**129**

100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: BLDG Block 6 (R100A) — Roof - Tributary
Area (ha): 0.153 — Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	76.08	8.37	67.70	40.62	132.7	0.00
20	119.95	51.11	9.02	42.09	50.50	143.0	0.00
30	91.87	39.14	9.24	29.90	53.83	146.4	0.00
40	75.15	32.02	9.28	22.73	**54.56**	147.2	0.00
50	63.95	27.25	9.25	18.00	54.00	146.6	0.00
60	55.89	23.81	9.17	14.65	52.74	145.3	0.00
70	49.79	21.21	9.06	12.16	51.06	143.5	0.00
80	44.99	19.17	8.93	10.24	49.14	141.6	0.00
90	41.11	17.52	8.80	8.72	47.08	139.4	0.00
100	37.90	16.15	8.66	7.49	44.95	137.2	0.00
110	35.20	15.00	8.52	6.48	42.79	135.0	0.00
120	32.89	14.02	8.37	5.64	40.62	132.7	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	147.16	0.15	9.28	54.56	57.30	0.00

Subdrainage Area: Parking Block 6 (F100B) — Controlled - Tributary
Area (ha): 0.255
C: 0.81

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	178.56	102.85	42.34	60.50	36.30	
20	119.95	69.09	42.34	26.75	32.10	
30	91.87	52.91	42.34	10.57	19.03	
40	75.15	43.28	42.34	0.94	2.25	
50	63.95	36.84	42.34	0.00	0.00	
60	55.89	32.19	42.34	0.00	0.00	
70	49.79	28.68	42.34	0.00	0.00	
80	44.99	25.91	42.34	0.00	0.00	
90	41.11	23.68	42.34	0.00	0.00	
100	37.90	21.83	42.34	0.00	0.00	
110	35.20	20.28	42.34	0.00	0.00	
120	32.89	18.95	42.34	0.00	0.00	

Storage: Surface Storage Above CB100AA

Orifice Equation: $Q = CdA(2gh)^{0.5}$ — Where C = 0.61

Orifice Diameter:	120.00	mm
Invert Elevation	55.33	m
T/G Elevation	56.98	m
Max Ponding Depth	0.27	m
Downstream W/L	53.91	m

Pipe Storage		
Length	Size	Volume
20.4	900	13.98

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	57.25	1.92	42.34	36.30	37.18	OK
					0.88	

Stormwater Management Calculations

Project #160401331, Petries Landing - Block 6, 7 and 8
Modified Rational Method Calculatons for Storage

Subdrainage Area: Parking Ramp Block 6 (F102A) — 100-year Capture - Tributary
Area (ha): 0.033
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill (L/s)
10	76.81	6.34	6.34	0.00	0.00	0.00
20	52.03	4.30	4.30	0.00	0.00	0.00
30	40.04	3.31	3.31	0.00	0.00	0.00
40	32.86	2.71	2.71	0.00	0.00	0.00
50	28.04	2.32	2.32	0.00	0.00	0.00
60	24.56	2.03	2.03	0.00	0.00	0.00
70	21.91	1.81	1.81	0.00	0.00	0.00
80	19.83	1.64	1.64	0.00	0.00	0.00
90	18.14	1.50	1.50	0.00	0.00	0.00
100	16.75	1.38	1.38	0.00	0.00	0.00
110	15.57	1.29	1.29	0.00	0.00	0.00
120	14.56	1.20	1.20	0.00	0.00	0.00

Subdrainage Area: Landscaped Area Block 6 (F102B) — Controlled - Tributary
Area (ha): 0.166
C: 0.20

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	7.09	7.09	0.00	0.00
20	52.03	4.80	4.80	0.00	0.00
30	40.04	3.70	3.70	0.00	0.00
40	32.86	3.03	3.03	0.00	0.00
50	28.04	2.59	2.59	0.00	0.00
60	24.56	2.27	2.27	0.00	0.00
70	21.91	2.02	2.02	0.00	0.00
80	19.83	1.83	1.83	0.00	0.00
90	18.14	1.67	1.67	0.00	0.00
100	16.75	1.55	1.55	0.00	0.00
110	15.57	1.44	1.44	0.00	0.00
120	14.56	1.34	1.34	0.00	0.00

Storage: Surface Storage Above CB102A

Orifice Equation: Q = CdA(2gh)^0.5 — Where C = 0.61
Orifice Diameter: 83.00 mm
Invert Elevation: 54.30 m
T/G Elevation: 56.64 m
Max Ponding Depth: 0.00 m
Downstream W/L: 53.91 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
2-year Water Level	56.64	2.34	7.09	0.00	0.50	OK

Block 6 Peak Flow Summary

Total Area = 0.607 ha — **Volume Used =** 16.47 m³
Q target = 84.9 L/s
Q unc = 0.0 L/s
Qramp = 6.3 L/s
Qroof = 6.2 L/s
Qpark = 42.5 L/s
Qtotal = 55 L/s

Subdrainage Area: BLDG Block 7 (R200A) — Roof - Tributary
Area (ha): 0.197 — Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	37.86	8.17	29.69	17.81	92.5	0.00
20	52.03	25.65	8.63	17.02	**20.42**	97.7	0.00
30	40.04	19.74	8.57	11.17	20.10	97.0	0.00
40	32.86	16.20	8.35	7.85	18.84	94.5	0.00
50	28.04	13.82	8.07	5.75	17.26	91.4	0.00
60	24.56	12.10	7.77	4.33	15.59	88.0	0.00
70	21.91	10.80	7.48	3.32	13.94	84.7	0.00
80	19.83	9.77	7.20	2.57	12.35	81.5	0.00
90	18.14	8.94	6.93	2.01	10.85	78.5	0.00
100	16.75	8.25	6.68	1.57	9.43	75.7	0.00
110	15.57	7.67	6.40	1.28	8.44	72.4	0.00
120	14.56	7.18	6.12	1.06	7.63	69.3	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	97.69	0.10	8.63	20.42	72.80	0.00

Subdrainage Area: Parking Ramp Block 7 (F202A) — 100-year Capture - Tributary
Area (ha): 0.052
C: 0.85

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill (L/s)
10	76.81	9.44	9.44	0.00	0.00	0.00
20	52.03	6.39	6.39	0.00	0.00	0.00
30	40.04	4.92	4.92	0.00	0.00	0.00
40	32.86	4.04	4.04	0.00	0.00	0.00
50	28.04	3.45	3.45	0.00	0.00	0.00
60	24.56	3.02	3.02	0.00	0.00	0.00
70	21.91	2.69	2.69	0.00	0.00	0.00
80	19.83	2.44	2.44	0.00	0.00	0.00
90	18.14	2.23	2.23	0.00	0.00	0.00
100	16.75	2.06	2.06	0.00	0.00	0.00
110	15.57	1.91	1.91	0.00	0.00	0.00
120	14.56	1.79	1.79	0.00	0.00	0.00

Project #160401331, Petries Landing - Block 6, 7 and 8
Modified Rational Method Calculatons for Storage

Subdrainage Area: Parking Ramp Block 6 (F102A) — 100-year Capture - Tributary
Area (ha): 0.033
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill (L/s)
10	178.56	16.38	16.38	0.00	0.00	0.00
20	119.95	11.00	11.00	0.00	0.00	0.00
30	91.87	8.43	8.43	0.00	0.00	0.00
40	75.15	6.89	6.89	0.00	0.00	0.00
50	63.95	5.87	5.87	0.00	0.00	0.00
60	55.89	5.13	5.13	0.00	0.00	0.00
70	49.79	4.57	4.57	0.00	0.00	0.00
80	44.99	4.13	4.13	0.00	0.00	0.00
90	41.11	3.77	3.77	0.00	0.00	0.00
100	37.90	3.48	3.48	0.00	0.00	0.00
110	35.20	3.23	3.23	0.00	0.00	0.00
120	32.89	3.02	3.02	0.00	0.00	0.00

Subdrainage Area: Landscaped Area Block 6 (F102B) — Controlled - Tributary
Area (ha): 0.166
C: 0.25

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	20.60	20.60	0.00	0.00
20	119.95	13.84	13.84	0.00	0.00
30	91.87	10.60	10.60	0.00	0.00
40	75.15	8.67	8.67	0.00	0.00
50	63.95	7.38	7.38	0.00	0.00
60	55.89	6.45	6.45	0.00	0.00
70	49.79	5.74	5.74	0.00	0.00
80	44.99	5.19	5.19	0.00	0.00
90	41.11	4.74	4.74	0.00	0.00
100	37.90	4.37	4.37	0.00	0.00
110	35.20	4.06	4.06	0.00	0.00
120	32.89	3.80	3.80	0.00	0.00

Storage: Surface Storage Above CB102A

Orifice Equation: Q = CdA(2gh)^0.5 — Where C = 0.61
Orifice Diameter: 83.00 mm
Invert Elevation: 54.30 m
T/G Elevation: 56.64 m
Max Ponding Depth: 0.08 m
Downstream W/L: 53.91 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	56.72	2.42	20.60	0.00	0.50	OK
					0.50	

Block 6 Peak Flow Summary

Total Area = 0.607 ha — **Volume Used =** 90.86 m³
Q target = 84.9 L/s
Q unc = 0.0 L/s
Qramp = 16.4 L/s
Qroof = 9.3 L/s
Qparking = 62.9 L/s
Qtotal = 89 L/s — 3.73 L/s

Subdrainage Area: BLDG Block 7 (R200A) — Roof - Tributary
Area (ha): 0.197 — Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	97.79	11.73	86.06	51.64	132.8	0.00
20	119.95	65.69	12.59	53.10	63.72	142.6	0.00
30	91.87	50.31	12.86	37.45	67.41	145.6	0.00
40	75.15	41.15	12.89	28.26	**67.83**	145.9	0.00
50	63.95	35.03	12.81	22.22	66.66	145.0	0.00
60	55.89	30.61	12.66	17.95	64.62	143.3	0.00
70	49.79	27.27	12.48	14.79	62.11	141.3	0.00
80	44.99	24.64	12.28	12.36	59.33	139.0	0.00
90	41.11	22.51	12.07	10.45	56.41	136.6	0.00
100	37.90	20.76	11.85	8.90	53.42	134.2	0.00
110	35.20	19.28	11.64	7.64	50.43	131.8	0.00
120	32.89	18.02	11.42	6.59	47.46	129.3	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	145.95	0.15	12.89	67.83	72.80	0.00

Subdrainage Area: Parking Ramp Block 7 (F202A) — 100-year Capture - Tributary
Area (ha): 0.052
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill (L/s)
10	178.56	25.81	25.81	0.00	0.00	0.00
20	119.95	17.34	17.34	0.00	0.00	0.00
30	91.87	13.28	13.28	0.00	0.00	0.00
40	75.15	10.86	10.86	0.00	0.00	0.00
50	63.95	9.25	9.25	0.00	0.00	0.00
60	55.89	8.08	8.08	0.00	0.00	0.00
70	49.79	7.20	7.20	0.00	0.00	0.00
80	44.99	6.50	6.50	0.00	0.00	0.00
90	41.11	5.94	5.94	0.00	0.00	0.00
100	37.90	5.48	5.48	0.00	0.00	0.00
110	35.20	5.09	5.09	0.00	0.00	0.00
120	32.89	4.76	4.76	0.00	0.00	0.00

Stormwater Management Calculations

Project #160401331, Petries Landing - Block 6, 7 and 8
Modified Rational Method Calculatons for Storage

Subdrainage Area: Uncontrolled Block 7 (UNC-1) — Uncontrolled - Non Tributary
Area (ha): 0.203
C: 0.20

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill (L/s)
10	76.81	8.67	8.67	0.00	0.00	0.00
20	52.03	5.87	5.87	0.00	0.00	0.00
30	40.04	4.52	4.52	0.00	0.00	0.00
40	32.86	3.71	3.71	0.00	0.00	0.00
50	28.04	3.16	3.16	0.00	0.00	0.00
60	24.56	2.77	2.77	0.00	0.00	0.00
70	21.91	2.47	2.47	0.00	0.00	0.00
80	19.83	2.24	2.24	0.00	0.00	0.00
90	18.14	2.05	2.05	0.00	0.00	0.00
100	16.75	1.89	1.89	0.00	0.00	0.00
110	15.57	1.76	1.76	0.00	0.00	0.00
120	14.56	1.64	1.64	0.00	0.00	0.00

Subdrainage Area: Uncontrolled Block 7 (UNC-2) — Uncontrolled - Non Tributary
Area (ha): 0.028
C: 0.20

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill (L/s)
10	76.81	1.20	1.20	0.00	0.00	0.00
20	52.03	0.81	0.81	0.00	0.00	0.00
30	40.04	0.62	0.62	0.00	0.00	0.00
40	32.86	0.51	0.51	0.00	0.00	0.00
50	28.04	0.44	0.44	0.00	0.00	0.00
60	24.56	0.38	0.38	0.00	0.00	0.00
70	21.91	0.34	0.34	0.00	0.00	0.00
80	19.83	0.31	0.31	0.00	0.00	0.00
90	18.14	0.28	0.28	0.00	0.00	0.00
100	16.75	0.26	0.26	0.00	0.00	0.00
110	15.57	0.24	0.24	0.00	0.00	0.00
120	14.56	0.23	0.23	0.00	0.00	0.00

Subdrainage Area: Parking Block 7 (F201A) — Controlled - Tributary
Area (ha): 0.059
C: 0.73

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	9.20	9.20	0.00	0.00
20	52.03	6.23	9.20	0.00	0.00
30	40.04	4.79	9.20	0.00	0.00
40	32.86	3.93	9.20	0.00	0.00
50	28.04	3.36	9.20	0.00	0.00
60	24.56	2.94	9.20	0.00	0.00
70	21.91	2.62	9.20	0.00	0.00
80	19.83	2.37	9.20	0.00	0.00
90	18.14	2.17	9.20	0.00	0.00
100	16.75	2.01	9.20	0.00	0.00
110	15.57	1.86	9.20	0.00	0.00
120	14.56	1.74	9.20	0.00	0.00

Storage: Surface Storage Above CB200B

Orifice Equation: Q = CdA(2gh)^0.5
Orifice Diameter: 102.00 mm
Invert Elevation 54.66 m
T/G Elevation 56.41 m
Max Ponding Depth 0.00 m
Downstream W/L 52.93 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
2-year Water Level	56.41	1.75	9.20	0.00	0.00	OK

Subdrainage Area: Parking Block 7 (F201B) — Controlled - Tributary
Area (ha): 0.107
C: 0.73

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	16.68	12.80	3.87	2.32
20	52.03	11.30	12.80	0.00	0.00
30	40.04	8.70	12.80	0.00	0.00
40	32.86	7.14	12.80	0.00	0.00
50	28.04	6.09	12.80	0.00	0.00
60	24.56	5.33	12.80	0.00	0.00
70	21.91	4.76	12.80	0.00	0.00
80	19.83	4.31	12.80	0.00	0.00
90	18.14	3.94	12.80	0.00	0.00
100	16.75	3.64	12.80	0.00	0.00
110	15.57	3.38	12.80	0.00	0.00
120	14.56	3.16	12.80	0.00	0.00

Storage: Surface Storage Above CBMH200C

Orifice Equation: LMF105

Invert Elevation 54.67 m
T/G Elevation 56.38 m
Max Ponding Depth 0.00 m
Downstream W/L 52.93 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
2-year Water Level	56.38	1.71	12.80	2.32	23.76	OK

Project #160401331, Petries Landing - Block 6, 7 and 8
Modified Rational Method Calculatons for Storage

Subdrainage Area: Uncontrolled Block 7 (UNC-1) — Uncontrolled - Non Tributary
Area (ha): 0.203
C: 0.25

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill (L/s)
10	178.56	25.19	25.19	0.00	0.00	0.00
20	119.95	16.92	16.92	0.00	0.00	0.00
30	91.87	12.96	12.96	0.00	0.00	0.00
40	75.15	10.60	10.60	0.00	0.00	0.00
50	63.95	9.02	9.02	0.00	0.00	0.00
60	55.89	7.89	7.89	0.00	0.00	0.00
70	49.79	7.02	7.02	0.00	0.00	0.00
80	44.99	6.35	6.35	0.00	0.00	0.00
90	41.11	5.80	5.80	0.00	0.00	0.00
100	37.90	5.35	5.35	0.00	0.00	0.00
110	35.20	4.97	4.97	0.00	0.00	0.00
120	32.89	4.64	4.64	0.00	0.00	0.00

Subdrainage Area: Uncontrolled Block 7 (UNC-2) — Uncontrolled - Non Tributary
Area (ha): 0.028
C: 0.25

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill (L/s)
10	178.56	3.47	3.47	0.00	0.00	0.00
20	119.95	2.33	2.33	0.00	0.00	0.00
30	91.87	1.79	1.79	0.00	0.00	0.00
40	75.15	1.46	1.46	0.00	0.00	0.00
50	63.95	1.24	1.24	0.00	0.00	0.00
60	55.89	1.09	1.09	0.00	0.00	0.00
70	49.79	0.97	0.97	0.00	0.00	0.00
80	44.99	0.88	0.88	0.00	0.00	0.00
90	41.11	0.80	0.80	0.00	0.00	0.00
100	37.90	0.74	0.74	0.00	0.00	0.00
110	35.20	0.69	0.69	0.00	0.00	0.00
120	32.89	0.64	0.64	0.00	0.00	0.00

Subdrainage Area: Parking Block 7 (F201A) — Controlled - Tributary
Area (ha): 0.059
C: 0.91

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	26.72	26.72	0.00	0.00
20	119.95	17.95	26.72	0.00	0.00
30	91.87	13.75	26.72	0.00	0.00
40	75.15	11.25	26.72	0.00	0.00
50	63.95	9.57	26.72	0.00	0.00
60	55.89	8.37	26.72	0.00	0.00
70	49.79	7.45	26.72	0.00	0.00
80	44.99	6.73	26.72	0.00	0.00
90	41.11	6.15	26.72	0.00	0.00
100	37.90	5.67	26.72	0.00	0.00
110	35.20	5.27	26.72	0.00	0.00
120	32.89	4.92	26.72	0.00	0.00

Storage: Surface Storage Above CB200B

Orifice Equation: Q = CdA(2gh)^0.5 Where C = 0.61
Orifice Diameter: 102.00 mm
Invert Elevation 54.66 m
T/G Elevation 56.41 m
Max Ponding Depth 0.00 m
Downstream W/L 52.93 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	56.41	1.75	26.72	0.00	0.00	OK
					0.00	

Subdrainage Area: Parking Block 7 (F201B) — Controlled - Tributary
Area (ha): 0.107
C: 0.91

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	48.47	13.57	34.90	20.94
20	119.95	32.56	13.57	18.99	22.79
30	91.87	24.94	13.57	11.37	20.46
40	75.15	20.40	13.57	6.83	16.39
50	63.95	17.36	13.57	3.79	11.37
60	55.89	15.17	13.57	1.60	5.77
70	49.79	13.51	13.57	0.00	0.00
80	44.99	12.21	13.57	0.00	0.00
90	41.11	11.16	13.57	0.00	0.00
100	37.90	10.29	13.57	0.00	0.00
110	35.20	9.56	13.57	0.00	0.00
120	32.89	8.93	13.57	0.00	0.00

Storage: Surface Storage Above CBMH200C

Orifice Equation: LMF105

Invert Elevation 54.67 m
T/G Elevation 56.38 m
Max Ponding Depth 0.21 m
Downstream W/L 52.93 m

Pipe Storage		
Length	Size	Volume
25.0	825	13.36

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	56.59	1.92	13.57	22.79	23.76	OK
					0.98	

Stormwater Management Calculations

Project #160401331, Petries Landing - Block 6, 7 and 8
Modified Rational Method Calculatons for Storage

Subdrainage Area: Parking Block 7 (F200B) — Controlled - Tributary
Area (ha): 0.071
C: 0.68

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	10.31	5.98	4.33	2.60
20	52.03	6.98	5.98	1.01	1.21
30	40.04	5.37	5.37	0.00	0.00
40	32.86	4.41	4.41	0.00	0.00
50	28.04	3.76	3.76	0.00	0.00
60	24.56	3.30	3.30	0.00	0.00
70	21.91	2.94	2.94	0.00	0.00
80	19.83	2.66	2.66	0.00	0.00
90	18.14	2.44	2.44	0.00	0.00
100	16.75	2.25	2.25	0.00	0.00
110	15.57	2.09	2.09	0.00	0.00
120	14.56	1.95	1.95	0.00	0.00

Storage: Surface Storage Above CB200A

Orifice Equation: LMF70
Invert Elevation 54.41 m
T/G Elevation 56.23 m
Max Ponding Depth 0.10 m
Downstream W/L 52.93 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
2-year Water Level	56.33	1.92	5.98	2.60	33.30	OK

Subdrainage Area: Landscaped Area Block 7 (F202B) — Controlled - Tributary
Area (ha): 0.043
C: 0.20

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	1.84	1.84	0.00	0.00
20	52.03	1.24	1.24	0.00	0.00
30	40.04	0.96	0.96	0.00	0.00
40	32.86	0.79	0.79	0.00	0.00
50	28.04	0.67	0.67	0.00	0.00
60	24.56	0.59	0.59	0.00	0.00
70	21.91	0.52	0.52	0.00	0.00
80	19.83	0.47	0.47	0.00	0.00
90	18.14	0.43	0.43	0.00	0.00
100	16.75	0.40	0.40	0.00	0.00
110	15.57	0.37	0.37	0.00	0.00
120	14.56	0.35	0.35	0.00	0.00

