File: 121693 – 7.3

DESIGN BRIEF
KINAXIS OFFICE
8700 CAMPEAU DRIVE
OTTAWA, ON

Development Application File No. **D07-12-19-0122**

Prepared for PC Developments Inc.
by IBI Group
July 2019
Revised October 2019

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1 INTRODUCTION

1.1 Scope

IBI Group has been retained by the PC Kanata Developments Inc. 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 PC Kanata Developments Inc. site is currently identified as all of draft Kanata West Business Park blocks 24, 25 and 28 along with a portion of draft block 29. It is anticipated that a new block for the subject site will be registered, as part of the Kanata West Business Park – Phase 5 registration, will be completed in advance of site plan approval.

The proposed development will be made up of a 5 story, 150,000 square foot office building for Kinaxis, an Ottawa based technology company. The building footprint is approximately 2,800m^2.

The location of the subject site is shown on **Figure 1.** The site is approximately 2.33 hectares in size and is bounded by Campeau Drive to the south, undeveloped land to the west, future Upper Canada Street to the north and Palladium Drive to the east. The latest aerial photo showing the existing conditions are shown on **Figure 2**. Detailed design drawings for the section of Palladium Drive adjacent to the site, which has been constructed, is included in **Appendix E**.

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 March 2019.
- Detail Design drawing set, Kanata West Business Park, 333 Huntmar Drive, prepared by IBI Group, latest revision dated October, 2019.

1.4 Geotechnical Considerations

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

- Report No. PG3115-6 dated September 20, 2019 for the Kinaxis site;

Among other items, the reports comment on the following:

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

Generally, the site is relatively flat, sloping from north-west to south-east. The subsurface profile encountered at the test hole locations 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.

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. Additionally, a 200 mm diameter main is proposed to be constructed within future Upper Canada Street in advance of the completion of the Kinaxis site works.

2.2 Design Criteria

Water demand criteria are taken from Table 4.2 of the 'Ottawa Design Guidelines – Water Distribution'. For this office site, the rate of with 75 litres/day/person was used. It is anticipated this office will accommodate a maximum of 540 persons. The anticipated water demands are as follows:

Average Day Demand	0.47 l/s
Maximum Day Demand	1.17 l/s
Peak Hour Demand	2.58 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 12,000 l/min (200.0 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 12,000l/min was determined. A copy of the FUS calculation and water demand calculation sheet are included in **Appendix A**. Additionally, a letter from the mechanical engineer confirming that the building will be sprinklered and a letter from the architect confirming the building will be constructed using fire resistive construction have also been 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 condition for the Kanata West Business Park at Campeau Drive and Huntmar Road.

The boundary condition report included in **Appendix A** and is summarized as follows:

Condition #1 – Nipissing Crt/Campeau	Hydraulic Grade Line
Basic Day (Max HGL)	162.3 m
Peak Hour (PKHR)	157.4 m
Max Day (MXDY) + Fire	123.9 m (Fire Flow 12,000 l/min)

Demands listed on the boundary condition request are aggregate demands based on the known demands and estimated demands for the undeveloped lands within the vicinity of the proposed connection. Additionally, the fire flow demand included in the boundary condition request was based on the KNW MSS.

A water model for the Kanata West Business Park has been created using the InfoWater program by Innovyze. The model includes all watermains constructed to date in the Business Park and adjacent Tanger site and the proposed watermains for this development. Two nodes have been added to the model for the Kinaxis site, nodes KI1 and KI2. Node B-175 has also been added for the watermain to be extended on Upper Canada Street. The model schematic and results are included in **Appendix A** and are summarized as follows:

Basic Day (Max HGL)	581.6 kPa
Peak Hour (PKHR)	475.0 kPa
Max Day (MXDY) + Fire	229.0 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 office building is 229.0 l/s which exceeds than the required 200.00 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 Kinaxis site is shown on the Site Servicing Plan C-001. 200mm watermains are shown crossing the site and connecting to both the existing 250 mm watermain on Palladium Drive and the proposed 200 mm watermain on future Upper Canada Street. The service will be further extended to the building. Two new private fire hydrants 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. Hydraulic modeling results for the development is included in **Appendix A**.

With 4 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.

BUILDING ID	FIRE FLOW DEMAND (L/MIN)	FIRE HYDRANT(S) WITHIN 75M (5,700 L/MIN)	FIRE HYDRANT(S) WITHIN 150M (3,800 L/MIN)	COMBINED FIRE FLOW (L/MIN)
Office	12,000	4	0	22,800

3 WASTEWATER DISPOSAL

3.1 Existing Conditions

The site was designed to be serviced by the existing sanitary sewers within the Kanata West Business Park 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 1.1, the propped development is to be a 5 storey office building designed to accommodate 540 employees on site. 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 2.29 Ha
- Office (Appendix 4A) 75 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 1.47 l/s. The detailed sewer calculations and sanitary drainage area plan are included in **Appendix B**.

The sanitary sewer design sheet for the Kanata West Business Park confirms flows from the subject lands have been accounted for within the KWBP sanitary sewer design. The KWBP sanitary sewer design sheet can be found in **Appendix B**. It is understood that the forthcoming registration of the Kanata West Business Park – Phase 5 lands will clearly demonstrate that the proposed flows from the subject lands are included in the sewer calculations for the existing sanitary sewers within the KWBP.

4 SITE STORMWATER MANAGEMENT

4.1 Existing Conditions

The existing undeveloped subject lands currently drain south-east via overland flow towards the Palladium Drive ROW. Existing storm sewers adjacent to the site include a 1050mm dia sewer within Palladium Drive which will be the ultimate outlet for the subject lands.

4.2 Design Criteria

As part of the Kanata West Business Park (KWBP) Design Brief stormwater management release rates were established for individual blocks. The subject site, listed as all or a portion of drainage areas 156A, 155B, 106A, 105A on the Kanata West Business Park 14289-500 Storm Drainage Area plan. Calculations to determine the proportioned allowable release rate are included on the stormwater management calculations found in **Appendix C**. Additionally, table 4.1 from the approved KWBP design brief has also been included in **Appendix C** to confirm the release rates per block used in the above noted 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 (MVCA) prior to commencement of servicing works.

The design of the on-site stormwater management has been done in such a way as to not negatively impact the adjacent properties and no flows up to and including the 100 year storm shall encroach on adjacent 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 Kinaxis 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 report for confirmation of percolation rates used in calculations.

The design of the infiltration gallery is to be as per MECP requirements and the bottom of storage media will be minimum 1m above the high groundwater. The header invert is 102.40m, based on the cross section the bottom of media storage is 101.8m. Based on the geotechnical report the current groundwater in the area is approximately 100.80m.

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 and dry year to establish overflow volume based on measured historical data. Once an overflow was established the maximum potential infiltration of the gallery was estimated using gallery size and precipitation norms for the area [920mm] and the overflow was then subtracted subtracted), 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 Kinaxis office building roof area. The below table provides summary of the infiltration calculations for the site, further details of the infiltration gallery are provided within the Engineering Drawings 121693-001 and 121693-010. Also, 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)
Kinaxis	2821	2466	738	1728

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 an infiltration gallery fed by rooftop drains. The infiltration gallery will provide an estimated 1728m^3 of infiltration on an annual basis, or 75.44mm/year for the 2.29ha site, above the required post-development rate of 75mm/year.

4.3 Stormwater Management

Based on the approved Kanata West Business Park Design Brief, table 4.2, and the storm water modeling, the maximum allowable release rate for the subjected site is 377/s.

The site is approximately 2.29 ha and is proposed to comprise of an office 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 1050mm storm sewer within Palladium Drive. The upstream flow will be controlled with inlet control devices at locations identified on plan C-001 and the CB data table.

Due to some grade differential at the south of the building, there will be some uncontrolled flow to the Campeau Drive ROW and storm sewer system, see grading plan C-200 for details.

The uncontrolled portion of the site is approximately 0.19 ha. Based on the proposed coefficient and Tc=10 min, the 100 yr flow from the uncontrolled area is 64.89 l/s. Based on an allowable

release rate of 377 l/s for the site, the controlled portion is limited to 377 l/s – 64.89 l/s = 312.11 l/s.

As noted above, stormwater runoff from the site is directed to the existing Palladium 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 downstream storm sewer network will be controlled by Inlet Control Devices (ICDs) to limit flow and prevent sewer surcharging downstream.

The minor storm sewer system is illustrated on the General Plan C-001 and the Details and Notes Plan C-010. 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 Palladium Drive through with a maximum 100 year restricted release rate of 312.11 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 underground in-line storage and surface ponding at inlet locations. Orifices in catchbasins and manholes will be employed to control runoff from parking, access and landscape areas. To determine the resulting storage volumes a 2 year, 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 in-line structure and surface ponding during the 5 year and 100 year events while only storage within the pipe and structures (underground) was utilized as available storage during the 2 year event. Please refer to the ponding plan 121693-C-600 for more information regarding pond volumes.

The modified rational method was used to calculate maximum storage required for a given release rate. As per accepted convention, when underground storage is considered available storage the ICD release rate is to be reduced by 50% to account for the loss of head during the initial part of the rainfall event while the underground portion of the storage fills with runoff.

Ponding depths were limited to 150 mm for the 5 year storm and 350 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.

The stormwater management for the site has ensured that there will be no surface ponding during the 2 year storm event. To achieve sufficient underground storage, storm sewer segments have been oversized.

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 MECP 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 3 – Post-Development Storage Summary Table

Post-Development Flows							
Drainage Area	ICD TYPE	Restricted /Uncontrolled Flow (L/s)		Storage Required (m^3)		Storage Provided (m^3)	Excess Storage Provided (m^3)
		5-year	100-year	5-year	100-year		
UNCONTROLLED FLOW							
UN	N/A		64.89	N/A	N/A	N/A	N/A
TOTAL UNRESTRICTED RELEASED RATE							
			64.89				
CONTROLLED TO PALLADIUM DRIVE STORM SEWER SYSTEM							
CB12/11/9/8/3 CBMH10	TEMPEST HF	130	130	137.18	355.66	775.37	419.71
CB7/5/2/4/CBMH6	TEMPEST HF	110	110	92.54	246.27	266.86	20.59
CB1	TEMPEST HF	44	44	2.02	10.73	10.98	0.25
ROOF	*by others*	25	25	30.18	83.91	85.00	1.09
TOTAL RESTRICTED RELEASED RATE							
			309				

Since the on-site storm sewers are under single ownership, are not for industrial use, no MECP ECA is required for the development.

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 watermains 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

The Servicing strategy can be summarized as follows:

- Adequate fire flow protection and domestic supply can be provided from the existing watermain located in Palladium Drive and the future proposed watermain in Upper Canada Street.
- 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 and manholes. Storage will be provided through underground in structure and parking lot surface ponding in larger events.
- Erosion and sediment control measures have been outlined for the construction of the development.

This report has illustrated that the proposed Kinaxis office 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 MECP 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.

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Associate Manager

James Battison C.E.T.

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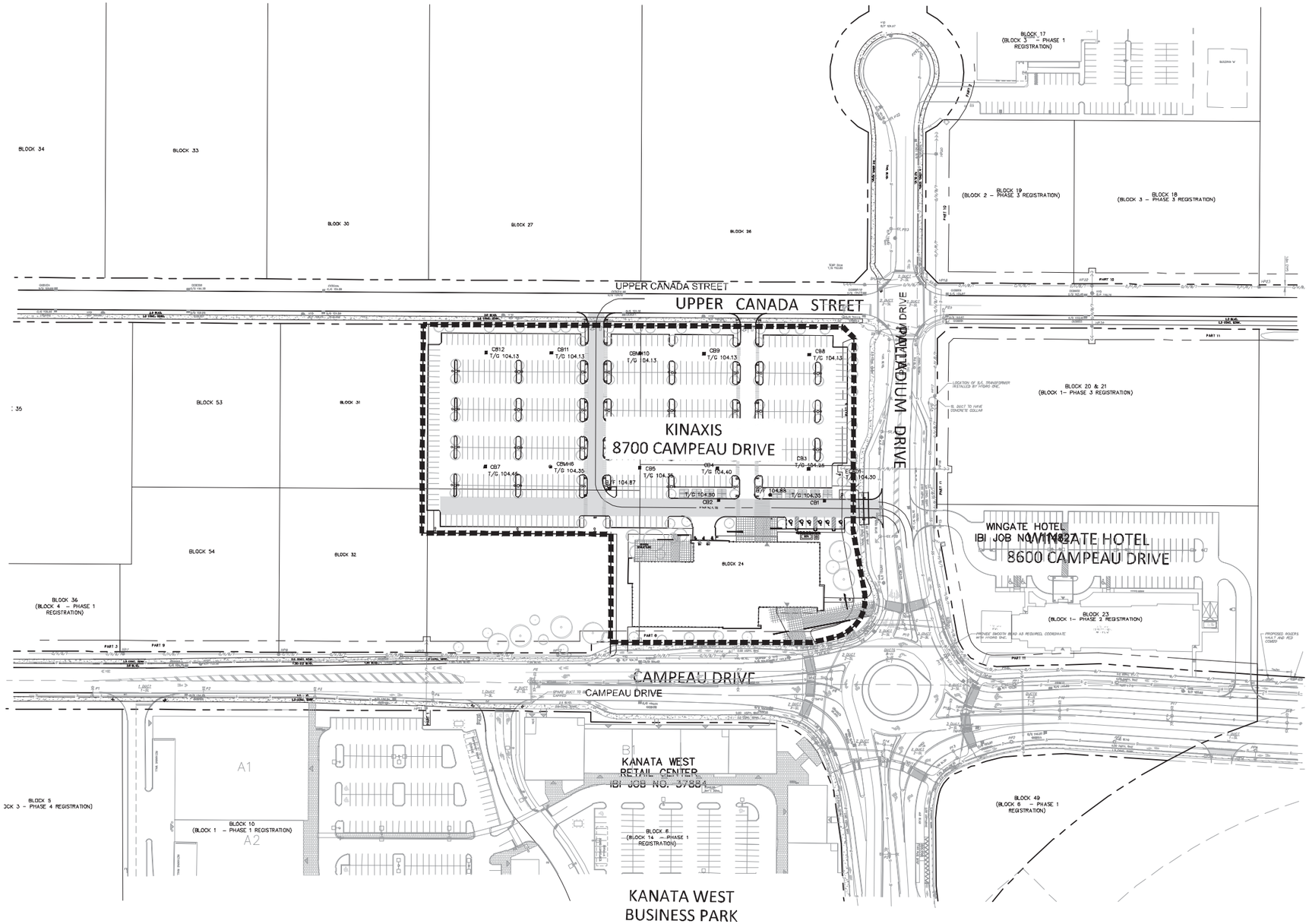

J:\121693_Kinaxis\7.0_Production\7.3_Design\04_Civil_LAND_FIGURES\121693-Figure-1.dwg Layout Name: FIGURE 1 Plot Scale: 1:5.13 Plotted At: 7/4/2019 Last Saved By: EHenrie Last Saved At: Jul. 3, 19

Scale	Project Title	Drawing Title	Sheet No.
N.T.S.	KINAXIS	LOCATION PLAN	FIGURE 1

J:\121693_Kinaxis\7.0_Production\7.3_Design\04_Civil_LAND_FIGURES\121693-Figure-2.dwg Layout Name: FIGURE 2

Project Title	Drawing Title	Sheet No.
KINAXIS	EXISTING CONDITIONS	FIGURE 2

APPENDIX A

IBI GROUP
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Fire Flow Design Sheet
Kinaxis
City of Ottawa
Project No. 121693
04-Jul-19

Kinaxis Office - 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 = 13935 m^2
C = 0.6
F = 15582.2 L/min

rounded off to 16,000 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 -15% x 16,000 = 13,600 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 13,600 = 9,520 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	100	0%	north side
Side 2	75	0%	east side
Side 3	46	0%	south side
Side 4	5	20%	west side
		20%	(Total shall not exceed 75%)

Increase due to separation 20% x 9,520 = 11,424 L/min

The fire flow requirement is 12,000 L/min
or **200 L/sec**
or 3,170 gpm (us)
or 2,640 gpm (uk)

Based on method described in:
"Water Supply for Public Fire Protection - A Guide to Recommended Practice", 1991
by Fire Underwriters Survey

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WATERMAIN DEMAND CALCULATION SHEET

PROJECT : Kinaxis Office
LOCATION : Kanata West Business Park - City of Ottawa
DEVELOPER : PC Kanata Developments Inc.

FILE: 121693
DATE PRINTED: 05-Jul-19
DESIGN: JEB
PAGE : 1 OF 1

NODE	RESIDENTIAL UNITS SF	RESIDENTIAL UNITS Office	RESIDENTIAL UNITS ST	Population	NON-RESIDENTIAL INDTRL (ha.)	NON-RESIDENTIAL INST. (ha.)	NON-RESIDENTIAL RETAIL (m^2)	AVERAGE DAILY DEMAND (l/s) Non-res.	AVERAGE DAILY DEMAND (l/s) Res.	AVERAGE DAILY DEMAND (l/s) Total	MAXIMUM DAILY DEMAND (l/s) Non-res.	MAXIMUM DAILY DEMAND (l/s) Res.	MAXIMUM DAILY DEMAND (l/s) Total	MAXIMUM HOURLY ` Non-res.	MAXIMUM HOURLY ` Res.	MAXIMUM HOURLY ` Total	FIRE DEMAND (l/min)
Kinaxis Office		540		540				0.47	0.00	0.47	1.17	0.00	1.17	2.58	0.00	2.58	12,000

ASSUMPTIONS

RESIDENTIAL DENSITIES
- Single Family (SF) 3.4 p / p / u
- Stacked Townhouse (ST) 2.3 p / p / u

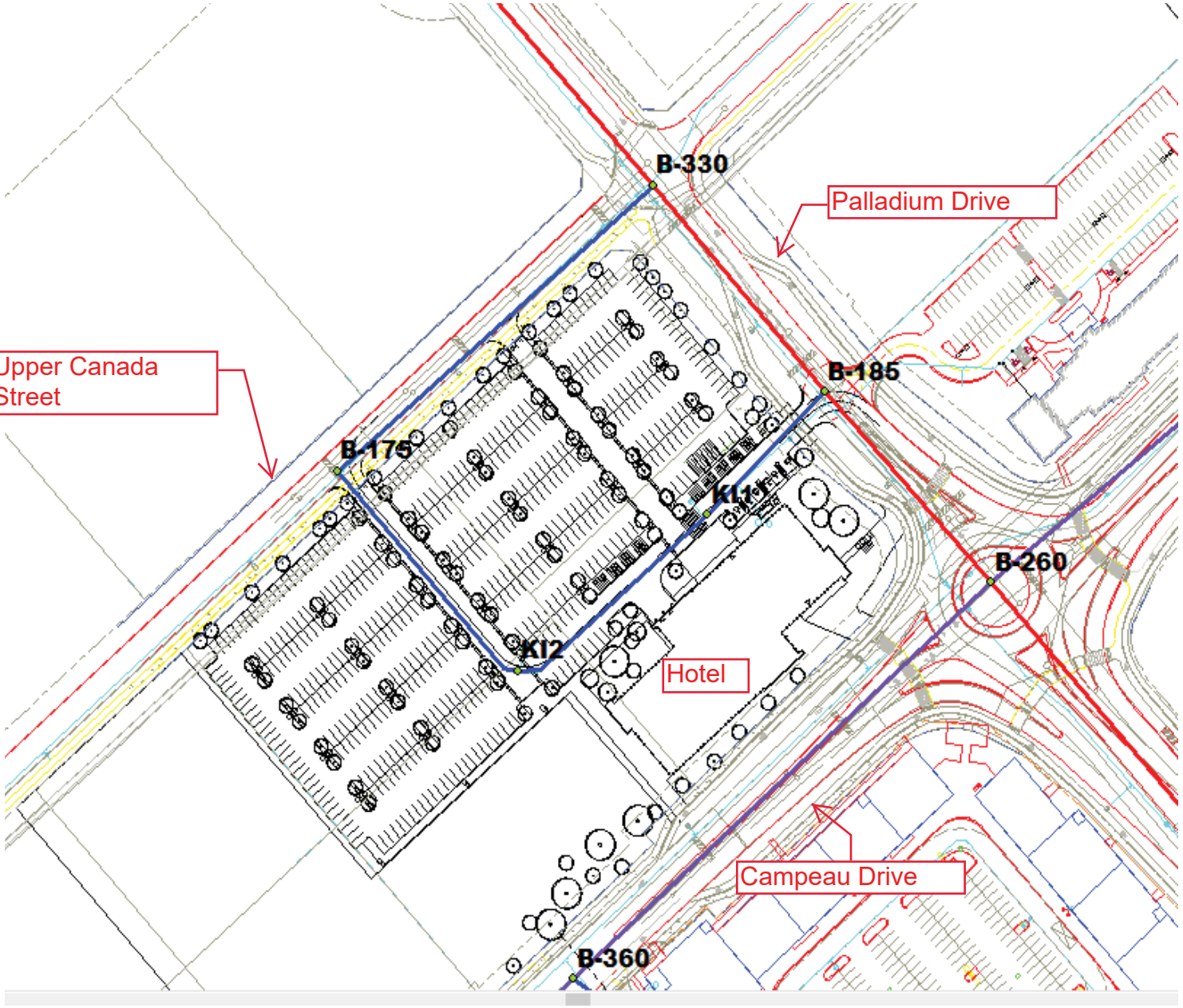
AVG. DAILY DEMAND
- Office (Table 4.2) 75 l / cap / day
- Business Park (Industrial) 35,000 l / ha / day
- Institutional 35,000 l / 1000m^2 / day
- Retail (Shopping Centre) 2,500 l / 1000m^2 / day

