



File: 121693 – 7.3

**DESIGN BRIEF
KINAXIS OFFICE
8700 CAMPEAU DRIVE
OTTAWA, ON**

Development Application File No. **D**__-__-__-__



Prepared for PC Developments Inc.
by IBI Group
July 2018

Table of Contents

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

Table of Contents (Continued)

List of Figures

- Figure 1** Key Plan
Figure 2 Location Plan

List of Appendices

- Appendix A** Watermain Demand Calculation Sheet
Fire Flow Calculations
Water Model Schematic and Results
- Appendix B** KWBP Sanitary Sewer Design Sheet
KWBP Sanitary Drainage Area Plan 14289-501
Sanitary Sewer Design Sheet
Sanitary Drainage Area Plan 121693-400
- Appendix C** Infiltration Calculations
Ponding Plan & Storm Drainage Plan
Storm Sewer Design Sheet
Kanata West Business Park Storm Drainage Area Plan 14289-500
- Appendix D** Erosion and Sediment Control Plan Drawing No. 121693-C-900
- Appendix E** Subdivision Design Drawing – Palladium Drive

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 2,800m².

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 March, 2019.

1.4 Geotechnical Considerations

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

- Report No. PG3115-6 dated July 4, 2019 for the Kinaxis site;

Among other items, the reports comment on the following:

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

Generally, the 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 20 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**.

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:

| <u>Condition #1 – Palladium Dr.</u> | <u>Hydraulic Grade Line</u> |
|-------------------------------------|----------------------------------|
| Basic Day (Max HGL) | 164.1 m |
| Peak Hour (PKHR) | 154.1 m |
| Max Day (MXDY) + Fire | 151.1 m (Fire Flow 13,000 l/min) |

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

| 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 proposed 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 | 2.33 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 proposed infiltration gallery has been sized to maximize infiltration potential for the site. The sizing was based on the roof drainage area, daily precipitation data (using wet year to minimize overflow and dry year to confirm infiltration volume), infiltration through the bottom and the bottom 1/3 of the side walls, and percolation rates based on Geotechnical investigation of the site. The sizing of the gallery has been tailored for the proposed 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 | 2466 | 1038 | 682 | 1783 |

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 1783m³ of infiltration on an annual basis, or 76.5mm/year for the 2.33ha 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 4.1, and the storm water modeling, the maximum allowable release rate for the subjected site is 360.88l/s.

The site is approximately 2.33 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 51.87 l/s. Based on an allowable release rate of 360.88 l/s for the site, the controlled portion is limited to 360.88 l/s – 51.87 l/s = 309.01 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 309.01 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 KWSS 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.

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 | | 51.87 | N/A | N/A | N/A | N/A |
| TOTAL UNRESTRICTED RELEASED RATE | | | | | | | |
| | | | 51.87 | | | | |
| CONTROLLED TO PALLADIUM DRIVE STORM SEWER SYSTEM | | | | | | | |
| CB12/11/9/8/3 CBMH10 | TEMPEST HF | 130 | 130 | 137.18 | 355.66 | 763.32 | 407.66 |
| CB7/5/2/4/CBMH6 | TEMPEST HF | 110 | 110 | 92.54 | 246.27 | 227.12 | 0.00 |
| CB1 | TEMPEST HF | 44 | 44 | 2.02 | 10.73 | 10.98 | 0.25 |
| TOTAL RESTRICTED RELEASED RATE | | | | | | | |
| | | | 284 | | | | |

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

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

6 CONCLUSION

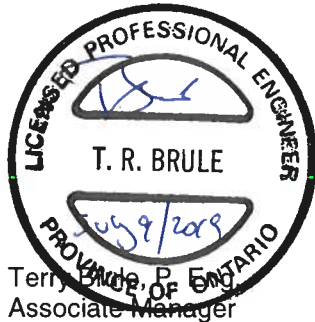
The Servicing strategy can be summarized as follows:

- 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.

IBI GROUP



A handwritten signature in blue ink, appearing to read "James Battison".

James Battison

APPENDIX A



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

Fire Flow Design Sheet
 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 m²
 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.

| <u>Separation</u> | <u>Charge</u> |
|-------------------|---------------|
| 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)



IBI GROUP
 333 PRESTON STREET
 OTTAWA, ON
 K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

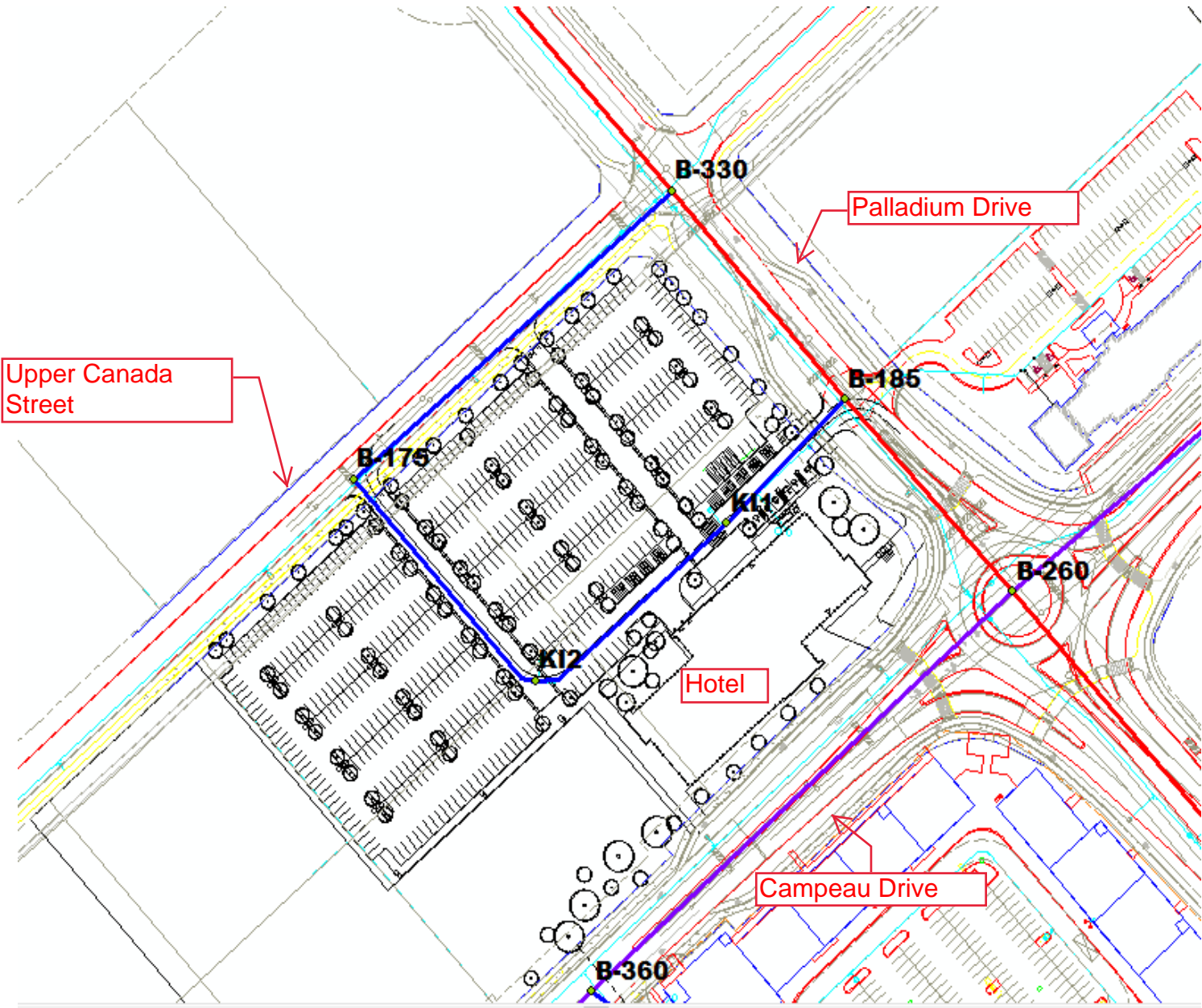
PROJECT : Kinaxis Office
LOCATION : Kanata West Business Park - City of Ottawa
DEVELOPER : PC Kanata Developments Inc.

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

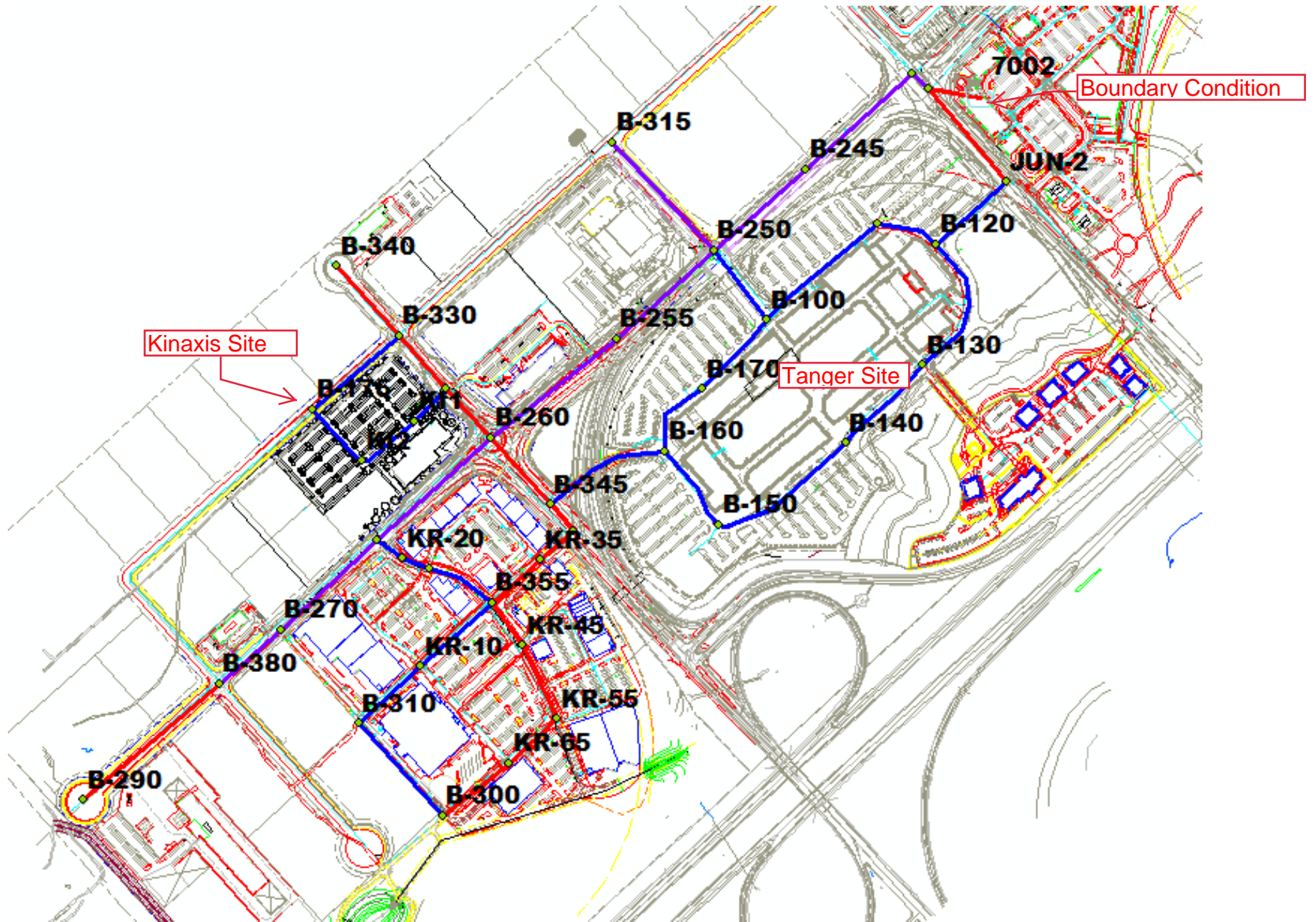
| NODE | RESIDENTIAL | | | | NON-RESIDENTIAL | | | AVERAGE DAILY DEMAND (l/s) | | | MAXIMUM DAILY DEMAND (l/s) | | | MAXIMUM HOURLY DEMAND | | | FIRE DEMAND (l/min) |
|----------------|-------------|--------|----|------------|-----------------|-------------|--------------------------|----------------------------|------|-------|----------------------------|------|-------|-----------------------|------|-------|---------------------|
| | UNITS | | | Population | INDTRL (ha.) | INST. (ha.) | RETAIL (m ²) | Non-res. | Res. | Total | Non-res. | Res. | Total | Non-res. | Res. | Total | |
| | SF | Office | ST | | | | | | | | | | | | | | |
| 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 | | AVG. DAILY DEMAND | MAX. HOURLY DEMAND |
| - Single Family (SF) | 3.4 p / p / u | - 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 |
| - Stacked Townhouse (ST) | 2.3 p / p / u | 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 |
| | | FIRE FLOW | |
| | | - Kinaxis Office | 12,000 l / min |