Storage: Surface Storage Above CB202A

Orifice Equation: Q = CdA(2gh)^0.5 Where C = 0.61
Orifice Diameter: 83.00 mm
Invert Elevation 53.47 m
T/G Elevation 54.83 m
Max Ponding Depth 0.00 m
Downstream W/L 52.93 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
2-year Water Level	54.83	1.36	1.84	0.00	0.00	

Block 7 Peak Flow Summary

Total Area = 0.760 ha — **Volume =** 25.34 m³
Q target = 106.2 L/s
Q unc = 9.9 L/s
Qramp = 9.4 L/s
Qroof = 8.6 L/s
Qparking = 29.8 L/s

Qtotal = 58 L/s

Subdrainage Area: Parking Block 8 (F300A) — Controlled - Tributary
Area (ha): 0.139
C: 0.80

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	23.74	5.94	17.80	10.68
20	52.03	16.08	5.94	10.14	12.17
30	40.04	12.38	5.94	6.43	11.58
40	32.86	10.16	5.94	4.21	10.12
50	28.04	8.67	5.94	2.72	8.17
60	24.56	7.59	5.94	1.65	5.93
70	21.91	6.77	5.94	0.83	3.48
80	19.83	6.13	5.94	0.19	0.89
90	18.14	5.61	5.61	0.00	0.00
100	16.75	5.18	5.18	0.00	0.00
110	15.57	4.81	4.81	0.00	0.00
120	14.56	4.50	4.50	0.00	0.00

Storage: Surface Storage Above CB300A

Orifice Equation: LMF70
Invert Elevation 52.97 m
T/G Elevation 54.77 m
Max Ponding Depth 0.10 m
Downstream W/L 51.46 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
2-year Water Level	54.87	1.90	5.94	12.17	56.01	OK

Project #160401331, Petries Landing - Block 6, 7 and 8
Modified Rational Method Calculatons for Storage

Subdrainage Area: Parking Block 7 (F200B) — Controlled - Tributary
Area (ha): 0.071
C: 0.85

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	29.96	6.28	23.67	14.20
20	119.95	20.12	6.28	13.84	16.61
30	91.87	15.41	6.28	9.13	16.43
40	75.15	12.61	6.28	6.32	15.18
50	63.95	10.73	6.28	4.45	13.34
60	55.89	9.38	6.28	3.09	11.14
70	49.79	8.35	6.28	2.07	8.70
80	44.99	7.55	6.28	1.27	6.07
90	41.11	6.90	6.28	0.61	3.32
100	37.90	6.36	6.28	0.08	0.46
110	35.20	5.91	5.91	0.00	0.00
120	32.89	5.52	5.52	0.00	0.00

Storage: Surface Storage Above CB200A

Orifice Equation: LMF70
Invert Elevation 54.41 m
T/G Elevation 56.23 m
Max Ponding Depth 0.30 m
Downstream W/L 52.93 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	56.53	2.12	6.28	16.61	33.30	OK

Subdrainage Area: Landscaped Area Block 7 (F202B) — Controlled - Tributary
Area (ha): 0.043
C: 0.25

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	5.34	5.34	0.00	0.00
20	119.95	3.58	3.58	0.00	0.00
30	91.87	2.75	2.75	0.00	0.00
40	75.15	2.25	2.25	0.00	0.00
50	63.95	1.91	1.91	0.00	0.00
60	55.89	1.67	1.67	0.00	0.00
70	49.79	1.49	1.49	0.00	0.00
80	44.99	1.34	1.34	0.00	0.00
90	41.11	1.23	1.23	0.00	0.00
100	37.90	1.13	1.13	0.00	0.00
110	35.20	1.05	1.05	0.00	0.00
120	32.89	0.98	0.98	0.00	0.00

Storage: Surface Storage Above CB202A

Orifice Equation: Q = CdA(2gh)^0.5 Where C = 0.61
Orifice Diameter: 83.00 mm
Invert Elevation 53.47 m
T/G Elevation 54.83 m
Max Ponding Depth 0.00 m
Downstream W/L 52.93 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	54.83	1.36	5.34	0.00	0.00	

Block 7 Peak Flow Summary

Total Area = 0.760 ha — **Volume =** 107.23 m³
Q target = 106.2 L/s
Q unc = 28.7 L/s
Qramp = 25.8 L/s
Qroof = 12.9 L/s
Qparking = 51.9 L/s

Qtotal = 119 L/s — 13.06 L/s

Subdrainage Area: Parking Block 8 (F300A) — Controlled - Tributary
Area (ha): 0.139
C: 0.91

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	62.96	6.25	56.71	34.03
20	119.95	42.30	6.25	36.04	43.25
30	91.87	32.39	6.25	26.14	47.05
40	75.15	26.50	6.25	20.24	48.59
50	63.95	22.55	6.25	16.30	48.89
60	55.89	19.71	6.25	13.46	48.44
70	49.79	17.56	6.25	11.30	47.47
80	44.99	15.86	6.25	9.61	46.13
90	41.11	14.50	6.25	8.24	44.51
100	37.90	13.36	6.25	7.11	42.67
110	35.20	12.41	6.25	6.16	40.65
120	32.89	11.60	6.25	5.35	38.49

Storage: Surface Storage Above CB300A

Orifice Equation: LMF70
Invert Elevation 52.97 m
T/G Elevation 54.77 m
Max Ponding Depth 0.30 m
Downstream W/L 51.46 m

	Stage	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Volume Check
100-year Water Level	55.07	2.10	6.25	48.89	56.01	OK
					7.12	

Stormwater Management Calculations

Project #160401331, Petries Landing - Block 6, 7 and 8
Modified Rational Method Calculatons for Storage

Subdrainage Area: BLDG Block 8 (R300A) — Roof
Area (ha): 0.236 — Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	45.35	10.15	35.20	21.12	89.4	0.00
20	52.03	30.72	10.67	20.05	**24.06**	94.0	0.00
30	40.04	23.64	10.58	13.07	23.52	93.1	0.00
40	32.86	19.41	10.29	9.12	21.88	90.6	0.00
50	28.04	16.56	9.93	6.62	19.87	87.5	0.00
60	24.56	14.50	9.56	4.94	17.77	84.2	0.00
70	21.91	12.94	9.20	3.74	15.70	81.0	0.00
80	19.83	11.71	8.85	2.86	13.71	78.0	0.00
90	18.14	10.71	8.52	2.19	11.83	75.0	0.00
100	16.75	9.89	8.12	1.77	10.63	71.5	0.00
110	15.57	9.19	7.75	1.45	9.55	68.2	0.00
120	14.56	8.60	7.41	1.19	8.56	65.2	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	93.96	0.09	10.67	24.06	94.40	0.00

Subdrainage Area: Parking Ramp Block 8 (F300B) — 100-year Capture - Tributary
Area (ha): 0.030
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill (L/s)
10	76.81	5.76	5.76	0.00	0.00	0.00
20	52.03	3.91	3.91	0.00	0.00	0.00
30	40.04	3.01	3.01	0.00	0.00	0.00
40	32.86	2.47	2.47	0.00	0.00	0.00
50	28.04	2.10	2.10	0.00	0.00	0.00
60	24.56	1.84	1.84	0.00	0.00	0.00
70	21.91	1.64	1.64	0.00	0.00	0.00
80	19.83	1.49	1.49	0.00	0.00	0.00
90	18.14	1.36	1.36	0.00	0.00	0.00
100	16.75	1.26	1.26	0.00	0.00	0.00
110	15.57	1.17	1.17	0.00	0.00	0.00
120	14.56	1.09	1.09	0.00	0.00	0.00

Subdrainage Area: Uncontrolled Block 8 (UNC-3) — Uncontrolled - Non Tributary
Area (ha): 0.368
C: 0.20

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill (L/s)
10	76.81	15.71	15.71	0.00	0.00	0.00
20	52.03	10.65	10.65	0.00	0.00	0.00
30	40.04	8.19	8.19	0.00	0.00	0.00
40	32.86	6.72	6.72	0.00	0.00	0.00
50	28.04	5.74	5.74	0.00	0.00	0.00
60	24.56	5.02	5.02	0.00	0.00	0.00
70	21.91	4.48	4.48	0.00	0.00	0.00
80	19.83	4.06	4.06	0.00	0.00	0.00
90	18.14	3.71	3.71	0.00	0.00	0.00
100	16.75	3.43	3.43	0.00	0.00	0.00
110	15.57	3.19	3.19	0.00	0.00	0.00
120	14.56	2.98	2.98	0.00	0.00	0.00

Block 8 Peak Flow Summary

Total Area = **0.773** **ha** — **Volume =** **36.23** **m³**
Q target = 99.5 L/s

Q unc = 15.7 L/s
Qramp = 5.8 L/s
Qroof = 10.7 L/s
Qparking = 5.9 L/s

Q total = **38** **L/s**

Overall Site Release Rate
Q target = 290.6 L/s
Q total = 150.9 L/s

Project #160401331, Petries Landing - Block 6, 7 and 8
Modified Rational Method Calculatons for Storage

Subdrainage Area: BLDG Block 8 (R300A) — Roof
Area (ha): 0.236 — Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	117.15	14.68	102.46	61.48	129.3	0.00
20	119.95	78.70	15.69	63.00	75.61	138.2	0.00
30	91.87	60.27	15.99	44.29	79.72	140.8	0.00
40	75.15	49.30	16.00	33.30	**79.92**	140.9	0.00
50	63.95	41.96	15.88	26.08	78.24	139.8	0.00
60	55.89	36.67	15.69	20.98	75.54	138.1	0.00
70	49.79	32.67	15.46	17.21	72.28	136.1	0.00
80	44.99	29.52	15.20	14.32	68.72	133.9	0.00
90	41.11	26.97	14.94	12.04	65.00	131.5	0.00
100	37.90	24.87	14.67	10.20	61.21	129.1	0.00
110	35.20	23.10	14.39	8.70	57.43	126.8	0.00
120	32.89	21.58	14.11	7.47	53.81	124.2	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	140.90	0.14	16.00	79.92	94.40	0.00

Subdrainage Area: Parking Ramp Block 8 (F300B) — 100-year Capture - Tributary
Area (ha): 0.030
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill (L/s)
10	178.56	14.89	14.89	0.00	0.00	0.00
20	119.95	10.00	10.00	0.00	0.00	0.00
30	91.87	7.66	7.66	0.00	0.00	0.00
40	75.15	6.27	6.27	0.00	0.00	0.00
50	63.95	5.33	5.33	0.00	0.00	0.00
60	55.89	4.66	4.66	0.00	0.00	0.00
70	49.79	4.15	4.15	0.00	0.00	0.00
80	44.99	3.75	3.75	0.00	0.00	0.00
90	41.11	3.43	3.43	0.00	0.00	0.00
100	37.90	3.16	3.16	0.00	0.00	0.00
110	35.20	2.94	2.94	0.00	0.00	0.00
120	32.89	2.74	2.74	0.00	0.00	0.00

Subdrainage Area: Uncontrolled Block 8 (UNC-3) — Uncontrolled - Non Tributary
Area (ha): 0.368
C: 0.25

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Qspill (L/s)
10	178.56	45.67	45.67	0.00	0.00	0.00
20	119.95	30.68	30.68	0.00	0.00	0.00
30	91.87	23.50	23.50	0.00	0.00	0.00
40	75.15	19.22	19.22	0.00	0.00	0.00
50	63.95	16.36	16.36	0.00	0.00	0.00
60	55.89	14.30	14.30	0.00	0.00	0.00
70	49.79	12.73	12.73	0.00	0.00	0.00
80	44.99	11.51	11.51	0.00	0.00	0.00
90	41.11	10.51	10.51	0.00	0.00	0.00
100	37.90	9.69	9.69	0.00	0.00	0.00
110	35.20	9.00	9.00	0.00	0.00	0.00
120	32.89	8.41	8.41	0.00	0.00	0.00

Block 8 Peak Flow Summary

Total Area = **0.773** **ha** — **Volume =** **128.81** **m³**
Q target = 99.5 L/s

Q unc = 45.7 L/s
Qramp = 14.9 L/s
Qroof = 16.0 L/s
Q parking = 6.3 L/s

Q total = **82.8** **L/s** — **-16.69 L/s**

Overall Site Release Rate
Q target = 290.6 L/s
Q total = 290.7 L/s

Project #160401331, Petries Landing - Block 6, 7 and 8
Roof Drain Design Sheet, Area R100A Block 6
Standard Watts Drainage Model R1100 Accuflow Roof Drains

Rating Curve				Volume Estimation				
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	Water Depth (m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0016	0	0.025	32	0	0	0.025
0.050	0.0006	0.0032	2	0.050	127	2	2	0.050
0.075	0.0009	0.0047	7	0.075	287	5	7	0.075
0.100	0.0013	0.0063	17	0.100	509	10	17	0.100
0.125	0.0016	0.0079	33	0.125	796	16	33	0.125
0.150	0.0019	0.0095	57	0.150	1146	24	57	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
1.9	588.7	1.9	0.16353
6.9	1065.3	5.0	0.45943
16.7	1555.8	9.8	0.8916
32.9	2052.0	16.2	1.46161
57.0	2551.0	24.1	2.17022

Rooftop Storage Summary

Total Building Area (sq.m)		1433	Excludes known areas with no roof storage available
Assume Available Roof Area (sq.m)	80%	1146	
Roof Imperviousness		0.99	
Roof Drain Requirement (sq.m/Notch)		232	
Number of Roof Notches*		5	
Max. Allowable Depth of Roof Ponding (m)		0.15	* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).
Max. Allowable Storage (cu.m)		57	
Estimated 100 Year Drawdown Time (h)		2.1	

From Watts Drain Catalogue

Head (m)	L/s Open	75%	50%	25%	Closed
0.025	**0.3155**	0.31545	0.31545	0.31545	0.31545
0.050	**0.6309**	0.6309	0.6309	0.6309	0.6309
0.075	**0.9464**	0.86749	0.78863	0.70976	0.6309
0.100	**1.2618**	1.10408	0.94635	0.78863	0.6309
0.125	**1.5773**	1.34067	1.10408	0.86749	0.6309
0.150	**1.8927**	1.57726	1.2618	0.94635	0.6309

* Note: Number of drains can be reduced if multiple-notch drain used.

Calculation Results	2yr	100yr	Available
Qresult (cu.m/s)	0.006	0.009	-
Depth (m)	0.099	0.147	0.150
Volume (cu.m)	16.5	54.6	57.3
Draintime (hrs)	0.883	2.097	

Project #160401331, Petries Landing - Block 6, 7 and 8
Roof Drain Design Sheet, Area BLDG Block 7
Standard Watts Drainage Model R1100 Accuflow Roof Drains

Rating Curve				Volume Estimation				
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	Water Depth (m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0022	0	0.025	40	0	0	0.025
0.050	0.0006	0.0044	3	0.050	162	2	3	0.050
0.075	0.0009	0.0066	9	0.075	364	6	9	0.075
0.100	0.0013	0.0088	22	0.100	647	12	22	0.100
0.125	0.0016	0.0110	42	0.125	1011	21	42	0.125
0.150	0.0019	0.0132	73	0.150	1456	31	73	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
2.4	534.2	2.4	0.14839
8.8	966.7	6.4	0.41691
21.2	1411.9	12.5	0.80909
41.8	1862.1	20.6	1.32635
72.5	2314.9	30.7	1.96939

Rooftop Storage Summary

Total Building Area (sq.m)		1820	Excludes known areas with no roof storage available
Assume Available Roof Area (sq.m)	80%	1456	
Roof Imperviousness		0.99	
Roof Drain Requirement (sq.m/Notch)		232	
Number of Roof Notches*		7	
Max. Allowable Depth of Roof Ponding (m)		0.15	* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).
Max. Allowable Storage (cu.m)		73	
Estimated 100 Year Drawdown Time (h)		1.9	

* Note: Number of drains can be reduced if multiple-notch drain used.

From Watts Drain Catalogue

Head (m)	L/s Open	75%	50%	25%	Closed
0.025	**0.3155**	0.31545	0.31545	0.31545	0.31545
0.050	**0.6309**	0.6309	0.6309	0.6309	0.6309
0.075	**0.9464**	0.86749	0.78863	0.70976	0.6309
0.100	**1.2618**	1.10408	0.94635	0.78863	0.6309
0.125	**1.5773**	1.34067	1.10408	0.86749	0.6309
0.150	**1.8927**	1.57726	1.2618	0.94635	0.6309

Calculation Results	2yr	100yr	Available
Qresult (cu.m/s)	0.009	0.013	-
Depth (m)	0.098	0.146	0.150
Volume (cu.m)	20.4	67.8	72.8
Draintime (hrs)	0.789	1.872	

Project #160401331, Petries Landing - Block 6, 7 and 8
Roof Drain Design Sheet, Area BLDG Block 8
Standard Watts Drainage Model R1100 Accuflow Roof Drains

Rating Curve				Volume Estimation				
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	Water Depth (m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0028	0	0.025	52	0	0	0.025
0.050	0.0006	0.0057	3	0.050	210	3	3	0.050
0.075	0.0009	0.0085	12	0.075	472	8	12	0.075
0.100	0.0013	0.0114	28	0.100	839	16	28	0.100
0.125	0.0016	0.0142	55	0.125	1311	27	55	0.125
0.150	0.0019	0.0170	94	0.150	1888	40	94	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
3.1	538.8	3.1	0.14966
11.4	974.9	8.3	0.42048
27.5	1423.9	16.2	0.81601
54.2	1878.0	26.7	1.33769
94.0	2334.7	39.8	1.98622

Rooftop Storage Summary

Total Building Area (sq.m)		2360	Excludes known areas with no roof storage available
Assume Available Roof Area (sq.m)	80%	1888	
Roof Imperviousness		0.99	
Roof Drain Requirement (sq.m/Notch)		232	
Number of Roof Notches*		9	
Max. Allowable Depth of Roof Ponding (m)		0.15	* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).
Max. Allowable Storage (cu.m)		94	
Estimated 100 Year Drawdown Time (h)		1.8	

* Note: Number of drains can be reduced if multiple-notch drain used.

From Watts Drain Catalogue

Head (m)	Open	75%	50%	25%	Closed
L/s					
0.025	**0.3155**	0.31545	0.31545	0.31545	0.31545
0.050	**0.6309**	0.6309	0.6309	0.6309	0.6309
0.075	**0.9464**	0.86749	0.78863	0.70976	0.6309
0.100	**1.2618**	1.10408	0.94635	0.78863	0.6309
0.125	**1.5773**	1.34067	1.10408	0.86749	0.6309
0.150	**1.8927**	1.57726	1.2618	0.94635	0.6309

Calculation Results	2yr	100yr	Available
Qresult (cu.m/s)	0.011	0.016	-
Depth (m)	0.094	0.141	0.150
Volume (cu.m)	24.1	79.9	94.4
Draintime (hrs)	0.748	1.757	

3223701 CANADA INC
C/O BRIGIL HOMES

DESIGN BRIEF
PETRIE'S LANDING II
PHASE 2

31464.5.2.2

REVISED AUGUST 2012
REVISED OCTOBER 2012
REVISED NOVEMBER 2012
REVISED AUGUST 2013
REVISED NOVEMBER 2013
REVISED FEBRUARY 7, 2014

- Pavement Structure:

Layer		Thickness (mm)	
		Car Parking Areas	Local Streets & Heavy Traffic Areas (Fire Route)
Wear Course:	Superpave 12.5 Asphaltic Concrete	50	40
Binder Course:	Superpave 19.0 Asphaltic Concrete		50
Base:	OPSS Granular "A" Crushed Stone	150	150
Sub-Base:	OPSS Granular "B" Type II	300	400

- Minimum Performance Grade (PG) 58-34 asphalt cement should be used;
- 3.0 m long sub-drain should be installed at each catchbasin.

The geotechnical report also provides guidelines regarding the permissible maximum grade raise(s) for the property without additional construction measures such as pre-loading, raft foundation, deep foundations or others approved alternatives such as light weight fill. The maximum grade raises vary between 1.8 m to 4.0 m depending on the building type and percentage of consolidation considered.

It should be noted that a copy of the proposed grading for the subject site has been forwarded to Paterson Group for its review and confirmation of its compliance with the grade raise recommendations.

2. MUNICIPAL SERVICES

As the Prestige Circle sewers and watermain were designed to accommodate the anticipated development along its perimeter, a simple extension of the main-line services into each sub-block will provide servicing for each of the buildings. The main design parameters for the various municipal services were designed as per the applicable City of Ottawa requirements and have been summarized in the sub-sections below.

2.1 Water Distribution

Prior to the detailed design of Prestige Circle, boundary conditions for the watermain at the intersection of Tenth Line Road and North Service Road were provided by City staff. Based on the proposed concept plan, grading and the existing boundary conditions, a 200mm diameter watermain loop complete with hydrants was proposed. The supporting hydraulic analysis demonstrated that the following municipal requirements and Fire Underwriters recommended flows for protection will be exceeded:

- Average daily demand — 350 l/cap/day (residential)
  15,000 l/Ha/day (institutional)
- Peak daily demand — 875 l/cap/day (residential)
  22,500 l/Ha/day (institutional)
- Peak hour demand — 1,925 l/cap/day (residential)
  40,500 l/Ha/day (institutional)
- Fire flow rate — 8,000 l/min (townhouses & 3-storey apartments)
  15,000 l/min (institutional)
- Minimum hydraulic grade line during max hour – 275 kPa
- Minimum hydraulic grade line during max day and fire flows – 140 kPa

Hence, the water servicing to Phase 2 will simply be accomplished through a number of connections to the 200mm diameter watermain along Prestige Circle.

Refer to Appendix C for the hydraulic analysis.