MAX. DAILY DEMAND
- Office (Table 4.2) 188 l / cap / day
- Industrial (Business Park) 52,500 l / ha / day
- Institutional 52,500 l / 1000m^2 / day
- Retail (Shopping Centre) 3750 l / 1000m^2 / day

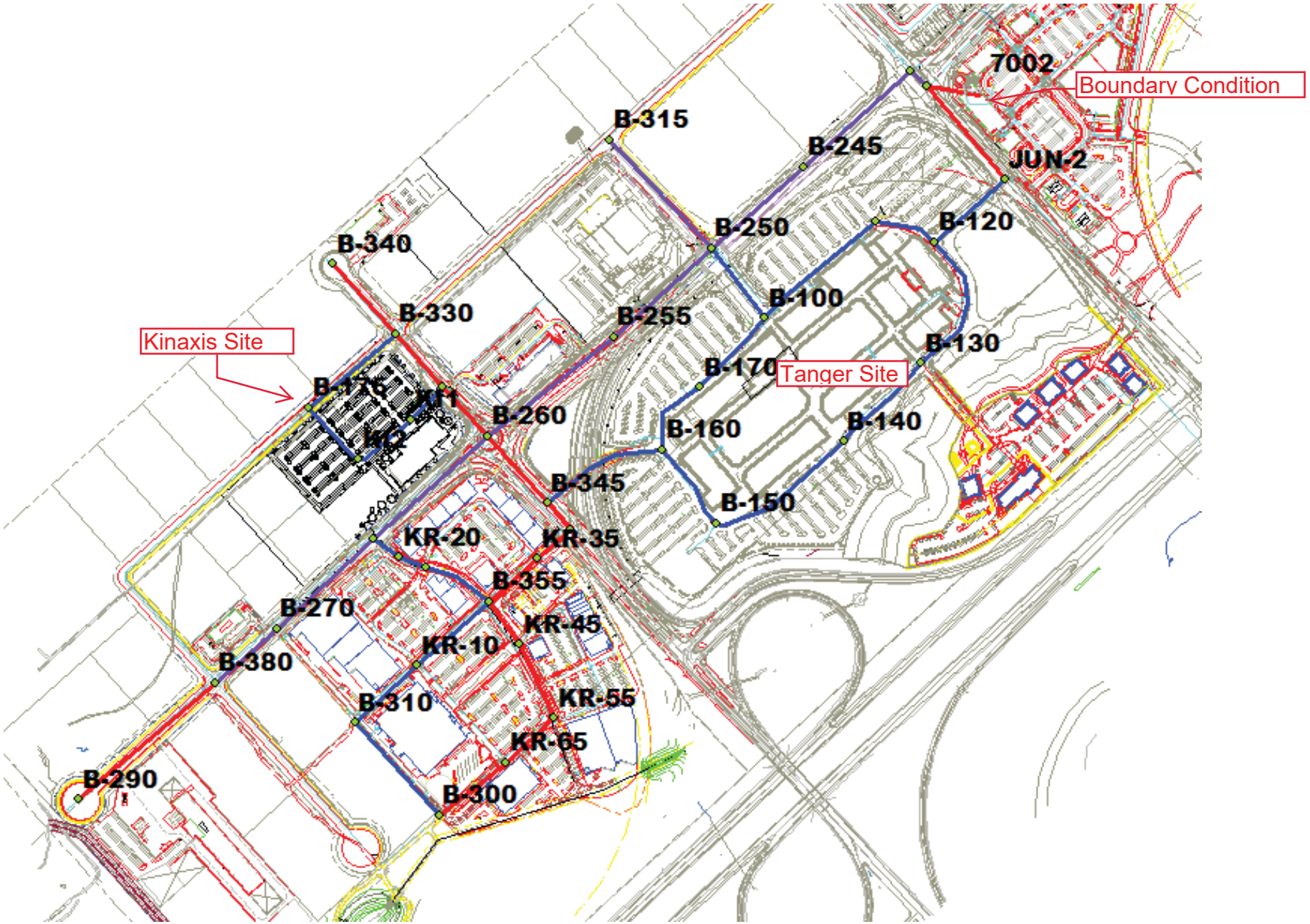
MAX. HOURLY DEMAND
- Office (Table 4.2) 413 l / cap / day
- Industrial (Business Park) 94,500 l / ha / day
- Institutional 94,500 l / 1000m^2 / day
- Retail (Shopping Centre) 6,750 l / 1000m^2 / day

FIRE FLOW
- Kinaxis Office 12,000 l / min

KINAXIS WATER MODEL



OVERALL MODEL



		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	☐	B-100	0.48	101.65	164.00	610.93
2	☐	B-110	1.30	101.70	164.00	610.54
3	☐	B-120	1.51	101.35	164.01	614.06
4	☐	B-130	1.34	101.50	163.98	612.27
5	☐	B-140	1.59	101.50	163.97	612.15
6	☐	B-150	1.38	101.65	163.96	610.63
7	☐	B-160	0.52	101.75	163.96	609.65
8	☐	B-170	0.87	101.50	163.98	612.21
9	☐	B-175	0.00	104.50	163.95	582.56
10	☐	B-185	0.00	104.40	163.95	583.52
11	☐	B-245	1.85	101.00	164.04	617.72
12	☐	B-250	0.00	102.10	164.00	606.59
13	☐	B-255	1.07	102.70	163.98	600.46
14	☐	B-260	0.72	104.50	163.95	582.58
15	☐	B-270	0.41	105.00	163.94	577.53
16	☐	B-290	2.37	106.35	163.93	564.24
17	☐	B-300	0.00	104.60	163.94	581.44
18	☐	B-310	1.17	104.80	163.94	579.48
19	☐	B-315	0.90	102.15	164.00	606.09
20	☐	B-330	0.65	104.30	163.95	584.52
21	☐	B-340	0.77	104.70	163.95	580.60
22	☐	B-345	0.17	104.75	163.95	580.12
23	☐	B-350	0.00	105.00	163.95	577.64
24	☐	B-355	3.60	104.50	163.94	582.45
25	☐	B-360	0.28	105.00	163.94	577.58
26	☐	B-380	1.24	105.75	163.93	570.16
27	☐	J-1	1.37	105.75	163.93	570.16
28	☐	J-2	0.43	105.65	163.93	571.14
29	☐	J-3	0.47	105.90	163.93	568.69
30	☐	JUN-1	0.00	100.20	164.10	626.16
31	☐	JUN-2	0.00	101.50	164.10	613.41
32	☐	JUN-3	0.00	100.25	164.09	625.59
33	☐	KI1	0.47	104.60	163.95	581.58
34	☐	KI2	0.00	104.70	163.95	580.60
35	☐	KR-10	0.00	105.00	163.94	577.53
36	☐	KR-20	0.00	105.05	163.94	577.08
37	☐	KR-25	0.00	104.90	163.94	578.55
38	☐	KR-35	0.00	104.60	163.94	581.52
39	☐	KR-45	0.00	0.00	163.94	1,606.46
40	☐	KR-55	0.00	104.70	163.94	580.47
41	☐	KR-65	0.00	104.70	163.94	580.47
42	☐	PH3-1	0.00	0.00	164.00	1,607.08
43	☐	PH3-2	0.00	0.00	164.00	1,607.08

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	☐	B-100	1.30	101.65	153.40	507.09
2	☐	B-110	3.50	101.70	153.47	507.26
3	☐	B-120	4.08	101.35	153.53	511.32
4	☐	B-130	3.61	101.50	153.31	507.72
5	☐	B-140	4.30	101.50	153.23	506.89
6	☐	B-150	3.72	101.65	153.19	505.08
7	☐	B-160	1.41	101.75	153.19	504.09
8	☐	B-170	2.36	101.50	153.27	507.28
9	☐	B-175	0.00	104.50	153.07	475.95
10	☐	B-185	0.00	104.40	153.08	476.97
11	☐	B-245	4.99	101.00	153.68	516.27
12	☐	B-250	0.00	102.10	153.44	503.07
13	☐	B-255	2.88	102.70	153.27	495.52
14	☐	B-260	1.95	104.50	153.09	476.16
15	☐	B-270	1.09	105.00	153.00	470.36
16	☐	B-290	6.39	106.35	152.96	456.70
17	☐	B-300	0.00	104.60	152.99	474.20
18	☐	B-310	3.15	104.80	152.99	472.24
19	☐	B-315	2.43	102.15	153.44	502.57
20	☐	B-330	1.76	104.30	153.07	477.92
21	☐	B-340	2.09	104.70	153.07	473.98
22	☐	B-345	0.45	104.75	153.09	473.65
23	☐	B-350	0.00	105.00	153.07	471.02
24	☐	B-355	9.72	104.50	153.01	475.34
25	☐	B-360	0.75	105.00	153.03	470.66
26	☐	B-380	3.36	105.75	152.98	462.86
27	☐	J-1	3.70	105.75	152.98	462.84
28	☐	J-2	1.17	105.65	152.98	463.83
29	☐	J-3	1.27	105.90	152.98	461.39
30	☐	JUN-1	0.00	100.20	154.09	528.09
31	☐	JUN-2	0.00	101.50	154.09	515.32
32	☐	JUN-3	0.00	100.25	154.04	527.08
33	☐	KI1	1.10	104.60	153.07	474.99
34	☐	KI2	2.58	104.70	153.07	473.98
35	☐	KR-10	0.00	105.00	153.00	470.35
36	☐	KR-20	0.00	105.05	153.03	470.12
37	☐	KR-25	0.00	104.90	153.02	471.54
38	☐	KR-35	0.00	104.60	153.04	474.70
39	☐	KR-45	0.00	0.00	153.00	1,499.32
40	☐	KR-55	0.00	104.70	153.00	473.29
41	☐	KR-65	0.00	104.70	153.00	473.27
42	☐	PH3-1	0.00	0.00	153.44	1,503.56
43	☐	PH3-2	0.00	0.00	153.44	1,503.56

		ID	Total Demand (L/s)	Available Flow at Hydrant (L/s)	Critical Node ID	Critical Node Pressure (kPa)	Critical Node Head (m)	Design Flow (L/s)	Design Pressure (kPa)	Design Fire Node Pressure (kPa)
1	☐	B-100	217.39	393.15	B-100	139.96	115.93	393.15	139.96	139.96
2	☐	B-110	218.61	337.90	B-110	139.96	115.98	337.90	139.96	139.96
3	☐	B-120	218.94	421.13	B-120	139.96	115.63	421.13	139.96	139.96
4	☐	B-130	218.68	252.83	B-130	139.96	115.78	252.83	139.96	139.97
5	☐	B-140	219.06	236.92	B-140	139.96	115.78	236.92	139.96	139.96
6	☐	B-150	218.74	259.07	B-150	139.96	115.93	259.07	139.96	139.97
7	☐	B-160	217.45	330.13	B-160	139.96	116.03	330.13	139.96	139.96
8	☐	B-170	217.98	314.12	B-170	139.96	115.78	314.12	139.96	139.96
9	☐	B-245	219.44	662.37	B-290	108.89	117.46	625.46	139.96	173.78
10	☐	B-250	216.67	517.33	B-290	103.20	116.88	483.46	139.96	177.62
11	☐	B-255	218.27	412.01	B-290	113.06	117.89	391.69	139.96	167.88
12	☐	B-260	217.75	346.65	B-290	122.77	118.88	335.43	139.96	157.26
13	☐	B-270	217.28	276.89	B-290	129.64	119.58	271.41	139.96	150.41
14	☐	B-290	220.22	183.07	B-290	139.96	120.63	183.07	139.96	139.98
15	☐	B-300	216.67	256.75	B-300	139.96	118.88	256.75	139.96	140.00
16	☐	B-310	218.42	216.45	B-310	139.96	119.08	216.45	139.96	139.96
17	☐	B-315	218.02	366.86	B-315	139.96	116.43	366.86	139.96	139.96
18	☐	B-330	217.65	241.24	B-340	136.04	118.58	239.52	139.96	143.90
19	☐	B-340	217.83	200.02	B-340	139.96	118.98	200.02	139.96	139.97
20	☐	B-345	216.92	325.80	B-345	139.96	119.03	325.80	139.96	139.96
21	☐	B-350	216.67	306.01	B-350	139.96	119.28	306.01	139.96	139.96
22	☐	B-355	222.07	293.79	B-355	139.96	118.78	293.79	139.96	139.96
23	☐	B-360	217.09	303.43	B-290	129.23	119.54	297.18	139.96	150.82
24	☐	B-380	218.54	264.19	B-290	133.99	120.02	261.15	139.96	145.97
25	☐	J-1	218.73	254.30	J-1	139.96	120.03	254.30	139.96	139.99
26	☐	J-2	217.32	245.38	J-2	139.96	119.93	245.38	139.96	139.98
27	☐	J-3	217.37	242.54	J-3	139.96	120.18	242.54	139.96	139.98
28	☐	KI1	201.17	228.95	KI1	139.96	118.88	228.95	139.96	139.97

Kinaxis Peak Hour - Pipe Report

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)	Status	Flow Reversal Count
1	☐	453	JUN-1	JUN-3	26.14	297.00	120.00	48.43	0.70	0.05	2.04	Open	0
2	☐	469	JUN-1	JUN-2	145.95	610.00	120.00	26.68	0.09	0.00	0.02	Open	0
3	☐	473	B-245	JUN-3	172.60	297.00	120.00	-48.43	0.70	0.35	2.04	Open	0
4	☐	475	B-250	B-255	157.97	297.00	120.00	34.31	0.50	0.17	1.08	Open	0
5	☐	477	B-360	B-260	184.36	297.00	120.00	-18.12	0.26	0.06	0.33	Open	0
6	☐	481	B-380	B-290	214.22	250.00	110.00	6.39	0.13	0.03	0.13	Open	0
7	☐	485	B-310	B-300	150.23	204.00	110.00	-0.36	0.01	0.00	0.00	Open	0
8	☐	489	B-250	B-100	104.68	204.00	110.00	6.70	0.21	0.04	0.38	Open	0
9	☐	491	B-100	B-110	177.45	204.00	110.00	-6.68	0.20	0.07	0.38	Open	0
10	☐	493	B-120	B-110	76.66	204.00	110.00	10.18	0.31	0.06	0.83	Open	0
11	☐	495	B-120	B-130	180.37	204.00	110.00	12.43	0.38	0.22	1.20	Open	0
12	☐	497	B-130	B-140	132.76	204.00	110.00	8.82	0.27	0.08	0.64	Open	0
13	☐	499	B-140	B-150	186.62	204.00	110.00	4.52	0.14	0.03	0.18	Open	0
14	☐	501	B-150	B-160	110.94	204.00	110.00	0.80	0.02	0.00	0.01	Open	0
15	☐	503	B-170	B-160	99.49	204.00	110.00	9.72	0.30	0.08	0.76	Open	0
16	☐	505	B-100	B-170	113.62	204.00	110.00	12.08	0.37	0.13	1.14	Open	0
17	☐	507	JUN-2	B-120	112.65	204.00	110.00	26.68	0.82	0.56	4.96	Open	0
18	☐	525	B-250	B-315	178.70	297.00	120.00	2.43	0.04	0.00	0.01	Open	0
19	☐	527	B-260	B-185	80.46	250.00	110.00	7.53	0.15	0.01	0.18	Open	0
20	☐	529	B-330	B-340	112.16	250.00	110.00	2.09	0.04	0.00	0.02	Open	0
21	☐	531	B-350	B-345	42.25	250.00	110.00	-12.48	0.25	0.02	0.45	Open	0
22	☐	533	B-360	B-270	158.01	297.00	120.00	13.44	0.19	0.03	0.19	Open	0
23	☐	537	B-270	B-380	98.74	297.00	120.00	12.35	0.18	0.02	0.16	Open	0
24	☐	539	B-255	B-260	192.02	297.00	120.00	31.43	0.45	0.18	0.92	Open	0
25	☐	541	B-245	B-250	147.79	297.00	120.00	43.44	0.63	0.25	1.67	Open	0
26	☐	559	B-345	B-260	106.53	250.00	110.00	-3.83	0.08	0.01	0.05	Open	0
27	☐	561	B-345	B-160	156.52	204.00	110.00	-9.10	0.28	0.11	0.68	Open	0
28	☐	563	B-380	J-1	57.31	250.00	110.00	2.60	0.05	0.00	0.02	Open	0
29	☐	565	J-2	J-3	84.71	250.00	110.00	-2.27	0.05	0.00	0.02	Open	0
30	☐	567	J-3	B-300	153.45	250.00	110.00	-3.54	0.07	0.01	0.04	Open	0
31	☐	569	B-310	KR-10	100.75	204.00	110.00	-2.79	0.09	0.01	0.08	Open	0
32	☐	571	B-355	KR-35	77.53	250.00	110.00	-12.48	0.25	0.03	0.45	Open	0
33	☐	575	7002	JUN-1	64.97	610.00	120.00	75.11	0.26	0.01	0.14	Open	0
34	☐	579	PH3-1	PH3-2	156.07	204.00	110.00	0.00	0.00	0.00	0.00	Open	0
35	☐	593	KR-35	B-350	53.55	250.00	110.00	-12.48	0.25	0.02	0.45	Open	0

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)	Status	Flow Reversal Count
36	☐	595	KR-10	B-355	115.51	204.00	110.00	-2.79	0.09	0.01	0.08	Open	0
37	☐	599	B-300	KR-65	101.86	250.00	110.00	-3.91	0.08	0.01	0.05	Open	0
38	☐	601	KR-65	KR-55	78.29	250.00	150.00	-3.91	0.08	0.00	0.03	Open	0
39	☐	605	KR-55	KR-45	97.32	250.00	110.00	-3.91	0.08	0.01	0.05	Open	0
40	☐	607	KR-45	B-355	63.51	250.00	110.00	-3.91	0.08	0.00	0.05	Open	0
41	☐	609	B-355	KR-25	87.90	204.00	110.00	-3.93	0.12	0.01	0.14	Open	0
42	☐	611	KR-25	KR-20	34.03	204.00	110.00	-3.93	0.12	0.00	0.14	Open	0
43	☐	613	KR-20	B-360	36.50	204.00	110.00	-3.93	0.12	0.01	0.14	Open	0
44	☐	627	B-175	B-330	136.36	204.00	110.00	-0.73	0.02	0.00	0.01	Open	0
45	☐	629	PH3-2	B-315	103.77	204.00	110.00	0.00	0.00	0.00	0.00	Open	0
46	☐	P11	J-1	J-2	91.84	250.00	110.00	-1.10	0.02	0.00	0.01	Open	0
47	☐	P13	B-185	B-330	85.68	250.00	110.00	4.58	0.09	0.01	0.07	Open	0
48	☐	P15	B-185	KI1	54.44	204.00	110.00	2.95	0.09	0.00	0.08	Open	0
49	☐	P17	KI1	KI2	80.20	204.00	110.00	1.85	0.06	0.00	0.04	Open	0
50	☐	P21	KI2	B-175	86.66	204.00	110.00	-0.73	0.02	0.00	0.01	Open	0

BOUNDARY CONDITIONS

Boundary Conditions For: 14289 Kanata West Business Park

Date of Boundary Conditions: 2019-Apr-15

Provided Information:

Scenario	Demand	
	L/min	L/s
Average Daily Demand	123.6	2.1
Maximum Daily Demand	186.0	3.1
Peak Hour	334.2	5.6
Fire Flow #1 Demand	13,000	216.7

Number Of Connections: 1

Location:

BOUNDARY CONDITIONS

Results:

Connection #: 1

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	162.3	83.0
Peak Hour	157.4	76.1
Max Day Plus Fire (13,000) L/min	123.9	28.5

[1]Elevation: **103.910 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:

a) 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.
b) 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) We are not able to provide HGL and pressure results off private watermains.

