File: 123987 – 7.3

DESIGN BRIEF
PUROLATOR INC.
1400 UPPER CANADA STREET
OTTAWA, ON

Development Application File No. **D07-12-20-0125**

Prepared for Purolator Inc.
by IBI Group
Revised December 2020

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1 INTRODUCTION

1.1 Scope

IBI Group has been retained by Purolator 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 subject site, located within Taggart Realty Management's Kanata West Business Park, is identified as Block 5 – Phase 5 on all approved subdivision plans.

The proposed development will be made up of a warehouse, office and retail facility in support of Purolator's parcel distribution operations. The building footprint is approximately 6,098m^2.

The location of the subject site is shown on **Figure 1.** The site is approximately 3.19 hectares in size and is bounded by Upper Canada Street to the south, development lands to the west, agricultural lands 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 Upper Canada Street (to which the building services will connect) have been 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. PG4783-1 dated January 31, 2020 for the Purolator site;

Among other items, the reports comment on the following:

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

Generally, the original grade is relatively flat, sloping from north-west to south-east; however, the presence of fill piles from the subdivision construction works was noted. The subsurface profile encountered at the test hole locations consists of fill in some locations, followed by topsoil underlain by a loose to compact, silty sand to sandy silt layer. Glacial till, consisting of compact to dense grey silty sand with clay, 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 in proximity to the site include a 250 mm diameter main on Palladium Drive installed in 2016 and a 200 mm main on Upper Canada Street, installed in 2020.

2.2 Watermain Design

The proposed watermain within Upper Canada Street, which will provide water service the site, was designed during the Kanata West Business Park – Phase 5 registration (City file number D07-16-14-0003_P5).

The following has been taken from the Water Distribution section of the Kanata West Business Park – Phase 5 design;

A hydraulic model of the water distribution system for the KWBP was prepared using InfoWater program by Innovyze. The hydraulic model includes the all recently constructed and proposed watermains within the KWBP. The City of Ottawa has provided a hydraulic boundary condition at the intersection of Huntmar and Campeau Drives; the specific boundary conditions are:

Max HGL (High Pressure Check) = 164.1 m

Peak Hour = 154.1 m

Max Day + Fire (Fire Flow rate 216 l/s) = 151.1 m

The following parameters were also used in the analysis for the subject site:

Table 1

DEVELOPMENT TYPE	BLOCKS	DEMANDS (L/HA/D)		
		AVERAGE DAY	MAXIMUM DAY	PEAK HOUR
Prestige Business Park High Profile Business Park & Extensive Employment	KWBP Tanger Outlets Centre	35,000 50,000	52,500 75,000	94,500 135,000

A target fire demand of 13,000 l/min (216.7 l/s) was added to the maximum daily demands at each node to confirm the system's firefighting capabilities. Required fire flows are calculated using criteria developed by the Fire Underwriter's Survey (FUS). In order to determine the fire flow for a proposed building, the following information is required: the building's total floor area, the type of construction, the building's fire hazard, availability of a sprinkler system and exposure to adjacent structures. The target fire demand of 13,000 l/min is a conservative assumption for this development.

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 13,000 l/min (216.7 l/s)
- Maximum pressure in unoccupied areas 689 kPa (100 psi)

- Maximum pressure in occupied areas 552 kPa (80 psi)

The fire flow rate for this Phase is 13,000 l/min (216.7 l/s). A copy of the water demand calculation sheet and copies of the boundary conditions provided by the City for Phase 5 and the overall model are included in **Appendix A**.

2.3 Site Analysis

A fire flow demand has been calculated using the Fire Underwriters Survey (FUS) method for the proposed building. Based on the building floor area, type of construction, use of a sprinkler system and exposure to adjacent buildings, a fire flow rate of 10,000 l/min was determined. The site specific FUS calculation results are included in **Appendix A**.

As the site specific FUS analysis confirms the actual firefighting demands are less than the modeled demands, the proposed watermains within Upper Canada Street will provide adequate fire protection.

The water demands used in the KWBP Phase 5 analysis of light industrial correspond to the proposed use of the site and as such the Phase 5 model remains accurate for the site use.

The node in the KWBP model which corresponds to the subject site is B-280. The model schematic and results are included in **Appendix A** and are the results from this node are summarized as follows:

Basic Day (Max HGL)	575.06 kPa
Peak Hour (PKHR)	468.50 kPa
Max Day (MXDY) + Fire	229.96 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 building is 229.96 l/s which exceeds than the required 183.3 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 service for the Purolator site is shown on the Site Servicing Plan C-001. A 150mm water service is shown connecting to the building from Upper Canada Street. The new building will be sprinklered and pressure reducing control will be required as well. Hydraulic modeling results from KWBP Phase 5 with the nodes pertaining to the subject site highlighted, have been included in **Appendix A**.

With 2 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. Furthermore, the ire dept. connection is located within 45m of a public hydrant located on Upper Canada Street, as such a private hydrant is not needed.

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)
Purolator	10,000	2	2	19,200

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 warehouse, office and retail facility. 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 3.19 Ha
- Industrial 35,000 l/Ha/d
- Infiltration Allowance 0.33 L/s/Ha
- Minimum Sewer Slopes - 200 mm diameter 0.32%

3.4 Sanitary Sewer Design

Given the above criteria, total wastewater flow from the proposed development will be 2.99 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**.

4 SITE STORMWATER MANAGEMENT

4.1 Existing Conditions

The existing undeveloped subject lands currently drain both westward via existing ditching towards the Pond 6 West SWM facility and south-east to an existing ditch inlet on the subject site that drains to the Pond 6 East SWM facility. Storm sewers adjacent to the site include an 825mm dia sewer within Upper Canada Street which drains eastward to the Pond 6 East SWM facility, this is the ultimate outlet for the subject lands. Additional storm sewers exists in Palladium Drive and Upper Canada Street however no new connections will be made to this infrastructure.

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 is identified as 155A on the Kanata West Business Park 14289-500 Storm Drainage Area plan, which is included in **Appendix C**. Table 4.1 from the approved KWBP design brief has also been included in **Appendix C** to confirm the release rate for the subject block.

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 = 0.20
  - 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 70 - 100 mm/year of runoff be infiltrated from the western 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 Purolator site is located within the western portion of the KWBP. The infiltration target has been established as 25% above the average of 70-100mm/year, for a target of 106mm/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 infiltration gallery fed by the stormwater flowing from the controlled rooftop. 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 lowest bottom of media storage is 102.30m (102.90m header pipe elevation – 0.6m depth). Based on the geotechnical report the current groundwater in the area is approximately 102.64m; however, upon completion of the paving of the site it is expected that the ground water elevation will be lowered by at least 2m.

The proposed infiltration gallery has been sized to maximize infiltration potential for the site. The sizing was based on the roof drainage area, daily precipitation data (using wet year and dry year to establish overflow volume based on measured historical data. The maximum potential infiltration of the gallery was estimated using gallery size and precipitation norms for the area [920mm] and the overflow was then subtracted. Infiltration was assumed through the bottom and the bottom 1/3 of the side walls, with percolation rates established based on Geotechnical investigation of the site. The sizing of the gallery has been tailored for the proposed Purolator building roof area. The below table provides summary of the infiltration calculations for the site, further details of the infiltration galleries are provided within the Engineering Drawings 123987-001 and 123987-010. Also, detailed design calculations are provided within **Appendix C**. For percolation rates please refer to the geotechnical report.

Table 1 - Infiltration Gallery Calculations Summary on Annual Basis

GALLERY	TRIB AREA (M2)	ANNUAL RUNOFF VOLUME (M3)	AVERAGE OVERFLOW VOLUME (M3)	AVERAGE ANNUAL VOLUME INFILTRATED (M3)
Parking Lot	6089	5322	1676	3646

Where:

- Annual Runoff Volume is based on rooftop area and 95% of the annual precipitation from rooftops available as runoff (920mm annual precipitation)
- 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 3646m^3 of infiltration on an annual basis, or 114.30mm/year for the 3.19ha site, above the required post-development rate of 106mm/year.

4.3 Stormwater Management

Based on the approved Kanata West Business Park Design Brief, table 4.2, and the storm water modeling, the maximum allowable release rate for the subjected site is 525 l/s.

The site is approximately 3.19 ha and is proposed to comprise of a warehouse, office and retail facility along with 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 will connect to the existing 825mm storm sewer within Upper Canada Street. The flows will be controlled with inlet control devices at locations identified on plan C-001 and the CB data table.

100 year flows from the loading dock trench drains have been included in the SWM calculations.

The unrestricted portions of the site (the loading dock trench drains, and the eastern vehicle access to Upper Canada Street) are approximately 0.15 ha. Based on the proposed coefficient and Tc=10 min, the 100 yr flow from the uncontrolled area is 73.71 l/s. Based on an allowable release rate of 525 l/s for the site, the controlled portion is limited to 525 l/s – 73.71 l/s = 451.29 l/s.

As noted above, stormwater runoff from the site is directed to the existing Upper Canada Street 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 1:2 yr (Ottawa)
- Sewer Sizing by Rational Method
- Runoff Coefficients:

Roof	C=0.90
Asphalt Parking Lot	C=0.90
Landscaped Areas	C=0.20

- 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 1:2 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 sheet and related Storm Sewer Drainage Area plan C-500 are included in **Appendix C**.

Minor system discharges to the storm sewer in Upper Canada Street within the maximum 100 year restricted release rate of 485.69 L/s. The flow rate is based on the City requirement to limit 100 year post development flow off site base on approved parameters provided on the KWMSS Storm Sewer Design Sheet. To this end, no negative impact on the existing downstream system is anticipated.

4.5 Onsite Detention

The site was designed to limit runoff to the allowable release rate up to the 100 year storm event. Flows in excess of the 5 year storm, up to the 100 year storm will be contained on-site via roof top storage and surface ponding at inlet locations. Orifices in catchbasins will be employed to control runoff from parking, access and landscape areas. To determine the resulting storage volumes a 2 year, 5 year and 100 year storm was applied, 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. Please refer to the ponding plan 123843-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 parking lots areas. Ponds of deeper depth have been located within the landscaping areas at the north east and north west property corners. In the event of less frequent storms overland flow routes toward Upper Canada Street and the Pond 6 East SWM facility have 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, 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 in customer parking areas during the 2 year storm event, some 2 year ponding will be present in employee parking areas, and heavy truck access areas; however, this has been discussed with the owner and they are in agreement with the proposal.

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

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

Table 2 – Post-Development Storage Summary Table

Post-Development Flows							
Drainage Area	ICD TYPE	Restricted /Uncontrolled Flow (L/s)		Storage Required (m^3)		Storage Provided (m^3)	
		5-year	100-year	5-year	100-year		
UNCONTROLLED FLOW							
UN1+CB 6 7	N/A		73.1	N/A	N/A	N/A	N/A
TOTAL UNRESTRICTED RELEASED RATE							
			73.71				
CONTROLLED FLOW							
L1	TEMPEST VORTEX	6	6	6.53	21.96	297.37	
CICB 18/CB20/CICB22/L2	TEMPEST HF	36	36	172.65	462.98	471.88	
CICB23	TEMPEST VORTEX	12	12	0.09	2.47	6.39	
CB11	TEMPEST HF	33	33	14.84	49.08	140.86	
L3	TEMPEST VORTEX	6	6	2.23	9.39	158.46	
CB17	TEMPEST VORTEX	6	6	23.20	56.78	5.81	
CICB16	TEMPEST VORTEX	6	6	16.15	40.82	12.27	
CICB25	TEMPEST HF	40	40	0.04	4.41	5.03	
CICB21	TEMPEST HF	50	50	0.00	3.88	3.80	
CICB19	TEMPEST HF	20	20	0.69	6.43	7.40	
CB 14 15	TEMPEST VORTEX	6	6	1.4	5.42	7.29	
CB12	TEMPEST HF	20	20	3.54	14.86	20.47	
CB10	TEMPEST HF	20	20	4.65	18.05	22.62	
CB8	TEMPEST HF	105	105	0	4.21	5.93	
CB3	TEMPEST HF	65	65	0	2.71	0	

ROOF	Watts Roof Control	20	20	116.50	276.54	697.50	
TOTAL RESTRICTED RELEASED RATE							
			451				

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. Therefore, no on-site quality control is required.

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 sediment capture filer sock. These will stay in place and be maintained during construction and build-out until it is appropriate to remove them.

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

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

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

6 CONCLUSION

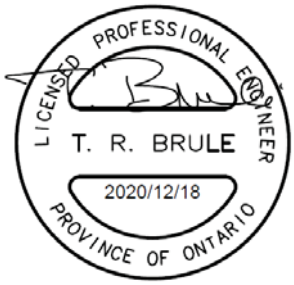
The Servicing strategy can be summarized as follows:

- Adequate fire flow protection and domestic supply will be provided from the existing watermain located 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 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, rooftop 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 Purolator 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.