2.2 Wastewater

2.2.1 EXISTING CONDITIONS

In 2002 the 900mm diameter Ottawa River Sub Trunk sanitary sewer was constructed by the City of Ottawa to accommodate the Petrie's Landing II lands as well as additional lands upstream.

The sub-trunk detailed design was prepared by Stantec Consulting Ltd. It included a flow allowance of 50,000 l/Ha/d with a peaking factor of 1.5 for the Petrie's Landing II property.

The Prestige Circle sanitary sewer design was based on the applicable City of Ottawa Design Guidelines and the preliminary concept plan which originally proposed 248 apartments and 170 retirement units for a total of 418 units.

The current concept plan for the overall development is now proposing a total of 405 units. The breakdown is as follows:

- Existing Phase 1: 40 units
- Phase 2 (subject phase): 268 units
- Future Phase 3: 97 units

Thus, the number of units is within the allocated number as based on the original concept plan and associated sanitary sewer design.

It should also be noted that the distribution of the population along the perimeter of Prestige Circle will have no negative impact on the sanitary sewer as it has a significant level of residual capacity distributed along its entire length which provides flexibility in the design of the locations for the proposed block connections. Refer to Appendix D for Petrie's Landing design sheet and drawing.

2.2.2 DESIGN CRITERIA

The sanitary flows for Block 2 were determined based on the following design criteria which includes, but is not limited to the following:

- Population: 1.8 persons per apartment/condo unit
- Domestic Flow: 350 l/cap per day
- Domestic Peak Factor: Harmon Formula
- Institutional: 50,000 l/d/Ha
- Institutional Peak Factor: 1.5
- Extraneous Flow: 0.28 l/s/Ha
- Minimum Pipe Size: 200 mm diameter
- Maximum Velocity 3.0 m/s
- Minimum Velocity 0.6 m/s

Refer to Appendix D for the resulting sanitary design sheet and drawing.

2.3 Storm Sewer

2.3.1 EXISTING CONDITIONS

In 1995, *McNeely Engineering Consultants Ltd.* was commissioned by the former Township of Cumberland to prepare a Master Drainage Plan (MDP) for the area surrounding and including the Petrie's Landing II lands. The report states that stormwater flows from the development are to be directed to the Brisebois Creek SWM facility prior to its discharge to the Ottawa River. This will ensure that quality control constraints are met. The report also recommended that post-development flows from the proposed Petrie's Landing II lands site be limited to 150 l/s/ha in order to insure that the downstream SWM facility meets its design targets.

With the above-noted constraints in mind, the overall stormwater management design for the subdivision took into account the two proposed phases within the development. Hence, both phases 1 and 2 were allocated 61.6 L/s and 461.35L/s respectively.

However, Phase 2 has subsequently been reduced in size and a third phase has been created. Thus, the initial allocation of 461.35 L/s for Phase 2 has been distributed proportionally based on the areas of the new Phases 2 and 3. The resulting flow allocation for Phase 2 is 361.87 L/s.

2.3.2 DESIGN PARAMETERS

The rational method in combination with the following parameters was used in the sizing of the storm sewer minor system for Block 2:

- **Design Storms**

  The 5 year design storm event was used in the evaluation of the site, consistent with the City of Ottawa Sewer Design Guidelines (November, 2004).

- **Run-Off Coefficients**

  The run-off coefficients utilized for the minor system design were derived from analysis of representative samples of drainage areas within the proposed Phase. Coefficients of 0.20 and 0.90 were utilized in the analysis to represent landscaped versus hard surface areas.

- **Time of Concentration**

  Inlet times of 10 min. for parking/hard surface areas were utilized as per the City of Ottawa Sewer Design Guidelines (November 2004).

3. STORMWATER MANAGMENT

Phase 2 is 2.91 Ha in size and as previously noted was reallocated 361.87 L/s as minor system flow as a result of its new area.

Of the 2.91 Ha design area, a total of 0.55 Ha has been left to discharge uncontrolled from the site due to grading or other constraints that do not feasibly allow for collection and control of runoff. Based on a 100-year event, where the runoff coefficient of the uncontrolled area is equal to an average of 0.30, the uncontrolled flow rate can be determined as follows:

- $\mathbf{Q_{Uncontrolled}} = 2.78*C*i_{100yr}*A$, where:

  C = Average site runoff coefficient uncontrolled area
  = 0.30

  $\mathbf{i_{100yr}}$ = Intensity of 100-year storm event (mm/hr)
  = $1735.688 * (T_c + 6.014)^{-0.820}$
  = 178.56 mm/hr; where T_c = 20 minutes

  A = Uncontrolled Area (Ha)
  = 0.55 ha

  Therefore,

- $\mathbf{Q_{Uncontrolled}}$ = 2.78 X 0.30 X 119.95mm/hr X 0.55 Ha = 55.02 L/s

Additionally, an area of the site equivalent to 0.27 Ha is taken up by depressed parking ramps, which must accommodate the 100-year flow. This flow rate can also be calculated as:

$Q_{parking}$ = **$2.78*C*i_{100yr}*A$**

= 2.78 * 0.80 * 119.95 * 0.27

= **107.22 L/s**

The maximum allowable release rate from the remainder of the site can then be determined as:

$Q_{max\ allowable}$ = $Q_{restricted} - Q_{uncontrolled} - Q_{parking}$

= 361.87 L/s – 55.02 L/s – 107.22 L/s

= **199.62 L/s**

Restricting flow into the minor system from the controlled portion of the site will be achieved through the use of inlet control devices and surface ponding. The size and type of each inlet control device was determined via the Modified Rational Method and are a function of the size of the drainage area and the amount of surface storage available on-site.

Any runoff generated from storms in excess of the site's release rate will be stored on-site and gradually released into the minor system so as not to surcharge the proposed sewers. Ponding storage will be provided at specific locations. Overland flow routes have been provided in the grading and surface designs to permit emergency overflow drainage from the site.

Refer to Appendix E for the modified rational method calculations, inlet control device sizing and ponding plan.

4. GRADING

As per standard practice, the design of the site grading takes into account a number of factors. Efforts are made to ensure that the proposed grading will tie in well with the surrounding areas. This includes matching the existing grades at controlling areas, such as property lines, existing roadways and geotechnical restraint lines, where no modification of the existing grades is permissible.

Other factors, such as stormwater management and geotechnical grade raise limitations also play a part in the grading of the site. Major overflow routes have been provided in order to ensure that emergency overflow can be conveyed from the site when required. Where possible, some areas have been graded to maximize on-site ponding. The depth of water has been limited to a maximum of 0.30 m at all locations.

5. UTILITIES

As part of Prestige Circle's second and final phase of construction, all utility purveyors will be extending their current plant within the Right-of-Way in order to provide servicing to Phase 2 and future Phase 3. As part of the detail design for Phase 2, servicing designs from Hydro One, Rogers, Bell and Enbridge have been requested.

FUS WATER SUPPLY FOR PUBLIC FIRE PROTECTION 1991

EXAMPLES OF REQUIRED FIRE FLOWS (REVISED)

For convenience in making general estimates some examples of required fire flows in typical buildings are provided below. In establishing fire flows for areas of a Municipality as yet undeveloped, but where a broad range of commercial, institutional, residential and industrial occupancies may be expected to be created under modern building code requirements, an outside design figure of 15,000 L/min appears likely to be suitable. When very large or high fire load buildings are probable, 25,000 L/min is more appropriate. It should be noted particularly that the tendency to install automatic sprinkler protection in large area and high hazard industrial and commercial buildings is a key factor in keeping required fire flows within ecomonically acceptable limits in many cases.

The following examples suppose no significant exposures to other buildings nor sprinkler protection unless specified. Where areas are given they are ground areas unless specified.

DETACHED DWELLINGS (TOTAL FLOOR AREAS)

— Under 100 m² = 2,000 L/min
101 m² — 200 m² = 3,000 L/min
Over 200 m² = 4,000 L/min

— Add for exposures to similar buildings on both sides:

Over 30 m	- nil
30 — 10 m	add 1,000 L/min
10 — 3 m	add 2,000 L/min
less than 3 m	see Note "D", if Frame. Brick, add 3,000 L/min.

— If wood shingle or shake roofs are prevalent,add 2,000 to 4,000 L/min.

— Modern residential subdivisions of 1 and 2 storey single family homes detached 3 to 6 m require usually 4,000 to 5,000 L/min.

— Old congested two and three family tenements detached less than 3 m and running the length of the block may require 15,000 to 25,000 L/min and should be calculated according to Note "D".

— Modern Row or Town House groups may require 6,000 to 10,000 L/min including adjoining exposures, providing required fire separations are adequate.

APARTMENT BUILDINGS

— 3 storeys, frame, 300 m² = 7,000 L/min and exposure coverage.

— 4 storeys, brick, 2,000 m² = 15,000 L/min and exposure coverage.

— 3 or more storeys, fire resistive, 5,600 m² with cut off shafts and stairs = 10,000 L/min and exposure coverage.

INSTITUTIONAL BUILDINGS

— 1 storey, fire resistive school of 2,300 m² = 5,000 L/min

— 3 storey, brick ordinary school of 2,300 m² = 15,000 L/min

— 3 or more storey, fire resistive hospital with adequate floor separations 1,000 m², no exposures = 4,000 L/min.

INDUSTRIAL BUILDINGS

— Typical industrial park, 1 storey ordinary, area 3,700 m² with average combustible contents fire load =14,000 L/min.

— Frame warehouse 1 storey, moderate contents fire load 3,700 m² = 20,000 L/min.

— Warehouse high fire load contents, brick non-combustible, 1 storey, 14,000 m² = 25,000 L/min. With full adequate automatic sprinkler protection (item 3, P.13) 13,000 L/min.

— Traditional 3 storey brick , ordinary factory with high fire load. 9,300 m² = 35,000 L/min.

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : PETRIE'S LANDING II - PHASE 2
LOCATION : CITY OF OTTAWA
DEVELOPER : BRIGIL PLATINUM

FILE: 31464.5.7
DATE: 2013-11-28
DESIGN: RPK
PAGE : 1 OF 1

NODE	RESIDENTIAL				NON-RESIDENTIAL			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND
	UNITS		GROSS RES. (ha)	POP'N	INDTRL (ha.)	COMM. (ha.)	INST. (ha.)	Res.	Non-res.	Total	Res.	Non-res.	Total	Res.	Non-res.	Total	(l/min)
	TH	APT															
BLK1		40		72				0.29	0.00	0.29	0.73	0.00	0.73	1.60	0.00	1.60	8,000
BLK2		40		72				0.29	0.00	0.29	0.73	0.00	0.73	1.60	0.00	1.60	8,000
BLK3A		92		166				0.67	0.00	0.67	1.68	0.00	1.68	3.69	0.00	3.69	8,000
BLK5		76		137				0.55	0.00	0.55	1.39	0.00	1.39	3.05	0.00	3.05	8,000
BLK6		76		137				0.55	0.00	0.55	1.39	0.00	1.39	3.05	0.00	3.05	8,000
BLK7		0		0				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8,000
BLK8		88		158				0.64	0.00	0.64	1.60	0.00	1.60	3.53	0.00	3.53	15,000
TOTALS	**0**	**412**	**0**	**742**	**0.00**	**0.00**	**0.00**	**2.99**	**0.00**	**2.99**	**7.52**	**0.00**	**7.52**	**16.52**	**0.00**	**16.52**	

ASSUMPTIONS

RESIDENTIAL DENSITIES

- Townhouse (TH) 2.7 p / p / u
- Apartment (APT) 1.8 p / p / u

AVG. DAILY DEMAND

- Residential 350 l / cap / day
- Institutional 15,000 l / ha / day

MAX. DAILY DEMAND

- Residential 875 l / cap / day
- Institutional 22,500 l / ha / day

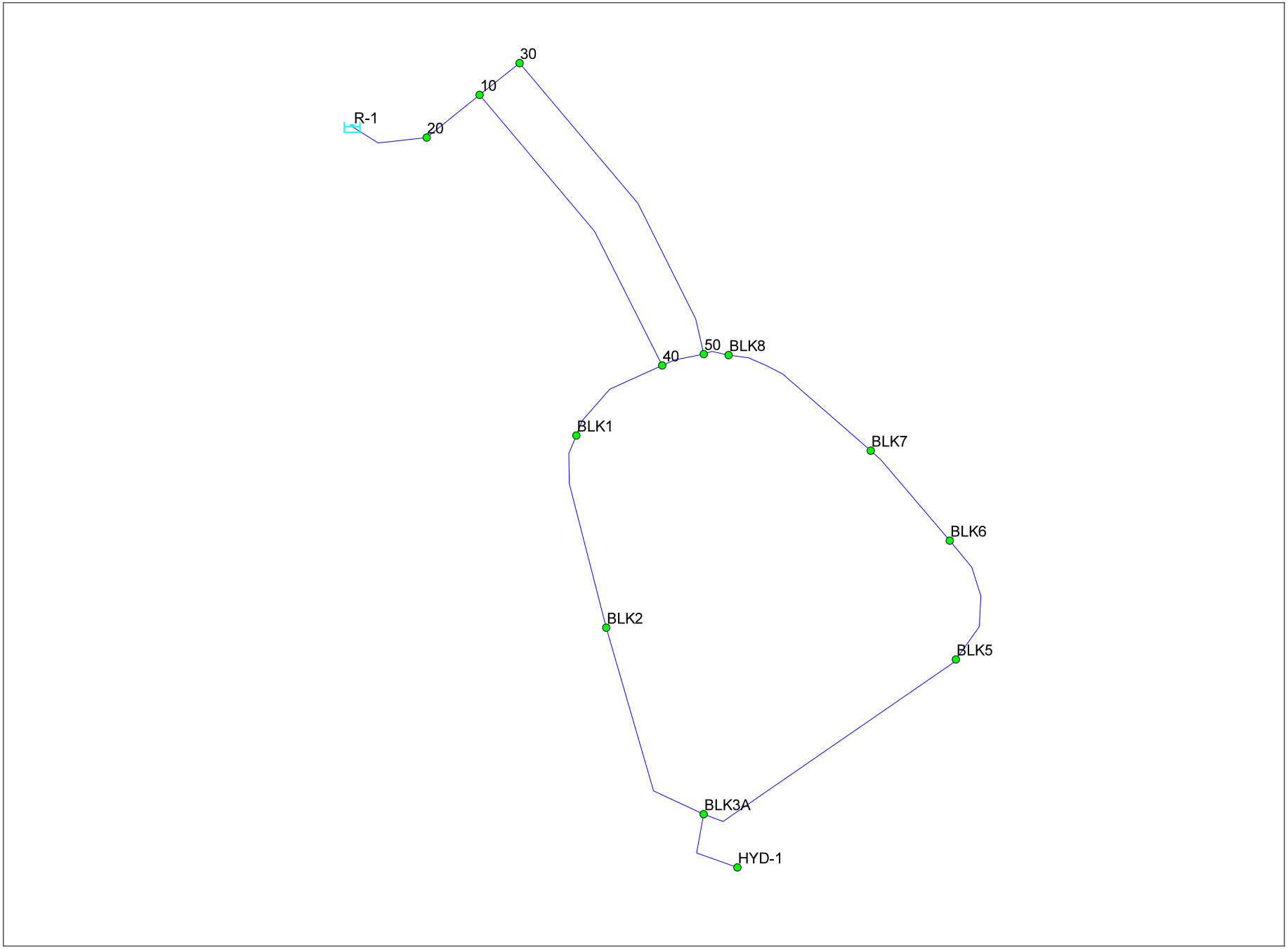
MAX. HOURLY DEMAND

- Residential 1,925 l / cap / day
- Institutional 40,500 l / ha / day

FIRE FLOW

- Townhouses 8,000 l / min
- 3-Storey Apartments 8,000 l / min
- Institutional 15,000 l / min

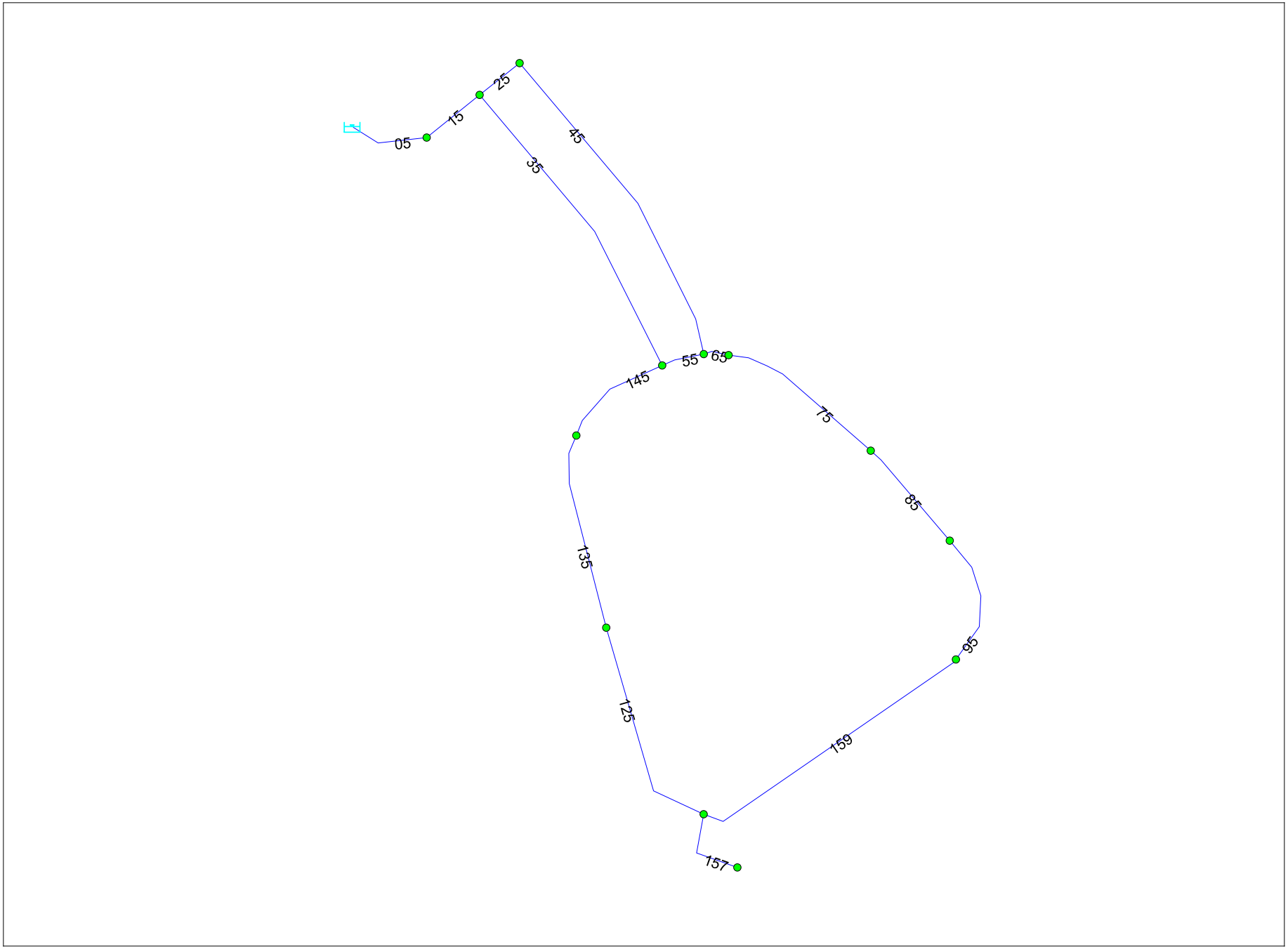
Petrie's Landing II - Node ID's



Prepared By: IBI Group

Date: Thursday, November 28, 2013

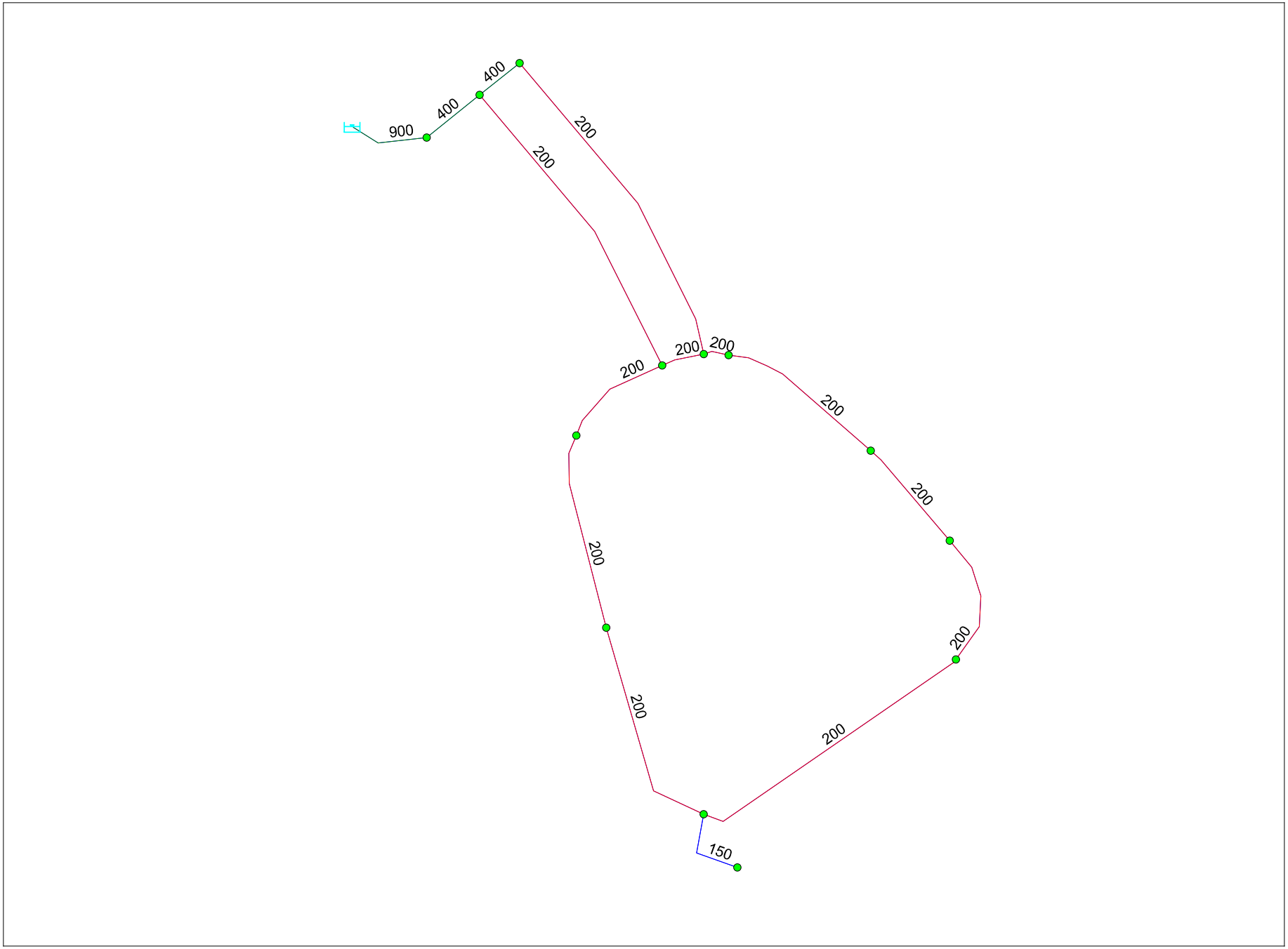
Petrie's Landing II - Pipe ID's



Prepared By: IBI Group

Date: Thursday, November 28, 2013

Petrie's Landing II - Pipe Sizes



Prepared By: IBI Group

Date: Thursday, November 28, 2013

Average Day (High Presure Check) - Junction Report (HGL = 115.00m)