3) Click or tap here to enter text.

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.

McKEE ENGINEERING

R.J. McKEE ENGINEERING LTD
1785 Woodward Drive
Ottawa, ON K2C 0P9
CANADA
Tel.: (613) 723-9585
Fax: (613) 723-9584
www.mckeeottawa.ca

October 28, 2019

File No: 19147

By Email: emily.mcgirr@taggart.ca

Taggart Realty Management
225 Metcalfe Street
Ottawa, ON K2P 1P9

Attention: Ms. Emily McGirr, Development Coordinator

Reference: Kanata West Business Park - New Office Building – Kinaxis
8700 Campeau Drive
Site Plan Municipal Comments: D07-12-19-0122

Dear Emily,

This letter is in response to the Municipal Site Plan application review comments for the new 8700 Campeau Drive office building.

10. Original Comment: Appendix A: Please provide email confirmation from the architect within Appendix A to confirm the building with be constructed with fire resistive construction (fully protected frame, floors and roof), to justify the use of C=0.6 in the fire flow calculations. In addition, ***please provide email confirmation from the mechanical consultant within Appendix A to confirm the building will be complete with a sprinkler system conforming to NFPA13.***

McKee: A water based fire protection sprinkler system will be provided throughout the building in conformance with the OBC and NFPA 13.

Please call if you require any additional information.

Yours truly,

McKEE ENGINEERING LTD.

Sylvain Chenier, P.Eng.

MCROBIE ARCHITECTS + INTERIOR DESIGNERS | 30 YEARS

PRESIDENT	David McRobie	FRAIC OAA OAQ AAA
VICE PRESIDENTS	William Crompton	FRAIC OAA
	James Salem	B.ARCH
SENIOR ASSOCIATES	Tony Fuso	OAAAS
	Jill Sparling	MRAIC OAA LEED®AP
	Johanna Garwood	BID ARIDO
ASSOCIATE	Ian Willson	MRAIC OAA

23 October 2019

Braden Walker | Development and Construction Associate
TAGGART REALTY MANAGEMENT
708 – 225 Metcalfe Street
Ottawa, ON K2P 1P9

RE: SITE PLAN CONTROL APPLICATION SECOND SUBMISSION COMMENTS – 8700 CAMPEAU DRIVE
KINAXIS OFFICE BUILDING, KANATA WEST BUSINESS PARK
FILE NUMBER: D07-12-19-0122 / OUR FILE 18-247

Dear Sir,

We reply to Ms. Laurel McCreight's *Ottawa* letter to Jacob Bolduc, *FOTENN* of 18 October 2019 Engineering Comment no. 10: *confirmation from the architect within Appendix A to confirm the building [will] be constructed with fire resistive construction (fully protected frame, floors and roof), to justify the use of C=0.6 in the fire flow calculations*.

The building shall be of non-combustible construction as defined by the Ontario Building Code: frame, floors and roof deck: reinforced poured concrete.

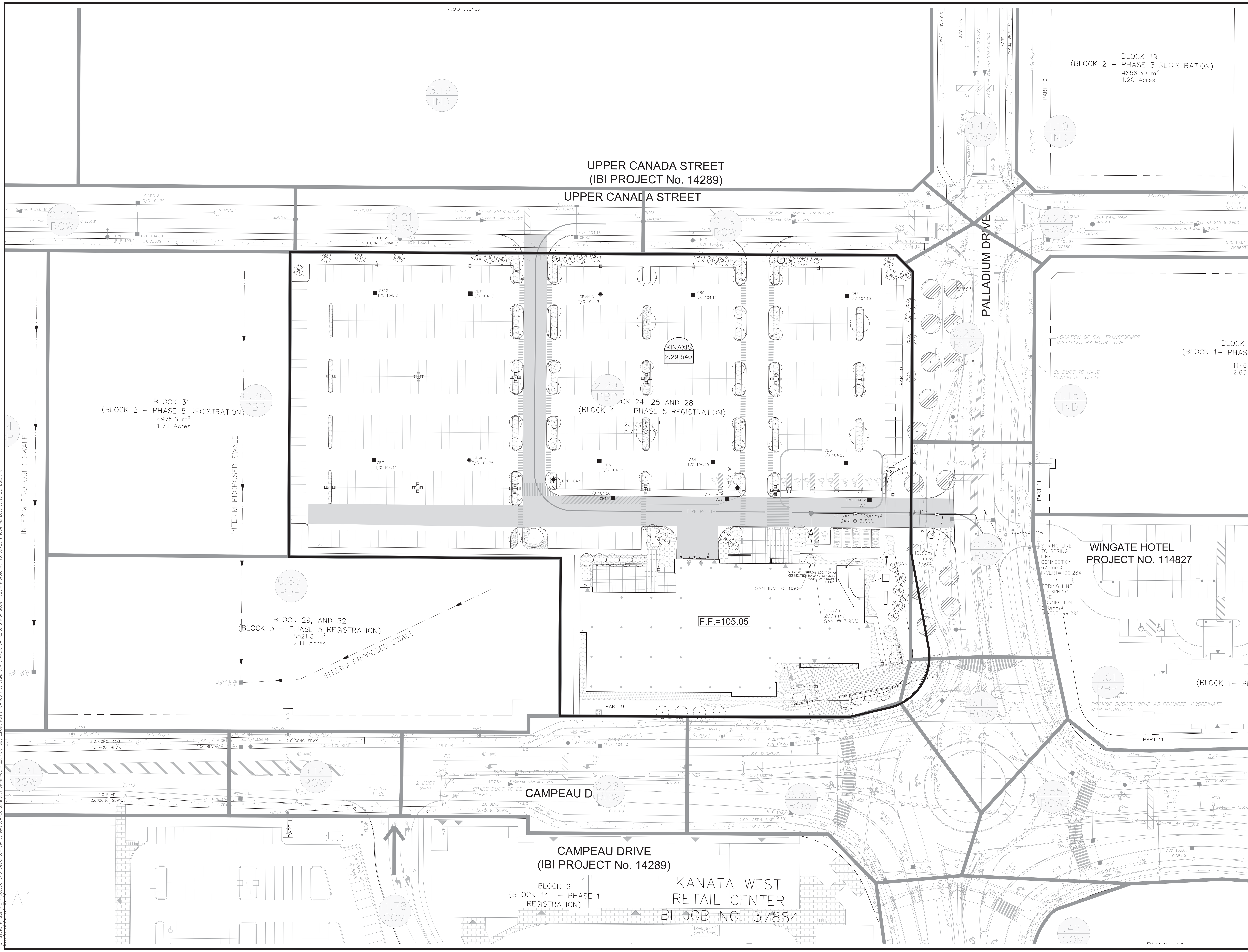
We trust this is sufficient to justify a rating of C = 0.6.

Yours truly,

ONTARIO ASSOCIATION OF ARCHITECTS
WILLIAM D. CROMPTON
LICENCE
3677

William Crompton
MCROBIE Architects + interior Designers

APPENDIX B



KEY PLAN (NTS)

SUBJECT AREA

NOTES:

1. SEE DETAIL DRAWING C-010 FOR ADDITIONAL DETAILS AND NOTES.
2. SITE BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR STANTEC GEOMATICS.

LEGEND :

- AREA NUMBER
- RUNOFF COEFFICIENT
- AREA IN HECTARES
- 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
- EXISTING DRAINAGE AREA LIMITS

No.	REVISIONS	By	Date
12			
11			
10			
9			
8			
7			
6			
5			
4			
3	REVISED AS PER CITY COMMENTS	T.R.B.	2019:10:29
2	REVISED AS PER NEW SITE PLAN AND CITY COMMENTS	T.R.B.	2019:09:30
1	ISSUED FOR SPA	T.R.B.	2019:07:09

PC KANATA DEVELOPMENTS INC.

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

Project Title
KINAXIS
8700 CAMPEAU DRIVE

LICENSED PROFESSIONAL ENGINEER
T. R. BRULE
2019/10/29
PROVINCE OF ONTARIO

Drawing Title
SANITARY DRAINAGE AREA PLAN

Scale	1 : 500
Design: JB	Date: JULY 2019
Drawn: DPS/DD/EH	Checked: TRB
Project No.: 121693	Drawing No.: C-400

D07-12-19-0122

#17988

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

SANITARY SEWER DESIGN SHEET

Kinaxis
CITY OF OTTAWA
PC Kanata Developments Inc.

LOCATION				Office										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA	UNIT TYPES				AREA	POPULATION				AREA (Ha)						ICI		AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH	w/ Units (Ha)	SF	SD	TH	Office	w/o Units (Ha)	IND	CUM	PEAK FACTOR	PEAK FLOW (L/s)	INSTITUTIONAL		COMMERCIAL		INDUSTRIAL		PEAK FACTOR	PEAK FLOW (L/s)	IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(full) (m/s)	L/s	(%)
														IND	CUM	IND	CUM	IND	CUM															
Kinaxis Site		BLDG	MH1A					540		540.0	540.0	1.50	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.33	2.33	0.77	0.00	0.00	1.47	64.01	17.36	200	3.50	1.974	62.54	97.70%
Kinaxis Site		MH1A	MH2A							0.0	540.0	1.50	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.33	0.77	0.00	0.00	1.47	64.01	30.75	200	3.50	1.974	62.54	97.70%
Kinaxis Site		MH2A	MAIN							0.0	540.0	1.50	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.33	0.77	0.00	0.00	1.47	64.01	19.69	200	3.50	1.974	62.54	97.70%

Design Parameters:

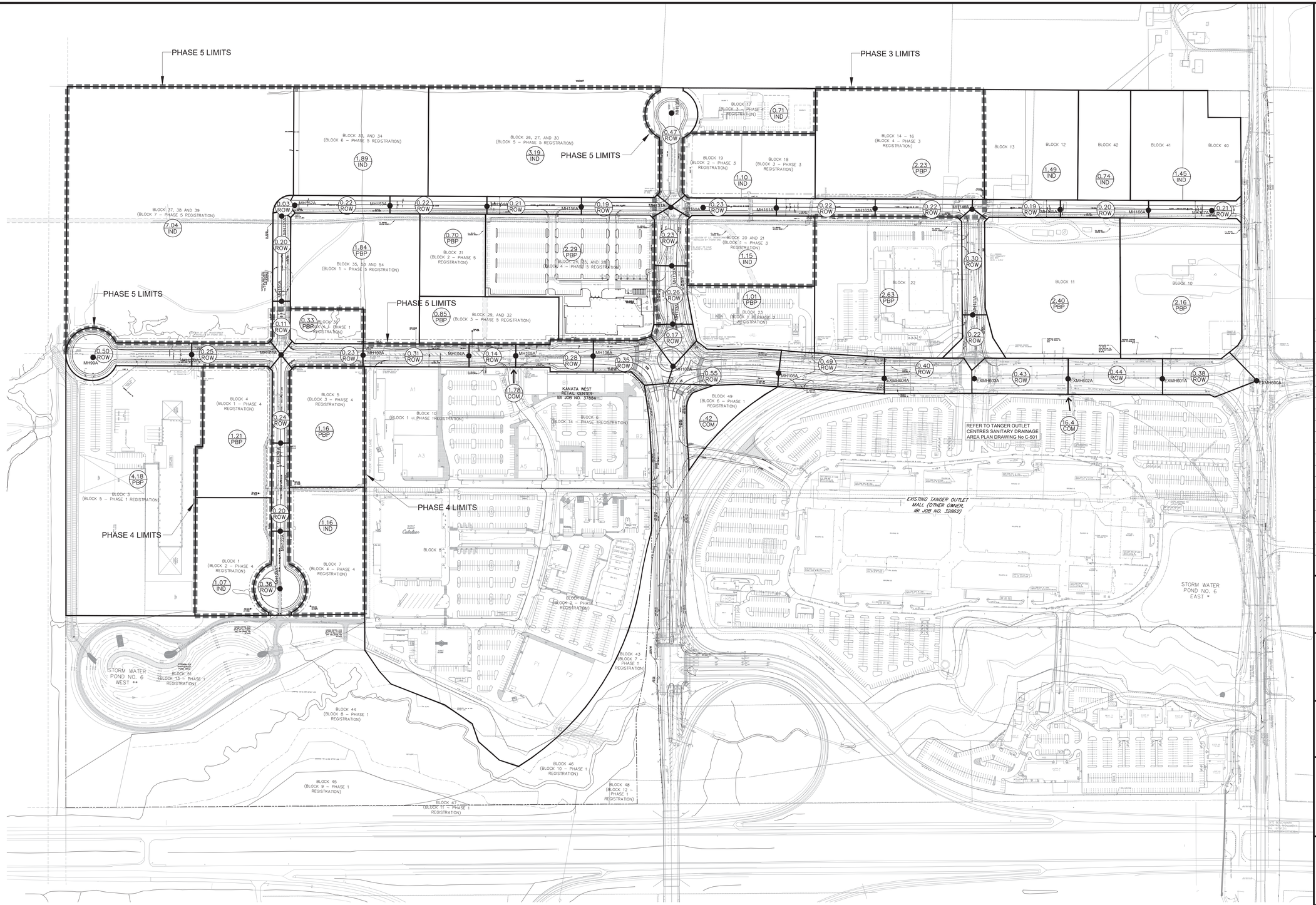
Residential			ICI Areas			
SF	3.4	p/p/u	INST	28,000	L/Ha/day	
TH/SD	2.7	p/p/u	COM	28,000	L/Ha/day	
APT	1.8	p/p/u	IND	35,000	L/Ha/day	MOE Chart
Other	60	p/p/Ha		17000	L/Ha/day	
Office	75	L/p/day				

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 200 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8
where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area,
1.5 if greater than 20%, otherwise 1.0

Designed: JEB
Checked: TRB
Dwg. Reference: 121693-501

No.	Revision	Date
1.	1st City Submission	2019-07-03

File Reference: 121693.7.3
Date: 2019-07-03
Sheet No: 1 of 1



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
- MH601A — SANITARY MANHOLE & NUMBER
- SANITARY SEWER & FLOW DIRECTION

No.	REVISIONS	By	Date
20			
19			
18			
17			
16			
15	ISSUED FOR PHASE 5 REGISTRATION	LME	19: 09: 10
14	REVISED AS PER PHASE 4 COMMENTS	LME	19: 07: 25
13	REVISED AS PER PHASE 4 COMMENTS	LME	19: 07: 22
12	REVISED AS PER PHASE 4 COMMENTS	LME	19: 06: 24
11	ISSUED FOR PHASE 4 REGISTRATION	LME	19: 04: 25
10	REVISED AS PER PHASE 3 COMMENTS	LME	19: 03: 08
9	ISSUED FOR PHASE 3 TENDER	LME	19: 01: 11
8	REVISED AS PER PHASE 3 COMMENTS	LME	18: 12: 14
7	REVISED FOR PHASE 3 REGISTRATION	LME	18: 09: 14
6	REVISED FOR PHASE 2 REGISTRATION	LME	18: 04: 20
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

TAGGART REALTY MANAGEMENT

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
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Project Title

KANATA WEST BUSINESS PARK PHASE 5

LICENSED PROFESSIONAL ENGINEER
L. M. ENGEL
13379508
2019/09/10
PROVINCE OF ONTARIO

Drawing Title

SANITARY DRAINAGE AREA PLAN

Scale
1:2000

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

D07-16-14-0003_P5

#17661

J:\14289_Innovation\3.0 Drawings\3.5Civil\Topo\c\501 SANITARY DRAINAGE AREA PLAN.dwg Layout Name: 501 SANITARY DRAINAGE AREA PLAN Plot Style: AIA STANDARD HALFTB Plot Scale: 1:1(1.0 Printed At: 10/24/2019 2:25 PM Last Saved By: dsouza Last Saved

