

File: 114827 - 5.2.2

DESIGN BRIEF WINGATE HOTEL 8600 CAMPEAU DRIVE OTTAWA, ON

Development Application File No. **D07-12-18-0034**



Prepared for BOREAL Hospitality Group.
by IBI Group
March 2018
July 2018

Table of Contents

1	INTRODUCTION	1
1.1	Scope	1
1.2	Subject Site	1
1.3	Previous Studies	1
1.4	Geotechnical Considerations	2
2	WATER DISTRIBUTION	3
2.1	Existing Conditions	3
2.2	Design Criteria	3
2.3	Hydraulic Analysis.....	3
2.4	Proposed Water Distribution Plan.....	4
3	WASTEWATER DISPOSAL	5
3.1	Existing Conditions	5
3.2	Proposed Site	5
3.3	Criteria.....	5
3.4	Sanitary Sewer Design	6
4	SITE STORMWATER MANAGEMENT	7
4.1	Existing Conditions	7
4.2	Design Criteria	7
4.2.1	Infiltration.....	7
4.3	Stormwater Management.....	8
4.4	Minor Storm Sewer Design Criteria	9
4.5	Onsite Detention	9
4.6	Quality Control	10
5	SEDIMENT AND EROSION CONTROL PLAN	11
6	CONCLUSION AND RECOMMENDATIONS	12

Table of Contents (Continued)

6.1	Conclusions	12
6.2	Recommendations	12

List of Figures

Figure 1	Key Plan
Figure 1A	Location Plan

List of Appendices

Appendix A	Watermain Boundary Condition Watermain Demand Calculation Sheet Fire Flow Calculations Building Area Confirmation Email Water Model Schematic and Results
Appendix B	KWBP Sanitary Sewer Design Sheet KWBP Sanitary Drainage Area Plan 14289-501 Sanitary Sewer Design Sheet Sanitary Drainage Area Plan 114289-400 Wingate Hotel Floor Plan
Appendix C	SWMHYMO Schematic XPSWMM Model Schematic Infiltration Calculations Impervious Length Calculations Ponding Plan & Storm Drainage Plan Storm Sewer Design Sheet Kanata West Business Park Storm Drainage Area Plan 14289-500 Tempest Flow Curves
Appendix D	Erosion and Sediment Control Plan Drawing No. 114827-C-900

Table of Contents (Continued)

Appendix E	Registered Plan of Subdivision 4M-1566 (KWBP Phase 1) Draft Plan of Subdivision (KWBP Phase 2)
Appendix F	Subdivision Design Drawing – Palladium Drive Subdivision Design Drawing – Campeau Drive
Appendix G	MOECC Confirmation Email Paterson Group Geotechnical Response Memo

1 INTRODUCTION

1.1 Scope

IBI Group has been retained by the Boreal Hospitality Group to prepare the necessary engineering plans, specifications and documents to support the development of the subject lands in accordance with the policies set out by the Planning and Development Branch of the City of Ottawa. The Design Brief is prepared in support of the overall Site Plan Application for the development. This Brief will present a detailed servicing scheme to support development of the property, and will include sections on water supply, wastewater management, minor and major stormwater management along with erosion and sediment control.

1.2 Subject Site

The Boreal Hospitality Group site is identified as block 1 of the Kanata West Business Park (KWBP) Phase 2 registration, in the Kanata West Community as shown on **Figure 1** and on the draft plan of subdivision located in **Appendix E**. The site plan application for the subject lands have been assigned application file number D07-12-18-0034. The KWBP Phase 2 registration is currently pending approval and will need to be completed prior to the City granting the subject lands site plan approval. It should be noted that prior to the Phase 2 registration, the subject lands were formerly known as block 23 in all previous KWBP draft plans of subdivision, additionally the previous draft block was approximately 0.20 Ha larger than the current block. The Boreal block is approximately 1.01 hectares in size and is bounded by Campeau Drive to the south, the Carpenter's Union block to the east, undeveloped land to the north and Palladium Drive to the west. The latest aerial photo showing the existing conditions are shown on **Figure 1A**. Detailed design drawings for the sections of Campeau Drive and Palladium Drive adjacent to the site, which have been constructed, are included in **Appendix F**.

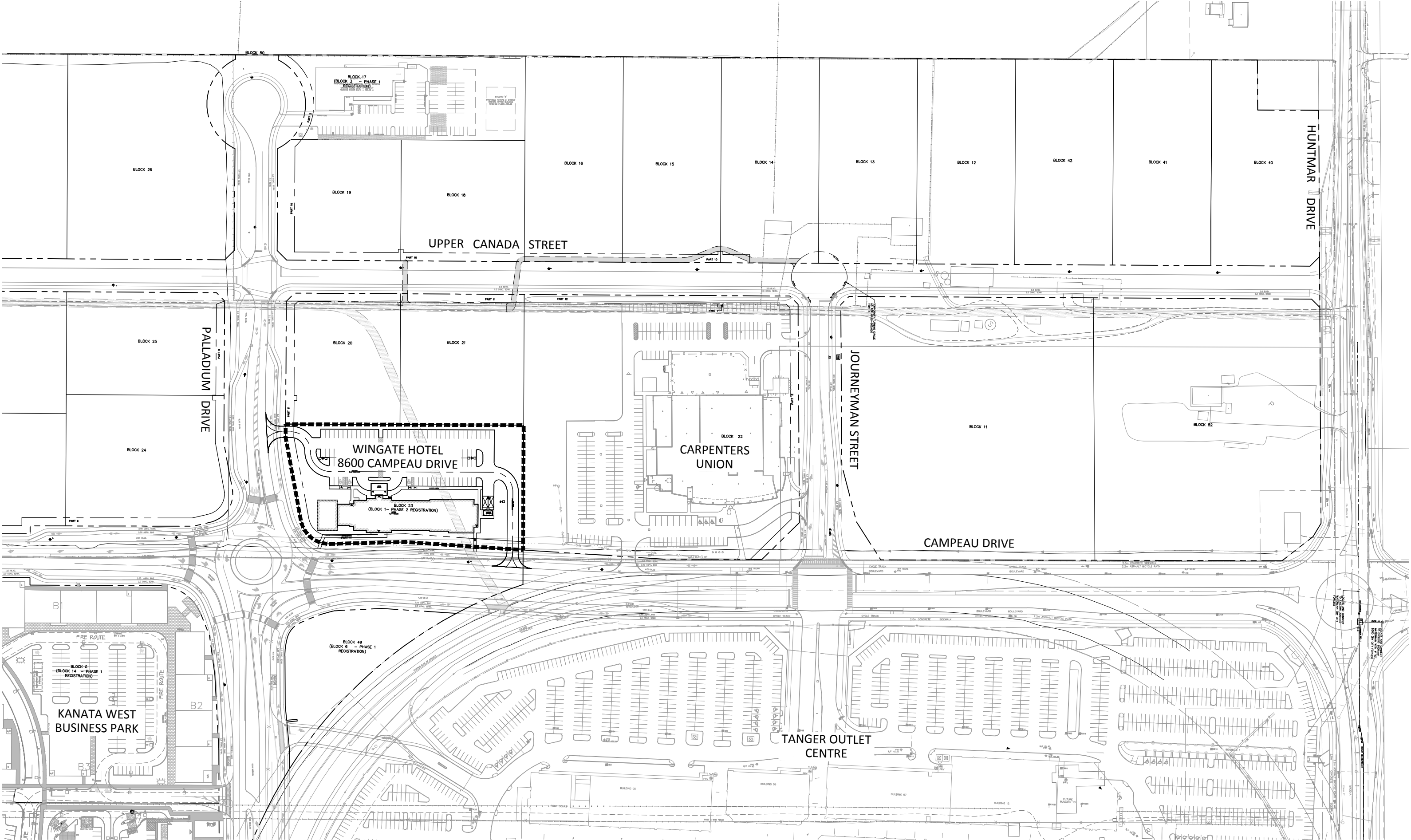
The proposed development will be made up of a 122 suite hotel and indoor pool along with associated parking and landscaped areas. The total building footprint is approximately 1,800 m².

1.3 Previous Studies

Design of this project has been undertaken in accordance with the following report:

- Design Brief, Kanata West Business Park, 333 Huntmar Drive, prepared by IBI Group, revised May 2018.
- Detail Design drawing set, Kanata West Business Park, 333 Huntmar Drive, prepared by IBI Group, latest revision dated May 31, 2018.

J:\114827_WingateHtl\5.9 Drawings\59civil\current\Figures\114827-Figure-1.dwg Layout Name: FIGURE 1 Plot Scale: 1:5.13 Plotted At: 8/1/2018 Last Saved By: James.Battison Last Saved At: Aug. 1, 18



j:\114827_Wingate\htl\5.9 Drawings\59civil\current\Figures\114827-Figure-1A.dwg Layout Name: FIGURE 1A



Project Title
WINGATE HOTEL

Drawing Title
EXISTING CONDITIONS

Sheet No.
FIGURE 1A

1.4 Geotechnical Considerations

The following geotechnical investigation report has been prepared by Paterson Group Inc:

- Report No. PG4378-1 January 5, 2018 for the Wingate Hotel;

Among other items, the reports comment on the following:

- Site grading
- Foundation design
- Pavement structure
- Infrastructure construction
- Groundwater Control
- Design for earthquakes
- Corrosion potential
- Environmental considerations
- Limit of hazard lands

Generally, the Boreal site is relatively flat, sloping from north-west to south-east. The subsurface profile encountered at the test hole location consists of topsoil underlain by a loose to compact, silty sand to sandy silt layer. Glacial till, consisting of a silty sand with gravel, cobbles and boulders was noted below the silty sand/sandy silt layer within the boreholes.

The geotechnical engineer has reviewed the proposed grading plan and has deemed the grading to be in accordance with the geotechnical report. Please refer to the response to geotechnical comments memo from Paterson Group in **Appendix G** for more information including sign off on the proposed grading plan.

The geotechnical report also specifies an underfloor slab drainage system. Please refer to geotechnical report and/or mechanical and architectural drawings for more details regarding this system.

2 WATER DISTRIBUTION

2.1 Existing Conditions

Existing watermains adjacent to the site include a 305 mm diameter main on Campeau Drive and a 255 mm main on Palladium Drive. These were installed in 2016 as part of the Kanata West Business Park subdivision construction.

2.2 Design Criteria

Water demand criteria are taken from Table 4.2 of the 'Ottawa Design Guidelines – Water Distribution'. For this hotel site, the rate for hotel with 120 units at 1.8 persons/unit was used. For the 120 units' hotel, the anticipated water demands are as follows:

Average Day Demand	0.56 l/s
Maximum Day Demand	1.41 l/s
Peak Hour Demand	3.09 l/s

Watermain design for the proposed development is in accordance with the following City of Ottawa design criteria:

- Minimum pressure during peak hour 276 kPa (40 psi)
- Minimum pressure during maximum day plus fire 140 kPa (20 psi)
- Fire flow rate 10,500 k/min (175.0 l/s)
- Maximum pressure in unoccupied areas 689 kPa (100 psi)
- Maximum pressure in occupied areas 552 kPa (80 psi)

A fire flow demand has been calculated using the Fire Underwriters Survey (FUS) method for the proposed building. Based on the building floor area, type of construction, use of a sprinkler system and exposure to adjacent buildings, a fire flow rate of 10,500 l/min was determined. A copy of the FUS calculation and water demand calculation sheet are included in Appendix A.

2.3 Hydraulic Analysis

With the water and fire flow demands from section 2.3, the City has provided hydraulic boundary conditions for the 300 mm diameter watermain on Campeau Drive. The email of February 26, 2018 is included in **Appendix A** and is summarized as follows:

<u>Condition</u>	<u>Hydraulic Grade Line</u>
Basic Day (Max HGL)	162.3 m
Peak Hour (PKHR)	157.9 m
Max Day (MXDY) + Fire	132.7 m (Fire Flow 238.3 l/s)

A hydraulic model of the water system for the hotel building has been created using the H2O MAP software model by MWH Soft Inc. The model includes the connection to the existing watermain on Palladium Drive with the boundary conditions, the private watermain and the connection to the building. The model schematic and results are included in **Appendix A** and are summarized as follows:

Basic Day (Max HGL)	566.87 kPa
Peak Hour (PKHR)	523.51 kPa
Max Day (MXDY) + Fire	183.90 l/s @ 140 kPa residual pressure

A comparison of the results and design criteria is summarized as follows:

Max HGL (High Pressure Check) – The pressure is greater than 552 kPa, requiring the use of pressure reducing valves for the building. All pressures are less than the maximum pressure in unoccupied areas of 689 kPa.

Design Fire Flow – The design fire flow at the Wingate Hotel building is 183.90 l/s which is marginally higher than the required 175.0 l/s calculated using the FUS method.

Peak Hour – The minimum peak hour pressure on the site exceeds the minimum requirement of 276 kPa.

2.4 Proposed Water Distribution Plan

The proposed water distribution system for the Wingate Hotel site is shown on the Site Servicing Plan C-100. 150 mm and 200mm watermain are shown crossing the site and connecting to both the existing 250 mm watermain on Palladium Drive and the existing 300 mm watermain on Campeau Drive. The service will be further extended to the building. A new private fire hydrant will be located at the entrance and located within 45 m of the proposed Siamese connection. The new building will be sprinklered and pressure reducing control will be required as well. In the KWBP Design Brief, the hydraulic model for the full development of the business park is included. Hydraulic modeling results for the development is included in **Appendix A**.

With 3 AA hydrants within 45m of the building The minimum number of hydrants needed to deliver the required fire flow to the structure is being provided in accordance with Technical Bulletin ISTB-2018-02 dated March 21, 2018.

3 WASTEWATER DISPOSAL

3.1 Existing Conditions

The site was designed to be serviced by the existing 250 mm diameter sanitary sewer within the Palladium Drive right of way north of Campeau Drive as identified in the KWBP Design Brief. A copy of the Kanata West Business Park sanitary drainage area plan and sewer design sheets have been included in **Appendix B**.

3.2 Proposed Site

As described above in section 1.01, the proposed development is to be a 122 suite hotel complete with pool. Discussions with the site developer have indicated the anticipated capacity of the pool area will be approximate 50 persons. The proposed ground floor plan for the site has been included in **Appendix B**. It should be noted that outside of a small contingent of staff (no more than 10 staff at any one time) and the pool, there are no other significant waste water generators for this site. Sanitary sewer flows are estimated using the specific City of Ottawa identified below.

3.3 Criteria

In accordance with the City of Ottawa's Sewer Design Guidelines, the following design criteria has been utilized in order to predict wastewater flows generated by the subject site and complete the sewer design;

• Minimum Velocity	0.6 m/s
• Maximum Velocity	3.0 m/s
• Manning Roughness Coefficient	0.013
• Total site area	1.01 Ha
• Hotel with full housekeeping facilities (Appendix 4A)	225 l/person/d
• Swimming pools (Appendix 4A)	40 l/person/d
• Infiltration Allowance	0.33 L/s/Ha
• Minimum Sewer Slopes - 200 mm diameter	0.32%

3.4 Sanitary Sewer Design

Given the above criteria, total wastewater flow from the proposed development will be 2.39 l/s. The detailed sewer calculations and sanitary drainage area plan are included in **Appendix B**.

As part of the development of the site, the owner shall acknowledge and agree that any pool discharge backwash/backflush into the sanitary sewer shall only be permitted during the hours of 10:00PM and 5:00AM (off-peak hours) and will only be permitted to discharge into the sanitary system at a to be determined controlled rate

The sanitary sewer design sheet for the Kanata West Business Park confirms flows from block 23 (Wingate Hotel Site) have been accounted for within the KWBP sanitary sewer design as part of the 11.15 l/s total flow received from blocks 17, 25, 26, 27, 28 and 23 . The KWBP sanitary sewer design sheet can be found in **Appendix B**.

It should be noted that the detailed flow estimates conducted as part of the Wingate Hotel site plan application are higher than the estimates conducted during the KWBP design as more accurate information is available, a 1.49 L/s increase, from subdivision design estimate to actual site plan flow estimate is calculated

Upon review of the KWBP sanitary sewer design sheet the downstream sewers all have at minimum 9.02 L/s residual capacity, which can easily accommodate the increased flow from the proposed hotel site with no negative impacts. Furthermore the latest City of Ottawa design parameters identified in Technical Bulletin ISTB-2018-01 provide substantial residual capacity throughout the development area and will allow the system to easily accommodate the small increase in flow.

4 SITE STORMWATER MANAGEMENT

4.1 Existing Conditions

The existing undeveloped subject lands currently drain south-east via overland flow towards an existing ditch inlet catch basin that outlets via existing sewers to Kanata West Pond 6 East. Existing storm sewers adjacent to the site include a 1050mm dia sewer within Palladium Drive, a 1350mm dia sewer within Campeau Drive and the aforementioned existing Ditch-Inlet Catchbasin connected to a 600mm lead.

4.2 Design Criteria

As part of the Kanata West Business Park Design Brief stormwater management release rates were established for individual blocks. The subject site, listed as drainage area 132A on the Kanata West Business Park 14289-500 Storm Drainage Area plan has a total allowable 5 year release rate of 187 l/s as shown on table 4.1, contained within **Appendix C**, from the Kanata West Business Park Design Brief. We have designed the on-site stormwater management using the modified rational method. Calculations

Some of the key criteria include the following:

- Design Storm 1:5 year return (Ottawa)
- Rational Method Sewer Sizing
- Initial Time of Concentration 10 minutes
- Runoff Coefficients
 - Landscaped Areas C = 0.30
 - Asphalt/Concrete C = 0.90
 - Roof C = 0.90
- Pipe Velocities 0.80 m/s to 6.0 m/s
- Minimum Pipe Size 250 mm diameter
(200 mm CB Leads)

The stormwater design for the lands in question are subject to review by the City of Ottawa development review branch and the Mississippi Valley Conservation Authority prior to commencement of servicing works. The Ottawa office of the Ministry of Environment and Climate Change (MOECC) has reviewed the proposed site plan for the subject lands and has confirmed that the MOECC will not need to review the proposed design.

The design of the on-site stormwater management has been done in such a way as to not negatively impact the adjacent Carpenter's Union property and no flows up to and including the 100 year storm shall encroach their lands.

4.2.1 Infiltration

The KWBP Design Brief maintained the infiltration targets established within previous studies completed for the Kanata West Area, namely the Kanata West Master Servicing Study. Relevant excerpts from the Kanata West MSS are provided within **Appendix C** for reference. The targets provided within the KWBP design brief indicated that a range of 50 - 70 mm/year of runoff be infiltrated from the eastern portion of the KWBP site, The Design Brief also maintained that post

development infiltration rates are to be increased by 25% above these pre-development rates to compensate for areas (ie. Roadway corridors) that cannot provide infiltration.

The Wingate Hotel site is located within the eastern portion of the KWBP. The infiltration target has been established as 25% above the average of 50-70mm/year, for a target of 75mm/year. The subject site has limited pervious area available for infiltration. As with previously approved site plans in the KWBP, the subject site will be provided with an engineered infiltration gallery fed by the rooftop drains to achieve the required infiltration rate. Please refer to the geotechnical memo in **Appendix G** for confirmation of percolation rates used in calculations.

The design of the infiltration gallery is to be as per MOECC requirements and the bottom of storage media will be minimum 1m above the high groundwater. Please refer to the geotechnical memo in **Appendix G** which confirms this separation has been met.

The proposed infiltration gallery has been sized to maximize infiltration potential for the site. The sizing was based on the roof drainage area, daily precipitation data (using wet year to minimize overflow and dry year to confirm infiltration volume), infiltration through the bottom and the bottom 1/3 of the side walls, and percolation rates based on Geotechnical investigation of the site. The sizing of the gallery has been tailored for the proposed Wingate Hotel building roof area. The below table provides summary of the infiltration calculations for the Wingate Hotel site, further details of the infiltration gallery are provided within the Engineering Drawings 114289-100, and detailed design calculations are provided within **Appendix C**.

Table 1 - Infiltration Gallery Calculations Summary on Annual Basis

BUILDING ID	AREA (M2)	ANNUAL RUNOFF VOLUME (M3)	AVERAGE OVERFLOW VOLUME (M3)	AVERAGE ANNUAL VOLUME INFILTRATED (M3)
Wingate Hotel	1365	1038	159	879

Where:

- Annual Runoff Volume is based on rooftop area and 95% of the annual precipitation from rooftops available as runoff
- Overflow Volume is based on building specific infiltration gallery sizing

The required infiltration will be provided by infiltration galleries fed by rooftop drains. The infiltration galleries will provide an estimated 879m³ of infiltration on an annual basis, or 80.6mm/year for the 1.01ha Wingate Hotel site, above the required post-development rate of 75mm/year.

4.3 Stormwater Management

Base on the approved Kanata West Business Park Design Brief, table 4.1, and the storm water modeling, the maximum allowable release rate for the subjected site is 187.00l/s.

The site is approximately 1.01 ha and is currently comprised of a hotel building, asphalt parking lot, and landscape areas. The post development average runoff coefficient was calculated as 0.85 in KWMSS.

The proposed development will have one outlet which connects to the existing MH108 along Campeau Drive via existing DI3 on the site. The existing DI3 will be removed and replaced by CBMH1. The upstream flow will be controlled at each catchbasin. And due to some grade differential at the south of the building and east portion of the subjected site, portion of the south and east landscaped area will be uncontrolled overland flow to adjacent lands, see grading plan C-200 for details.

The portion of the site being controlled and piped to existing MH108 is 0.69 ha in size and has controlled into six sub drainage areas, and the uncontrolled portion of the site is approximately 0.32 ha. Based on the proposed coefficient and $T_c=10$ min, the 100 yr flow from the uncontrolled area is 118.80 l/s. Based on an allowable release rate of 187.00 l/s for the site, the controlled portion is limited to $187.00 \text{ l/s} - 118.80 \text{ l/s} = 68.20 \text{ l/s}$.

As noted above, stormwater runoff from the site is directed to Campeau Drive Storm Sewer System which ultimately outlets to the Pond 6 East Stormwater Management Facility.

4.4 Minor Storm Sewer Design Criteria

The minor storm sewers for this site will be sized based on standards of both the City of Ottawa and the provincial Ministry of the Environment. Some of the key criteria will include the following:

- Design Return Periods: Local and Collector Roads 1:5 yr (Ottawa)
- Sewer Sizing by Rational Method
- Runoff Coefficients:

Roof	C=0.90
Asphalt Parking Lot	C=0.90
Landscaped Areas	C=0.30
- Initial T of C 10 min
- Min Velocity: City Design Guidelines 0.80 m/s

The minor storm sewers for the subject site will be sized based on the rational method and the City of Ottawa 1:5 yr. event. Minor storm flow to the existing DI3 will be controlled by Inlet Control Devices (ICDs) to limit flow and prevent sewer surcharging downstream. And the existing DI3 will be removed and replaced with a CBMH.

The minor storm sewer system is illustrated on the General Plan C-100 and C-101 including specifications and details. The storm sewer design sheets, post development runoff coefficient calculation, and related Storm Sewer Drainage Area plans C-500 are included in **Appendix C**.

Minor system discharges to the storm sewer in Campeau Drive through CBMH1 with a maximum 100 year restricted release rate of 187.00 L/s. The flow rate is based on the City requirement to limit 100 year post development flow off site base on approved parameters provided on the KWMSS Storm Sewer Design Sheet. To this end, no negative impact on the existing downstream system is anticipated.

4.5 Onsite Detention

The site was designed to limit runoff to the allowable release rate up to the 100 year storm event. Flows in excess of the 5 year storm, up to the 100 year storm will be contained on-site via surface ponding at inlet locations. Orifices in catchbasins will be employed to control runoff from parking, access and landscape areas. To determine the resulting storage volume a 5 year and 100 year storm was applied with starting at 2 minutes with time steps of 5 minutes interval until a peak storage volume requirement was attained for the sub-area being controlled. The peak storage volume required was then met or exceeded at the ponding location. Ponding volumes were determined by the AutoCAD Civil 3D grading model. Available ponding volumes at each inlet were calculated using surface ponding only, please refer to the ponding plan 114827-C-600 for more information regarding pond volumes.

Ponding depths were limited to 150 mm for the 5 year storm and 300 mm for the 100 year event. In the event of less frequent storms an overland flow route toward Campeau Drive has been provided that will prevent any negative impact on the buildings.

Major flow up to the 100 year storm is contained on-site and is gradually released to the minor system, aside from the small uncontrolled areas, major flow does not leave the site via overland flow.

A stormwater management summary sheet and the results of the on-site storage volume requirements are included in **Appendix C**.

4.6 Quality Control

The site outlets to Kanata West Pond 6 East which was designed to provide both quantity and quality control for the subject lands, furthermore the approval exceptions set out under Ontario Regulation 525/98: *Approval Exceptions* are satisfied therefore no Ministry approval is required to be obtained to facilitate the development proposal. An excerpt from the approved Kanata West Business Park design brief regarding Pond 6 east is included in **Appendix C**. For more information regarding Pond 6 East please refer to the MOECC ECA # 4648-A2KQFP located in **Appendix C**.

A summary of the ICD type for each drainage area and corresponding storage details is provided in Table 2 below.

Table 2 – Post-Development Storage Summary Table

Post-Development Flows							
Drainage Area	ICD TYPE	Restricted /Uncontrolled Flow (L/s)		Storage Required (m³)		Storage Provided (m³)	Excess Storage Provided (m³)
		5-year	100-year	5-year	100-year		
CONTROLLED TO CAMPEAU DRIVE STORM SEWER SYSTEM							
CB1	TEMPEST LHF	6	6	13.93	42.11	47.71	5.6
CB2	TEMPEST LHF	15	15	13.69	47.47	47.87	0.4
CB3	TEMPEST LHF	13	13	20.48	65.08	64.65	-0.43
CBMH5	TEMPEST HF	23	23	.85	8.9	11.54	2.64
RYCB1	TEMPEST HF	18	18	0	.6	.71	0.11
RYCB2	TEMPEST LHF	9	9	.24	2.89	3.10	0.21
TOTAL RESTRICTED RELEASED RATE							
			84				

Since the on-site storm sewers are under single ownership, are for commercial use, no MOE ECA is required for the redevelopment.

5 SEDIMENT AND EROSION CONTROL PLAN

During construction, existing stream and storm water conveyance systems can be exposed to significant sediment loadings. A number of construction techniques designed to reduce unnecessary construction sediment loadings may be used such as;

- The installation of straw bales within existing drainage features surrounding the site;
- Bulkhead barriers will be installed in the outlet pipes;
- Sediment capture filter socks will remain on open surface structures such as manholes and catchbasins until these structures are commissioned and put into use;
- Installation of silt fence, where applicable, around the perimeter of the proposed work area.