Based 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



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APPENDIX A

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : **Purolator Inc.**
LOCATION : **Kanata West Business Park - City of Ottawa**
DEVELOPER : **Purolator Inc.**

FILE: 123987
DATE PRINTED: 17-Sep-20
DESIGN: JEB
PAGE : 1 OF 1

NODE	RESIDENTIAL UNITS SF	RESIDENTIAL UNITS Office	RESIDENTIAL UNITS ST	Population	NON-RESIDENTIAL INDTRL (ha.)	NON-RESIDENTIAL INST. (ha.)	NON-RESIDENTIAL RETAIL (m^2)	AVERAGE DAILY DEMAND (l/s) Non-res.	AVERAGE DAILY DEMAND (l/s) Res.	AVERAGE DAILY DEMAND (l/s) Total	MAXIMUM DAILY DEMAND (l/s) Non-res.	MAXIMUM DAILY DEMAND (l/s) Res.	MAXIMUM DAILY DEMAND (l/s) Total	MAXIMUM HOURLY Non-res.	MAXIMUM HOURLY Res.	MAXIMUM HOURLY Total	FIRE DEMAND (l/min)
Purolator					3.20			1.30		1.30	1.94		1.94	3.50		3.50	10,000

ASSUMPTIONS

RESIDENTIAL DENSITIES

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

AVG. DAILY DEMAND

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

MAX. DAILY DEMAND

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

MAX. HOURLY DEMAND

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

FIRE FLOW

- Purolator 10,000 l / min

Fire Flow Requirement from Fire Underwriters Survey

Purolator - 1400 Upper Canada Street

2 largest adjoining floors plus 50% of floors above up to eight for fire resistive building

Building Footprint	6,098	m^2
Total	6,098	m^2

Fire Flow

$F = 220C\sqrt{A}$

C	0.8		C =	1.5 wood frame
A	6,098	m^2		1.0 ordinary
				0.8 non-combustible
F	13,744	l/min		0.6 fire-resistive
Use	14,000	l/min		

Occupancy Adjustment

		-25% non-combustible
		-15% limited combustible
Use	0%	0% combustible
		+15% free burning
Adjustment	0 l/min	+25% rapid burning
Fire flow	14,000 l/min	

Sprinkler Adjustment

		-30% system conforming to NFPA 13
		-50% complete automatic system
Use	-30%	
Adjustment	-4200 l/min	

Exposure Adjustment

Building Face	Separation (m)	Adjacent Exposed Wall			Exposure Charge *
		Length	Stories	L*H Factor	
north	45.0	50.0	2	100	0%
east	45.0	50.0	2	100	0%
south	45.0	50.0	2	100	0%
west	45.0	50.0	2	100	0%
Total					0%

* Exposure charges from Techinical Bulletin ISTB 2018-02 Appendix H (ISO Method)

Adjustment - l/min

Required Fire Flow

Total adjustments	(4,200)	l/min
Fire flow	9,800	l/min
Use	**10,000**	**l/min**
	166.7	**l/s**

Mark Fraser, EIT
Junior Infrastructure Engineer, Suburban Services

PLANNING AND GROWTH MANAGEMENT
URBANISME ET GESTION DE LA CROISSANCE

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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 waterman 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

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IBI **Defining the cities of tomorrow**

Boundary Conditions at KWBP(Campeau Dr.) West

Boundary Conditions at Jun-1:

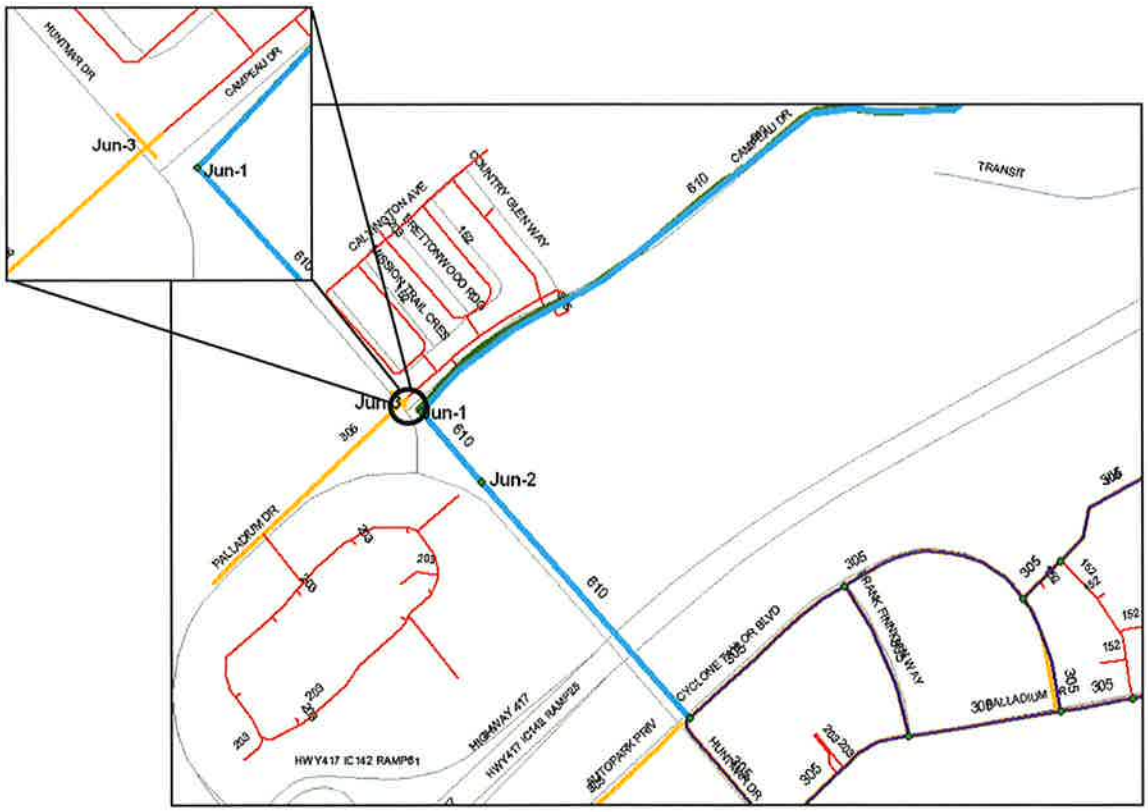
Max HGL = 164.1m
PKHR = 154.1m
MXDY+Fire (216 L/s) =151.1m

To ensure adequate fire supple 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

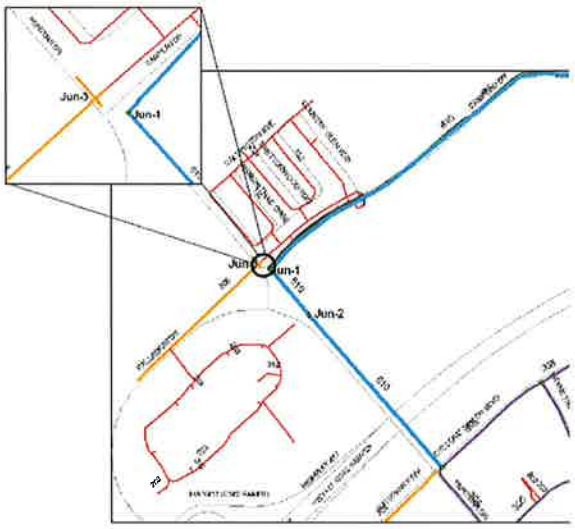
From: Fraser, Mark [Mark.Fraser@ottawa.ca]
Sent: Wednesday, September 17, 2014 9:27 AM
To: Lance Erion
Cc: Ogilvie, Chris; Terry Brule
Subject: RE: Kanata West Business Park - Request for Watermain Boundary Conditions
Attachments: BC_KWBP.PDF; KWBP watermain connections_Requested.pdf

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,

IBI GROUP

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : KANATA WEST BUSINESS PARK
333 HUNTMAR DRIVE
DEVELOPER : TAGGART REALTY MANAGEMENT

FILE: 14289.5.7
DATE PRINTED: 18-Apr-18
DESIGN: LE
PAGE : 1 OF 1

NODE	BLOCK No.	RESIDENTIAL UNITS SF	SD & TH	ST	POP'N	NON-RESIDENTIAL INDTRL (ha.)	COMM. (ha.)	INST. (ha.)	AVERAGE DAILY DEMAND (l/s) Res.	Non-res.	Total	MAXIMUM DAILY DEMAND (l/s) Res.	Non-res.	Total	MAXIMUM HOURLY DEMAND (l/s) Res.	Non-res.	Total	FIRE DEMAND (l/min)
KWBP																		
B-245	52, 11					4.56			0.00	1.85	1.85	0.00	2.77	2.77	0.00	4.99	4.99	13,000
B-255	22					2.63			0.00	1.07	1.07	0.00	1.60	1.60	0.00	2.88	2.88	13,000
B-260	23, 24					1.78			0.00	0.72	0.72	0.00	1.08	1.08	0.00	1.95	1.95	13,000
B-270	54, 32					1.00			0.00	0.41	0.41	0.00	0.61	0.61	0.00	1.09	1.09	13,000
B-280	27, 28, 30, 31, 33, 53					4.68			0.00	1.90	1.90	0.00	2.84	2.84	0.00	5.12	5.12	13,000
B-290	3, 38					5.84			0.00	2.37	2.37	0.00	3.55	3.55	0.00	6.39	6.39	13,000
B-305	41, 42					1.48			0.00	0.60	0.60	0.00	0.90	0.90	0.00	1.62	1.62	13,000
B-310	8					2.88			0.00	1.17	1.17	0.00	1.75	1.75	0.00	3.15	3.15	13,000
B-315	12, 13, 14					2.22			0.00	0.90	0.90	0.00	1.35	1.35	0.00	2.43	2.43	13,000
B-320	15, 16, 18, 21					2.63			0.00	1.07	1.07	0.00	1.60	1.60	0.00	2.88	2.88	13,000
B-325	40					0.70			0.00	0.28	0.28	0.00	0.43	0.43	0.00	0.77	0.77	13,000
B-330	19, 20, 25					1.61			0.00	0.65	0.65	0.00	0.98	0.98	0.00	1.76	1.76	13,000
B-340	17, 26					1.91			0.00	0.77	0.77	0.00	1.16	1.16	0.00	2.09	2.09	13,000
B-345	49					0.41			0.00	0.17	0.17	0.00	0.25	0.25	0.00	0.45	0.45	13,000
B-355	6, 9, 10					8.89			0.00	3.60	3.60	0.00	5.40	5.40	0.00	9.72	9.72	13,000
B-360	29					0.69			0.00	0.28	0.28	0.00	0.42	0.42	0.00	0.75	0.75	13,000
B-370	34, 35, 39					6.38			0.00	2.58	2.58	0.00	3.88	3.88	0.00	6.98	6.98	13,000
B-380	4, 5, 36, 37					3.07			0.00	1.24	1.24	0.00	1.87	1.87	0.00	3.36	3.36	13,000
B-385	2					0.79			0.00	0.32	0.32	0.00	0.48	0.48	0.00	0.86	0.86	13,000
B-395	1, 7					1.94			0.00	0.79	0.79	0.00	1.18	1.18	0.00	2.12	2.12	13,000
TANGER SITE																		
B-100							0.83		0.00	0.48	0.48	0.00	0.72	0.72	0.00	1.30	1.30	13,000
B-110							2.24		0.00	1.30	1.30	0.00	1.94	1.94	0.00	3.50	3.50	13,000
B-120							2.61		0.00	1.51	1.51	0.00	2.27	2.27	0.00	4.08	4.08	13,000
B-130							2.31		0.00	1.34	1.34	0.00	2.01	2.01	0.00	3.61	3.61	13,000
B-140							2.75		0.00	1.59	1.59	0.00	2.39	2.39	0.00	4.30	4.30	13,000
B-150							2.38		0.00	1.38	1.38	0.00	2.07	2.07	0.00	3.72	3.72	13,000
B-160							0.90		0.00	0.52	0.52	0.00	0.78	0.78	0.00	1.41	1.41	13,000
B-170							1.51		0.00	0.87	0.87	0.00	1.31	1.31	0.00	2.36	2.36	13,000
TOTALS		**0**	**0**	**0**	**0**	**56.09**	**15.53**	**0.00**	**0.00**	**31.73**	**31.73**	**0.00**	**47.59**	**47.59**	**0.00**	**85.64**	**85.64**	

ASSUMPTIONS

RESIDENTIAL DENSITIES

- Single Family (SF) 3.4 p / p / u
- Semi Detached (SD) & Townhouse (TH 2.7 p / p / u
- Stacked Townhouse (ST) 3.5 p / p / u

AVG. DAILY DEMAND

- Residential 350 l / cap / day
- Business Park (Industrial) 35,000 l / ha / day
- Employment Area (Commerc 50,000 l / ha / day

MAX. DAILY DEMAND

- Residential 875 l / cap / day
- Business Park (Industrial) 52,500 l / ha / day
- Employment Area (Commerc 75,000 l / ha / day