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

SANITARY SEWER DESIGN SHEET

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

LOCATION				RESIDENTIAL									ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN							
				UNIT TYPES				AREA	POPULATION		PEAK FACTOR	PEAK FLOW	AREA (Ha)							PEAK FLOW	AREA (Ha)		FLOW			CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	VELOCITY (actual)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH	SF	SD	TH	APT	(Ha)	IND	CUM		(L/s)	PRESTIGE BUISNESS PK		COMMERCIAL		INDUSTRIAL			(L/s)	IND	CUM	(L/s)	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	(m/s)	L/s	(%)
													IND	CUM	IND	CUM	IND	CUM	PF													
KANATA WEST BUSINESS PARK - Block number based on overall concept plan of subdivision																																	
Upper Canada Street	**Blocks 31**	**MH154A**	**MH153A**										**0.70**	**0.70**				**0.00**	**1.50**	**0.34**	**0.92**	**0.92**	**0.30**	**0.00**	**0.64**	**43.87**	**110.00**	**250**	**0.50**	**0.866**	**0.301**	**43.22**	**98.53**
	Blocks 35, 53, 54												**1.84**	**2.54**				**0.00**	**1.50**	**1.23**	**2.06**	**2.98**		**0.00**	**1.23**								
	Blocks 33, 34	**MH153A**	**MH152A**														**1.89**	**1.89**	**5.90**	**4.52**	**1.89**	**4.87**	**1.61**	**0.00**	**7.36**	**39.24**	**114.86**	**250**	**0.40**	**0.774**	**0.543**	**31.88**	**81.24**
		MH152A	**MH151A**											**2.54**				**1.89**	**5.90**	**5.75**	**0.03**	**4.90**	**1.62**	**0.00**	**7.37**	**36.70**	**10.84**	**250**	**0.35**	**0.724**	**0.562**	**29.33**	**79.92**
	Blocks 37, 38, 39	**MH151A**	**MH150A**											**2.54**			**7.04**	**8.93**	**4.50**	**17.51**	**7.24**	**12.14**	**4.01**	**0.00**	**21.52**	**36.70**	**102.56**	**250**	**0.35**	**0.724**	**0.753**	**15.18**	**41.37**
		MH150A	*MH101A*											*2.54*				*8.93*	*4.50*	*17.51*	*0.11*	*12.25*	*4.04*	*0.00*	*21.56*	*36.70*	*63.86*	*250*	*0.35*	*0.724*	*0.753*	*15.15*	*41.27*
Campeau Drive	*Blocks 3*	*MH99A*	*MH100A*										*4.18*	*4.18*						*2.03*	*4.68*	*4.68*	*1.54*	*0.00*	*3.58*	*50.02*	*112.75*	*250*	*0.65*	*0.987*	*0.570*	*46.44*	*92.85*
		MH100A	*MH101A*											*4.18*						*2.03*	*0.25*	*4.93*	*1.63*	*0.00*	*3.66*	*51.91*	*101.44*	*250*	*0.70*	*1.024*	*0.571*	*48.25*	*92.95*
Nipissing Court	**Blocks 1, 7**	**MH123A**	**MH122A**														**2.23**	**2.23**	**6.25**	**5.65**	**2.59**	**2.59**	**0.85**	**0.00**	**6.50**	**50.02**	**65.18**	**250**	**0.65**	**0.987**	**0.607**	**43.52**	**87.00**
		MH122A	**MH121A**															**2.23**	**6.25**	**5.65**	**0.20**	**2.79**	**0.92**	**0.00**	**6.57**	**50.02**	**100.00**	**250**	**0.65**	**0.987**	**0.607**	**43.45**	**86.87**
	Blocks 4, 5	**MH121A**	**MH101A**										**2.37**	**2.37**				**2.23**	**6.25**	**6.80**	**2.61**	**5.40**	**1.78**	**0.00**	**8.58**	**85.51**	**97.00**	**250**	**1.90**	**1.688**	**1.038**	**76.93**	**89.97**
Campeau Drive	*Block 36*	*MH101A*	*MH103A*										*0.33*	*9.42*				*11.16*	*4.75*	*26.05*	*0.56*	*23.14*	*7.64*	*0.00*	*33.69*	*43.87*	*93.00*	*250*	*0.50*	*0.866*	*0.952*	*10.18*	*23.20*
	Block 32, 54	*MH103A*	*MH104A*										*1.00*	*10.42*				*11.16*	*4.75*	*26.54*	*1.31*	*24.45*	*8.07*	*0.00*	*34.61*	*43.87*	*120.00*	*250*	*0.50*	*0.866*	*0.952*	*9.26*	*21.11*
Campeau Drive	*Block 29, 32*	*MH104A*	*MH105A*										*0.85*	*11.27*				*11.16*	*4.75*	*26.95*	*0.99*	*25.44*	*8.40*	*0.00*	*35.35*	*43.87*	*53.11*	*250*	*0.50*	*0.866*	*0.952*	*8.52*	*19.42*
KWRC	*Blocks 6, 8, 9, 10*		*MH 105A*												*11.78*	*11.78*				*5.73*	*11.78*	*11.78*	*3.89*	*0.00*	*9.61*	*39.24*	*12.01*	*250*	*0.40*	*0.774*	*0.601*	*29.62*	*75.50*
Campeau Drive		*MH105A*	*MH106A*											*11.27*		*11.78*		*11.16*	*4.75*	*32.68*	*0.28*	*37.50*	*12.38*	*0.00*	*45.05*	*59.68*	*87.77*	*300*	*0.35*	*0.818*	*0.877*	*14.63*	*24.51*
	Block 24	*MH106A*	*MH107A*										*0.75*	*12.02*		*11.78*		*11.16*	*4.75*	*33.04*	*1.10*	*38.60*	*12.74*	*0.00*	*45.78*	*59.68*	*90.92*	*300*	*0.35*	*0.818*	*0.900*	*13.90*	*23.29*
Upper Canada Street	**Blocks 26, 27, 30**	**MH154A**	**MH156A**														**3.19**	**3.19**	**5.50**	**7.11**	**3.40**	**3.40**	**1.12**	**0.00**	**8.23**	**50.02**	**107.00**	**250**	**0.65**	**0.987**	**0.692**	**41.79**	**83.55**
		MH156A	**MH131A**															**3.19**	**5.50**	**7.11**	**0.19**	**3.59**	**1.18**	**0.00**	**8.29**	**50.02**	**101.71**	**250**	**0.65**	**0.987**	**0.692**	**41.73**	**83.42**
Palladium Drive	*Blocks 17*	*MH130A*	*MH131A*											*0.00*			*0.71*	*0.71*	*5.50*	*1.58*	*1.18*	*1.18*	*0.39*	*0.00*	*1.97*	*50.02*	*106.00*	*250*	*0.65*	*0.987*	*0.467*	*48.05*	*96.06*
Palladium Drive		*MH131A*	*MH132A*											*0.00*				*3.90*	*5.25*	*8.29*	*0.23*	*5.00*	*1.65*	*0.00*	*9.94*	*43.87*	*67.35*	*250*	*0.50*	*0.866*	*0.672*	*33.92*	*77.33*
	Block 23, 24, 25, 28	*MH132A*	*MH133A*										*3.30*	*3.30*				*3.90*	*5.25*	*9.90*	*3.56*	*8.56*	*2.82*	*0.00*	*12.72*	*43.87*	*71.26*	*250*	*0.50*	*0.866*	*0.730*	*31.14*	*71.00*
		MH133A	*MH107A*											*3.30*				*3.90*	*5.25*	*9.90*	*0.17*	*8.73*	*2.88*	*0.00*	*12.78*	*107.45*	*42.79*	*250*	*3.00*	*2.121*	*1.304*	*94.67*	*88.11*
Campeau Drive	*Block 49*	*MH107A*	*MH108A*											*15.32*	*0.42*	*12.20*		*15.06*	*4.40*	*40.22*	*0.97*	*48.30*	*15.94*	*0.00*	*56.16*	*59.68*	*120.00*	*300*	*0.35*	*0.818*	*0.900*	*3.52*	*5.90*
		MH108A	*EX604A*											*15.32*		*12.20*		*15.06*	*4.40*	*40.22*	*0.49*	*48.79*	*16.10*	*0.00*	*56.32*	*59.68*	*120.00*	*300*	*0.35*	*0.818*	*0.900*	*3.36*	*5.63*
	Block 22	*MH 604A*	*MH 603A*										*2.63*	*17.95*		*12.20*		*15.06*	*4.40*	*41.50*	*3.03*	*51.82*	*17.10*	*0.00*	*58.60*	*62.51*	*102.12*	*300*	*0.38*	*0.857*	*0.942*	*3.91*	*6.26*
Upper Canada Street	**Blocks 18, 19, 20, 21**	**MH160A**	**MH161A**											**0.00**			**2.25**	**2.25**	**5.75**	**5.24**	**2.48**	**2.48**	**0.82**	**0.00**	**6.06**	**58.86**	**83.00**	**250**	**0.90**	**1.162**	**0.714**	**52.80**	**89.70**
	Block 14- 16	**MH161A**	**MH162A**										**2.23**	**2.23**				**2.25**	**5.75**	**6.32**	**2.45**	**4.93**	**1.63**	**0.00**	**7.95**	**50.02**	**112.00**	**250**	**0.65**	**0.987**	**0.692**	**42.07**	**84.10**
		MH162A	**MH140A**											**2.23**				**2.25**	**5.75**	**6.32**	**0.22**	**5.15**	**1.70**	**0.00**	**8.02**	**63.57**	**110.98**	**250**	**1.05**	**1.255**	**0.772**	**55.55**	**87.38**
Upper Canada Street	**Blocks 40, 41**	**MH167A**	**MH166A**											**0.00**			**1.45**	**1.45**	**6.25**	**3.67**	**1.66**	**1.66**	**0.55**	**0.00**	**4.22**	**51.91**	**72.00**	**250**	**0.70**	**1.024**	**0.611**	**47.69**	**91.87**
	Block 42	**MH166A**	**MH165A**											**0.00**			**0.74**	**2.19**	**5.70**	**5.06**	**0.94**	**2.60**	**0.86**	**0.00**	**5.91**	**50.02**	**100.00**	**250**	**0.65**	**0.987**	**0.607**	**44.10**	**88.17**
	Blocks 12, 13	**MH165A**	**MH140A**											**0.00**			**1.49**	**3.68**	**5.30**	**7.90**	**1.68**	**4.28**	**1.41**	**0.00**	**9.31**	**39.24**	**99.02**	**250**	**0.40**	**0.774**	**0.601**	**29.92**	**76.26**
Journeyman Street		*MH140A*	*MH141A*											*2.23*				*5.93*	*5.00*	*13.10*	*0.30*	*9.73*	*3.21*	*0.00*	*16.31*	*31.02*	*120.00*	*250*	*0.25*	*0.612*	*0.612*	*14.71*	*47.43*
		MH141A	*MH (84)*											*2.23*				*5.93*	*5.00*	*13.10*	*0.22*	*9.95*	*3.28*	*0.00*	*16.38*	*31.02*	*40.30*	*250*	*0.25*	*0.612*	*0.612*	*14.64*	*47.20*
		Stub	*MH 603A*											*2.23*				*5.93*	*5.00*	*13.10*	*0.00*	*9.95*	*3.28*	*0.00*	*16.38*	*31.63*	*32.98*	*250*	*0.26*	*0.624*	*0.624*	*15.26*	*48.22*
Campeau Drive	*Block 11*	*MH 603A*	*MH 602A*										*2.40*	*22.58*		*12.20*		*20.99*	*3.80*	*49.22*	*2.83*	*64.60*	*21.32*	*0.00*	*70.54*	*103.47*	*105.24*	*375*	*0.32*	*0.908*	*0.973*	*32.93*	*31.83*
	Tanger Outlet Centres	*MH 602A*	*MH 601A*											*22.58*	*16.40*	*28.60*		*20.99*	*3.80*	*57.19*	*16.84*	*81.44*	*26.88*	*0.00*	*84.07*	*109.75*	*107.73*	*375*	*0.36*	*0.963*	*1.059*	*25.68*	*23.40*
	Block 52	*MH 601A*	*MH 600A*										*2.16*	*24.74*		*28.60*		*20.99*	*3.80*	*58.24*	*2.54*	*83.98*	*27.71*	*0.00*	*85.95*	*109.75*	*106.95*	*375*	*0.36*	*0.963*	*1.059*	*23.79*	*21.68*
Campeau Drive	*Block XX*	*MH XXX*	*MH XXX*	*Light Grey = Constructed Sewer*																													

KINAXIS

Design Parameters:

Residential			ICI Areas		
SF	3.4	p/p/u			Peak Factor (PF)
TH/SD	2.7	p/p/u	P.B.P.	28,000 L/Ha/day	1.5
APT	1.8	p/p/u	COM	28,000 L/Ha/day	1.5
Other	60	p/p/Ha	IND	35,000 L/Ha/day	MOE Chart

Notes:
1. Manning's coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 300 L/day
3. Infiltration allowance: 0.33 L/s/Ha 0.4 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+P^0.5)) K=0.8
where P = population in thousands

Designed: LME
Checked:
Dwg. Reference: 14289-501

No.	Revision	Date
1.	City submission No. 1	2014-11-25
2.	City submission No. 2	2015-04-08
3.	City submission No. 3	2015-06-18
4.	City submission No. 4	2015-10-15
5.	Revised for Phase 2 Registration	2018-04-19
6.	Revised for Phase 3 Registration	2018-09-14
7.	Revised per City Comments (Phase 3)	2018-12-14
8.	Revised for Phase 4 Registration	2019-04-26
9.	Revised for Phase 4 Registration Comments	2019-06-24
10.	Revised for Phase 5 Registration	2019-09-11
11.	Revised per City comments for Phase 5 Registration	2019-10-25

File Reference:	Date:	Sheet No:
14289.5.7.1	2018-04-19	1 of 1

APPENDIX C

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400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
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ibigroup.com

STORM SEWER DESIGN SHEET

Kinaxis
City of Ottawa
PC Kanata Developments Inc.

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW												SEWER DATA									
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.25	C= 0.40	C= 0.50	C= 0.57	C= 0.65	C= 0.69	C= 0.70	C= 0.76	C= 0.90	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	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) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
Kinaxis Site	CB12	CB12	CB11										0.19	0.48	0.48	10.00	0.56	10.56	76.81	104.19	122.14	178.56	36.51	49.53	58.06	84.88		36.51	100.18	29.40	375			0.30	0.879	63.67	63.56%
Kinaxis Site	CB11	CB11	CBMH10										0.16	0.40	0.88	10.56	0.76	11.32	74.73	101.34	118.78	173.62	65.44	88.74	104.01	152.04		65.44	100.18	39.99	375			0.30	0.879	34.75	34.68%
Kinaxis Site	CBMH10, CB9, CB8	CBMH10	MH9										0.54	1.35	2.23	11.32	1.33	12.64	72.10	97.72	114.52	167.36	160.54	217.60	255.01	372.68		160.54	449.81	78.53	750			0.15	0.986	289.27	64.31%
Kinaxis Site	CB3	MH9	MH3										0.13	0.33	2.55	12.64	0.46	13.10	67.96	92.04	107.83	157.54	173.42	234.88	275.18	402.04		173.42	449.81	27.01	750			0.15	0.986	276.39	61.45%
Kinaxis Site		MH3	MH2											0.00	2.55	13.10	0.26	13.36	66.65	90.25	105.72	154.45	170.09	230.31	269.81	394.15		170.09	188.11	17.59	450			0.40	1.146	18.02	9.58%
Kinaxis Site	CB7	CB7	CBMH6										0.19	0.48	0.48	10.00	0.56	10.56	76.81	104.19	122.14	178.56	36.51	49.53	58.06	84.88		36.51	100.18	29.40	375			0.30	0.879	63.67	63.56%
Kinaxis Site	CBMH6, CB2 CB5, CB4, CB2	CBMH6	MH4										0.56	1.40	1.88	10.56	2.14	12.69	74.73	101.34	118.78	173.62	140.23	190.16	222.89	325.79		140.23	339.63	117.86	675			0.15	0.919	199.41	58.71%
Kinaxis Site		MH4	MH26											0.00	1.88	12.69	0.17	12.87	67.81	91.83	107.59	157.18	127.24	172.32	201.89	294.96		127.24	188.11	11.80	450			0.40	1.146	60.87	32.36%
Kinaxis Site	R1	BLDG	MH25										0.28	0.70	0.70	10.00	0.31	10.31	76.81	104.19	122.14	178.56	53.81	72.99	85.57	125.09		53.81	87.74	31.79	250			2.00	1.731	33.93	38.67%
Kinaxis Site		MH25	MH26											0.00	0.70	10.31	0.35	10.66	75.65	102.60	120.27	175.81	53.00	71.88	84.26	123.16		53.00	71.33	20.62	300			0.50	0.978	18.34	25.71%
Kinaxis Site	CB1	MH26	MH2										0.08	0.20	2.78	12.87	0.18	13.05	67.31	91.15	106.79	156.01	186.94	253.15	296.58	433.28		186.94	245.74	12.09	525			0.30	1.100	58.80	23.93%
Kinaxis Site		MH2	MAIN											0.00	5.33	13.36	0.35	13.71	65.94	89.28	104.58	152.77	351.43	475.78	557.34	814.15		351.43	438.47	24.97	675			0.25	1.187	87.04	19.85%

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 732.951 / (TC+6.199)^0.810] 2 YEAR
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed: JEB

Checked: TRB

Dwg. Reference: 121693-C-500

No.	Revision	Date
1.	1st City Submission	2019-07-03

File Reference: 121693.7.3
Date: 2019-07-03
Sheet No: 1 of 1

UPPER CANADA STREET
(IBI PROJECT No. 14289)

PALLADIUM DRIVE

BLOCK 19
(BLOCK 2 – PHASE 3 REGISTRATION)

BLOCK 31
(BLOCK 2 – PHASE 5 REGISTRATION)

BLOCK 24, 25 AND 28
(BLOCK 4 – PHASE 5 REGISTRATION)

BLOCK 29, AND 32
(BLOCK 3 – PHASE 5 REGISTRATION)

CAMPEAU DRIVE

CAMPEAU DRIVE
(IBI PROJECT No. 14289)

BLOCK 6
(BLOCK 14 – PHASE 1 REGISTRATION)

KANATA WEST
RETAIL CENTER
IBI JOB NO. 37884

WINGATE HOTEL
IBI PROJECT NO. 114827

INTERIM PROPOSED SWALE

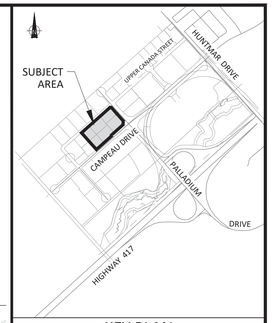
155A 0.85 | 3.19 — Tc=14.55, AC=2.71
154C 0.57 | 0.17
155C 0.57 | 0.29
156B 0.57 | 0.11
154A 0.85 | 0.70 — Tc=11.25, AC=0.60
104A 0.85 | 0.85 — Tc=11.25, AC=0.72
130D 0.85 | 0.24
160Ai 0.85 | 0.49 — Tc=10.10, AC=0.42
160D 0.57 | 0.12
156C 0.85 | 0.14
160C 0.85 | 0.15
160B 0.85 | 1.15 — Tc=11.05, AC=0.98
132A 0.85 | 1.01 — Tc=11.30, AC=0.86
132D 0.85 | 2.29 — Tc=14.95, AC=1.95
132B 0.85 | 0.15
132C 0.85 | 0.15
CB12 0.19 | 0.90
CB11 0.16 | 0.90
CBMH10 0.16 | 0.90
CB9 0.16 | 0.90
CB8 0.22 | 0.90
CB7 0.19 | 0.90
CBMH6 0.17 | 0.90
CB5 0.22 | 0.90
CB4 0.09 | 0.90
CB3 0.13 | 0.90
CB2 0.08 | 0.90
CB1 0.08 | 0.90
R1 0.28 | 0.90
UN 0.19 | 0.55
104B 0.61 | 0.30
105B 0.61 | 0.22
106B 0.85 | 0.15
106C 0.85 | 0.17
133A 0.85 | 0.15
133B 0.85 | 0.16
135E 0.85 | 0.25
107C 0.85 | 0.06
107B 0.85 | 0.09
107A 0.85 | 0.22

F.F.=105.05

29.40m – 375mmø STM @ 0.30%
39.99m – 375mmø STM @ 0.30%
78.53m – 250mmø STM @ 0.75%
117.86m – 675mmø STM @ 0.40%
11.80m – 450mmø STM @ 0.40%
20.51m – 300mmø STM @ 0.50%
29.63m – 250mmø STM @ 1.00%
12.09m – 525mmø STM @ 0.30%
250mmø @ 1% MIN
200mmø @ 1% MIN

ICD TEMPEST HF–TYPE E 110 L/s
ICD TEMPEST HF–TYPE E 130 L/s
ICD TEMPEST HF–TYPE D 54 L/s

FIRE ROUTE
SIAMESE APPROX. LOCATION OF CONNECTION BUILDING SERVICES ROOMS ON GROUND FLOOR
STM INV 102.800
LOCATION OF S/L TRANSFORMER INSTALLED BY HYDRO ONE.
S/L DUCT TO HAVE CONCRETE COLLAR
SPARE DUCT TO BE CAPPED
PROVIDE SMOOTH BEND AS REQUIRED. COORDINATE WITH HYDRO ONE.
TEMP DICB T/G 103.80
LOADING 3.5m x 3.5m



KEY PLAN
(NTS)

NOTES:
1. SEE DETAIL DRAWING C–010 FOR ADDITIONAL DETAILS AND NOTES.
2. SITE BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR STANTEC GEOMATICS.

LEGEND :

- WH / 1.01 | 0.0 — AREA NUMBER, RUNOFF COEFFICIENT, AREA IN HECTARES
- WH / 1.01 | 0.0 — EXISTING AREA NUMBER, EXISTING AREA IN HECTARES, EXISTING RUNOFF COEFFICIENT
- Tc=11.70, AC=1.23 — ESTIMATED TIME OF CONCENTRATION IN MINUTES, PRODUCT OF AREA AND RUNOFF COEFFICIENT
- DRAINAGE AREA LIMITS
- EXISTING DRAINAGE AREA LIMITS
- EXISTING EMERGENCY OVERLAND FLOW

No.	REVISIONS	By	Date
10			
9			
8			
7			
6			
5			
4			
3	REVISED AS PER CITY COMMENTS	T.R.B.	2019:10:29
2	REVISED AS PER NEW SITE PLAN AND CITY COMMENTS	T.R.B.	2019:09:30
1	ISSUED FOR SPA	T.R.B.	2019:07.09

PC KANATA DEVELOPMENTS INC.