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		10	0.00	51.75	115.00	619.78
2		20	0.00	52.00	115.00	617.35
3		30	0.00	51.60	115.00	621.25
4		40	0.00	55.05	115.00	587.42
5		50	0.00	55.05	115.00	587.42
6		BLK1	0.29	55.20	114.99	585.94
7		BLK2	0.29	56.70	114.99	571.24
8		BLK3A	0.67	57.00	114.99	568.30
9		BLK5	0.55	57.10	114.99	567.32
10		BLK6	0.55	56.60	114.99	572.22
11		BLK7	0.00	55.65	114.99	581.53
12		BLK8	0.64	55.00	115.00	587.91
13		HYD-1	0.00	57.10	114.99	567.32

Average Day (High Presure Check) - Pipe Report (HGL = 115.00m)

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)
1		05	R-1	20	0.10	900.00	130.00	2.99	0.00	0.00
2		125	BLK3A	BLK2	57.74	200.00	110.00	-0.67	0.02	0.000
3		135	BLK2	BLK1	50.89	200.00	110.00	-0.96	0.03	0.000
4		145	BLK1	40	29.62	200.00	110.00	-1.25	0.04	0.000
5		15	20	10	800.00	400.00	120.00	2.99	0.02	0.00
6		157	BLK3A	HYD-1	21.20	150.00	100.00	0.00	0.00	0.00
7		159	BLK3A	BLK5	81.61	200.00	110.00	0.00	0.000	0.00
8		25	10	30	13.11	400.00	120.00	1.47	0.01	0.00000
9		35	10	40	84.27	200.00	110.00	1.52	0.05	0.00
10		45	30	50	89.46	200.00	110.00	1.47	0.05	0.00
11		55	40	50	11.11	200.00	110.00	0.27	0.01	0.0000
12		65	50	BLK8	6.59	200.00	110.00	1.74	0.06	0.000
13		75	BLK8	BLK7	44.78	200.00	110.00	1.10	0.03	0.000
14		85	BLK7	BLK6	30.74	200.00	110.00	1.10	0.03	0.000
15		95	BLK6	BLK5	34.82	200.00	110.00	0.55	0.02	0.000

Average Day (High Presure Check) - Pipe Report (HGL = 115.00m)

		ID	HL/1000 (m/km)
1		05	0.00
2		125	0.01
3		135	0.01
4		145	0.02
5		15	0.00
6		157	0.00
7		159	0.00
8		25	0.000
9		35	0.03
10		45	0.03
11		55	0.00
12		65	0.03
13		75	0.01
14		85	0.01
15		95	0.00

Max Day + Fire - Fireflow Report (HGL = 110.00m)

		ID	Total Demand (L/s)	Critical Node 1 ID	Critical Node 1 Pressure (kPa)	Critical Node 1 Head (m)	Adjusted Fire-Flow (L/s)	Available Flow @Hydrant (L/s)	Critical Node 2 ID	Critical Node 2 Pressure (kPa)	Critcal Node 2 Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
1		BLK1	134.06	HYD-1	448.81	101.00	345.12	335.18	BLK1	139.96	69.48	335.18	335.18
2		BLK2	134.06	BLK2	426.82	100.26	289.16	289.18	BLK2	139.96	70.98	289.18	289.16
3		BLK5	134.72	BLK5	415.09	99.46	276.06	276.08	BLK5	139.96	71.38	276.08	276.06
4		BLK6	134.72	BLK6	427.07	100.18	289.25	289.27	BLK6	139.96	70.88	289.27	289.25
5		BLK7	133.33	BLK5	438.59	100.41	318.44	310.34	BLK7	139.96	69.93	310.34	310.34
6		BLK8	251.60	BLK5	335.27	89.21	375.48	378.29	BLK6	134.64	68.74	375.44	375.44
7		HYD-1	133.33	HYD-1	304.50	88.17	182.43	182.43	HYD-1	139.96	71.38	182.43	182.43

Peak Hour - Junction Report (HGL = 108.00m)

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		10	0.00	51.75	107.95	550.69
2		20	0.00	52.00	108.00	548.76
3		30	0.00	51.60	107.95	552.16
4		40	0.00	55.05	107.89	517.83
5		50	0.00	55.05	107.89	517.82
6		BLK1	1.60	55.20	107.88	516.23
7		BLK2	1.60	56.70	107.87	501.39
8		BLK3A	3.69	57.00	107.86	498.37
9		BLK5	3.05	57.10	107.86	497.39
10		BLK6	3.05	56.60	107.86	502.32
11		BLK7	0.00	55.65	107.87	511.74
12		BLK8	3.53	55.00	107.89	518.26
13		HYD-1	0.00	57.10	107.86	497.39

APPENDIX D

IBI Group
400 - 333 Preston Street
Ottawa, ON
K1S 5N4

SANITARY SEWER DESIGN SHEET

PROJECT: PETRIE'S LANDING II - PHASE 2
LOCATION: CITY OF OTTAWA
DEVELOPER: BRIGIL PLATINUM

JOB: 31464.5.7
DATE: 2013-11-28
DESIGN: RPK

LOCATION				INDIVIDUAL		CUMULATIVE		DESIGN FLOW					SEWER DATA					
FROM MH	TO MH	TH (#)	APT (#)	POP.	AREA (Ha)	POP.	AREA (Ha)	PEAK FACTOR	POP. FLOW (L/s)	INFILT. FLOW (L/s)	OFFSITE FLOW (L/s)	PEAK FLOW (L/s)	CAP. (L/s)	VELOCITY (FULL) (m/s)	LENGTH (m)	PIPE (mm)	SLOPE (%)	AVAIL. CAP. (%)
19A	*1A*			*0.0*	*0.27*	*0*	*0.27*	*4.00*	*0.00*	*0.08*		***0.08***	***22.47***	*1.23*	*12.49*	*150*	*2.00*	*99.64%*
STUB	*18A*			***17.10 L/s from off-site lands south of Regional Road No. 174***							*17.10*	***17.10***	***67.64***	*0.93*	*2.00*	*300*	*0.45*	*74.72%*
18A	*17A*			*0.0*	*0.00*	*0*	*0.00*	*4.00*	*0.00*	*0.00*	*17.10*	***17.10***	***67.64***	*0.93*	*6.91*	*300*	*0.45*	*74.72%*
17A	*1A*			*0.0*	*0.00*	*0*	*0.00*	*4.00*	*0.00*	*0.00*	*17.10*	***17.10***	***67.64***	*0.93*	*68.70*	*300*	*0.45*	*74.72%*
BLK 5	200A		76	136.8	0.25	137	0.25	4.00	2.22	0.07		**2.29**	**22.47**	1.23	32.98	150	2.00	89.81%
200A	CAP			0.0	0.00	137	0.25	4.00	2.22	0.07		**2.29**	**67.64**	0.93	2.05	300	0.45	96.61%
CAP	22A			0.0	0.00	137	0.25	4.00	2.22	0.07		**2.29**	**67.64**	0.93	8.31	300	0.45	96.61%
22A	*1A*			0.0	0.00	137	0.25	4.00	2.22	0.07		**2.29**	**67.64**	0.93	24.22	300	0.45	96.61%
1A	*2A*			*0.0*	*0.07*	*137*	*0.59*	*4.00*	*2.22*	*0.17*	*17.10*	***19.49***	***67.64***	*0.93*	*51.00*	*300*	*0.45*	*71.19%*
300A	CAP		76	136.8	0.64	137	0.64	4.00	2.22	0.18		**2.40**	**28.41**	0.88	15.27	200	0.69	91.55%
CAP	*2A*			0.0	0.00	137	0.64	4.00	2.22	0.18		**2.40**	**28.41**	0.88	10.00	200	0.69	91.55%
2A	*3A*			*0.0*	*0.02*	*274*	*1.25*	*4.00*	*4.43*	*0.35*	*17.10*	***21.88***	***67.64***	*0.93*	*13.41*	*300*	*0.45*	*67.65%*
3A	*4A*			*0.0*	*0.02*	*274*	*1.27*	*4.00*	*4.43*	*0.36*	*17.10*	***21.89***	***67.64***	*0.93*	*11.07*	*300*	*0.45*	*67.64%*
4A	*21A*			*0.0*	*0.07*	*274*	*1.34*	*4.00*	*4.43*	*0.38*	*17.10*	***21.91***	***67.64***	*0.93*	*15.67*	*300*	*0.45*	*67.61%*
401A	*CAP*		76	136.8	0.75	137	0.75	4.00	2.22	0.21		**2.43**	**34.21**	1.06	25.51	200	1.00	92.90%
CAP	*21A*			0.0	0.00	137	0.75	4.00	2.22	0.21		**2.43**	**34.21**	1.06	10.00	200	1.00	92.90%

Q = Average daily per capita flow 350 l/cap/d
I = Unit of peak extraneous flow 0.28 l/sec/Ha
M = Peaking factor = 1+(14/(4+P)^0.5)), P=pop. IN 1000'S, max. of 4
Q(p) = Peak population flow (l/s)
Q(i) = Peak extraneous flow (l/s)
Population = 2.7 per townhouse (TH) unit, 1.8 per apartment (APT) unit
Coeff. of friction (n) = 0.013

IBI Group
400 - 333 Preston Street
Ottawa, ON
K1S 5N4

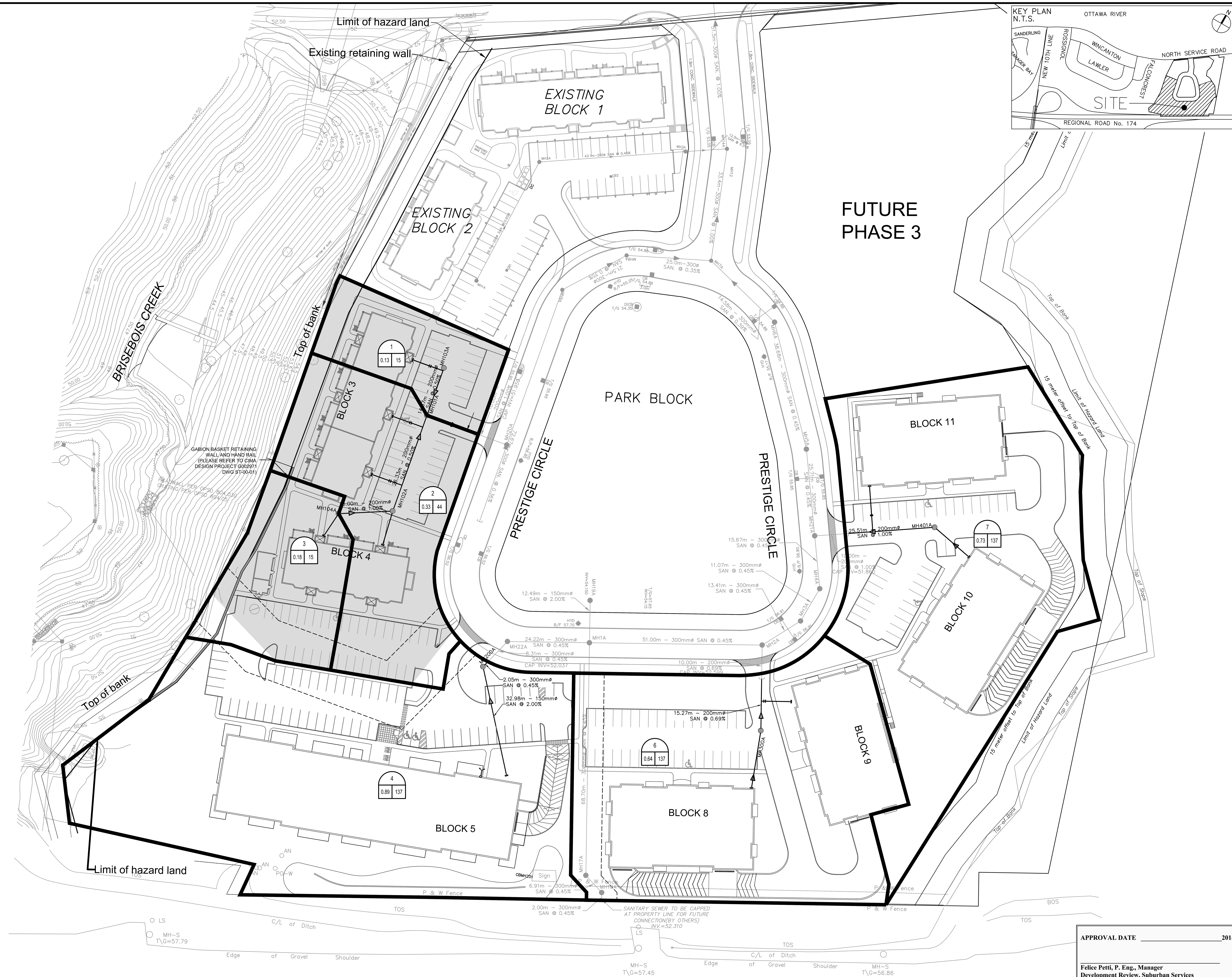
SANITARY SEWER DESIGN SHEET

PROJECT: PETRIE'S LANDING II - PHASE 2
LOCATION: CITY OF OTTAWA
DEVELOPER: BRIGIL PLATINUM

JOB: 31464.5.7
DATE: 2013-11-28
DESIGN: RPK

LOCATION				INDIVIDUAL		CUMULATIVE		DESIGN FLOW					SEWER DATA					
FROM MH	TO MH	TH (#)	APT (#)	POP.	AREA (Ha)	POP.	AREA (Ha)	PEAK FACTOR	POP. FLOW (L/s)	INFILT. FLOW (L/s)	OFFSITE FLOW (L/s)	PEAK FLOW (L/s)	CAP. (L/s)	VELOCITY (FULL) (m/s)	LENGTH (m)	PIPE (mm)	SLOPE (%)	AVAIL. CAP. (%)
21A	*5A*			*0.0*	*0.07*	*410*	*2.16*	*4.00*	*6.65*	*0.60*	*17.10*	***24.35***	***67.64***	*0.93*	*25.71*	*300*	*0.45*	*64.00%*
5A	*6A*			*0.0*	*0.00*	*410*	*2.16*	*4.00*	*6.65*	*0.60*	*17.10*	***24.35***	***67.64***	*0.93*	*38.68*	*300*	*0.45*	*64.00%*
	6A		*81*	*145.8*	*0.57*	*146*	*0.57*	*4.00*	*2.36*	*0.16*		***2.52***						
6A	*7A*			*0.0*	*0.04*	*556*	*2.77*	*3.95*	*8.90*	*0.78*	*17.10*	***26.78***	***62.97***	*0.86*	*26.08*	*300*	*0.39*	*57.47%*
10A	*20A*			*0.0*	*0.16*	*0*	*0.16*	*4.00*	*0.00*	*0.04*		***0.04***	***59.69***	*0.82*	*41.00*	*300*	*0.35*	*99.93%*
104A	102A		8	14.4	0.12	14	0.12	4.00	0.23	0.03		**0.26**	**34.21**	1.06	16.00	200	1.00	99.24%
102A	101A		24	43.2	0.27	58	0.39	4.00	0.93	0.11		**1.04**	**24.19**	0.75	26.33	200	0.50	95.70%
103A	101A		8	14.6	0.13	15	0.13	4.00	0.24	0.04		**0.28**	**24.19**	0.75	14.87	200	0.50	98.84%
101A	*CAP*			0.0	0.00	72	0.52	4.00	1.17	0.15		**1.32**	**34.21**	1.06	15.15	200	1.00	96.14%
CAP	*20A*			0.0	0.00	72	0.52	4.00	1.17	0.15		**1.32**	**34.21**	1.06	10.00	200	1.00	96.14%
20A	*9A*			*0.0*	*0.03*	*72*	*0.71*	*4.00*	*1.17*	*0.20*		***1.37***	***59.69***	*0.82*	*48.80*	*300*	*0.35*	*97.70%*
	9A		*40*	*72.0*	*0.61*	*72*	*0.61*	*4.00*	*1.17*	*0.17*		***1.34***						
9A	*8A*			*0.0*	*0.03*	*144*	*1.35*	*4.00*	*2.34*	*0.38*		***2.72***	***79.46***	*1.09*	*21.08*	*300*	*0.62*	*96.58%*
8A	*7A*			*0.0*	*0.03*	*144*	*1.38*	*4.00*	*2.34*	*0.39*		***2.73***	***68.44***	*0.94*	*25.19*	*300*	*0.46*	*96.01%*
7A	*13A*			*0.0*	*0.09*	*700*	*4.24*	*3.89*	*11.05*	*1.19*	*17.10*	***29.34***	***101.35***	*1.39*	*33.06*	*300*	*1.01*	*71.05%*
13A	*14A*			*0.0*	*0.11*	*700*	*4.35*	*3.89*	*11.05*	*1.22*	*17.10*	***29.37***	***104.85***	*1.44*	*51.59*	*300*	*1.08*	*71.99%*
14A	*15A*			*0.0*	*0.00*	*700*	*4.35*	*3.89*	*11.05*	*1.22*	*17.10*	***29.37***	***100.91***	*1.38*	*23.00*	*300*	*1.00*	*70.90%*
15A	*EX 10A*			*0.0*	*0.00*	*700*	*4.35*	*3.89*	*11.05*	*1.22*	*17.10*	***29.37***	***100.91***	*1.38*	*34.90*	*300*	*1.00*	*70.90%*

Q = Average daily per capita flow 350 l/cap/d
I = Unit of peak extraneous flow 0.28 l/sec/Ha
M = Peaking factor = 1+(14/(4+P)^0.5)), P=pop. IN 1000'S, max. of 4
Q(p) = Peak population flow (l/s)
Q(i) = Peak extraneous flow (l/s)
Population = 2.7 per townhouse (TH) unit, 1.8 per apartment (APT) unit
Coeff. of friction (n) = 0.013



LEGEND :

- 1 — AREA IDENTIFICATION
- 0.13 | 15 — POPULATION
- AREA IN HECTARES

POPULATION:
- APARTMENT = 1.8 PPU

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8	REVISED PER CITY COMMENTS	RPK	14:02:06
7	REVISED PER CITY COMMENTS	RPK	13:11:26
6	REVISED BLOCK 5	RPK	13:08:19
5	RE-ISSUED FOR SITE PLAN APPROVAL	TRB	12:11:19
4	RE-ISSUED FOR SITE PLAN APPROVAL	RPK	12:10:19
3	RE-ISSUED FOR SITE PLAN APPROVAL	RPK	12:08:27
2	ISSUED FOR SITE PLAN APPROVAL	RPK	12:04:12
1	ISSUED FOR REVIEW	RPK	12:03:07

LE GROUPE BRIGIL CONSTRUCTION

IBI GROUP
333 Preston Street
Tower 1, Suite 400
Ottawa, Ontario
Canada K1S 5N4
Tel (613)225-1311
Fax (613)225-9868