KINAXIS WATER MODEL



OVERALL MODEL



Kinaxis Basic Day (Max HGL) - Junction Report

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

Kinaxis Peak Hour - Junction Report

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

Kinaxis Max Day + Fire - Fireflow Design Report

| | | 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 | <input type="checkbox"/> | B-100 | 217.39 | 393.15 | B-100 | 139.96 | 115.93 | 393.15 | 139.96 | 139.96 |
| 2 | <input type="checkbox"/> | B-110 | 218.61 | 337.90 | B-110 | 139.96 | 115.98 | 337.90 | 139.96 | 139.96 |
| 3 | <input type="checkbox"/> | B-120 | 218.94 | 421.13 | B-120 | 139.96 | 115.63 | 421.13 | 139.96 | 139.96 |
| 4 | <input type="checkbox"/> | B-130 | 218.68 | 252.83 | B-130 | 139.96 | 115.78 | 252.83 | 139.96 | 139.97 |
| 5 | <input type="checkbox"/> | B-140 | 219.06 | 236.92 | B-140 | 139.96 | 115.78 | 236.92 | 139.96 | 139.96 |
| 6 | <input type="checkbox"/> | B-150 | 218.74 | 259.07 | B-150 | 139.96 | 115.93 | 259.07 | 139.96 | 139.97 |
| 7 | <input type="checkbox"/> | B-160 | 217.45 | 330.13 | B-160 | 139.96 | 116.03 | 330.13 | 139.96 | 139.96 |
| 8 | <input type="checkbox"/> | B-170 | 217.98 | 314.12 | B-170 | 139.96 | 115.78 | 314.12 | 139.96 | 139.96 |
| 9 | <input type="checkbox"/> | B-245 | 219.44 | 662.37 | B-290 | 108.89 | 117.46 | 625.46 | 139.96 | 173.78 |
| 10 | <input type="checkbox"/> | B-250 | 216.67 | 517.33 | B-290 | 103.20 | 116.88 | 483.46 | 139.96 | 177.62 |
| 11 | <input type="checkbox"/> | B-255 | 218.27 | 412.01 | B-290 | 113.06 | 117.89 | 391.69 | 139.96 | 167.88 |
| 12 | <input type="checkbox"/> | B-260 | 217.75 | 346.65 | B-290 | 122.77 | 118.88 | 335.43 | 139.96 | 157.26 |
| 13 | <input type="checkbox"/> | B-270 | 217.28 | 276.89 | B-290 | 129.64 | 119.58 | 271.41 | 139.96 | 150.41 |
| 14 | <input type="checkbox"/> | B-290 | 220.22 | 183.07 | B-290 | 139.96 | 120.63 | 183.07 | 139.96 | 139.98 |
| 15 | <input type="checkbox"/> | B-300 | 216.67 | 256.75 | B-300 | 139.96 | 118.88 | 256.75 | 139.96 | 140.00 |
| 16 | <input type="checkbox"/> | B-310 | 218.42 | 216.45 | B-310 | 139.96 | 119.08 | 216.45 | 139.96 | 139.96 |
| 17 | <input type="checkbox"/> | B-315 | 218.02 | 366.86 | B-315 | 139.96 | 116.43 | 366.86 | 139.96 | 139.96 |
| 18 | <input type="checkbox"/> | B-330 | 217.65 | 241.24 | B-340 | 136.04 | 118.58 | 239.52 | 139.96 | 143.90 |
| 19 | <input type="checkbox"/> | B-340 | 217.83 | 200.02 | B-340 | 139.96 | 118.98 | 200.02 | 139.96 | 139.97 |
| 20 | <input type="checkbox"/> | B-345 | 216.92 | 325.80 | B-345 | 139.96 | 119.03 | 325.80 | 139.96 | 139.96 |
| 21 | <input type="checkbox"/> | B-350 | 216.67 | 306.01 | B-350 | 139.96 | 119.28 | 306.01 | 139.96 | 139.96 |
| 22 | <input type="checkbox"/> | B-355 | 222.07 | 293.79 | B-355 | 139.96 | 118.78 | 293.79 | 139.96 | 139.96 |
| 23 | <input type="checkbox"/> | B-360 | 217.09 | 303.43 | B-290 | 129.23 | 119.54 | 297.18 | 139.96 | 150.82 |
| 24 | <input type="checkbox"/> | B-380 | 218.54 | 264.19 | B-290 | 133.99 | 120.02 | 261.15 | 139.96 | 145.97 |
| 25 | <input type="checkbox"/> | J-1 | 218.73 | 254.30 | J-1 | 139.96 | 120.03 | 254.30 | 139.96 | 139.99 |
| 26 | <input type="checkbox"/> | J-2 | 217.32 | 245.38 | J-2 | 139.96 | 119.93 | 245.38 | 139.96 | 139.98 |
| 27 | <input type="checkbox"/> | J-3 | 217.37 | 242.54 | J-3 | 139.96 | 120.18 | 242.54 | 139.96 | 139.98 |
| 28 | <input type="checkbox"/> | 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 | <input type="checkbox"/> | 453 | JUN-1 | JUN-3 | 26.14 | 297.00 | 120.00 | 48.43 | 0.70 | 0.05 | 2.04 | Open | 0 |
| 2 | <input type="checkbox"/> | 469 | JUN-1 | JUN-2 | 145.95 | 610.00 | 120.00 | 26.68 | 0.09 | 0.00 | 0.02 | Open | 0 |
| 3 | <input type="checkbox"/> | 473 | B-245 | JUN-3 | 172.60 | 297.00 | 120.00 | -48.43 | 0.70 | 0.35 | 2.04 | Open | 0 |
| 4 | <input type="checkbox"/> | 475 | B-250 | B-255 | 157.97 | 297.00 | 120.00 | 34.31 | 0.50 | 0.17 | 1.08 | Open | 0 |
| 5 | <input type="checkbox"/> | 477 | B-360 | B-260 | 184.36 | 297.00 | 120.00 | -18.12 | 0.26 | 0.06 | 0.33 | Open | 0 |
| 6 | <input type="checkbox"/> | 481 | B-380 | B-290 | 214.22 | 250.00 | 110.00 | 6.39 | 0.13 | 0.03 | 0.13 | Open | 0 |
| 7 | <input type="checkbox"/> | 485 | B-310 | B-300 | 150.23 | 204.00 | 110.00 | -0.36 | 0.01 | 0.00 | 0.00 | Open | 0 |
| 8 | <input type="checkbox"/> | 489 | B-250 | B-100 | 104.68 | 204.00 | 110.00 | 6.70 | 0.21 | 0.04 | 0.38 | Open | 0 |
| 9 | <input type="checkbox"/> | 491 | B-100 | B-110 | 177.45 | 204.00 | 110.00 | -6.68 | 0.20 | 0.07 | 0.38 | Open | 0 |
| 10 | <input type="checkbox"/> | 493 | B-120 | B-110 | 76.66 | 204.00 | 110.00 | 10.18 | 0.31 | 0.06 | 0.83 | Open | 0 |
| 11 | <input type="checkbox"/> | 495 | B-120 | B-130 | 180.37 | 204.00 | 110.00 | 12.43 | 0.38 | 0.22 | 1.20 | Open | 0 |
| 12 | <input type="checkbox"/> | 497 | B-130 | B-140 | 132.76 | 204.00 | 110.00 | 8.82 | 0.27 | 0.08 | 0.64 | Open | 0 |
| 13 | <input type="checkbox"/> | 499 | B-140 | B-150 | 186.62 | 204.00 | 110.00 | 4.52 | 0.14 | 0.03 | 0.18 | Open | 0 |
| 14 | <input type="checkbox"/> | 501 | B-150 | B-160 | 110.94 | 204.00 | 110.00 | 0.80 | 0.02 | 0.00 | 0.01 | Open | 0 |
| 15 | <input type="checkbox"/> | 503 | B-170 | B-160 | 99.49 | 204.00 | 110.00 | 9.72 | 0.30 | 0.08 | 0.76 | Open | 0 |
| 16 | <input type="checkbox"/> | 505 | B-100 | B-170 | 113.62 | 204.00 | 110.00 | 12.08 | 0.37 | 0.13 | 1.14 | Open | 0 |
| 17 | <input type="checkbox"/> | 507 | JUN-2 | B-120 | 112.65 | 204.00 | 110.00 | 26.68 | 0.82 | 0.56 | 4.96 | Open | 0 |
| 18 | <input type="checkbox"/> | 525 | B-250 | B-315 | 178.70 | 297.00 | 120.00 | 2.43 | 0.04 | 0.00 | 0.01 | Open | 0 |
| 19 | <input type="checkbox"/> | 527 | B-260 | B-185 | 80.46 | 250.00 | 110.00 | 7.53 | 0.15 | 0.01 | 0.18 | Open | 0 |
| 20 | <input type="checkbox"/> | 529 | B-330 | B-340 | 112.16 | 250.00 | 110.00 | 2.09 | 0.04 | 0.00 | 0.02 | Open | 0 |
| 21 | <input type="checkbox"/> | 531 | B-350 | B-345 | 42.25 | 250.00 | 110.00 | -12.48 | 0.25 | 0.02 | 0.45 | Open | 0 |
| 22 | <input type="checkbox"/> | 533 | B-360 | B-270 | 158.01 | 297.00 | 120.00 | 13.44 | 0.19 | 0.03 | 0.19 | Open | 0 |
| 23 | <input type="checkbox"/> | 537 | B-270 | B-380 | 98.74 | 297.00 | 120.00 | 12.35 | 0.18 | 0.02 | 0.16 | Open | 0 |
| 24 | <input type="checkbox"/> | 539 | B-255 | B-260 | 192.02 | 297.00 | 120.00 | 31.43 | 0.45 | 0.18 | 0.92 | Open | 0 |
| 25 | <input type="checkbox"/> | 541 | B-245 | B-250 | 147.79 | 297.00 | 120.00 | 43.44 | 0.63 | 0.25 | 1.67 | Open | 0 |
| 26 | <input type="checkbox"/> | 559 | B-345 | B-260 | 106.53 | 250.00 | 110.00 | -3.83 | 0.08 | 0.01 | 0.05 | Open | 0 |
| 27 | <input type="checkbox"/> | 561 | B-345 | B-160 | 156.52 | 204.00 | 110.00 | -9.10 | 0.28 | 0.11 | 0.68 | Open | 0 |
| 28 | <input type="checkbox"/> | 563 | B-380 | J-1 | 57.31 | 250.00 | 110.00 | 2.60 | 0.05 | 0.00 | 0.02 | Open | 0 |
| 29 | <input type="checkbox"/> | 565 | J-2 | J-3 | 84.71 | 250.00 | 110.00 | -2.27 | 0.05 | 0.00 | 0.02 | Open | 0 |
| 30 | <input type="checkbox"/> | 567 | J-3 | B-300 | 153.45 | 250.00 | 110.00 | -3.54 | 0.07 | 0.01 | 0.04 | Open | 0 |
| 31 | <input type="checkbox"/> | 569 | B-310 | KR-10 | 100.75 | 204.00 | 110.00 | -2.79 | 0.09 | 0.01 | 0.08 | Open | 0 |
| 32 | <input type="checkbox"/> | 571 | B-355 | KR-35 | 77.53 | 250.00 | 110.00 | -12.48 | 0.25 | 0.03 | 0.45 | Open | 0 |
| 33 | <input type="checkbox"/> | 575 | 7002 | JUN-1 | 64.97 | 610.00 | 120.00 | 75.11 | 0.26 | 0.01 | 0.14 | Open | 0 |
| 34 | <input type="checkbox"/> | 579 | PH3-1 | PH3-2 | 156.07 | 204.00 | 110.00 | 0.00 | 0.00 | 0.00 | 0.00 | Open | 0 |
| 35 | <input type="checkbox"/> | 593 | KR-35 | B-350 | 53.55 | 250.00 | 110.00 | -12.48 | 0.25 | 0.02 | 0.45 | Open | 0 |

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 |
|----|--------------------------|-----|-----------|---------|------------|---------------|-----------|------------|----------------|--------------|-----------------|--------|---------------------|
| 36 | <input type="checkbox"/> | 595 | KR-10 | B-355 | 115.51 | 204.00 | 110.00 | -2.79 | 0.09 | 0.01 | 0.08 | Open | 0 |
| 37 | <input type="checkbox"/> | 599 | B-300 | KR-65 | 101.86 | 250.00 | 110.00 | -3.91 | 0.08 | 0.01 | 0.05 | Open | 0 |
| 38 | <input type="checkbox"/> | 601 | KR-65 | KR-55 | 78.29 | 250.00 | 150.00 | -3.91 | 0.08 | 0.00 | 0.03 | Open | 0 |
| 39 | <input type="checkbox"/> | 605 | KR-55 | KR-45 | 97.32 | 250.00 | 110.00 | -3.91 | 0.08 | 0.01 | 0.05 | Open | 0 |
| 40 | <input type="checkbox"/> | 607 | KR-45 | B-355 | 63.51 | 250.00 | 110.00 | -3.91 | 0.08 | 0.00 | 0.05 | Open | 0 |
| 41 | <input type="checkbox"/> | 609 | B-355 | KR-25 | 87.90 | 204.00 | 110.00 | -3.93 | 0.12 | 0.01 | 0.14 | Open | 0 |
| 42 | <input type="checkbox"/> | 611 | KR-25 | KR-20 | 34.03 | 204.00 | 110.00 | -3.93 | 0.12 | 0.00 | 0.14 | Open | 0 |
| 43 | <input type="checkbox"/> | 613 | KR-20 | B-360 | 36.50 | 204.00 | 110.00 | -3.93 | 0.12 | 0.01 | 0.14 | Open | 0 |
| 44 | <input type="checkbox"/> | 627 | B-175 | B-330 | 136.36 | 204.00 | 110.00 | -0.73 | 0.02 | 0.00 | 0.01 | Open | 0 |
| 45 | <input type="checkbox"/> | 629 | PH3-2 | B-315 | 103.77 | 204.00 | 110.00 | 0.00 | 0.00 | 0.00 | 0.00 | Open | 0 |
| 46 | <input type="checkbox"/> | P11 | J-1 | J-2 | 91.84 | 250.00 | 110.00 | -1.10 | 0.02 | 0.00 | 0.01 | Open | 0 |
| 47 | <input type="checkbox"/> | P13 | B-185 | B-330 | 85.68 | 250.00 | 110.00 | 4.58 | 0.09 | 0.01 | 0.07 | Open | 0 |
| 48 | <input type="checkbox"/> | P15 | B-185 | K11 | 54.44 | 204.00 | 110.00 | 2.95 | 0.09 | 0.00 | 0.08 | Open | 0 |
| 49 | <input type="checkbox"/> | P17 | K11 | K12 | 80.20 | 204.00 | 110.00 | 1.85 | 0.06 | 0.00 | 0.04 | Open | 0 |
| 50 | <input type="checkbox"/> | P21 | K12 | 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 |

¹Elevation: **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.