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

Project Title
8700 CAMPEAU DRIVE

PROFESSIONAL ENGINEER — T. R. BRULE — 2019/10/29 — PROVINCE OF ONTARIO

Drawing Title
STORM DRAINAGE AREA PLAN

Scale: 1 : 500

Design	Date
JB	JULY 2019
Drawn: DPS/DD/EH	Checked: TRB
Project No.: 121693	Drawing No.: C-500

D07-12-19-0122

#17988

UPPER CANADA STREET
(IBI PROJECT No. 14289)

ROADWAY AND SERVICES WITHIN UPPER CANADA STREET TO BE CONSTRUCTED BY OTHERS

DEPRESSED CURB, SIDEWALK AND CURB RETURN AS PER CITY OF OTTAWA STANDARD DETAIL SC7.1

BLOCK 19
(BLOCK 2 – PHASE 3 REGISTRATION)

PALLADIUM DRIVE

INTERIM PROPOSED SWALE

BLOCK 31
(BLOCK 2 – PHASE 5 REGISTRATION)

BLOCK 28
(BLOCK 4 – PHASE 5 REGISTRATION)

BLOCK 29, AND 32
(BLOCK 3 – PHASE 5 REGISTRATION)

POND ID	1
TOP OF GRATE (m)	104.13
STATIC ELEV (m)	104.48
STATIC DEPTH (m)	0.35
STATIC VOLUME (m³)	636.33

POND ID	2
TOP OF GRATE (m)	104.45
STATIC ELEV (m)	104.65
STATIC DEPTH (m)	0.20
STATIC VOLUME (m³)	37.01

POND ID	3
TOP OF GRATE (m)	104.35
STATIC ELEV (m)	104.60
STATIC DEPTH (m)	0.25
STATIC VOLUME (m³)	44.83

POND ID	4
TOP OF GRATE (m)	104.40
STATIC ELEV (m)	104.60
STATIC DEPTH (m)	0.20
STATIC VOLUME (m³)	40.26

POND ID	5
TOP OF GRATE (m)	104.25
STATIC ELEV (m)	104.50
STATIC DEPTH (m)	0.25
STATIC VOLUME (m³)	55.29

POND ID	6
TOP OF GRATE (m)	104.35
STATIC ELEV (m)	104.65
STATIC DEPTH (m)	0.30
STATIC VOLUME (m³)	78.51

POND ID	7
TOP OF GRATE (m)	104.50
STATIC ELEV (m)	104.65
STATIC DEPTH (m)	0.15
STATIC VOLUME (m³)	9.66

POND ID	8
TOP OF GRATE (m)	104.60
STATIC ELEV (m)	104.65
STATIC DEPTH (m)	0.05
STATIC VOLUME (m³)	0.39

POND ID	9
TOP OF GRATE (m)	104.35
STATIC ELEV (m)	104.45
STATIC DEPTH (m)	0.10
STATIC VOLUME (m³)	2.14

ROOF DRAIN LOCATION (TYP)

F.F.=105.05

ROOF RELEASE RATE = 25 L/s
MIN. ROOFTOP STORAGE REQUIRED = 84 m³
*FINAL NUMBER OF ROOF DRAINS, DRAIN LOCATION AND FLOW TO BE CONFIRMED WITH ARCHITECTURAL, STRUCTURAL AND MECHANICAL DRAWINGS DURING BUILDING PERMIT REVIEW

LOCATION OF S/L TRANSFORMER INSTALLED BY HYDRO ONE. F.F.=104.25

SL DUCT TO HAVE CONCRETE COLLAR

DEPRESSED CURB, SIDEWALK AND CURB RETURN AS PER CITY OF OTTAWA STANDARD DETAIL SC7.1

DOWNSTREAM HIGHPOINT OF 104.33 – VERTICAL CLEARANCE OF 0.15m MIN PROVIDED SURROUNDING SUBJECT PROPERTY.

PROVIDE SMOOTH BEND AS REQUIRED. COORDINATE WITH HYDRO ONE.

WINGATE HOTEL
IBI PROJECT NO. 114827

CAMPEAU DRIVE
(IBI PROJECT No. 14289)

BLOCK 6
(BLOCK 14 – PHASE 1 REGISTRATION)

KANATA WEST
RETAIL CENTER
IBI JOB NO. 37884

BLOCK 49
(BLOCK 6 – PHASE 1 REGISTRATION)

BLOCK 10

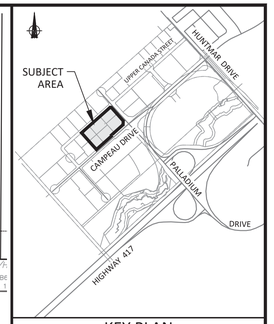
A1

FIRE ROUTE

LOADING 3m x 13m

PART 9 PART 10 PART 11

F.F.=104.25 F.F.=103.50



KEY PLAN
(NTS)

NOTES:
1. SEE DETAIL DRAWING C–010 FOR ADDITIONAL DETAILS AND NOTES.
2. SITE BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR STANTEC GEOMATICS.

LEGEND :

- WH / 1.01 / 0.0 — AREA NUMBER, RUNOFF COEFFICIENT, AREA IN HECTARES
- DRAINAGE AREA LIMITS
- 100 YEAR PONDING LIMIT (103.60)
- 5 YEAR PONDING LIMIT
- EMMERGENCY FLOW ROUTE FOR STORMWATER ABOVE THE 1:100 EVENT
- MAX PONDING ELEVATION (EMERGENCY) (103.60)

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3	REVISED AS PER CITY COMMENTS	T.R.B.	2019.10.29
2	REVISED AS PER NEW SITE PLAN AND CITY COMMENTS	T.R.B.	2019.09.30
1	ISSUED FOR SPA	T.R.B.	2019.07.09

PC KANATA
DEVELOPMENTS
INC.

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ibigroup.com

Project Title
8700 CAMPEAU DRIVE

LICENSED PROFESSIONAL ENGINEER
T. R. BRULE
2019/10/29
PROVINCE OF ONTARIO

Drawing Title
PONDING PLAN

Scale
1 : 500

Design	Date
JB	JULY 2019
Drawn: DPS/DD/EH	Checked: TRB
Project No. 121693	Drawing No. C-600

D07-12-19-0122

#17988

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

PROJECT: Kinaxis
DATE: 2019-09-21
FILE: 121693
REV #: 1
DESIGNED BY: JEB
CHECKED BY: TB

STORMWATER MANAGEMENT

Formulas and Descriptions

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

Maximum Allowable Release Rate

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

	% of original block included in Kinaxis Site	KWBP Minor System Flow (Table 4.2) L/s	Flow to be used in Kinaxis Site L/s
Area ID 132D	100%	377	377

Q_{TOTAL} = 377.00 L/s

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

C =	0.69	Drainage area UN (increased by 25%)
T_c =	10	min
i_{100yr} =	178.56	mm/hr
$A_{uncontrolled}$ =	0.19	Ha

$Q_{uncontrolled}$ = 64.89 L/s

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

$Q_{max\ allowable}$ = 312.11 L/s

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

Drainage Area	*CB12/11/9/8 CBMH10/3*	*Ponding IDs*	*1,5*	ICD Flow Rate
Area (Ha)	1.020			
C =	1.00	Restricted Flow Q_r (L/s)=	65.00	130

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)*
35	82.58	234.16	65.00	169.16	355.24
37	79.42	225.19	65.00	160.19	355.63
38	77.93	220.99	65.00	155.99	**355.66**
39	76.51	216.96	65.00	151.96	355.58
41	73.83	209.36	65.00	144.36	355.12

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	355.66	691.62	83.75	0.00

Drainage Area	*CB12/11/9/8 CBMH10/3*	*Ponding IDs*	*1,5*	ICD Flow Rate
Area (Ha)	1.020			
C =	0.90	Restricted Flow Q_r (L/s)=	65.00	130

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)*
18	74.97	191.33	65.00	126.33	136.43
20	70.25	179.28	65.00	114.28	137.14
21	68.13	173.87	65.00	108.87	**137.18**
22	66.15	168.81	65.00	103.81	137.03
24	62.54	159.61	65.00	94.61	136.23

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	137.18	691.62	83.75	0.00

Drainage Area	*CB12/11/9/8 CBMH10/3*	*Ponding IDs*	*1,5*	ICD Flow Rate
Area (Ha)	1.020			
C =	0.90	Restricted Flow Q_r (L/s)=	65.00	130

2-Year Ponding

T_c Variable (min)	*i_{2yr} (mm/hour)*	*Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)*	*Q_r (L/s)*	*Q_p-Q_r (L/s)*	*Volume 2yr (m^3)*
13	66.93	170.81	65.00	105.81	82.53
15	61.77	157.63	65.00	92.63	83.37
16	59.50	151.86	65.00	86.86	**83.38**
17	57.42	146.53	65.00	81.53	83.16
19	53.70	137.04	65.00	72.04	82.12

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	83.38	691.62	83.75	0.00

In-Pipe Storage

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)
27.01	0.750	0.442	11.93
78.53	0.750	0.442	34.69
39.99	0.375	0.110	4.42
29.40	0.375	0.110	3.25
8.50	0.250	0.049	0.42
23.80	0.250	0.049	1.17
8.60	0.250	0.049	0.42
			56.30

Structure Storage

Structure	Depth	Area (m^2)	Volume (m^3)
CB12 (600mm x 600mm)	1.80	0.36	0.65
CB11 (600mm x 600mm)	1.80	0.36	0.65
CB9 (600mm x 600mm)	1.80	0.36	0.65
CB8 (600mm x 600mm)	1.80	0.36	0.65
CB3 (600mm x 600mm)	1.80	0.36	0.65
CBMH10 (1500mm round)	2.50	1.77	4.42
MH9 (1800mm round)	2.50	5.37	13.43
MH3 (1800mm round)	2.50	2.54	6.36
			27.45

Drainage Area	CB7/CB5/CB2/CB4/CBMH6	Ponding IDs	2,3,4,6,7,8	ICD Flow Rate
Area (Ha)	0.750			
C =	1.00	Restricted Flow Q_r (L/s)=	55.00	110

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)
30	91.87	191.55	55.00	136.55	245.78
32	87.89	183.24	55.00	128.24	246.22
33	86.03	179.38	55.00	124.38	**246.27**
34	84.27	175.70	55.00	120.70	246.22
36	80.96	168.81	55.00	113.81	245.83

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	246.27	210.66	56.20	0.00

In-Pipe Storage

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)
117.86	0.675	0.358	42.18
29.40	0.375	0.110	3.25
			45.42

Drainage Area	CB7/CB5/CB2/CB4/CBMH6	Ponding IDs	2,3,4,6,7,8	ICD Flow Rate
Area (Ha)	0.750			
C =	0.90	Restricted Flow Q_r (L/s)=	55.00	110

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)
15	83.56	156.80	55.00	101.80	91.62
17	77.61	145.63	55.00	90.63	92.44
18	74.97	140.68	55.00	85.68	**92.54**
19	72.53	136.09	55.00	81.09	92.45
21	68.13	127.85	55.00	72.85	91.79

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	92.54	210.66	56.20	0.00

Structure Storage

Structure	Depth	Area (m^2)	Volume (m^3)
CB4 (600mm x 600mm)	1.80	0.36	0.65
CB5 (600mm x 600mm)	1.80	0.36	0.65
CB7 (600mm x 600mm)	1.80	0.36	0.65
CBMH6 (1500mm round)	2.50	1.77	4.42
MH4 (1500mm round)	2.50	1.77	4.42
			10.78

Drainage Area	CB7/CB5/CB2/CB4/CBMH6	Ponding IDs	2,3,4,6,7,8	ICD Flow Rate
Area (Ha)	0.750			
C =	0.90	Restricted Flow Q_r (L/s)=	55.00	110

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
11	73.17	137.30	55.00	82.30	54.32
13	66.93	125.59	55.00	70.59	55.06
14	64.23	120.53	55.00	65.53	**55.05**
15	61.77	115.91	55.00	60.91	54.82
17	57.42	107.74	55.00	52.74	53.80

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	55.05	210.66	56.20	0.00

Drainage Area	CB1	Ponding IDs	10	ICD Flow Rate
Area (Ha)	0.080			
C =	1.00	Restricted Flow Q_r (L/s)=	22.00	44

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)
6	226.01	50.26	22.00	28.26	10.18
8	199.20	44.30	22.00	22.30	10.71
9	188.25	41.87	22.00	19.87	**10.73**
10	178.56	39.71	22.00	17.71	10.63
12	162.13	36.06	22.00	14.06	10.12

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	10.73	10.33	0.65	0.00

Drainage Area	CB1	Ponding IDs	8	ICD Flow Rate
Area (Ha)	0.080			
C =	0.90	Restricted Flow Q_r (L/s)=	22.00	44

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	46.13	22.00	24.13	0.00
2	182.69	36.57	22.00	14.57	1.75
3	166.09	33.24	22.00	11.24	**2.02**
4	152.51	30.53	22.00	8.53	2.05
6	131.57	26.33	22.00	4.33	1.56

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.02	10.33	0.65	0.00

Structure Storage

Structure	Depth	Area (m^2)	Volume (m^3)
CB1 (600mm x 600mm)	1.80	0.36	0.65
			0.65

Drainage Area	CB1	Ponding IDs	8	ICD Flow Rate
Area (Ha)	0.080			
C =	0.90	Restricted Flow Q_r (L/s)=	22.00	44

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
-1	192.83	38.60	22.00	16.60	-1.00
1	148.14	29.65	22.00	7.65	0.46
2	133.33	26.69	22.00	4.69	**0.56**
3	121.46	24.31	22.00	2.31	0.42
5	103.57	20.73	22.00	-1.27	-0.38

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.56	10.33	0.65	0.00

overflows to: 0

Drainage Area	R1			
Area (Ha)	0.280			
C =	1.00	Restricted Flow Q_r (L/s)=	25.00	

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)
24	106.68	83.04	25.00	58.04	83.57
26	101.18	78.76	25.00	53.76	83.86
27	98.66	76.80	25.00	51.80	**83.91**
28	96.27	74.94	25.00	49.94	83.90
30	91.87	71.51	25.00	46.51	83.72

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	83.91	85.00	0	0.00

Drainage Area	R1			
Area (Ha)	0.280			
C =	0.90	Restricted Flow Q_r (L/s)=	25.00	

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)
12	94.70	66.34	25.00	41.34	29.76
14	86.93	60.90	25.00	35.90	30.16
15	83.56	58.54	25.00	33.54	**30.18**
16	80.46	56.37	25.00	31.37	30.11
18	74.97	52.52	25.00	27.52	29.72

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	30.18	85.00	0	0.00

Drainage Area	R1			
Area (Ha)	0.280			
C =	0.90	Restricted Flow Q_r (L/s)=	25.00	

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
8	85.46	59.87	25.00	34.87	16.74
10	76.81	53.81	25.00	28.81	17.28
11	73.17	51.26	25.00	26.26	**17.33**
12	69.89	48.96	25.00	23.96	17.25
14	64.23	45.00	25.00	20.00	16.80

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	17.33	85.00	0	0.00

overflows to: 0

SUMMARY OF INFILTRATION GALLERY CALCULATIONS

AVERAGE SILTY SAND PERCOLATION RATE

annual precipitation (mm)	920
95% available runoff (mm)	874
area (ha)	2.29

								Infiltration Gallery Overflow (%)			Overflow Volume (m^3)			Infiltration Volume (m^3)		
Building ID	Area (m^2)	Available Runoff Volume (m^3)	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
Kinaxis Office	2821	2466	1	6	13	78	1	48.89%	10.97%	29.93%	1205	270	738	1260	2195	1728
TOTAL		2466											738			1728

AVERAGE INFILTRATION RATE	75.44
REQUIRED INFILTRATION RATE	75

INFILTRATION GALLERY SIZING CALCULATION

WET YEAR CALCULATION

Kinaxis Office	2821	m^2	PRECIPITATION DATA APRIL 1 TO OCTOBER 31 (WET YEAR)		
Effective Runoff	0.95	%	TOT PRECIP DEPTH	800.4	mm
Percolation	0.35	(m/day, avg silty sand)	TOTAL PRECIP VOLUME	2144	m3
INFILTRATION GALLERY SIZING			TOT INFILTRATION VOL	1483	m3
Width	6	m	DEVELOPMENT AREA	2.33	ha
Length	13	m			
depth	1	m	OVERFLOW VOL	725	m3/year
Number Cells	1				
void ratio	0.38		RUNOFF VOLUME OVERFLOW	48.89%	
	29.64	TOTAL DRYCELL VOL			

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]
01-Apr	0.2	0.008	0	0	0	0	0	0	0
02-Apr	0.4	0.017	1	1	1	0	1	0	0
03-Apr	0	0.000	0	0	0	0	0	0	0
04-Apr	0	0.000	0	0	0	0	0	0	0
05-Apr	0	0.000	0	0	0	0	0	0	0
06-Apr	7.8	0.325	21	21	21	0	21	0	0
07-Apr	3.4	0.142	9	9	9	0	9	0	0
08-Apr	4.6	0.192	12	12	12	0	12	0	0
09-Apr	4.2	0.175	11	11	11	0	11	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	22	22	22	0	22	0	0
21-Apr	2.8	0.117	8	8	8	0	8	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
01-May	9	0.375	24	24	24	0	24	0	0
02-May	0	0.000	0	0	0	0	0	0	0
03-May	0	0.000	0	0	0	0	0	0	0
04-May	2.4	0.100	6	6	6	0	6	0	0
05-May	8	0.333	21	21	21	0	21	0	0
06-May	1	0.042	3	3	3	0	3	0	0
07-May	1.6	0.067	4	4	4	0	4	0	0
08-May	0.8	0.033	2	2	2	0	2	0	0
09-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	3	3	3	0	3	0	0
16-May	17.4	0.725	47	30	30	17	27	4	0
17-May	0	0.000	0	0	0	0	0	0	0
18-May	11	0.458	29	29	29	0	27	4	0
19-May	30.2	1.258	81	30	30	51	27	4	0
20-May	29.4	1.225	79	30	30	49	27	4	0
21-May	5.9	0.246	16	16	16	0	16	0	0
22-May	26.9	1.121	72	30	30	42	27	4	0
23-May	11.3	0.471	30	30	30	1	27	4	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	21	21	21	0	21	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
01-Jun	10.6	0.442	28	28	28	0	27	4	0
02-Jun	0	0.000	0	0	0	0	0	0	0
03-Jun	0	0.000	0	0	0	0	0	0	0
04-Jun	0	0.000	0	0	0	0	0	0	0
05-Jun	1.4	0.058	4	4	4	0	4	0	0
06-Jun	0	0.000	0	0	0	0	0	0	0
07-Jun	5	0.208	13	13	13	0	13	0	0
08-Jun	0.2	0.008	1	1	1	0	1	0	0
09-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	13	13	13	0	13	0	0
12-Jun	26.2	1.092	70	30	30	41	27	4	0
13-Jun	1	0.042	3	3	3	0	3	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	15	15	15	0	15	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	11	11	11	0	11	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	3	3	3	0	3	0	0
24-Jun	27.2	1.133	73	30	30	43	27	4	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	78	30	30	48	27	4	0
28-Jun	0	0.000	0	0	0	0	0	0	0
29-Jun	0.2	0.008	1	1	1	0	1	0	0
30-Jun	0	0.000	0	0	0	0	0	0	0
01-Jul	0	0.000	0	0	0	0	0	0	0
02-Jul	10	0.417	27	27	27	0	27	0	0
03-Jul	14.8	0.617	40	30	30	10	27	4	0
04-Jul	7.6	0.317	20	20	20	0	20	0	0
05-Jul	14.8	0.617	40	30	30	10	27	4	0
06-Jul	0	0.000	0	0	0	0	0	0	0
07-Jul	0	0.000	0	0	0	0	0	0	0