Project Title
PETRIE'S LANDING II
PHASE 2

LICENSED PROFESSIONAL ENGINEER R.P. KENNEDY 100086734 2014/02/06 PROVINCE OF ONTARIO

Drawing Title
SANITARY DRAINAGE AREA PLAN

Scale 1:500

Design	Date
RPK	FEB. 2012
Drawn	Checked
DD	TRB
Project No.	Drawing No.
31464	501

APPROVAL DATE ____________ 2014

Felice Petti, P. Eng., Manager
Development Review, Suburban Services

APPENDIX E

IBI Group
400 - 333 Preston Street
Ottawa, ON
K1S 5N4

STORM SEWER DESIGN SHEET

PROJECT: PETRIE'S LANDING II - PHASE 2
LOCATION: CITY OF OTTAWA
DEVELOPER: BRIGIL PLATINUM

JOB: 31464.5.7
DATE: 2013-11-28
DESIGN: RPK

		AREA (Ha)									DESIGN FLOW							SEWER DATA						
FROM MH	TO MH	C= 0.10	C= 0.20	C= 0.30	C= 0.70	C= 0.75	C= 0.80	C= 0.90	INDIV. 2.78AC	CUM. 2.78AC	INLET (min)	TIME IN PIPE	TOTAL	$i_{5\text{-year}}$ (mm/hr)	$i_{100\text{-year}}$ (mm/hr)	PEAK FLOW (L/s) IND	PEAK FLOW (L/s) TOTAL	CAP. (L/s)	LENGTH (m)	PIPE (mm)	SLOPE (%)	n	VEL. (m/s)	AVAIL. CAP. (%)
CBMH 17	MH 1		0.270						0.15	0.15	10.00	0.11	10.11	104.20		**15.63**	**15.63**	**142.65**	12.49	300	2.00	0.013	1.96	89.04%
MH 1	MH 2								0.00	0.15	10.11	0.62	10.73	103.60		**15.54**	**15.54**	**78.15**	40.05	300	0.60	0.013	1.07	80.11%
GAR 8	MH 303								0.00	0.00	10.00			104.20		**0.00**	**0.00**							
							0.070		0.16	0.16	10.00	0.27	10.27		178.60	**28.58**	**28.58**	**34.21**	16.77	200	1.00	0.013	1.06	16.48%
MH 303	MH 301								0.00	0.00	10.27			102.80		**0.00**	**0.00**							
									0.00	0.16	10.27	0.17	10.43		176.20	**28.19**	**28.19**	**34.21**	10.50	200	1.00	0.013	1.06	17.60%
GAR 9	MH 301								0.00	0.00	10.00			104.20		**0.00**	**0.00**							
							0.050		0.11	0.11	10.00	0.26	10.26		178.60	**19.65**	**19.65**	**34.21**	16.69	200	1.00	0.013	1.06	42.58%
MH 301	MH 300				0.040			0.100	0.33	0.33	10.43			102.00		**33.66**	**33.66**							
									0.00	0.27	10.43	0.33	10.76		174.70	**47.17**	**80.83**	**114.99**	31.40	300	1.30	0.013	1.58	29.71%
CB 302	CBMH 32				0.120				0.23	0.23	10.00	0.24	10.24	104.20		**23.97**	**23.97**	**65.83**	28.85	200	3.70	0.013	2.03	63.59%
CBMH 32	MH 300				0.110				0.21	0.21	10.00	0.06	10.06	104.20		**21.88**	**21.88**	**138.74**	10.31	250	5.00	0.013	2.74	84.23%
MH 300	MH 2							0.100	0.25	0.79	10.76			100.30		**79.24**	**79.24**							
									0.00	0.27	10.76	0.32	11.08		171.90	**46.41**	**125.65**	**151.97**	25.18	375	0.69	0.013	1.33	17.32%
MH 2	MH 3				0.120				0.23	1.17	11.08			98.80		**115.60**	**115.60**							
									0.00	0.27	11.08	0.19	11.26		169.30	**45.71**	**161.31**	**218.51**	14.76	450	0.54	0.013	1.33	26.18%
MH 3	MH 4								0.00	1.17	11.26			98.00		**114.66**	**114.66**							
									0.00	0.27	11.26	0.10	11.36		167.80	**45.31**	**159.97**	**361.78**	9.29	525	0.65	0.013	1.62	55.78%
MH 4	MH 21								0.00	1.17	11.36			97.50		**114.08**	**114.08**							
									0.00	0.27	11.36	0.22	11.58		167.00	**45.09**	**159.17**	**429.62**	19.81	600	0.45	0.013	1.47	62.95%
RYCB 43	MH 404			0.050					0.04	0.04	15.00	0.21	15.21	83.60		**3.34**	**3.34**	**87.71**	21.28	250	2.00	0.013	1.73	96.19%
MH 404	MH 403							0.100	0.25	0.29	15.21	0.12	15.33	82.90		**24.04**	**24.04**	**124.09**	18.24	250	4.00	0.013	2.45	80.63%
MH 403	MH 401				0.140				0.27	0.56	15.33	0.21	15.54	82.50		**46.20**	**46.20**	**87.71**	21.57	250	2.00	0.013	1.73	47.33%
GAR 10	MH 405								0.00	0.00	10.00			104.20		**0.00**	**0.00**							
							0.070		0.16	0.16	10.00	0.23	10.23		178.60	**28.58**	**28.58**	**34.21**	14.23	200	1.00	0.013	1.06	16.48%
MH 405	MH 402								0.00	0.00	10.23			103.00		**0.00**	**0.00**							
									0.00	0.16	10.23	0.33	10.56		176.50	**28.24**	**28.24**	**34.21**	21.06	200	1.00	0.013	1.06	17.46%
GAR 11	MH 402								0.00	0.00	10.00			104.20		**0.00**	**0.00**							
							0.050		0.11	0.11	10.00	0.29	10.29		178.60	**19.65**	**19.65**	**34.21**	18.11	200	1.00	0.013	1.06	42.58%
MH 402	MH 401				0.060				0.12	0.12	10.56			101.30		**12.16**	**12.16**							
									0.00	0.27	10.56	0.34	10.90		173.60	**46.87**	**59.03**	**114.99**	32.30	300	1.30	0.013	1.58	48.67%
MH 401	MH 21							0.100	0.25	0.93	15.54			81.90		**76.17**	**76.17**							
									0.00	0.27	15.54	0.26	15.79		140.00	**37.80**	**113.97**	**182.87**	24.70	375	1.00	0.013	1.60	37.68%
MH 21	MH 5				0.080				0.16	2.26	15.79			81.10		**183.29**	**183.29**							
									0.00	0.54	15.79	0.26	16.05		138.60	**74.84**	**258.13**	**410.07**	21.89	600	0.41	0.013	1.41	37.05%

Q = 2.78AIC, where:
Q = Peak Flow in Litres per Second (l/s)
A = Area in Hectares (ha.)
I = Rainfall Intensity in Millimeters per Hour (mm/hr)

I=998.071/(TC+6.053)^0.814

IBI Group
400 - 333 Preston Street
Ottawa, ON
K1S 5N4

STORM SEWER DESIGN SHEET
PROJECT: PETRIE'S LANDING II - PHASE 2
LOCATION: CITY OF OTTAWA
DEVELOPER: BRIGIL PLATINUM

JOB: 31464.5.7
DATE: 2013-11-28
DESIGN: RPK

		AREA (Ha)									DESIGN FLOW							SEWER DATA						
FROM MH	TO MH	C= 0.10	C= 0.20	C= 0.30	C= 0.70	C= 0.75	C= 0.80	C= 0.90	INDIV. 2.78AC	CUM. 2.78AC	INLET (min)	TIME IN PIPE	TOTAL	$i_{5\text{-year}}$ (mm/hr)	$i_{100\text{-year}}$ (mm/hr)	PEAK FLOW (L/s) IND	PEAK FLOW (L/s) TOTAL	CAP. (L/s)	LENGTH (m)	PIPE (mm)	SLOPE (%)	n	VEL. (m/s)	AVAIL. CAP. (%)
	MH 5					0.330			0.69	0.69	11.00													
MH 5	MH 6								0.00	2.95	16.05			80.30		**236.89**	**236.89**							
									0.00	0.54	16.05	0.53	16.58		137.30	**74.14**	**311.03**	**389.64**	42.06	600	0.37	0.013	1.34	20.18%
	MH 6					0.570			1.19	1.19	11.50													
MH 6	MH 7				0.120				0.23	4.37	16.58			78.80		**344.36**	**344.36**							
									0.00	0.54	16.58	0.32	16.90	78.80	134.70	**72.74**	**417.09**	**488.33**	25.46	675	0.31	0.013	1.32	14.59%
MH 12	MH 7				0.090				0.18	0.18	10.00	0.31	10.31	104.20		**18.76**	**18.76**	**172.61**	27.98	375	0.89	0.013	1.51	89.13%
PARK	MH 7	0.360							0.10	0.10	10.00	0.21	10.21	104.20		**10.42**	**10.42**	**62.02**	15.60	250	1.00	0.013	1.22	83.20%
MH 7	MH 8				0.120				0.23	4.88	16.90			77.90		**380.15**	**380.15**							
									0.00	0.54	16.90	0.37	17.27		133.10	**71.87**	**452.03**	**580.53**	27.87	750	0.25	0.013	1.27	22.14%
	MH 8					0.610			1.27	1.27	11.50													
MH 8	MH 9								0.00	6.15	17.27			76.90		**472.94**	**472.94**							
									0.00	0.54	17.27	0.23	17.50		131.40	**70.96**	**543.89**	**706.40**	21.72	750	0.37	0.013	1.55	23.01%
MH 9	MH 20				0.060				0.12	6.27	17.50			76.30		**478.40**	**478.40**							
									0.00	0.54	17.50	0.58	18.08		130.30	**70.36**	**548.76**	**819.98**	51.50	825	0.30	0.013	1.49	33.08%
CB 10	MH 101				0.100				0.19	0.19	10.00	0.15	10.15	104.20		**19.80**	**19.80**	**72.58**	20.33	200	4.50	0.013	2.24	72.72%
CB 102	MH 101				0.130				0.25	0.25	10.00	0.10	10.10	104.20		**26.05**	**26.05**	**83.80**	16.02	200	6.00	0.013	2.58	68.91%
MH 101	MH 20								0.00	0.44	10.10	0.27	10.37	103.70		**45.63**	**45.63**	**100.91**	22.15	300	1.00	0.013	1.38	54.78%
MH 20	MH 10				0.130				0.25	6.96	18.08			74.80		**520.61**	**520.61**							
									0.00	0.54	18.08	0.45	18.53		127.70	**68.96**	**589.57**	**819.98**	40.50	825	0.30	0.013	1.49	28.10%
MH 10	MH 11								0.00	6.96	18.53			73.60		**512.26**	**512.26**							
									0.00	0.54	18.53	0.08	18.61		125.80	**67.93**	**580.19**	**1,527.39**	12.48	825	1.04	0.013	2.77	62.01%
MH 11	MH 13								0.00	6.96	18.61			73.50		**511.56**	**511.56**	**0.00**						
									0.00	0.54	18.61	0.28	18.89		125.50	**67.77**	**579.33**	**1,037.39**	32.06	825	0.48	0.013	1.88	44.16%
MH 13	MH 14								0.00	6.96	18.89			72.80		**506.69**	**506.69**							
									0.00	0.54	18.89	0.43	19.32		124.30	**67.12**	**573.81**	**886.20**	41.69	825	0.35	0.013	1.61	35.25%
CB 21	MH 200				0.140				0.27	0.27	10.00	0.34	10.34	104.20		**28.13**	**28.13**	**34.21**	21.47	200	1.00	0.013	1.06	17.77%
ECB 1	MH 200			0.020					0.02	0.02	10.00	0.10	10.10	104.20		**2.08**	**2.08**	**62.02**	7.29	250	1.00	0.013	1.22	96.64%
RYCB 22	MH 200			0.070					0.06	0.06	15.00	0.24	15.24	83.60		**5.02**	**5.02**	**34.21**	14.99	200	1.00	0.013	1.06	85.34%
GAR 5	MH 200								0.00	0.00	10.00			104.20		**0.00**	**0.00**							
							0.030		0.07	0.07	10.00	0.03	10.03		178.60	**12.50**	**12.50**	**34.21**	2.10	200	1.00	0.013	1.06	63.46%

Q = 2.78AIC, where:
Q = Peak Flow in Litres per Second (l/s)
A = Area in Hectares (ha.)
I = Rainfall Intensity in Millimeters per Hour (mm/hr)

I=998.071/(TC+6.053)^0.814

IBI Group
400 - 333 Preston Street
Ottawa, ON
K1S 5N4

STORM SEWER DESIGN SHEET

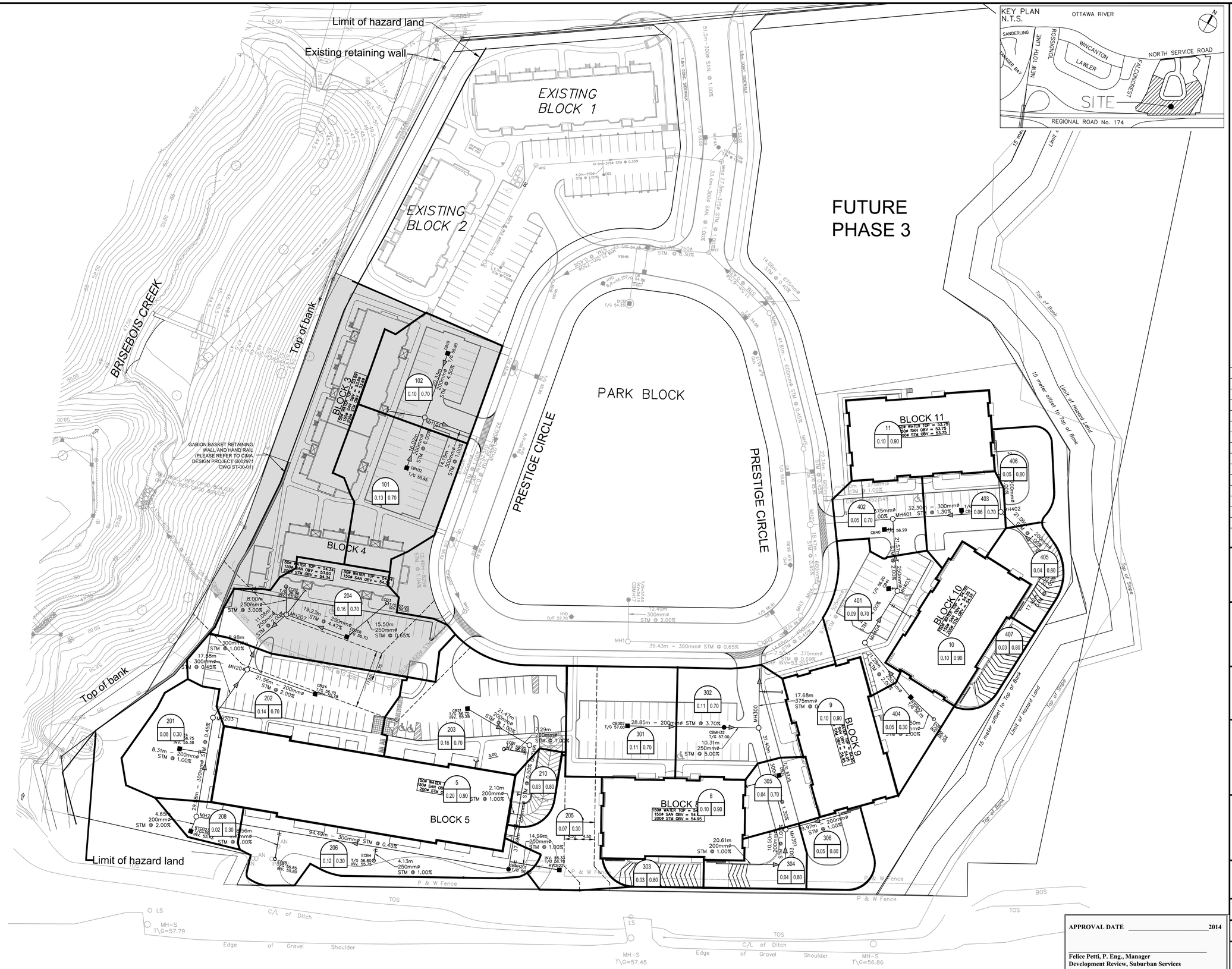
PROJECT: PETRIE'S LANDING II - PHASE 2
LOCATION: CITY OF OTTAWA
DEVELOPER: BRIGIL PLATINUM

JOB: 31464.5.7
DATE: 2013-11-28
DESIGN: RPK

		AREA (Ha)									DESIGN FLOW							SEWER DATA						
FROM MH	TO MH	C= 0.10	C= 0.20	C= 0.30	C= 0.70	C= 0.75	C= 0.80	C= 0.90	INDIV. 2.78AC	CUM. 2.78AC	INLET (min)	TIME IN PIPE	TOTAL	$i_{5\text{-year}}$ (mm/hr)	$i_{100\text{-year}}$ (mm/hr)	PEAK FLOW (L/s) IND	PEAK FLOW (L/s) TOTAL	CAP. (L/s)	LENGTH (m)	PIPE (mm)	SLOPE (%)	n	VEL. (m/s)	AVAIL. CAP. (%)
MH 200	CBMH 201								*0.00*	0.35	15.24			82.80		**28.98**	**28.98**							
									0.00	0.07	15.24	0.72	15.96		141.60	**9.91**	**38.89**	**43.88**	37.59	250	0.50	0.013	0.87	11.37%
CBMH 201	MH 202								*0.00*	0.35	15.96			80.60		**28.21**	**28.21**							
				0.120					*0.10*	0.17	15.96	1.70	17.66		137.80	**23.43**	**51.64**	**67.64**	94.49	300	0.45	0.013	0.93	23.66%
RYCB 23	MH 202			0.020					*0.02*	0.02	15.00	0.05	15.05	83.60		**1.67**	**1.67**	**48.38**	4.65	200	2.00	0.013	1.49	96.54%
RYCB 24	MH 202			0.080					*0.07*	0.07	15.00	0.13	15.13	83.60		**5.85**	**5.85**	**34.21**	8.31	200	1.00	0.013	1.06	82.90%
MH 202	MH 203								*0.00*	0.44	17.66			75.80		**33.35**	**33.35**							
									0.00	0.17	17.66	0.54	18.20		129.60	**22.03**	**55.38**	**67.64**	29.98	300	0.45	0.013	0.93	18.12%
MH 203	MH 204								*0.00*	0.44	18.20			74.50		**32.78**	**32.78**							
									0.00	0.17	18.20	0.32	18.51		127.20	**21.62**	**54.40**	**67.64**	17.58	300	0.45	0.013	0.93	19.57%
CB 24	MH 204				0.140				*0.27*	0.27	10.00	0.24	10.24	104.20		**28.13**	**28.13**	**48.38**	21.56	200	2.00	0.013	1.49	41.85%
MH 204	*MH 14*								*0.00*	0.71	18.51			73.70		**52.33**	**52.33**							
									0.00	0.17	18.51	0.11	18.62		125.90	**21.40**	**73.73**	**100.91**	8.98	300	1.00	0.013	1.38	26.94%
CB 206	MH 207				0.210				*0.41*	0.41	10.00	0.14	10.14	104.20		**42.72**	**42.72**	**72.35**	19.23	200	4.47	0.013	2.23	40.95%
MH 207	*MH 14*								*0.00*	0.41	10.14	0.11	10.25	103.40		**42.39**	**42.39**	**87.71**	11.08	250	2.00	0.013	1.73	51.67%
MH 14	*MH 15*								*0.00*	*8.08*	*19.32*			*71.80*		***580.14***	***580.14***							
									0.00	*0.71*	*19.32*	*0.18*	*19.50*		122.60	***87.05***	***667.19***	***1,519.67***	*29.14*	*825*	*1.03*	*0.013*	*2.75*	56.10%
MH 15	*HW*								*0.00*	*8.08*	*19.50*			*71.40*		***576.91***	***576.91***							
									0.00	*0.71*	*19.50*	*0.18*	*19.68*		121.90	***86.55***	***663.46***	***1,519.67***	*29.14*	*825*	*1.03*	*0.013*	*2.75*	56.34%
		0.360	**0.270**	**0.360**	**1.910**	**1.510**	**0.270**	**0.400**		**9.02**														

Q = 2.78AIC, where:
Q = Peak Flow in Litres per Second (l/s)
A = Area in Hectares (ha.)
I = Rainfall Intensity in Millimeters per Hour (mm/hr)

I=998.071/(TC+6.053)^0.814



LEGEND :

406 | 0.03 | 0.80 — AREA IDENTIFICATION; RUNOFF COEFFICIENT; AREA IN HECTARES

MAJOR FLOW ROUTE

MINOR FLOW ROUTE

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8	REVISED PER CITY COMMENTS	RPK	14: 02: 06
7	REVISED PER CITY COMMENTS	RPK	13: 11: 26
6	REVISED BLOCK 5	RPK	13: 08: 19
5	RE-ISSUED FOR SITE PLAN APPROVAL	TRB	12: 11: 19
4	RE-ISSUED FOR SITE PLAN APPROVAL	RPK	12: 10: 19
3	RE-ISSUED FOR SITE PLAN APPROVAL	RPK	12: 08: 27
2	ISSUED FOR SITE PLAN APPROVAL	RPK	12: 04: 12
1	ISSUED FOR REVIEW	RPK	12: 03: 07

LE GROUPE BRIGIL CONSTRUCTION

IBI GROUP
333 Preston Street
Tower 1, Suite 400
Ottawa, Ontario
Canada K1S 5N4
Tel (613)225-1311
Fax (613)225-9868

Project Title

PETRIE'S LANDING II

PHASE 2

LICENSED PROFESSIONAL ENGINEER
R.P. KENNEDY
100086 ?04
2014/02/06
PROVINCE OF ONTARIO

Drawing Title

STORM DRAINAGE AREA PLAN

Scale: 1:500

Design	Date
RPK	FEB. 2012
Drawn: DD	Checked: TRB
Project No.: 31464	Drawing No.: 500

APPROVAL DATE _____ 2014

Felice Petti, P. Eng., Manager
Development Review, Suburban Services

11.1 Brisbois Creek

11.1.1 Quantity Control

On-site detention storages consisting of parking lot and rooftop storage for all future commercial/business park developments are required to ensure that capacities of culverts at Hwy. 17 and the North Service Road are not exceeded. The release rate for the on-site storage is the 5 year post-development peak flow which is 150 l/s/ha. The required storage volume for quantity control is 160 m^3/ha.