During construction of the services, any trench dewatering using pumps will be fitted with a “filter sock.” Thus, any pumped groundwater will be filtered prior to release to the existing surface runoff. The contractor will inspect and maintain the filter sock as needed including sediment removal and disposal.

All catchbasins, and to a lesser degree manholes, convey surface water to sewers. Consequently, until the surrounding surface has been completed these structures will be covered to prevent sediment from entering the minor storm sewer system. Thus, these structures will be constructed with a geotextile filter fabric located between the structure frame and cover. These will stay in place and be maintained during construction and build-out until it is appropriate to remove them.

During construction of any development both imported and native soils are stockpiled. Mitigative measures and proper management to prevent these materials entering the sewer systems is needed.

During construction of the deeper watermain and sewers, imported granular bedding materials are temporarily stockpiled on site. These materials are however quickly used up and generally before any catchbasins are installed.

The Sediment and Erosion Control Plan C-900 is included in **Appendix D**.

6 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusions

The Servicing strategy can be summarized as follows:

- Adequate fire flow protection and domestic supply can be provided from the existing 250 mm watermain located in Palladium Drive.
- Sanitary design flows under the proposed condition can be accommodated by the existing sanitary sewers with no negative impact on downstream sewers is anticipated.
- Stormwater can be attenuated on-site to meet the release rate criteria established by the previous study. Control will be achieved through the use of orifice controls in the catchbasins. Storage will be provided through parking lot and yard surface ponding in larger events.
- Flows in excess of the 100 year event will be directed overland to the Campeau Drive Right of Way.
- Erosion and sediment control measures have been outlined for the construction of the development.

This report has illustrated that the proposed Wingate Hotel site can be serviced by the adjacent existing municipal services. All municipal infrastructure designs have been done in conformance with current City of Ottawa and Ministry of Environment and Climate Change guidelines.

Bases on the information provided within this report, the site plan prepared for the subject parcel can be serviced to meet City of Ottawa requirements.

6.2 Recommendations

Based on the findings and conclusions of our investigation, IBI confirms that the proposed Wingate Hotel can be serviced with the existing water supply, wastewater and controlled stormwater can outlet to existing surrounding infrastructure.

IBI GROUP



Terry Brule, P. Eng.
Associate Manager

APPENDIX A

BOUNDARY CONDITIONS



Boundary Conditions For: 8600 Campeau Dr.

Date of Boundary Conditions: 2018-Jun-11

Provided Information:

Scenario	Demand	
	L/min	L/s
Average Daily Demand	33.6	0.6
Maximum Daily Demand	84.6	1.4
Peak Hour	185.4	3.1
Fire Flow #1 Demand	10,500	175.0

Number of Connections: 2

Location:



BOUNDARY CONDITIONS



Results:

Connection #: 1 Palladium Dr.

Demand Scenario	Head (m)	Pressure ¹ (psi)
Maximum HGL	162.3	86.0
Peak Hour	159.1	79.5
Max Day Plus Fire (10,500) L/min	149.4	67.9

¹Elevation: **101.81 m**

Connection #: 2 Campeau Dr.

Demand Scenario	Head (m)	Pressure ¹ (psi)
Maximum HGL	162.3	84.5
Peak Hour	157.7	78.0
Max Day Plus Fire (10,500) L/min	142.8	56.5

¹Elevation: **102.88 m**

Notes:

1) As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:

- If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
- Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

2) **HGL and pressures provided at two connection points is based on installing a 203 mm diameter watermain that connects the two locations. Refer to Connection Location figure for pipe size and orientation**

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.



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WATERMAIN DEMAND CALCULATION SHEET

PROJECT : Wingate Hotel
LOCATION : Kanata West Business Park - City of Ottawa
DEVELOPER : Borel Hospitality Group

FILE: 114827
DATE PRINTED: 4-Jun-18
DESIGN: WY
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			BEDS	INDTRL	INST.	RETAIL										
	SF	APT	ST		(ha.)	(ha.)	(m²)	Res.	Non-res.	Total	Res.	Non-res.	Total	Res.	Non-res.	Total	(l/min)
Wingate Hotel		120		216				0.56	0.00	0.56	1.41	0.00	1.41	3.09	0.00	3.09	10,500
					</												

ASSUMPTIONS					
RESIDENTIAL DENSITIES		AVG. DAILY DEMAND		MAX. HOURLY DEMAND	
- Single Family (SF)	3.4 p / p / u	- Hotel (Table 4.2)	225 l / cap / day	- Hotel (Table 4.2)	1,238 l / cap / day
- Hotel Beds average	1.8 p / p / u	- Business Park (Industrial)	35,000 l / ha / day	- Industrial (Business Park)	94,500 l / ha / day
- Stacked Townhouse (ST)	2.3 p / p / u	- Institutional	35,000 l / 1000m ² / day	- Institutional	94,500 l / 1000m ² / day
		- Retail (Shopping Centre)	2,500 l / 1000m ² / day	- Retail (Shopping Centre)	6,750 l / 1000m ² / day
		MAX. DAILY DEMAND		FIRE FLOW	
		- Hotel (Table 4.2)	563 l / cap / day	- Wingate Hotel	10,200 l / min
		- Industrial (Business Park)	52,500 l / ha / day		
		- Institutional	52,500 l / 1000m ² / day		
		- Retail (Shopping Centre)	3750 l / 1000m ² / day		

**IBI GROUP**

400-333 Preston Street
 Ottawa, Ontario K1S 5N4 Canada
 tel 613 225 1311 fax 613 225 9868
 ibigroup.com

Fire Flow Design Sheet

Wingate Hotel
 City of Ottawa
 Project No. 114827
 4-Jun-18

Wingate Hotel - Full Sprinkler System, Limited Combustible

1. An estimate of the Fire Flow required for a given fire area may be estimated by: $F = 220 C \sqrt{A}$

F = required fire flow in litres per minute

C = coefficient related to the type of construction

1.5 for wood construction (structure essentially combustible)

1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)

0.8 for noncombustible construction (unprotected metal structural components, masonry or metal walls)

0.6 for fire-resistive construction (fully protected frame, floors, roof)

A = total floor area in square metres (including all storeys, but excluding basements at least 50% below grade)

A = 6419 m²

C = 0.8

F = 14101.0 L/min

rounded off to 15,000 L/min (min value of 2000 L/min)

2. The value obtained in 1. may be reduced by as much as 25% for occupancies having a low contents fire hazard.

Non-combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Reduction due to low occupancy hazard 0% x 15,000 = 15,000 L/min

3. The value obtained in 2. may be reduced by as much as 75% for buildings equipped with automatic sprinkler protection.

Non-combustible c/w Automatic Sprinkler System	-75%
Combustible c/w Automatic Sprinkler System	-50%
Sprinkler System conforming to NFPA13	-30%
No Automatic Sprinkler System	0%

Reduction due to Sprinkler System -30% x 15,000 = 10,500 L/min

4. The value obtained in 3. may be increased for structures exposed within 45 metres by the fire area under consideration.

Separation	Charge
0 to 3 m	25%
3.1 to 10 m	20%
10.1 to 20 m	15%
20.1 to 30 m	10%
30.1 to 45 m	5%

Side 1	105	0% north side
Side 2	150	0% east side
Side 3	85	0% south side
Side 4	85	0% west side

0% (Total shall not exceed 75%)

Increase due to separation 0% x 10,500 = 10,500 L/min

The fire flow requirement is 10,500 L/min
 or 175 L/sec
 or 2,774 gpm (us)
 or 2,310 gpm (uk)

James Battison

From: Stephen Mak <smak@parallelarch.ca>
Sent: Monday, July 16, 2018 5:04 PM
To: Scott Alain
Cc: Terry Brule; James Battison; Paul Black
Subject: Re: Engineering Design Brief Comments

The GFA is confirmed at 6,419.08 m², and the Fire Flow Design Sheet should be reduced accordingly. We will update the site plan accordingly.

Please update the balance of areas where the GFA appears in the report.

Thanks.

On Jul 16, 2018, at 11:59 AM, Scott Alain <alain@fotenn.com> wrote:

Hi all,

A few requests:

Steve: Can you provide correspondence as requested per this comment related to the engineering design brief?:

6. A total floor area 6804m² is identified on the *Fire Flow Design Sheet dated June 4, 2018* provided in Appendix A. The Site Plan indicates a total gross floor area of 6,355m². The response comment indicates that the GFA matches the Site Plan. Please provide correspondence from the Architect in the Appendix confirming the GFA applied in the FUS calculations as previously requested.

Terry/James: Comment 7 for the engineering design brief requests confirmation of all building uses directly from the applicant (Fotenn) for the appendix. Can you let me know what format is expected?

Terry/James: Comment 16 for the engineering design brief requires Taggart's consent for the proposed off-site works – would you like us to reach out to our contacts at Taggart or are you intending to do so?

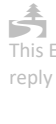
Thanks,

Scott Alain, M.PL
Planner

FOTENN
223 McLeod St
Ottawa, ON K2P 0Z8
T 613.730.5709 ext. 231
fotenn.com

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<[image001.png](#)><[image002.png](#)><[image003.png](#)><[image004.png](#)>

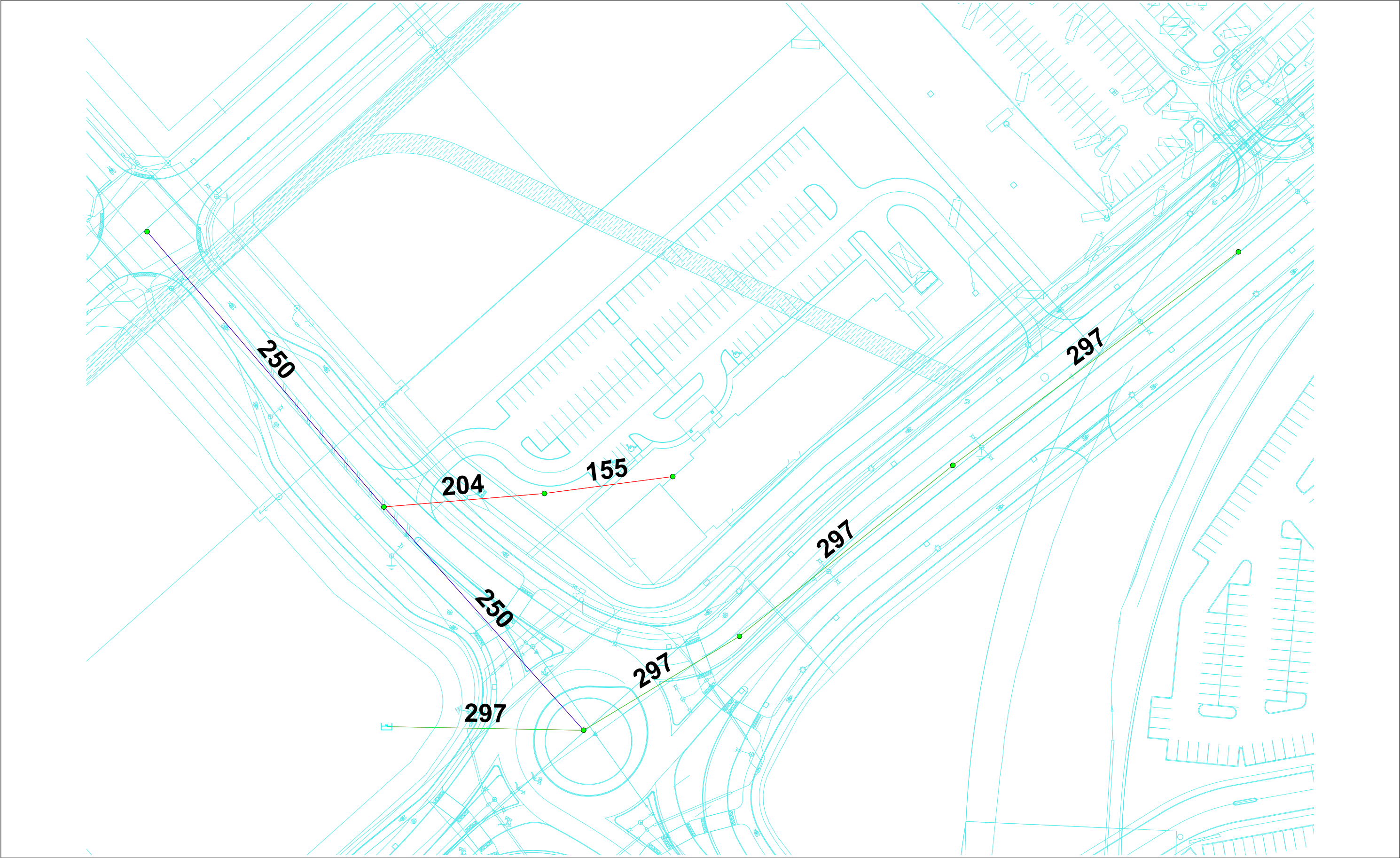


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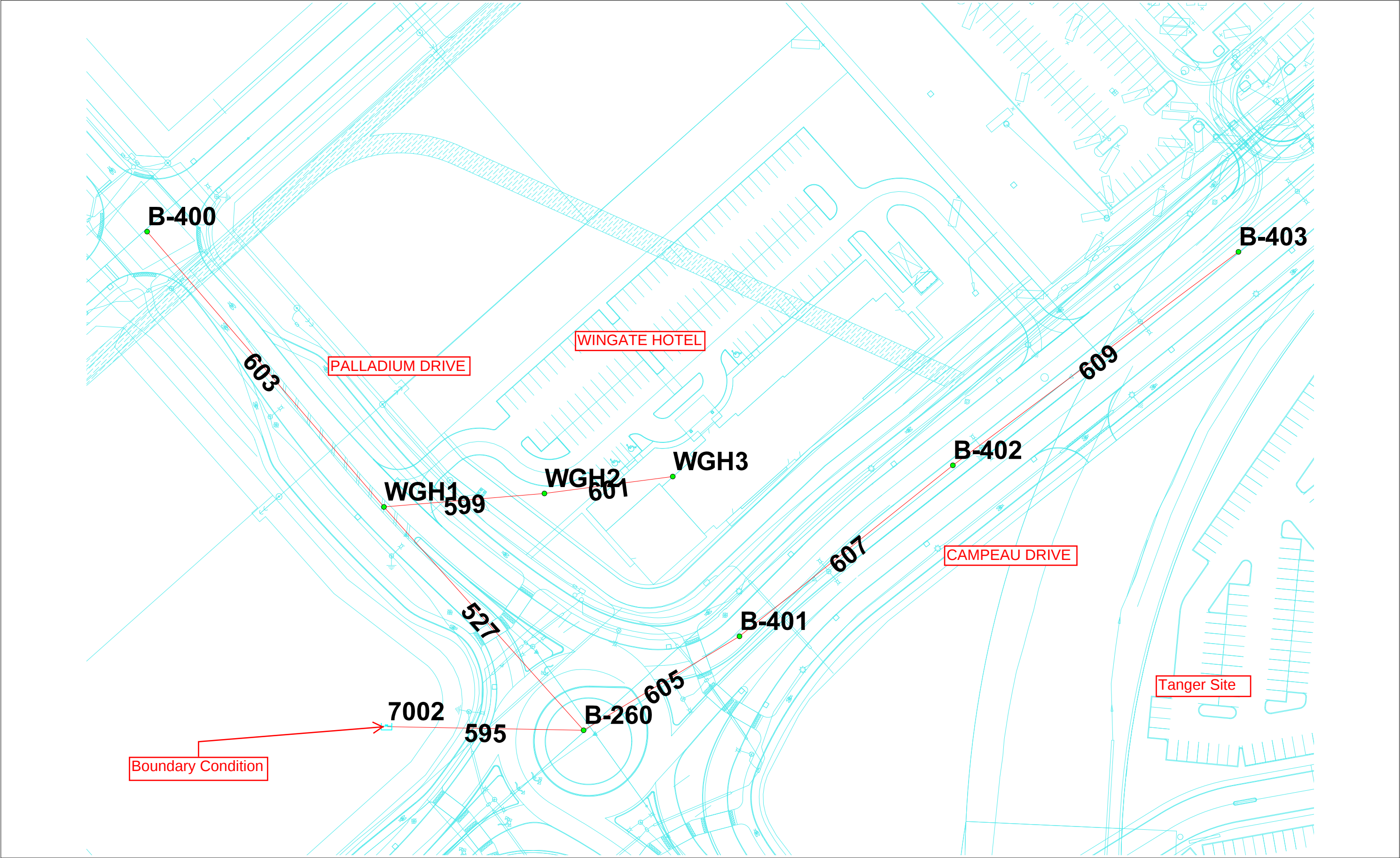
WINGATE HOTEL - PIPE SIZES



BASIC DAY HGL 162.3m - JUNCTION REPORT

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		B-260	0.79	104.50	162.30	566.39
2		B-400	0.65	104.35	162.30	567.85
3		B-401	0.00	104.10	162.30	570.31
4		B-402	0.00	103.50	162.30	576.18
5		B-403	1.07	102.65	162.30	584.51
6		WGH1	0.00	104.25	162.30	568.83
7		WGH2	0.00	104.45	162.30	566.87
8		WGH3	0.88	104.45	162.30	566.85

WINGATE HOTEL - PIPE AND NODE ID's



PEAK HOUR 157.9m - JUNCTION REPORT

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		B-260	2.13	104.50	157.89	523.21
2		B-400	1.75	104.35	157.88	524.56
3		B-401	0.00	104.10	157.89	527.12
4		B-402	0.00	103.50	157.89	532.99
5		B-403	2.88	102.65	157.89	541.31
6		WGH1	0.00	104.25	157.88	525.55
7		WGH2	0.00	104.45	157.87	523.51
8		WGH3	4.85	104.45	157.84	523.20

MXDY + FIRE HGL 132.7m - FIREFLOW DESIGN REPORT

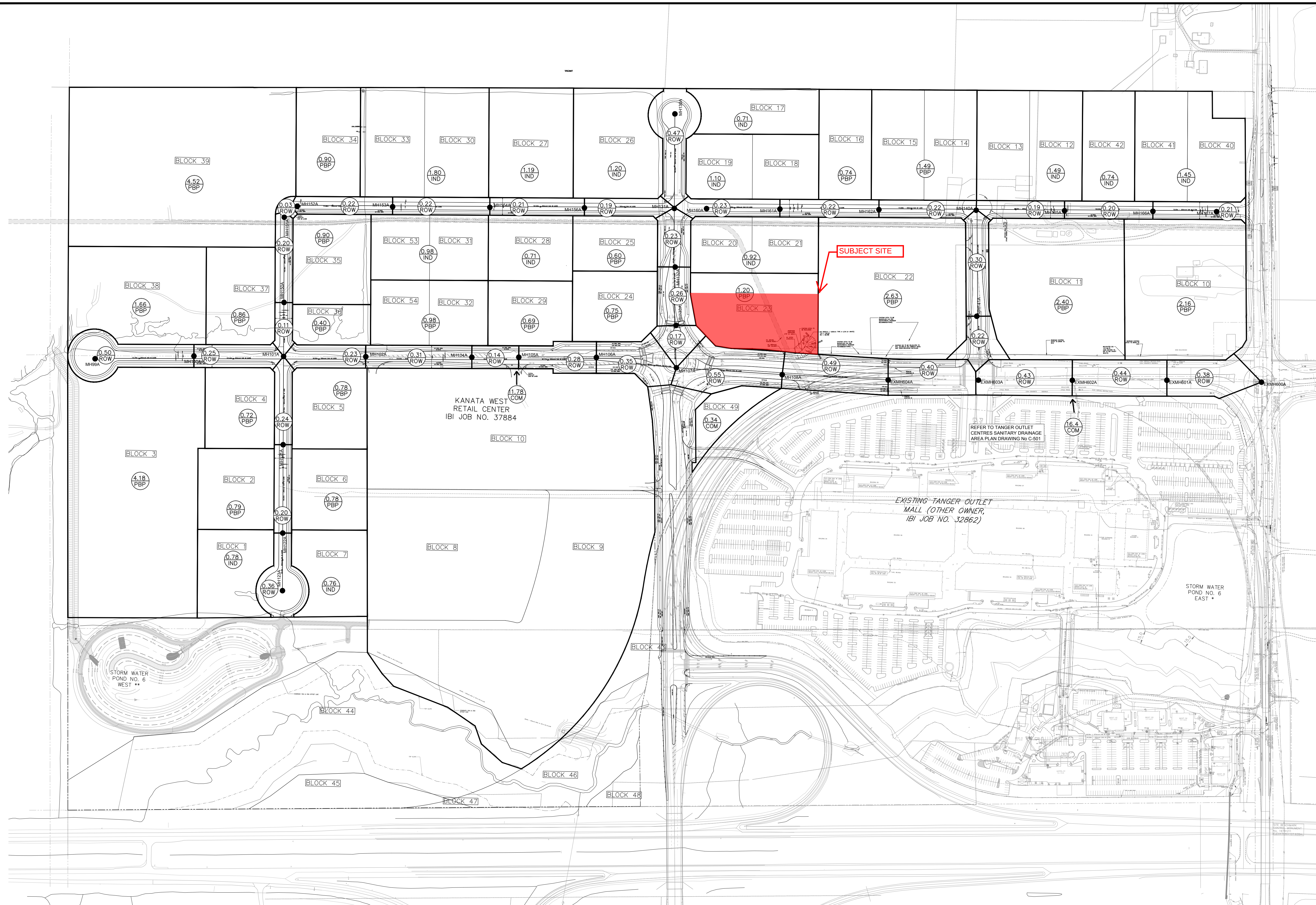
		ID	Total Demand (L/s)	Critical Node 1 ID	Critical Node 1 Pressure (kPa)	Critical Node 1 Head (m)	Adjusted Fire-Flow (L/s)	Available Flow @Hydrant (L/s)	Critical Node 2 ID	Critical Node 2 Pressure (kPa)	Critical Node 2 Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
1		B-260	217.85	B-260	259.36	130.97	680.85	680.86	B-260	139.97	118.78	680.87	680.85
2		B-400	217.64	B-400	110.13	115.59	195.65	195.65	B-400	139.96	118.63	195.65	195.65
3		B-401	216.67	B-401	248.11	129.42	484.75	484.75	B-401	139.96	118.38	484.75	484.75
4		B-402	216.67	B-402	231.19	127.09	369.51	369.51	B-402	139.96	117.78	369.51	369.51
5		B-403	218.27	B-403	209.79	124.06	302.34	302.34	B-403	139.96	116.93	302.34	302.34
6		WGH2	238.33	WGH2	57.08	110.27	183.90	183.90	WGH2	139.96	118.73	183.90	183.90

PEAK HOUR 157.9m - PIPE REPORT

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/km)
1		527	B-260	WGH1	76.71	250.00	110.00	6.60	0.13	0.01	0.14
2		595	7002	B-260	50.29	297.00	120.00	11.61	0.17	0.01	0.15
3		599	WGH1	WGH2	41.25	204.00	110.00	4.85	0.15	0.01	0.21
4		601	WGH2	WGH3	33.17	155.00	100.00	4.85	0.26	0.03	0.96
5		603	B-400	WGH1	93.00	250.00	110.00	-1.75	0.04	0.00	0.01
6		605	B-260	B-401	46.60	297.00	120.00	2.88	0.04	0.000	0.01
7		607	B-401	B-402	70.03	297.00	120.00	2.88	0.04	0.000	0.01
8		609	B-402	B-403	91.31	297.00	120.00	2.88	0.04	0.00	0.01

APPENDIX B

J:\14289 - Kanata West Business Park\Drawings\Sanitary Drainage\SD1.dwg
User: LME
Date: 2015/11/05
Time: 11:14 AM
Plot Size: 14
Plot Scale: 1:2000
Plot Date: 11/05/2015 11:14 AM
Unit: SI
Scale: 1:2000
Plot Size: 14
Plot Scale: 1:2000
Plot Date: 11/05/2015 11:14 AM
Unit: SI
Scale: 1:2000



LEGEND:

5.14
P.B.P. AREA IN HECTARES
LAND USE TYPE

PBP PRESTIGE BUSINESS PARK - 35 000 l/s/ha
IND LIGHT INDUSTRIAL - 35 000 l/s/ha
COM COMMERCIAL - 50 000 l/s/ha
ROW RIGHT OF WAY (INFILTRATION FLOW ONLY)

— DRAINAGE AREA LIMITS
● MH001A SANITARY MANHOLE & NUMBER
— SANITARY SEWER & FLOW DIRECTION

14			
13			
12			
11			
10			
9			
8			
7			
6			
5	REVISED AS PER CITY COMMENTS	LME	15:11:05
4	REVISED AS PER CITY COMMENTS	LME	15:10:15
3	REVISED AS PER NEW SITE PLAN AND CITY COMMENTS	LME	15:06:19
2	REVISED AS PER CITY COMMENTS	LME	15:04:08
1	ISSUED TO CITY FOR APPROVAL	LME	14:11:27
No.	REVISIONS	By	Date

TAGGART
REALTY MANAGEMENT

IBI IBI GROUP
400 - 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title
KANATA WEST BUSINESS PARK

Professional Engineer
L. M. ERON
2015/11/05
PROVINCE OF ONTARIO

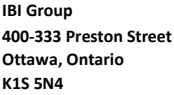
Drawing Title
SANITARY DRAINAGE AREA PLAN

Scale
1:2000

Design LME	Date NOV. 2014
Drawn DPS	Checked TRB
Project No. 14289	Drawing No. 501

REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed _____
Date _____ 2015
Plan Number _____



PROJECT: KANATA WEST BUSINESS PARK

LOCATION: 333 HUNTMAR DRIVE

CLIENT: TAGGART

A circular professional engineer seal for the Province of Ontario. The outer ring contains the text "LICENSED PROFESSIONAL ENGINEER" at the top and "PROVINCE OF ONTARIO" at the bottom. In the center, the name "L. M. ERION" is printed. The seal features a stylized design with two horizontal bars and curved ends, resembling a bridge or a stylized 'E'.



APPROVED ☐	REFUSED ☐
THIS _____ DAY OF _____, 2018	
_____ DERRICK MOODIE, MANAGER DEVELOPMENT REVIEW WEST PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA	

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Verify all dimensions prior to construction. Do not scale drawings. Report all errors, omissions or discrepancies to the architect. Use only the latest revised drawings or those that are marked, "issued for construction".