Mark Fraser, EIT
Junior Infrastructure Engineer, Suburban Services



City of Ottawa | Ville d'Ottawa
Planning and Growth Management Department
110 Laurier Avenue West, 4th Floor, Ottawa ON, K1P 1J1
Tel: 613.580.2424 ext. 27791
Fax: 613-580-2576
Mail: Code 01-14
Email: Mark.Fraser@ottawa.ca

*Please consider your environmental responsibility before printing this e-mail

This message, including any document or file attached, is intended only for the addressee and may contain privileged and/or confidential information. Any person is strictly prohibited from reading, using, disclosing or copying this message. If you received this message in error, please notify the sender and delete the message. Thank you.

From: Lance Erion [<mailto:lerion@IBIGroup.com>]
Sent: September 10, 2014 4:27 PM
To: Ogilvie, Chris; Fraser, Mark
Cc: Terry Brule
Subject: Kanata West Business Park - Request for Watermain Boundary Conditions

We are working on the detailed design of the Kanata West Business Park located west of Huntmar Drive and adjacent to the Tanger site and are requesting new boundary conditions at the intersection of Huntmar Drive and Campeau Drive as the 600 mm watermain on Campeau Drive from Dewsbury to Huntmar is now in service. Water demands have been calculated based on 52.9 ha of Prestige Business Park blocks with a average day rate of 35,000 l/s/ha and are summarized as follows.

| | |
|----------------------|----------|
| Average daily demand | 21.4 l/s |
| Maximum daily demand | 31.4 l/s |
| Peak Hour demand | 57.9 l/s |

The fire flow rate is 13,000 l/min per the Kanata West MSS. Please let us know if you require further information.

Thank you

Lance Erion P.Eng

Associate
email lerion@IBIGroup.com web www.ibigroup.com

IBI GROUP
400-333 Preston Street
Ottawa ON K1S 5N4 Canada
tel +1 613 225 1311 ext 516 fax +1 613 225 9868



NOTE: This email message/attachments may contain privileged and confidential information. If received in error, please notify the sender and delete this e-mail message.

NOTE: Ce courriel peut contenir de l'information privilégiée et confidentielle. Si vous avez reçu ce message par erreur, veuillez le mentionner immédiatement à l'expéditeur et effacer ce courriel.

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Boundary Conditions at KWBP(Campeau Dr.) West

Boundary Conditions at Jun-1:

Max HGL = 164.1m

PKHR = 154.1m

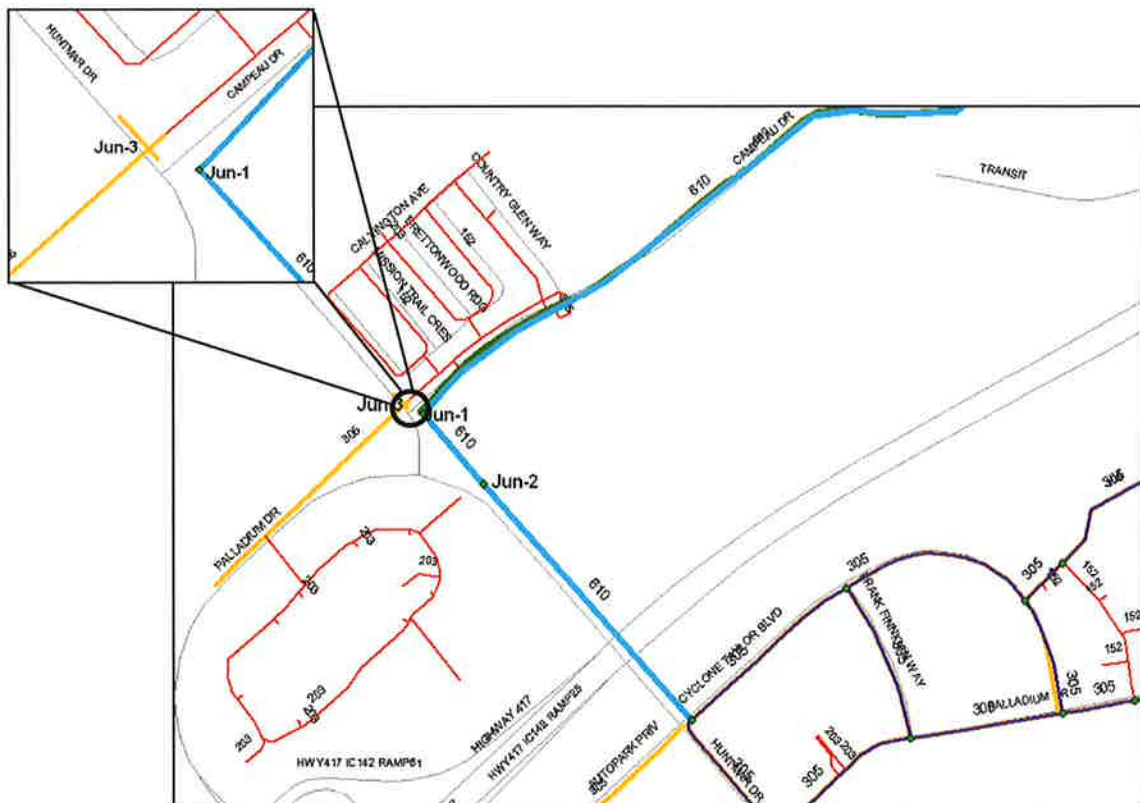
MXDY+Fire (216 L/s) =151.1m

To ensure adequate fire supply and system reliability, the development is subject to the the following conditions:

1. Provide a 25m connection between Jun-3 and Jun-1 as shown in figure below.
2. To construct only after 610mm pipe built from Jun-1 to Cyclone Taylor Blvd.
3. Provide a connection between Huntmar Dr. 610mm pipe and 203mm pipe off (Jun-2) the east side of the loop. This is need for a reliability purposes.

In response to the client request, we were unable to provide the boundary conditions at the locations requested due to a lack of fire supply.

Location of Connections:



Lance Erion

From: Fraser, Mark [Mark.Fraser@ottawa.ca]
Sent: Wednesday, September 17, 2014 9:27 AM
To: Lance Erion
Cc: Ogilvie, Chris; Terry Brule
Subject: RE: Kanata West Business Park - Request for Watermain Boundary Conditions
Attachments: BC_KWBP.PDF; KWBP watermain connections_Requested.pdf

Lance,

Please find below water distribution network boundary condition results for hydraulic analysis as requested based on the provided anticipated water demand and fire flow demand requirements. Please note that the City of Ottawa was unable to provide boundary conditions at the locations requested due to a lack of fire supply.

Water Demand and Fire Flow Requirements:

Proposed Development Location: Kanata West Business Park

Average daily demand = 21.4 l/s

Maximum daily demand = 31.4 l/s

Peak Hour demand = 57.9 l/s

Fire Flow = 216 l/s (13,000 L/min)

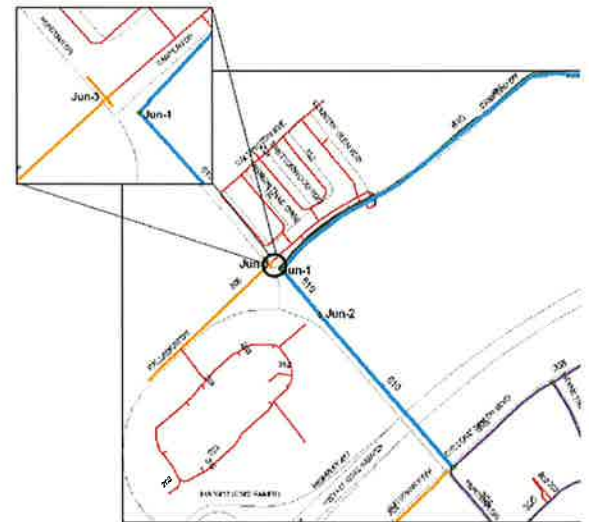
City of Ottawa Watermain Boundary Conditions:

Specified Service Connection Point(s): Please refer to the figure provided.

Max HGL = 164.1m

PKHR = 154.1m

MXDY+Fire = 151.1m



To ensure adequate fire supply and system reliability, the development is subject to the following conditions:

- Provide a 25mm connection between Jun-3 and Jun-1 as shown in figure provided.
- To construct only after 610mm pipe built from Jun-1 to Cyclone Taylor Blvd.
- Provide a connection between Huntmar Drive 610mm dia. pipe and 203mm dia. pipe off (Jun-2) the east side of the loop. This is required for reliability purposes.
- The City of Ottawa was unable to provide boundary conditions at the locations requested due to a lack of fire supply.

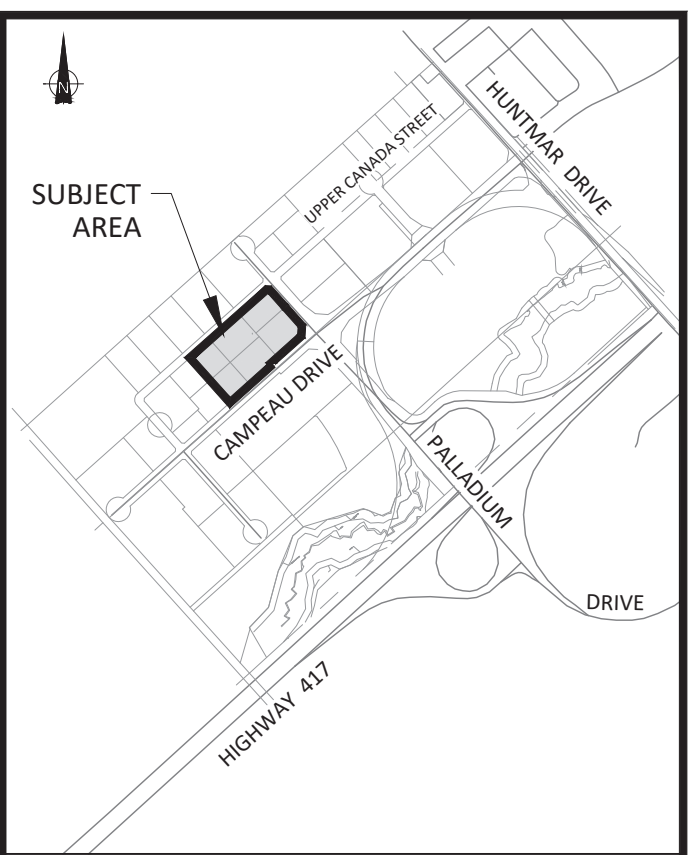
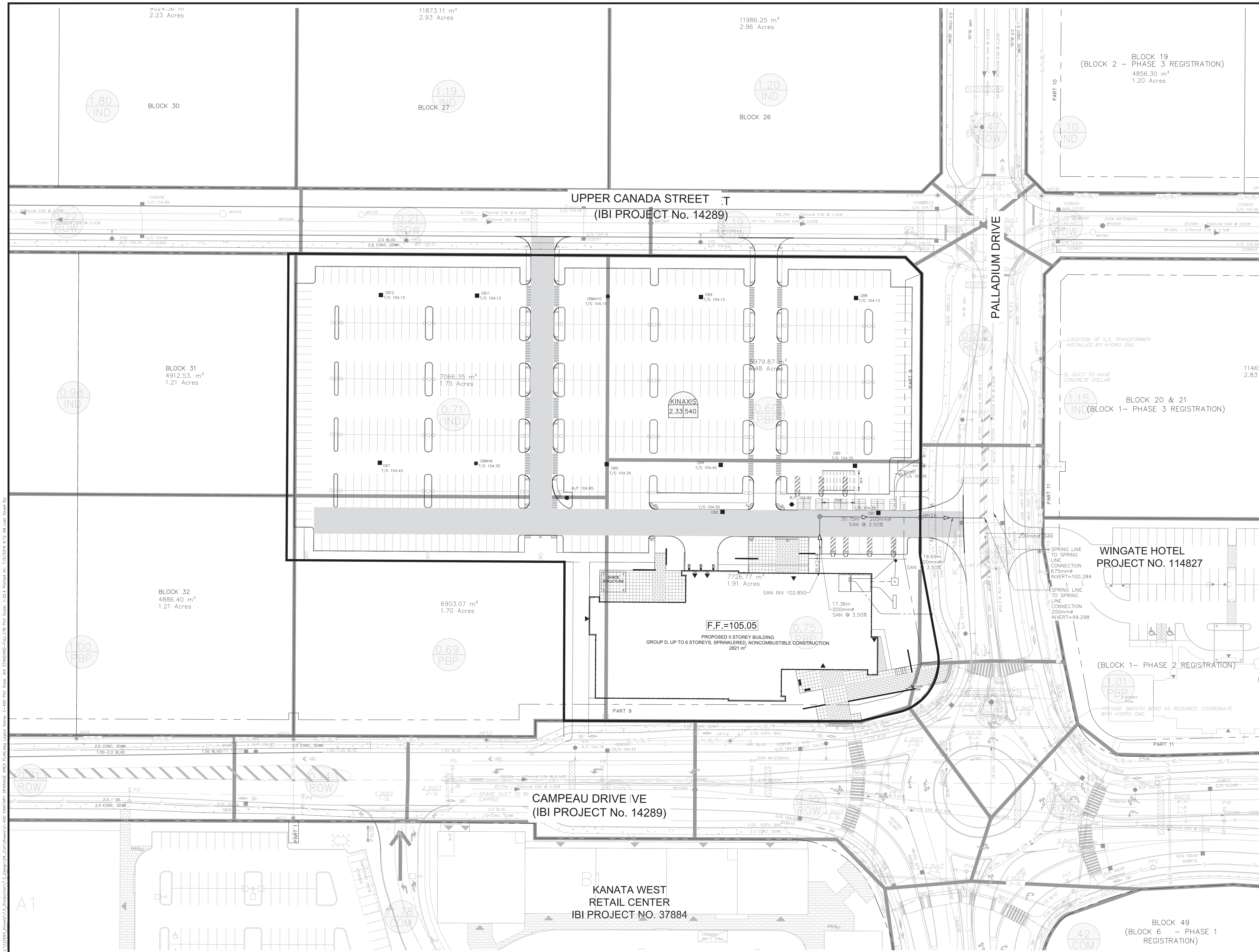
Please refer to City of Ottawa, *Ottawa Design Guidelines – Water Distribution*, First Edition, July 2010, WDG001 Clause 4.2.2 for watermain pressure and demand objectives.