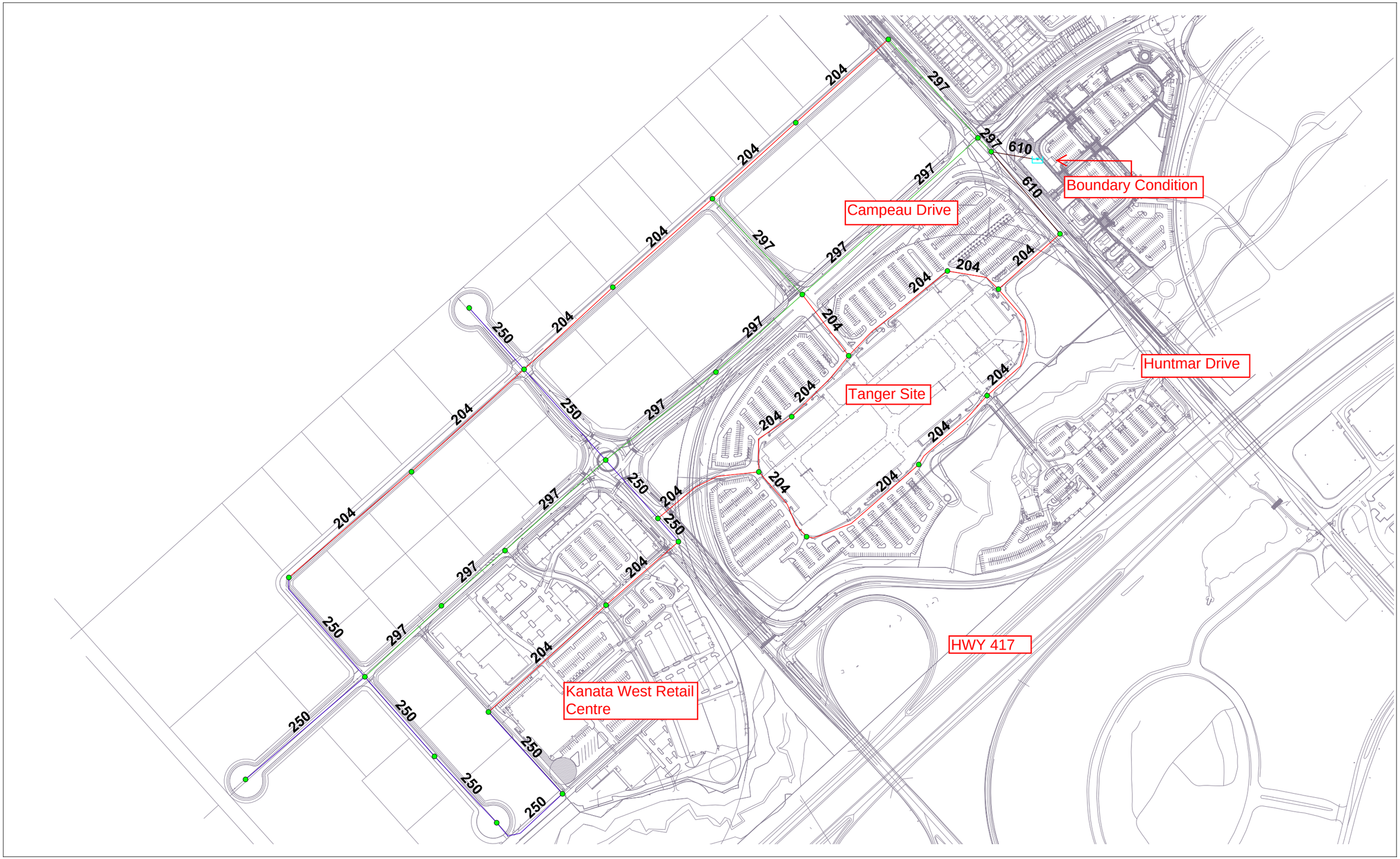
MAX. HOURLY DEMAND

- Residential 1,925 l / cap / day
- Business Park (Industrial) 94,500 l / ha / day
- Employment Area (Commerc 135,000 l / ha / day

FIRE FLOW

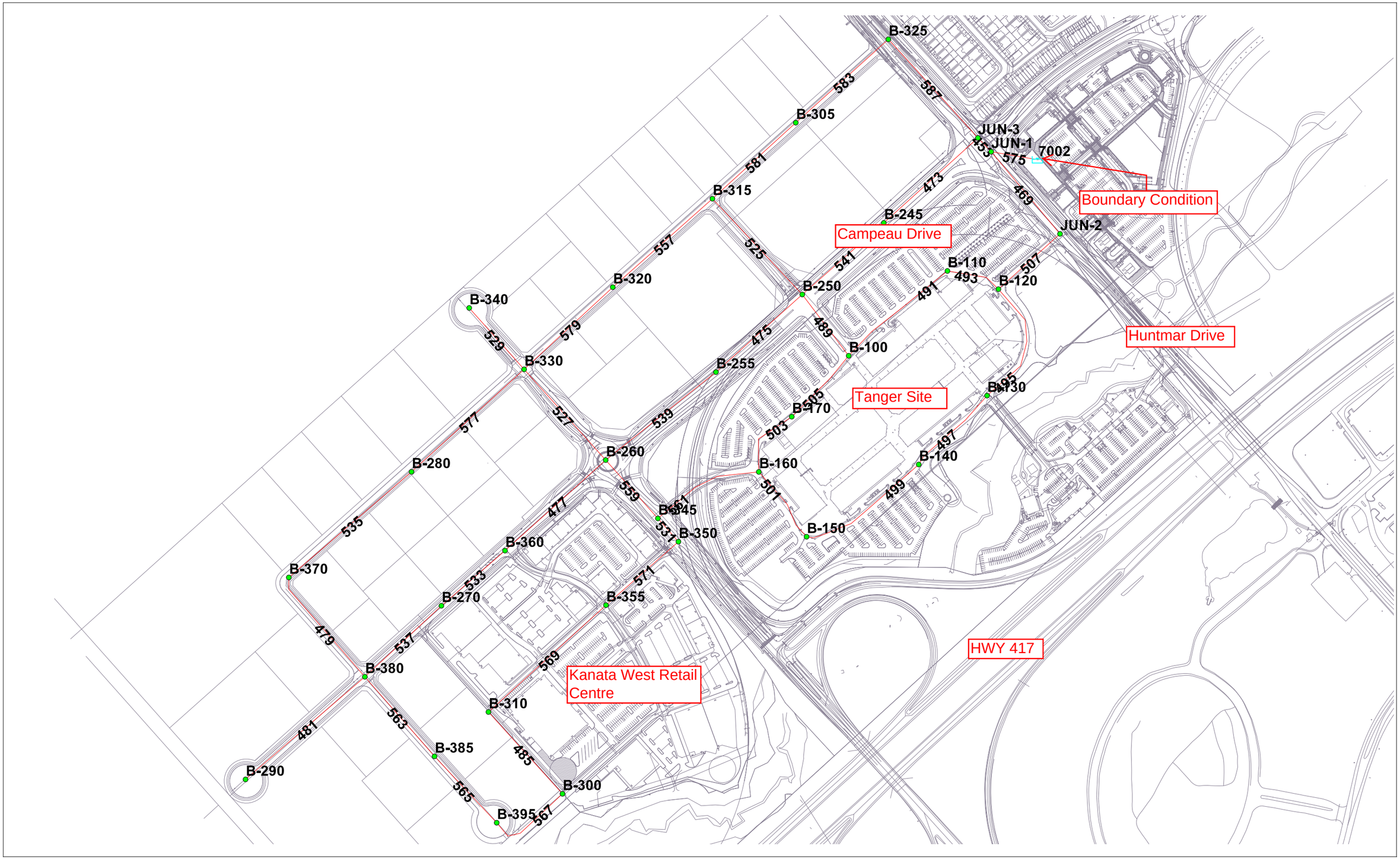
- ICI 13,000 l / min

KWBP - Pipe Sizes



Date: Friday, June 19, 2015

KWBP - Pipe and Node ID's



Date: Friday, June 19, 2015

Basic Day Pressure Check HGL 164.1m - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		B-100	0.48	101.65	164.00	610.96
2		B-110	1.30	101.70	164.01	610.55
3		B-120	1.51	101.35	164.02	614.07
4		B-130	1.34	101.50	163.98	612.29
5		B-140	1.59	101.50	163.97	612.18
6		B-150	1.38	101.65	163.97	610.67
7		B-160	0.52	101.75	163.97	609.69
8		B-170	0.87	101.50	163.98	612.24
9		B-245	1.85	101.00	164.04	617.71
10		B-250	0.00	102.10	164.00	606.61
11		B-255	1.07	102.70	163.98	600.50
12		B-260	0.72	104.50	163.96	582.62
13		B-270	0.41	105.00	163.94	577.55
14		B-280	1.90	105.25	163.93	575.06
15		B-290	2.37	106.35	163.93	564.21
16		B-300	0.00	104.60	163.93	581.38
17		B-305	0.60	102.20	164.04	605.94
18		B-310	1.17	104.80	163.93	579.42
19		B-315	0.90	102.15	164.00	606.12
20		B-320	1.07	102.95	163.97	597.97
21		B-325	0.28	101.90	164.08	609.30
22		B-330	0.65	104.30	163.95	584.57
23		B-340	0.77	104.70	163.95	580.65
24		B-345	0.17	104.75	163.95	580.16
25		B-350	0.00	105.00	163.95	577.69
26		B-355	3.60	104.50	163.93	582.37
27		B-360	0.28	105.00	163.94	577.61
28		B-370	2.58	106.30	163.93	564.73
29		B-380	1.24	105.75	163.93	570.13
30		B-385	0.32	105.65	163.93	571.10
31		B-395	0.79	105.90	163.93	568.64
32		JUN-1	0.00	100.20	164.10	626.15
33		JUN-2	0.00	101.50	164.10	613.41
34		JUN-3	0.00	100.25	164.09	625.54

Peak Hour HGL 154.1m - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		B-100	1.30	101.65	153.45	507.64
2		B-110	3.50	101.70	153.51	507.72
3		B-120	4.08	101.35	153.57	511.71
4		B-130	3.61	101.50	153.37	508.29
5		B-140	4.30	101.50	153.30	507.56
6		B-150	3.72	101.65	153.27	505.83
7		B-160	1.41	101.75	153.27	504.85
8		B-170	2.36	101.50	153.34	507.96
9		B-245	4.99	101.00	153.70	516.46
10		B-250	0.00	102.10	153.49	503.62
11		B-255	2.88	102.70	153.35	496.29
12		B-260	1.95	104.50	153.19	477.16
13		B-270	1.09	105.00	153.09	471.20
14		B-280	5.12	105.25	153.06	468.50
15		B-290	6.39	106.35	153.01	457.26
16		B-300	0.00	104.60	153.03	474.54
17		B-305	1.62	102.20	153.69	504.58
18		B-310	3.15	104.80	153.03	472.57
19		B-315	2.43	102.15	153.49	503.12
20		B-320	2.88	102.95	153.29	493.34
21		B-325	0.77	101.90	153.97	510.20
22		B-330	1.76	104.30	153.19	479.05
23		B-340	2.09	104.70	153.18	475.11
24		B-345	0.45	104.75	153.19	474.65
25		B-350	0.00	105.00	153.17	472.04
26		B-355	9.72	104.50	153.03	475.59
27		B-360	0.75	105.00	153.13	471.59
28		B-370	6.98	106.30	153.03	457.96
29		B-380	3.36	105.75	153.04	463.42
30		B-385	0.86	105.65	153.03	464.31
31		B-395	2.12	105.90	153.03	461.81
32		JUN-1	0.00	100.20	154.09	528.07
33		JUN-2	0.00	101.50	154.09	515.30
34		JUN-3	0.00	100.25	154.01	526.79

Max Day + Fire HGL 151.1m - Fireflow Report

		ID	Total Demand (L/s)	Critical Node 1 ID	Critical Node 1 Pressure (kPa)	Critical Node 1 Head (m)	Adjusted Fire-Flow (L/s)	Available Flow @Hydrant (L/s)	Critical Node 2 ID	Critical Node 2 Pressure (kPa)	Critcal Node 2 Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
1		B-100	217.39	B-100	374.87	139.91	420.76	420.76	B-100	139.96	115.93	420.76	420.76
2		B-110	218.61	B-110	333.20	135.70	348.04	348.07	B-110	139.96	115.98	348.07	348.04
3		B-120	218.94	B-120	383.03	140.44	433.10	433.10	B-120	139.96	115.63	433.10	433.10
4		B-130	218.68	B-130	228.24	124.79	257.97	257.97	B-130	139.96	115.78	257.97	257.97
5		B-140	219.06	B-140	196.49	121.55	242.10	242.10	B-140	139.96	115.78	242.10	242.10
6		B-150	218.74	B-150	242.67	126.41	267.17	267.18	B-150	139.96	115.93	267.18	267.17
7		B-160	217.45	B-160	333.15	135.75	350.70	350.70	B-160	139.96	116.03	350.70	350.70
8		B-170	217.98	B-170	318.63	134.02	329.82	329.82	B-170	139.96	115.78	329.82	329.82
9		B-245	219.44	B-290	396.43	141.46	739.81	739.07	B-245	139.97	115.28	739.07	739.07
10		B-250	216.67	B-290	378.90	140.77	582.51	620.82	B-290	105.47	112.86	582.52	582.51
11		B-255	218.27	B-290	354.19	138.84	472.98	482.72	B-290	129.45	115.91	472.99	472.98
12		B-260	217.75	B-290	332.27	138.41	407.26	420.14	B-290	123.71	117.12	407.26	407.26
13		B-270	217.28	B-290	285.83	134.17	325.03	327.01	B-290	136.87	118.97	325.03	325.03
14		B-280	219.51	B-280	164.16	122.00	229.96	229.96	B-280	139.96	119.53	229.96	229.96
15		B-290	220.22	B-290	75.98	114.10	197.24	197.24	B-290	139.96	120.63	197.24	197.24
16		B-300	216.67	B-300	170.60	122.01	229.90	229.90	B-300	139.96	118.88	229.90	229.90
17		B-305	217.57	B-305	337.02	136.59	352.78	352.79	B-305	139.96	116.48	352.79	352.78
18		B-310	218.42	B-310	149.81	120.09	222.46	222.46	B-310	139.96	119.08	222.46	222.46
19		B-315	218.02	B-370	379.99	140.93	598.47	514.98	B-315	139.96	116.43	514.98	514.98
20		B-320	218.27	B-320	274.72	130.98	293.53	293.54	B-320	139.96	117.23	293.54	293.53
21		B-325	217.10	B-290	419.76	144.74	1,360.67	626.15	B-325	139.97	116.18	626.16	626.16
22		B-330	217.65	B-340	309.17	135.85	342.67	345.14	B-340	136.04	118.18	342.67	342.67
23		B-340	217.83	B-340	210.27	126.16	251.70	251.71	B-340	139.96	118.98	251.71	251.70
24		B-345	216.92	B-350	322.42	137.65	366.40	366.87	B-350	139.28	118.96	366.40	366.40
25		B-350	216.67	B-350	297.77	135.39	328.68	328.68	B-350	139.96	119.28	328.68	328.68
26		B-355	222.07	B-355	181.81	123.05	240.70	240.70	B-355	139.96	118.78	240.70	240.70
27		B-360	217.09	B-290	300.85	135.70	346.53	346.46	B-360	139.96	119.28	346.46	346.46
28		B-370	220.55	B-370	206.35	127.36	254.97	254.97	B-370	139.96	120.58	254.97	254.97
29		B-380	218.54	B-290	268.66	133.17	305.47	309.03	B-290	133.99	119.42	305.47	305.47
30		B-385	217.15	B-385	218.21	127.92	258.26	258.27	B-385	139.96	119.93	258.27	258.26
31		B-395	217.85	B-395	181.30	124.40	237.21	237.21	B-395	139.96	120.18	237.21	237.21