For mitigation of possible reductions in baseflows, roof drains should be discharged on grassed areas or into a drainage pit. Recharge of approximately two-thirds of the yearly average rainfall from roof areas would be sufficient to balance hard surface recharge loss. During the detailed design, however, the natural groundwater baseflow from the surficial sands should be verified to assess what ultimate mitigation measures, if any, are required.

11.1.2 Quality Control

The storage volume for quality control required in the valley upstream of the NSR is 5,300 m^3. Figure 11.2 gives the stage-storage characteristics of the existing valley.

The proposed pond will have a permanent pool about 1.2 m deep near the outlet. The active storage volume for quality control of 5,300 m^3 is available at elevation 47.3 m. The outlet of the quality control storage is to be sized to give a detention time of 72 hours in accordance with MNR's guidelines.

To avoid excessive velocities through the pond, a 1.8 m x 3.5 m bypass sewer as shown in Figures 11.3 and 11.4 or an increase in the cross-sectional area of the pond (Figures D3.3 and D3.4) is proposed. The preferred option will be determined at the detailed design stage.

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

PROJECT: Petrie's Landing II - 2
DATE: 2013-11-28
FILE: 31464.5.7
REV #: 4
DESIGNED BY: RPK
CHECKED BY: TRB

STORMWATER MANAGEMENT

Formulas and Descriptions

i_{5yr} = 1:5 year Intensity = $998.071 / (T_c+6.053)^{0.814}$
i_{10yr} = 1:10 year Intensity = $1174.184 / (T_c+6.014)^{0.816}$
i_{100yr} = 1:100 year Intensity = $1735.688 / (T_c+6.014)^{0.820}$
T_c = Time of Concentration (min)
C = Average Runoff Coefficient
A = Area (Ha)
Q = Flow = 2.78CiA (L/s)

Maximum Allowable Release Rate

Site Area

Area =	2.91 Ha

Restricted Flowrate (based on "Servicing Design Brief - Petrie's Landing II" 2010-03-15)

$Q_{restricted}$ =	361.87 L/s

Uncontrolled Release (Q = 2.78CiA)
C = 0.30
100-year design flow
T_c = 20 min
$A_{uncontrolled}$ = 0.55 Ha

$Q_{uncontrolled}$ =	55.02 L/s

Garage Ramps (Q = 2.78CiA)
C = 0.80
100-year design flow
T_c = 10 min
A_{garage} = 0.27 Ha

Q_{garage} =	107.22 L/s

Maximum Allowable Release Rate
$Q_{max\ allowable} = Q_{restricted} - Q_{uncontrolled} - Q_{garage}$

$Q_{max\ allowable}$ =	199.62 L/s

Total Proposed Release Rate
(not including $Q_{uncontrolled} + Q_{garage}$)

$Q_{proposed}$ =	155.00 L/s

MODIFIED RATIONAL METHOD (100-Year & 5-Year Ponding)

Drainage Area	***101***
Area (Ha)	0.130
C =	0.70

Restricted Flow Q_r (L/s)= 12.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
10	178.56	45.17	12.00	33.17	19.90	2.5	173.95	44.01	12.00	32.01	4.80	
15	142.89	36.15	12.00	24.15	21.73	5	141.18	35.72	12.00	23.72	7.11	
20	119.95	30.35	12.00	18.35	22.01	7.5	119.59	30.25	12.00	18.25	8.21	
25	103.85	26.27	12.00	14.27	**21.41**	10	104.19	26.36	12.00	14.36	**8.62**	**Required Storage**
30	91.87	23.24	12.00	11.24	20.23	12.5	92.61	23.43	12.00	11.43	8.57	
35	82.58	20.89	12.00	8.89	18.67	15	83.56	21.14	12.00	9.14	8.22	
40	75.15	19.01	12.00	7.01	16.82	17.5	76.26	19.29	12.00	7.29	7.66	
45	69.05	17.47	12.00	5.47	14.76	20	70.25	17.77	12.00	5.77	6.93	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	21.41	31.74	0.00	overflows to Area 102

Drainage Area	***102***
Area (ha)	0.100
C =	0.70

Restricted Flow Q_r (L/s)= 12.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
0	398.62	77.57	12.00	65.57	0.00	0	230.48	44.85	12.00	32.85	0.00	
5	242.70	47.23	12.00	35.23	10.57	2.5	173.95	33.85	12.00	21.85	3.28	
10	178.56	34.75	12.00	22.75	13.65	5	141.18	27.47	12.00	15.47	4.64	
15	142.89	27.81	12.00	15.81	**14.23**	7.5	119.59	23.27	12.00	11.27	**5.07**	**Required Storage**
20	119.95	23.34	12.00	11.34	13.61	10	104.19	20.28	12.00	8.28	4.97	
25	103.85	20.21	12.00	8.21	12.31	12.5	92.61	18.02	12.00	6.02	4.52	
30	91.87	17.88	12.00	5.88	10.58	15	83.56	16.26	12.00	4.26	3.83	
35	82.58	16.07	12.00	4.07	8.55	17.5	76.26	14.84	12.00	2.84	2.98	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	14.23	38.79	0.00	overflows to Prestige Circle

Drainage Area	***201***
Area (Ha)	0.080
C =	0.30

Restricted Flow Q_r (L/s)= 6.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
7	211.67	14.12	6.00	8.12	3.41	2	182.69	12.19	6.00	6.19	0.74	
8	199.20	13.29	6.00	7.29	3.50	3	166.09	11.08	6.00	5.08	0.91	
9	188.25	12.56	6.00	6.56	3.54	4	152.51	10.18	6.00	4.18	1.00	
10	178.56	11.91	6.00	5.91	**3.55**	5	141.18	9.42	6.00	3.42	**1.03**	**Required Storage**
11	169.91	11.34	6.00	5.34	3.52	6	131.57	8.78	6.00	2.78	1.00	
12	162.13	10.82	6.00	4.82	3.47	7	123.30	8.23	6.00	2.23	0.94	
13	155.11	10.35	6.00	4.35	3.39	8	116.11	7.75	6.00	1.75	0.84	
14	148.72	9.92	6.00	3.92	3.30	9	109.79	7.33	6.00	1.33	0.72	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	3.55	27.91	0.00	overflows to Brisebois Creek

Drainage Area	**202**
Area (ha)	0.140
C =	0.70

Restricted Flow Q_r (L/s)= 15.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
0	398.62	108.60	15.00	93.60	0.00	6	131.57	35.84	15.00	20.84	7.50	
5	242.70	66.12	15.00	51.12	15.34	7	123.30	33.59	15.00	18.59	7.81	
10	178.56	48.65	15.00	33.65	20.19	8	116.11	31.63	15.00	16.63	7.98	
15	142.89	38.93	15.00	23.93	**21.54**	9	109.79	29.91	15.00	14.91	**8.05**	**Required Storage**
20	119.95	32.68	15.00	17.68	21.22	10	104.19	28.39	15.00	13.39	8.03	
25	103.85	28.29	15.00	13.29	19.94	11	99.19	27.02	15.00	12.02	7.94	
30	91.87	25.03	15.00	10.03	18.05	12	94.70	25.80	15.00	10.80	7.78	
35	82.58	22.50	15.00	7.50	15.75	13	90.63	24.69	15.00	9.69	7.56	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	21.54	82.61	0.00	overflows to Area 203

Drainage Area	**203**
Area (ha)	0.160
C =	0.70

Restricted Flow Q_r (L/s)= 15.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
5	242.70	75.57	15.00	60.57	18.17	2.5	173.95	54.16	15.00	39.16	5.87	
10	178.56	55.60	15.00	40.60	24.36	5	141.18	43.96	15.00	28.96	8.69	
15	142.89	44.49	15.00	29.49	26.54	7.5	119.59	37.23	15.00	22.23	10.01	
20	119.95	37.35	15.00	22.35	**26.82**	10	104.19	32.44	15.00	17.44	**10.46**	**Required Storage**
25	103.85	32.33	15.00	17.33	26.00	12.5	92.61	28.84	15.00	13.84	10.38	
30	91.87	28.60	15.00	13.60	24.49	15	83.56	26.02	15.00	11.02	9.91	
35	82.58	25.71	15.00	10.71	22.49	17.5	76.26	23.75	15.00	8.75	9.18	
40	75.15	23.40	15.00	8.40	20.15	20	70.25	21.87	15.00	6.87	8.25	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	26.82	67.07	0.00	overflows to Prestige Circle

Drainage Area	**204**
Area (ha)	0.160
C =	0.70

Restricted Flow Q_r (L/s)= 15.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
5	242.70	75.57	15.00	60.57	18.17	8	116.11	36.15	15.00	21.15	10.15	
10	178.56	55.60	15.00	40.60	24.36	9	109.79	34.19	15.00	19.19	10.36	
15	142.89	44.49	15.00	29.49	26.54	10	104.19	32.44	15.00	17.44	10.46	
20	119.95	37.35	15.00	22.35	**26.82**	11	99.19	30.88	15.00	15.88	**10.48**	**Required Storage**
25	103.85	32.33	15.00	17.33	26.00	12	94.70	29.48	15.00	14.48	10.43	
30	91.87	28.60	15.00	13.60	24.49	13	90.63	28.22	15.00	13.22	10.31	
35	82.58	25.71	15.00	10.71	22.49	14	86.93	27.07	15.00	12.07	10.14	
40	75.15	23.40	15.00	8.40	20.15	15	83.56	26.02	15.00	11.02	9.91	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	26.82	102.49	0.00	overflows to Prestige Circle

Drainage Area	205
Area (ha)	0.070
C =	0.30

Restricted Flow Q_r (L/s)= 6.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
5	242.70	14.17	6.00	8.17	2.45	1	203.51	11.88	6.00	5.88	0.35	
6	226.01	13.19	6.00	7.19	2.59	2	182.69	10.67	6.00	4.67	0.56	
7	211.67	12.36	6.00	6.36	2.67	3	166.09	9.70	6.00	3.70	0.67	
8	199.20	11.63	6.00	5.63	**2.70**	4	152.51	8.90	6.00	2.90	**0.70**	**Required Storage**
9	188.25	10.99	6.00	4.99	2.69	5	141.18	8.24	6.00	2.24	0.67	
10	178.56	10.42	6.00	4.42	2.65	6	131.57	7.68	6.00	1.68	0.61	
11	169.91	9.92	6.00	3.92	2.59	7	123.30	7.20	6.00	1.20	0.50	
12	162.13	9.47	6.00	3.47	2.50	8	116.11	6.78	6.00	0.78	0.37	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	2.70	4.26	0.00	overflows to ditch

Drainage Area	206
Area (ha)	0.120
C =	0.30

Restricted Flow Q_r (L/s)= 17.87 *

**** 100-year unrestricted flow collected rear yard perforated pipe network***

Drainage Area	208
Area (ha)	0.020
C =	0.30

Restricted Flow Q_r (L/s)= 6.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
0	398.62	6.65	6.00	0.65	**0.00**	0	230.48	3.84	6.00	-2.16	**0.00**	**Required Storage**
1	351.38	5.86	6.00	-0.14	-0.01	1	203.51	3.39	6.00	-2.61	-0.16	
2	315.00	5.25	6.00	-0.75	-0.09	2	182.69	3.05	6.00	-2.95	-0.35	
3	286.05	4.77	6.00	-1.23	-0.22	3	166.09	2.77	6.00	-3.23	-0.58	
4	262.41	4.38	6.00	-1.62	-0.39	4	152.51	2.54	6.00	-3.46	-0.83	
5	242.70	4.05	6.00	-1.95	-0.59	5	141.18	2.35	6.00	-3.65	-1.09	
6	226.01	3.77	6.00	-2.23	-0.80	6	131.57	2.19	6.00	-3.81	-1.37	
7	211.67	3.53	6.00	-2.47	-1.04	7	123.30	2.06	6.00	-3.94	-1.66	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	0.00	4.41	0.00	overflows to ditch

Drainage Area	**305**
Area (ha)	0.040
C =	0.70

Restricted Flow Q_r (L/s)= 6.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
5	242.70	18.89	6.00	12.89	3.87	3	166.09	12.93	6.00	6.93	1.25	
7.5	205.22	15.97	6.00	9.97	4.49	4	152.51	11.87	6.00	5.87	1.41	
10	178.56	13.90	6.00	7.90	4.74	5	141.18	10.99	6.00	4.99	1.50	
12.5	158.53	12.34	6.00	6.34	**4.76**	6	131.57	10.24	6.00	4.24	**1.53**	**Required Storage**
15	142.89	11.12	6.00	5.12	4.61	7	123.30	9.60	6.00	3.60	1.51	
17.5	130.31	10.14	6.00	4.14	4.35	8	116.11	9.04	6.00	3.04	1.46	
20	119.95	9.34	6.00	3.34	4.00	9	109.79	8.55	6.00	2.55	1.38	
22.5	111.26	8.66	6.00	2.66	3.59	10	104.19	8.11	6.00	2.11	1.27	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	4.76	24.70	0.00	overflows to Area 302

Drainage Area	**302**
Area (ha)	0.220
C =	0.70

Restricted Flow Q_r (L/s)= 20.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
5	242.70	103.91	20.00	83.91	25.17	8	116.11	49.71	20.00	29.71	14.26	
10	178.56	76.44	20.00	56.44	33.87	9	109.79	47.00	20.00	27.00	14.58	
15	142.89	61.18	20.00	41.18	37.06	10	104.19	44.61	20.00	24.61	14.76	
20	119.95	51.35	20.00	31.35	**37.62**	11	99.19	42.47	20.00	22.47	**14.83**	**Required Storage**
25	103.85	44.46	20.00	24.46	36.69	12	94.70	40.54	20.00	20.54	14.79	
30	91.87	39.33	20.00	19.33	34.80	13	90.63	38.80	20.00	18.80	14.66	
35	82.58	35.35	20.00	15.35	32.24	14	86.93	37.22	20.00	17.22	14.46	
40	75.15	32.17	20.00	12.17	29.21	15	83.56	35.77	20.00	15.77	14.20	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	37.62	148.18	0.00	overflows to Prestige Circle

Drainage Area	**401**
Area (ha)	0.090
C =	0.70

Restricted Flow Q_r (L/s)= 12.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
0	398.62	69.81	12.00	57.81	0.00	0	230.48	40.37	12.00	28.37	0.00	
5	242.70	42.51	12.00	30.51	9.15	2.5	173.95	30.47	12.00	18.47	2.77	
10	178.56	31.27	12.00	19.27	11.56	5	141.18	24.73	12.00	12.73	3.82	
15	142.89	25.03	12.00	13.03	**11.72**	7.5	119.59	20.94	12.00	8.94	**4.03**	**Required Storage**
20	119.95	21.01	12.00	9.01	10.81	10	104.19	18.25	12.00	6.25	3.75	
25	103.85	18.19	12.00	6.19	9.28	12.5	92.61	16.22	12.00	4.22	3.17	
30	91.87	16.09	12.00	4.09	7.36	15	83.56	14.63	12.00	2.63	2.37	
35	82.58	14.46	12.00	2.46	5.17	17.5	76.26	13.36	12.00	1.36	1.42	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	11.72	24.95	0.00	overflows to Area 402

Drainage Area	**403**
Area (ha)	0.060
C =	0.70

Restricted Flow Q_r (L/s)= 12.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
0	398.62	46.54	12.00	34.54	0.00	1	203.51	23.76	12.00	11.76	0.71	
2.5	299.75	35.00	12.00	23.00	3.45	2	182.69	21.33	12.00	9.33	1.12	
5	242.70	28.34	12.00	16.34	4.90	3	166.09	19.39	12.00	7.39	1.33	
7.5	205.22	23.96	12.00	11.96	**5.38**	4	152.51	17.81	12.00	5.81	**1.39**	**Required Storage**
10	178.56	20.85	12.00	8.85	5.31	5	141.18	16.48	12.00	4.48	1.35	
12.5	158.53	18.51	12.00	6.51	4.88	6	131.57	15.36	12.00	3.36	1.21	
15	142.89	16.68	12.00	4.68	4.22	7	123.30	14.40	12.00	2.40	1.01	
17.5	130.31	15.22	12.00	3.22	3.38	8	116.11	13.56	12.00	1.56	0.75	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	5.38	24.95	0.00	overflows to Area 402

Drainage Area	**402**
Area (ha)	0.050
C =	0.70

Restricted Flow Q_r (L/s)= 12.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
0	398.62	38.79	12.00	26.79	0.00	0	230.48	22.43	12.00	10.43	0.00	
2.5	299.75	29.17	12.00	17.17	2.57	1	203.51	19.80	12.00	7.80	0.47	
5	242.70	23.62	12.00	11.62	3.48	2	182.69	17.78	12.00	5.78	0.69	
7.5	205.22	19.97	12.00	7.97	**3.59**	3	166.09	16.16	12.00	4.16	**0.75**	**Required Storage**
10	178.56	17.37	12.00	5.37	3.22	4	152.51	14.84	12.00	2.84	0.68	
12.5	158.53	15.43	12.00	3.43	2.57	5	141.18	13.74	12.00	1.74	0.52	
15	142.89	13.90	12.00	1.90	1.71	6	131.57	12.80	12.00	0.80	0.29	
17.5	130.31	12.68	12.00	0.68	0.71	7	123.30	12.00	12.00	0.00	0.00	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	3.59	24.96	0.00	overflows to Prestige Circle

Drainage Area	**404**
Area (ha)	0.050
C =	0.30

Restricted Flow Q_r (L/s)= 6.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
2	315.00	13.14	6.00	7.14	0.86	0	230.48	9.61	6.00	3.61	0.00	
3	286.05	11.93	6.00	5.93	1.07	1	203.51	8.49	6.00	2.49	0.15	
4	262.41	10.94	6.00	4.94	1.19	2	182.69	7.62	6.00	1.62	**0.19**	
5	242.70	10.12	6.00	4.12	**1.24**	3	166.09	6.93	6.00	0.93	0.17	**Required Storage**
6	226.01	9.42	6.00	3.42	1.23	4	152.51	6.36	6.00	0.36	0.09	
7	211.67	8.83	6.00	2.83	1.19	5	141.18	5.89	6.00	-0.11	-0.03	
8	199.20	8.31	6.00	2.31	1.11	6	131.57	5.49	6.00	-0.51	-0.18	
9	188.25	7.85	6.00	1.85	1.00	7	123.30	5.14	6.00	-0.86	-0.36	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	1.24	1.62	0.00	overflows to Creek

GARAGE RAMPS

Drainage Area	***210***		
Area (ha)	0.030		
C =	0.80	Restricted Flow Q_r (L/s)=	11.91 *

**** 100-year unrestricted flow collected by garage drain***

Drainage Area	***303***		
Area (ha)	0.030		
C =	0.80	Restricted Flow Q_r (L/s)=	11.91 *

**** 100-year unrestricted flow collected by garage drain***

Drainage Area	***304***		
Area (ha)	0.040		
C =	0.80	Restricted Flow Q_r (L/s)=	15.88 *

**** 100-year unrestricted flow collected by garage drain***

Drainage Area	***306***		
Area (ha)	0.050		
C =	0.80	Restricted Flow Q_r (L/s)=	19.86 *

**** 100-year unrestricted flow collected by garage drain***

Drainage Area	***405***		
Area (ha)	0.040		
C =	0.80	Restricted Flow Q_r (L/s)=	15.88 *

**** 100-year unrestricted flow collected by garage drain***

Drainage Area	***406***		
Area (ha)	0.050		
C =	0.80	Restricted Flow Q_r (L/s)=	19.86 *

**** 100-year unrestricted flow collected by garage drain***

Drainage Area	***407***		
Area (ha)	0.030		
C =	0.80	Restricted Flow Q_r (L/s)=	11.91 *

**** 100-year unrestricted flow collected by garage drain***

BUILDINGS

Building	***5***
Area (ha)	0.200
C =	0.90
Restricted Flow Q_r (L/s)=	20.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
5	242.70	121.45	20.00	101.45	30.43	5	141.18	70.65	20.00	50.65	15.19	
10	178.56	89.35	20.00	69.35	41.61	7.5	119.59	59.84	20.00	39.84	17.93	
15	142.89	71.50	20.00	51.50	46.35	10	104.19	52.14	20.00	32.14	19.28	
20	119.95	60.02	20.00	40.02	**48.03**	12.5	92.61	46.34	20.00	26.34	**19.76**	**Required Storage**
25	103.85	51.97	20.00	31.97	47.95	15	83.56	41.81	20.00	21.81	19.63	
30	91.87	45.97	20.00	25.97	46.75	17.5	76.26	38.16	20.00	18.16	19.07	
35	82.58	41.32	20.00	21.32	44.78	20	70.25	35.15	20.00	15.15	18.18	
40	75.15	37.60	20.00	17.60	42.25	22.5	65.20	32.63	20.00	12.63	17.05	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	48.03	375.00	0.00	controlled on roof