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

Disclaimer: *The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.*

Regards,

APPENDIX B



KEY PLAN (INTS)

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 | AREA NUMBER |
| 1.01 / 0.0 | RUNOFF COEFFICIENT |
| 5.14 | AREA IN HECTARES |
| PBP | LAND USE TYPE |
| PBP | PRESTIGE BUSINESS |
| IND | PARK - 35 000 l/s/ha |
| COM | LIGHT INDUSTRIAL - 35 000 l/s/ha |
| ROW | COMMERCIAL - 50 000 l/s/ha |
| ROW | RIGHT OF WAY (INFILTRATION FLOW ONLY) |
| --- | DRAINAGE AREA LIMITS |
| --- | EXISTING DRAINAGE AREA LIMITS |

| | | | |
|-----|----------------|--------|------------|
| 12 | | | |
| 11 | | | |
| 10 | | | |
| 9 | | | |
| 8 | | | |
| 7 | | | |
| 6 | | | |
| 5 | | | |
| 4 | | | |
| 3 | | | |
| 2 | | | |
| 1 | ISSUED FOR SPA | T.R.B. | 2019-07-09 |
| No. | REVISIONS | By | Date |

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

LI-CENSA PROFESSIONAL ENGINEER
 T. R. BRULE
 2019-07-09
 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 |

J:\121693_Kinaxis\0_Production\03_Design\04_Civil\Sheets\C-400_SANITARY_DRAINAGE_AREA_PLAN\Area_Plan.dwg
 Name: C-400_Plot_Sheet_AIA_STANDARD-HULL.CTB Plot Scale: 1:25.4 Printed At: 7/9/2019 9:12 AM Plot Size: By:

D07-16-17-XXXX

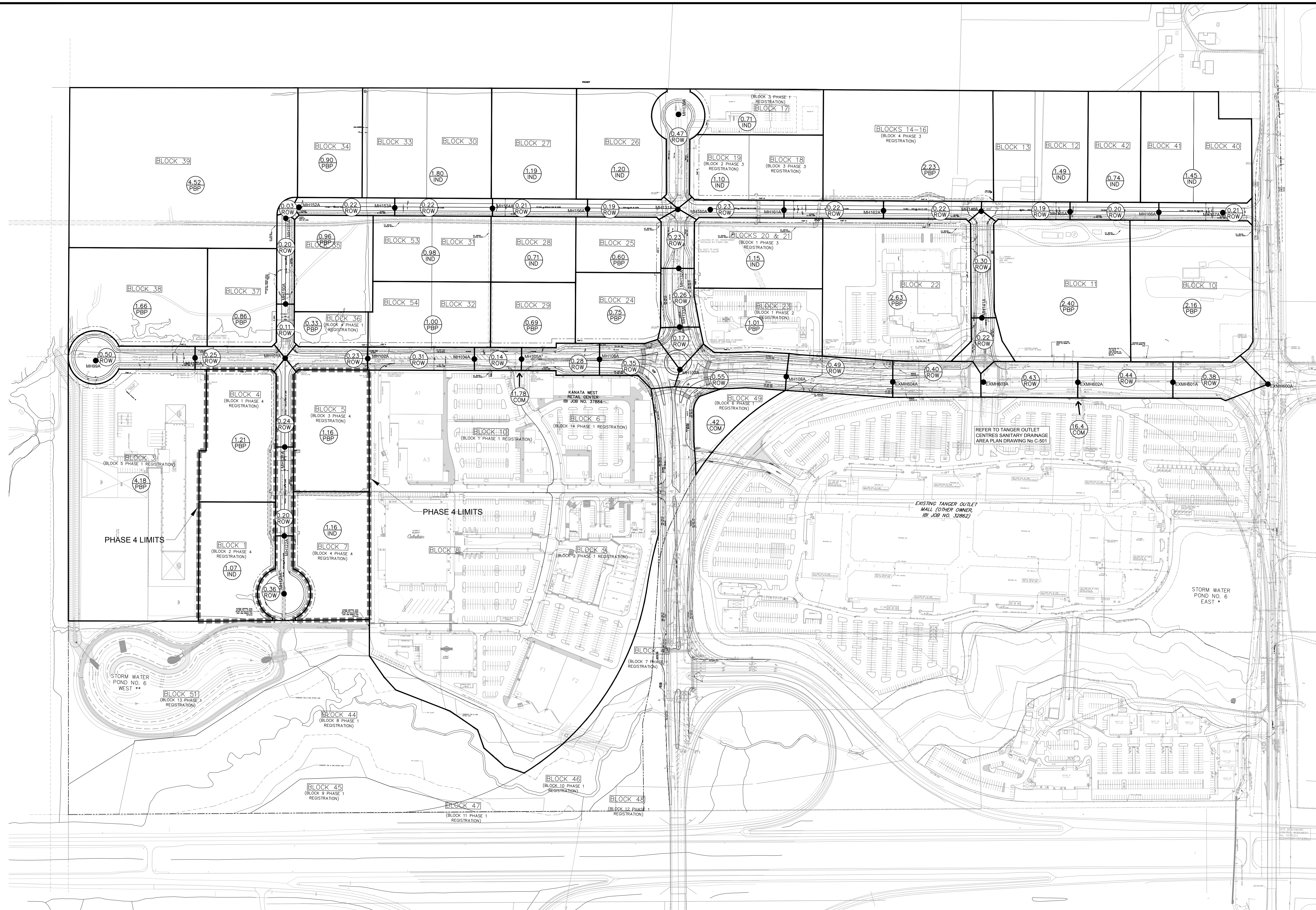


IBI GROUP
 400-333 Preston Street
 Ottawa, Ontario K1S 5N4 Canada
 tel 613 225 1311 fax 613 225 9868
 ibigroup.com

SANITARY SEWER DESIGN SHEET

Kinaxis
 CITY OF OTTAWA
 PC Kanata Developments Inc.

| LOCATION | | | | Office | | | | | | | | | | ICI AREAS | | | | | | | | INFILTRATION ALLOWANCE | | | | FIXED FLOW (L/s) | | TOTAL FLOW (L/s) | PROPOSED SEWER DESIGN | | | | | | |
|---------------------------|---------|---------|-------|--|------------|----|----|--------|---------------------|------------|-------|----------------------------|-----------------|---------------|------|----------------------------|------|------------|------|---------------------|-----------------|------------------------|------|------------------|------|------------------|------|------------------|-----------------------|------------|----------|-----------|-----------------------|--------------------|---|
| STREET | AREA ID | FROM MH | TO MH | AREA w/ Units (Ha) | UNIT TYPES | | | | AREA w/o Units (Ha) | POPULATION | | PEAK FACTOR | PEAK FLOW (L/s) | INSTITUTIONAL | | COMMERCIAL | | INDUSTRIAL | | ICI PEAK FACTOR | PEAK FLOW (L/s) | AREA (Ha) | | FLOW (L/s) | IND | CUM | IND | CUM | CAPACITY (L/s) | LENGTH (m) | DIA (mm) | SLOPE (%) | VELOCITY (full) (m/s) | AVAILABLE CAPACITY | |
| | | | | | SF | SD | TH | Office | | IND | CUM | | | IND | CUM | IND | CUM | IND | CUM | | | IND | CUM | | | | | | | | | | | L/s | % |
| Kinaxis Site | | BLDG | MH1A | | | | | | | 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: | | | | Notes: | | | | | | | | Designed: | | | | No. | | | | Revision | | | | Date | | | | | | | | | | | |
| Residential | | | | 1. Mannings coefficient (n) = 0.013 | | | | | | | | JEB | | | | 1. | | | | 1st City Submission | | | | 2019-07-03 | | | | | | | | | | | |
| ICI Areas | | | | 2. Demand (per capita): 280 L/day | | | | | | | | Checked: TRB | | | | | | | | | | | | | | | | | | | | | | | |
| SF 3.4 p/p/u | | | | 3. Infiltration allowance: 0.33 L/s/Ha | | | | | | | | Dwg. Reference: 121693-501 | | | | File Reference: 121693.7.3 | | | | Date: 2019-07-03 | | | | Sheet No: 1 of 1 | | | | | | | | | | | |
| TH/SD 2.7 p/p/u | | | | 4. Residential Peaking Factor: Harmon Formula = $1 + (14 / (4 + (P/1000)^{0.5}))^{0.8}$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| APT 1.8 p/p/u | | | | where K = 0.8 Correction Factor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other 60 p/p/Ha | | | | 5. Commercial and Institutional Peak Factors based on total area, 1.5 if greater than 20%, otherwise 1.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Office 75 L/p/day | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| INST 28,000 L/Ha/day | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| COM 28,000 L/Ha/day | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IND 35,000 L/Ha/day | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MOE Chart | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IND 17,000 L/Ha/day | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



LEGEND:

| | |
|----------------------|--|
| | 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 | |
| | SANITARY MANHOLE & NUMBER |
| | SANITARY SEWER & FLOW DIRECTION |

| | | | |
|-----|--|-----|----------|
| No. | REVISIONS | By | Date |
| 14 | | | |
| 13 | | | |
| 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 | 15:08:19 |
| 2 | REVISED AS PER CITY COMMENTS | LME | 15:04:08 |
| 1 | ISSUED TO CITY FOR APPROVAL | LME | 14:11:27 |



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

KANATA WEST
KANATA WEST BUSINESS PARK PHASE 4

REGISTERED PROFESSIONAL ENGINEER

 M. ERNEN
 13379508
 2019/06/24
 PROVINCE OF ONTARIO

Drawing Title
SANITARY DRAINAGE AREA PLAN

Scale
 1:2000

| | | | |
|--------|-----|---------|-----------|
| Design | LME | Date | NOV. 2014 |
| Drawn | DPS | Checked | TRB |

| | | | |
|-------------|-------|-------------|-----|
| Project No. | 14289 | Drawing No. | 501 |
|-------------|-------|-------------|-----|

J:\14289_14289\Drawings\Sanitary_Drainage\Area_Plan\Area_Plan.dwg, 501 - Sanitary Drainage Area Plan, Plot Size: A4, PLOT DATE: 2014-11-11 11:00:00 AM, PLOT SCALE: 1:2000, PLOT SHEET: 1 OF 1, PLOT STATUS: PLOTTED, PLOT TIME: 11:00:00 AM, PLOT USER: LME

D07-16-14-0003_P4



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

SANITARY SEWER DESIGN SHEET

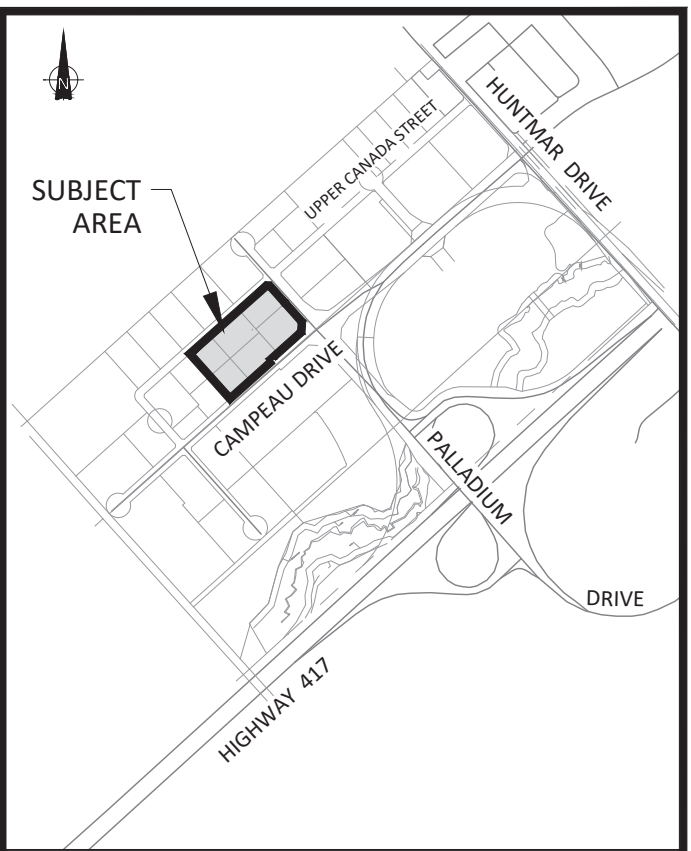
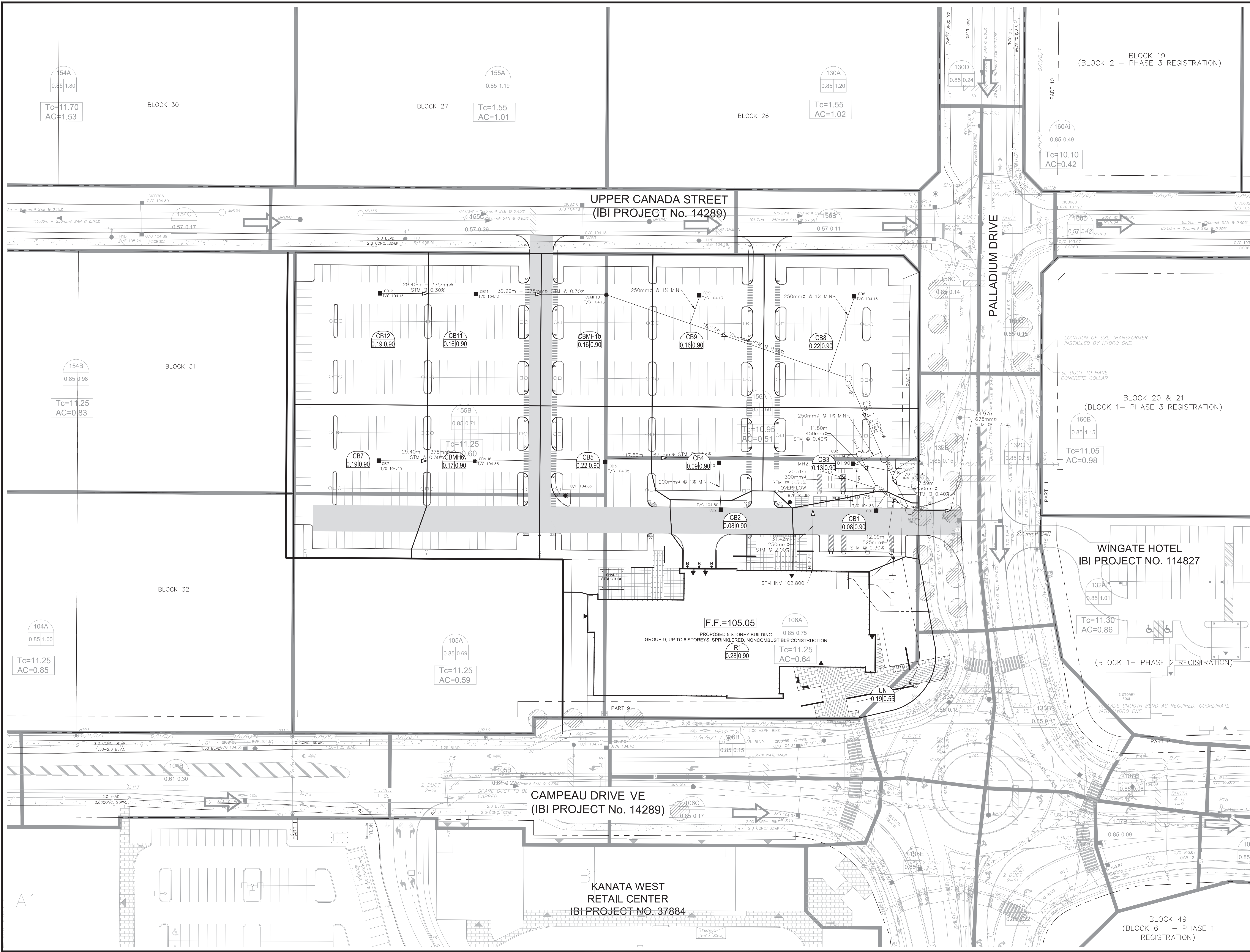
PROJECT: KANATA WEST BUSINESS PARK
LOCATION: 333 HUNTMAR DRIVE
CLIENT: TAGGART