1	07-06-18	
number	date	ISSUED FOR DEVELOPMENT PERMIT description

WINGATE
by WYNDHAM

500 CAMPEAU DRIVE,
KANATA, ONTARIO

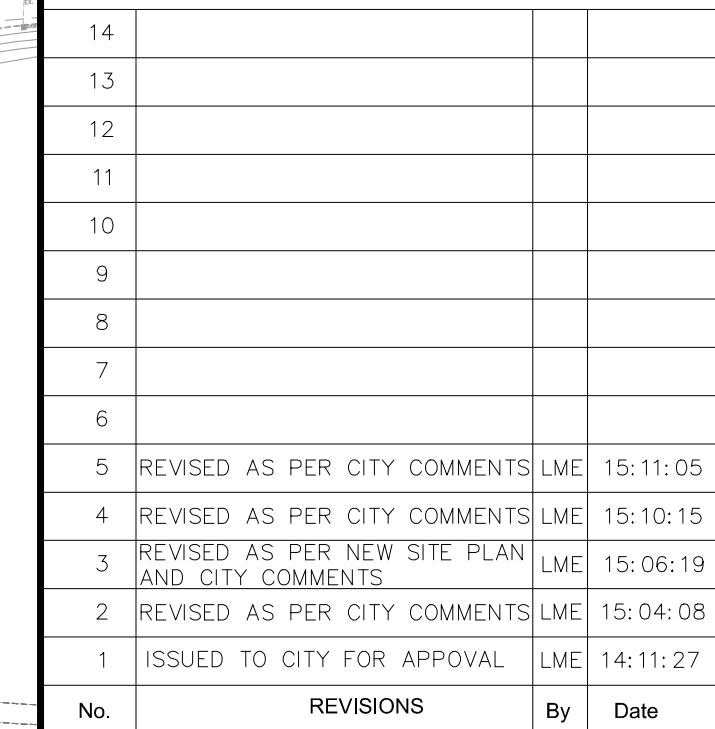
project

GROUND & SECOND FLOOR PLAN

18-002	 ONTARIO ASSOCIATION OF ARCHITECTS STEPHEN MAX LICENCE 4199
project no.	
MARCH 2018	
date	
DRW	
drawn by	
1:150	
scale	
SM	
checked by	

A2.01

APPENDIX C



Project No.	Drawing No.
14289	500

REVIEWED BY DEVELOPMENT REVIEW SERVICES BRANCH	
Signed	_____
Date	_____ 2015
Plan Number	_____

Area ID	Area (ha)	IMP (%)		LGI (m)	AVAILABLE/REQUIRED STORAGE (cu-m)	MINOR SYSTEM CAPTURE (l/s)
		TIMP	XIMP			
120A	0.78	0.93	0.93	78	75	191
120B	0.26	0.53	0.53	100	7	45
103A	0.33	0.93	0.93	56	20	104
104C	0.36	0.59	0.59	135	17	62
Kanata West Retail Centre modelled as per approved report "Design Brief Kanata West Retail Centre 3015, 3075 and 3095 Palladium Drive" (IBI Group, July 2017)						
121B	0.79	0.93	0.93	102	76	187
121A	0.78	0.93	0.93	78	76	192
121C	0.21	0.53	0.53	101	49	37
122B	0.78	0.93	0.93	103	78	182
122A	0.75	0.93	0.93	78	73	185
122C	0.21	0.69	0.69	60	21	46
122D	0.14	0.69	0.69	30	24	31
153A	0.9	0.93	0.93	100	89	214
153B	0.96	0.93	0.93	89	90	217
153C	0.16	0.53	0.53	79	n/a	29
154D	0.15	0.53	0.53	76	n/a	29
154A	1.8	0.93	0.93	116	177	412
154B	0.98	0.93	0.93	71	95	244
154C	0.17	0.57	0.57	82	48	33
155A	1.19	0.93	0.93	106	196	186
155B	0.71	0.93	0.93	68	123	111
155C	0.29	0.57	0.57	141	60	50
130A	1.2	0.93	0.93	106	201	187
156A	0.6	0.93	0.93	63	104	94
156B	0.11	0.57	0.57	56	5	22
156C	0.14	0.93	0.93	82	7	40
132B	0.15	0.93	0.93	80	9	43
130C	0.15	0.93	0.93	30	15	41
130B	0.71	0.93	0.93	101	120	111
130D	0.24	0.93	0.93	67	15	62
160C	0.15	0.93	0.93	81	n/a	43
132A	1.01	0.93	0.93	117	132	187
132C	0.15	0.93	0.93	77	4	43
104A	0.98	0.93	0.93	75	105	242
104B	0.3	0.71	0.71	111	65	75
105A	0.69	0.93	0.93	73	119	108
105B	0.22	0.93	0.93	65	n/a	57
106C	0.17	0.93	0.93	82	1	110
135E	0.25	0.93	0.93	50	11	80
106A	0.75	0.93	0.93	75	129	117
106B	0.15	0.93	0.93	82	1	58
133A	0.15	0.93	0.93	57	19	48
133B	0.16	0.93	0.93	57	n/a	74
137A	0.08	0.93	0.93	33	n/a	38
137B/C	0.12	0.93	0.93	36	n/a	57
137D/E	0.14	0.93	0.93	35	n/a	67
137F/G	0.15	0.93	0.93	35	n/a	72



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

STORM SEWER DESIGN SHEET

PROJECT: KANATA WEST BUSINESS PARK
LOCATION: 333 HUNTMAR DRIVE
CLIENT: TAGGART

LOCATION				AREA (Ha)											RATIONAL DESIGN FLOW											SEWER DATA											
STREET	AREA ID	FROM MH	TO MH	C= 0.20	C= 0.57	C= 0.57	C= 0.61	C= 0.68	C= 0.68	C= 0.70	C= 0.85	C= 0.85	C= 0.90	C= 0.90	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)		
																														DIA	W	H			(L/s)	(%)	
KANATA WEST BUSINESS PARK - PHASE 1																																					
Campeau Drive	Block 29	MH105	MH106								0.69				1.63	1.63	11.25				98.02	114.88	167.89	159.82													
							0.22								0.37	0.37	11.25	1.04	12.29	98.02	114.88	167.89			62.63		222.5	317.2	89.00	525				0.50	1.420	94.79	29.88%
	Block 24	MH106	MH107								0.75				1.77	3.40	12.29				93.46	109.50	159.99	318.00										0.50	1.679	121.42	19.58%
												0.32			0.76	1.13	12.29	1.18	13.47	93.46	109.50	159.99			180.67		498.7	620.1	118.60	675							
Upper Canada St.	Blocks 27, 28	MH155	MH156								1.90				4.49	4.49	11.25				98.02	114.88	167.89	440.10													
							0.29								0.46	0.46	11.25	0.91	12.16	98.02	114.88	167.89			77.15		517.2	588.3	87.00	675				0.45	1.593	71.02	12.07%
	Block 25	MH156	MH131								0.60				1.42	5.91	12.16				94.02	110.16	160.96	555.40										0.45	1.708	68.43	8.78%
							0.11					0.14			0.51	0.96	12.16	1.04	13.20	94.02	110.16	160.96			155.27		710.7	779.1	106.29	750							
Palladium Drive	Blocks 17, 26	MH130	MH131								1.91				4.51	4.51	10.00				104.19	122.14	178.56	470.26													
												0.39			0.92	0.92	10.00	1.29	11.29	104.19	122.14	178.56			164.55		634.8	844.6	99.64	900				0.20	1.286	209.79	24.84%
Palladium Drive		MH131	MH132												0.00	10.42	13.20				89.87	105.28	153.80	936.55													
															0.00	1.89	13.20	0.61	13.81	89.87	105.28	153.80			290.10		1226.6	1,478.7	70.00	975				0.40	1.919	252.00	17.04%
		MH132	MH133												0.00	10.42	13.81				87.63	102.64	149.92	913.13													
												0.30			0.71	2.60	13.81	0.56	14.37	87.63	102.64	149.92			389.06		1302.2	1,911.0	72.07	1050				0.45	2.138	608.84	31.86%
		MH133	MH107												0.00	10.42	14.37				85.66	100.32	146.52	892.63													
												0.31			0.73	3.33	14.37	0.34	14.71	85.66	100.32	146.52			487.57		1380.2	1,911.0	43.99	1050				0.45	2.138	530.83	27.78%
Palladium Drive		MH137	MH136												0.00	0.00	10.00				104.19	122.14	178.56	0.00													
												0.49			1.16	1.16	10.00	0.96	10.96	104.19	122.14	178.56			206.75		206.7	238.5	120.00	375				1.70	2.092	31.74	13.31%
		MH136	MH135									0.25			0.00	0.00	10.96				99.40	116.50	170.27	0.00													
															0.59	1.75	10.96	0.44	11.40	99.40	116.50	170.27			297.73		297.7	399.0	64.15	450				1.80	2.431	101.32	25.39%
Tanger entrance		MH170	MH135								0.28				0.66	0.66	10.00				104.19	122.14	178.56	68.94													
												0.12			0.28	0.28	10.00	0.67	10.67	104.19	122.14	178.56			50.63		119.6	182.9	64.40	375				1.00	1.604	63.34	34.63%
Palladium Drive	Block 49	MH135	MH134								0.34				0.80	1.47	11.40				97.36	114.09	166.73	142.63													
												0.54			1.28	3.31	11.40	0.67	12.07	97.36	114.09	166.73			551.58		694.2	899.6	79.72	750				0.60	1.973	205.41	22.83%
		MH134	MH107												0.00	1.47	12.07				94.40	110.61	161.62	138.30													
															0.00	3.31	12.07	0.33	12.40	94.40	110.61	161.62			534.68		673.0	899.6	38.58	750				0.60	1.973	226.65	25.19%
Campeau Drive		MH107	MH108								0.50				1.18	16.47	14.71				84.51	98.97	144.53	1,391.81													
												0.65			1.54	9.30	14.71	0.63	15.34	84.51	98.97	144.53			1,344.28		2,736.1	4,658.7	119.50	1350				0.70	3.153	1922.58	41.27%
	Block 23	MH108	MH604								1.01				2.39	18.86	15.34				82.47	96.57	141.02	1,555.09													
												0.33			0.78	10.08	15.34	0.48	15.83	82.47	96.57	141.02			1,421.55		2,976.6	4,658.7	91.51	1350				0.70	3.153	1682.03	36.11%
Campeau Drive	Block 22	MH 604	MH 603								2.63				6.21	25.07	15.83				80.98	94.82	138.45	2,030.32													
												0.59			1.39	11.48	15.83	0.75	16.57	80.98	94.82	138.45			1,588.70		3,619.0	3,340.9	101.49	1350				0.36	2.261	-278.1	-8.32%
Upper Canada St.	Blocks 18,19,20,21	MH160	MH161								2.25				5.32	5.32	11.05				98.96	115.97	169.50	526.12													
							0.12								0.54	0.54	11.05	0.71	11.76	98.96	115.97	169.50															

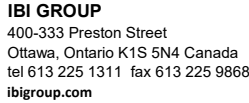


IBI Group
400-333 Preston Street
Ottawa, Ontario
K1S 5N4

STORM SEWER DESIGN SHEET

PROJECT: KANATA WEST BUSINESS PARK
LOCATION: 333 HUNTMAR DRIVE
CLIENT: TAGGART

LOCATION				AREA (Ha)											RATIONAL DESIGN FLOW											SEWER DATA											
STREET	AREA ID	FROM MH	TO MH	C= 0.20	C= 0.57	C= 0.57	C= 0.61	C= 0.68	C= 0.68	C= 0.70	C= 0.85	C= 0.85	C= 0.90	C= 0.90	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)		
																														DIA	W	H			(L/s)	(%)	
KANATA WEST BUSINESS PARK - PHASE 1																																					
Journeyman St.		MH140	MH141												0.00	19.28	16.32				79.51	93.10	135.92	1,533.17													
		MH141	MH141B			0.13				0.32					0.83	2.96	16.32	0.95	17.27		79.51	93.10	135.92		402.03		1,935.2	2,784.1	107.00	1350			0.25	1.884	848.9	30.5%	
															0.00	19.28	17.27				76.88	90.00	131.37	1,482.33													
Journeyman St.		Stub	MH 603							0.13					0.25	3.21	17.27	0.54	17.81		76.88	90.00	131.37		421.81		1,904.1	2,156.5	47.35	1350			0.15	1.460	252.4	11.7%	
															0.00	19.28	17.81				75.46	88.33	128.92	1,454.94													
															0.00	3.21	17.81	0.33	18.14		75.46	88.33	128.92		413.95		1,868.9	1,363.9	18.02	1350			0.06	0.923	-505.0	-37.0%	
Campeau Drive		603	602												0.00	44.35	16.57				78.80	92.25	134.68	3,494.84													
		602	601								0.26				0.61	15.30	16.57	0.71	17.28		78.80	92.25	134.68		2,060.61		5,555.4	3,971.3	92.77	1500			0.29	2.177	-1584.1	-39.9%	
											0.32				0.00	44.35	17.28				76.84	89.95	131.30	3,408.01													
															0.76	16.06	17.28	0.53	17.81		76.84	89.95	131.30		2,108.24		5,516.3	4,362.8	76.05	1500			0.35	2.392	-1153.4	-26.4%	
Tanger	Blocks 10, 11	601	9								4.56				10.78	55.13	17.81				75.45	88.31	128.90	4,159.24													
															1.84	17.90	17.81	0.87	18.68		75.45	88.31	128.90		2,307.30		6,466.5	5,730.3	96.86	1950			0.15	1.859	-736.3	-12.8%	
Tanger		9	12										3.24		8.11	63.24	18.68				73.28	85.77	125.17	4,634.03													
															0.00	17.90	18.68	0.81	19.49		73.28	85.77	125.17		2,240.55	18.00	6,892.6	5,749.5	90.76	1950			0.15	1.865	-1143.1	-19.9%	
Tanger		12	13										1.81		4.53	67.76	19.49				71.38	83.54	121.90	4,837.18													
															0.00	17.90	19.49	0.22	19.71		71.38	83.54	121.90		2,181.96	18.00	7,037.1	5,749.5	24.54	1950			0.15	1.865	-1287.7	-22.4%	
Tanger		13	Pond 6E										4.11		10.28	78.05	19.71				70.89	82.96	121.05	5,532.59													
													0.84		2.10	20.00	19.71	0.08	19.80		70.89	82.96	121.05		2,421.10	153.00	8,106.7	7,005.7	9.99	2100			0.15	1.959	-1101.0	-15.7%	
KANATA WEST BUSINESS PARK - PHASE 2																																					
Upper Canada St.	Blocks 30,31,33,53	MH154	MH153								2.78				6.57	6.57	11.25				98.02	114.88	167.89	643.93													
						0.32									0.51	0.51	11.25	1.70	12.95		98.02	114.88	167.89		85.13		729.1	905.5	120.00	975			0.15	1.175	176.42	19.48%	
	External Drainage	DI200	MH153	14.53											0.00																						
															8.08	8.08	30.00	2.48	32.48		53.93	63.05	91.87	435.66				435.7	473.6	127.45	825			0.10	0.858	37.89	8.00%
Upper Canada St.	Blocks 34, 35	MH153	MH152								1.86				4.40	19.04	12.95				90.81	106.39	155.43	1,729.39													
						0.16									0.25	0.76	12.95	0.93	13.89		90.81	106.39	155.43		118.22		1847.6	2,156.5	81.80	1350			0.15	1.460	308.94	14.33%	
	Blocks 39	MH152	MH151								4.52				10.68	29.72	13.89				87.34	102.30	149.42	2,595.97													
															0.00	0.76	13.89	0.17	14.06		87.34	102.30	149.42		113.65		2709.6	3,006.9	13.91	1650			0.10	1.362	297.24	9.89%	
		MH151	MH150			0.17									0.27	29.99	14.06				86.73	101.59	148.38	2,601.44													
															0.00	0.76	14.06	1.27	15.32		86.73	101.59	148.38		112.86		2714.3	3,006.9	103.40	1650			0.10	1.362	292.57	9.73%	
		MH150	MH120												0.00	29.99	15.32				82.53	96.65	141.13	2,475.41													
						0.20									0.32	1.08	15.32	0.89	16.21		82.53	96.65	141.13		152.07		2627.5	3,006.9	72.86	1650			0.10	1.362	379.39	12.62%	
Campeau Drive	Blocks 3,38	MH99	MH100								5.84				13.80	13.80	11.70				96.00	112.49	164.38	1,324.74													
															0.68	0.68	11.70	1.13	12.83		96.00	112.49	164.38		111.87		1436.6	1,560.3	118.50	1050			0.30	1.746	123.74	7.93%	
	Blocks 4,37	MH100	MH101								1.58				3.73	17.53	12.83				91.29	106.95	156.24	1,600.													



Wingate Hotel
City of Ottawa

J:\114827_WingateHtl\5.7 Calculations\5.7.1 Sewers & Grading\CCS_storm_2018-07-17



IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

PROJECT: Wingate Hotel
DATE: 7/30/2018
FILE: 114827
REV #:
DESIGNED BY: JEB
CHECKED BY: TB

STORMWATER MANAGEMENT

Formulas and Descriptions

$i_{2yr} = 1.2 \text{ year Intensity} = 732.951 / (T_c + 6.199)^{0.810}$
 $i_{5yr} = 1.5 \text{ year Intensity} = 998.071 / (T_c + 6.053)^{0.814}$
 $i_{100yr} = 1:100 \text{ year Intensity} = 1735.688 / (T_c + 6.014)^{0.820}$
 T_c = Time of Concentration (min)
 C = Average Runoff Coefficient
 A = Area (Ha)
 Q = Flow = $2.78CiA$ (L/s)

Maximum Allowable Release Rate

Restricted Flowrate from Kanata West Business Park approved Table 4.1 (see table in Appendix C)

Release rate North side (MU02) 187 L/s

$Q_{TOTAL} = 187.00 \text{ L/s}$

Uncontrolled Release ($Q_{uncontrolled} = 2.78 \cdot C \cdot i_{100yr} \cdot A_{uncontrolled}$)

$C = 0.69$
 $T_c = 10 \text{ min}$
 $i_{100yr} = 178.56 \text{ mm/hr}$
 $A_{uncontrolled} = 0.30 \text{ Ha}$

$Q_{uncontrolled} = 102.85 \text{ L/s}$

Uncontrolled Areas	Area	C Value	Area Ave.	Weighted C
UC1	0.08	0.39	0.27	0.10
CBMH1	0.04	0.35	0.13	0.05
R1	0.18	0.9	0.60	0.54
0.3				1.00
				0.69

Maximum Allowable Release Rate ($Q_{max \text{ allowable}} = Q_{restricted} - Q_{uncontrolled}$)

$Q_{max \text{ allowable}} = 84.15 \text{ L/s}$

MODIFIED RATIONAL METHOD (100-Year, 5-Year & 2-Year Ponding)

Drainage Area		RYCB2 (1 & 8 with weighted average C)			
Area (Ha)	0.060				
C =	0.45	Restricted Flow Q_r (L/s)= 9.00			
100-Year Ponding					
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)
4	262.41	19.70	9.00	10.70	2.57
6	226.01	16.96	9.00	7.96	2.87
7	211.67	15.89	9.00	6.89	2.89
8	199.20	14.95	9.00	5.95	2.86
10	178.56	13.40	9.00	4.40	2.64

Storage (m^3)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	2.89	3.10	0.00	0.00

Drainage Area		RYCB2			
Area (Ha)	0.060				
C =	0.36		Restricted Flow Q_r (L/s)= 9.00		
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78 \times C i_{5yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
-1	266.98	16.03	9.00	7.03	-0.42
1	203.51	12.22	9.00	3.22	0.19
2	182.69	10.97	9.00	1.97	0.24
3	166.09	9.97	9.00	0.97	0.18
5	141.18	8.48	9.00	-0.52	-0.16

Storage (m^3)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	0.24	3.10	0.00	0.00

Drainage Area		CB3			
Area (Ha)		0.210			
C =	0.91	Restricted Flow Q_r (L/s)= 13.00			
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78 \times C i_{100yr} A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
33	86.03	45.83	13.00	32.83	65.01
35	82.58	43.99	13.00	30.99	65.08
36	80.96	43.13	13.00	30.13	65.08
37	79.42	42.31	13.00	29.31	65.06
39	76.51	40.76	13.00	27.76	64.96
Storage (m^3)					
Overflow	Required	Surface	Sub-surface	Balance	
0.00	65.08	64.65	0.00	0.43	

Drainage Area		CB3			
Area (Ha)	0.210				
C =	0.73	Restricted Flow Q_r (L/s)= 13.00			
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78 \times C i_{5yr} A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
14	86.93	37.05	13.00	24.05	20.20
16	80.46	34.29	13.00	21.29	20.44
17	77.61	33.07	13.00	20.07	20.48
18	74.97	31.95	13.00	18.95	20.47
20	70.25	29.94	13.00	16.94	20.33
Storage (m^3)					
Overflow	Required	Surface	Sub-surface	Balance	
0.00	20.48	64.65	0.00	0.00	

Drainage Area		CB2			
Area (Ha)	0.170				
C =	0.95	Restricted Flow Q_r (L/s)= 15.00			
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78 \times C i_{100yr} A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
23	109.68	49.24	15.00	34.24	47.26
25	103.85	46.62	15.00	31.62	47.44
26	101.18	45.43	15.00	30.43	47.47
27	98.66	44.30	15.00	29.30	47.46
29	94.01	42.21	15.00	27.21	47.34
Storage (m^3)					
Overflow	Required	Surface	Sub-surface	Balance	
0.43	47.90	47.87	0	0.03	

Drainage Area		CB2			
Area (Ha)		0.170			
C =		0.76 Restricted Flow Q_r (L/s)= 15.00			
5-Year Ponding					
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	104.19	37.42	15.00	22.42	13.45
12	94.70	34.01	15.00	19.01	13.69
13	90.63	32.55	15.00	17.55	13.69
14	86.93	31.22	15.00	16.22	13.63
16	80.46	28.90	15.00	13.90	13.34
Storage (m^3)					
Overflow	Required	Surface	Sub-surface	Balance	
0.00	13.69	47.87	0	0.00	

Drainage Area		CB1			
Area (Ha)		0.120			
C =	0.94	Restricted Flow Q_r (L/s)= 6.00			
100-Year Ponding					
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)
41	73.83	23.09	6.00	17.09	42.04
43	71.35	22.32	6.00	16.32	42.09
44	70.18	21.95	6.00	15.95	42.11
45	69.05	21.60	6.00	15.60	42.11
47	66.91	20.93	6.00	14.93	42.09
Storage (m^3)					
Overflow	Required	Surface	Sub-surface	Balance	
0.03	42.13	47.71	0	0.00	

Drainage Area		CB1			
Area (Ha)		0.120			
C =		0.75		Restricted Flow Q_r (L/s)= 6.00	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p=2.78Ci_{5yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
19	72.53	18.15	6.00	12.15	13.85
21	68.13	17.05	6.00	11.05	13.92
22	66.15	16.55	6.00	10.55	13.93
23	64.29	16.08	6.00	10.08	13.92
25	60.90	15.24	6.00	9.24	13.85
Storage (m^3)					
Overflow	Required	Surface	Sub-surface	Balance	
0.03	13.95	47.71	0	0.00	

Drainage Area		RYCB1				
Area (Ha)		0.070				
C =		0.38	Restricted Flow Q _r (L/s)=		18.00	
100-Year Ponding						
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)	
-1	462.72	33.77	18.00	15.77	-0.95	
1	351.38	25.64	18.00	7.64	0.46	
2	315.00	22.99	18.00	4.99	0.60	
3	286.05	20.87	18.00	2.87	0.52	
5	242.70	17.71	18.00	-0.29	-0.09	

Storage (m^3)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	0.60	0.71	0	0.00

Drainage Area		RYCB1			
Area (Ha)		0.070			
C =	0.30	Restricted Flow Q _r (L/s)=		18.00	
5-Year Ponding					
T _c Variable (min)	i _{5yr} (mm/hour)	Peak Flow Q _p = 2.78C <i>i</i> _{5yr} A (L/s)	Q _r (L/s)	Q _p - Q _r (L/s)	Volume 5yr (m ³)
-3	402.34	23.49	18.00	5.49	-0.99
-1	266.98	15.59	18.00	-2.41	0.14
0	230.48	13.46	18.00	-4.54	0.00
1	203.51	11.88	18.00	-6.12	-0.37
3	166.09	9.70	18.00	-8.30	-1.49

Storage (m^3)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	0.71	0	0.00

Drainage Area		CBMH5			
Area (Ha)	0.080				
C =	0.94	Restricted Flow Q _r (L/s)= 23.00			
100-Year Ponding					
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)
5	242.70	50.60	23.00	27.60	8.28
7	211.67	44.13	23.00	21.13	8.88
8	199.20	41.53	23.00	18.53	8.90
9	188.25	39.25	23.00	16.25	8.78
11	169.91	35.43	23.00	12.43	8.20

Storage (m^3)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	8.90	11.54	0	0.00

Drainage Area		CBMH5			
Area (Ha)	0.080				
C =	0.75	Restricted Flow Q _r (L/s)=		23.00	
5-Year Ponding					
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	230.48	38.44	23.00	15.44	0.00
2	182.69	30.47	23.00	7.47	0.90
3	166.09	27.70	23.00	4.70	0.85
4	152.51	25.44	23.00	2.44	0.59
6	131.57	21.95	23.00	-1.05	-0.38

Storage (m^3)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	0.85	11.54	0	0.00

Figure 3.4.35
Subwatershed Stormwater
Infiltration Potential



LF Landfill
U Urban

Suitable

Sand and Gravel (> 3m Deep)

Questionable (Percolation Rates $\geq 15\text{mm/hr}$
or Overburden Depth < 3m)

Fine Sand Loam Over Clay

Peat Over Till

Till

Unsuitable (Percolation Rates $\gg 15\text{mm/hr}$)

Clay

Unsuitable (Shallow Bedrock)

Bedrock

Planning Area

Carp River Watershed

Drainage

Carp River

Village / Hamlet

Roads

4 Lane Highway

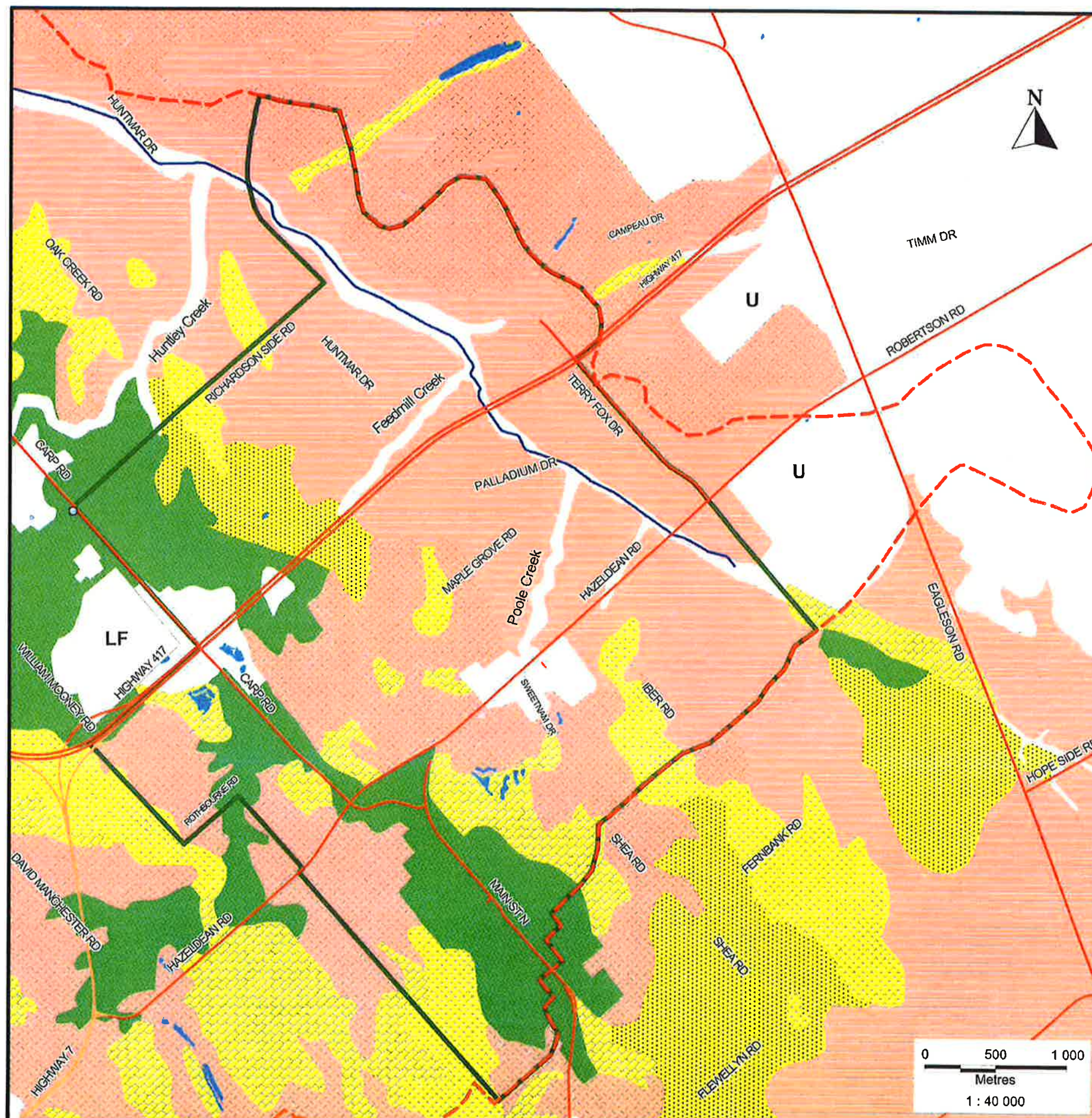
Highway

Main

Secondary

**Robinson
Consultants**

Aquafor
Beech
Limited



Natural Environment (NE) 20%

All three alternatives will have essentially the same impact on the natural environment. Alternative I has a minor increased impact due to the number of ponds (8) and their location within the KWCP.