Building	***8***
Area (ha)	0.100
C =	0.90
Restricted Flow Q_r (L/s)=	10.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
5	242.70	60.72	10.00	50.72	15.22	5	141.18	35.32	10.00	25.32	7.60	
10	178.56	44.68	10.00	34.68	20.81	7.5	119.59	29.92	10.00	19.92	8.96	
15	142.89	35.75	10.00	25.75	23.18	10	104.19	26.07	10.00	16.07	9.64	
20	119.95	30.01	10.00	20.01	**24.01**	12.5	92.61	23.17	10.00	13.17	**9.88**	**Required Storage**
25	103.85	25.98	10.00	15.98	23.97	15	83.56	20.91	10.00	10.91	9.82	
30	91.87	22.99	10.00	12.99	23.37	17.5	76.26	19.08	10.00	9.08	9.54	
35	82.58	20.66	10.00	10.66	22.39	20	70.25	17.58	10.00	7.58	9.09	
40	75.15	18.80	10.00	8.80	21.12	22.5	65.20	16.31	10.00	6.31	8.52	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	24.01	168.75	0.00	controlled on roof

Building	***9***
Area (ha)	0.100
C =	0.90
Restricted Flow Q_r (L/s)=	10.00

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
5	242.70	60.72	10.00	50.72	15.22	5	141.18	35.32	10.00	25.32	7.60	
10	178.56	44.68	10.00	34.68	20.81	7.5	119.59	29.92	10.00	19.92	8.96	
15	142.89	35.75	10.00	25.75	23.18	10	104.19	26.07	10.00	16.07	9.64	
20	119.95	30.01	10.00	20.01	**24.01**	12.5	92.61	23.17	10.00	13.17	**9.88**	**Required Storage**
25	103.85	25.98	10.00	15.98	23.97	15	83.56	20.91	10.00	10.91	9.82	
30	91.87	22.99	10.00	12.99	23.37	17.5	76.26	19.08	10.00	9.08	9.54	
35	82.58	20.66	10.00	10.66	22.39	20	70.25	17.58	10.00	7.58	9.09	
40	75.15	18.80	10.00	8.80	21.12	22.5	65.20	16.31	10.00	6.31	8.52	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	24.01	168.75	0.00	controlled on roof

Building	10										
Area (ha)	0.100										
C =	0.90	Restricted Flow Q_r (L/s)=		10.00							

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
5	242.70	60.72	10.00	50.72	15.22	5	141.18	35.32	10.00	25.32	7.60	
10	178.56	44.68	10.00	34.68	20.81	7.5	119.59	29.92	10.00	19.92	8.96	
15	142.89	35.75	10.00	25.75	23.18	10	104.19	26.07	10.00	16.07	9.64	
20	119.95	30.01	10.00	20.01	**24.01**	12.5	92.61	23.17	10.00	13.17	**9.88**	**Required Storage**
25	103.85	25.98	10.00	15.98	23.97	15	83.56	20.91	10.00	10.91	9.82	
30	91.87	22.99	10.00	12.99	23.37	17.5	76.26	19.08	10.00	9.08	9.54	
35	82.58	20.66	10.00	10.66	22.39	20	70.25	17.58	10.00	7.58	9.09	
40	75.15	18.80	10.00	8.80	21.12	22.5	65.20	16.31	10.00	6.31	8.52	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	24.01	168.75	0.00	controlled on roof

Building	11										
Area (ha)	0.100										
C =	0.90	Restricted Flow Q_r (L/s)=		10.00							

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)	T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)	
5	242.70	60.72	10.00	50.72	15.22	5	141.18	35.32	10.00	25.32	7.60	
10	178.56	44.68	10.00	34.68	20.81	7.5	119.59	29.92	10.00	19.92	8.96	
15	142.89	35.75	10.00	25.75	23.18	10	104.19	26.07	10.00	16.07	9.64	
20	119.95	30.01	10.00	20.01	**24.01**	12.5	92.61	23.17	10.00	13.17	**9.88**	**Required Storage**
25	103.85	25.98	10.00	15.98	23.97	15	83.56	20.91	10.00	10.91	9.82	
30	91.87	22.99	10.00	12.99	23.37	17.5	76.26	19.08	10.00	9.08	9.54	
35	82.58	20.66	10.00	10.66	22.39	20	70.25	17.58	10.00	7.58	9.09	
40	75.15	18.80	10.00	8.80	21.12	22.5	65.20	16.31	10.00	6.31	8.52	

Storage (m^3)

Overflow	Required	Available	Balance	
0.00	24.01	168.75	0.00	controlled on roof

Appendix F PROPOSED SITE PLAN

KEY PLAN

SCALE: 1:5000

2
A100

LEGEND

PROPERTY LINE

BOUNDRY OF PHASES

NOTE 1:
– Exterior lighting fixtures from Keene Conlyte, model: Silhouette Roadway Luminaire Types: A: A2 and A3. Metal Halide (MA) 70W.
– To be installed on 18' poles (see plan for locations)

Informations herein as per Electrical Eng. preliminary documents. Please refer to annexe thechnical data sheets for further information.

Appendix A
PLZ Stage 2: RSAQ1490 Zoning Compliance Chart
Site Plan : 78 units - BLOCK 6, 140 Prestige Circle

Applicable sections from Bylaw 2008-250	Requirement	Provided
Assume that Prestige Circle is front lot line.		
Property area Phase 2		**20,006.0 m²**
Property area Block 6		**6,136.5 m²**
Table 164A - Apartment dwelling, low rise, Stacked		
Minimum Lot Width (m)	18.0	> 18.0 m
Minimum Lot Area (m²)	5400 m²	> 540 m²
Maximum Building Height (storeys) - exception R5A[1409]	30	4
Minimum Front Yard Setback (m)	6.0 m	> 6.0 m
Minimum Corner Yard Setback (m)	4.5 m	n.a. m
Minimum Interior Side Yard Setback (m)	3.0 m	> 3.0 m
Minimum Rear Yard Setback (m) - exception R5A[1409]	7.5 m	> 7.5 m
Minimum Setback from North Service Road (m) - exception R5A[1409]	100.0 m	n.a. m
Minimum distance between apartment dwellings under 7 storeys and OS1 zone (m)	7.5 m	> 7.5 m
Minimum required building spacing - exception R5A[1409]	3.0	> 3.0 m
Table 164A - IV Planed unit development		
Minimum Lot Width (m)	18.0	> 18.0 m
Minimum Lot Area (m²)	14000 m²	> 1400.0 m²
Maximum Building Height (storeys) - exception R5A[1409]	30	4
Minimum Front Yard Setback (m)	6.0 m	> 6.0 m
Minimum Corner Yard Setback (m)	4.5 m	n.a. m
Minimum Interior Side Yard Setback (m) *	3.0 m	> 3.0 m
Minimum Rear Yard Setback (m) - exception R5A[1409]	7.5 m	> 7.5 m
Minimum Setback from North Service Road (m) - exception R5A[1409]	100.0 m	n.a. m
Minimum distance between apartment dwellings under 7 storeys and OS1 zone (m)	7.5 m	> 7.5 m
Minimum required building spacing - exception R5A[1409]	3.0	> 3.0 m
* For a yard abutting a lot, the yard setback is 6 m from the front lot line/from a street lot line, in all other circumstances, the yard setback is 6 m. Notwithstanding the foregoing, for any yard adjacent to an apartment dwelling, mid-high rise and apartment dwelling, low rise or stacked dwelling within a planned unit development, the yard setback provisions for that use apply.		
Section 163(9)		
Minimum landscape area (% of site)	30.0%	47.2%
Section 101 and 102		
Minimum No. of parking spaces (total)	(ratio = 1.2) = 93	95
Minimum No. of visitor parking spaces (total)	(ratio = 0.2) = 16	16
Total Parking (visitor and residential)		111
Section 106		
Parking space width (m) per section 106 (3)(a)ii - applicable to 50% of resident spaces	2.4 min	2.4 min
Parking space width (m)	2.6 min 2.75 max	2.6
Minimum parking space depth (m)	5.2	5.2
Section 107		
Driveway access - min width (m) one way	3.0 m	n.a. m
Driveway access - min width (m) two way	6.7 m	6.7 m
Section 110		
Minimum landscape area of parking lot (15%)	15 %	34.1%
Minimum landscape buffer width of parking lot not abutting street (m)	3.0 m	3.0 m
- 1.5 if fewer than 100 spaces; 3 meters if more than 100 spaces	1.5/3 m	3.0 m
Minimum landscape buffer width of parking lot abutting street (m)	3.0 m	3.0 m
Section 111		
Bicycle Parking Space Requirement (Total)	(ratio =0.5) = 39	39
Section 131 (PUD)		
Min. width of private way- Table 131 (1)	6.0 m	6.0 m
Min. setback from any garage- Table 131 (2)	5.2 m	n.a. m
Min. setback for any garage Table 131 (3)	5.2 m	n.a. m
Min. sep distance between bldgs less than 7 storeys in height Table 131 (4)	1.2 m	n.a. m
Section 137		
Total amenity area in sq. m per unit (min 6m²/unit)	47m²	1054.5 m²
Communal amenity area: 50% of total required Total amenity area (in sq.m.) Total)	235² m²	270.6 m² rooftop terrace
Section 55 (Accessory Buildings)		
Min. Required Setback from an Int. Side Lot Line or Rear Lot Line not abutting a street		
- rear yard (m)	0.6 m	0.6 m

Appendix A
PLZ Stage 2: RSAQ1490 Zoning Compliance Chart
Site Plan : 112 units - BLOCK 8, 180 Prestige Circle

Applicable sections from Bylaw 2008-250	Requirement	Provided
Assume that Prestige Circle is front lot line.		
Property area Phase 3		**7,495.2 m²**
Property area Block 8		**7,495.2 m²**
Table 164A - Apartment dwelling, low rise, Stacked		
Minimum Lot Width (m)	18.0	> 18.0 m
Minimum Lot Area (m²)	5400 m²	> 540 m²
Maximum Building Height (storeys) - exception R5A[1409]	30	4
Minimum Front Yard Setback (m)	6.0 m	> 6.0 m
Minimum Corner Yard Setback (m)	4.5 m	n.a. m
Minimum Interior Side Yard Setback (m)	3.0 m	> 3.0 m
Minimum Rear Yard Setback (m) - exception R5A[1409]	7.5 m	> 7.5 m
Minimum Setback from North Service Road (m) - exception R5A[1409]	100.0 m	> 100 m
Minimum distance between apartment dwellings under 7 storeys and OS1 zone (m)	7.5 m	> 7.5 m
Minimum required building spacing - exception R5A[1409]	3.0	> 3.0 m
Table 164A - IV Planed unit development		
Minimum Lot Width (m)	18.0	> 18.0 m
Minimum Lot Area (m²)	14000 m²	> 1400.0 m²
Maximum Building Height (storeys) - exception R5A[1409]	30	4
Minimum Front Yard Setback (m)	6.0 m	> 6.0 m
Minimum Corner Yard Setback (m)	4.5 m	> 4.5 m
Minimum Interior Side Yard Setback (m) *	3.0 m	> 3.0 m
Minimum Rear Yard Setback (m) - exception R5A[1409]	7.5 m	> 7.5 m
Minimum Setback from North Service Road (m) - exception R5A[1409]	100.0 m	> 100 m
Minimum distance between apartment dwellings under 7 storeys and OS1 zone (m)	7.5 m	> 7.5 m
Minimum required building spacing - exception R5A[1409]	3.0	> 3.0 m
* For a yard abutting a lot, the yard setback is 6 m from the front lot line/from a street lot line, in all other circumstances, the yard setback is 6 m. Notwithstanding the foregoing, for any yard adjacent to an apartment dwelling, mid-high rise and apartment dwelling, low rise or stacked dwelling within a planned unit development, the yard setback provisions for that use apply.		
Section 163(9)		
Minimum landscape area (% of site)	30.0%	52.6%
Section 101 and 102		
Minimum No. of parking spaces (total)	(ratio = 1.2) = 106	106
Minimum No. of visitor parking spaces (total)	(ratio = 0.2) = 18	18
Section 106		
Parking space width (m) per section 106 (3)(a)ii - applicable to 50% of resident spaces	2.4 min	2.4 min
Parking space width (m)	2.6 min 2.75 max	2.6
Minimum parking space depth (m)	5.2	5.2
Section 107		
Driveway access - min width (m) one way	3.0 m	n.a. m
Driveway access - min width (m) two way	6.7 m	6.7 m
Section 110		
Minimum landscape area of parking lot (15%)	15 %	37.6%
Minimum landscape buffer width of parking lot not abutting street (m)	3.0 m	3.0 m
- 1.5 if fewer than 100 spaces; 3 meters if more than 100 spaces	1.5/3 m	3.0 m
Minimum landscape buffer width of parking lot abutting street (m)	3.0 m	3.0 m
Section 111		
Bicycle Parking Space Requirement (Total)	(ratio =0.5) = 46	46
Section 131 (PUD)		
Min. width of private way- Table 131 (1)	6.0 m	6.0 m
Min. setback from any garage- Table 131 (2)	5.2 m	n.a. m
Min. setback for any garage Table 131 (3)	5.2 m	n.a. m
Min. sep distance between bldgs less than 7 storeys in height Table 131 (4)	1.2 m	n.a. m
Section 137		
Total amenity area in sq. m per unit (min 6m²/unit)	552 m²	1187.1 m²
Communal amenity area: 50% of total required Total amenity area (in sq.m.) Total)	276 m²	336.4 m² common hangar and terrace
Section 55 (Accessory Buildings)		
Min. Required Setback from an Int. Side Lot Line or Rear Lot Line not abutting a street		
- rear yard (m)	0.6 m	0.6 m

Appendix A
PLZ Stage 2: RSAQ1490 Zoning Compliance Chart
Site Plan : 89 units - BLOCK 7, 160 Prestige Circle

Applicable sections from Bylaw 2008-250	Requirement	Provided
Assume that Prestige Circle is front lot line.		
Property area Phase 2		**20,006.0 m²**
Property area Block 7		**7,858.6 m²**
Table 164A - Apartment dwelling, low rise, Stacked		
Minimum Lot Width (m)	18.0	> 18.0 m
Minimum Lot Area (m²)	5400 m²	> 540 m²
Maximum Building Height (storeys) - exception R5A[1409]	30	4
Minimum Front Yard Setback (m)	6.0 m	> 6.0 m
Minimum Corner Yard Setback (m)	4.5 m	n.a. m
Minimum Interior Side Yard Setback (m)	3.0 m	> 3.0 m
Minimum Rear Yard Setback (m) - exception R5A[1409]	7.5 m	> 7.5 m
Minimum Setback from North Service Road (m) - exception R5A[1409]	100.0 m	n.a. m
Minimum distance between apartment dwellings under 7 storeys and OS1 zone (m)	7.5 m	> 7.5 m
Minimum required building spacing - exception R5A[1409]	3.0	> 3.0 m
Table 164A - IV Planed unit development		
Minimum Lot Width (m)	18.0	> 18.0 m
Minimum Lot Area (m²)	14000 m²	> 1400.0 m²
Maximum Building Height (storeys) - exception R5A[1409]	30	4
Minimum Front Yard Setback (m)	6.0 m	> 6.0 m
Minimum Corner Yard Setback (m)	4.5 m	> 4.5 m
Minimum Interior Side Yard Setback (m) *	3.0 m	> 3.0 m
Minimum Rear Yard Setback (m) - exception R5A[1409]	7.5 m	> 7.5 m
Minimum Setback from North Service Road (m) - exception R5A[1409]	100.0 m	> 100 m
Minimum distance between apartment dwellings under 7 storeys and OS1 zone (m)	7.5 m	> 7.5 m
Minimum required building spacing - exception R5A[1409]	3.0	> 3.0 m
* For a yard abutting a lot, the yard setback is 6 m from the front lot line/from a street lot line, in all other circumstances, the yard setback is 6 m. Notwithstanding the foregoing, for any yard adjacent to an apartment dwelling, mid-high rise and apartment dwelling, low rise or stacked dwelling within a planned unit development, the yard setback provisions for that use apply.		
Section 163(9)		
Minimum landscape area (% of site)	30.0%	52.6%
Section 101 and 102		
Minimum No. of parking spaces (total)	(ratio = 1.2) = 106	106
Minimum No. of visitor parking spaces (total)	(ratio = 0.2) = 18	18
Section 106		
Parking space width (m) per section 106 (3)(a)ii - applicable to 50% of resident spaces	2.4 min	2.4 min
Parking space width (m)	2.6 min 2.75 max	2.6
Minimum parking space depth (m)	5.2	5.2
Section 107		
Driveway access - min width (m) one way	3.0 m	n.a. m
Driveway access - min width (m) two way	6.7 m	6.7 m
Section 110		
Minimum landscape area of parking lot (15%)	15 %	37.6%
Minimum landscape buffer width of parking lot not abutting street (m)	3.0 m	3.0 m
- 1.5 if fewer than 100 spaces; 3 meters if more than 100 spaces	1.5/3 m	3.0 m
Minimum landscape buffer width of parking lot abutting street (m)	3.0 m	3.0 m
Section 111		
Bicycle Parking Space Requirement (Total)	(ratio =0.5) = 46	46
Section 131 (PUD)		
Min. width of private way- Table 131 (1)	6.0 m	6.0 m
Min. setback from any garage- Table 131 (2)	5.2 m	n.a. m
Min. setback for any garage Table 131 (3)	5.2 m	n.a. m
Min. sep distance between bldgs less than 7 storeys in height Table 131 (4)	1.2 m	n.a. m
Section 137		
Total amenity area in sq. m per unit (min 6m²/unit)	552 m²	1187.1 m²
Communal amenity area: 50% of total required Total amenity area (in sq.m.) Total)	276 m²	336.4 m² common hangar and terrace
Section 55 (Accessory Buildings)		
Min. Required Setback from an Int. Side Lot Line or Rear Lot Line not abutting a street		
- rear yard (m)	0.6 m	0.6 m

ENTIRE SITE STATISTICS - BRIGIL

UNIT STATISTICS		
Phase 1 - Block 1 & 2	40	
Phase 2 - Block 3 & 4	40	
Phase 2 - Block 5	76	
Phase 2 - Block 6	78	
Phase 2 - Block 7	89	
Phase 3 - Block 8	112	
TOTAL	435	Units
Area of Entire site m²	**42,834**	m²
Unit Density - Provided	**101.55**	units/ha
Unit Density - Minimum	**78.00**	units/ha
Unit Density - Maximum	**100.00**	units/ha

CAR PARKING / Ratio min 1:1.4	Requirement		Provided	
	Ratio	Qty.	Ratio	Qty.
Phase 1 - Block 1 & 2	1.40	56		58
Phase 2 - Block 3 & 4	1.40	56		68
Phase 2 - Block 5	1.20	106		130
Phase 2 - Block 6	1.20	94		97
Phase 2 - Block 7	1.20	125		137
Phase 3 - Block 8	1.20	157		152
TOTAL		643		

BIKE PARKING / Ratio 0.5 PHA SE 2	Requirement	Provided
Phase 2 - Block 3 & 4	20	21
Phase 2 - Block 5	39	39
Phase 2 - Block 6	39	39
Phase 2 - Block 7	45	45
Phase 3 - Block 8	56	56
TOTAL	199	200

Echelle/Scale 1:500

0 1 5 10 15 20 25 m
0 5 25 50 75 pi/ft

LEGEND
Bicycle parking
New fence
New stone retaining wall
Fire truck path

PROPERTY INFORMATION
PIN 14501-0695
PART OF BLOCK 2
REGISTERED PLAN 4M-1425
CITY OF OTTAWA
Surveyed by Annis, O'Sullivan, Vollebekk Ltd.

SITE PLAN

SCALE: 1:500

1
A100

I:\P_10400\10498.03(CAD)\049803_A100_Site_Plan.dwg

#15546

CITY OF OTTAWA FILE NUMBER: D07-12-17-0093

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ASSOCIATION OF ARCHITECTS ORDRE DES ARCHITECTES DU QUÉBEC LICENCE 6219

NEUF ARCHITECT(E)S

BRIGIL

CLIENT Client

OUVRAGE Project

PETRIE'S LANDING
BLOCK 6, 7 & 8

EMPLACEMENT Location
ORLEANS, ON

NO PROJET No.
10498.03

NO	RÉVISION	DATE (aa.mm.jj)
A	CITY VALIDATION	2016-12-15
B	Site plan revision	2017-03-27
C	Site Plan Application	2017-06-13
D	For client review	2017-09-20
E	Site plan control_1st review	2018-01-23
F	Site plan control_2nd review	2018-03-23
G	Issued for building permit	2018-06-01
H	Site Plan Application_3rd review	2018-06-06
J	Rev. angled parking & 3m setback	2018-07-16
K	Radius for parking island mod.	2018-07-17
L	Site Plan Application_4th review	2018-09-07
M	Site Plan_New Transformers	2018-11-14
1	Issued for construction Block 6	2019-03-19
2	Issued for foundation constr. Block 7	2019-10-08
3	Issued for Complete Construction BK7	2019-12-09
4	Parking added & table updated	2020-11-11

DESSINÉ PAR Drawn by
A.B.

VERIFIÉ PAR Checked by
ANT. C.