Peak Hour HGL 154.1m - Pipe Report

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/km)
1		453	JUN-1	JUN-3	26.14	297.00	120.00	60.08	0.87	0.08	3.05
2		469	JUN-1	JUN-2	145.95	610.00	120.00	25.56	0.09	0.00	0.02
3		473	B-245	JUN-3	172.60	297.00	120.00	-44.78	0.65	0.31	1.77
4		475	B-250	B-255	157.97	297.00	120.00	31.83	0.46	0.15	0.94
5		477	B-360	B-260	184.36	297.00	120.00	-19.34	0.28	0.07	0.37
6		479	B-380	B-370	173.91	250.00	110.00	3.47	0.07	0.01	0.04
7		481	B-380	B-290	214.22	250.00	110.00	6.39	0.13	0.03	0.13
8		485	B-310	B-300	150.23	250.00	110.00	-1.30	0.03	0.00	0.01
9		489	B-250	B-100	104.68	204.00	110.00	6.63	0.20	0.04	0.38
10		491	B-100	B-110	177.45	204.00	110.00	-6.13	0.19	0.06	0.33
11		493	B-120	B-110	76.66	204.00	110.00	9.63	0.29	0.06	0.75
12		495	B-120	B-130	180.37	204.00	110.00	11.85	0.36	0.20	1.10
13		497	B-130	B-140	132.76	204.00	110.00	8.24	0.25	0.07	0.56
14		499	B-140	B-150	186.62	204.00	110.00	3.94	0.12	0.03	0.14
15		501	B-150	B-160	110.94	204.00	110.00	0.22	0.01	0.0000	0.000
16		503	B-170	B-160	99.49	204.00	110.00	9.10	0.28	0.07	0.68
17		505	B-100	B-170	113.62	204.00	110.00	11.46	0.35	0.12	1.04
18		507	JUN-2	B-120	112.65	204.00	110.00	25.56	0.78	0.52	4.58
19		525	B-250	B-315	178.70	297.00	120.00	1.33	0.02	0.000	0.00
20		527	B-260	B-330	166.12	250.00	110.00	3.55	0.07	0.01	0.04
21		529	B-330	B-340	112.16	250.00	110.00	2.09	0.04	0.00	0.02
22		531	B-350	B-345	42.25	250.00	110.00	-11.57	0.24	0.02	0.39
23		533	B-270	B-360	114.57	297.00	120.00	-18.59	0.27	0.04	0.35
24		535	B-370	B-280	220.49	204.00	110.00	-3.51	0.11	0.03	0.12
25		537	B-380	B-270	142.19	297.00	120.00	-17.50	0.25	0.04	0.31
26		539	B-255	B-260	192.02	297.00	120.00	28.95	0.42	0.15	0.79
27		541	B-245	B-250	147.79	297.00	120.00	39.79	0.57	0.21	1.42
28		557	B-320	B-315	181.36	204.00	110.00	-11.81	0.36	0.20	1.10
29		559	B-345	B-260	106.53	250.00	110.00	-4.11	0.08	0.01	0.06
30		561	B-345	B-160	156.52	204.00	110.00	-7.90	0.24	0.08	0.52
31		563	B-380	B-385	143.94	250.00	110.00	4.28	0.09	0.01	0.06
32		565	B-385	B-395	123.78	250.00	110.00	3.42	0.07	0.01	0.04
33		567	B-395	B-300	119.52	250.00	110.00	1.30	0.03	0.000	0.01
34		569	B-310	B-355	216.24	204.00	110.00	-1.85	0.06	0.01	0.04
35		571	B-355	B-350	131.09	204.00	110.00	-11.57	0.35	0.14	1.05
36		575	7002	JUN-1	64.97	610.00	120.00	85.64	0.29	0.01	0.18
37		577	B-280	B-330	207.26	204.00	110.00	-8.63	0.26	0.13	0.61
38		579	B-320	B-330	164.53	204.00	110.00	8.93	0.27	0.11	0.65
39		581	B-315	B-305	153.64	204.00	110.00	-12.91	0.40	0.20	1.29
40		583	B-305	B-325	169.62	204.00	110.00	-14.53	0.44	0.27	1.61
41		587	JUN-3	B-325	181.17	297.00	120.00	15.30	0.22	0.04	0.24

APPENDIX B

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

Purolator
CITY OF OTTAWA

LOCATION				Office									ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						ICI PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)		FLOW										
														INSTITUTIONAL		COMMERCIAL		INDUSTRIAL														
STREET	AREA ID	FROM MH	TO MH		SF	SD	TH	Office		IND	CUM			IND	CUM	IND	CUM	IND	CUM			IND	CUM	(L/s)	IND	CUM	(L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY L/s	(%)
Purolator		BLDG	MH3A							0.0	0.0	1.50	0.00	0.00	0.00	0.00	0.00	3.19	3.19	1.50	1.94	3.19	3.19	1.05	0.00	0.00	2.99	48.39	13.73	200	2.00	1.492	45.40	93.82%
Purolator		MH3A	MH2A							0.0	0.0	1.50	0.00	0.00	0.00	0.00	0.00	0.00	3.19	1.50	1.94	0.00	3.19	1.05	0.00	0.00	2.99	69.70	16.02	200	4.15	2.149	66.71	95.71%
Purolator		MH2A	MH1A							0.0	0.0	1.50	0.00	0.00	0.00	0.00	0.00	0.00	3.19	1.50	1.94	0.00	3.19	1.05	0.00	0.00	2.99	34.22	83.55	200	1.00	1.055	31.23	91.26%
Purolator		MH1A	MAIN							0.0	0.0	1.50	0.00	0.00	0.00	0.00	0.00	0.00	3.19	1.50	1.94	0.00	3.19	1.05	0.00	0.00	2.99	34.22	19.07	200	1.00	1.055	31.23	91.26%

Design Parameters:

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

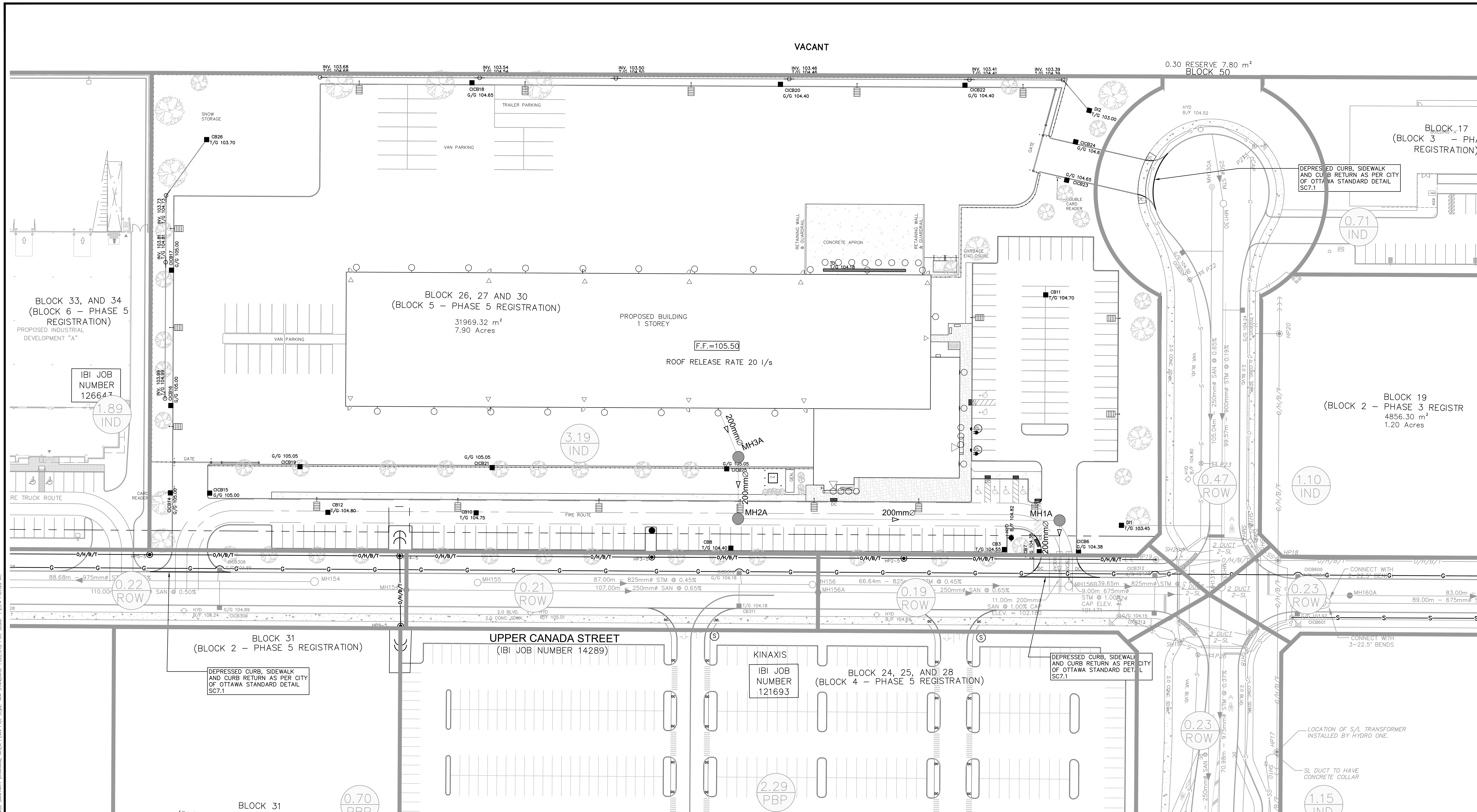
Notes:

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

Designed: JEB
Checked: TRB
Dwg. Reference: 123987-001

No.	Revision	Date
1.	1st City Submission	2020-09-17
2.	2nd City Submission	2020-12-18

File Reference: 123987.7.3
Date: 2019-07-03
Sheet No: 1 of 1



NOTES:

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

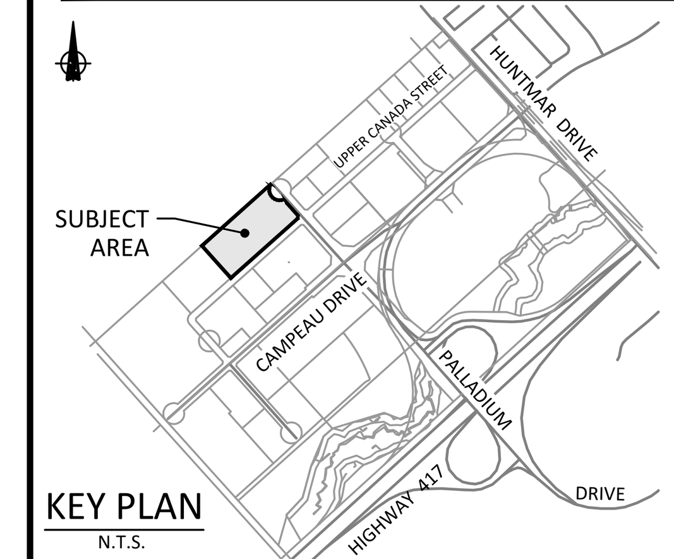
LEGEND :

- WH — AREA NUMBER
- 1.01 0.0 — RUNOFF COEFFICIENT
- AREA IN HECTARES
- 5.14 PBP — AREA IN HECTARES
- LAND USE TYPE

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

- DRAINAGE AREA LIMITS
- EXISTING DRAINAGE AREA LIMITS

SEE 010, FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS



KEY PLAN
N.T.S.