5.5.2 Selection of Stormwater Management Alternatives

Based on the above evaluation, Alternative III is selected as the preferred stormwater management alternative. This option offers the greatest amount of flexibility for phasing opportunities while providing an economical servicing solution that meets the objectives of the Carp River Watershed/Subwatershed Study.

5.6 Best Management Practices

The Carp River Watershed/Subwatershed Study (Robinson Consultants, November 2004) proposes target infiltration rates of 104 mm/yr and 73 mm/yr for areas of moderate and low recharge, respectively, within the KWCP. To meet the identified infiltration targets suggested the following best management practices (BMP's) were recommended and are shown on Figures 7.3.3 through 7.3.7 in Appendix 3.4.

- Subsurface Infiltration;
- Biofilters;
- Wet ponds; and
- Dry ponds.

A water balance and subsurface hydrogeological investigation at the detailed design stage will dictate which of the proposed BMPs will be selected for specific developments.

Given the establishment of the dominant soil associations that exist in the Study area (see Figure 5.4), and considering the extent of the poorly draining soils within the nearly flat topography, it is apparent that drainage in the Study area is primarily governed by the characteristics of the poorly draining silty clay to clay soils underlying all but a small percentage of the Study area. As a result, the establishment of the infiltration rates of the soils can be simplified to reflect the silty clay to clay soils and the till material over bedrock. Table 5.6 below summarizes the anticipated infiltration rates of these two principal soil groups, based on soil characteristics and borehole data regarding degree of compaction.

Table 5.6 -Summary of Infiltration Rates of Principal Soil Groups

Soil Groups	Estimated Infiltration Rates ¹ (mm/yr)	Percent of Annual Rainfall Infiltrated
Castor, Dalhousie, North Gower (silty clay to clay)	50-70 mm/yr	5-7
Anstruther, Farmington, Nepean (sandy loams to till)	70-100 mm/yr	7-11

STANTEC / CUMMING COCKBURN LIMITED / IBI GROUP
Kanata West Master Servicing Study June 2006

1. Infiltration rates presented in this table are consistent with the average hydraulic conductivities of the individual soils comprising the principal soil group.

As the infiltration rates provided in Table 5.6 reflect estimated hydraulic conductivities only, further in-situ analysis of soils under saturated loading conditions is necessary at each site in order to provide site-specific values. The above rates are based on borehole logs completed to date appended to this report in Appendix 3.5.

Post development infiltration rates are to be increased by 25 percent above the pre-development rate. This rate of infiltration has been established to compensate for those areas (i.e. Roadway corridors) that can not provide infiltration.

5.7 Stormwater Management Design

Preliminary site plans of each of the proposed ponds have been prepared and are provided in Appendix 3.1. These ponds have been sized to meet the requirements established in Section 5.2. It is noted that the pond site plans are included to demonstrate the land area required to accommodate an appropriate SWM facility and are not intended for construction purposes. A detailed design of the specific facilities will be required at the subsequent design stage. Stage-storage curves for the proposed ponds are presented in Appendix 3.3.1.

At the detailed design stage for Ponds 6 and 7, consideration shall be made for erosion control volumes in order to comply with any erosion control criteria established for Feedmill Creek.

Low flow velocities for existing and future conditions were modeled for the 2, 5 and 10 year events to assess erosion potential. Pond banks are clay and loam and the calculated velocities do not approach levels that would create erosion for these banks.

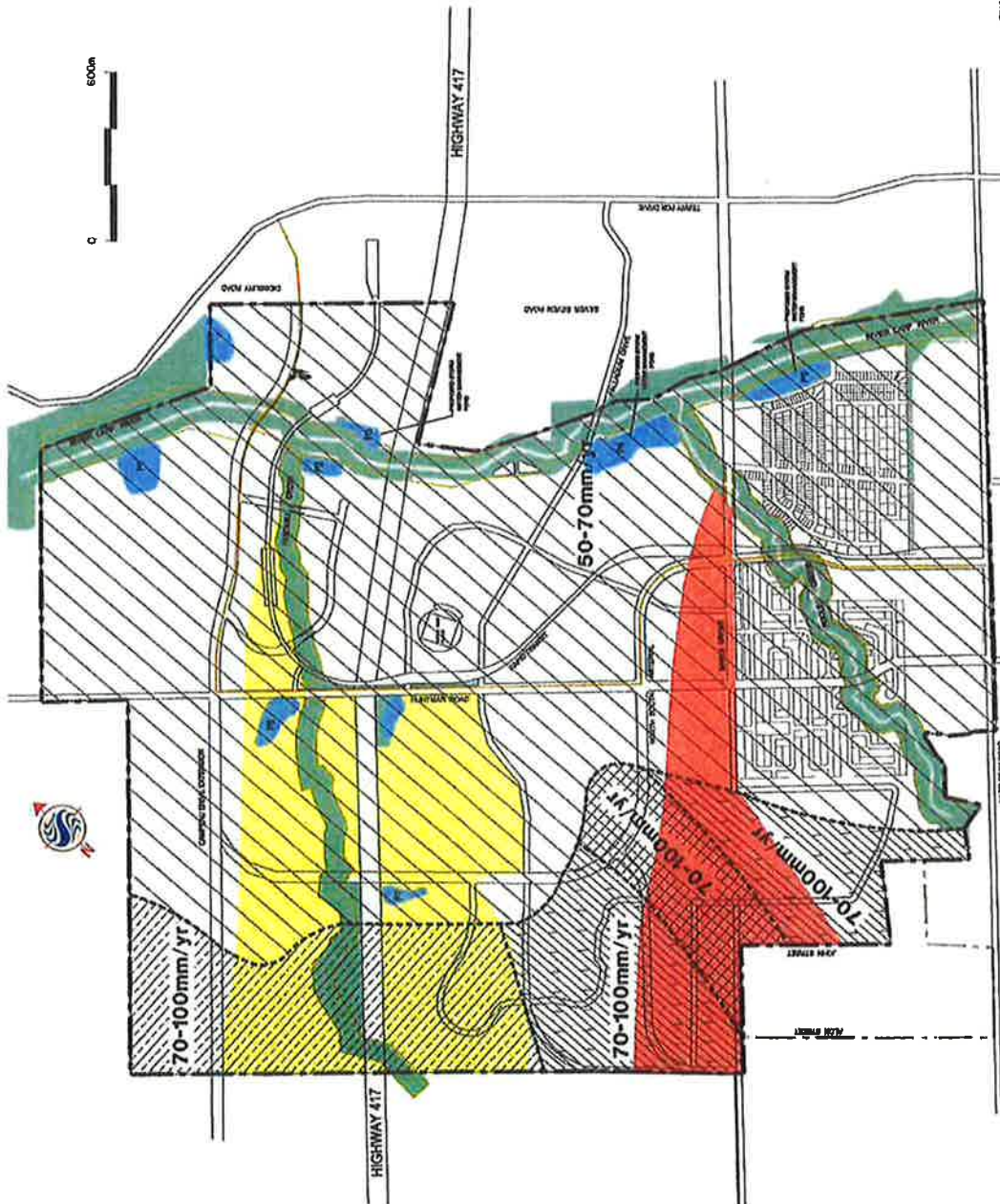
The post development analysis addresses the potential changes in the Regulatory 1:100 year flood plain and the potential impact on erosion throughout the reach. The hydrologic and hydraulic analysis, which has been reviewed and supported by the Mississippi Valley Conservation Authority, indicates that there will be no significant impact. A further assessment of the potential for erosion has been conducted in the Flow Characterization and Flood Level Analysis, prepared by CH2MHill and dated June 2006. Pond sizing is provided in Tables 5.7.1 and 5.7.2 below.

Table 5.7.1 – Stormwater Management Pond Elevations
Constraining the Minor System

Pond	Carp/Poole/Feedmill 100 year Water Level (m)*	Carp/Poole/Feedmill Normal Water Level (m)	100 year Pond Level* (m)
1	93.65	92.00	93.96
2	93.80	92.25	94.23
3	93.85	92.25	94.20
4	94.20	92.50	94.74
5	94.60	92.70	94.94
6	97.20	96.50	98.94
7	101.80	100.50	102.92

- 100 yr water levels from Mississippi Valley Conservation Authority Regulatory Floodplain Mapping

INFILTRATION TARGETS



SOIL TYPE	RECHARGE
FINE SAND	MODERATE
PALEOZOIC BEDROCK	MODERATE
TILL	MODERATE
CLAY	LOW

- Kanata-West Concept Plan Boundary
- Area Tributary To Feedmill Creek (Existing Conditions)
- Area Tributary To Maple Grove Ditch System and Poole Creek (Existing Conditions)
- OPEN SPACE

NOTE:
SOIL TYPES AND RECHARGE POTENTIAL FROM CARP RIVER WATERSHED/SUBWATERSHED STUDY BY ROBINSON CONSULTANTS INC. 2004.
TARGET INFILTRATION RATES OBTAINED FROM ENVIRONMENTAL FACT SHEETS FROM 2004 REPORT.

FIG. 5.4

MAY 2006

CCL/IBI



SUMMARY OF INFILTRATION GALLERY CALCULATIONS
AVERAGE SILTY SAND PERCOLATION RATE

annual precipitation (mm) 800.4
95% available runoff (mm) 760.38
area (ha) 1.09

								Infiltration Gallery Overflow (%)			Overflow Volume (m³)			Infiltration Volume (m³)		
Building ID	Area (m²)	Available Runoff Volume (m³)	Gallery ID	Width (m)	Length (m)	Area (m2)	Depth (m)	WET YEAR	DRY YEAR	AVERAGE	WET YEAR	DRY YEAR	AVERAGE	WET YEAR	DRY YEAR	AVERAGE
Wingate Hotel	1365	1038	1	5	10	50	1.5	26.82%	3.89%	15.36%	278	40	159	760	998	879
TOTAL		1038									159			879		

AVERAGE INFILTRATION RATE 80.60
REQUIRED INFILTRATION RATE 75

INFILTRATION GALLERY SIZING CALCULATION

WET YEAR CALCULATION

Wingate Hotel	1365 m ²
Effective Runoff	0.95 %
Percolation	1.08 (m/day, avg silty sand)
INFILTRATION GALLERY SIZING	
Width	6 m
Length	6.5 m
depth	1.5 m
Number Cells	1
void ratio	0.38
22.23 TOTAL DRYCELL VOL	

PRECIPITATION DATA APRIL 1 TO OCTOBER 31 (WET YEAR)	
TOT PRECIP DEPTH	800.4 mm
TOTAL PRECIP VOLUME	1038 m3
TOT INFILTRATION VOL	818 m3
DEVELOPMENT AREA	1.09 ha
INFIL RATE	75.06 mm/year
OVERFLOW VOL	219 m3/year

RUNOFF VOLUME OVERFLOW 26.82%

DATE	RAINFALL	RAINFALL INTENSITY (AVG)	RAINWATER AVAILABLE	VOLUME INFLOW TO DRYCELL	VOLUME IN DRY CELL	VOLUME PASSING DRY CELL	INFILTRATION FROM BOTTOM	INFILTRATION FROM SIDES (BOTTOM 1/3)	BALANCE IN DRYCELL
	[MM]	[MM/HR]	[M ³]	[M ³]	[M ³]	[M ³]	[M ³]	[M ³]	[M ³]
1-Apr	0.2	0.008	0	0	0	0	0	0	0
2-Apr	0.4	0.017	1	1	1	0	1	0	0
3-Apr	0	0.000	0	0	0	0	0	0	0
4-Apr	0	0.000	0	0	0	0	0	0	0
5-Apr	0	0.000	0	0	0	0	0	0	0
6-Apr	7.8	0.325	10	10	10	0	10	0	0
7-Apr	3.4	0.142	4	4	4	0	4	0	0
8-Apr	4.6	0.192	6	6	6	0	6	0	0
9-Apr	4.2	0.175	5	5	5	0	5	0	0
10-Apr	0	0.000	0	0	0	0	0	0	0
11-Apr	0	0.000	0	0	0	0	0	0	0
12-Apr	0	0.000	0	0	0	0	0	0	0
13-Apr	0	0.000	0	0	0	0	0	0	0
14-Apr	0	0.000	0	0	0	0	0	0	0
15-Apr	0	0.000	0	0	0	0	0	0	0
16-Apr	0	0.000	0	0	0	0	0	0	0
17-Apr	0	0.000	0	0	0	0	0	0	0
18-Apr	0	0.000	0	0	0	0	0	0	0
19-Apr	0	0.000	0	0	0	0	0	0	0
20-Apr	8.2	0.342	11	11	11	0	11	0	0
21-Apr	2.8	0.117	4	4	4	0	4	0	0
22-Apr	0	0.000	0	0	0	0	0	0	0
23-Apr	0	0.000	0	0	0	0	0	0	0
24-Apr	0	0.000	0	0	0	0	0	0	0
25-Apr	0	0.000	0	0	0	0	0	0	0
26-Apr	0	0.000	0	0	0	0	0	0	0
27-Apr	0	0.000	0	0	0	0	0	0	0
28-Apr	0	0.000	0	0	0	0	0	0	0
29-Apr	0	0.000	0	0	0	0	0	0	0
30-Apr	0	0.000	0	0	0	0	0	0	0
1-May	9	0.375	12	12	12	0	12	0	0
2-May	0	0.000	0	0	0	0	0	0	0
3-May	0	0.000	0	0	0	0	0	0	0
4-May	2.4	0.100	3	3	3	0	3	0	0
5-May	8	0.333	10	10	10	0	10	0	0
6-May	1	0.042	1	1	1	0	1	0	0
7-May	1.6	0.067	2	2	2	0	2	0	0
8-May	0.8	0.033	1	1	1	0	1	0	0
9-May	0	0.000	0	0	0	0	0	0	0
10-May	0	0.000	0	0	0	0	0	0	0
11-May	0	0.000	0	0	0	0	0	0	0
12-May	0	0.000	0	0	0	0	0	0	0
13-May	0	0.000	0	0	0	0	0	0	0
14-May	0	0.000	0	0	0	0	0	0	0
15-May	1	0.042	1	1	1	0	1	0	0
16-May	17.4	0.725	23	22	22	0	22	0	0
17-May	0	0.000	0	0	0	0	0	0	0
18-May	11	0.458	14	14	14	0	14	0	0
19-May	30.2	1.258	39	22	22	17	22	0	0
20-May	29.4	1.225	38	22	22	16	22	0	0
21-May	5.9	0.246	8	8	8	0	8	0	0
22-May	26.9	1.121	35	22	22	13	22	0	0
23-May	11.3	0.471	15	15	15	0	15	0	0
24-May	0.4	0.017	1	1	1	0	1	0	0
25-May	0	0.000	0	0	0	0	0	0	0
26-May	0	0.000	0	0	0	0	0	0	0
27-May	7.8	0.325	10	10	10	0	10	0	0
28-May	0	0.000	0	0	0	0	0	0	0
29-May	0	0.000	0	0	0	0	0	0	0
30-May	0	0.000	0	0	0	0	0	0	0
31-May	0	0.000	0	0	0	0	0	0	0
1-Jun	10.6	0.442	14	14	14	0	14	0	0
2-Jun	0	0.000	0	0	0	0	0	0	0
3-Jun	0	0.000	0	0	0	0	0	0	0
4-Jun	0	0.000	0	0	0	0	0	0	0
5-Jun	1.4	0.058	2	2	2	0	2	0	0
6-Jun	0	0.000	0	0	0	0	0	0	0
7-Jun	5	0.208	6	6	6	0	6	0	0
8-Jun	0.2	0.008	0	0	0	0	0	0	0
9-Jun	0	0.000	0	0	0	0	0	0	0
10-Jun	0	0.000	0	0	0	0	0	0	0
11-Jun	4.8	0.200	6	6	6	0	6	0	0
12-Jun	26.2	1.092	34	22	22	12	22	0	0
13-Jun	1	0.042	1	1	1	0	1	0	0
14-Jun	0	0.000	0	0	0	0	0	0	0
15-Jun	0	0.000	0	0	0	0	0	0	0
16-Jun	5.6	0.233	7	7	7	0	7	0	0
17-Jun	0	0.000	0	0	0	0	0	0	0
18-Jun	0	0.000	0	0	0	0	0	0	0
19-Jun	4	0.167	5	5	5	0	5	0	0
20-Jun	0	0.000	0	0	0	0	0	0	0
21-Jun	0	0.000	0	0	0	0	0	0	0
22-Jun	0	0.000	0	0	0	0	0	0	0
23-Jun	1	0.042	1	1	1	0	1	0	0
24-Jun	27.2	1.133	35	22	22	13	22	0	0
25-Jun	0	0.000	0	0	0	0	0	0	0
26-Jun	0	0.000	0	0	0	0	0	0	0
27-Jun	29	1.208	38	22	22	15	22	0	0
28-Jun	0	0.000	0	0	0	0	0	0	0
29-Jun	0.2	0.008	0	0	0	0	0	0	0
30-Jun	0	0.000	0	0	0	0	0	0	0
1-Jul	0	0.000	0	0	0	0	0	0	0
2-Jul	10	0.417	13	13	13	0	13	0	0
3-Jul	14.8	0.617	19	19	19	0	19	0	0
4-Jul	7.6	0.317	10	10	10	0	10	0	0
5-Jul	14.8	0.617	19	19	19	0	19	0	0
6-Jul	0	0.000	0	0	0	0	0	0	0
7-Jul	0	0.000	0	0	0	0	0	0	0

8-Jul	0	0.000	0	0	0	0	0	0	0
9-Jul	0	0.000	0	0	0	0	0	0	0
10-Jul	0	0.000	0	0	0	0	0	0	0
11-Jul	0	0.000	0	0	0	0	0	0	0
12-Jul	0	0.000	0	0	0	0	0	0	0
13-Jul	10.6	0.442	14	14	14	0	14	0	0
14-Jul	0.4	0.017	1	1	1	0	1	0	0
15-Jul	0	0.000	0	0	0	0	0	0	0
16-Jul	0	0.000	0	0	0	0	0	0	0
17-Jul	0	0.000	0	0	0	0	0	0	0
18-Jul	0	0.000	0	0	0	0	0	0	0
19-Jul	0	0.000	0	0	0	0	0	0	0
20-Jul	6.2	0.258	8	8	8	0	8	0	0
21-Jul	0	0.000	0	0	0	0	0	0	0
22-Jul	0	0.000	0	0	0	0	0	0	0
23-Jul	0	0.000	0	0	0	0	0	0	0
24-Jul	0	0.000	0	0	0	0	0	0	0
25-Jul	3.6	0.150	5	5	5	0	5	0	0
26-Jul	31.6	1.317	41	22	22	19	22	0	0
27-Jul	0	0.000	0	0	0	0	0	0	0
28-Jul	0	0.000	0	0	0	0	0	0	0
29-Jul	42.4	1.767	55	22	22	33	22	0	0
30-Jul	2.4	0.100	3	3	3	0	3	0	0
31-Jul	0	0.000	0	0	0	0	0	0	0
1-Aug	0.6	0.025	1	1	1	0	1	0	0
2-Aug	10.8	0.450	14	14	14	0	14	0	0
3-Aug	0	0.000	0	0	0	0	0	0	0
4-Aug	0	0.000	0	0	0	0	0	0	0
5-Aug	0.4	0.017	1	1	1	0	1	0	0
6-Aug	4	0.167	5	5	5	0	5	0	0
7-Aug	1.2	0.050	2	2	2	0	2	0	0
8-Aug	2.8	0.117	4	4	4	0	4	0	0
9-Aug	11	0.458	14	14	14	0	14	0	0
10-Aug	0	0.000	0	0	0	0	0	0	0
11-Aug	0	0.000	0	0	0	0	0	0	0
12-Aug	0	0.000	0	0	0	0	0	0	0
13-Aug	0	0.000	0	0	0	0	0	0	0
14-Aug	0	0.000	0	0	0	0	0	0	0
15-Aug	2	0.083	3	3	3	0	3	0	0
16-Aug	0	0.000	0	0	0	0	0	0	0
17-Aug	0	0.000	0	0	0	0	0	0	0
18-Aug	14.2	0.592	18	18	18	0	18	0	0
19-Aug	0	0.000	0	0	0	0	0	0	0
20-Aug	0	0.000	0	0	0	0	0	0	0
21-Aug	15.6	0.650	20	20	20	0	20	0	0
22-Aug	0	0.000	0	0	0	0	0	0	0
23-Aug	6.6	0.275	9	9	9	0	9	0	0
24-Aug	0.8	0.033	1	1	1	0	1	0	0
25-Aug	0	0.000	0	0	0	0	0	0	0
26-Aug	3.8	0.158	5	5	5	0	5	0	0
27-Aug	24.2	1.008	31	22	22	9	22	0	0
28-Aug	0.8	0.033	1	1	1	0	1	0	0
29-Aug	0	0.000	0	0	0	0	0	0	0
30-Aug	0	0.000	0	0	0	0	0	0	0
31-Aug	0	0.000	0	0	0	0	0	0	0
1-Sep	0	0.000	0	0	0	0	0	0	0
2-Sep	0.4	0.017	1	1	1	0	1	0	0
3-Sep	0	0.000	0	0	0	0	0	0	0
4-Sep	1.9	0.079	2	2	2	0	2	0	0
5-Sep	5.8	0.242	8	8	8	0	8	0	0
6-Sep	0	0.000	0	0	0	0	0	0	0
7-Sep	0	0.000	0	0	0	0	0	0	0
8-Sep	0	0.000	0	0	0	0	0	0	0
9-Sep	0	0.000	0	0	0	0	0	0	0
10-Sep	6.4	0.267	8	8	8	0	8	0	0
11-Sep	61.8	2.575	80	22	22	58	22	0	0
12-Sep	20.6	0.858	27	22	22	4	22	0	0
13-Sep	5.8	0.242	8	8	8	0	8	0	0
14-Sep	0	0.000	0	0	0	0	0	0	0
15-Sep	8.1	0.338	11	11	11	0	11	0	0
16-Sep	2.3	0.096	3	3	3	0	3	0	0
17-Sep	0	0.000	0	0	0	0	0	0	0
18-Sep	0	0.000	0	0	0	0	0	0	0
19-Sep	0	0.000	0	0	0	0	0	0	0
20-Sep	0.8	0.033	1	1	1	0	1	0	0
21-Sep	0	0.000	0	0	0	0	0	0	0
22-Sep	0	0.000	0	0	0	0	0	0	0
23-Sep	13	0.542	17	17	17	0	17	0	0
24-Sep	0	0.000	0	0	0	0	0	0	0
25-Sep	0	0.000	0	0	0	0	0	0	0
26-Sep	0	0.000	0	0	0	0	0	0	0
27-Sep	0	0.000	0	0	0	0	0	0	0
28-Sep	1.3	0.054	2	2	2	0	2	0	0
29-Sep	14.1	0.588	18	18	18	0	18	0	0
30-Sep	25.2	1.050	33	22	22	10	22	0	0
1-Oct	0	0.000	0	0	0	0	0	0	0
2-Oct	0.4	0.017	1	1	1	0	1	0	0
3-Oct	7.8	0.325	10	10	10	0	10	0	0
4-Oct	7.8	0.325	10	10	10	0	10	0	0
5-Oct	6	0.250	8	8	8	0	8	0	0
6-Oct	0.4	0.017	1	1	1	0	1	0	0
7-Oct	0	0.000	0	0	0	0	0	0	0
8-Oct	1	0.042	1	1	1	0	1	0	0
9-Oct	1.2	0.050	2	2	2	0	2	0	0
10-Oct	0	0.000	0	0	0	0	0	0	0
11-Oct	0	0.000	0	0	0	0	0	0	0
12-Oct	0	0.000	0	0	0	0	0	0	0
13-Oct	10.4	0.433	13	13	13	0	13	0	0
14-Oct	9	0.375	12	12	12	0	12	0	0
15-Oct	0	0.000	0	0	0	0	0	0	0
16-Oct	0.2	0.008	0	0	0	0	0	0	0
17-Oct	1.6	0.067	2	2	2	0	2	0	0
18-Oct	0	0.000	0	0	0	0	0	0	0
19-Oct	0	0.000	0	0	0	0	0	0	0
20-Oct	0	0.000	0	0	0	0	0	0	0
21-Oct	5.8	0.242	8	8	8	0	8	0	0
22-Oct	0	0.000	0	0	0	0	0	0	0
23-Oct	1	0.042	1	1	1	0	1	0	0
24-Oct	0	0.000	0	0	0	0	0	0	0
25-Oct	0	0.000	0	0	0	0	0	0	0
26-Oct	1.3	0.054	2	2	2	0	2	0	0
27-Oct	10.9	0.454	14	14	14	0	14	0	0
28-Oct	0	0.000	0	0	0	0	0	0	0
29-Oct	13	0.542	17	17	17	0	17	0	0
30-Oct	0	0.000	0	0	0	0	0	0	0
31-Oct	0	0.000	0	0	0	0	0	0	0