DATE (aa.mm.jj)
21.01.28

ÉCHELLE Scale
INDIQUÉE

TITRE DU DESSIN Drawing Title

Site Plan

RÉVISION Revision
4

NO. DESSIN Dwg Number
A100

Appendix G CITY COMMENTS AND RESPONSE LETTER

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue, Ottawa ON K2C 3G4

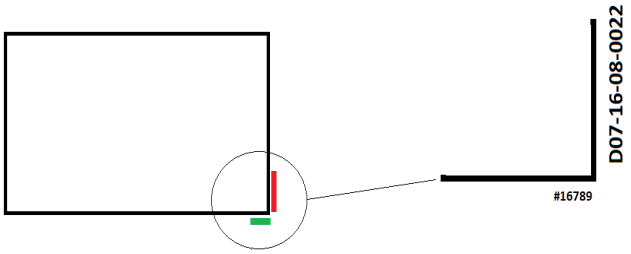
September 14, 2021
File: 160401479 / D07-12-19-0212

Attention: Will Curry
Project Manager
Development Review Branch

Reference: 2nd Consolidation of Engineering-Related Comments – 8466 Jeanne d'Arc Blvd N
Ward 1, Councillor Matthew Luloff

Please find below response to comments provided April 22, 2021

A0. General: Architect and Landscape Architect
A0.1 Place on all plans; DWG # and D07 # as per sample



Use **Bold Black text**:

Your Numbers are as per the colours listed here.
DWG **18062** (place number on the bottom right)
D07 Number **D07-12-19-0212**

- **R/ Plan and drawing numbers have been added to the engineering set.**

A. List of Drawing(s):
Site Plan, A-001, prepared by Neuf Architects, revision 5, dated April 15, 2021.

A1. Provide appropriate drawing number and D07 number on the plan. Yours are shown differently. Please revise

A2. Does the proposed Hydro Pads conflict with the proposed sidewalk? Is that what you are attempting to show? Why are they in colour? Please clarify/resolve.

A3. We are solely interested in Block 8 with the Site plan revision. You show an overall Site Plan for several blocks, not sure why. Maybe screen everything else down if you wish to retain this plan. Please review and revise for clarity.

A4. Does Block 8 have a Prestige address yet. If yes, then please place it on all plans instead of 8466 please revise

- **R/ The address has now been revised to 180 Prestige Circle.**

Reference: 2nd Consolidation of Engineering-Related Comments – 8466 Jeanne d'Arc Blvd N
Ward 1, Councillor Matthew Luloff

Site Plan Block 8, A100c, prepared by Neuf Architects, revision A, dated April 15, 2021.

A5. Provide appropriate drawing number and D07 number on the plan. Please revise

A6. Are the Hydro Pads proposed? If proposed they should be on Private property. Please clarify/resolve.

- **R/**

Notes and Legends, NL-1, prepared by Stantec Consulting Ltd., revision 1, dated March 24, 2021.

A7. Remove general Note 7. YOU NEVER provided a "Topographical Plan of Survey" even though it was required, and you also said you have provided it. Is it imbedded in some hidden rear corner of a report when it is supposed to be a full-size plan? Not found and still waiting. Note, a 4M Plan is something entirely different.

- **R/**

Site Servicing Plan, **SSP-1,** prepared by Stantec Consulting Ltd., revision 1, dated March 24, 2021.

A8. Provide a new plan without showing all the other blocks and street. Revise

- **R/ Plans have been revised to show Block 8 only with little overlap. Scale adjusted from 1:500 to 1:250.**

A9. Clearly your call out note says you are pumping Roof, Ramp, Parking Deck and the building footing. Do you have a proposed Cistern inside the building to hold this storm flow? Where is it and what volume can it hold? You will FLOOD otherwise. Revise.

- **R/ As discussed in the Stormwater management and Servicing report, stormwater storage will be achieved though surface ponding in the parking lot, subsurface storage in a storage pipe in the parking lot and roof top storage. No cistern is required for stormwater retention.**

A10. The existing Storm and Sanitary MHs on Prestige Circle have MH numeric identifiers. Please provide.

- **R/ Existing storm and sanitary MH's on Prestige Circle have numeric identifiers.**

A11. Your Notes: What are lower levels and upper levels for required PRVs?

- **R/ PRV is required as per OBC. Mechanical engineer to provide booster pumps if necessary to reach upper levels of the building.**

A12. RAMP: Your inside drainage may work if you have provided an oversized cistern. Not sure why you want to design this way when you could have a gravity outlet as per Sewer Detail S18 and S17. Reconsider please.

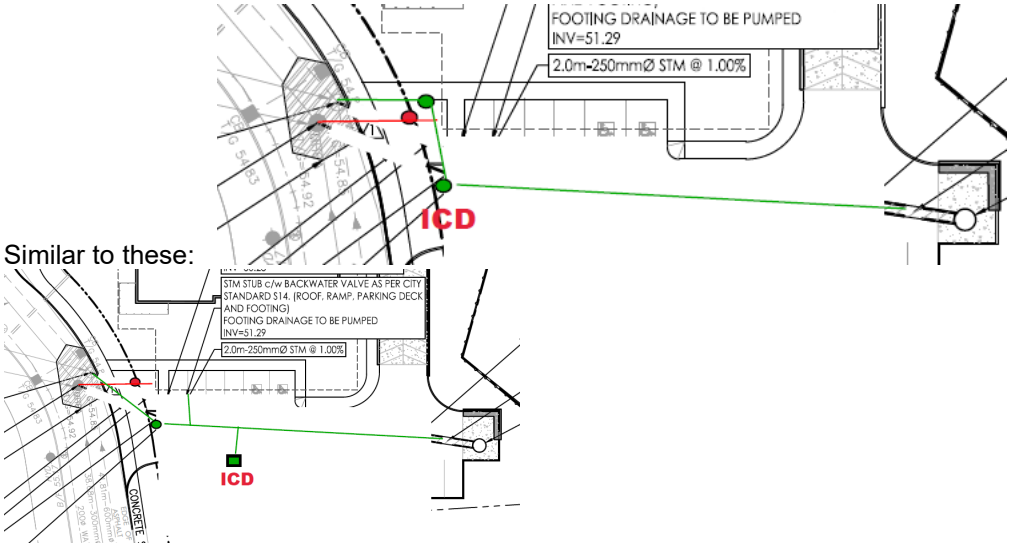
- **R/ Storm sewer elevations in the road are higher than the trench drain top of grate elevation. Pumping for some of the storm sewer system will be necessary. Trench drain to be designed to capture 100yr flows.**

Reference: 2nd Consolidation of Engineering-Related Comments – 8466 Jeanne d'Arc Blvd N
Ward 1, Councillor Matthew Luloff

A13. Why is the second submission worse than the first? Why do the stubs have to connect on that side of the building? Your sanitary and storm stubs are supposed to have 90 degrees angle or greater and not pinched as you show at the MH connection. Consider moving your new MHs to the Property line and shift them over to improve upon this angle. Also change where/how the stub connects to the building if that helps. Or connect into MH 7 and MH 7A on Prestige.

- **R/ Please see new storm and sanitary sewer alignment and connections.**

Similar to these:



Revise and provide a better configuration or provide new MHs on the mainline sewers.

- **R/ Please see revised storm and sanitary sewer alignment and connections.**

A14. Why is the Siamese connection so far from the watermain that enters the building? Clearly it is due the nearby Hydrant. This scenario is not ideal. Are you telling me that there is a water service that runs inside the building all the way from where you connect to the building all the way over to the Siamese connection, unmetered? The City deems this undesirable. Water Division staff will object to this. Info.

- **R/ See revised water servicing on SSP-1.**

A15. Your proposed Boss 2000, 900mm Ø is not an acceptable product as mainline sewer, MS-22.15. HDPE sewer is only acceptable as secondary sewer such as culvert or rear yard as per S29. 0% slope is not acceptable. Revise.

- **R/ The 900mm storage pipe has been removed.**

A16. What is the purpose of the 375mm Ø pipe between STM 1000 & STM 1002 if you only have 27.3 L/s going through it?

- **R/ The storm sewer sizes have been reduced.**

Reference: 2nd Consolidation of Engineering-Related Comments – 8466 Jeanne d'Arc Blvd N
Ward 1, Councillor Matthew Luloff

Grading Plan, GP-1, prepared by Stantec Consulting Ltd., revision 1, dated March 24, 2021

A17. You propose stairs in the ROW. You should keep all the stairs within the private parcel and a walkway only within the ROW. Revise.

- **R/ Revised, all stairs are out of the ROW.**

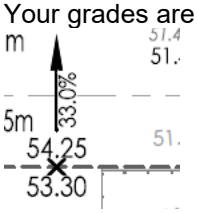
A18. Show the sidewalk along Prestige as proposed. Revise.

- **R/ Sidewalk is shown as proposed.**

A19. The Grading plan would be much more appreciated if it displayed the Block 8 and the immediate area only rather than the entire Prestige site. What is the purpose of showing previous blocks? This new submission is now significantly different than the previous and should be designed as Block 8 and not all the previous applications. Chane the drawing and also revise the scale as this will help with the drawing appearance. Revise.

- **R/ Drawing scale and size has been revised as requested.**

A20. Your grades are confusing along the underground Parking outline. Shown here.



What is the proposed elevation as they are both different for the same location. Revise please.

- **R/ Revised for clarity. The 2 different elevations were detailing a vertical face, one elevation of top of the garage deck and one at the grade below. Retaining walls have now been added in areas so the U/G parking structure will not be exposed.**

A21. Remove all Emergency overland Flow arrows that are shown spilling to Bellevue Creek. If you can't design this to spill to the ROW then the application will go on hold and remain on Hold indefinitely.

- **R/ The grading has been revised to direct more overland flow towards Prestige Circle, however there will still be emergency overland flow after the 100-year storm event to Bellevue Creek. Please note that the existing conditions directed all flow to the creek, whereas the proposed condition capture flows to the 100-year storm event and only spills emergency flows to Bellevue Creek.**

A22. The proposed Engineered major spill drainage to the Bellevue Creek is not permitted. This conflicts with the SDG and the RVCA Draft Plan of Subdivision approval conditions. Revise.

- **R/ Please see comment response above (A21).**

A23. You are **not** permitted to spill proposed major flows to the Bellevue Creek. Areas sloped and uncontrolled, will sheet flow there but you can't Design or Engineer to spill major flow

Reference: 2nd Consolidation of Engineering-Related Comments – 8466 Jeanne d'Arc Blvd N
Ward 1, Councillor Matthew Luloff

there. You are not permitted to introduce engineering whereby the result is your design creates and provides for a designated surface discharge to Bellevue Creek. Revise.

- **R/ Please see comment response above (A21).**

A24. Your CB Parking Deck with T/G of 55.00 and an adjacent spill point of 55.05 is not acceptable. You capture nothing because it spills immediately. You should demonstrate that you capture 100-year flow with elevations. Revise your grades.

- **R/ The grading has been revised to provide 10cm of depth allowing the water ample time to pool before spilling at the 54.03m elevation.**

A25. Retaining walls requires structural details stamped by structural P. Eng. Please provide with the next submission.

- **R/ Retaining walls have been designed by Paterson Group. Details can be provided with the next submission.**

Erosion Control Plan and Detail Sheet, EC/DS-1, prepared by Stantec Consulting Ltd., revision 1, dated March 24, 2021

A26. Please look at City Detail S19. This is the frame and cover on the CBs on Prestige Circle. The concrete CB is square, and the upper portion of the frame is round. If you have a round Terrafix Siltsack product you may use it the way you propose otherwise you need a different product to sit inside the upper portion of the round frame as shown on Detail S19. Please confirm you have a **round** Terrafix Siltsack first. Flex Storm has round 24 inch and would work. Review and revise please.

- **R/ Please see Flexstorm detail on drawing EC/DS-1, Item code P-RD-240-223-FX**

A27. You propose a Flexstorm inlet filter in CBMH 1001. City Detail S25 has an inside lip of 740 mm or 29.1 inches. Confirm that Flextorm has a product that size listed first. Review and revise please.

- **R/ Please see Flexstorm detail on drawing EC/DS-1, Item code P-RD-290-270-FX**

A28. Remove S19.1 from this sheet. Not an acceptable product and is only for broken replacement. Revise

- **R/ Revised**

A29. Detail SC1.1 has a newer version of 2021. Replace.

- **R/ Replaced**

A30. Detail SC1.4 has a newer version of 2021. Replace please.

- **R/ Replaced**

A31. Detail SC7.1 has a newer version of 2021. Replace.

- **R/ Replaced**

Reference: 2nd Consolidation of Engineering-Related Comments – 8466 Jeanne d'Arc Blvd N
Ward 1, Councillor Matthew Luloff

A32. OPSD detail should be added, OPSD 219.130 for the segment at the top of Bank. Provide a call out note on the plan for heavy Duty along that one side. Please revise.

- **R/ Revised. Please see detail and legend on drawing EC/DS-1**

Storm Drainage Plan, SD-1, prepared by Stantec Consulting Ltd., revision 1, dated March 24, 2021

A33. Why do you show all of Prestige Circle? Revise this plan with a better scale to Show Block 8 only.

- **R/ Revised**

Sanitary Drainage Plan, SAN-1, prepared by Stantec Consulting Ltd., revision 1, dated March 24, 2021

A34. Such a large DWG for just Block 8. Revise.

- **R/ Revised**

Landscape Plan, L1.01, prepared by Levstek Consultants Inc., revision 2, dated March 29, 2021

A34. You need to specify something between the 15-meter Offset to Top of Bank and the Limit of hazard land. That area will be destroyed by the Landscape Contractor planting trees on a 33% slope and the Civil Engineer plans to wash it all away with surface water. Provide something please, so it is stable and not all washed away.

- **R/**

B. List of Report(s):

Site Servicing & Storm Water Management Brief, prepared by Stantec Consulting Ltd., Project # 160401331, dated December 13, 2019

B1. Revise the report to reflect the requested changes made with drawings.

- **R/ The report has been revised.**

B2. 4.2 references the Appendixes. They are wrong appendixes

- **R/ Appendix B refers to all sanitary calculations and Appendix H references all the engineering drawings. Due to the size restrictions, the drawings (Appendix H) are not attached to the report and are submitted separately as individual PDF's which should be reviewed in conjunction with the servicing report.**

Reference: 2nd Consolidation of Engineering-Related Comments – 8466 Jeanne d'Arc Blvd N
Ward 1, Councillor Matthew Luloff

B3. Section 5.2: Revise your previously determine release rate for Block 8. Determine it now with this significantly changed application. Once you calculate the new Block 8 Release rate. When you determine what it is be sure to subtract UNC-1, F1002B, F1002A, then that will be your new Release Rate. Also, Max RR flow should match or be similar to the RR Tables on SSP-1 when added up.

- **R/ The target release rate for Block 8 was obtained through IBI's background study for Petrie's Landing II Phase 2 in 2014. Both controlled and uncontrolled flows have been included in the design and meet quality requirements. Tables in the drawings and report have been revised.**

B4. Section 5.2 does not have a SD-1 in Appendix E as you say for this block. Provide/revise.

- **R/ Reference has been revised.**

B5. 5.3.3 We are only concerned with Block 8. This block no longer conforms to the combined Blocks 6, 7 & 8 and should have its own separate information. You better explain the release rate and how it was derived for Block 8. Provide a small description here to say how it was determined.

- **R/ Please see response to B3.**

B6. Appendix D includes other Block Calculations. Where are the Calculations for Block 8 ONLY and the corresponding Area IDs as shown on Drawing SD-1? Revise.

- **R/ Storm calculations and design sheets have been included as part of Appendix C and background excerpts can be found in Appendix E.**

B7. 5.3.4 Appendix C is something else. Revise.

- **R/ Calculations for Block 8 have been revised and included in Appendix C.**

B8. Appendix D: Your storm design sheets are incomplete for Block 8. Remove Block 7. Area IDs do not match the plan. Also, is it STM 102 or STM 1002 as per the plans. Is it a 300mm or a 900mm as per the plans. Revise all.

- **R/ Revised.**

B9. Appendix D: Why do you still have Block 6 and Block 7 Report. It is no longer applicable with the latest Site Plan revision and is just confusing. Especially when looking for appendixes. Remove/Revise.

- **R/ The appendices in the last submission did not include storm calculations for just block 8 which caused confusion. The background report excerpts will still be included in Appendix E for reference.**

B10. Section 5.3.6: Table 5 and table 6 should be revised. Uncontrolled areas should be identified as uncontrolled and subtracted from the Site release Rate. Please revise.

- **R/ Both tables indicate the overall target release rate for Block 8 and subtract the uncontrolled flows to determine the remainder directed to the minor system.**

Reference: 2nd Consolidation of Engineering-Related Comments – 8466 Jeanne d'Arc Blvd N
Ward 1, Councillor Matthew Luloff

B11. Appendix G is empty.

- **R/ Please see response to question B2.**

B12. Section 8.0 says this is a Condominium. Please confirm with Brigil. I heard it was retained rentals. Revise.

- **R/ Wording has been revised.**

B13. Section 10.0 says the Geotech is in Appendix D. Not located in D. Revise.

- **R/ Reference have been revised.**

B14. 10.0 says the Geotech report is May 24, 2017. My Geotech report is July 30, 2019. Revise.

- **R/ Revised with the latest report.**

B15. 10.0 Table 8 does not match the Geotech recommendations. Revise.

- **R/ Geotechnical section has been revised.**
-

B16. Remove the Geotech from this report in the Appendixes.

- **R/ Excerpts of the report have been included for reference.**

B17. Remove the IBI report also. You can reference it by title if need be.

- **R/ Excerpts of the report have been included for reference.**

B18. Have Patterson provide a Memo indicating it is acceptable to exceed the Grade Raise Restriction. Please provide.

- **R/ Based on Paterson's review the grading plan is acceptable. The memo can be found in Appendix D**

B19. Revise your Stormwater Management calculations in Appendix C and the Design Sheets.

- **R/ Revised.**

Regards,

STANTEC CONSULTING LTD.

Mike Sharp
Civil Engineering Technologist
Phone: 613 784 2208
Fax: 613 722 2799
Design with community in mind

Reference: 2nd Consolidation of Engineering-Related Comments – 8466 Jeanne d'Arc Blvd N
Ward 1, Councillor Matthew Luloff

Mike.Sharp@stantec.com

Reference: Site Plan Control Approval Application – Response to 2nd Submission
9403434 Canada Inc. (Brigil)
8466 *Jeanne* **d'Arc Boulevard (180 Prestige Circle)**

- **R/**

j) *White Spruce*. It is recommended that white pine (Pinus strobus) or hemlock (Tsuga canadensis) be added or replace some of the white spruce to add more variety to the coniferous species.
- **R/**

k) *Seeding*. Consideration should be given to extending the seed mix along the entire rear of the site and removing the sod as proposed. This matter can be discussed further, if desired, with Sami Rehman (613-580-2424, ext. 13364; Sami.Rehman@ottawa.ca).
- **R/**

Review of Engineering Plans:

1. Please refer to the attached comprehensive Memorandum/Letter from William Curry, Infrastructure Project Manager, respecting his review of the engineering-related plans and reports. Please review the comments and address them accordingly. Should you have any questions or require clarification respecting the engineering-related plans and reports, please contact William Curry.
   - **R/ Noted**

2. In addition to the comments contained in the attached memorandum, please address the following comments received from the environmental planner, Sami Rehman.

a) The proposed grading impacts trees and their critical root zones (CRZ) in the setback area. The recommendations of the TCR to avoid grading, vegetation removal and use of heavy machinery is not reflected in or incorporated into the grading plan. The proposed grading should be adjusted to avoid impacts on the trees and their CRZ identified in Figure 4 of the TCR.
   - **R/ Fencing around East side of site has been adjusted as per TCR to avoid the CRZ of the existing trees.**

b) The plan does not illustrate the permanent turtle exclusion fencing, as outlined in the EIS (p.42). Please illustrate the location and extent of the fencing on the plan.
   - **R/ As discussed in the EIS report, in the interim the silt fence will act as a turtle exclusion barrier. Once construction is complete a chain link fence as detailed on the Landscape plans will provide a permanent barrier for turtle protection.**

Other City Department Comments:

The following and attached comments from other City department representatives who were requested to comment on the proposed site development are provide for your information and action where required.

1. Waste Collection Services. The City's Waste Collection Services staff provided the following comments.

Reference: Site Plan Control Approval Application – Response to 2nd Submission
9403434 Canada Inc. (Brigil)
8466 *Jeanne* **d'Arc Boulevard (180 Prestige Circle)**

- **R/**

a) The proposed site development would be entitled to municipal multi-residential collection service to a centralized garbage enclosure or room of sufficient size to store the garbage, recycling and organics.
   - **R/**

b) The following waste container specifications are what will be required to support the proposed 112-unit residential apartment development:
   - Garbage – 3 x 4-yard bins;
   - Fiber – 1 x 4-yard bin;
   - Glass/metal/plastic – 1 x 2-yard bin; and
   - Organics – 2 x 240L carts.
   - **R/**

c) Please ensure that the location, dimensions and specifications of the garbage enclosure or storage room is provided on the site plan. Waste Collection Services staff will need to review the revised on-site waste management solution.
   - **R/**

Technical Agency Comments:

A few of the external agencies that were circulated the revised zoning amendment and site plan control submissions provided further comments for your and City staff's consideration. The following and attached comments from the various technical agencies are provide for your information and action where required.

1. *Rideau Valley Conservation Authority (RVCA)*. The RVCA reviewed the Geotechnical Assessment - Slope Review - Block 8 by Paterson Group and had no objection to the proposed development based on the consultants' recommendations. The report is acceptable as submitted. Please see the attached letter.
   - **R/**

2. *Hydro One*. Hydro Ottawa submitted comments and concerns. Please see the attached e-mail correspondence for your review and immediate action.
   - **R/ Locates have been performed in the field and a topo pick up of the existing utilities has been added to the plans.**

3. *Bell Canada*. The original comments from February 2020 are offered again. The standard conditions of site plan control approval will apply. Please see the attached e-mail correspondence.
   - **R/**

4. *Zayo*. The original comments from February 2020 are offered again. No concerns or objections. Please see the attached e-mail correspondence.

Appendix H DRAWINGS