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3	REVISED AS PER CITY COMMENTS	T.R.B.	2020:12:18
2	ISSUED FOR 30% REVIEW	T.R.B.	2020:11:13
1	ISSUED FOR SPA	T.R.B.	2020:09:17

TAGGART REALTY MANAGEMENT

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

Project Title
Purolator
DISTRIBUTION KANATA
1400 UPPER CANADA STREET,

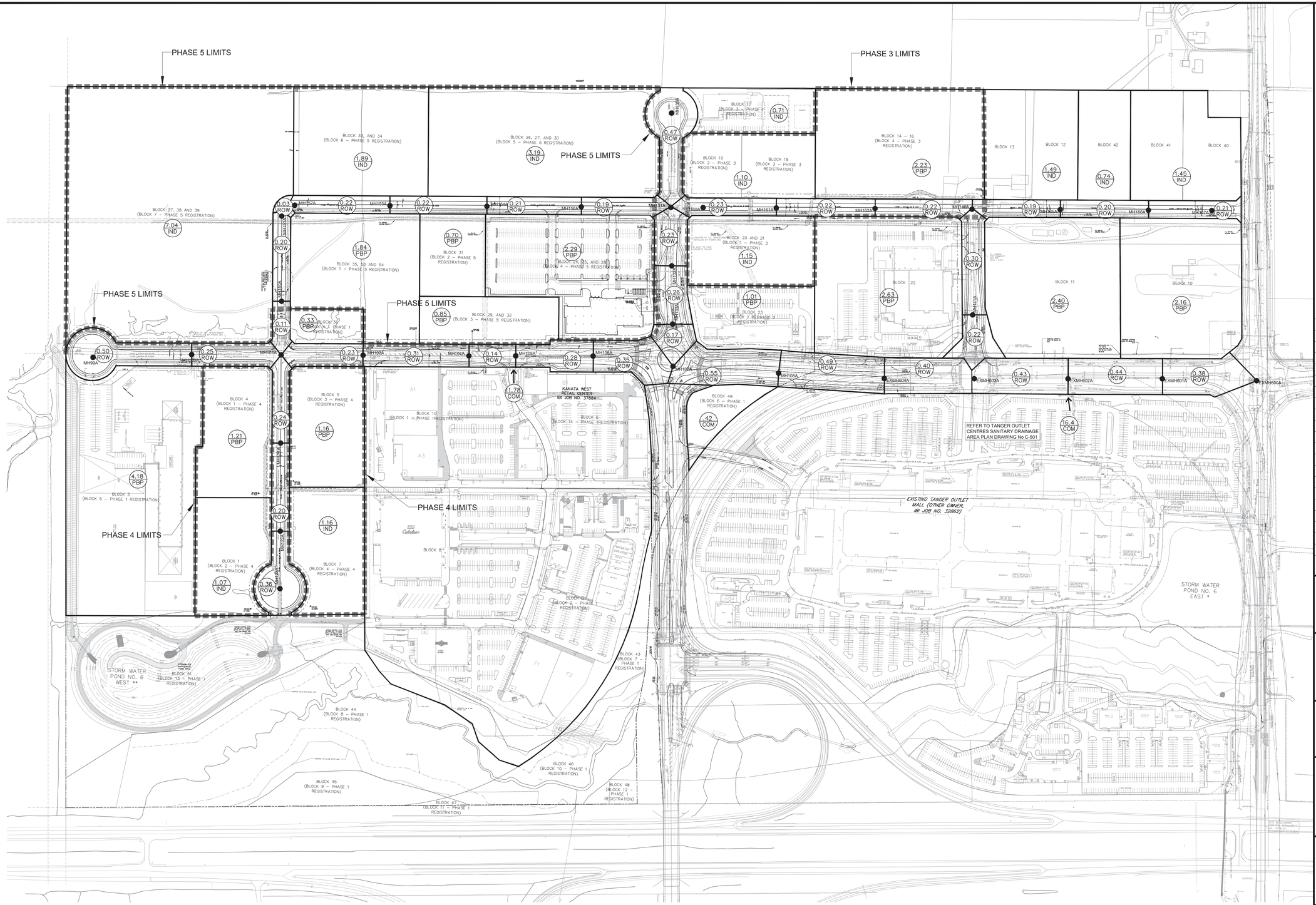
LICENSED PROFESSIONAL ENGINEER
T. R. BRULE
2020/12/18
PROVINCE OF ONTARIO

Drawing Title
SANITARY DRAINAGE
AREA PLAN

Scale
1:500

Design	Date
J.B.	AUG . 2020
Drawn	**Checked**
J.B/D.P.S.	T.R.B.
Project No.	**Drawing No.**
123987	C-400

CITY PLAN No. 18260
CITY FILE No. D07-12-20-0125



LEGEND:

- 5.14 / P.B.P. — AREA IN HECTARES / LAND USE TYPE
- PBP — PRESTIGE BUSINESS PARK - 35 000 l/s/ha
- IND — LIGHT INDUSTRIAL - 35 000 l/s/ha
- COM — COMMERCIAL - 50 000 l/S/ha
- ROW — RIGHT OF WAY (INFILTRATION FLOW ONLY)
- DRAINAGE AREA LIMITS
- MH601A — SANITARY MANHOLE & NUMBER
- SANITARY SEWER & FLOW DIRECTION

No.	REVISIONS	By	Date
20			
19			
18			
17			
16			
15	ISSUED FOR PHASE 5 REGISTRATION	LME	19: 09: 10
14	REVISED AS PER PHASE 4 COMMENTS	LME	19: 07: 25
13	REVISED AS PER PHASE 4 COMMENTS	LME	19: 07: 22
12	REVISED AS PER PHASE 4 COMMENTS	LME	19: 06: 24
11	ISSUED FOR PHASE 4 REGISTRATION	LME	19: 04: 25
10	REVISED AS PER PHASE 3 COMMENTS	LME	19: 03: 08
9	ISSUED FOR PHASE 3 TENDER	LME	19: 01: 11
8	REVISED AS PER PHASE 3 COMMENTS	LME	18: 12: 14
7	REVISED FOR PHASE 3 REGISTRATION	LME	18: 09: 14
6	REVISED FOR PHASE 2 REGISTRATION	LME	18: 04: 20
5	REVISED AS PER CITY COMMENTS	LME	15: 11: 05
4	REVISED AS PER CITY COMMENTS	LME	15: 10: 15
3	REVISED AS PER NEW SITE PLAN AND CITY COMMENTS	LME	15: 06: 19
2	REVISED AS PER CITY COMMENTS	LME	15: 04: 08
1	ISSUED TO CITY FOR APPROVAL	LME	14: 11: 27

TAGGART REALTY MANAGEMENT

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

Project Title

KANATA WEST BUSINESS PARK PHASE 5

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

Drawing Title

SANITARY DRAINAGE AREA PLAN

Scale
1:2000

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

D07-16-14-0003_P5

#17661

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

SANITARY SEWER DESIGN SHEET

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

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

PUROLATOR

Design Parameters:

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

Notes:

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

Designed: LME

Checked:

Dwg. Reference: 14289-501

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

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

APPENDIX C

JRE 6

VACANT

BLOCK 26, 27 AND 30
(BLOCK 5 – PHASE 5 REGISTRATION)
31969.32 m²
7.90 Acres

PROPOSED BUILDING
1 STOREY

F.F.=105.50

ROOF RELEASE RATE 20 l/s

BLOCK 33, AND 34
(BLOCK 6 – PHASE 5 REGISTRATION)
PROPOSED INDUSTRIAL
DEVELOPMENT "A"

IBI JOB NUMBER 126643

BLOCK 31
(BLOCK 2 – PHASE 5 REGISTRATION)

UPPER CANADA STREET
(IBI JOB NUMBER 14289)

KINAXIS
IBI JOB NUMBER 121693

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

BLOCK 19
(BLOCK 2 – PHASE 3 REGISTR
4856.30 m²
1.20 Acres

BLOCK 17
(BLOCK 3 – PHA
REGISTRATION)

0.30 RESERVE 7.80 m²
BLOCK 50

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

LOCATION OF S/L TRANSFORMER INSTALLED BY HYDRO ONE.

SL DUCT TO HAVE CONCRETE COLLAR

CONNECT WITH 2-22.5° BENDS

CONNECT WITH 3-22.5° BENDS

NOTES:

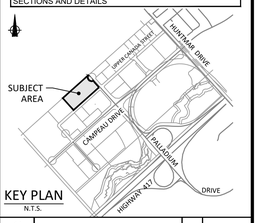
1. SEE DETAIL DRAWING C-010 FOR ADDITIONAL DETAILS AND NOTES.
2. SITE BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR STANTEC GEOMATICS.

LEGEND :

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

SEE 010, FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS

KEY PLAN
N.T.S.



No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3	REVISED AS PER CITY COMMENTS	T.R.B.	2020:12:18
2	ISSUED FOR 30% REVIEW	T.R.B.	2020:11:13
1	ISSUED FOR SPA	T.R.B.	2020:09:17

TAGGART REALTY MANAGEMENT

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

Project Title
PUROLATOR
DISTRIBUTION KANATA
1400 UPPER CANADA STREET,

LICENSED PROFESSIONAL ENGINEER
T. R. BRULE
2020/12/18
PROVINCE OF ONTARIO

Drawing Title
STORM DRAINAGE AREA PLAN

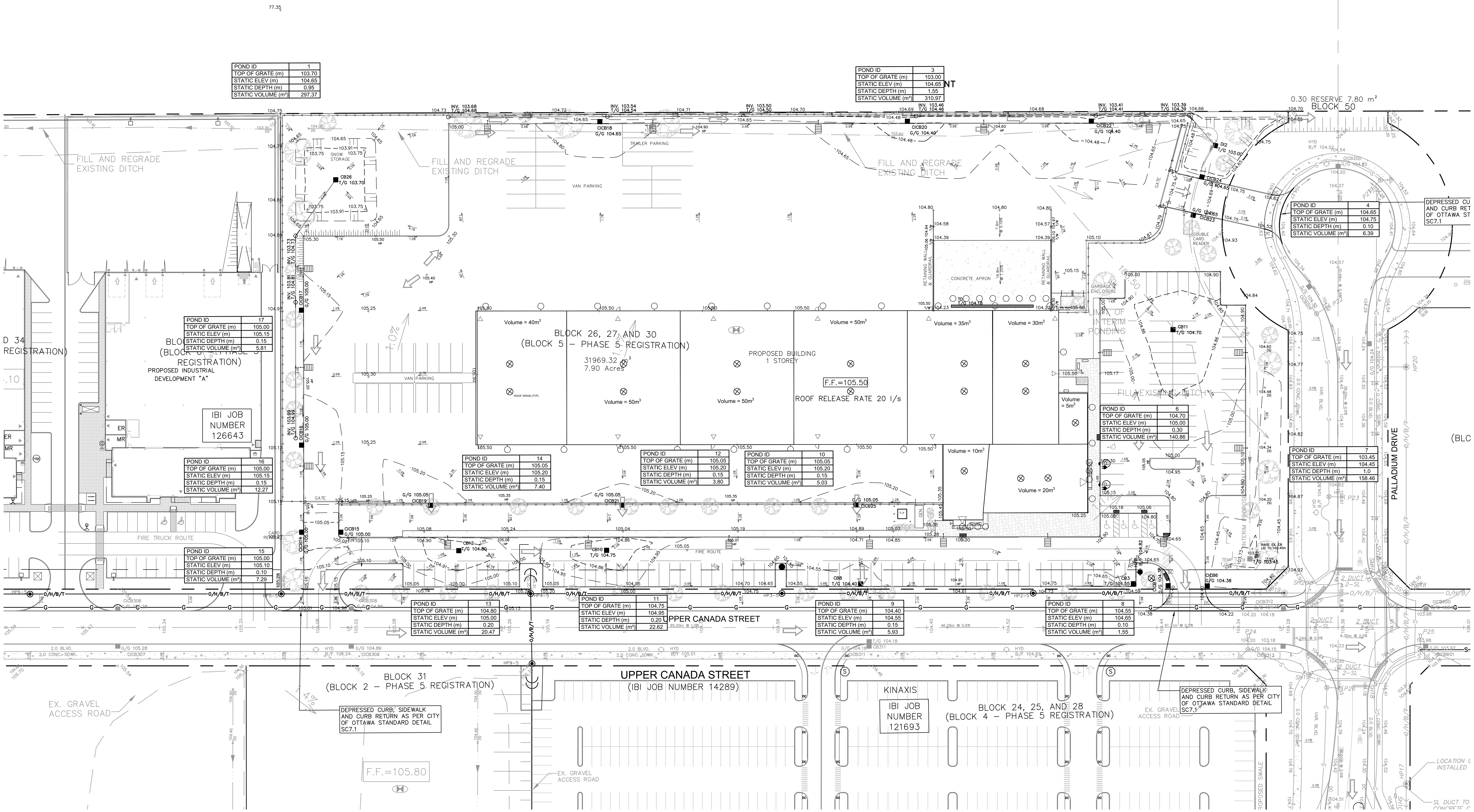
Scale
1:500

Design	Date
J.B.	AUG . 2020
Drawn: J.B/D.P.S.	Checked: T.R.B.
Project No. 123987	Drawing No. C-500

CITY PLAN No. 18260
CITY FILE No. D07-12-20-0125

S:\123987_KNP\Production\7.0_Production\7.03_Design\04_Civil\Sheets\C-500.dwg Layout Name: C-500 STORM DRAINAGE AREA PLAN Plot Style: AIA STANDARD-FULL.CTB Plot Scale: 1:25.4 Printed At: 12/18/2020 11:12 AM Last Saved By:

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



SEE 010, FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS

100 YEAR PONDING VOLUME LIMIT
5 YEAR PONDING ELEVATION
MAX PONDING ELEVATION

KEY PLAN
N.T.S.