| LOCATION | | | | RESIDENTIAL | | | | | | | | | | ICI AREAS | | | | | | | | | | FIXED FLOW | TOTAL FLOW | PROPOSED SEWER DESIGN | | | | |
|---------------------------|-----------------------|---------|---------|-------------|----|----|-----|-----------|------------|-----|-------------|-----------------|----------------------|------------|------------|-----------------|------------------------|-----|------------------|------------------|----------------|------------|----------|------------|-----------------------|-------------------------|--------------------|-----|-----|------------|
| STREET | AREA ID | FROM MH | TO MH | UNIT TYPES | | | | AREA (Ha) | POPULATION | | PEAK FACTOR | PEAK FLOW (L/s) | AREA (Ha) | | | PEAK FLOW (L/s) | INFILTRATION ALLOWANCE | | FIXED FLOW (L/s) | TOTAL FLOW (L/s) | CAPACITY (L/s) | LENGTH (m) | DIA (mm) | SLOPE (%) | VELOCITY (full) (m/s) | VELOCITY (actual) (m/s) | AVAILABLE CAPACITY | | | |
| | | | | SF | SD | TH | APT | | IND | CUM | | | PRESTIGE BUISNESS PK | COMMERCIAL | INDUSTRIAL | | IND | CUM | | | | | | | | | PF | IND | CUM | FLOW (L/s) |
| KANATA WEST BUSINESS PARK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Upper Canada Street | Blocks 30, 31, 33, 53 | MH154A | MH153A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Blocks 34, 35 | MH153A | MH152A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Blocks 39 | MH152A | MH151A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | MH151A | MH150A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | MH150A | MH101A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Campeau Drive | Blocks 3, 38 | MH99A | MH100A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Blocks 4, 37 | MH100A | MH101A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nipissing Court | Blocks 1, 7 | MH123A | MH122A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Blocks 2 | MH122A | MH121A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Block 5 | MH121A | MH101A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Campeau Drive | Block 36 | MH101A | MH103A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Block 32, 54 | MH103A | MH104A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Campeau Drive | Block 29 | MH104A | MH105A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| KWRC | Blocks 6, 8, 9, 10 | | MH 105A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Campeau Drive | | MH105A | MH106A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Block 24 | MH106A | MH107A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Upper Canada Street | Blocks 27, 28 | MH154A | MH156A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Block 25 | MH156A | MH131A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Palladium Drive | Blocks 17, 26 | MH130A | MH131A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Palladium Drive | | MH131A | MH132A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Block 23 | MH132A | MH133A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | MH133A | MH107A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Campeau Drive | Block 49 | MH107A | MH108A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | MH108A | EX604A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Block 22 | MH 604A | MH 603A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Upper Canada Street | Blocks 18, 19, 20, 21 | MH160A | MH161A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Block 14- 16 | MH161A | MH162A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | MH162A | MH140A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Upper Canada Street | Blocks 40, 41 | MH167A | MH166A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Block 42 | MH166A | MH165A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Blocks 12, 13 | MH165A | MH140A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Journeyman Street | | MH140A | MH141A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | MH141A | MH (84) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Stub | MH 603A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Campeau Drive | Block 11 | MH 603A | MH 602A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Tanger Outlet Centres | MH 602A | MH 601A | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Block 52 | MH 601A | MH 600A | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Campeau Drive Block XX MH XXX MH XXX Light Grey = Constructed Sewer

| | | | | | | | | | | | |
|--------------------|------------------------|---|------------|---------------|--|-----|--|-------------------------------------|--|------------------|--|
| Design Parameters: | | Notes: | | Designed: LME | | No. | | Revision | | Date | |
| Residential | ICI Areas | 1. Manning's coefficient (n) = 0.013 | | | | 1. | | City submission No. 1 | | 11/25/2014 | |
| SF 3.4 p/p/u | | 2. Demand (per capita): 280 L/day | 300 L/day | | | 2. | | City submission No. 2 | | 4/8/2015 | |
| TH/SD 2.7 p/p/u | P.B.P. 28,000 L/Ha/day | 3. Infiltration allowance: 0.33 L/s/Ha | 0.4 L/s/Ha | | | 3. | | City submission No. 3 | | 6/18/2015 | |
| APT 1.8 p/p/u | COM 28,000 L/Ha/day | 4. Residential Peaking Factor: | | | | 4. | | City submission No. 4 | | 10/15/2015 | |
| Other 60 p/p/Ha | IND 35,000 L/Ha/day | Harmon Formula = 1+(14/(4+P^0.5)) K=0.8 | | | | 5. | | Revised for Phase 2 Registration | | 4/19/2018 | |
| | MOE Chart | where P = population in thousands | | | | 6. | | Revised for Phase 3 Registration | | 9/14/2018 | |
| | | | | | | 7. | | Revised per City Comments (Phase 3) | | 12/14/2018 | |
| | | | | | | | | File Reference: 14289.5.7.1 | | Date: 4/19/2018 | |
| | | | | | | | | | | Sheet No: 1 of 1 | |

APPENDIX C



KEY PLAN (INT)

NOTES:
 1. SEE DETAIL DRAWING C-100 FOR ADDITIONAL DETAILS AND NOTES.
 2. SITE BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR STANTEC GEOMATICS.

- LEGEND:**
- AREA NUMBER
 - RUNOFF COEFFICIENT
 - AREA IN HECTARES
 - EXISTING AREA NUMBER
 - EXISTING AREA IN HECTARES
 - EXISTING RUNOFF COEFFICIENT
 - ESTIMATED TIME OF CONCENTRATION IN MINUTES
PRODUCT OF AREA AND RUNOFF COEFFICIENT
 - DRAINAGE AREA LIMITS
 - EXISTING DRAINAGE AREA LIMITS
 - EXISTING EMERGENCY OVERLAND FLOW

| 10 | | | |
|-----|----------------|--------|------------|
| 9 | | | |
| 8 | | | |
| 7 | | | |
| 6 | | | |
| 5 | | | |
| 4 | | | |
| 3 | | | |
| 2 | | | |
| 1 | ISSUED FOR SPA | T.R.B. | 2019-07-09 |
| No. | REVISIONS | By | Date |

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
 2019-07-09
 PROVINCE OF ONTARIO

STORM DRAINAGE AREA PLAN

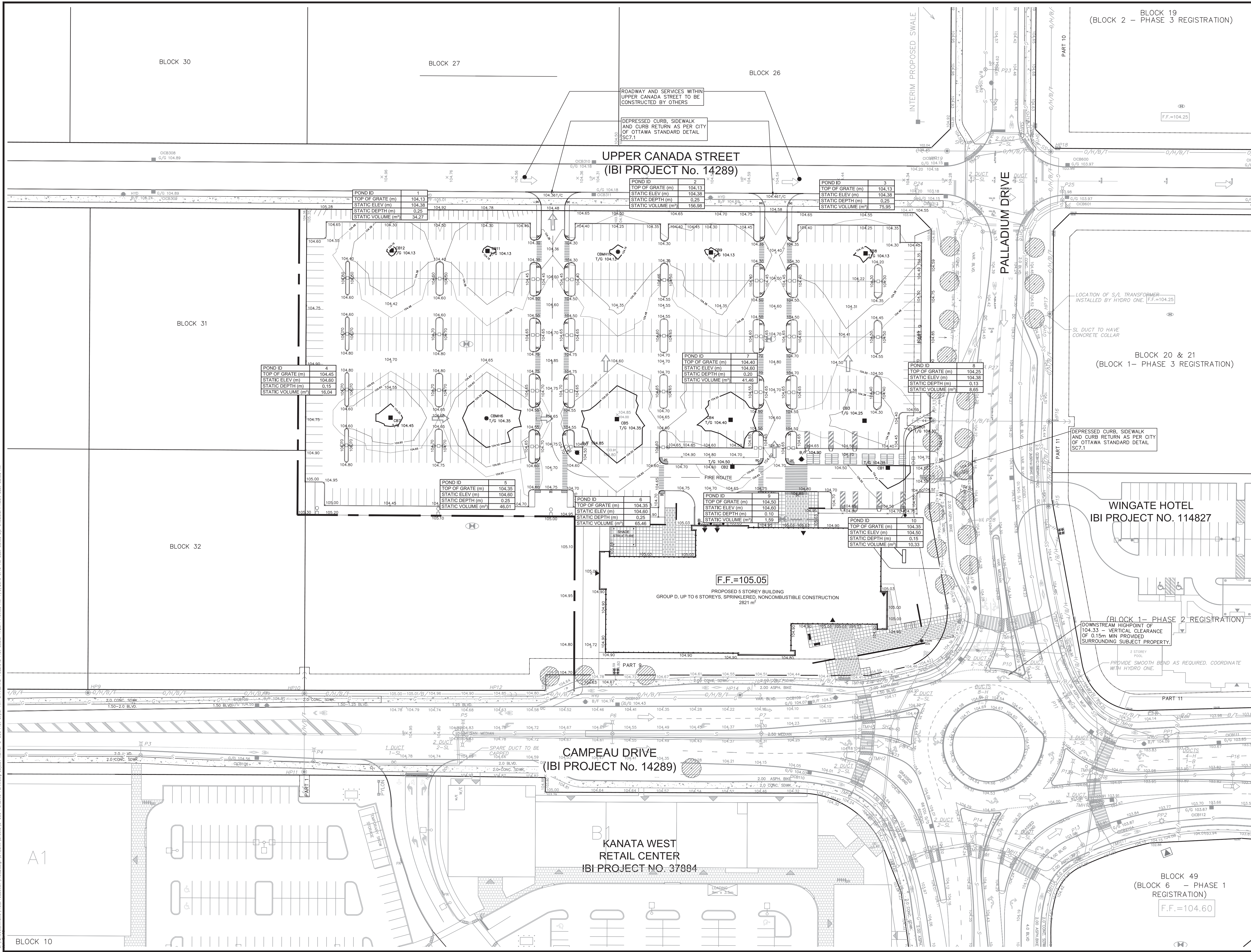
Scale 1 : 500

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

J:\121693_Kinaxis\0_0_Production\0_3_Design\04_Civil\Sheets\C-500 STORM DRAINAGE AREA PLAN.dwg Layout Name: C-500 Plot Style: AIA STANDARD - FULL CTB Plot Scale: 1:254.4 Printed At: 7/19/2019 9:13 AM Last Saved By: JAMES BATTISON

D07-16-17-XXXX

#17XXX



(BLOCK 2 - BLOCK 19
REGISTRATION)