08-Jul	0	0.000	0	0	0	0	0	0	0
09-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	28	28	28	0	27	4	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	17	17	17	0	17	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	10	10	10	0	10	0	0
26-Jul	31.6	1.317	85	30	30	55	27	4	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	114	30	30	84	27	4	0
30-Jul	2.4	0.100	6	6	6	0	6	0	0
31-Jul	0	0.000	0	0	0	0	0	0	0
01-Aug	0.6	0.025	2	2	2	0	2	0	0
02-Aug	10.8	0.450	29	29	29	0	27	4	0
03-Aug	0	0.000	0	0	0	0	0	0	0
04-Aug	0	0.000	0	0	0	0	0	0	0
05-Aug	0.4	0.017	1	1	1	0	1	0	0
06-Aug	4	0.167	11	11	11	0	11	0	0
07-Aug	1.2	0.050	3	3	3	0	3	0	0
08-Aug	2.8	0.117	8	8	8	0	8	0	0
09-Aug	11	0.458	29	29	29	0	27	4	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	5	5	5	0	5	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	38	30	30	8	27	4	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	42	30	30	12	27	4	0
22-Aug	0	0.000	0	0	0	0	0	0	0
23-Aug	6.6	0.275	18	18	18	0	18	0	0
24-Aug	0.8	0.033	2	2	2	0	2	0	0
25-Aug	0	0.000	0	0	0	0	0	0	0
26-Aug	3.8	0.158	10	10	10	0	10	0	0
27-Aug	24.2	1.008	65	30	30	35	27	4	0
28-Aug	0.8	0.033	2	2	2	0	2	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
01-Sep	0	0.000	0	0	0	0	0	0	0
02-Sep	0.4	0.017	1	1	1	0	1	0	0
03-Sep	0	0.000	0	0	0	0	0	0	0
04-Sep	1.9	0.079	5	5	5	0	5	0	0
05-Sep	5.8	0.242	16	16	16	0	16	0	0
06-Sep	0	0.000	0	0	0	0	0	0	0
07-Sep	0	0.000	0	0	0	0	0	0	0
08-Sep	0	0.000	0	0	0	0	0	0	0
09-Sep	0	0.000	0	0	0	0	0	0	0
10-Sep	6.4	0.267	17	17	17	0	17	0	0
11-Sep	61.8	2.575	166	30	30	136	27	4	0
12-Sep	20.6	0.858	55	30	30	26	27	4	0
13-Sep	5.8	0.242	16	16	16	0	16	0	0
14-Sep	0	0.000	0	0	0	0	0	0	0
15-Sep	8.1	0.338	22	22	22	0	22	0	0
16-Sep	2.3	0.096	6	6	6	0	6	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	2	2	2	0	2	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	35	30	30	5	27	4	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	3	3	3	0	3	0	0
29-Sep	14.1	0.588	38	30	30	8	27	4	0
30-Sep	25.2	1.050	68	30	30	38	27	4	0
01-Oct	0	0.000	0	0	0	0	0	0	0
02-Oct	0.4	0.017	1	1	1	0	1	0	0
03-Oct	7.8	0.325	21	21	21	0	21	0	0
04-Oct	7.8	0.325	21	21	21	0	21	0	0
05-Oct	6	0.250	16	16	16	0	16	0	0
06-Oct	0.4	0.017	1	1	1	0	1	0	0
07-Oct	0	0.000	0	0	0	0	0	0	0
08-Oct	1	0.042	3	3	3	0	3	0	0
09-Oct	1.2	0.050	3	3	3	0	3	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	28	28	28	0	27	4	0
14-Oct	9	0.375	24	24	24	0	24	0	0
15-Oct	0	0.000	0	0	0	0	0	0	0
16-Oct	0.2	0.008	1	1	1	0	1	0	0
17-Oct	1.6	0.067	4	4	4	0	4	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	16	16	16	0	16	0	0
22-Oct	0	0.000	0	0	0	0	0	0	0
23-Oct	1	0.042	3	3	3	0	3	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	3	3	3	0	3	0	0
27-Oct	10.9	0.454	29	29	29	0	27	4	0
28-Oct	0	0.000	0	0	0	0	0	0	0
29-Oct	13	0.542	35	30	30	5	27	4	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

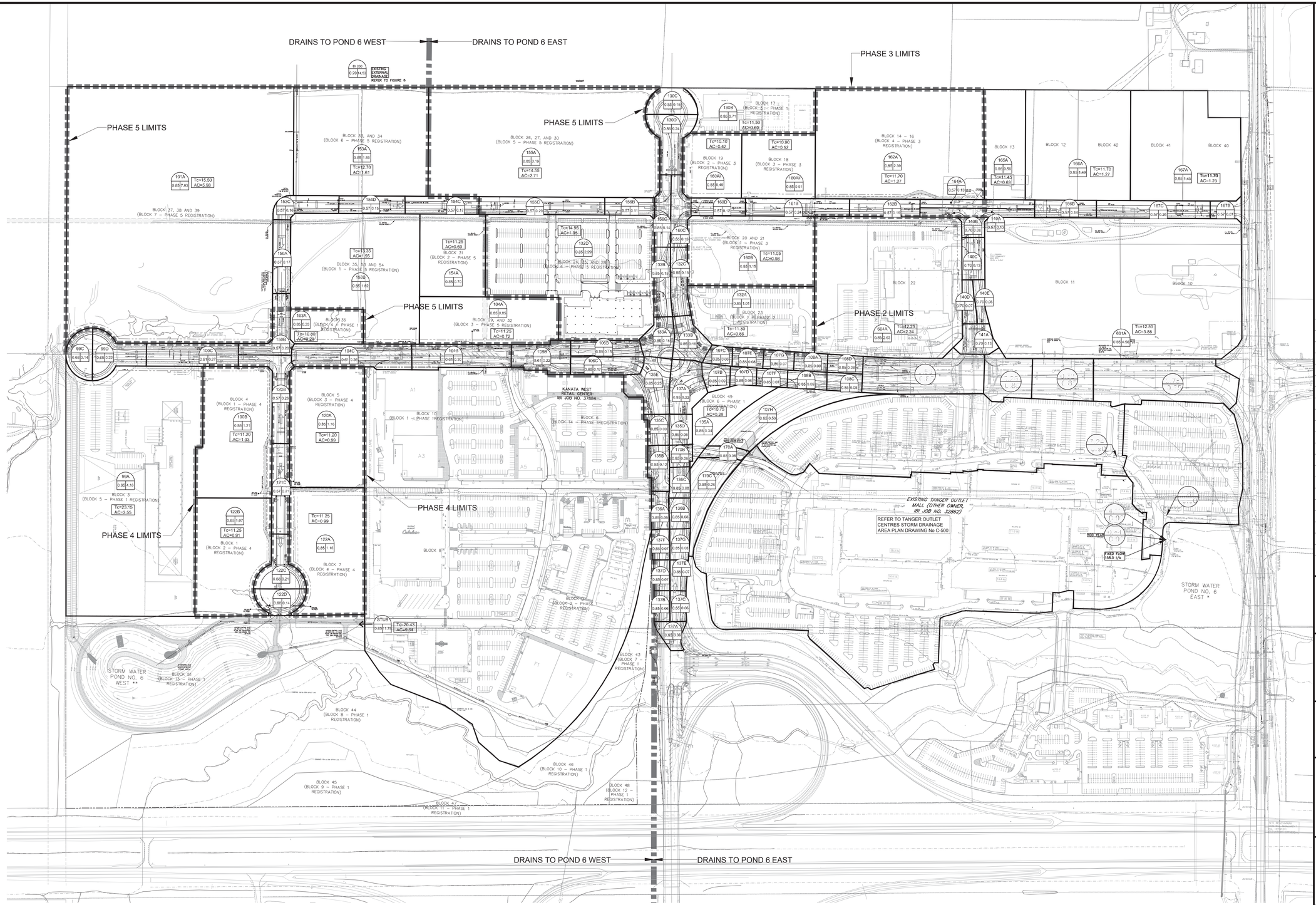
INFILTRATION GALLERY SIZING CALCULATION

DRY YEAR CALCULATION

Kinaxis Office	2821	m^2	PRECIPITATION DATA APRIL 1 TO OCTOBER 31 (DRY YEAR)		
Effective Runoff	0.95	%	TOT PRECIP DEPTH	405.1	mm
Percolation	0.35	(m/day, avg silty sand)	TOTAL PRECIP VOLUME	1086	m3
INFILTRATION GALLERY SIZING			TOT INFILTRATION VOL	1002	m3
Width	6	m	DEVELOPMENT AREA	2.33	ha
Length	13	m			
depth	1	m	OVERFLOW VOL	110	m3/year
Number Cells	1				
void ratio	0.38		RUNOFF VOLUME OVERFLOW	10.97%	
	29.64	TOTAL DRYCELL VOL			

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]
01-Apr	0	0.000	0	0	0	0	0	0	0
02-Apr	0	0.000	0	0	0	0	0	0	0
03-Apr	0	0.000	0	0	0	0	0	0	0
04-Apr	15	0.625	40	30	30	11	27	4	0
05-Apr	0	0.000	0	0	0	0	0	0	0
06-Apr	0	0.000	0	0	0	0	0	0	0
07-Apr	0.3	0.013	1	1	1	0	1	0	0
08-Apr	0	0.000	0	0	0	0	0	0	0
09-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	3	3	3	0	3	0	0
13-Apr	1.6	0.067	4	4	4	0	4	0	0
14-Apr	5.9	0.246	16	16	16	0	16	0	0
15-Apr	2.3	0.096	6	6	6	0	6	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	18	18	18	0	18	0	0
23-Apr	4.8	0.200	13	13	13	0	13	0	0
24-Apr	0.3	0.013	1	1	1	0	1	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	29	29	29	0	27	4	0
30-Apr	1.6	0.067	4	4	4	0	4	0	0
01-May	3.8	0.158	10	10	10	0	10	0	0
02-May	0	0.000	0	0	0	0	0	0	0
03-May	11.3	0.471	30	30	30	1	27	4	0
04-May	0	0.000	0	0	0	0	0	0	0
05-May	0	0.000	0	0	0	0	0	0	0
06-May	4.1	0.171	11	11	11	0	11	0	0
07-May	3	0.125	8	8	8	0	8	0	0
08-May	0	0.000	0	0	0	0	0	0	0
09-May	23.4	0.975	63	30	30	33	27	4	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	60	30	30	30	27	4	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	6	6	6	0	6	0	0
16-May	0.3	0.013	1	1	1	0	1	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	23	23	23	0	23	0	0
23-May	10	0.417	27	27	27	0	27	0	0
24-May	3.4	0.142	9	9	9	0	9	0	0
25-May	6.2	0.258	17	17	17	0	17	0	0
26-May	1.9	0.079	5	5	5	0	5	0	0
27-May	0.3	0.013	1	1	1	0	1	0	0
28-May	1.3	0.054	3	3	3	0	3	0	0
29-May	1.1	0.046	3	3	3	0	3	0	0
30-May	0	0.000	0	0	0	0	0	0	0
31-May	10.9	0.454	29	29	29	0	27	4	0
01-Jun	0	0.000	0	0	0	0	0	0	0
02-Jun	0.5	0.021	1	1	1	0	1	0	0
03-Jun	0	0.000	0	0	0	0	0	0	0
04-Jun	0	0.000	0	0	0	0	0	0	0
05-Jun	0	0.000	0	0	0	0	0	0	0
06-Jun	0	0.000	0	0	0	0	0	0	0
07-Jun	0	0.000	0	0	0	0	0	0	0
08-Jun	0	0.000	0	0	0	0	0	0	0
09-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	1	1	1	0	1	0	0
13-Jun	12.2	0.508	33	30	30	3	27	4	0
14-Jun	0.3	0.013	1	1	1	0	1	0	0
15-Jun	1.3	0.054	3	3	3	0	3	0	0
16-Jun	11.8	0.492	32	30	30	2	27	4	0
17-Jun	6.4	0.267	17	17	17	0	17	0	0
18-Jun	0.8	0.033	2	2	2	0	2	0	0
19-Jun	0	0.000	0	0	0	0	0	0	0
20-Jun	5.2	0.217	14	14	14	0	14	0	0
21-Jun	3.2	0.133	9	9	9	0	9	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	1	1	1	0	1	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	3	3	3	0	3	0	0
01-Jul	0.5	0.021	1	1	1	0	1	0	0
02-Jul	6.1	0.254	16	16	16	0	16	0	0
03-Jul	0	0.000	0	0	0	0	0	0	0
04-Jul	6.4	0.267	17	17	17	0	17	0	0
05-Jul	0.8	0.033	2	2	2	0	2	0	0
06-Jul	0	0.000	0	0	0	0	0	0	0
07-Jul	0	0.000	0	0	0	0	0	0	0

08-Jul	0	0.000	0	0	0	0	0	0	0
09-Jul	6.7	0.279	18	18	18	0	18	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	56	30	30	26	27	4	0
19-Jul	11.5	0.479	31	30	30	1	27	4	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	18	18	18	0	18	0	0
24-Jul	9.2	0.383	25	25	25	0	25	0	0
25-Jul	0	0.000	0	0	0	0	0	0	0
26-Jul	0.3	0.013	1	1	1	0	1	0	0
27-Jul	1.3	0.054	3	3	3	0	3	0	0
28-Jul	0	0.000	0	0	0	0	0	0	0
29-Jul	1.1	0.046	3	3	3	0	3	0	0
30-Jul	0.3	0.013	1	1	1	0	1	0	0
31-Jul	4.1	0.171	11	11	11	0	11	0	0
01-Aug	0	0.000	0	0	0	0	0	0	0
02-Aug	8.9	0.371	24	24	24	0	24	0	0
03-Aug	11.5	0.479	31	30	30	1	27	4	0
04-Aug	0.8	0.033	2	2	2	0	2	0	0
05-Aug	0	0.000	0	0	0	0	0	0	0
06-Aug	0	0.000	0	0	0	0	0	0	0
07-Aug	0	0.000	0	0	0	0	0	0	0
08-Aug	0.8	0.033	2	2	2	0	2	0	0
09-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	3	3	3	0	3	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	2	2	2	0	2	0	0
18-Aug	0	0.000	0	0	0	0	0	0	0
19-Aug	5.5	0.229	15	15	15	0	15	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	2	2	2	0	2	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	9	9	9	0	9	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	2	2	2	0	2	0	0
01-Sep	0	0.000	0	0	0	0	0	0	0
02-Sep	0.9	0.038	2	2	2	0	2	0	0
03-Sep	8.4	0.350	23	23	23	0	23	0	0
04-Sep	0	0.000	0	0	0	0	0	0	0
05-Sep	0	0.000	0	0	0	0	0	0	0
06-Sep	0	0.000	0	0	0	0	0	0	0
07-Sep	0	0.000	0	0	0	0	0	0	0
08-Sep	0	0.000	0	0	0	0	0	0	0
09-Sep	0.6	0.025	2	2	2	0	2	0	0
10-Sep	4.4	0.183	12	12	12	0	12	0	0
11-Sep	0	0.000	0	0	0	0	0	0	0
12-Sep	3.5	0.146	9	9	9	0	9	0	0
13-Sep	11.7	0.488	31	30	30	2	27	4	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	3	3	3	0	3	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	8	8	8	0	8	0	0
21-Sep	1.4	0.058	4	4	4	0	4	0	0
22-Sep	0.6	0.025	2	2	2	0	2	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	13	13	13	0	13	0	0
26-Sep	0.3	0.013	1	1	1	0	1	0	0
27-Sep	0	0.000	0	0	0	0	0	0	0
28-Sep	3.9	0.163	10	10	10	0	10	0	0
29-Sep	2.1	0.088	6	6	6	0	6	0	0
30-Sep	0	0.000	0	0	0	0	0	0	0
01-Oct	0	0.000	0	0	0	0	0	0	0
02-Oct	4.5	0.188	12	12	12	0	12	0	0
03-Oct	0	0.000	0	0	0	0	0	0	0
04-Oct	0	0.000	0	0	0	0	0	0	0
05-Oct	0	0.000	0	0	0	0	0	0	0
06-Oct	0	0.000	0	0	0	0	0	0	0
07-Oct	3	0.125	8	8	8	0	8	0	0
08-Oct	0	0.000	0	0	0	0	0	0	0
09-Oct	0	0.000	0	0	0	0	0	0	0
10-Oct	2	0.083	5	5	5	0	5	0	0
11-Oct	0	0.000	0	0	0	0	0	0	0
12-Oct	1.8	0.075	5	5	5	0	5	0	0
13-Oct	0	0.000	0	0	0	0	0	0	0
14-Oct	8.9	0.371	24	24	24	0	24	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	18	18	18	0	18	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	18	18	18	0	18	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	15	15	15	0	15	0	0
31-Oct	0.3	0.013	1	1	1	0	1	0	0



LEGEND:

- DRAINAGE AREA LIMITS
- MH601 — STORM MANHOLE & NUMBER
- STORM SEWER & FLOW DIRECTION
- 604A / 0.85 | 2.63 — AREA ID, AREA IN HECTARES, RUNOFF COEFFICIENT
- EMERGENCY OVERLAND FLOW ROUTE
- Tc=11.70 / AC=1.23 — ESTIMATED TIME OF CONCENTRATION IN MINUTES, PRODUCT OF AREA AND RUNOFF COEFFICIENT

EXISTING TANGER OUTLET CENTRE

- 0.56 / 0.85 — AREA IN HECTARES, RUNOFF COEFFICIENT

No.	REVISIONS	By	Date
20			
19			
18			
17			
16			
15	ISSUED FOR PHASE 5 REGISTRATION	LME	19: 09: 10
14	REVISED AS PER PHASE 4 COMMENTS	LME	19: 07: 25
13	REVISED AS PER PHASE 4 COMMENTS	LME	19: 07: 22
12	REVISED AS PER PHASE 4 COMMENTS	LME	19: 06: 24
11	ISSUED FOR PHASE 4 REGISTRATION	LME	19: 04: 25
10	REVISED AS PER PHASE 3 COMMENTS	LME	19: 03: 08
9	ISSUED FOR PHASE 3 TENDER	LME	19: 01: 11
8	REVISED AS PER PHASE 3 COMMENTS	LME	18: 12: 14
7	REVISED FOR PHASE 3 REGISTRATION	LME	18: 09: 14
6	REVISED FOR PHASE 2 REGISTRATION	LME	18: 04: 20
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 APPOVAL	LME	14: 11: 27

TAGGART REALTY MANAGEMENT

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 PHASE 5

L. M. ENGEL — 100161508 — 2019/09/10 — PROVINCE OF ONTARIO

Drawing Title

STORM DRAINAGE AREA PLAN

Scale: 1:2000

Design	Date
LME	NOV. 2014
Drawn	Checked
DPS	TRB
Project No.	Drawing No.
14289	500