SUBJECT AREA

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3	REVISED AS PER CITY COMMENTS	T.R.B	2020:12:18
2	ISSUED FOR 30% REVIEW	T.R.B	2020:11:13
1	ISSUED FOR SPA	T.R.B	2020:09:17

TAGGART REALTY MANAGEMENT

IBI GROUP
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Project Title
Purolator
DISTRIBUTION KANATA
1400 UPPER CANADA STREET, KANATA, ONTARIO

LICENSED PROFESSIONAL ENGINEER
T. R. BRULE
2020/12/18
PROVINCE OF ONTARIO

Drawing Title
PONDING PLAN

Scale
1:500

Design	Date
J.B.	AUG. 2020
Drawn	Checked
J.B/D.P.S.	T.R.B.
Project No.	Drawing No.
123987	C-600

CITY PLAN No. 18260
CITY FILE No. D07-12-20-0125

Roof Ponding Information
i. 16 flow control roof drains proposed
ii. All drains to be Watts RD100 with flow control or approved equivilant
iii. Maximum depth of storage 150mm
iv. Flow per drain to be maximum 1.25 litres/second, total flow from roof 20 litres/second
v. Scupper locations not yet established

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STORM SEWER DESIGN SHEET

Purolator Inc.
City of Ottawa

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW													SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.25	C= 0.30	C= 0.50	C= 0.57	C= 0.65	C= 0.69	C= 0.70	C= 0.76	C= 0.90	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
Purolator - 2 yr	CICB18	MH6	MH7										0.33	0.83	0.83	10.00	1.85	11.85	76.81	104.19	122.14	178.56	63.41	86.03	100.85	147.43		63.41	91.46	89.07	375			0.25	0.802	28.04	30.66%
Purolator - 2 yr	CICB20, CICB22	MH7	MH8										0.48	1.20	2.03	11.85	2.08	13.93	70.36	95.34	111.71	163.24	142.60	193.21	226.40	330.83										
																11.85	2.08	13.93	70.36	95.34	111.71	163.24	0.00	0.00	0.00	0.00		142.60	173.76	97.17	525			0.15	0.778	31.17	17.94%
Purolator	L2, CICB23	MH8	MH11			0.09							0.04	0.18	2.20	13.93	0.52	14.45	64.41	87.17	102.10	149.13	141.81	191.93	224.80	328.35										
																13.93	0.52	14.45	64.41	87.17	102.10	149.13	0.00	0.00	0.00	0.00		141.81	224.33	31.15	525			0.25	1.004	82.52	36.79%
Purolator	CB11	MH11	MH9										0.22	0.55	2.75	14.45	0.39	14.84	63.10	85.38	99.99	146.03	173.65	234.97	275.20	401.91										
Purolator - 100yr	*UN1*	*MH8*	*MH9*										*0.08*	0.20	0.20	14.45	0.39	14.84	63.10	85.38	99.99	146.03	12.63	17.09	20.01	29.23		202.88	245.74	25.46	525			0.30	1.100	42.86	17.44%
Purolator		MH9	MH1											0.00	2.75	14.84	0.79	15.63	62.16	84.09	98.48	143.81	171.07	231.43	271.03	395.80										
Purolator - 100yr	*UN1*	*MH9*	*MH1*											0.00	0.20	14.84	0.79	15.63	62.16	84.09	98.48	143.81	12.44	16.83	19.71	28.79		199.85	245.74	52.13	525			0.30	1.100	45.89	18.67%
Purolator	L1, CB17, CICB16	MH10	MH5			0.19							0.25	0.78	0.78	10.00	1.49	11.49	76.81	104.19	122.14	178.56	60.21	81.68	95.75	139.98		60.21	91.46	71.59	375			0.25	0.802	31.24	34.16%
Purolator	CICB15, CICB19, CB12, CB10, CICB21	MH5	MH4										0.37	0.93	1.71	11.49	1.44	12.93	71.53	96.94	113.60	166.02	122.29	165.74	194.23	283.84		122.29	148.72	78.35	450			0.25	0.906	26.42	17.77%
Purolator		MH4	MH2											0.00	1.71	12.93	0.92	13.85	67.13	90.91	106.50	155.58	114.77	155.42	182.08	266.00		114.77	148.72	49.83	450			0.25	0.906	33.94	22.82%
Purolator	R1	BLDG	MH3										0.62	1.55	1.55	10.00	0.15	10.15	76.81	104.19	122.14	178.56	119.14	161.63	189.47	276.99		119.14	182.91	14.24	375			1.00	1.604	63.77	34.86%
Purolator		MH3	MH2											0.00	1.55	10.15	0.13	10.28	76.24	103.42	121.23	177.22	118.27	160.43	188.05	274.91		118.27	182.91	12.43	375			1.00	1.604	64.64	35.34%
Purolator	CICB25, CB8, CB3	MH2	MH1										0.34	0.85	4.11	13.85	1.32	15.16	64.63	87.48	102.47	149.67	265.75	359.69	421.31	615.38		265.75	350.85	94.95	600			0.30	1.202	85.10	24.26%
Purolator	CICB 6 7	MH1	BLKHD										0.07	0.18	7.04	15.16	0.08	15.24	61.39	83.04	97.24	142.00	432.10	584.49	684.47	999.50										
Purolator - 100yr	*UN1*	*MH1*	*BLKHD*											0.00	0.20	15.24	0.08	15.32	61.21	82.79	96.95	141.57	12.25	16.57	19.41	28.34		460.44	640.56	10.14	600			1.00	2.195	180.12	28.12%
Purolator		BLKHD	MH156B											0.00	7.04	15.24	0.07	15.31	61.21	82.79	96.95	141.57	430.84	582.77	682.44	996.53										
Purolator - 100yr	*UN1*	*BLKHD*	*MH156B*											0.00	0.20	15.31	0.07	15.38	61.05	82.58	96.70	141.20	12.22	16.53	19.36	28.26		459.11	640.56	9.00	600			1.00	2.195	181.45	28.33%
																															600						

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

Notes:
1. Mannings coefficient (n) = 0.013

Designed: JEB

Checked: TRB

Dwg. Reference: 123987-500

No.	Revision	Date
1.	Issued for Site Plan Application	2020-09-17
2.	Revised per City comments	2020-12-18

File Reference:	Date:	Sheet No:
123987.7.03	2020-09-17	1 of 1

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

PROJECT: Purolator
DATE: 2020-08-20
FILE: 123987
REV #: 2 2020-12-18
DESIGNED BY: JEB
CHECKED BY: TB

STORMWATER MANAGEMENT

Formulas and Descriptions

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

Maximum Allowable Release Rate

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

		KWBP Minor System Flow (Table 4.2) L/s
Area ID	155A	525

Q_{TOTAL} =	525.00	L/s

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

C =	0.99	Drainage area UN1 (increased by 25%)
T_c =	10	min
i_{100yr} =	178.56	mm/hr
$A_{uncontrolled}$ =	0.15	Ha

$Q_{uncontrolled}$ =	73.71	L/s

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

$Q_{max\ allowable}$ =	451.29	L/s

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

Drainage Area	***L1***	***Ponding IDs***	***1***
Area (Ha)	0.190		
C =	0.38	Restricted Flow Q_r (L/s)=	6.00

100-Year Ponding

T_c Variable (min)	***i_{100yr} (mm/hour)***	***Peak Flow Q_p =2.78xCi $_{100yr}$ A (L/s)***	***Q_r (L/s)***	***Q_p-Q_r (L/s)***	***Volume 100yr (m^3)***
25	103.85	20.57	6.00	14.57	21.85
27	98.66	19.54	6.00	13.54	21.94
28	96.27	19.07	6.00	13.07	**21.96**
29	94.01	18.62	6.00	12.62	21.96
31	89.83	17.79	6.00	11.79	21.93

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
79.52	101.47	297.37	0.00	0.00

Drainage Area	***L1***	***Ponding IDs***	***1***	ICD Flow Rate
Area (Ha)	0.190			
C =	0.30	Restricted Flow Q_r (L/s)=	6.00	12

5-Year Ponding

T_c Variable (min)	***i_{5yr} (mm/hour)***	***Peak Flow Q_p =2.78xCi $_{5yr}$ A (L/s)***	***Q_r (L/s)***	***Q_p-Q_r (L/s)***	***Volume 5yr (m^3)***
11	99.19	15.72	6.00	9.72	6.41
13	90.63	14.36	6.00	8.36	6.52
14	86.93	13.78	6.00	7.78	**6.53**
15	83.56	13.24	6.00	7.24	6.52
17	77.61	12.30	6.00	6.30	6.42

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	6.53	297.37	0.00	0.00

Drainage Area	***L1***	***Ponding IDs***	***1***	ICD Flow Rate
Area (Ha)	0.190			
C =	0.30	Restricted Flow Q_r (L/s)=	6.00	12

2-Year Ponding

T_c Variable (min)	***i_{2yr} (mm/hour)***	***Peak Flow Q_p =2.78xCi $_{2yr}$ A (L/s)***	***Q_r (L/s)***	***Q_p-Q_r (L/s)***	***Volume 2yr (m^3)***
7	90.66	14.37	6.00	8.37	3.51
9	80.87	12.82	6.00	6.82	3.68
10	76.81	12.17	6.00	6.17	**3.70**
11	73.17	11.59	6.00	5.59	3.69
13	66.93	10.61	6.00	4.61	3.59

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	3.70	297.37	0.00	0.00

Drainage Area	CICB18/CICB20 /CICB22/L2	Ponding IDs	3
Area (Ha)	0.900		
C =	1.00	Restricted Flow Q_r (L/s)=	36.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
116	33.78	84.51	18.00	66.51	462.90
118	33.33	83.39	18.00	65.39	462.96
119	33.11	82.84	18.00	64.84	**462.98**
120	32.89	82.30	18.00	64.30	462.98
122	32.47	81.25	18.00	63.25	462.97

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	462.98	310.97	160.91	0.00

In-Pipe Storage

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)	
97.17	0.525	0.216	21.02	
89.07	0.375	0.110	9.83	
18.40	0.200	0.031	0.58	
203.00	0.375	0.110	22.41	*PERF
			53.84	

Drainage Area	CICB20/CICB22/L2	Ponding IDs	8
Area (Ha)	0.900		
C =	0.80	Restricted Flow Q_r (L/s)=	36.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
55	35.12	70.30	18.00	52.30	172.60
57	34.21	68.48	18.00	50.48	172.65
58	33.78	67.61	18.00	49.61	**172.65**
59	33.36	66.76	18.00	48.76	172.62
61	32.54	65.14	18.00	47.14	172.53

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	172.65	310.97	160.91	0.00

Structure Storage

	Number	Depth	Area (m^2)	Volume (m^3)
CBs (600mm x 600mm)	4	1.70	0.36	2.45
MHs (1200mm round)	3	2.20	1.13	7.46
				9.91

Drainage Area	CICB20/CICB22/L2	Ponding IDs	8
Area (Ha)	0.900		
C =	0.80	Restricted Flow Q_r (L/s)=	36.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
41	32.30	64.65	18.00	46.65	114.76
43	31.23	62.51	18.00	44.51	114.84
44	30.73	61.50	18.00	43.50	**114.85**
45	30.24	60.53	18.00	42.53	114.82
47	29.32	58.68	18.00	40.68	114.71

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	114.85	310.97	160.91	0.00

Pref - Pipe Storage

Length (m)	Width (m)	Depth(m)	Void Ratio	Pipe Volume	Stone Volume (m^3)
203.00	1.000	1.550	0.38	22.41	97.16
					97.16

Depth of perf pipe storage obtained by taking ponding spill elevation (104.65, minus average pipe invert elevation, minus .1m topsoil, plus 0.6m clear stone depth below perf pipe

Drainage Area	CICB23	Ponding IDs	4
Area (Ha)	0.040		
C =	0.75	Restricted Flow Q_r (L/s)=	12.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
2	315.00	26.27	12.00	14.27	1.71
4	262.41	21.88	12.00	9.88	2.37
5	242.70	20.24	12.00	8.24	**2.47**
6	226.01	18.85	12.00	6.85	2.47
8	199.20	16.61	12.00	4.61	2.21

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.47	6.39	0.00	0.00

Drainage Area	CICB23	Ponding IDs	4
Area (Ha)	0.040		
C =	0.60	Restricted Flow Q_r (L/s)=	12.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
-2	319.47	21.32	12.00	9.32	-1.12
0	230.48	15.38	12.00	3.38	0.00
1	203.51	13.58	12.00	1.58	**0.09**
2	182.69	12.19	12.00	0.19	0.02
4	152.51	10.18	12.00	-1.82	-0.44

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.09	6.39	0.00	0.00

Drainage Area	CICB23	Ponding IDs	4
Area (Ha)	0.040		
C =	0.60	Restricted Flow Q_r (L/s)=	12.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
-3	285.77	19.07	12.00	7.07	-1.27
-1	192.83	12.87	12.00	0.87	-0.05
0	167.22	11.16	12.00	-0.84	**0.00**
1	148.14	9.88	12.00	-2.12	-0.13
3	121.46	8.10	12.00	-3.90	-0.70

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	6.39	0.00	0.00

Drainage Area	CB11	Ponding IDs	6
Area (Ha)	0.220		
C =	1.00	Restricted Flow Q_r (L/s)=	33.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
14	148.72	90.96	33.00	57.96	48.69
16	137.55	84.13	33.00	51.13	49.08
17	132.63	81.12	33.00	48.12	**49.08**
18	128.08	78.34	33.00	45.34	48.96
20	119.95	73.36	33.00	40.36	48.43