INFILTRATION GALLERY SIZING CALCULATION

DRY YEAR CALCULATION

Wingate Hotel	1365 m ²
Effective Runoff	0.95 %
Percolation	1.08 (m/day, avg silty sand)
INFILTRATION GALLERY SIZING	
Width	6 m
Length	6.5 m
depth	1.5 m
Number Cells	1
void ratio	0.38
22.23 TOTAL DRYCELL VOL	

PRECIPITATION DATA APRIL 1 TO OCTOBER 31 (DRY YEAR)	
TOT PRECIP DEPTH	405.1 mm
TOTAL PRECIP VOLUME	525 m3
TOT INFILTRATION VOL	506 m3
DEVELOPMENT AREA	1.09 ha
INFIL RATE	46.39 mm/year
OVERFLOW VOL	20 m3/year

RUNOFF VOLUME OVERFLOW 3.89%

DATE	RAINFALL	RAINFALL INTENSITY (AVG)	RAINWATER AVAILABLE	VOLUME INFLOW TO DRYCELL	VOLUME IN DRY CELL	VOLUME PASSING DRY CELL	INFILTRATION FROM BOTTOM	INFILTRATION FROM SIDES (BOTTOM 1/3)	BALANCE IN DRYCELL
	[MM]	[MM/HR]	[M ³]	[M ³]	[M ³]	[M ³]	[M ³]	[M ³]	[M ³]
1-Apr	0	0.000	0	0	0	0	0	0	0
2-Apr	0	0.000	0	0	0	0	0	0	0
3-Apr	0	0.000	0	0	0	0	0	0	0
4-Apr	15	0.625	19	19	19	0	19	0	0
5-Apr	0	0.000	0	0	0	0	0	0	0
6-Apr	0	0.000	0	0	0	0	0	0	0
7-Apr	0.3	0.013	0	0	0	0	0	0	0
8-Apr	0	0.000	0	0	0	0	0	0	0
9-Apr	0	0.000	0	0	0	0	0	0	0
10-Apr	0	0.000	0	0	0	0	0	0	0
11-Apr	0	0.000	0	0	0	0	0	0	0
12-Apr	1	0.042	1	1	1	0	1	0	0
13-Apr	1.6	0.067	2	2	2	0	2	0	0
14-Apr	5.9	0.246	8	8	8	0	8	0	0
15-Apr	2.3	0.096	3	3	3	0	3	0	0
16-Apr	0	0.000	0	0	0	0	0	0	0
17-Apr	0	0.000	0	0	0	0	0	0	0
18-Apr	0	0.000	0	0	0	0	0	0	0
19-Apr	0	0.000	0	0	0	0	0	0	0
20-Apr	0	0.000	0	0	0	0	0	0	0
21-Apr	0	0.000	0	0	0	0	0	0	0
22-Apr	6.9	0.288	9	9	9	0	9	0	0
23-Apr	4.8	0.200	6	6	6	0	6	0	0
24-Apr	0.3	0.013	0	0	0	0	0	0	0
25-Apr	0	0.000	0	0	0	0	0	0	0
26-Apr	0	0.000	0	0	0	0	0	0	0
27-Apr	0	0.000	0	0	0	0	0	0	0
28-Apr	0	0.000	0	0	0	0	0	0	0
29-Apr	10.8	0.450	14	14	14	0	14	0	0
30-Apr	1.6	0.067	2	2	2	0	2	0	0
1-May	3.8	0.158	5	5	5	0	5	0	0
2-May	0	0.000	0	0	0	0	0	0	0
3-May	11.3	0.471	15	15	15	0	15	0	0
4-May	0	0.000	0	0	0	0	0	0	0
5-May	0	0.000	0	0	0	0	0	0	0
6-May	4.1	0.171	5	5	5	0	5	0	0
7-May	3	0.125	4	4	4	0	4	0	0
8-May	0	0.000	0	0	0	0	0	0	0
9-May	23.4	0.975	30	22	22	8	22	0	0
10-May	0.5	0.021	1	1	1	0	1	0	0
11-May	0	0.000	0	0	0	0	0	0	0
12-May	22.3	0.929	29	22	22	7	22	0	0
13-May	0	0.000	0	0	0	0	0	0	0
14-May	0	0.000	0	0	0	0	0	0	0
15-May	2.3	0.096	3	3	3	0	3	0	0
16-May	0.3	0.013	0	0	0	0	0	0	0
17-May	0	0.000	0	0	0	0	0	0	0
18-May	0	0.000	0	0	0	0	0	0	0
19-May	0	0.000	0	0	0	0	0	0	0
20-May	0	0.000	0	0	0	0	0	0	0
21-May	0	0.000	0	0	0	0	0	0	0
22-May	8.4	0.350	11	11	11	0	11	0	0
23-May	10	0.417	13	13	13	0	13	0	0
24-May	3.4	0.142	4	4	4	0	4	0	0
25-May	6.2	0.258	8	8	8	0	8	0	0
26-May	1.9	0.079	2	2	2	0	2	0	0
27-May	0.3	0.013	0	0	0	0	0	0	0
28-May	1.3	0.054	2	2	2	0	2	0	0
29-May	1.1	0.046	1	1	1	0	1	0	0
30-May	0	0.000	0	0	0	0	0	0	0
31-May	10.9	0.454	14	14	14	0	14	0	0
1-Jun	0	0.000	0	0	0	0	0	0	0
2-Jun	0.5	0.021	1	1	1	0	1	0	0
3-Jun	0	0.000	0	0	0	0	0	0	0
4-Jun	0	0.000	0	0	0	0	0	0	0
5-Jun	0	0.000	0	0	0	0	0	0	0
6-Jun	0	0.000	0	0	0	0	0	0	0
7-Jun	0	0.000	0	0	0	0	0	0	0
8-Jun	0	0.000	0	0	0	0	0	0	0
9-Jun	0	0.000	0	0	0	0	0	0	0
10-Jun	0	0.000	0	0	0	0	0	0	0
11-Jun	0	0.000	0	0	0	0	0	0	0
12-Jun	0.3	0.013	0	0	0	0	0	0	0
13-Jun	12.2	0.508	16	16	16	0	16	0	0
14-Jun	0.3	0.013	0	0	0	0	0	0	0
15-Jun	1.3	0.054	2	2	2	0	2	0	0
16-Jun	11.8	0.492	15	15	15	0	15	0	0
17-Jun	6.4	0.267	8	8	8	0	8	0	0
18-Jun	0.8	0.033	1	1	1	0	1	0	0
19-Jun	0	0.000	0	0	0	0	0	0	0
20-Jun	5.2	0.217	7	7	7	0	7	0	0
21-Jun	3.2	0.133	4	4	4	0	4	0	0
22-Jun	0	0.000	0	0	0	0	0	0	0
23-Jun	0	0.000	0	0	0	0	0	0	0
24-Jun	0.3	0.013	0	0	0	0	0	0	0
25-Jun	0	0.000	0	0	0	0	0	0	0
26-Jun	0	0.000	0	0	0	0	0	0	0
27-Jun	0	0.000	0	0	0	0	0	0	0
28-Jun	0	0.000	0	0	0	0	0	0	0
29-Jun	0	0.000	0	0	0	0	0	0	0
30-Jun	1.1	0.046	1	1	1	0	1	0	0
1-Jul	0.5	0.021	1	1	1	0	1	0	0
2-Jul	6.1	0.254	8	8	8	0	8	0	0
3-Jul	0	0.000	0	0	0	0	0	0	0
4-Jul	6.4	0.267	8	8	8	0	8	0	0
5-Jul	0.8	0.033	1	1	1	0	1	0	0
6-Jul	0	0.000	0	0	0	0	0	0	0
7-Jul	0	0.000	0	0	0	0	0	0	0

8-Jul	0	0.000	0	0	0	0	0	0	0
9-Jul	6.7	0.279	9	9	9	0	9	0	0
10-Jul	0	0.000	0	0	0	0	0	0	0
11-Jul	0	0.000	0	0	0	0	0	0	0
12-Jul	0	0.000	0	0	0	0	0	0	0
13-Jul	0	0.000	0	0	0	0	0	0	0
14-Jul	0	0.000	0	0	0	0	0	0	0
15-Jul	0	0.000	0	0	0	0	0	0	0
16-Jul	0	0.000	0	0	0	0	0	0	0
17-Jul	0	0.000	0	0	0	0	0	0	0
18-Jul	20.9	0.871	27	22	22	5	22	0	0
19-Jul	11.5	0.479	15	15	15	0	15	0	0
20-Jul	0	0.000	0	0	0	0	0	0	0
21-Jul	0	0.000	0	0	0	0	0	0	0
22-Jul	0	0.000	0	0	0	0	0	0	0
23-Jul	6.9	0.288	9	9	9	0	9	0	0
24-Jul	9.2	0.383	12	12	12	0	12	0	0
25-Jul	0	0.000	0	0	0	0	0	0	0
26-Jul	0.3	0.013	0	0	0	0	0	0	0
27-Jul	1.3	0.054	2	2	2	0	2	0	0
28-Jul	0	0.000	0	0	0	0	0	0	0
29-Jul	1.1	0.046	1	1	1	0	1	0	0
30-Jul	0.3	0.013	0	0	0	0	0	0	0
31-Jul	4.1	0.171	5	5	5	0	5	0	0
1-Aug	0	0.000	0	0	0	0	0	0	0
2-Aug	8.9	0.371	12	12	12	0	12	0	0
3-Aug	11.5	0.479	15	15	15	0	15	0	0
4-Aug	0.8	0.033	1	1	1	0	1	0	0
5-Aug	0	0.000	0	0	0	0	0	0	0
6-Aug	0	0.000	0	0	0	0	0	0	0
7-Aug	0	0.000	0	0	0	0	0	0	0
8-Aug	0.8	0.033	1	1	1	0	1	0	0
9-Aug	0	0.000	0	0	0	0	0	0	0
10-Aug	0	0.000	0	0	0	0	0	0	0
11-Aug	0	0.000	0	0	0	0	0	0	0
12-Aug	1.3	0.054	2	2	2	0	2	0	0
13-Aug	0	0.000	0	0	0	0	0	0	0
14-Aug	0	0.000	0	0	0	0	0	0	0
15-Aug	0	0.000	0	0	0	0	0	0	0
16-Aug	0	0.000	0	0	0	0	0	0	0
17-Aug	0.6	0.025	1	1	1	0	1	0	0
18-Aug	0	0.000	0	0	0	0	0	0	0
19-Aug	5.5	0.229	7	7	7	0	7	0	0
20-Aug	0	0.000	0	0	0	0	0	0	0
21-Aug	0	0.000	0	0	0	0	0	0	0
22-Aug	0	0.000	0	0	0	0	0	0	0
23-Aug	0.8	0.033	1	1	1	0	1	0	0
24-Aug	0	0.000	0	0	0	0	0	0	0
25-Aug	0	0.000	0	0	0	0	0	0	0
26-Aug	0	0.000	0	0	0	0	0	0	0
27-Aug	3.3	0.138	4	4	4	0	4	0	0
28-Aug	0	0.000	0	0	0	0	0	0	0
29-Aug	0	0.000	0	0	0	0	0	0	0
30-Aug	0	0.000	0	0	0	0	0	0	0
31-Aug	0.8	0.033	1	1	1	0	1	0	0
1-Sep	0	0.000	0	0	0	0	0	0	0
2-Sep	0.9	0.038	1	1	1	0	1	0	0
3-Sep	8.4	0.350	11	11	11	0	11	0	0
4-Sep	0	0.000	0	0	0	0	0	0	0
5-Sep	0	0.000	0	0	0	0	0	0	0
6-Sep	0	0.000	0	0	0	0	0	0	0
7-Sep	0	0.000	0	0	0	0	0	0	0
8-Sep	0	0.000	0	0	0	0	0	0	0
9-Sep	0.6	0.025	1	1	1	0	1	0	0
10-Sep	4.4	0.183	6	6	6	0	6	0	0
11-Sep	0	0.000	0	0	0	0	0	0	0
12-Sep	3.5	0.146	5	5	5	0	5	0	0
13-Sep	11.7	0.488	15	15	15	0	15	0	0
14-Sep	0	0.000	0	0	0	0	0	0	0
15-Sep	0	0.000	0	0	0	0	0	0	0
16-Sep	0	0.000	0	0	0	0	0	0	0
17-Sep	1.1	0.046	1	1	1	0	1	0	0
18-Sep	0	0.000	0	0	0	0	0	0	0
19-Sep	0	0.000	0	0	0	0	0	0	0
20-Sep	3.1	0.129	4	4	4	0	4	0	0
21-Sep	1.4	0.058	2	2	2	0	2	0	0
22-Sep	0.6	0.025	1	1	1	0	1	0	0
23-Sep	0	0.000	0	0	0	0	0	0	0
24-Sep	0	0.000	0	0	0	0	0	0	0
25-Sep	4.9	0.204	6	6	6	0	6	0	0
26-Sep	0.3	0.013	0	0	0	0	0	0	0
27-Sep	0	0.000	0	0	0	0	0	0	0
28-Sep	3.9	0.163	5	5	5	0	5	0	0
29-Sep	2.1	0.088	3	3	3	0	3	0	0
30-Sep	0	0.000	0	0	0	0	0	0	0
1-Oct	0	0.000	0	0	0	0	0	0	0
2-Oct	4.5	0.188	6	6	6	0	6	0	0
3-Oct	0	0.000	0	0	0	0	0	0	0
4-Oct	0	0.000	0	0	0	0	0	0	0
5-Oct	0	0.000	0	0	0	0	0	0	0
6-Oct	0	0.000	0	0	0	0	0	0	0
7-Oct	3	0.125	4	4	4	0	4	0	0
8-Oct	0	0.000	0	0	0	0	0	0	0
9-Oct	0	0.000	0	0	0	0	0	0	0
10-Oct	2	0.083	3	3	3	0	3	0	0
11-Oct	0	0.000	0	0	0	0	0	0	0
12-Oct	1.8	0.075	2	2	2	0	2	0	0
13-Oct	0	0.000	0	0	0	0	0	0	0
14-Oct	8.9	0.371	12	12	12	0	12	0	0
15-Oct	0	0.000	0	0	0	0	0	0	0
16-Oct	0	0.000	0	0	0	0	0	0	0
17-Oct	6.8	0.283	9	9	9	0	9	0	0
18-Oct	0	0.000	0	0	0	0	0	0	0
19-Oct	0	0.000	0	0	0	0	0	0	0
20-Oct	0	0.000	0	0	0	0	0	0	0
21-Oct	0	0.000	0	0	0	0	0	0	0
22-Oct	0	0.000	0	0	0	0	0	0	0
23-Oct	0	0.000	0	0	0	0	0	0	0
24-Oct	0	0.000	0	0	0	0	0	0	0
25-Oct	6.6	0.275	9	9	9	0	9	0	0
26-Oct	0	0.000	0	0	0	0	0	0	0
27-Oct	0	0.000	0	0	0	0	0	0	0
28-Oct	0	0.000	0	0	0	0	0	0	0
29-Oct	0	0.000	0	0	0	0	0	0	0
30-Oct	5.5	0.229	7	7	7	0	7	0	0
31-Oct	0.3	0.013	0	0	0	0	0	0	0

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 4648-A2KQFP

Issue Date: September 28, 2015

RioCan Management Inc.
2300 Yonge Street, Suite 500
Toronto, Ontario
M4P 1E4

Site Location: 333 Huntmar Drive - Tanger Outlet Centre
Kanata West Pond 6 East SWM Facility
Part of Lots 3 and 4, Concession 1 (Huntley)
City of Ottawa

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

amendment of wastewater infrastructure servicing the approximately 20 hectare Tanger Outlet Mall and Hotel Site commercial development, located between Palladium Drive and Huntmar Drive, immediately south of Campeau Drive in the City of Ottawa, including stormwater management facilities for the collection, treatment and disposal of stormwater run-off from the development and from approximately 25.2 hectares of land external to the development and draining to the Tanger Outlet Centre SWM Facility, identified as Pond 6 East providing Enhanced Level water quality control and erosion protection, and attenuating post-development peak flows to targeted outflow rates established in the Kanata West Master Servicing Study for various storm events, discharging via Feedmill Creek to the Carp River and the Ottawa River, to increase the catchment area draining to the Kanata West Pond 6 East, consisting of the following:

Proposed Works:

stormwater management facility (Pond 6 East - revised catchment area 45.74 hectares): - a wet pond located west of Huntmar Drive, south of Campeau Drive, adjacent to and on the north side of Feedmill Creek with a sediment forebay, having a permanent pool volume of $10,477 \text{ m}^3$, an extended detention volume of $1,830 \text{ m}^3$, and a total storage volume of approximately $24,525 \text{ m}^3$, including the permanent pool volume, at a total depth of approximately 5.4 m, discharging to Feedmill Creek, just upstream of Huntmar Drive;

Previous Works:

sanitary sewer on Huntmar Drive from the development, and on Campeau Drive, connecting to an existing 375 mm diameter sanitary sewer at the intersection of Huntmar Drive and Campeau Drive which discharges to the Signature Ridge Pumping Station at Didsbury Road and Terry Fox Drive to the east;

storm sewer on Campeau Drive, west from Huntmar Drive, connecting through the Tanger Outlet Mall development to the stormwater management facility, identified below;

stormwater management facility (Pond 6 East - catchment area 39.35 hectares): - a wet pond located west of Huntmar Drive, south of Campeau Drive, adjacent to and on the north side of Feedmill Creek with a sediment forebay, having a permanent pool volume of 10,477 m³, an extended detention volume of 1,766 m³, and a total storage volume of approximately 23,610 m³, including the permanent pool volume, at a total depth of approximately 5.4 m, discharging to Feedmill Creek, just upstream of Huntmar Drive;

oil and grit separator and outfall (catchment area 2.37 hectares): - a temporary oil and grit separator (Model Number Vortechs 16000 or Equivalent), receiving flows from the approximately 2.4 hectare Tanger Outlet Centre Hotel Site, located west of Huntmar Drive, adjacent to and on the south side of Feedmill Creek, having a sediment storage capacity of 5.43 m³, an oil storage capacity of 3,175 L, a total storage volume of 18,349 L, and a peak treatment capacity of 707.9 L/s, discharging via an 825 mm diameter storm sewer outfall to Feedmill Creek, just upstream of Huntmar Drive;

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

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

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

"Approval" means this entire document including the application and any supporting documents listed in any schedules in this Approval;

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

"District Manager" means the District Manager of the Ottawa office of the Ministry;

"Equivalent" means a substituted product that meets the required quality and performance standards of a named product;

"Ministry" means the ministry of the government of Ontario responsible for the Environmental Protection Act and the Ontario Water Resources Act and includes all officials, employees or other persons acting on its behalf;

"Owner" means RioCan Management Inc. and includes their successors and assignees;

"Previous Works" means those portions of the sewage Works previously approved under an Approval;

"Water Supervisor" means the Water Supervisor of the Ottawa office of the Ministry;

"Works" means the sewage works described in the Owner's application(s) and this Approval.

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

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

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

(2) The designation of the City of Ottawa as the operating authority of the site on the application for approval of the Works does not relieve the Owner from the responsibility of complying with any and all of the Conditions of this Approval.

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

(4) Where there is a conflict between a provision of any submitted document referred to in this Approval and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(5) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(6) The Conditions of this Approval are severable. If any Condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such Condition to other circumstances and the remainder of this Approval shall not be affected thereby.

(7) The issuance of, and compliance with the Conditions of this Approval does not:

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

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

(8) This Approval includes the treatment and disposal of stormwater run-off from the Tanger Outlet Mall commercial development, located between Palladium Drive and Huntmar Drive, immediately south of Campeau Drive in the Kanata West Business Park (approximately 19.75 hectares). This Approval is also for the treatment and disposal of stormwater run-off from lands to the north and adjacent to the commercial development draining to the stormwater management facility (Pond 6 East), for a total drainage area of 45.74 hectares, assuming an average imperviousness of 93%. Any future development changes within the total drainage area that might increase the required storage volumes or increase the flows to or from the wet pond or any structural/physical changes to the wet pond including the inlets or outlets will require an amendment to this Approval. This Approval is also for the temporary oil and grit separator and outfall for the Tanger Outlet Centre Hotel Site. Any modification or removal of the temporary outfall to Feedmill Creek will require an amendment to this Approval.

2. EXPIRY OF APPROVAL

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

3. CHANGE OF OWNER

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

(a) change of Owner;

(b) change of address of the Owner;

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

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

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

(3) Notwithstanding any other requirements in this Approval, upon transfer of the ownership of the Works to a municipality, if applicable, any reference to the "District Manager" within the Terms and Conditions of this Approval shall be replaced with "Water Supervisor".

4. OPERATION AND MAINTENANCE

(1) The Owner shall ensure that the design minimum liquid retention volume is maintained at all times.

(2) The Owner shall inspect the Works at least **once a year** and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation.

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

(a) the name of the Works

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed.

5. MONITORING AND REPORTING

(1) The Owner shall carry out a monitoring program for the inspection and maintenance of the Works as per the standardized SWM monitoring program specified by the City of Ottawa for the Kanata West Area and the requirements of the Mississippi Valley Conservation Authority.

(2) The Owner shall copy the District Manager on any and all reports submitted to the City of Ottawa and/or the Mississippi Valley Conservation Authority related to the operation and maintenance of the Works.

(3) After the Owner obtains a minimum of **two (2) years** of monitoring results following completion of the Works, the requirement to copy the District Manager in subsection (2) above may be modified by the District Manager upon written request.

6. TEMPORARY EROSION AND SEDIMENT CONTROL

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

(2) The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

7. RECORD KEEPING

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

Schedule "A"

1. Application for Environmental Compliance Approval, dated June 25, 2013 and received on July 3, 2013, submitted by IBI Group;
2. Application for Environmental Compliance Approval, dated June 28, 2013 and received on July 3, 2013, submitted by IBI Group, including a set of Engineering Drawings;
3. Supplementary information, dated July 10, 2013, submitted by IBI Group;
4. Design Brief, Tanger Outlet Centres, 333 Huntmar Drive, dated June 2013, prepared by IBI Group;
5. Kanata West Business Park, Stormwater Management Report and Pond 6 East Design Brief, 333 Huntmar Drive - Tanger Outlet Centres, dated June 2013, prepared by IBI Group;
6. Pipe Data Form for the storm and sanitary sewers including the storm and sanitary sewer design sheets;
7. E-mails from Peter Deir of IBI Group to the Ministry, dated August 1, 2013 and August 7, 2013;
8. Letter from Peter Spal of IBI Group to the Ministry, dated August 14, 2013;
9. Application for Environmental Compliance Approval, dated June 29, 2015 and received on July 13, 2015, submitted by the City of Ottawa;
10. Copy of letter from Stuart Craig of RioCan Management Inc. to West Ottawa Land Holdings Inc. and West Ottawa Land Holdings (2) Inc., dated June 24, 2015;
11. Amendment to Kanata West Business Park Stormwater Management Report and Pond 6 East Design Brief 333 Huntmar Drive - Tanger Outlet Centres, dated July 6, 2015, prepared by IBI Group;
12. Copy of letter from Myra Van Die of Mississippi Valley Conservation Authority to the City of Ottawa, dated July 10, 2015;
13. Copy of Memorandum from Don Moss of Greenland International Consulting Ltd. to Don Herweyer, dated June 14, 2013;
14. E-mail from Peter Deir of IBI Group to the Ministry, dated September 23, 2015; and
15. E-mail from Peter Deir of IBI Group to the Ministry, dated September 25, 2015.