**UPPER CANADA STREET
(IBI PROJECT NO. 14289)**

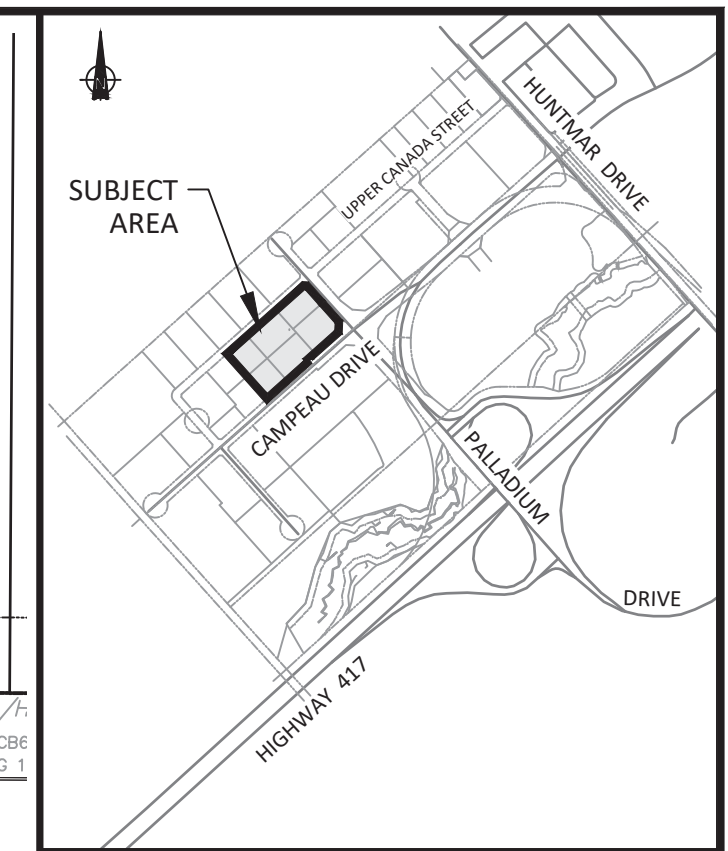
(BLOCK 1- PHASE 3
REGISTRATION)

**WINGATE HOTEL
IBI PROJECT NO. 114827**

**CAMPEAU DRIVE
(IBI PROJECT NO. 14289)**

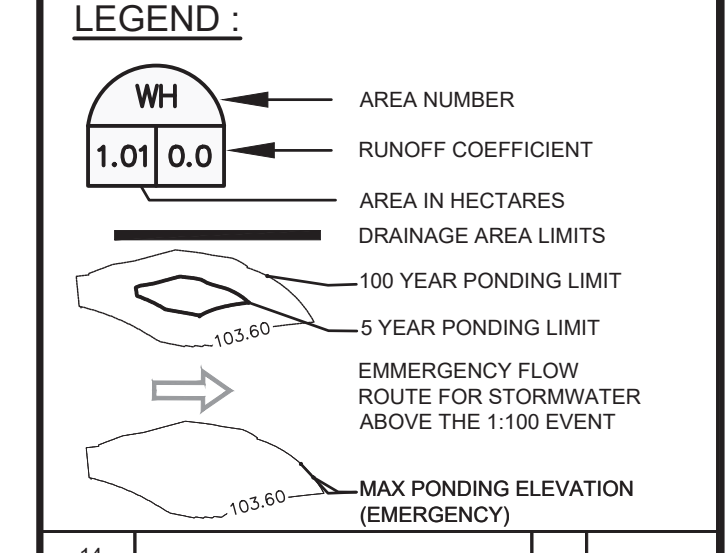
**KANATA WEST
RETAIL CENTER
IBI PROJECT NO. 37884**

BLOCK 49
(BLOCK 6 - PHASE 1
REGISTRATION)
F.F. = 104.60



**KEY PLAN
(N.T.S.)**

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

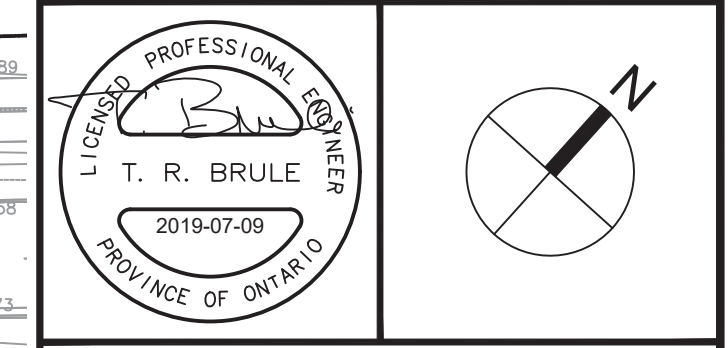


| No. | REVISIONS | By | Date |
|-----|----------------|-----|------------|
| 14 | | | |
| 13 | | | |
| 12 | | | |
| 11 | | | |
| 10 | | | |
| 9 | | | |
| 8 | | | |
| 7 | | | |
| 6 | | | |
| 5 | | | |
| 4 | | | |
| 3 | | | |
| 2 | | | |
| 1 | ISSUED FOR SPA | TRB | 2019-07-09 |

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



PONDING PLAN

Scale: 1:500

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

J:\121693_Kinaxis\0_Production\0_Production\0_3_Design\04_Civil\Sheets\C-600_PONDING PLAN.dwg Layout Name: C-600 Plot: Sheet: A11 STANDARD-FULL.CTB Plot Scale: 1:25.4 Printed At: 7/9/2019 9:13 AM User: James.Battiston

D07-16-17-XXXX #17XXX



IBI GROUP
 400-333 Preston Street
 Ottawa, Ontario K1S 5N4 Canada
 tel 613 225 1311 fax 613 225 9868
 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= | C= | C= | C= | C= | C= | C= | C= | C= | C= | IND | CUM | INLET | TIME | TOTAL | i (2) | i (5) | i (10) | i (100) | 2yr PEAK | 5yr PEAK | 10yr PEAK | 100yr PEAK | FIXED | DESIGN | CAPACITY | LENGTH | PIPE SIZE (mm) | | | SLOPE | VELOCITY | AVAIL CAP (2yr) | |
| | | | | 0.20 | 0.25 | 0.40 | 0.50 | 0.57 | 0.65 | 0.69 | 0.70 | 0.76 | 0.90 | 2.78AC | 2.78AC | (min) | IN PIPE | (min) | (mm/hr) | (mm/hr) | (mm/hr) | (mm/hr) | FLOW (L/s) | FLOW (L/s) | FLOW (L/s) | FLOW (L/s) | FLOW (L/s) | FLOW (L/s) | (L/s) | (m) | DIA | W | H | (%) | (m/s) | (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 | | | | | | | | | | | Revision | | | | | | | | | | | |
| | | | | | | | | | | | | | | | Checked: TRB | | | | | | | | | | | 1. | | | | | | | | | | | |
| | | | | | | | | | | | | | | | Dwg. Reference: 121693-C-500 | | | | | | | | | | | 1st City Submission | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | Date: 2019-07-03 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | Sheet No: 1 of 1 | | | | | | | | | | | |



IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

PROJECT: Kinaxis
DATE: 2019-07-03
FILE: 121693
REV #:
DESIGNED BY: JEB
CHECKED BY: TB

STORMWATER MANAGEMENT

Formulas and Descriptions

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

Maximum Allowable Release Rate

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

| Area ID | % of original block included in Kinaxis Site | KWBP Minor System Flow (Table 4.1) L/s | Flow to be used in Kinaxis Site L/s |
|-----------------|--|--|-------------------------------------|
| 156A (Block 25) | 100% | 94 | 94 |
| 155B (Block 28) | 100% | 111 | 111 |
| 106A (Block 24) | 100% | 117 | 117 |
| 105A (Block 29) | 36% | 108 | 38.88 |
| | | | 360.88 |

$Q_{TOTAL} = 360.88 \text{ L/s}$

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

$C = 0.55$ Drainage area UN
 $T_c = 10$ min
 $i_{100yr} = 178.56$ mm/hr
 $A_{uncontrolled} = 0.19$ Ha

$Q_{uncontrolled} = 51.87 \text{ L/s}$

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

$Q_{max\ allowable} = 309.01 \text{ L/s}$

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

| Drainage Area CB12/11/9/8 CBMH10/3 Ponding IDs 1,2,3,8 ICD Flow Rate | | | | | | Drainage Area CB12/11/9/8 CBMH10/3 Ponding IDs 1,2,3,8 ICD Flow Rate | | | | | | Drainage Area CB12/11/9/8 CBMH10/3 Ponding IDs 1,2,3,8 ICD Flow Rate | | | | | | | | | | | | | | | | | |
|--|-----------------------|--|-------------|------------------------------|------------------------|--|---------------------|--|-------------|-------------------|----------------------|--|---------------------|--|-------------|-------------------|----------------------|-----|--|-----------|--|-------|--|------------------------------|--|-------|--|-----|--|
| Area (Ha) | | 1.020 | | Restricted Flow Q_r (L/s)= | | 65.00 | | 130 | | Area (Ha) | | 1.020 | | Restricted Flow Q_r (L/s)= | | 65.00 | | 130 | | Area (Ha) | | 1.020 | | Restricted Flow Q_r (L/s)= | | 65.00 | | 130 | |
| C = | | 1.00 | | | | | | | | C = | | 0.90 | | | | | | | | C = | | 0.90 | | | | | | | |
| 100-Year Ponding | | | | | | 5-Year Ponding | | | | | | 2-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) | 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) | 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) | | | | | | | | | | | | |
| 35 | 82.58 | 234.16 | 65.00 | 169.16 | 355.24 | 18 | 74.97 | 191.33 | 65.00 | 126.33 | 136.43 | 13 | 66.93 | 170.81 | 65.00 | 105.81 | 82.53 | | | | | | | | | | | | |
| 37 | 79.42 | 225.19 | 65.00 | 160.19 | 355.63 | 20 | 70.25 | 179.28 | 65.00 | 114.28 | 137.14 | 15 | 61.77 | 157.63 | 65.00 | 92.63 | 83.37 | | | | | | | | | | | | |
| 38 | 77.93 | 220.99 | 65.00 | 155.99 | 355.66 | 21 | 68.13 | 173.87 | 65.00 | 108.87 | 137.18 | 16 | 59.50 | 151.86 | 65.00 | 86.86 | 83.38 | | | | | | | | | | | | |
| 39 | 76.51 | 216.96 | 65.00 | 151.96 | 355.58 | 22 | 66.15 | 168.81 | 65.00 | 103.81 | 137.03 | 17 | 57.42 | 146.53 | 65.00 | 81.53 | 83.16 | | | | | | | | | | | | |
| 41 | 73.83 | 209.36 | 65.00 | 144.36 | 355.12 | 24 | 62.54 | 159.61 | 65.00 | 94.61 | 136.23 | 19 | 53.70 | 137.04 | 65.00 | 72.04 | 82.12 | | | | | | | | | | | | |

Storage (m^3)

| Overflow | Required | Surface | Sub-surface | Balance |
|----------|----------|---------|-------------|---------|
| 19.15 | 374.81 | 679.57 | 83.75 | 0.00 |

Storage (m^3)

| Overflow | Required | Surface | Sub-surface | Balance |
|----------|----------|---------|-------------|---------|
| 0.00 | 137.18 | 679.57 | 83.75 | 0.00 |

Storage (m^3)

| Overflow | Required | Surface | Sub-surface | Balance |
|----------|----------|---------|-------------|---------|
| 0.00 | 83.38 | 679.57 | 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 | 4,5,6,7,9 | ICD Flow Rate |
|-------------------------------|------------------------------|--|---------------------------------------|--------------------------------------|--------------------------------|
| Area (Ha) | | 0.750 | Restricted Flow Q _r (L/s)= | | 55.00 |
| C = | | 1.00 | | | 110 |
| 100-Year Ponding | | | | | |
| T _c Variable (min) | i _{100yr} (mm/hour) | Peak Flow Q _p =2.78xCl _{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 |

| Drainage Area | | CB7/CB5/CB2/CB4/CBMH6 | Ponding IDs | 4,5,6,7,9 | ICD Flow Rate |
|-------------------------------|----------------------------|--|---------------------------------------|--------------------------------------|------------------------------|
| Area (Ha) | | 0.750 | Restricted Flow Q _r (L/s)= | | 55.00 |
| C = | | 0.90 | | | 110 |
| 5-Year Ponding | | | | | |
| T _c Variable (min) | i _{5yr} (mm/hour) | Peak Flow Q _p =2.78xCl _{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 |

| Drainage Area | | CB7/CB5/CB2/CB4/CBMH6 | Ponding IDs | 4,5,6,7,9 | ICD Flow Rate |
|-------------------------------|----------------------------|--|---------------------------------------|--------------------------------------|------------------------------|
| Area (Ha) | | 0.750 | Restricted Flow Q _r (L/s)= | | 55.00 |
| C = | | 0.90 | | | 110 |
| 2-Year Ponding | | | | | |
| T _c Variable (min) | i _{2yr} (mm/hour) | Peak Flow Q _p =2.78xCl _{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 | 246.27 | 170.92 | 56.20 | 19.15 |

| Storage (m ³) | | | | |
|---------------------------|----------|---------|-------------|---------|
| Overflow | Required | Surface | Sub-surface | Balance |
| 0.00 | 92.54 | 170.92 | 56.20 | 0.00 |

| Storage (m ³) | | | | |
|---------------------------|----------|---------|-------------|---------|
| Overflow | Required | Surface | Sub-surface | Balance |
| 0.00 | 55.05 | 170.92 | 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 |