D07-16-14-0003_P5

#17661

IBI GROUP

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) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr) (L/s)	(%)
KANATA WEST BUSINESS PARK - Block numbers based on overall concept plan of subdivision																																		
Campeau Drive	*Block 29*	*MH105*	*MH106*								*1.09*				*2.58*	*2.58*	*11.25*			*98.02*	*114.88*	*167.89*	*252.48*												
							0.22								*0.37*	*0.37*	*11.25*	*1.04*	*12.29*	*98.02*	*114.88*	*167.89*			*62.63*		*315.1*	*317.2*	*89.00*	*525*			*0.50*	*1.420*	*2.14*	*0.67%*
	Block 24	*MH106*	*MH107*								*0.89*				*2.10*	*4.68*	*12.29*			*93.46*	*109.50*	*159.99*	*437.25*												
												0.32			*0.76*	*1.13*	*12.29*	*1.18*	*13.47*	*93.46*	*109.50*	*159.99*			*180.67*		*617.9*	*620.1*	*118.60*	*675*			*0.50*	*1.679*	*2.17*	*0.35%*
Upper Canada St.	**Blocks 26, 27, 28**	**MH155**	**MH156**								**3.19**				**7.54**	**7.54**	**14.55**			**85.04**	**99.60**	**145.45**	**641.03**												
						0.29									**0.46**	**0.46**	**14.55**	**0.80**	**15.35**	**85.04**	**99.60**	**145.45**			**66.84**		**707.9**	**1,004.6**	**87.00**	**825**			**0.45**	**1.820**	**296.69**	**29.53%**
		MH156	**MH131**												**0.00**	**7.54**	**15.35**			**82.45**	**96.55**	**140.99**	**621.54**												
						0.11						**0.14**			**0.51**	**0.96**	**15.35**	**0.97**	**16.32**	**82.45**	**96.55**	**140.99**			**136.01**		**757.5**	**1,004.6**	**106.29**	**825**			**0.45**	**1.820**	**247.01**	**24.59%**
Palladium Drive	*Blocks 17*	*MH130*	*MH131*								*0.71*				*1.68*	*1.68*	*10.00*			*104.19*	*122.14*	*178.56*	*174.81*												
												0.39			*0.92*	*0.92*	*10.00*	*1.29*	*11.29*	*104.19*	*122.14*	*178.56*			*164.55*		*339.4*	*844.6*	*99.64*	*900*			*0.20*	*1.286*	*505.24*	*59.82%*
Palladium Drive		*MH131*	*MH132*												*0.00*	*9.22*	*16.32*			*79.52*	*93.11*	*135.93*	*732.86*												
															0.00	*1.89*	*16.32*	*0.61*	*16.93*	*79.52*	*93.11*	*135.93*			*256.40*		*989.3*	*1,478.7*	*70.00*	*975*			*0.40*	*1.919*	*489.39*	*33.10%*
	Block 24, 25, 28, 23	*MH132*	*MH133*								*3.30*				*7.80*	*17.01*	*16.93*			*77.81*	*91.09*	*132.97*	*1,323.76*												
												0.30			*0.71*	*2.60*	*16.93*	*0.56*	*17.49*	*77.81*	*91.09*	*132.97*			*345.08*		*1668.8*	*1,911.0*	*72.07*	*1050*			*0.45*	*2.138*	*242.19*	*12.67%*
		MH133	*MH107*												*0.00*	*17.01*	*17.49*			*76.29*	*89.31*	*130.36*	*1,297.99*												
												0.31			*0.73*	*3.33*	*17.49*	*0.34*	*17.83*	*76.29*	*89.31*	*130.36*			*433.79*		*1731.8*	*1,911.0*	*43.99*	*1050*			*0.45*	*2.138*	*179.25*	*9.38%*
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*												*0.00*	*0.00*	*10.96*			*99.40*	*116.50*	*170.27*	*0.00*												
												0.25			*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*	*24.34*	*17.83*			*75.40*	*88.26*	*128.82*	*1,835.11*												
												0.65			*1.54*	*9.30*	*17.83*	*0.63*	*18.46*	*75.40*	*88.26*	*128.82*			*1,198.16*		*3,033.3*	*4,658.7*	*119.50*	*1350*			*0.70*	*3.153*	*1625.40*	*34.89%*
	Block 23	*MH108*	*MH604*								*1.01*				*2.39*	*26.73*	*18.46*			*73.81*	*86.40*	*126.09*	*1,972.69*												
												0.33			*0.78*	*10.08*	*18.46*	*0.48*	*18.95*	*73.81*	*86.40*	*126.09*			*1,271.07*		*3,243.8*	*4,658.7*	*91.51*	*1350*			*0.70*	*3.153*	*1414.90*	*30.37%*
Campeau Drive	*Block 22*	*MH 604*	*MH 603*								*2.63*				*6.21*	*32.94*	*18.95*			*72.65*	*85.03*	*124.08*	*2,393.06*												
												0.59			*1.39*	*11.48*	*18.95*	*0.75*	*19.70*	*72.65*	*85.03*	*124.08*			*1,423.83*		*3,816.9*	*3,340.9*	*101.49*	*1350*			*0.36*	*2.261*	*-476.0*	*-14.25%*
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						**0.15**			**0.54**	**0.54**	**11.05**	**0.75**	**11.80**	**98.96**	**115.97**	**169.50**			**92.31**		**618.4**	**733.69**	**89.00**	**675**			**0.70**	**1.986**	**115.26**	**15.71%**
		MH161	**MH162**												**0.00**	**5.32**	**11.80**			**95.57**	**111.99**	**163.65**	**508.13**												
						0.24									**0.38**	**0.92**	**11.80**	**0.96**	**12.75**	**95.57**	**111.99**	**163.65**			**151.36**		**659.5**	**1,058.9**	**110.00**	**825**			**0.50**	**1.919**	**399.40**	**37.72%**
	Blocks 14- 16	**MH162**	**MH163**								**2.39**				**5.65**	**10.96**	**12.75**			**91.60**	**107.32**	**156.78**	**1,004.34**												
						0.16									**0.25**	**1.18**	**12.75**	**0.76**	**13.52**	**91.60**	**107.32**	**156.78**			**184.76**		**1,189.1**	**1,400.6**	**97.85**	**900**			**0.55**	**2.133**	**211.51**	**15.10%**
		MH163	**MH140**												**0.00**	**10.96**	**13.52**			**88.68**	**103.87**	**151.73**	**972.28**												
															0.00	**1.18**	**13.52**	**0.12**	**13.64**	**88.68**	**103.87**	**151.73**			**178.81**		**1,151.1**	**1,400.6**	**15.23**	**900**			**0.55**	**2.133**	**249.52**	**17.82%**
Upper Canada St.	**Blocks 40, 41**	**MH167**	**MH166**								**1.45**				**3.43**	**3.43**	**11.70**			**96.00**	**112.49**	**164.38**	**328.92**												
						0.33									**0.52**	**0.52**	**12.50**	**1.08**	**13.58**	**92.61**	**108.51**	**158.53**			**82.90**		**411.8**	**1,286.2**	**71.56**	**1200**			**0.10**	**1.102**	**874.38**	**67.98%**
	Blocks 12, 42	**MH166**	**MH165**								**1.49**				**3.52**	**6.95**	**13.58**			**88.43**	**103.59**	**151.32**	**614.38**												
						0.14									**0.22**	**0.74**	**13.58**	**1.51**	**15.10**	**88.43**	**103.59**	**151.32**			**112.69**		**727.1**	**1,286.2**	**100.00**	**1200**			**0.10**	**1.102**	**559.12**	**43.47%**
	Block 13	**MH165**	**MH164**								**0.58**				**1.37**	**8.32**	**15.10**			**83.25**	**97.49**	**142.36**	**692.46**												
															0.00	**0.74**	**15.10**	**1.23**	**16.32**	**83.25**	**97.49**	**142.36**			**106.03**		**798.5**	**1,762.2**	**87.86**	**1350**			**0.10**	**1.193**	**963.76**	**54.69%**
		MH164	**MH140**												**0.00**	**8.32**	**16.32**			**79.51**	**93.10**	**135.92**	**661.37**												
						0.13									**0.21**	**0.95**	**16.32**	**0.21**	**16.53**	**79.51**	**93.10**	**135.92**			**129.22**		**790.6**	**1,760.8**	**15.00**	**1350**			**0.10**	**1.192**	**970.22**	**55.10%**

KINAXIS

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

2. The Storm Sewer Design Sheet is for the rational method storm sewer design only, release rates for the individual blocks are included in Table 4.1 of the Design Brief, Kanata West Business Park, 333 Huntmar Drive, by IBI Group November 2015

Designed: LME
Checked:
Dwg. Reference: 14289-500

No.	Revision	Date
1.	City submission No. 1	2014-11-25
2.	City submission No. 2	2015-04-08
3.	City submission No. 3	2015-06-18
4.	City submission No. 4	2015-10-15
5.	City submission No. 5	2015-11-04
6.	Revised for Phase 2 Regristration	2018-04-19
7.	Revised for Phase 3 Registration	2018-09-14
8.	Revised per City comments	2018-12-14
9.	Revised per City comments	2019-03-08
10.	Revised for Phase 4 Registration	2019-04-25
11.	Revised per comments for Phase 4 Registration	2019-06-24
12.	Revised per Phase 5 Registration	2019-09-10
13.	Revised per City Comments for Phase 5 Registration	2019-10-24

File Reference: 14289.5.7.1 | **Date:** 2019-10-24 | **Sheet No:** 1 of 2

IBI GROUP
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) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr) (L/s)	(%)
KANATA WEST BUSINESS PARK - Block numbers based on overall concept plan of subdivision																																		
Journeyman St.		*MH140*	*MH141*												*0.00*	*19.28*	*16.32*			*79.51*	*93.10*	*135.92*	*1,533.17*												
						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%*
		MH141	*MH141B*												*0.00*	*19.28*	*17.27*			*76.88*	*90.00*	*131.37*	*1,482.33*												
										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%*
Journeyman St.		*Stub*	*MH 603*												*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*	*52.22*	*19.70*			*70.93*	*83.00*	*121.11*	*3,703.90*												
												0.26			*0.61*	*15.30*	*19.70*	*0.71*	*20.41*	*70.93*	*83.00*	*121.11*			*1,853.06*		*5,557.0*	*3,971.3*	*92.77*	*1500*			*0.29*	*2.177*	*-1585.7*	*-39.9%*
		602	*601*												*0.00*	*52.22*	*20.41*			*69.37*	*81.18*	*118.44*	*3,622.77*												
												0.32			*0.76*	*16.06*	*20.41*	*0.53*	*20.94*	*69.37*	*81.18*	*118.44*			*1,901.67*		*5,524.4*	*4,362.8*	*76.05*	*1500*			*0.35*	*2.392*	*-1161.6*	*-26.6%*
Tanger	*Blocks 10, 11*	*601*	*9*								*4.56*				*10.78*	*63.00*	*20.94*			*68.26*	*79.87*	*116.52*	*4,300.30*												
												0.78			*1.84*	*17.90*	*20.94*	*0.87*	*21.80*	*68.26*	*79.87*	*116.52*			*2,085.72*		*6,386.0*	*5,730.3*	*96.86*	*1950*			*0.15*	*1.859*	*-655.7*	*-11.4%*
Tanger		*9*	*12*										*3.24*		*8.11*	*71.10*	*21.80*			*66.52*	*77.83*	*113.53*	*4,730.12*												
															0.00	*17.90*	*21.80*	*0.81*	*22.62*	*66.52*	*77.83*	*113.53*			*2,032.17*	*18.00*	*6,780.3*	*5,749.5*	*90.76*	*1950*			*0.15*	*1.865*	*-1030.8*	*-17.9%*
Tanger		*12*	*13*										*1.81*		*4.53*	*75.63*	*22.62*			*64.99*	*76.03*	*110.89*	*4,915.20*												
															0.00	*17.90*	*22.62*	*0.22*	*22.83*	*64.99*	*76.03*	*110.89*			*1,984.84*	*18.00*	*6,918.0*	*5,749.5*	*24.54*	*1950*			*0.15*	*1.865*	*-1168.6*	*-20.3%*
Tanger		*13*	*Pond 6E*										*4.11*		*10.28*	*85.92*	*22.83*			*64.59*	*75.56*	*110.20*	*5,548.96*												
														0.84	*2.10*	*20.00*	*22.83*	*0.08*	*22.92*	*64.59*	*75.56*	*110.20*			*2,204.06*	*153.00*	*7,906.0*	*7,005.7*	*9.99*	*2100*			*0.15*	*1.959*	*-900.3*	*-12.9%*
KANATA WEST BUSINESS PARK																																			
Upper Canada St.	Block31,33,34	**MH154**	**MH153**								**2.59**				**6.12**	**6.12**	**12.70**			**91.81**	**107.56**	**157.14**	**561.88**												
						0.32									**0.51**	**0.51**	**12.70**	**1.70**	**14.40**	**91.81**	**107.56**	**157.14**			**79.68**		**641.6**	**905.5**	**120.00**	**975**			**0.15**	**1.175**	**263.92**	**29.15%**
Upper Canada St.	**Blocks 35, 53, 54**	**MH153**	**MH152B**								**1.82**				**4.30**	**10.42**	**14.40**			**85.54**	**100.18**	**146.32**	**891.39**												
						0.16									**0.25**	**0.76**	**14.40**	**1.10**	**15.51**	**85.54**	**100.18**	**146.32**			**111.29**		**1002.7**	**1,103.3**	**81.80**	**1050**			**0.15**	**1.234**	**100.65**	**9.12%**
	External Drainage	**DI200**	**MH152B**	14.53											**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.		**MH152B**	**MH152**												**0.00**	**18.50**	**14.40**			**85.54**	**100.18**	**146.32**	**1,582.43**												
															0.00	**0.76**	**14.40**	**1.07**	**15.47**	**85.54**	**100.18**	**146.32**			**111.29**		**1693.7**	**2,332.0**	**81.80**	**1500**			**0.10**	**1.278**	**638.30**	**27.37%**
	Blocks 39	**MH152**	**MH151**												**0.00**	**18.50**	**15.47**			**82.07**	**96.11**	**140.33**	**1,518.31**												
															0.00	**0.76**	**15.47**	**0.18**	**15.65**	**82.07**	**96.11**	**140.33**			**106.74**		**1625.0**	**2,332.0**	**13.91**	**1500**			**0.10**	**1.278**	**706.98**	**30.32%**
		MH151	**MH150**												**0.00**	**18.50**	**15.65**			**81.51**	**95.45**	**139.37**	**1,507.97**												
						0.17									**0.27**	**1.03**	**15.65**	**1.35**	**17.00**	**81.51**	**95.45**	**139.37**			**143.55**		**1651.5**	**2,332.0**	**103.40**	**1500**			**0.10**	**1.278**	**680.50**	**29.18%**
		MH150	**MH120**												**0.00**	**18.50**	**17.00**			**77.61**	**90.86**	**132.64**	**1,435.79**												
						0.20									**0.32**	**1.35**	**17.00**	**0.89**	**17.89**	**77.61**	**90.86**	**132.64**			**178.65**		**1614.4**	**3,006.9**	**72.86**	**1650**			**0.10**	**1.362**	**1392.42**	**46.31%**
Campeau Drive	*Blocks 3,38*	*MH99*	*MH100*								*5.84*				*13.80*	*13.80*	*11.70*			*96.00*	*112.49*	*164.38*	*1,324.74*												
									0.36						*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 37	*MH100*	*MH101*								*0.86*				*2.03*	*15.83*	*12.83*			*91.29*	*106.95*	*156.24*	*1,445.28*												
							0.27								*0.46*	*1.14*	*12.83*	*0.76*	*13.59*	*91.29*	*106.95*	*156.24*			*177.87*		*1623.2*	*2,073.9*	*80.84*	*1200*			*0.26*	*1.776*	*450.77*	*21.74%*
		MH101	*MH120*								*7.03*				*16.61*	*32.44*	*15.50*			*81.98*	*95.99*	*140.17*	*2,659.62*												
															0.00	*1.14*	*15.50*	*0.14*	*15.64*	*81.98*	*95.99*	*140.17*			*159.57*		*2819.2*	*2,961.0*	*20.89*	*1200*			*0.53*	*2.536*	*141.85*	*4.79%*
Campeau Drive	*Block 32, 29*	*MH104*	*MH103*								*0.85*				*2.01*	*2.01*	*11.25*			*98.02*	*114.88*	*167.89*	*196.89*												
							0.66								*1.12*	*1.12*	*11.25*	*2.33*	*13.58*	*98.02*	*114.88*	*167.89*			*187.90*		*384.8*	*473.6*	*120.00*	*825*			*0.10*	*0.858*	*88.76*	*18.74%*
	Block 36	*MH103*	*MH102*								*0.33*				*0.78*	*2.79*	*13.58*			*88.44*	*103.60*	*151.33*	*246.61*												
															0.00	*1.12*	*13.58*	*1.52*	*15.10*	*88.44*	*103.60*	*151.33*			*169.37*		*416.0*	*597.2*	*82.99*	*900*			*0.10*	*0.909*	*181.24*	*30.35%*
		MH102	*MH120*												*0.00*	*2.79*	*15.10*			*83.23*	*97.47*	*142.33*	*232.08*												
															0.00	*1.12*	*15.10*	*0.37*	*15.47*	*83.23*	*97.47*	*142.33*			*159.30*		*391.4*	*597.2*	*20.01*	*900*			*0.10*	*0.909*	*205.85*	*34.47%*
Nipissing Court	*Blocks 4, 5*	*MH120*	*MH121*								*2.37*				*5.60*	*59.33*	*17.89*			*75.25*	*88.09*	*128.57*	*4,464.86*												
						0.26									*0.41*	*4.02*	*17.89*	*0.74*	*18.63*	*75.25*	*88.09*	*128.57*			*516.40*		*4981.3*	*6,120.8*	*88.44*	*1950*			*0.17*	*1.985*	*1139.52*	*18.62%*
		MH121	*MH122*		*0.21*										*0.33*	*59.66*	*18.63*			*73.40*	*85.92*	*125.38*	*4,379.67*												
															0.00	*4.02*	*18.63*	*0.73*	*19.36*	*73.40*	*85.92*	*125.38*			*503.61*		*4883.3*	*7,119.4*	*100.84*	*1950*			*0.23*	*2.309*	*2236.16*	*31.41%*
	Blocks 1, 7	*MH122*	*MH123*						*0.35*		*2.23*				*5.93*	*65.60*	*19.36*			*71.69*	*83.90*	*122.43*	*4,702.50*												
															0.00	*4.02*	*19.36*	*0.77*	*20.13*	*71.69*	*83.90*	*122.43*			*491.73*		*5194.2*	*6,638.9*	*99.19*	*1950*			*0.20*	*2.154*	*1444.68*	*21.76%*
Future	*Blocks 8, 9*	*MH (215)*	*MH123*								*11.78*				*27.84*	*27.84*	*20.70*	*0.24*	*20.94*	*68.75*	*80.45*	*117.37*	*1,913.77*					*1,913.8*	*3,006.9*	*20.00*	*1650*			*0.10*	*1.362*	*1093.09*	*36.35%*
West Pond Outlet		*MH123*	*Outlet*												*0.00*	*93.43*	*20.13*			*69.97*	*81.88*	*119.47*	*6,537.73*												
															0.00	*4.02*	*20.13*	*0.87*	*21.00*	*69.97*	*81.88*	*119.47*			*479.86*		*7017.6*	*10,648.2*	*119.64*	*2400*			*0.17*	*2.280*	*3630.64*	*34.10%*
Future	*Blocks X,X*	*MH XX*	*MHXX*	*Grey = Constructed*																															

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

2. The Storm Sewer Design Sheet is for the rational method storm sewer design only, release rates for the individual blocks are included in Table 4.1 of the Design Brief, Kanata West Business Park, 333 Huntmar Drive, by IBI Group November 2015

Designed: LME
Checked:
Dwg. Reference: 14289-500

No.	Revision	Date
1.	City submission No. 1	2014-11-25
2.	City submission No. 2	2015-04-08
3.	City submission No. 3	2015-06-18
4.	City submission No. 4	2015-10-15
5.	City submission No. 5	2015-11-04
6.	Revised for Phase 2 Regristration	2018-04-19
7.	Revised for Phase 3 Regristration	2018-09-14
8.	Revised per City comments	2018-12-14
9.	Revised per City comments	2019-03-08
10.	Revised for Phase 4 Registration	2019-04-25
11.	Revised per comments for Phase 4 Registration	2019-06-24
12.	Revised for Phase 5 Registration	2019-09-10
13.	Revised per City comments for Phase 5 Registration	2019-10-24

File Reference: 14289.5.7.1 | **Date:** 2019-10-24 | **Sheet No:** 2 of 2

C. Minor system flows generated in the SWMHYMO model were exported to the XPSWMM models to determine hydraulic grade line within the sewer networks serviced by the existing Pond 6 West and Pond 6 East, as discussed in Section 4.6. The main hydrological parameters used in the rational method spreadsheet and SWMHYMO model are summarized in the following sections.

4.4.1 Design Storms and Drainage Area Parameters

The following design parameters were used in the evaluation of the stormwater management system for the subject site.

4.4.1.1 Design Storms

The following storm events were used in the design and evaluation of the site:

- 5 and 100 year 3 hour Chicago
- Sensitivity analysis: 100 year 3 hour Chicago with 20% increase in intensity

The following storm events were used in the evaluation of the existing Pond 6 West and Pond 6 East.

- 2, 5, 10, and 100 year, 12 hour SCS Type II storm event,
- Sensitivity analysis: July 1979, August 1988, and August 1996 Historical storms, as well as the 100 year 12 hour SCS Type II storm event with 20% increase in intensity.