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

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This Condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.
2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.
3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that any subsequent Owner of the Works is made aware of the Approval and continues to operate the Works in compliance with it.
4. Condition 4 is included to require that the Works be properly operated and maintained such that the environment is protected.
5. Condition 5 is included to enable the Owner to evaluate and demonstrate the performance of the Works, on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives specified in the Approval and that the Works do not cause any impairment to the receiving watercourse.
6. Condition 6 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction, until they are no longer required.
7. Condition 7 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

**Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s).
3371-9A5GTU issued on August 15, 2013.**

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

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

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are

substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

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

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

This Notice must be served upon:

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

AND

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

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

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

DATED AT TORONTO this 28th day of September, 2015



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

DC/

c: District Manager, MOECC Ottawa office
Water Supervisor, MOECC Ottawa office
West Ottawa Land Holdings Inc. and West Ottawa Land Holdings (2) Inc.
Peter Spal, IBI Group



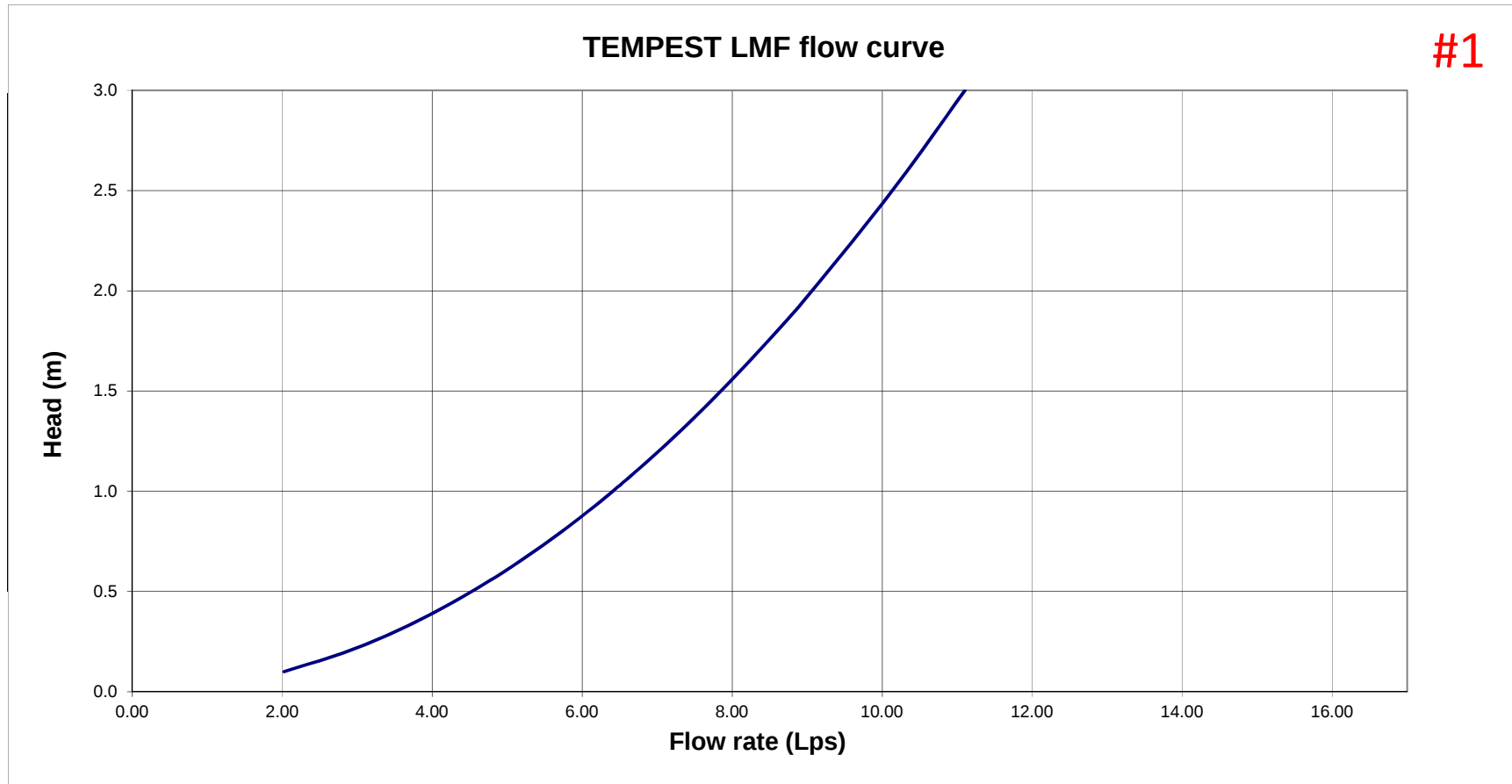
RYCB 1



Flow Parameters

Head (m)	2.63
Flow (Lps)	10

Input desired parameters in green boxes at left and then refer to graphs below for corresponding flow curves. If your design criteria fall outside the maximum parameters of this flow curve calculator please contact your IPEX representative for your TEMPEST design.





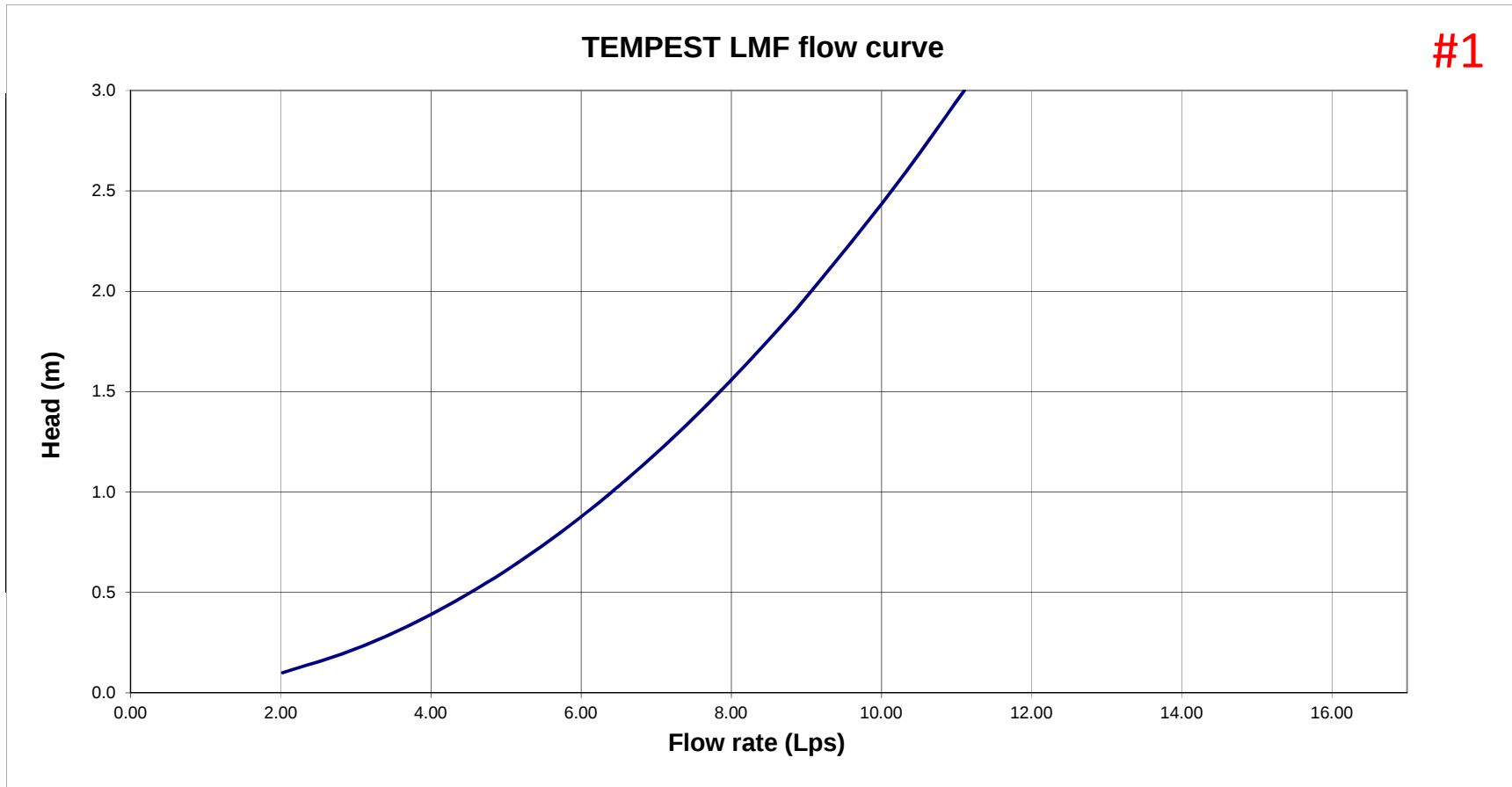
Flow Parameters

Head (m)	2.09
Flow (Lps)	8.8

RYCB 2



Input desired parameters in green boxes at left and then refer to graphs below for corresponding flow curves. If your design criteria fall outside the maximum parameters of this flow curve calculator please contact your IPEX representative for your TEMPEST design.





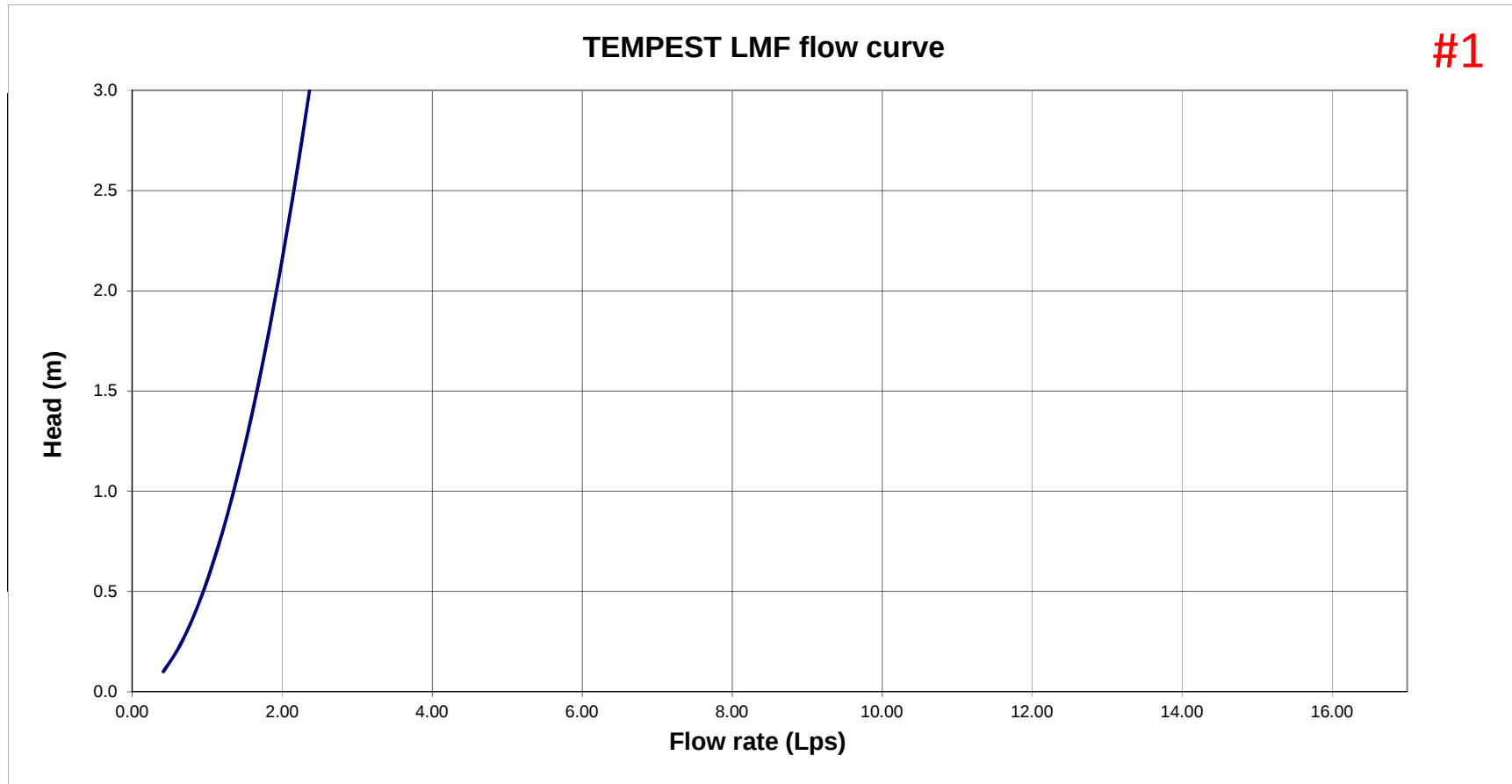
CB 1



Flow Parameters

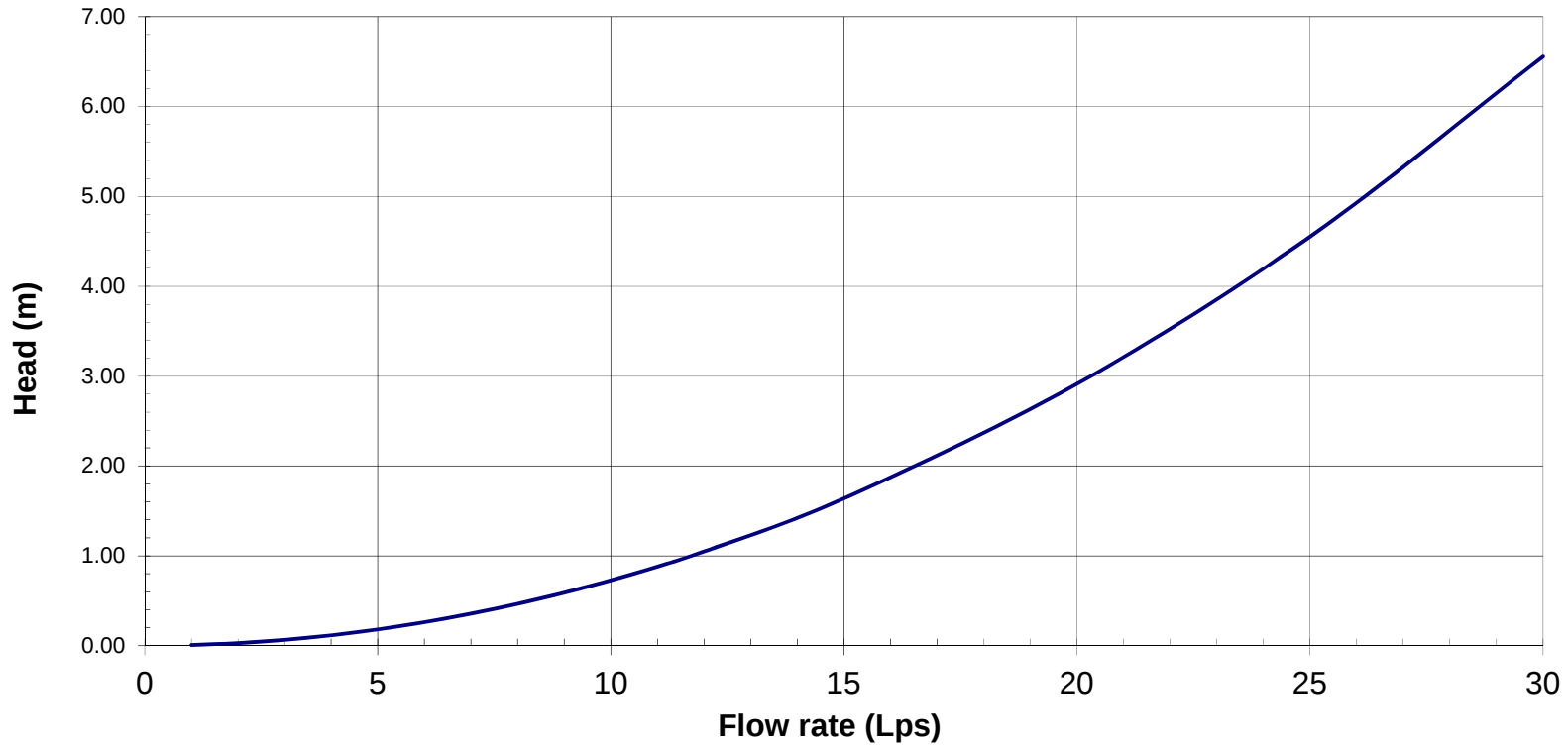
Head (m)	6.3
Flow (Lps)	2.21

Input desired parameters in green boxes at left and then refer to graphs below for corresponding flow curves. If your design criteria fall outside the maximum parameters of this flow curve calculator please contact your IPEX representative for your TEMPEST design.



TEMPEST HF, HF Sump & MHF flow curve
(For flow rates <30 Lps)

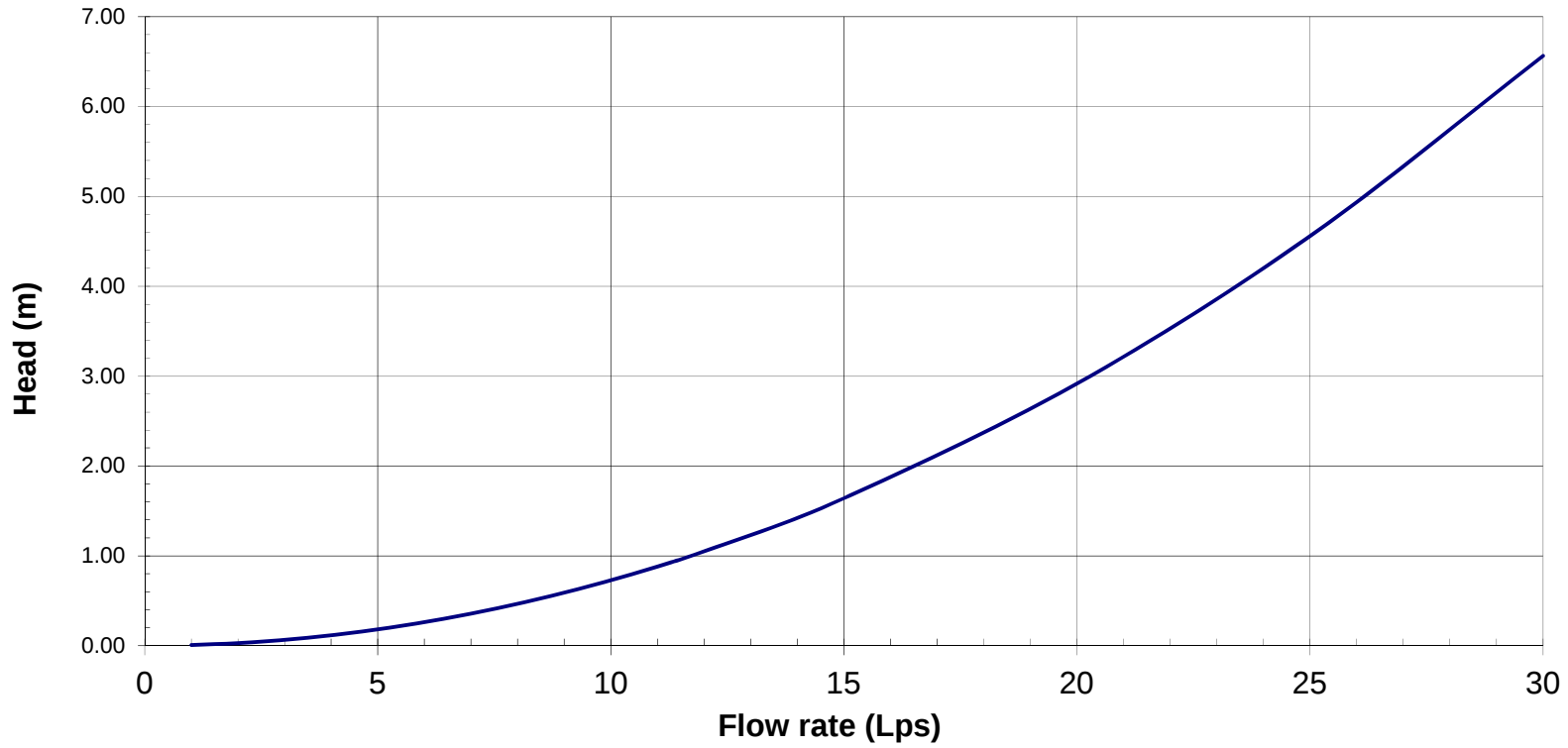
#2



CB 2

TEMPEST HF, HF Sump & MHF flow curve
(For flow rates <30 Lps)

#2



CB 3



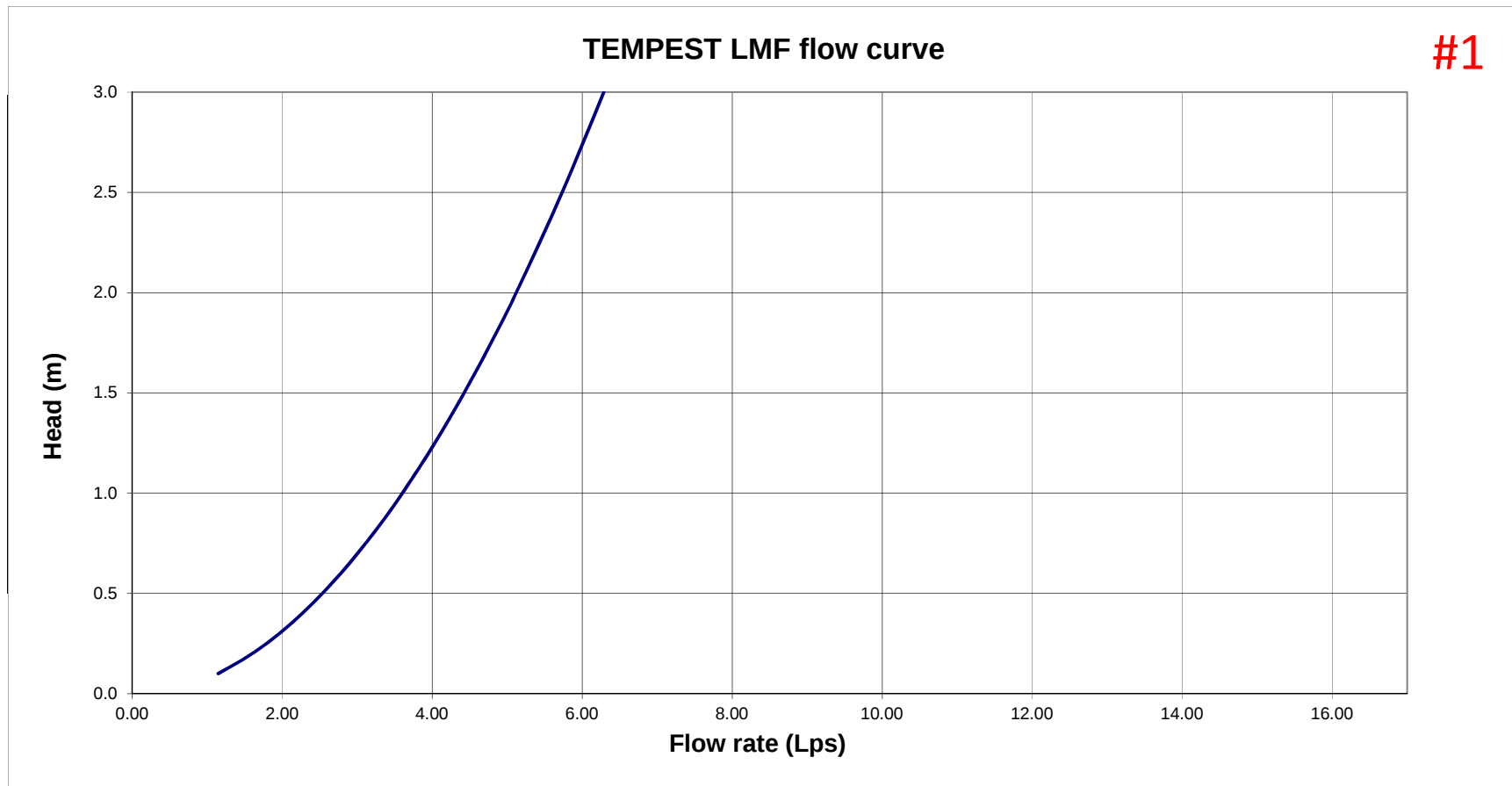
CBMH 5



Flow Parameters

Head (m)	2.63
Flow (Lps)	5.4

Input desired parameters in green boxes at left and then refer to graphs below for corresponding flow curves. If your design criteria fall outside the maximum parameters of this flow curve calculator please contact your IPEX representative for your TEMPEST design.



In January of 2017, IBI Group completed the study “Design Brief UPS Canada Inc. 8825 Campeau Drive.” That study outlined the detailed design of the proposed UPS site tributary to the Pond 6 West SWM facility.

In July of 2017, IBI Group completed the study “Design Brief Kanata West Retail Centre 3015, 3075 and 3095 Palladium Drive.” That study outlined the detailed design of the proposed Kanata West Retail Centre tributary to the Pond 6 West SWM facility.

4.2 Objective

The stormwater management for the KWBP carries forward with the findings and criteria of the previous studies listed within Section 4.1. The purpose of this section is to present the dual drainage design, including the minor and major system, for the Kanata West Business Park development. The design includes the sizing of inlet control devices, maximum depth and velocity of flow on the surface and hydraulic grade line analysis. The evaluation and design takes into consideration the City of Ottawa Sewer Design Guidelines (OSDG) and the June 2012 Technical Bulletin ISDTB-2012-4.

4.3 Overall Stormwater Management Approach

4.3.1 Pond 6 West

The proposed Pond 6 West Stormwater Management Facility is to be located at the western edge of the site, north of Feedmill Creek. The facility will provide water quality and water quantity control for the proposed development west of Founders Way and will discharge to Feedmill Creek in accordance with the Kanata West Business Park Stormwater Management report and Pond 6 West Design Brief Report 14289-5.2.3, November 2015. That study established the minimum minor system capture rates for the KWBP development tributary to the West Pond. The location of Pond 6 West is illustrated within **Figure 1**.

4.3.2 Pond 6 East and Trunk Storm Sewer

The existing Pond 6 East Stormwater Management Facility is located to the east of the Tanger Outlets Centre development, north of Feedmill Creek. The facility provides water quality and water quantity control for the proposed development east of Founders Way and discharges to Feedmill Creek as outlined within the “Addendum Report: Kanata West Business Park Stormwater Management Report and Pond 6 East Design Brief, 333 Huntmar Drive – Tanger Outlets Centre Report 32862-5.2.3, November 2015. That study established the minor system capture rates for the KWBP development tributary to the East Pond. The location of Pond 6 East is illustrated within **Figure 1**.

4.3.3 Dual Drainage Design

The site has been designed with dual drainage features, accommodating minor and major system flow. The minor system is tributary to the existing Pond 6 East and proposed Pond 6 West SWM Facilities. Cascading overland flow from the majority of the site will be conveyed across the site from the west to the east. The major system outlet is Huntmar Dr., an arterial road. For this reason, minor system capture was optimized to minimize major flow cascading from the subject site.