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	49.08	140.86	0.00	0.00

Drainage Area	CB11	Ponding IDs	8
Area (Ha)	0.220		
C =	0.90	Restricted Flow Q_r (L/s)=	33.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
5	141.18	77.71	33.00	44.71	13.41
7	123.30	67.87	33.00	34.87	14.65
8	116.11	63.91	33.00	30.91	**14.84**
9	109.79	60.43	33.00	27.43	14.81
11	99.19	54.60	33.00	21.60	14.26

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	14.84	140.86	0.00	0.00

Drainage Area	CB11	Ponding IDs	8
Area (Ha)	0.220		
C =	0.90	Restricted Flow Q_r (L/s)=	33.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
3	121.46	66.86	33.00	33.86	6.09
5	103.57	57.01	33.00	24.01	7.20
6	96.64	53.19	33.00	20.19	**7.27**
7	90.66	49.91	33.00	16.91	7.10
9	80.87	44.52	33.00	11.52	6.22

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	7.27	140.86	0.00	0.00

overflows to: 0

Drainage Area	L3	Ponding IDs	7
Area (Ha)	0.110		
C =	0.38	Restricted Flow Q_r (L/s)=	6.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
14	148.72	17.05	6.00	11.05	9.29
16	137.55	15.77	6.00	9.77	9.38
17	132.63	15.21	6.00	9.21	**9.39**
18	128.08	14.69	6.00	8.69	9.38
20	119.95	13.76	6.00	7.76	9.31

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	9.39	158.46	0.00	0.00

Drainage Area	L3	Ponding IDs	7
Area (Ha)	0.110		
C =	0.30	Restricted Flow Q_r (L/s)=	6.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
5	141.18	12.95	6.00	6.95	2.09
7	123.30	11.31	6.00	5.31	2.23
8	116.11	10.65	6.00	4.65	**2.23**
9	109.79	10.07	6.00	4.07	2.20
11	99.19	9.10	6.00	3.10	2.05

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.23	158.46	0.00	0.00

Drainage Area	L3	Ponding IDs	7
Area (Ha)	0.110		
C =	0.30	Restricted Flow Q_r (L/s)=	6.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
2	133.33	12.23	6.00	6.23	0.75
4	111.72	10.25	6.00	4.25	1.02
5	103.57	9.50	6.00	3.50	**1.05**
6	96.64	8.87	6.00	2.87	1.03
8	85.46	7.84	6.00	1.84	0.88

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.05	158.46	0.00	0.00

Drainage Area	CICB17	Ponding IDs	17
Area (Ha)	0.140		
C =	1.00	Restricted Flow Q_r (L/s)=	6.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
52	62.14	24.19	6.00	18.19	56.74
54	60.44	23.52	6.00	17.52	56.77
55	59.62	23.21	6.00	17.21	**56.78**
56	58.83	22.90	6.00	16.90	56.78
58	57.32	22.31	6.00	16.31	56.76

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	56.78	5.81	0.00	50.97

Drainage Area	CICB17	Ponding IDs	17
Area (Ha)	0.140		
C =	0.90	Restricted Flow Q_r (L/s)=	6.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
28	56.49	19.79	6.00	13.79	23.16
30	53.93	18.89	6.00	12.89	23.20
31	52.74	18.47	6.00	12.47	**23.20**
32	51.61	18.08	6.00	12.08	23.19
34	49.50	17.34	6.00	11.34	23.13

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	23.20	5.81	0.00	17.39

#REF!

Drainage Area	CICB17	Ponding IDs	17
Area (Ha)	0.140		
C =	0.90	Restricted Flow Q_r (L/s)=	6.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
20	52.03	18.23	6.00	12.23	14.67
22	49.02	17.17	6.00	11.17	14.75
23	47.66	16.69	6.00	10.69	**14.76**
24	46.37	16.24	6.00	10.24	14.75
26	44.03	15.42	6.00	9.42	14.70

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	14.76	5.81	0.00	8.95

overflows to: L1

Drainage Area	CICB16	Ponding IDs	16
Area (Ha)	0.110		
C =	1.00	Restricted Flow Q_r (L/s)=	6.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
41	73.83	22.58	6.00	16.58	40.78
43	71.35	21.82	6.00	15.82	40.81
44	70.18	21.46	6.00	15.46	**40.82**
45	69.05	21.12	6.00	15.12	40.81
47	66.91	20.46	6.00	14.46	40.78

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	40.82	12.27	0.00	28.55

Drainage Area	CICB16	Ponding IDs	8
Area (Ha)	0.110		
C =	0.90	Restricted Flow Q_r (L/s)=	6.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
21	68.13	18.75	6.00	12.75	16.07
23	64.29	17.69	6.00	11.69	16.14
24	62.54	17.21	6.00	11.21	**16.15**
25	60.90	16.76	6.00	10.76	16.14
27	57.88	15.93	6.00	9.93	16.09

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
17.39	33.54	12.27	0.00	21.27

Drainage Area	CICB16	Ponding IDs	8
Area (Ha)	0.110		
C =	0.90	Restricted Flow Q_r (L/s)=	6.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
15	61.77	17.00	6.00	11.00	9.90
17	57.42	15.80	6.00	9.80	10.00
18	55.49	15.27	6.00	9.27	**10.01**
19	53.70	14.78	6.00	8.78	10.01
21	50.48	13.89	6.00	7.89	9.94

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
8.95	18.96	12.27	0.00	6.69

overflows to: L1

Drainage Area	CICB25	Ponding IDs	10
Area (Ha)	0.080		
C =	1.00	Restricted Flow Q_r (L/s)=	40.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
1	351.38	78.15	40.00	38.15	2.29
3	286.05	63.62	40.00	23.62	4.25
4	262.41	58.36	40.00	18.36	**4.41**
5	242.70	53.98	40.00	13.98	4.19
7	211.67	47.07	40.00	7.07	2.97

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	4.41	5.03	0	0.00

Drainage Area	CICB25		
Area (Ha)	0.080		
C =	0.90	Restricted Flow Q_r (L/s)=	40.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
-2	319.47	63.95	40.00	23.95	-2.87
0	230.48	46.13	40.00	6.13	0.00
1	203.51	40.73	40.00	0.73	**0.04**
2	182.69	36.57	40.00	-3.43	-0.41
4	152.51	30.53	40.00	-9.47	-2.27

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.04	5.03	0	0.00

Drainage Area	CICB25		
Area (Ha)	0.080		
C =	0.90	Restricted Flow Q_r (L/s)=	40.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
-4	387.14	77.49	40.00	37.49	-9.00
-2	229.26	45.89	40.00	5.89	-0.71
-1	192.83	38.60	40.00	-1.40	**0.08**
0	167.22	33.47	40.00	-6.53	0.00
2	133.33	26.69	40.00	-13.31	-1.60

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.08	5.03	0	0.00

Drainage Area	CICB21	Ponding IDs	12
Area (Ha)	0.090		
C =	1.00	Restricted Flow Q_r (L/s)=	50.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
0	398.62	99.73	50.00	49.73	0.00
2	315.00	78.81	50.00	28.81	3.46
3	286.05	71.57	50.00	21.57	**3.88**
4	262.41	65.65	50.00	15.65	3.76
6	226.01	56.55	50.00	6.55	2.36

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	3.88	3.80	0.00	0.08

Drainage Area	CICB21	Ponding IDs	12
Area (Ha)	0.090		
C =	0.90	Restricted Flow Q_r (L/s)=	50.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
-3	402.34	90.60	50.00	40.60	-7.31
-1	266.98	60.12	50.00	10.12	-0.61
0	230.48	51.90	50.00	1.90	**0.00**
1	203.51	45.83	50.00	-4.17	-0.25
3	166.09	37.40	50.00	-12.60	-2.27

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	3.80	0.00	0.00

Drainage Area	CICB21	Ponding IDs	12
Area (Ha)	0.090		
C =	0.90	Restricted Flow Q_r (L/s)=	50.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
-4	387.14	87.18	50.00	37.18	-8.92
-2	229.26	51.62	50.00	1.62	-0.19
-1	192.83	43.42	50.00	-6.58	**0.39**
0	167.22	37.66	50.00	-12.34	0.00
2	133.33	30.02	50.00	-19.98	-2.40

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.39	3.80	0.00	0.00

Drainage Area	CICB19	Ponding IDs	14
Area (Ha)	0.060		
C =	1.00	Restricted Flow Q_r (L/s)=	20.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
4	262.41	43.77	20.00	23.77	5.70
6	226.01	37.70	20.00	17.70	6.37
7	211.67	35.31	20.00	15.31	**6.43**
8	199.20	33.23	20.00	13.23	6.35
10	178.56	29.78	20.00	9.78	5.87

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	6.43	7.40	0.00	0.00

Drainage Area	CICB19	Ponding IDs	14
Area (Ha)	0.060		
C =	0.90	Restricted Flow Q_r (L/s)=	20.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
1	203.51	30.55	20.00	10.55	0.63
3	166.09	24.93	20.00	4.93	0.89
4	152.51	22.89	20.00	2.89	**0.69**
5	141.18	21.19	20.00	1.19	0.36
7	123.30	18.51	20.00	-1.49	-0.63

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.69	7.40	0.00	0.00

Drainage Area	CICB19	Ponding IDs	14
Area (Ha)	0.060		
C =	0.90	Restricted Flow Q_r (L/s)=	20.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
-1	192.83	28.95	20.00	8.95	-0.54
1	148.14	22.24	20.00	2.24	0.13
2	133.33	20.02	20.00	0.02	**0.00**
3	121.46	18.23	20.00	-1.77	-0.32
5	103.57	15.55	20.00	-4.45	-1.34

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	7.40	0.00	0.00

Drainage Area	CB 14 15	Ponding IDs	15
Area (Ha)	0.030		
C =	1.00	Restricted Flow Q_r (L/s)=	6.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
9	188.25	15.70	6.00	9.70	5.24
11	169.91	14.17	6.00	8.17	5.39
12	162.13	13.52	6.00	7.52	**5.42**
13	155.11	12.94	6.00	6.94	5.41
15	142.89	11.92	6.00	5.92	5.33

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	5.42	7.29	0.00	0.00

Drainage Area	CB 14 15	Ponding IDs	8
Area (Ha)	0.030		
C =	0.90	Restricted Flow Q_r (L/s)=	6.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
3	166.09	12.47	6.00	6.47	1.16
5	141.18	10.60	6.00	4.60	1.38
6	131.57	9.88	6.00	3.88	**1.40**
7	123.30	9.26	6.00	3.26	1.37
9	109.79	8.24	6.00	2.24	1.21

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.40	7.29	0.00	0.00

Drainage Area	CB 14 15	Ponding IDs	8
Area (Ha)	0.030		
C =	0.90	Restricted Flow Q_r (L/s)=	6.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
1	148.14	11.12	6.00	5.12	0.31
3	121.46	9.12	6.00	3.12	0.56
4	111.72	8.39	6.00	2.39	**0.57**
5	103.57	7.77	6.00	1.77	0.53
7	90.66	6.81	6.00	0.81	0.34

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.57	7.29	0.00	0.00

overflows to: 0

Drainage Area	CB12	Ponding IDs	13
Area (Ha)	0.090		
C =	1.00	Restricted Flow Q_r (L/s)=	20.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
8	199.20	49.84	20.00	29.84	14.32
10	178.56	44.68	20.00	24.68	14.81
11	169.91	42.51	20.00	22.51	**14.86**
12	162.13	40.57	20.00	20.57	14.81
14	148.72	37.21	20.00	17.21	14.46

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	14.86	20.47	0	0.00

Drainage Area	CB12		
Area (Ha)	0.090		
C =	0.90	Restricted Flow Q_r (L/s)=	20.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
2	182.69	41.14	20.00	21.14	2.54
4	152.51	34.34	20.00	14.34	3.44
5	141.18	31.79	20.00	11.79	**3.54**
6	131.57	29.63	20.00	9.63	3.47
8	116.11	26.15	20.00	6.15	2.95

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	3.54	20.47	0	0.00

Drainage Area	CB12		
Area (Ha)	0.090		
C =	0.90	Restricted Flow Q_r (L/s)=	20.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
0	167.22	37.66	20.00	17.66	0.00
2	133.33	30.02	20.00	10.02	1.20
3	121.46	27.35	20.00	7.35	**1.32**
4	111.72	25.16	20.00	5.16	1.24
6	96.64	21.76	20.00	1.76	0.63

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.32	20.47	0	0.00

Drainage Area	CB10	Ponding IDs	11
Area (Ha)	0.100		
C =	1.00	Restricted Flow Q_r (L/s)=	20.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{100yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
9	188.25	52.33	20.00	32.33	17.46
11	169.91	47.23	20.00	27.23	17.97
12	162.13	45.07	20.00	25.07	**18.05**
13	155.11	43.12	20.00	23.12	18.03
15	142.89	39.72	20.00	19.72	17.75

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	18.05	22.62	0.00	0.00

Drainage Area	CB10	Ponding IDs	11
Area (Ha)	0.100		
C =	0.90	Restricted Flow Q_r (L/s)=	20.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{5yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
3	166.09	41.55	20.00	21.55	3.88
5	141.18	35.32	20.00	15.32	4.60
6	131.57	32.92	20.00	12.92	**4.65**
7	123.30	30.85	20.00	10.85	4.56
9	109.79	27.47	20.00	7.47	4.03

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	4.65	22.62	0.00	0.00

#REF!