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 | | CB1 | Ponding IDs | 10 | ICD Flow Rate |
|-------------------------------|------------------------------|--|---------------------------------------|--------------------------------------|--------------------------------|
| Area (Ha) | | 0.080 | Restricted Flow Q _r (L/s)= | | 22.00 |
| C = | | 1.00 | | | 44 |
| 100-Year Ponding | | | | | |
| T _c Variable (min) | i _{100yr} (mm/hour) | Peak Flow Q _p =2.78xCl _{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 |

| Drainage Area | | CB1 | Ponding IDs | 8 | ICD Flow Rate |
|-------------------------------|----------------------------|--|---------------------------------------|--------------------------------------|------------------------------|
| Area (Ha) | | 0.080 | Restricted Flow Q _r (L/s)= | | 22.00 |
| C = | | 0.90 | | | 44 |
| 5-Year Ponding | | | | | |
| T _c Variable (min) | i _{5yr} (mm/hour) | Peak Flow Q _p =2.78xCl _{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 |

| Drainage Area | | CB1 | Ponding IDs | 8 | ICD Flow Rate |
|-------------------------------|----------------------------|--|---------------------------------------|--------------------------------------|------------------------------|
| Area (Ha) | | 0.080 | Restricted Flow Q _r (L/s)= | | 22.00 |
| C = | | 0.90 | | | 44 |
| 2-Year Ponding | | | | | |
| T _c Variable (min) | i _{2yr} (mm/hour) | Peak Flow Q _p =2.78xCl _{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 | 10.73 | 10.33 | 0.65 | 0.00 |

| Storage (m ³) | | | | |
|---------------------------|----------|---------|-------------|---------|
| Overflow | Required | Surface | Sub-surface | Balance |
| 0.00 | 2.02 | 10.33 | 0.65 | 0.00 |

| Storage (m ³) | | | | |
|---------------------------|----------|---------|-------------|---------|
| Overflow | Required | Surface | Sub-surface | Balance |
| 0.00 | 0.56 | 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 |

| Drainage Area | | R1 | Ponding IDs | | ICD Flow Rate |
|-------------------------------|------------------------------|--|---------------------------------------|--------------------------------------|--------------------------------|
| Area (Ha) | | 0.280 | Restricted Flow Q _r (L/s)= | | 25.00 |
| C = | | 1.00 | | | 25.00 |
| 100-Year Ponding | | | | | |
| T _c Variable (min) | i _{100yr} (mm/hour) | Peak Flow Q _p =2.78xCl _{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 |

| Drainage Area | | R1 | Ponding IDs | | ICD Flow Rate |
|-------------------------------|----------------------------|--|---------------------------------------|--------------------------------------|------------------------------|
| Area (Ha) | | 0.280 | Restricted Flow Q _r (L/s)= | | 25.00 |
| C = | | 0.90 | | | 25.00 |
| 5-Year Ponding | | | | | |
| T _c Variable (min) | i _{5yr} (mm/hour) | Peak Flow Q _p =2.78xCl _{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 |

| Drainage Area | | R1 | Ponding IDs | | ICD Flow Rate |
|-------------------------------|----------------------------|--|---------------------------------------|--------------------------------------|------------------------------|
| Area (Ha) | | 0.280 | Restricted Flow Q _r (L/s)= | | 25.00 |
| C = | | 0.90 | | | 25.00 |
| 2-Year Ponding | | | | | |
| T _c Variable (min) | i _{2yr} (mm/hour) | Peak Flow Q _p =2.78xCl _{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 | 83.91 | 11.54 | 0 | 72.37 |

| Storage (m ³) | | | | |
|---------------------------|----------|---------|-------------|---------|
| Overflow | Required | Surface | Sub-surface | Balance |
| 0.00 | 30.18 | 11.54 | 0 | 18.64 |

| Storage (m ³) | | | | |
|---------------------------|----------|---------|-------------|---------|
| Overflow | Required | Surface | Sub-surface | Balance |
| 0.00 | 17.33 | 11.54 | 0 | 5.79 |

overflows to: 0

overflows to: 0

SUMMARY OF INFILTRATION GALLERY CALCULATIONS
AVERAGE SILTY SAND PERCOLATION RATE

annual precipitation (mm) 920
95% available runoff (mm) 874
area (ha) 2.33

| Building ID | Area (m ²) | Available Runoff Volume (m ³) | Gallery ID | Width (m) | Length (m) | Area (m ²) | Depth (m) | Infiltration Gallery Overflow (%) | | | Overflow Volume (m ³) | | | Infiltration Volume (m ³) | | |
|----------------|------------------------|---|------------|-----------|------------|------------------------|-----------|-----------------------------------|----------|---------|-----------------------------------|----------|---------|---------------------------------------|----------|---------|
| | | | | | | | | WET YEAR | DRY YEAR | AVERAGE | WET YEAR | DRY YEAR | AVERAGE | WET YEAR | DRY YEAR | AVERAGE |
| Kinaxis Office | 2821 | 2466 | 1 | 6 | 10 | 60 | 1.5 | 46.52% | 8.84% | 27.68% | 1147 | 218 | 682 | 1319 | 2248 | 1783 |
| TOTAL | | 2466 | | | | | | | | | | | 682 | | | 1783 |

AVERAGE INFILTRATION RATE 76.53
REQUIRED INFILTRATION RATE 75

INFILTRATION GALLERY SIZING CALCULATION

DRY YEAR CALCULATION

Kinaxis Office 2821 m²
Effective Runoff 0.95 %
Percolation 0.35 (m/day, avg silty sand)
INFILTRATION GALLERY SIZING
Width 6 m
Length 10 m
depth 1.5 m
Number Cells 1
void ratio 0.38
34.2 TOTAL DRYCELL VOL

PRECIPITATION DATA APRIL 1 TO OCTOBER 31 (DRY YEAR)
TOT PRECIP DEPTH 405.1 mm
TOTAL PRECIP VOLUME 1086 m³
TOT INFILTRATION VOL 995 m³
DEVELOPMENT AREA 2.33 ha
INFIL RATE 42.71 mm/year
OVERFLOW VOL 88 m³/year
RUNOFF VOLUME OVERFLOW 8.84%

| DATE | RAINFALL [MM] | RAINFALL INTENSITY (AVG) [MM/HR] | RAINWATER AVAILABLE [M ³] | VOLUME INFLOW TO DRYCELL [M ³] | VOLUME IN DRY CELL [M ³] | VOLUME PASSING DRY CELL [M ³] | INFILTRATION FROM BOTTOM [M ³] | INFILTRATION FROM SIDES (BOTTOM 1/3) [M ³] | BALANCE IN DRYCELL [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 | 34 | 34 | 6 | 21 | 4 | 9 |
| 05-Apr | 0 | 0.000 | 0 | 0 | 9 | 0 | 9 | 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 | 21 | 4 | 4 |
| 30-Apr | 1.6 | 0.067 | 4 | 4 | 8 | 0 | 8 | 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 | 0 | 21 | 4 | 6 |
| 04-May | 0 | 0.000 | 0 | 0 | 6 | 0 | 6 | 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 | 34 | 34 | 29 | 21 | 4 | 9 |
| 10-May | 0.5 | 0.021 | 1 | 1 | 11 | 0 | 11 | 0 | 0 |
| 11-May | 0 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12-May | 22.3 | 0.929 | 60 | 34 | 34 | 26 | 21 | 4 | 9 |
| 13-May | 0 | 0.000 | 0 | 0 | 9 | 0 | 9 | 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 | 21 | 4 | 0 |
| 23-May | 10 | 0.417 | 27 | 27 | 27 | 0 | 21 | 4 | 2 |
| 24-May | 3.4 | 0.142 | 9 | 9 | 11 | 0 | 11 | 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 | 21 | 4 | 4 |
| 01-Jun | 0 | 0.000 | 0 | 0 | 4 | 0 | 4 | 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 | 33 | 33 | 0 | 21 | 4 | 8 |
| 14-Jun | 0.3 | 0.013 | 1 | 1 | 9 | 0 | 9 | 0 | 0 |
| 15-Jun | 1.3 | 0.054 | 3 | 3 | 3 | 0 | 3 | 0 | 0 |
| 16-Jun | 11.8 | 0.492 | 32 | 32 | 32 | 0 | 21 | 4 | 7 |
| 17-Jun | 6.4 | 0.267 | 17 | 17 | 24 | 0 | 21 | 4 | 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 | 34 | 34 | 22 | 21 | 4 | 9 |
| 19-Jul | 11.5 | 0.479 | 31 | 25 | 34 | 6 | 21 | 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 | 21 | 4 | 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 | 21 | 4 | 0 |
| 03-Aug | 11.5 | 0.479 | 31 | 31 | 31 | 0 | 21 | 4 | 6 |
| 04-Aug | 0.8 | 0.033 | 2 | 2 | 8 | 0 | 8 | 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 | 21 | 4 | 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 | 31 | 31 | 0 | 21 | 4 | 7 |
| 14-Sep | 0 | 0.000 | 0 | 0 | 7 | 0 | 7 | 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 | 21 | 4 | 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 |

INFILTRATION GALLERY SIZING CALCULATION

WET YEAR CALCULATION

Kinaxis Office 2821 m²
 Effective Runoff 0.95 %
 Percolation 0.35 (m/day, avg silty sand)
 INFILTRATION GALLERY SIZING
 Width 6 m
 Length 10 m
 depth 1.5 m
 Number Cells 1
 void ratio 0.38
 34.2 TOTAL DRYCELL VOL

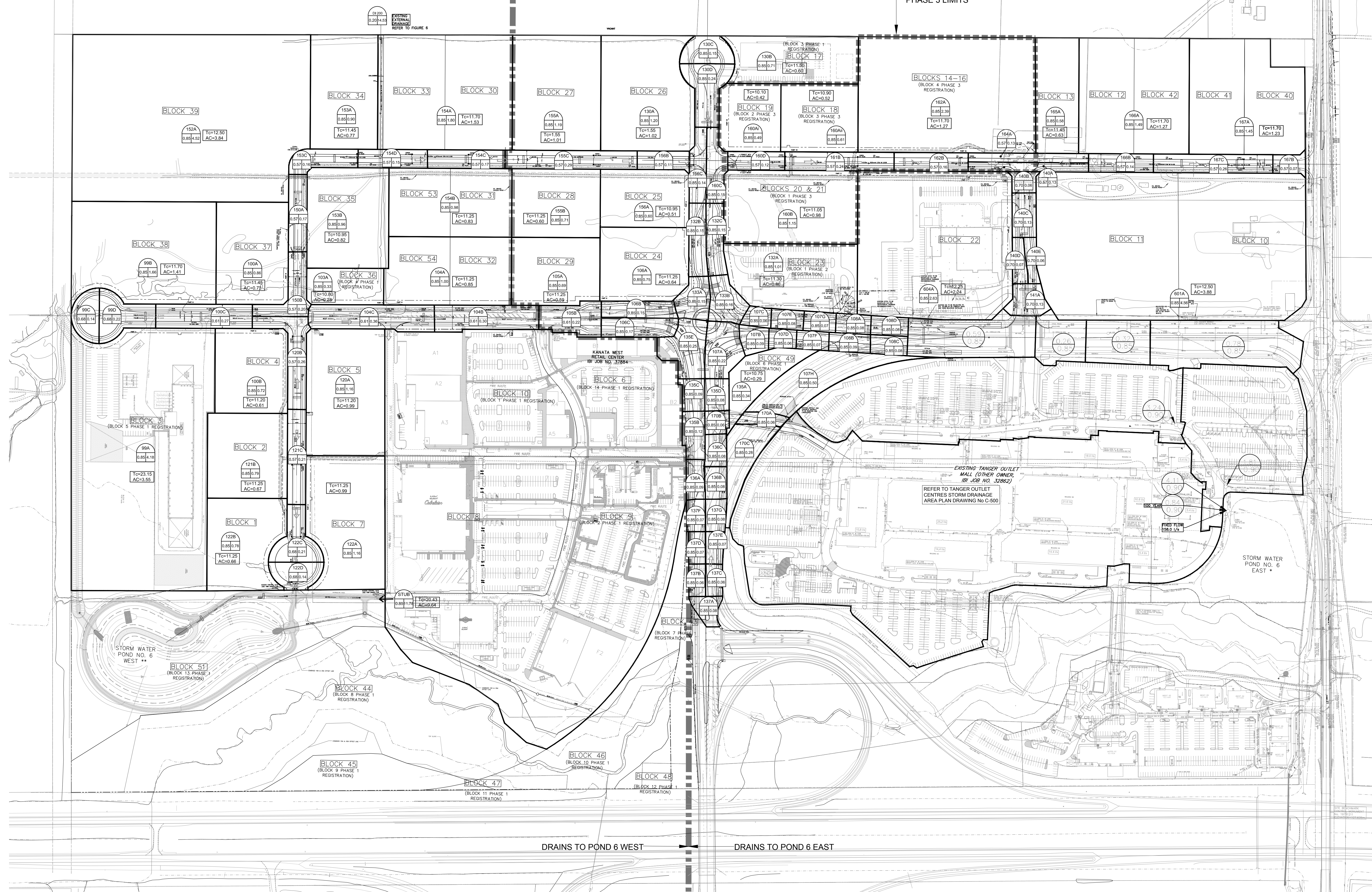
PRECIPITATION DATA APRIL 1 TO OCTOBER 31 (WET YEAR)
 TOT PRECIP DEPTH 800.4 mm
 TOTAL PRECIP VOLUME 2144 m³
 TOT INFILTRATION VOL 1439 m³
 DEVELOPMENT AREA 2.33 ha
 INFIL RATE 61.77 mm/year
 OVERFLOW VOL 669 m³/year
 RUNOFF VOLUME OVERFLOW 46.52%