4.4.1.2 Drainage Area Parameters

- Area and imperviousness - Catchment areas and imperviousness values are based on the areas and runoff coefficients applied in the rational method spreadsheet. Runoff coefficients were established in the September 2012 Conceptual Site Servicing Plan and are typical of commercial land use. See Drawing 14289-500 for the catchment areas used in the SWMHYMO modeling.
- Infiltration - Infiltration losses were selected to be consistent with the OSDG. The Horton values are as follows: f_o = 76.2 mm/h, f_c = 13.2 mm/h, k = 0.00115 s^{-1}.
- Length Parameter - The length parameter (LGI) for the detailed design municipal ROW within the development area are based on the measured sewer trunk length. The length parameter (LGI) for the proposed commercial blocks within the development area are based on the average between the trunk sewer length and a calculated length from the SWMHYMO user manual. This approach is consistent with the OSDG Appendix 8 (November 2004). Applicable calculations are provided in **Appendix C**.
- Slope - The ground slope was based upon the average slope for both impervious and pervious area. Generally, the slope is approximately 2% (0.02 m/m). This assumes a slope of approximately 1% for impervious or road surfaces and 3% for pervious surfaces (lot grading).
- Initial Abstraction (Detention Storage) - Detention storage depths of 0.8 mm and 1.5 mm were used for impervious and pervious areas, respectively. These values are more conservative than the OSDG.
- Manning's Roughness - Manning's roughness coefficients of 0.013 and 0.25 were used for impervious and pervious areas, respectively.

Table 4.2 summarizes the main hydrological parameters used in the SWMHYMO model. The drainage area plan is presented in Drawing 14289-500. Model output files are enclosed within **Appendix C**.

Table 4.2 Drainage Area Parameters (Model file: 100398.OUT)

Area ID	Area (ha)	IMP (%)		LGI (m)	AVAILABLE/REQUIRED STORAGE (cu-m)	MINOR SYSTEM CAPTURE (l/s)
		TIMP	XIMP			
101A	**7.03**	**0.93**	**0.93**	**327**	**780**	**1230**
150A	**0.17**	**0.53**	**0.53**	**83**	**n/a**	**31**
150B	**0.2**	**0.53**	**0.53**	**75**	**7**	**37**
UPS Site modelled as per approved report "Design Brief UPS Canada Inc. 8825 Campeau Drive (IBI Group, January 2017)						
99C	0.14	0.69	0.69	30	44	33
99D	0.22	0.69	0.69	60	21	45
100C	0.27	0.59	0.59	103	13	49
100B	1.21	0.93	0.93	155	117	259
120A	1.16	0.93	0.93	214	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)						
121C	0.21	0.53	0.53	101	49	37
122B	1.07	0.93	0.93	149	103	231
122A	1.16	0.93	0.93	216	73	185
122C	0.21	0.69	0.69	60	21	46
122D	0.14	0.69	0.69	30	24	31
153A	**1.89**	**0.93**	**0.93**	**119**	**190**	**430**
153B	**1.82**	**0.93**	**0.93**	**129**	**180**	**408**
153C	**0.16**	**0.53**	**0.53**	**79**	**n/a**	**29**
154D	**0.15**	**0.53**	**0.53**	**76**	**n/a**	**29**
154A	**0.70**	**0.93**	**0.93**	**81**	**70**	**171**
154C	**0.17**	**0.57**	**0.57**	**82**	**48**	**33**
155C	**0.29**	**0.57**	**0.57**	**141**	**60**	**50**
155A	**3.19**	**0.93**	**0.93**	**160**	**480**	**525**
132D	**2.29**	**0.93**	**0.93**	**157**	**360**	**377**
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	**0.85**	**0.93**	**0.93**	**95**	**90**	**204**
104B	0.3	0.71	0.71	111	65	75
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
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

Area ID	Area (ha)	IMP (%)		LGI (m)	AVAILABLE/REQUIRED STORAGE (cu-m)	MINOR SYSTEM CAPTURE (l/s)
		TIMP	XIMP			
137D/E	0.14	0.93	0.93	35	n/a	67
137F/G	0.15	0.93	0.93	35	n/a	72
136A/B/C	0.25	0.93	0.93	69	n/a	116
170A	0.06	0.93	0.93	54	n/a	29
170B	0.06	0.93	0.93	25	n/a	29
135B	0.12	0.93	0.93	64	n/a	56
135A	1.12	0.93	0.93	117	111	257
135C/D	0.17	0.93	0.93	35	n/a	81
107A	0.22	0.93	0.93	64	n/a	101
107C/B	0.15	0.93	0.93	35	n/a	72
107E/D	0.14	0.93	0.93	35	n/a	67
107G/F	0.14	0.93	0.93	35	n/a	67
108A/B	0.17	0.93	0.93	36	n/a	81
108D/C	0.16	0.93	0.93	40	n/a	76
604A	2.63	0.93	0.93	166	266	556
604B	0.59	0.93	0.93	137	n/a	170
166A	1.49	0.93	0.93	112	247	233
166B	0.14	0.53	0.53	70	5	42
167A	1.45	0.93	0.93	112	240	227
167C	0.26	0.53	0.53	127	14	59
167B	0.07	0.53	0.53	35	n/a	30
160B	1.01	0.93	0.93	80	245	144
160A	160A(i)ϕ 0.49ha	1.1	0.93	0.93	79	184 TBD	172 76ϕ
	160A(ii)θ 0.61ha					TBD	96θ
160D	0.12	0.53	0.53	61	n/a	23
161B	0.24	0.53	0.53	117	47	36
162A	2.39	0.93	0.93	188	355	233
162B	0.16	0.53	0.53	79	n/a	30
165A	0.58	0.93	0.93	92	160	116
164A	0.13	0.53	0.53	76	4	30
140AB	0.19	0.61	0.61	76	32	53
140C	0.13	0.71	0.71	48	11	32
140D/E	0.13	0.71	0.71	49	7	39
141A	0.13	0.71	0.71	34	15	30
603	0.26	0.93	0.93	54	n/a	75
602	0.32	0.93	0.93	70	n/a	92
601A	4.56	0.93	0.93	212	642	712
600	0.78	0.93	0.93	164	n/a	225

Bold font indicates Phase 5 areas

* required to store the 100 year storm event

ϕ Block 2 – Phase 3 Registration

θ Block 3 – Phase 3 Registration

TBD – To Be Determined at Site Plan Application

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

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 m^3, an extended detention volume of 1,830 m^3, and a total storage volume of approximately 24,525 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 m^3, an extended detention volume of 1,766 m^3, and a total storage volume of approximately 23,610 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;

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 m^3, 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**

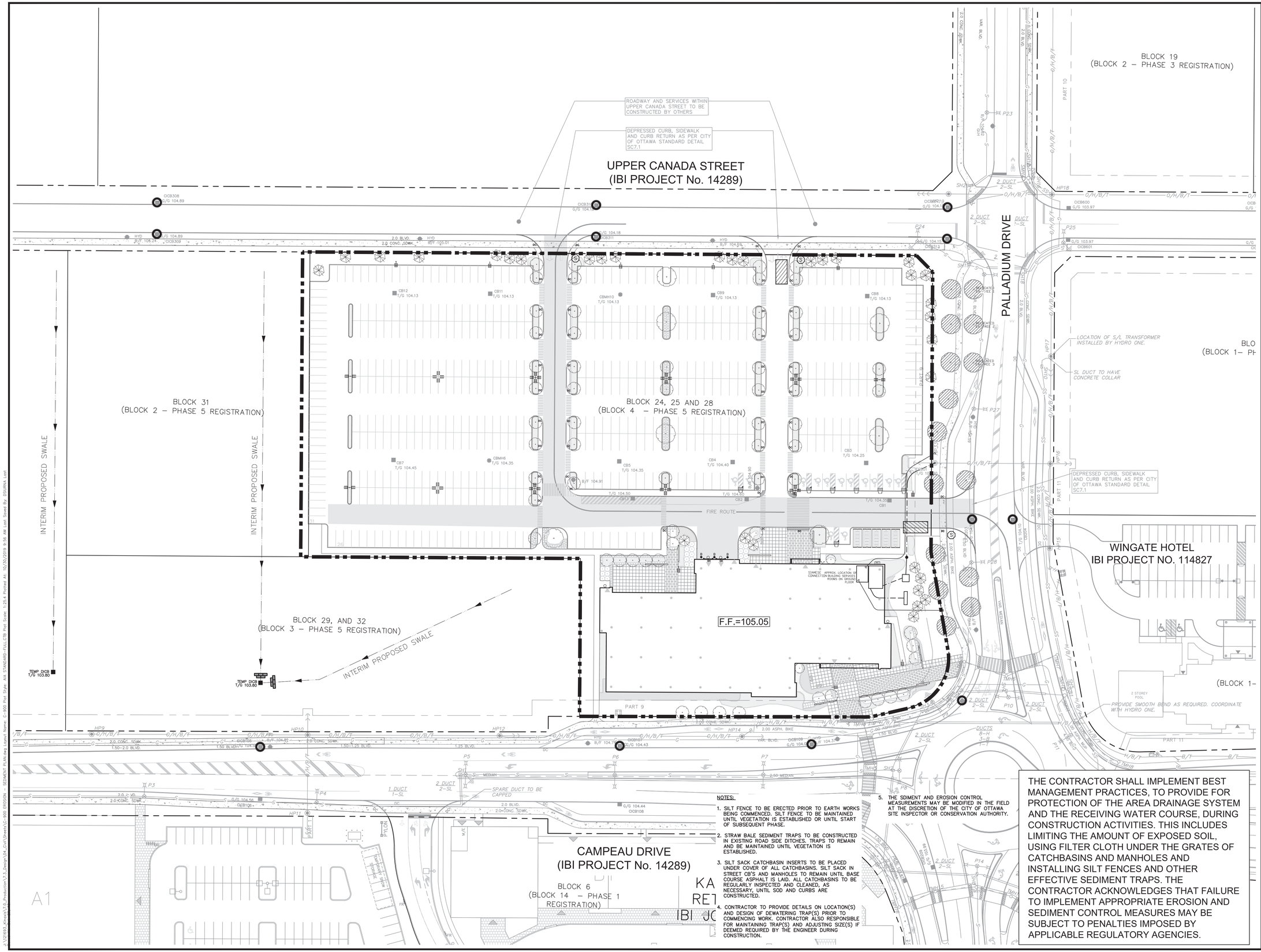
The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

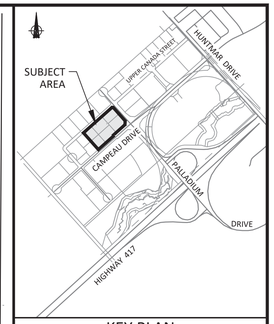
DATED AT TORONTO this 28th day of September, 2015

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

APPENDIX D





KEY PLAN
(NTS)

NOTES:
1. SEE DETAIL DRAWING C–010 FOR ADDITIONAL DETAILS AND NOTES.
2. SITE BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR STANTEC GEOMATICS.

LEGEND :

- LIGHT DUTY SILT FENCE AS PER OPSD-219.110
- STRAW BALE CHECK DAM AS PER OPSD-219.180
- SILT SACK CATCHBASIN INSERT PLACED UNDER CB OR MH COVER
- TEMPORARY MUD MAT 0.15m THICK 50mm CLEAR STONE ON NON WOVEN FILTER CLOTH (15.00 × 7.00)

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3	REVISED AS PER CITY COMMENTS	T.R.B.	2019.10.29
2	REVISED AS PER NEW SITE PLAN AND CITY COMMENTS	T.R.B.	2019.09.30
1	ISSUED FOR SPA	T.R.B.	2019.07.09

NOTES:
1. SILT FENCE TO BE ERECTED PRIOR TO EARTH WORKS BEING COMMENCED. SILT FENCE TO BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED OR UNTIL START OF SUBSEQUENT PHASE.
2. STRAW BALE SEDIMENT TRAPS TO BE CONSTRUCTED IN EXISTING ROAD SIDE DITCHES. TRAPS TO REMAIN AND BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED.
3. SILT SACK CATCHBASIN INSERTS TO BE PLACED UNDER COVER OF ALL CATCHBASINS. SILT SACK IN STREET CB'S AND MANHOLES TO REMAIN UNTIL BASE COURSE ASPHALT IS LAID. ALL CATCHBASINS TO BE REGULARLY INSPECTED AND CLEANED, AS NECESSARY, UNTIL SOD AND CURBS ARE CONSTRUCTED.
4. CONTRACTOR TO PROVIDE DETAILS ON LOCATION(S) AND DESIGN OF DEWATERING TRAP(S) PRIOR TO COMMENCING WORK. CONTRACTOR ALSO RESPONSIBLE FOR MAINTAINING TRAP(S) AND ADJUSTING SIZE(S) IF DEEMED REQUIRED BY THE ENGINEER DURING CONSTRUCTION.
5. THE SDIMENT AND EROSION CONTROL MEASUREMENTS MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE CITY OF OTTAWA SITE INSPECTOR OR CONSERVATION AUTHORITY.

THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATER COURSE, DURING CONSTRUCTION ACTIVITIES. THIS INCLUDES LIMITING THE AMOUNT OF EXPOSED SOIL, USING FILTER CLOTH UNDER THE GRATES OF CATCHBASINS AND MANHOLES AND INSTALLING SILT FENCES AND OTHER EFFECTIVE SEDIMENT TRAPS. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY APPLICABLE REGULATORY AGENCIES.

PC KANATA DEVELOPMENTS INC.

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

Project Title
8700 CAMPEAU DRIVE

LICENSED PROFESSIONAL ENGINEER
T. R. BRULE
2019/10/29
PROVINCE OF ONTARIO

Drawing Title
EROSION AND SEDIMENT PLAN

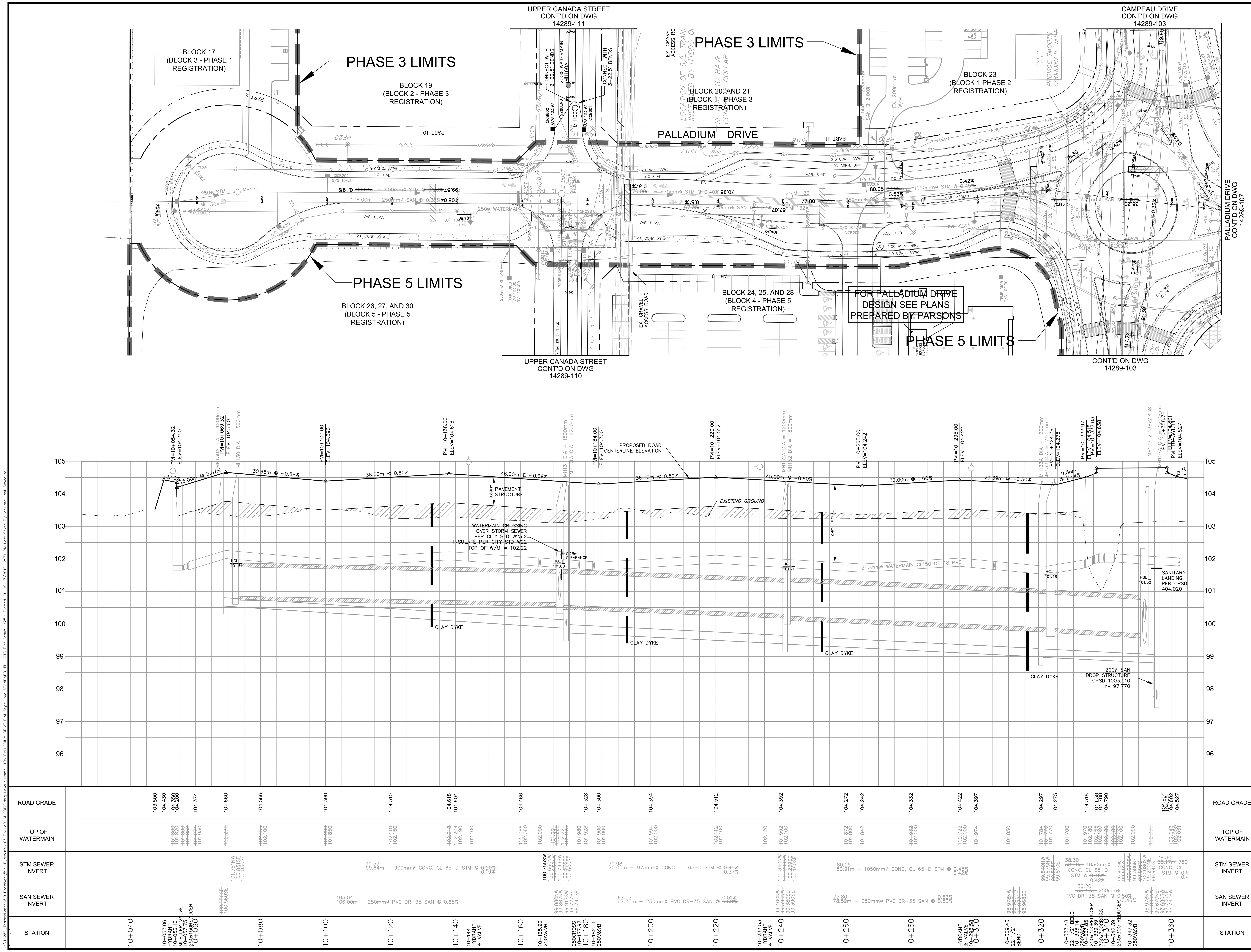
Scale
1 : 500

Design	Date
JB	JULY 2019
Drawn	Checked
DPS/DD/EH	TRB
Project No.	Drawing No.
121693	C-900

D07-12-19-0122

#17988

APPENDIX E



LEGEND:

- MH3A SANITARY MANHOLE
- MH3 STORM MANHOLE
- CB T/G 99.76 STREET CATCHBASIN c/w TOP OF GRATE
- CICB G/G 99.76 CURB INLET CATCHBASIN c/w GUTTER GRADE
- RYCB T/G 100.27 REARYARD CB c/w TOP OF GRATE
- DIMH T/G 97.40 DITCH INLET MANHOLE c/w TOP OF GRATE
- CBMH G/G 101.55 STREET CATCHBASIN MANHOLE c/w GUTTER GRADE
- V&VB VALVE AND VALVE BOX
- V&C VALVE AND CHAMBER
- HYD B/F 100.56 HYDRANT c/w BOTTOM OF FLANGE ELEVATION
- BARRIER CURB AS PER SC1.1
- D.C. DEPRESSED BARRIER CURB AS PER SC1.1 COMPLETE WITH TWSI PER SC7.3
- MOUNTABLE CURB AS PER SC1.3
- PROPOSED CONCRETE SIDEWALK
- REQUIRED FILL BELOW ROAD SUBGRADE
- CLAY DYKES
- HGL 103.54 HYDRAULIC GRADE LINE
- TEMPORARY 3.0m GRAVEL ACCESS ROAD

FOR EXTENT OF EXISTING CONSTRUCTION REFER TO DRAWING 14289-100A

No.	REVISIONS	By	Date
14	REVISED AS PER PHASE 5 COMMENTS	LME	19:10:18
13	ISSUED FOR PHASE 5 REGISTRATION	LME	19:09:10
12	REVISED FOR PHASE 3 REGISTRATION	LME	18:09:14
11	ADDED CITY FILE NUMBER	LME	18:05:30
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 MH107A TO 98.800	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

TAGGART REALTY MANAGEMENT

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 PHASE 5

LICENSED PROFESSIONAL ENGINEER L. M. ERION 13379508 2019-10-18 PROVINCE OF ONTARIO

Drawing Title
PALLADIUM DRIVE
FROM STA 10+040 TO CAMPEAU DRIVE

Scale
HORIZ. SCALE 1:500
VERT. SCALE 1:50

Design	LME	Date	NOV. 2014
Drawn	DPS	Checked	TRB
Project No.	14289	Drawing No.	106

D07-16-14-0003_P5

#17661