As a commercial site, the blocks are provided with on-site storage to control the 100 year flow. The streets through the development are provided with a saw-tooth design to facilitate ponding and minimize grade raise on-site. Inlet control devices (ICDs) are proposed to minimize the surcharge in the minor system during infrequent storm events and maximize use of available on-site storage. The minor system capture of ICDs is based on 5 year flow for street segments. The minor system capture for proposed commercial blocks tributary to the proposed Pond 6 West is based on 5 year flow. The minor system capture for the proposed commercial blocks tributary to

re: **Percolation Rate Estimation**
Proposed Stormwater Infiltration Galleries - Block 23
Kanata West Business Park (Hotel Block) - 8600 Campeau Drive - Ottawa

to: BHG Kanata West Hotel LP - **Mr. Luc Sergerie** - luc@mctltld.com

to: IBI Group - **Mr. Terry Brule** - TBrule@IBIGroup.com
IBI Group - **Mr. James Battison** - James.Battison@ibigroup.com

date: June 20, 2018

file: PG4378-MEMO.01

Further to your request, Paterson Group (Paterson) carried out a review of available information from the geotechnical programs completed within the Kanata West Business park to establish a percolation rate for the materials located at the aforementioned site.

Generally, the soil profile encountered at the test hole locations consists a topsoil layer or crushed stone fill at ground surface overlying a very stiff to stiff brown silty clay crust. A stiff grey silty clay was encountered below the above noted layers followed by loose to very loose, grey clayey silt to silt and a glacial till deposit. The glacial till consists of grey silt with some sand and trace clay, gravel and cobbles. Refer to the Soil Profile and Test Data sheets attached for specific details of the soil profile encountered at the borehole locations..

The infiltration galleries are likely to be located beneath the asphaltic parking areas within the current development phase. Varying strata at the base of the galleries will be encountered during the installation and will affect the rate of stormwater infiltration into the underlying material. The calculations for the infiltration galleries should be reviewed to correspond with the appropriate percolation rates given the appropriate strata. The percolation rate was interpreted from the hydraulic conductivity which was estimated based on the available soils information for the proposed development area. Based on these values, the average percolation rate (T-Time) was estimated to be within the ranges in Table 1 below.

Table 1 - Estimated Percolation Rates		
Material	Hydraulic Conductivity - k (m/sec)	Percolation (T-time) - (mins/cm)
Silty Clay ¹	3×10^{-6} to 1×10^{-10}	35 to 50+
Clayey Silt/Clayey Sand ²	1×10^{-6} to 1×10^{-8}	12 to 50
Sandy Silt ¹	1×10^{-7} to 1×10^{-8}	20 to 50
Silty Sand ²	1×10^{-4} to 1×10^{-5}	8 to 20
¹ - Values are based upon nearby site specific testing		
² - Values are based upon typical material properties and accepted published data		

We trust that this information satisfies your requirements.

Best Regards,

Paterson Group Inc.



Colin Belcourt, M.Eng.



David Gilbert, P.Eng.

Paterson Group Inc.

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

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

St. Lawrence Office
993 Princess Street
Kingston - Ontario - K7L 1H3
Tel: (613) 542-7381 Fax: (613) 542-8399

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

Block 23 - Campeau Drive at Palladium Drive
Ottawa, Ontario

DATUM TBM - Top of grate of catch basin located on the south side of subject site, along Campeau Drive. Elevation = 103.39m.

REMARKS

BORINGS BY CME 55 Power Auger

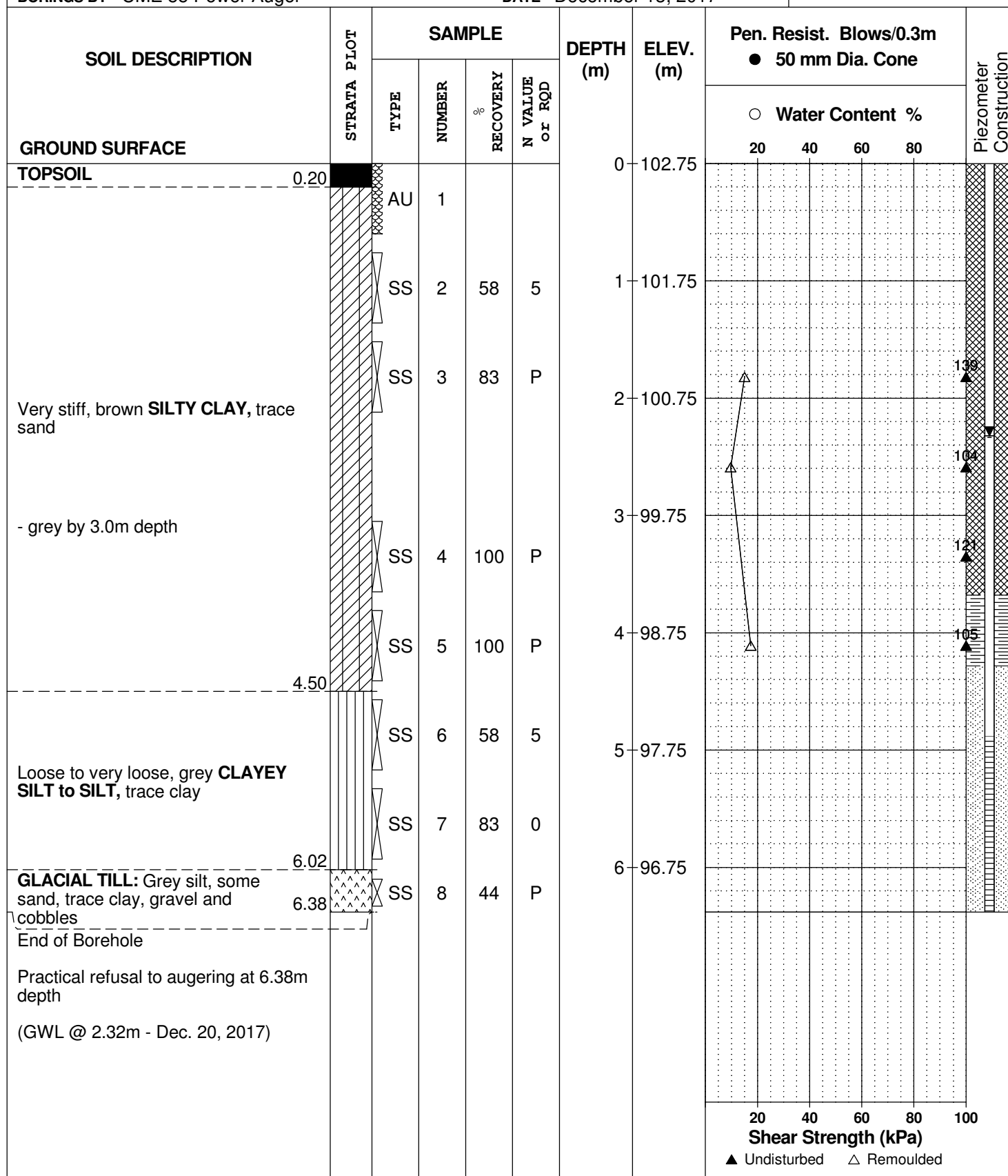
DATE December 13, 2017

FILE NO.

PG4378

HOLE NO.

BH 1-17



DATUM TBM - Top of grate of catch basin located on the south side of subject site, along Campeau Drive. Elevation = 103.39m.

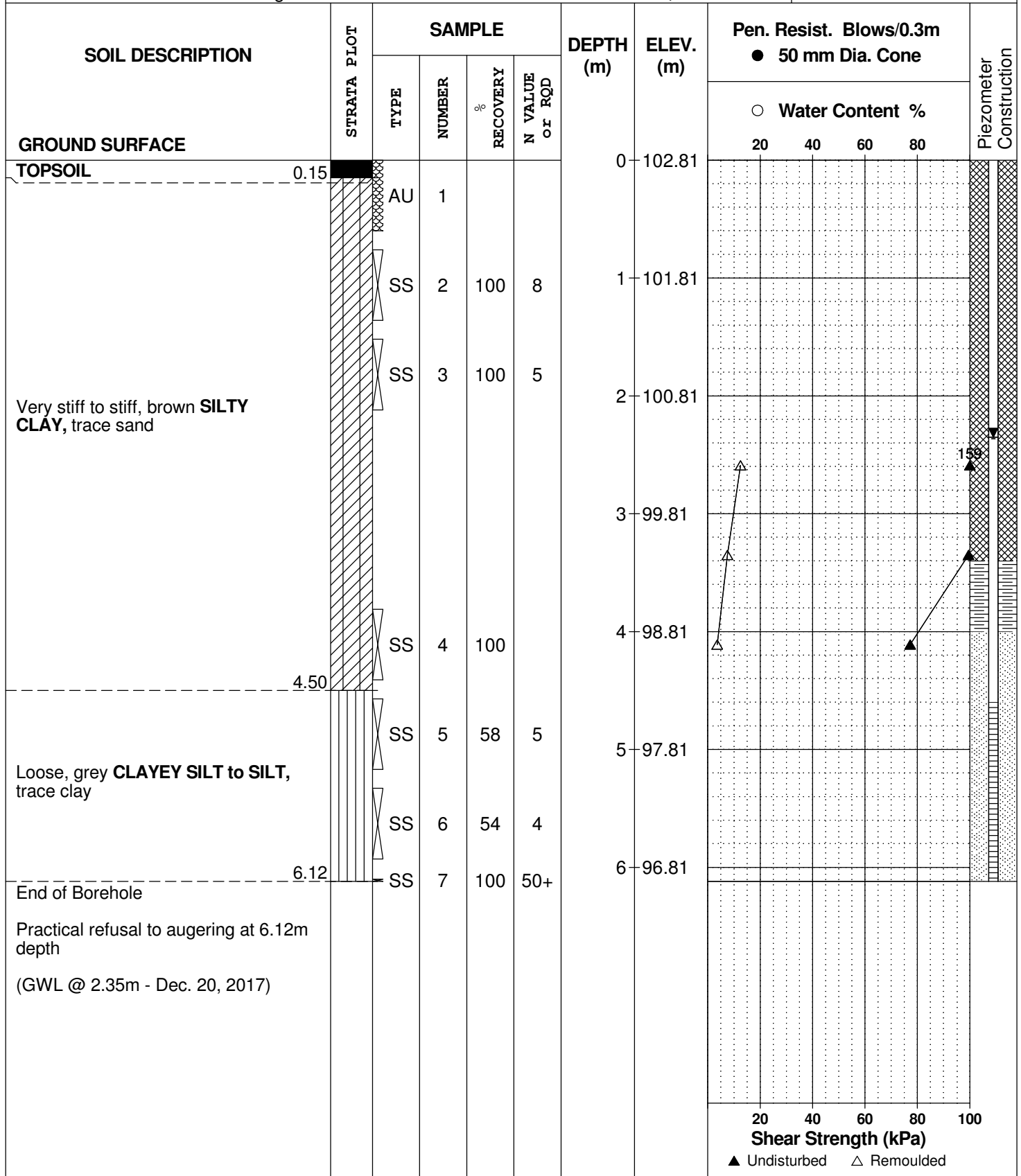
REMARKS

BORINGS BY CME 55 Power Auger

DATE December 13, 2017

FILE NO. PG4378

HOLE NO. BH 2-17



DATUM TBM - Top of grate of catch basin located on the south side of subject site, along Campeau Drive. Elevation = 103.39m.

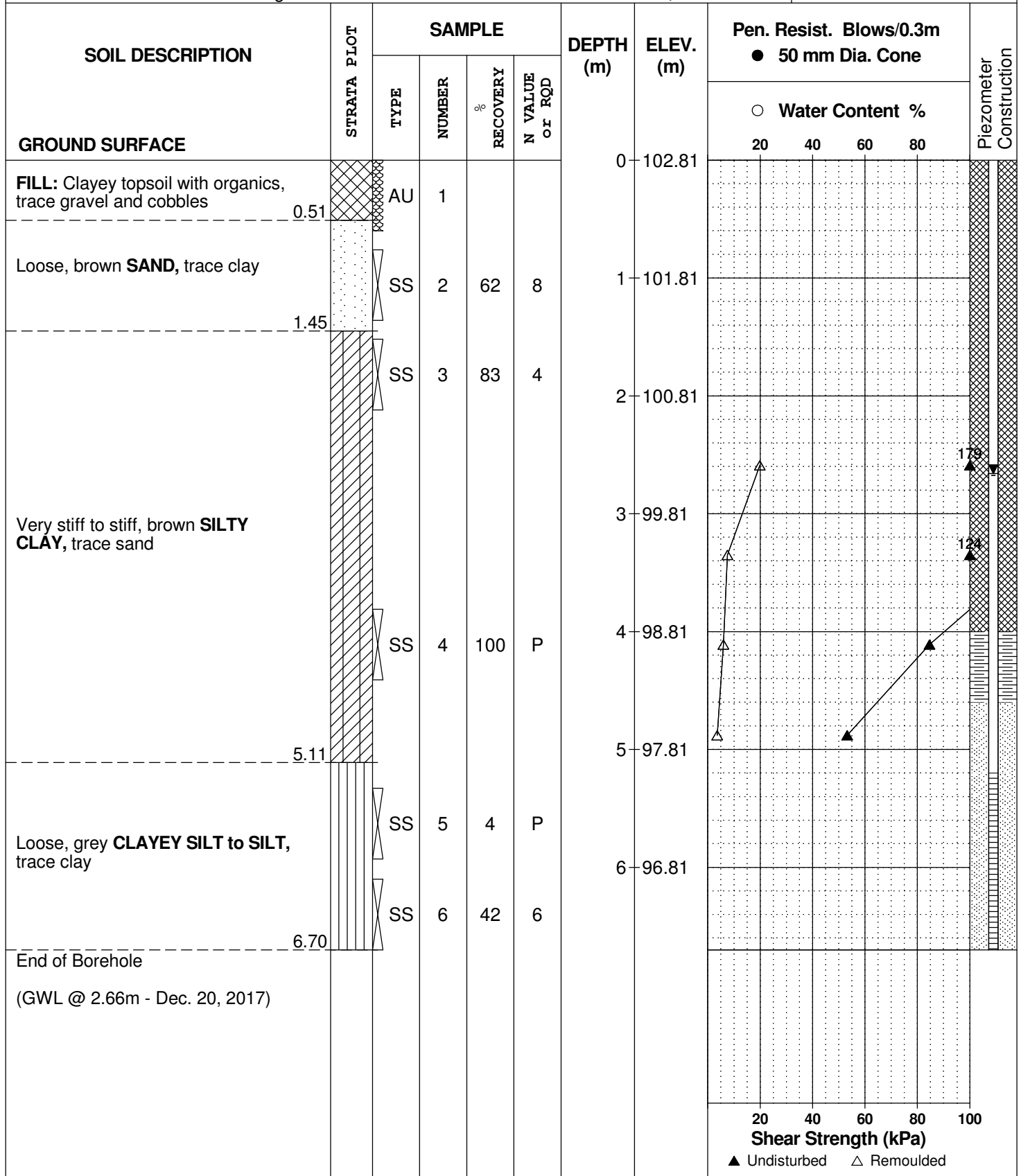
REMARKS

BORINGS BY CME 55 Power Auger

DATE December 13, 2017

FILE NO. PG4378

HOLE NO. BH 3-17



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Block 23 - Campeau Drive at Palladium Drive
Ottawa, Ontario

DATUM TBM - Top of grate of catch basin located on the south side of subject site, along Campeau Drive. Elevation = 103.39m.

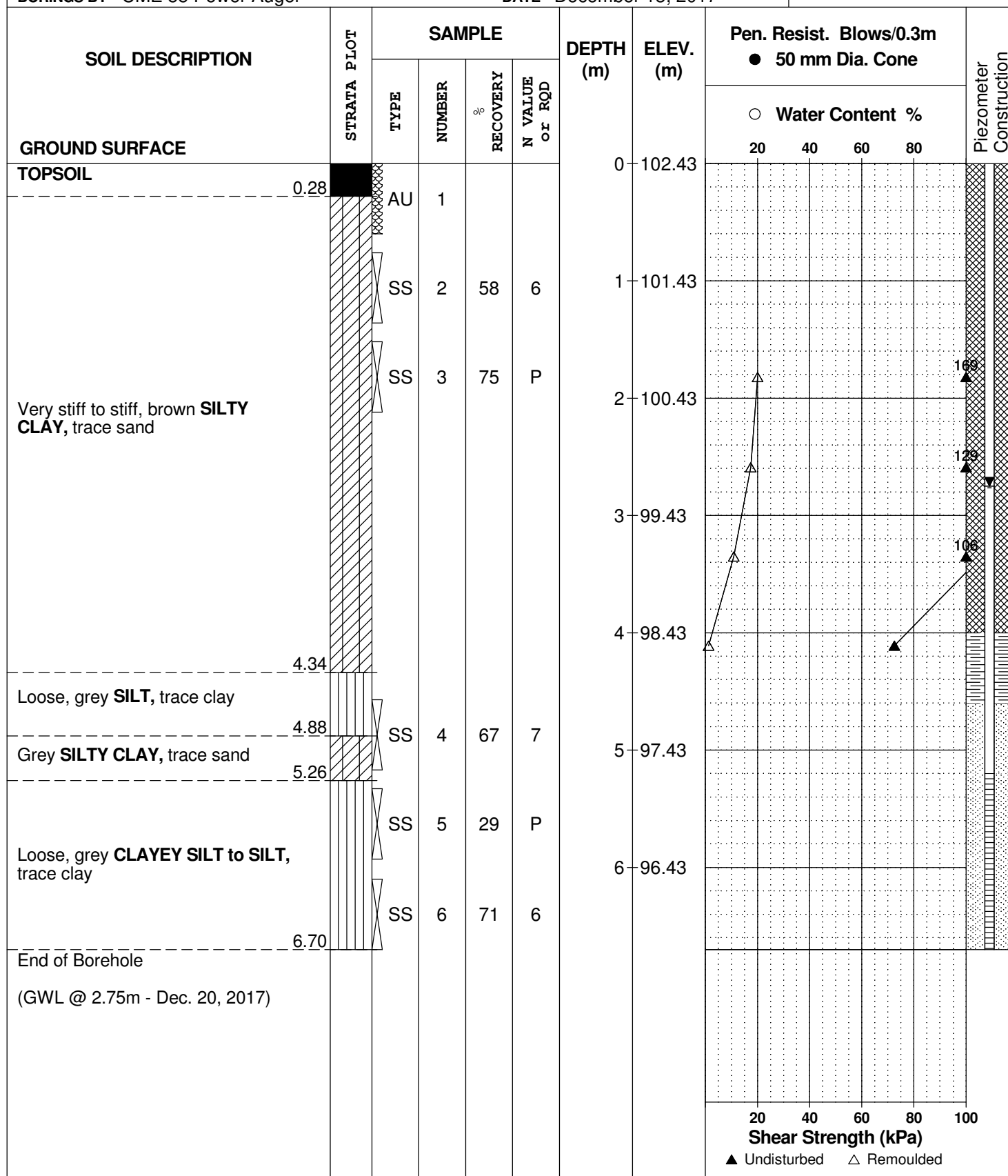
REMARKS

BORINGS BY CME 55 Power Auger

DATE December 13, 2017

FILE NO.
PG4378

HOLE NO.
BH 4-17



DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

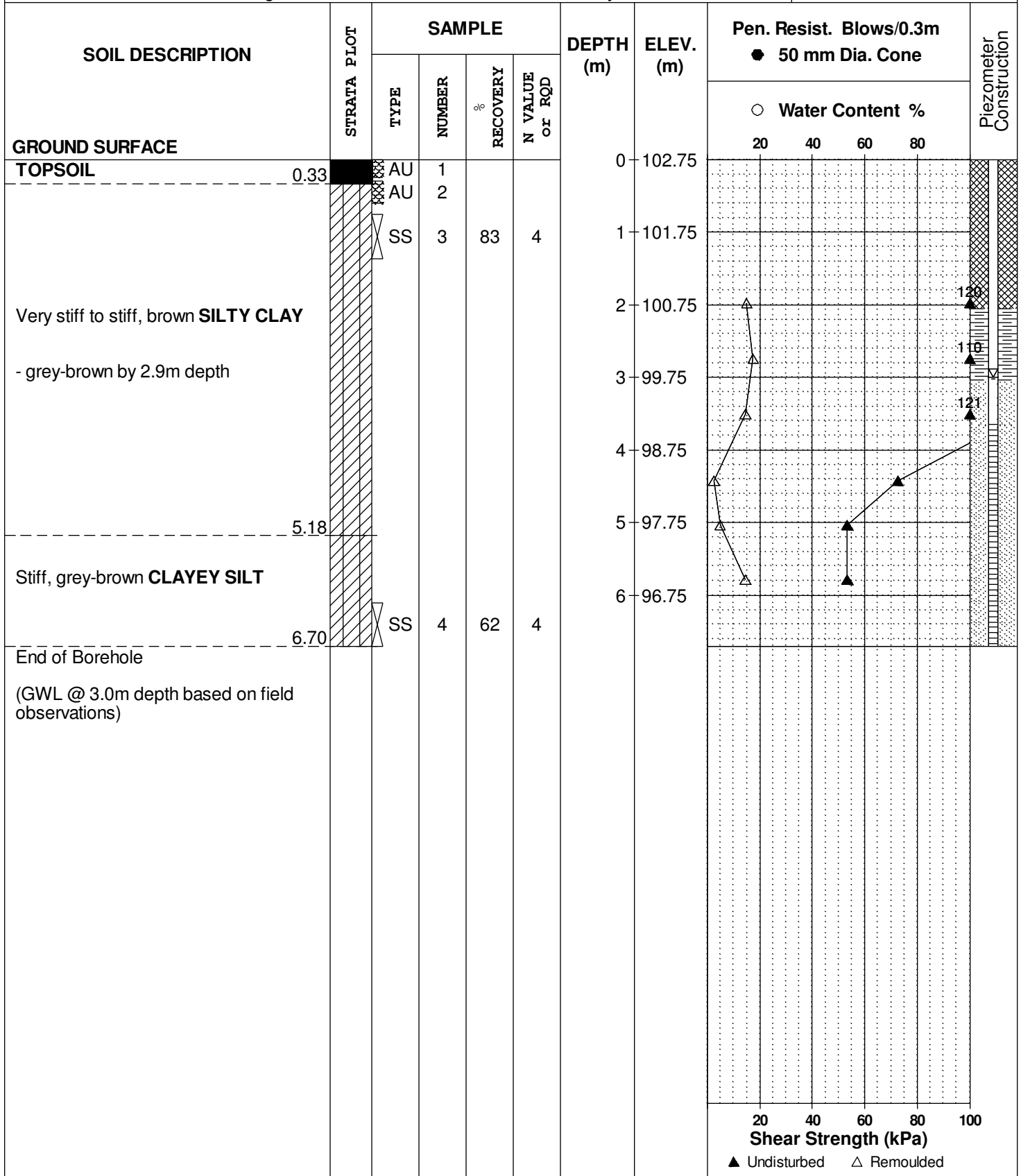
REMARKS

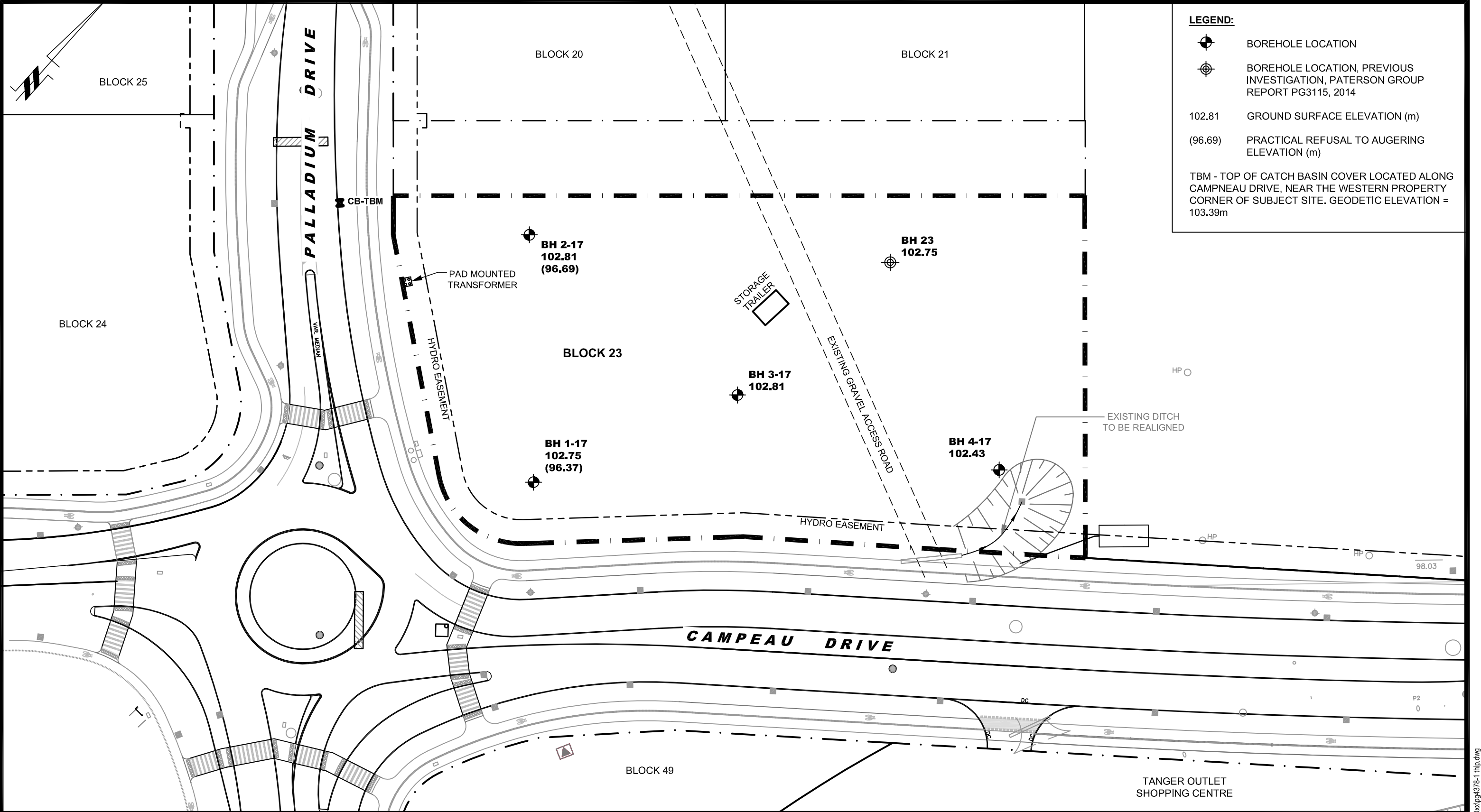
BORINGS BY CME 55 Power Auger

DATE January 9, 2014

FILE NO. PG3115

HOLE NO. BH23





LEGEND:

BOREHOLE LOCATION

BOREHOLE LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PG3115, 2014

102.81 GROUND SURFACE ELEVATION (m)

(96.69) PRACTICAL REFUSAL TO AUGERING ELEVATION (m)

TBM - TOP OF CATCH BASIN COVER LOCATED ALONG CAMPEAU DRIVE, NEAR THE WESTERN PROPERTY CORNER OF SUBJECT SITE. GEODETIC ELEVATION = 103.39m

patersongroup consulting engineers 154 Colonnade Road South Ottawa, Ontario K2E 7J5 Tel: (613) 226-7381 Fax: (613) 226-6344					BOREAL HOSPITALITY GROUP GEOTECHNICAL INVESTIGATION BLOCK 23 - CAMPEAU DRIVE AT PALLADIUM DRIVE OTTAWA, ONTARIO	Scale: 1:750	Date: 01/2018
						Drawn by: RCG	Report No.: PE4171-1
						Checked by: FA	Dwg. No.: PG4378-1
	0					Approved by: DJG	Revision No.: 0
	NO.	REVISIONS	DATE	INITIAL			

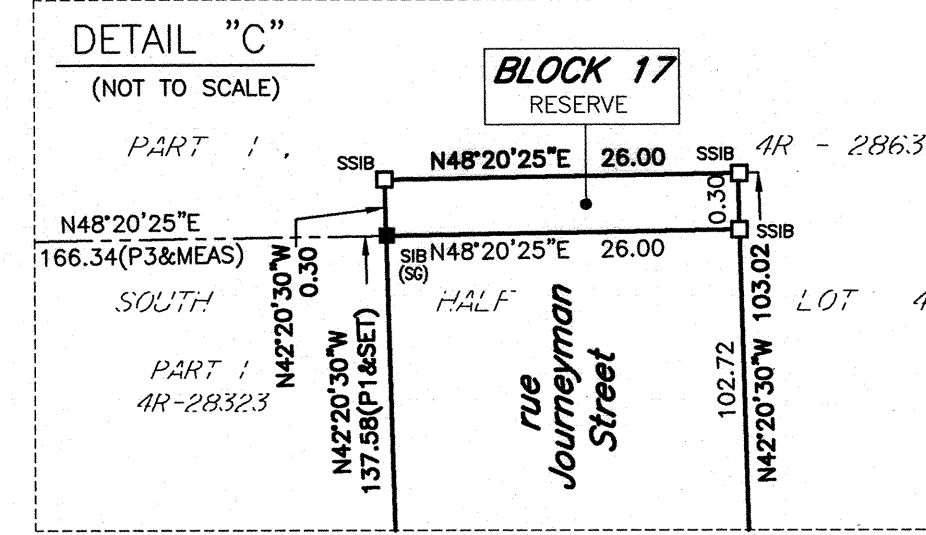
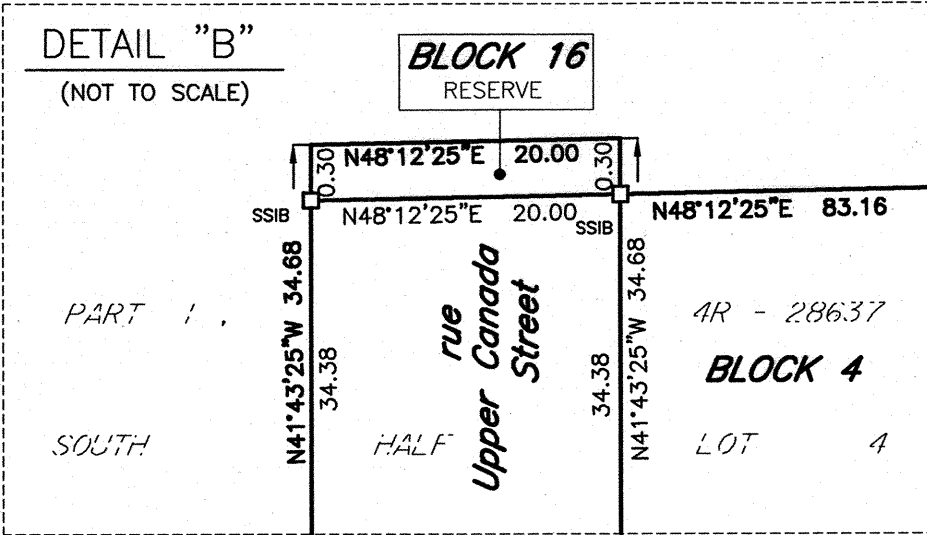
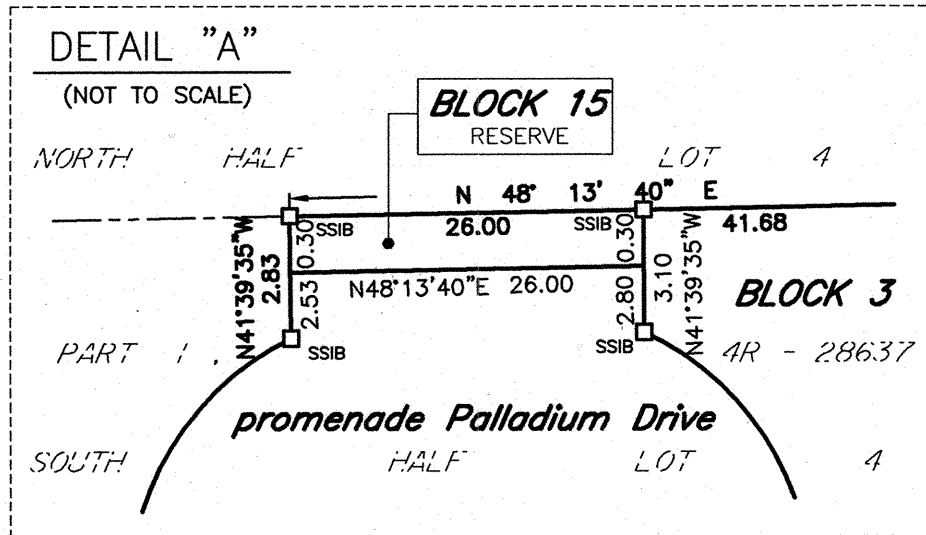
01autocad drawings\geotechnical\loc4

p:\autocad drawings\geotechnical\pg43xx\pg4378-1.tbl.dwg

APPENDIX D

APPENDIX E

18 May 2016 11:16 AM



APPROVED UNDER SECTION 51 OF THE PLANNING ACT BY THE CITY OF OTTAWA THIS 30 DAY OF MAY, 2016

MICHAEL MIZZI, MCIP, RPP, ACTING GENERAL MANAGER
PLANNING AND GROWTH MANAGEMENT DEPARTMENT
CITY OF OTTAWA

BLOCKS 3, 4, 15, 16 AND 17, ALL OF rue Upper Canada Street, ALL OF rue Journeymen Street, PART OF promenade Palladium Drive AND PART OF promenade Campeau Drive COMPOSE PART OF PIN 04508-0125.

BLOCKS 1, 2, 5 TO 14 INCLUSIVE, ALL OF rue Nipissing Court, PART OF promenade Palladium Drive and PART OF promenade Campeau Drive COMPOSE PART OF PIN 04508-0125.

PART OF BLOCKS 1 AND 14, PART OF promenade Palladium Drive and PART OF promenade Campeau Drive ARE SUBJECT TO EASEMENT PER INST. NO. OC1720686.

ALL OF BLOCKS 1 TO 17 INCLUSIVE, ALL OF promenade Palladium Drive, ALL OF promenade Campeau Drive, ALL OF rue Nipissing Court, ALL OF rue Journeymen Street and all of Upper Canada Street ARE SUBJECT TO EASEMENT PER INST. NO. OC1776587.

PLAN 4M-1566

I CERTIFY THAT THIS PLAN IS REGISTERED IN THE LAND REGISTRY OFFICE FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON No.4 AT 13:59 O'CLOCK ON THE 7 DAY OF June, 2016 AND ENTERED IN THE REGISTER FOR PROPERTY IDENTIFIER 04508-0125 and 04508-0125 AND THE REQUIRED CONSENTS ARE REGISTERED AS PLAN DOCUMENT NO. 04793704.

REPRESENTATIVE FOR THE LAND REGISTRAR

THIS PLAN COMPRISES THE LAND IDENTIFIED BY PART OF PINS 04508-0123 AND 04508-0125.

PLAN OF SUBDIVISION of PART OF LOTS 3 AND 4 CONCESSION 1 GEOGRAPHIC TOWNSHIP OF HUNTLEY CITY OF OTTAWA

Scale 1:2000
40 20 0 20 40 80 120 METRES

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

GRID SCALE CONVERSION
DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.99995.

BEARING NOTE
BEARINGS HEREON ARE GRID BEARINGS DERIVED FROM THE CAN-NET VRS NETWORK AND ARE REFERRED TO THE CENTRAL MERIDIAN 76° 30' WEST LONGITUDE OF THE 3rd MTM ONTARIO COORDINATE SYSTEM, NAD83 (ORIGINAL) ZONE 9.

OBSERVED REFERENCE POINTS DERIVED FROM GPS OBSERVATIONS USING THE CAN-NET VIRTUAL REFERENCE STATION NETWORK:
MTM ZONE 9, NAD83 (ORIGINAL).
COORDINATES TO URBAN ACCURACY PER SEC 14(2) OF OREG. 216/10

ORP ID	NORTHING	EASTING
①	5017173.28	348028.09
②	5017883.23	348823.38

COORDINATES CANNOT, IN THEMSELVES, BE USED TO REESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

LEGEND	DEFINITIONS
IB	IRON BAR
IB2	ROUND IRON BAR
SB	STANDARD IRON BAR
SB2	SHORT STANDARD IRON BAR
CC	CUT CROSS
CP	CONCRETE PIN
WIT	WITNESS
PIN	PROPERTY IDENTIFICATION NUMBER
MEAS	MEASURED
PROP	PROPORTIONED
OU	ORIGIN UNKNOWN
STANTEC	STANTEC GEOMATICS LTD.
P	PLAN 4M-28887
P1	PLAN 4M-28823
P2	PLAN 4M-28837
P3	PLAN 4M-27790
ORP	OBSERVED REFERENCE POINT
NT	NONTANGENTIAL

OWNER'S CERTIFICATE

- THIS IS TO CERTIFY THAT:
- BLOCKS 3 AND 4, THE STREETS, NAMELY PART OF promenade Campeau Drive, PART OF promenade Palladium Drive AND rue Journeymen Street HAVE BEEN LAID OUT IN ACCORDANCE WITH OUR INSTRUCTIONS.
 - THE STREETS ARE DEDICATED AS PUBLIC HIGHWAYS.

DATED: May 18, 2016
KEVIN MCGARRIN, VICE PRESIDENT
WEST OTTAWA LAND HOLDINGS INC.
I HAVE THE AUTHORITY TO BIND THE CORPORATION

DATED: May 18, 2016
JEFF PARKES, VICE PRESIDENT
WEST OTTAWA LAND HOLDINGS INC.
I HAVE THE AUTHORITY TO BIND THE CORPORATION

OWNER'S CERTIFICATE

- THIS IS TO CERTIFY THAT:
- BLOCKS 3 AND 4, THE STREETS, NAMELY PART OF promenade Campeau Drive, PART OF promenade Palladium Drive, rue Upper Canada Street AND rue Journeymen Street AND RESERVES NAMELY BLOCKS 15, 16 AND 17 HAVE BEEN LAID OUT IN ACCORDANCE WITH OUR INSTRUCTIONS.
 - THE STREETS ARE DEDICATED AS PUBLIC HIGHWAYS.

DATED: May 18, 2016
KEVIN MCGARRIN, VICE PRESIDENT
WEST OTTAWA LAND HOLDINGS INC.
I HAVE THE AUTHORITY TO BIND THE CORPORATION

DATED: May 18, 2016
JEFF PARKES, VICE PRESIDENT
WEST OTTAWA LAND HOLDINGS INC.
I HAVE THE AUTHORITY TO BIND THE CORPORATION

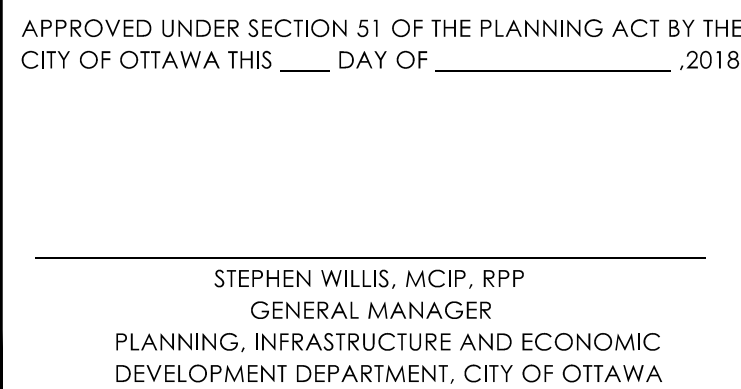
SURVEYOR'S CERTIFICATE

- I CERTIFY THAT:
- THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
 - THE SURVEY WAS COMPLETED ON THE 3rd DAY OF MAY, 2016.

DATED: May 18, 2016
BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

Stantec
CANADA AND ONTARIO LAND SURVEYORS
1331 CLYDE AVENUE, SUITE 400
OTTAWA, ONTARIO, K2C 3G4
TEL: (613) 722-4420 FAX: (613) 722-2799
stantec.com

DRAWN: CEC CHECKED: BW PM: BW FIELD: WO PROJECT NO.: 161612445-231



I CERTIFY THAT THIS PLAN IS REGISTERED IN THE LAND REGISTRY OFFICE
FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON No.4 AT _____
O'CLOCK ON THE _____ DAY OF _____, 2018 AND ENTERED IN
THE PARCEL REGISTER FOR PROPERTY IDENTIFIER _____
AND THE REQUIRED CONSENTS ARE REGISTERED AS PLAN DOCUMENT
NUMBER OC-_____.

REPRESENTATIVE FOR LAND REGISTRATION

THIS PLAN COMPRISES PART OF PIN 04508 - 0133

PART OF LOT 4

CONCESSION 1

CITY OF OTTAWA



METRIC CONVERSION

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

GRID SCALE CONVERSION

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.XXXXXX.

BEARING NOTE

BEARINGS ARE GRID, DERIVED FROM CAN-NET VRS NETWORK GPS
OBSERVATIONS ON NCC HORIZONTAL CONTROL MONUMENTS 19773035 AND
19680191, CENTRAL MERIDIAN, 76° 30' WEST LONGITUDE MTM ZONE 9, NAD83
(ORIGINAL).

19773035 N:5006060.42 E:324888.04
19680191 N:5033564.26 E:388064.92

OBSERVED REFERENCE POINTS DERIVED FROM GPS OBSERVATIONS USING THE CAN-NET VIRTUAL REFERENCE STATION NETWORK: MTM ZONE 9, NAD83 [ORIGINAL], COORDINATES TO URBAN ACCURACY PER SEC 14(2) OF O.REG. 216/10		
ORP ID	NORTHING	EASTING
(A)		*
(B)		
COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.		

LEGEND

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS (B)
	"	UNLESS OTHERWISE STATED
IB	"	IRON BAR
IR	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MAS	"	MEASURED
PROP	"	PROPORTIONED
CU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
ORP	"	OBSERVED REFERENCE POINT
	"	*
	"	*
	"	*
	"	*

OWNER'S CERTIFICATE

THIS IS TO CERTIFY THAT

1. LOTS * TO *, BOTH INCLUSIVE, BLOCKS * TO *, BOTH INCLUSIVE, THE STREETS, NAMELY BLOCKS *, STREET WIDENINGS, NAMELY BLOCKS *, LANES, NAMELY BLOCKS *, AND RESERVES, NAMELY BLOCKS *, HAVE BEEN LAID OUT IN ACCORDANCE WITH OUR INSTRUCTIONS.
2. THE STREETS AND STREET WIDENINGS AND LANES ARE HEREBY DEDICATED TO CITY OF OTTAWA AS PUBLIC HIGHWAYS.

DATE _____

* PRESIDENT

ONTARIO LIMITED

I HAVE THE AUTHORITY TO BIND THE CORPORATION

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE DAY OF , 2017.

DATE _____

BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

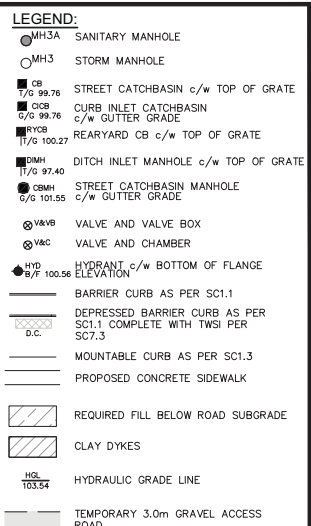


Stantec Geomatics Ltd

ONTARIO LAND SURVEYORS
CANADA LANDS SURVEYORS
331 CLYDE AVENUE, SUITE 400
OTTAWA, ONTARIO, K2C 3G4
613.722.4420 FAX, 613.722.27
stantec.com

DRAWN: DM	CHECKED: BW	PM: BW	FIELD: *	PROJECT No.: 161612445-23
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APPENDIX F



14			
13			
12			
11			
10	REVISED FOR PHASE 2 REGISTRATION	LME	18:04:20
9	RE-ISSUED FOR CONSTRUCTION	LME	16:02:03
8	ISSUED FOR CONSTRUCTION	LME	16:01:19
7	ISSUED FOR MYLARS	LME	16:01:12
6	REVISED NW INVERT MHT07A TO 39.800	LME	15:12:22
5	ISSUED TO TAGGART	LME	15:12:14
4	REVISED AS PER CITY COMMENTS	LME	15:10:15
3	REVISED AS PER NEW SITE PLAN AND CITY COMMENTS	LME	15:06:19
2	REVISED AS PER CITY COMMENTS	LME	15:04:08
1	ISSUED TO CITY FOR APPROVAL	LME	14:11:27
No.	REVISIONS	By	Date



Drawing Title	
PALLADIUM DRIVE	
FROM STA 10+040 TO CAMPEAU DRIVE	
Scale	
HORIZ. SCALE	1:500
VERT. SCALE	1:50
Design	Date
LME	NOV. 2014
Drawn	Checked
DPS	TRB
Project No.	Drawing No.
14289	106

[illegible]

APPENDIX G

James Battison

From: Diamond, Emily (MECP) <Emily.Diamond@ontario.ca>
Sent: Friday, July 20, 2018 12:55 PM
To: James Battison
Subject: RE: 14829 - Wingate Hotel Site - Kanata West Business Park

Hi James,

From the information provided and based on the conversation we had regarding the proposed project, an ECA would not be required for this site. The site would meet the exemption set out in Section 3. of Ontario Regulation 525/98 under the Ontario Water Resources Act.

Regards,

Emily Diamond

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

From: James Battison [mailto:James.Battison@ibigroup.com]
Sent: July 20, 2018 9:19 AM
To: Diamond, Emily (MECP) <Emily.Diamond@ontario.ca>; Fraser, Mark <Mark.Fraser@ottawa.ca>
Subject: FW: 14829 - Wingate Hotel Site - Kanata West Business Park

Hi Emily,

Per my voicemails this week, can you please review the emails below and respond.

Thank-you.

James Battison

Please note that our phone extensions have been updated. New extensions effective June 20, 2018.

IBI GROUP

Suite 400, 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel +1 613 225 1311 ext 64039 fax +1 613 225 9868



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From: James Battison
Sent: Wednesday, June 13, 2018 1:00 PM

To: 'Diamond, Emily (MOECC)' <Emily.Diamond@ontario.ca>
Subject: FW: 14829 - Wingate Hotel Site - Kanata West Business Park

Hi Emily,

Hope all is well, are you able to comment on the email below? The City is looking for something in writing from the MOECC.

James Battison

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From: James Battison
Sent: Wednesday, December 20, 2017 9:28 AM
To: 'Diamond, Emily (MOECC)' <Emily.Diamond@ontario.ca>
Cc: Terry Brule <tbrule@IBIGroup.com>
Subject: 14829 - Wingate Hotel Site - Kanata West Business Park

Hi Emily,

Thanks for taking the time to chat with me this morning about the hotel site that is proposed to be located on part of block 23 within the Kanata West Business Park at the northeast corner of the Palladium/Campeau roundabout. I have highlighted the subject property on the attached sketch "14289-Overall Plan-2017-08-01 - Block 23 Highlight".

As discussed, I have made a quick summary of our discussion below.

IBI stated that the proposed development is to be a hotel and a sketch of the possible site plan is attached. It was noted that the site plan may be subject to minor adjustments based on recent comments received from the City urban planner; however the general size of the site and scale of the proposed structure/development will more or less remain unchanged. Hence, only the location/orientation of the building may shift pending refinement of the design.

The subject block is currently undeveloped vacant land. Within the block, at the southeast corner, there is currently a ditch inlet catch basin (DICB) that provides a drainage outlet for overland flows from both the subject block and the adjacent undeveloped blocks to the north. IBI noted that the development of the subject block would interrupt a portion of the overland flow pattern directed towards the DICB making it redundant and allowing its removal.

Given that the proposed development is a hotel (industrial zoning notwithstanding) and that proposed development of the subject block will ensure that no storm water from outside of the subject block will be directed onto and or captured by subject development, it is the Ministry of Environment and Climate Change's opinion that an Environmental Compliance Application is not required in support of the proposed Site Plan Application.

James Battison

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154 Colonnade Road South
Ottawa, Ontario
K2E 7J5

Tel: (613) 226-7381

Fax: (613) 226-6344

July 17, 2018

File: PG4378-LET.01

BHG Kanata West Hotel LP

108-70C Mount Joy Street N

Timmins, Ontario

P4N 4V7

Geotechnical Engineering
Environmental Engineering
Hydrogeology
Geological Engineering
Materials Testing
Building Science
Archaeological Services

www.patersongroup.ca

Attention: **Mr. Luc Sergerie**

Subject: **Geotechnical Response to City Comments
Proposed Multi-Storey Hotel Building
8600 Campeau Drive - Ottawa**

Dear Sir,

Further to your request, Paterson Group (Paterson) has prepared the present report to outline our responses to the City of Ottawa review comments dated July 11, 2018 for the Engineering submission prepared for the aforementioned development. The present report should be read in conjunction with our updated geotechnical Report PG4378-1 Revision 1 dated July 17, 2018.

Geotechnical Investigation Comment 1:

Comment: *Please provide the civic address (8600 Campeau Drive) of the subject property on the cover sheet.*

Response: Refer to our revised report PG4378-1 Revision 1 dated July 17, 2018.

Geotechnical Investigation Comment 2:

Comment: *The subject site is identified as Block 23. Please note that the block will not be identified as Block 23 once the block is registered as Phase 2 of the subdivision. The site shall be identified in accordance with the 4M-Plan and a reference make to the draft plan of subdivision block number 23.*

Response: Reference to Block 23 has been removed from the updated geotechnical report.

Geotechnical Investigation Comment 3:

Comment: *Please note that Paterson Group is required to submit a letter sealed by a professional engineer licensed in the province of Ontario to the city signing off on the most recent grading plan to verify that Paterson Group has reviewed the proposed grading and accepts that the grading and proposed features are in conformance with the recommendations and conclusions, constraints of the latest geotechnical investigation. The memo shall reference the final grading plan/revision date.*

Response: Refer to Paterson memorandum PG4378-MEMO.02 - Grading Plan Review - June 20, 2018 attached in Appendix 3 of our revised report. If updates to the grading plan are completed, Paterson can provide an updated memorandum.

Geotechnical Investigation Comment 4:

Comment: *Please provide discussion and recommendations within the report regarding the proposed infiltration gallery. Also, provide a discussion within the body of the report and verify that the established seasonally high water table depth elevation is minimum 1 m below the bottom of the proposed infiltration trench as this is a requirement as per MOE Stormwater Design Manual.*

Response: Refer to Subsection 5.8 in our revised report PG4378-1 Revision 1 dated July 17, 2018. The design of the proposed infiltration gallery is acceptable from a geotechnical perspective.

Geotechnical Investigation Comment 5:

Comment: *Please indicate if clay dykes are required for the subject site and confirm the locations.*

Response: Based on the proposed depth of the service trenches in comparison to the long-term groundwater level, it is anticipated that the long-term groundwater level will remain below the trench excavation. Therefore, clay dykes are not required as groundwater is not expected to be encountered while excavating the service trenches. This recommendation can be confirmed at the time of construction.

Geotechnical Investigation Comment 6:

Comment: *Please provide a tree planting restrictions section.*

Response: Refer to Subsection 6.8 in our revised report PG4378-1 Revision 1 dated July 17, 2018.

Geotechnical Investigation Comment 7:

Comment: *Please provide a memorandum to establish a percolation rate for the soil characteristics encountered specific to the subject site.*

Response: Refer to Paterson memorandum PG4378-MEMO.01 - Percolation Rates - June 20-2018 attached in Appendix 3 of our revised report.

Geotechnical Investigation Comment 8:

Comment: *It is noted that a PTTW may be required for this project. Based on the proposed works and investigation undertaken, please provide a professional opinion if a PTTW will likely be required for this development as it is noted that a min. of 4 to 5 months should be allowed for the completion of the PTTW application package and issuance of a permit by the MOECC. Based on the timelines presented for construction it would be in the interest of the applicant to establish at this time if a permit will be required to allow time to file an application as this would result in a significant delay in starting construction activities while awaiting a permit from the MOECC if determined to be required at a later date.*

Response: It has been confirmed that the proposed building will not have a basement level and the site will undergo a grade raise of approximately 2 m above the existing grade. Therefore, the excavation will be shallow and above the groundwater level.

Based on this information, a PTTW will not be required. However, due to the size of the building footprint, it is recommended that an EASR be obtained for the subject site as the excavation could accumulate significant amounts of water during rain events. Paterson is in the process of applying for an EASR which will be obtained prior to the start of construction.

Geotechnical Investigation Comment 9:

Comment: *An underfloor slab drainage system is noted to be implemented to control water infiltration. Please provide specific details regarding this system in the report in consultation with the civil engineer.*

Response: Based on the anticipated founding elevation and grade raise across the subject site, the slab on grade building will be well above the long-term groundwater level. Therefore, underfloor drainage pipes are not required for the proposed project.

The perimeter foundation drainage pipe is still recommended to be installed as per the recommendations in the geotechnical report.

Mr. Luc Sergerie
Page 4
File: PG4378-LET.01

We trust that this information satisfies your requirements.

Best Regards,

Paterson Group Inc.



Colin Belcourt, P.Eng.



Faisal I. Abou-Seido, P.Eng.