| DATE | RAINFALL [MM] | RAINFALL INTENSITY (AVG) [MM/HR] | RAINWATER AVAILABLE [M ³] | VOLUME INFLOW TO DRYCELL [M ³] | VOLUME IN DRY CELL [M ³] | VOLUME PASSING DRY CELL [M ³] | INFILTRATION FROM BOTTOM [M ³] | INFILTRATION FROM SIDES (BOTTOM 1/3) [M ³] | BALANCE IN DRYCELL [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 | 21 | 4 | 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 | 21 | 4 | 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 | 4 | 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 | 34 | 34 | 12 | 21 | 4 | 9 |
| 17-May | 0 | 0.000 | 0 | 0 | 9 | 0 | 9 | 0 | 0 |
| 18-May | 11 | 0.458 | 29 | 29 | 29 | 0 | 21 | 4 | 5 |
| 19-May | 30.2 | 1.258 | 81 | 29 | 34 | 51 | 21 | 4 | 5 |
| 20-May | 29.4 | 1.225 | 79 | 29 | 34 | 49 | 21 | 4 | 5 |
| 21-May | 5.9 | 0.246 | 16 | 16 | 21 | 0 | 21 | 0 | 0 |
| 22-May | 26.9 | 1.121 | 72 | 34 | 34 | 38 | 21 | 4 | 9 |
| 23-May | 11.3 | 0.471 | 30 | 25 | 34 | 6 | 21 | 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 | 21 | 4 | 4 |
| 02-Jun | 0 | 0.000 | 0 | 0 | 4 | 0 | 4 | 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 | 34 | 34 | 36 | 21 | 4 | 9 |
| 13-Jun | 1 | 0.042 | 3 | 3 | 12 | 0 | 12 | 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 | 34 | 34 | 39 | 21 | 4 | 9 |
| 25-Jun | 0 | 0.000 | 0 | 0 | 9 | 0 | 9 | 0 | 0 |
| 26-Jun | 0 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 27-Jun | 29 | 1.208 | 78 | 34 | 34 | 44 | 21 | 4 | 9 |
| 28-Jun | 0 | 0.000 | 0 | 0 | 9 | 0 | 9 | 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 | 21 | 4 | 2 |
| 03-Jul | 14.8 | 0.617 | 40 | 32 | 34 | 8 | 21 | 4 | 7 |
| 04-Jul | 7.6 | 0.317 | 20 | 20 | 28 | 0 | 21 | 4 | 0 |
| 05-Jul | 14.8 | 0.617 | 40 | 34 | 34 | 5 | 21 | 4 | 9 |
| 06-Jul | 0 | 0.000 | 0 | 0 | 9 | 0 | 9 | 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 | 21 | 4 | 4 |
| 14-Jul | 0.4 | 0.017 | 1 | 1 | 5 | 0 | 5 | 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 | 34 | 34 | 50 | 21 | 4 | 9 |
| 27-Jul | 0 | 0.000 | 0 | 0 | 9 | 0 | 9 | 0 | 0 |
| 28-Jul | 0 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29-Jul | 42.4 | 1.767 | 114 | 34 | 34 | 79 | 21 | 4 | 9 |
| 30-Jul | 2.4 | 0.100 | 6 | 6 | 16 | 0 | 16 | 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 | 21 | 4 | 4 |
| 03-Aug | 0 | 0.000 | 0 | 0 | 4 | 0 | 4 | 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 | 21 | 4 | 5 |
| 10-Aug | 0 | 0.000 | 0 | 0 | 5 | 0 | 5 | 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 | 34 | 34 | 4 | 21 | 4 | 9 |
| 19-Aug | 0 | 0.000 | 0 | 0 | 9 | 0 | 9 | 0 | 0 |
| 20-Aug | 0 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21-Aug | 15.6 | 0.650 | 42 | 34 | 34 | 8 | 21 | 4 | 9 |
| 22-Aug | 0 | 0.000 | 0 | 0 | 9 | 0 | 9 | 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 | 34 | 34 | 31 | 21 | 4 | 9 |
| 28-Aug | 0.8 | 0.033 | 2 | 2 | 12 | 0 | 12 | 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 | 34 | 34 | 131 | 21 | 4 | 9 |
| 12-Sep | 20.6 | 0.858 | 55 | 25 | 34 | 30 | 21 | 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 | 21 | 4 | 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 | 34 | 34 | 1 | 21 | 4 | 9 |
| 24-Sep | 0 | 0.000 | 0 | 0 | 9 | 0 | 9 | 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 | 34 | 34 | 4 | 21 | 4 | 9 |
| 30-Sep | 25.2 | 1.050 | 68 | 25 | 34 | 43 | 21 | 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 | 21 | 4 | 3 |
| 14-Oct | 9 | 0.375 | 24 | 24 | 27 | 0 | 21 | 4 | 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 | 21 | 4 | 4 |
| 28-Oct | 0 | 0.000 | 0 | 0 | 4 | 0 | 4 | 0 | 0 |
| 29-Oct | 13 | 0.542 | 35 | 34 | 34 | 1 | 21 | 4 | 9 |
| 30-Oct | 0 | 0.000 | 0 | 0 | 9 | 0 | 9 | 0 | 0 |
| 31-Oct | 0 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

DRAINS TO POND 6 WEST DRAINS TO POND 6 EAST

PHASE 3 LIMITS



- LEGEND:**
- DRAINAGE AREA LIMITS
 - STORM MANHOLE & NUMBER
 - STORM SEWER & FLOW DIRECTION
 - AREA ID
 - AREA IN HECTARES
 - RUNOFF COEFFICIENT
 - EMERGENCY OVERLAND FLOW ROUTE
 - ESTIMATED TIME OF CONCENTRATION IN MINUTES
 - PRODUCT OF AREA AND RUNOFF COEFFICIENT

EXISTING TANGER OUTLET CENTRE
 AREA IN HECTARES
 RUNOFF COEFFICIENT

| No. | REVISIONS | By | Date |
|-----|--|-----|----------|
| 14 | | | |
| 13 | | | |
| 12 | | | |
| 11 | | | |
| 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 | 15:08:19 |
| 2 | REVISED AS PER CITY COMMENTS | LME | 15:04:08 |
| 1 | ISSUED TO CITY FOR APPROVAL | LME | 14:11:27 |



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 3

Drawing Title
STORM DRAINAGE AREA PLAN

Scale
 1:2000

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

J:\14289_1\mxd\dwg\14289_1_01.dwg 1:10.0 Printed At: 3/2/2019 1:47 PM Last Saved By: drsno, Last Saved At: Mar 8, 11

D07-16-14-0003_P3

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 m³, an extended detention volume of 1,830 m³, and a total storage volume of approximately 24,525 m³, including the permanent pool volume, at a total depth of approximately 5.4 m, discharging to Feedmill Creek, just upstream of Huntmar Drive;

Previous Works:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

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

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

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

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

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

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

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

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

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

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

2. EXPIRY OF APPROVAL

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

3. CHANGE OF OWNER

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

(a) change of Owner;

(b) change of address of the Owner;

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

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

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

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

4. OPERATION AND MAINTENANCE

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

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

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

(a) the name of the Works

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

5. MONITORING AND REPORTING

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

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

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

6. TEMPORARY EROSION AND SEDIMENT CONTROL

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

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

7. RECORD KEEPING

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

Schedule "A"

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

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

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

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

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

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

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

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

The Notice should also include:

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

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

This Notice must be served upon:

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

AND

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

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

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

DATED AT TORONTO this 28th day of September, 2015

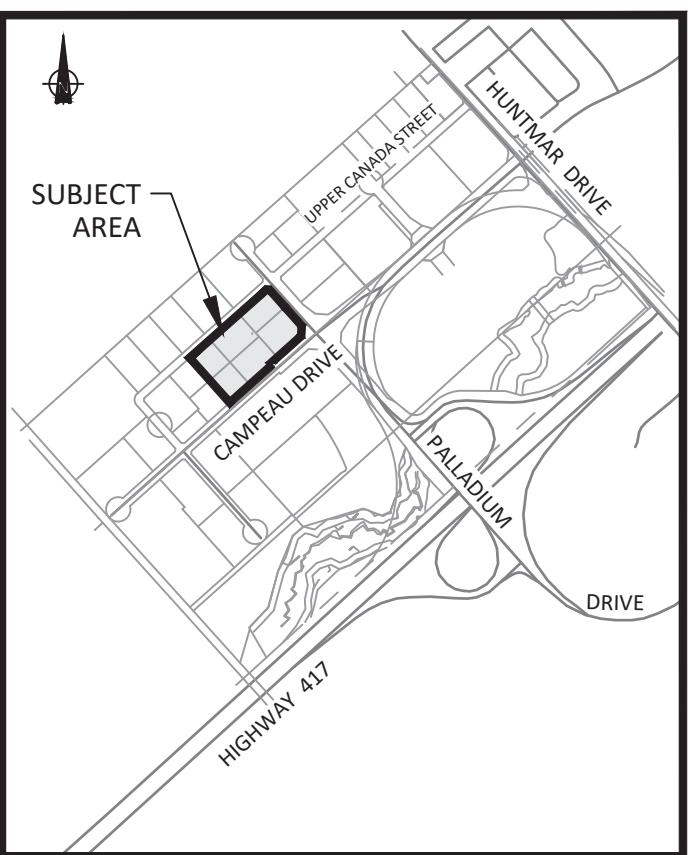
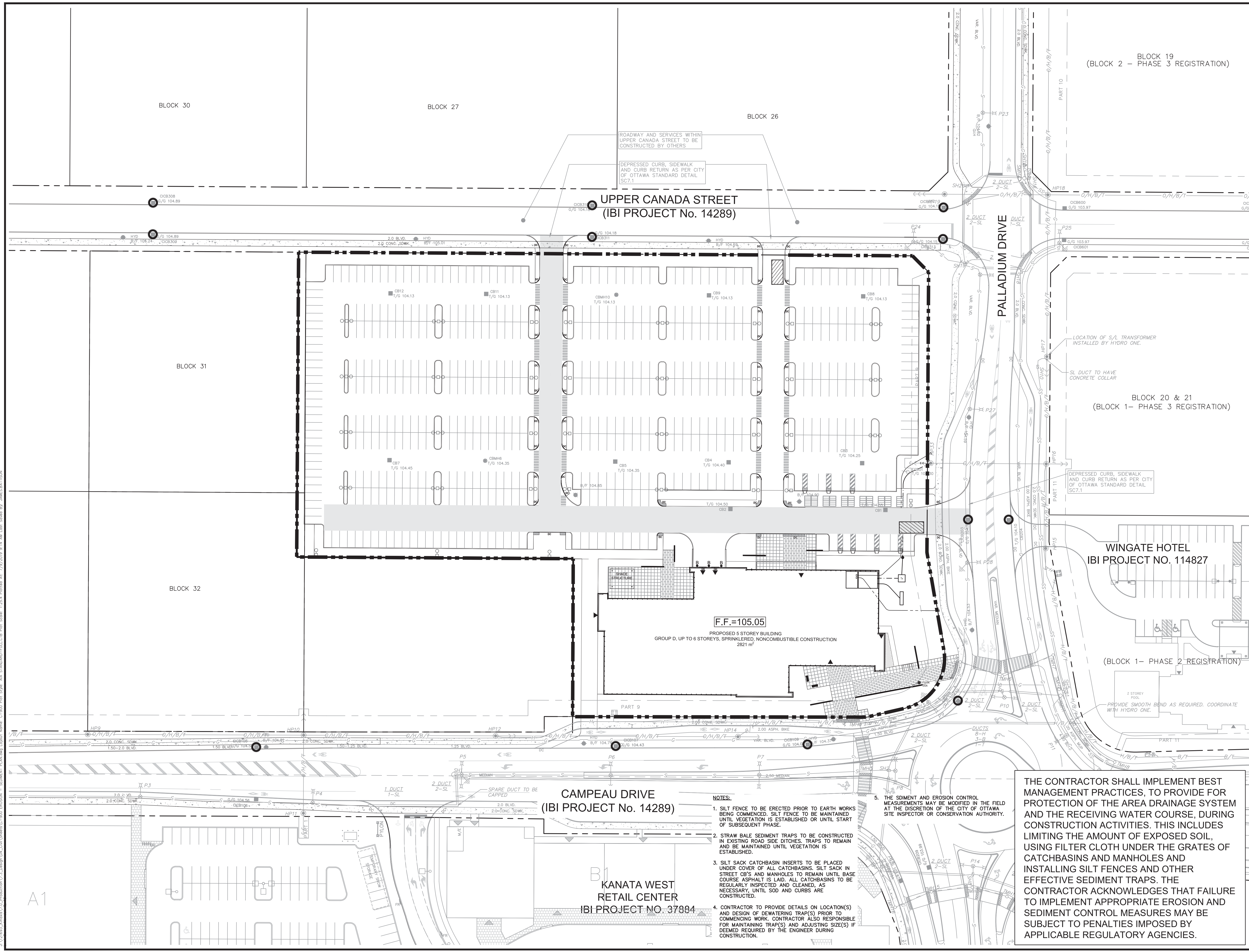


Gregory Zimmer, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

DC/

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

APPENDIX D



KEY PLAN
(NTS)

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

- LEGEND :**
- LIGHT DUTY SILT FENCE AS PER OFSD-219.110
 - STRAW BALE CHECK DAM AS PER OFSD-219.160
 - SILT SACK CATCHBASIN INSERT PLACED UNDER CB OR MH COVER
 - TEMPORARY MUD MAT 0.15m THICK, 50mm CLEAR STONE ON NON WOVEN FILTER CLOTH

| 14 | | |
|-----|----------------|-------------------|
| 13 | | |
| 12 | | |
| 11 | | |
| 10 | | |
| 9 | | |
| 8 | | |
| 7 | | |
| 6 | | |
| 5 | | |
| 4 | | |
| 3 | | |
| 2 | | |
| 1 | ISSUED FOR SPA | T.R.B. 2019-07-09 |
| No. | REVISIONS | By Date |

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

Professional Engineer
T. R. BRULE
2019-07-09
PROVINCE OF ONTARIO

EROSION AND SEDIMENT PLAN

Scale 1 : 500

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

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.

- NOTES:**
- SILT FENCE TO BE ERRECTED PRIOR TO EARTH WORKS BEING COMMENCED. SILT FENCE TO BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED OR UNTIL START OF SUBSEQUENT PHASE.
 - STRAW BALE SEDIMENT TRAPS TO BE CONSTRUCTED IN EXISTING ROAD SIDE DITCHES. TRAPS TO REMAIN AND BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED.
 - SILT SACK CATCHBASIN INSERTS TO BE PLACED UNDER COVER OF ALL CATCHBASINS. SILT SACK IN STREET C/B'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.
 - 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.
 - THE SEDIMENT AND EROSION CONTROL MEASUREMENTS MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE CITY OF OTTAWA SITE INSPECTOR OR CONSERVATION AUTHORITY.

J:\121693_Kinaxis\02_Production\03_Design\04_Civil\Sheets\C-900_EROSION - SEDIMENT PLAN.dwg Layout Name: C-900 Plot Style: AA_STANDARD-FULL.CTB Plot Scale: 1:25.4 Printed At: 7/9/2019 9:14 AM User: James.Battison

D07-16-17-XXXX

APPENDIX E