Drainage Area	CB10	Ponding IDs	11
Area (Ha)	0.100		
C =	0.90	Restricted Flow Q_r (L/s)=	20.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{2yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
1	148.14	37.07	20.00	17.07	1.02
3	121.46	30.39	20.00	10.39	1.87
4	111.72	27.95	20.00	7.95	**1.91**
5	103.57	25.91	20.00	5.91	1.77
7	90.66	22.68	20.00	2.68	1.13

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.91	22.62	0.00	0.00

Drainage Area	CB8	Ponding IDs	9
Area (Ha)	0.160		
C =	1.00	Restricted Flow Q_r (L/s)=	105.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{100yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
-1	462.72	205.82	105.00	100.82	-6.05
1	351.38	156.29	105.00	51.29	3.08
2	315.00	140.11	105.00	35.11	**4.21**
3	286.05	127.23	105.00	22.23	4.00
5	242.70	107.95	105.00	2.95	0.89

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	4.21	5.93	0.00	0.00

Drainage Area	CB8	Ponding IDs	8
Area (Ha)	0.160		
C =	0.90	Restricted Flow Q_r (L/s)=	105.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{5yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
-3	402.34	161.06	105.00	56.06	-10.09
-1	266.98	106.88	105.00	1.88	-0.11
0	230.48	92.27	105.00	-12.73	**0.00**
1	203.51	81.47	105.00	-23.53	-1.41
3	166.09	66.49	105.00	-38.51	-6.93

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.00	5.93	0.00	0.00

Drainage Area	CB8	Ponding IDs	8
Area (Ha)	0.160		
C =	0.90	Restricted Flow Q_r (L/s)=	105.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78 x C i_{2yr} A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
-4	387.14	154.98	105.00	49.98	-12.00
-2	229.26	91.78	105.00	-13.22	1.59
-1	192.83	77.19	105.00	-27.81	**1.67**
0	167.22	66.94	105.00	-38.06	0.00
2	133.33	53.37	105.00	-51.63	-6.20

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.67	5.93	0.00	0.00

overflows to: 0

Drainage Area	CB3	Ponding IDs	8
Area (Ha)	0.100		
C =	1.00	Restricted Flow Q_r (L/s)=	65.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
-1	462.72	128.64	65.00	63.64	-3.82
1	351.38	97.68	65.00	32.68	1.96
2	315.00	87.57	65.00	22.57	**2.71**
3	286.05	79.52	65.00	14.52	2.61
5	242.70	67.47	65.00	2.47	0.74

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.71	1.55	0	1.16

Drainage Area	CB3		
Area (Ha)	0.100		
C =	0.90	Restricted Flow Q_r (L/s)=	65.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
-4	555.75	139.05	65.00	74.05	-17.77
-2	319.47	79.93	65.00	14.93	-1.79
-1	266.98	66.80	65.00	1.80	**-0.11**
0	230.48	57.67	65.00	-7.33	0.00
2	182.69	45.71	65.00	-19.29	-2.31

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	-0.11	1.55	0	0.00

Drainage Area	CB3		
Area (Ha)	0.100		
C =	0.90	Restricted Flow Q_r (L/s)=	65.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
-5	632.75	158.31	65.00	93.31	-27.99
-3	285.77	71.50	65.00	6.50	-1.17
-2	229.26	57.36	65.00	-7.64	**0.92**
-1	192.83	48.25	65.00	-16.75	1.01
1	148.14	37.07	65.00	-27.93	-1.68

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	0.92	1.55	0	0.00

Drainage Area	R1		
Area (Ha)	0.620		
C =	1.00	Restricted Flow Q_r (L/s)=	20.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
70	49.79	85.82	20.00	65.82	276.43
72	48.74	84.01	20.00	64.01	276.52
73	48.23	83.14	20.00	63.14	**276.54**
74	47.74	82.28	20.00	62.28	276.54
76	46.78	80.63	20.00	60.63	276.49

Storage (m^3)

Overflow	Required	Roof	Sub-surface	Balance
0.00	276.54		0	276.54

Drainage Area	R1		
Area (Ha)	0.620		
C =	0.90	Restricted Flow Q_r (L/s)=	20.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
37	46.67	72.40	20.00	52.40	116.34
39	44.98	69.78	20.00	49.78	116.48
40	44.18	68.54	20.00	48.54	**116.50**
41	43.42	67.35	20.00	47.35	116.49
43	41.97	65.11	20.00	45.11	116.38

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	116.50	0.00	0	116.50

Drainage Area	R1		
Area (Ha)	0.620		
C =	0.90	Restricted Flow Q_r (L/s)=	20.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
28	41.93	65.04	20.00	45.04	75.67
30	40.04	62.12	20.00	42.12	75.81
31	39.17	60.76	20.00	40.76	**75.82**
32	38.34	59.47	20.00	39.47	75.78
34	36.78	57.06	20.00	37.06	75.60

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	75.82	0.00	0	75.82

overflows to: 0

SUMMARY OF INFILTRATION GALLERY CALCULATIONS

AVERAGE SILTY SAND PERCOLATION RATE

annual precipitation (mm)	920
95% available runoff (mm)	874
area (ha)	3.19

								Infiltration Gallery Overflow (%)			Overflow Volume (m^3)			Infiltration Volume (m^3)		
Building ID	Area (m^2)	Available Runoff Volume (m^3)	Gallery ID	Width (m)	Length (m)	Area (m2)	Depth (m)	WET YEAR	DRY YEAR	AVERAGE	WET YEAR	DRY YEAR	AVERAGE	WET YEAR	DRY YEAR	AVERAGE
Roof	6089	5322	1	5	42	210	0.6	43.69%	19.28%	31.49%	2325	1026	1676	2997	4296	3646
TOTAL		5322											1676			3646

AVERAGE INFILTRATION RATE	114.30
REQUIRED INFILTRATION RATE	106

INFILTRATION GALLERY SIZING CALCULATION

WET YEAR CALCULATION

Roof	6089	m^2	PRECIPITATION DATA APRIL 1 TO OCTOBER 31 (WET YEAR)		
Effective Runoff	0.95	%	TOT PRECIP DEPTH	800.4	mm
Percolation	0.504	(m/day, avg sandy silt)	TOTAL PRECIP VOLUME	4629	m3
INFILTRATION GALLERY SIZING					
Width	5	m	DEVELOPMENT AREA	3.19	ha
Length	42	m			
depth	0.6	m	OVERFLOW VOL	2022	m3/year
Number Cells	1				
void ratio	0.38		RUNOFF VOLUME OVERFLOW	43.69%	
	47.88	TOTAL DRYCELL VOL			

DATE	RAINFALL	RAINFALL INTENSITY (AVG)	RAINWATER AVAILABLE	VOLUME INFLOW TO DRYCELL	VOLUME IN DRY CELL	VOLUME PASSING DRY CELL	INFILTRATION FROM BOTTOM	INFILTRATION FROM SIDES (BOTTOM 1/3)	BALANCE IN DRYCELL
	[MM]	[MM/HR]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]
01-Apr	0.2	0.008	0	0	0	0	0	0	0
02-Apr	0.4	0.017	2	2	2	0	2	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	45	45	45	0	45	0	0
07-Apr	3.4	0.142	20	20	20	0	20	0	0
08-Apr	4.6	0.192	27	27	27	0	27	0	0
09-Apr	4.2	0.175	24	24	24	0	24	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	47	47	47	0	47	0	0
21-Apr	2.8	0.117	16	16	16	0	16	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	52	48	48	4	48	0	0
02-May	0	0.000	0	0	0	0	0	0	0
03-May	0	0.000	0	0	0	0	0	0	0
04-May	2.4	0.100	14	14	14	0	14	0	0
05-May	8	0.333	46	46	46	0	46	0	0
06-May	1	0.042	6	6	6	0	6	0	0
07-May	1.6	0.067	9	9	9	0	9	0	0
08-May	0.8	0.033	5	5	5	0	5	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	6	6	6	0	6	0	0
16-May	17.4	0.725	101	48	48	53	48	0	0
17-May	0	0.000	0	0	0	0	0	0	0
18-May	11	0.458	64	48	48	16	48	0	0
19-May	30.2	1.258	175	48	48	127	48	0	0
20-May	29.4	1.225	170	48	48	122	48	0	0
21-May	5.9	0.246	34	34	34	0	34	0	0
22-May	26.9	1.121	156	48	48	108	48	0	0
23-May	11.3	0.471	65	48	48	17	48	0	0
24-May	0.4	0.017	2	2	2	0	2	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	45	45	45	0	45	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	61	48	48	13	48	0	0
02-Jun	0	0.000	0	0	0	0	0	0	0
03-Jun	0	0.000	0	0	0	0	0	0	0
04-Jun	0	0.000	0	0	0	0	0	0	0
05-Jun	1.4	0.058	8	8	8	0	8	0	0
06-Jun	0	0.000	0	0	0	0	0	0	0
07-Jun	5	0.208	29	29	29	0	29	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	28	28	28	0	28	0	0
12-Jun	26.2	1.092	152	48	48	104	48	0	0
13-Jun	1	0.042	6	6	6	0	6	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	32	32	32	0	32	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	23	23	23	0	23	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	6	6	6	0	6	0	0
24-Jun	27.2	1.133	157	48	48	109	48	0	0
25-Jun	0	0.000	0	0	0	0	0	0	0
26-Jun	0	0.000	0	0	0	0	0	0	0
27-Jun	29	1.208	168	48	48	120	48	0	0
28-Jun	0	0.000	0	0	0	0	0	0	0
29-Jun	0.2	0.008	1	1	1	0	1	0	0
30-Jun	0	0.000	0	0	0	0	0	0	0
01-Jul	0	0.000	0	0	0	0	0	0	0
02-Jul	10	0.417	58	48	48	10	48	0	0
03-Jul	14.8	0.617	86	48	48	38	48	0	0
04-Jul	7.6	0.317	44	44	44	0	44	0	0
05-Jul	14.8	0.617	86	48	48	38	48	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	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	61	48	48	13	48	0	0
14-Jul	0.4	0.017	2	2	2	0	2	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	36	36	36	0	36	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	21	21	21	0	21	0	0
26-Jul	31.6	1.317	183	48	48	135	48	0	0
27-Jul	0	0.000	0	0	0	0	0	0	0
28-Jul	0	0.000	0	0	0	0	0	0	0
29-Jul	42.4	1.767	245	48	48	197	48	0	0
30-Jul	2.4	0.100	14	14	14	0	14	0	0
31-Jul	0	0.000	0	0	0	0	0	0	0
01-Aug	0.6	0.025	3	3	3	0	3	0	0
02-Aug	10.8	0.450	62	48	48	15	48	0	0
03-Aug	0	0.000	0	0	0	0	0	0	0
04-Aug	0	0.000	0	0	0	0	0	0	0
05-Aug	0.4	0.017	2	2	2	0	2	0	0
06-Aug	4	0.167	23	23	23	0	23	0	0
07-Aug	1.2	0.050	7	7	7	0	7	0	0
08-Aug	2.8	0.117	16	16	16	0	16	0	0
09-Aug	11	0.458	64	48	48	16	48	0	0
10-Aug	0	0.000	0	0	0	0	0	0	0
11-Aug	0	0.000	0	0	0	0	0	0	0
12-Aug	0	0.000	0	0	0	0	0	0	0
13-Aug	0	0.000	0	0	0	0	0	0	0
14-Aug	0	0.000	0	0	0	0	0	0	0
15-Aug	2	0.083	12	12	12	0	12	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	82	48	48	34	48	0	0
19-Aug	0	0.000	0	0	0	0	0	0	0
20-Aug	0	0.000	0	0	0	0	0	0	0
21-Aug	15.6	0.650	90	48	48	42	48	0	0
22-Aug	0	0.000	0	0	0	0	0	0	0
23-Aug	6.6	0.275	38	38	38	0	38	0	0
24-Aug	0.8	0.033	5	5	5	0	5	0	0
25-Aug	0	0.000	0	0	0	0	0	0	0
26-Aug	3.8	0.158	22	22	22	0	22	0	0
27-Aug	24.2	1.008	140	48	48	92	48	0	0
28-Aug	0.8	0.033	5	5	5	0	5	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	2	2	2	0	2	0	0
03-Sep	0	0.000	0	0	0	0	0	0	0
04-Sep	1.9	0.079	11	11	11	0	11	0	0
05-Sep	5.8	0.242	34	34	34	0	34	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	37	37	37	0	37	0	0
11-Sep	61.8	2.575	357	48	48	310	48	0	0
12-Sep	20.6	0.858	119	48	48	71	48	0	0
13-Sep	5.8	0.242	34	34	34	0	34	0	0
14-Sep	0	0.000	0	0	0	0	0	0	0
15-Sep	8.1	0.338	47	47	47	0	47	0	0
16-Sep	2.3	0.096	13	13	13	0	13	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	5	5	5	0	5	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	75	48	48	27	48	0	0
24-Sep	0	0.000	0	0	0	0	0	0	0
25-Sep	0	0.000	0	0	0	0	0	0	0
26-Sep	0	0.000	0	0	0	0	0	0	0
27-Sep	0	0.000	0	0	0	0	0	0	0
28-Sep	1.3	0.054	8	8	8	0	8	0	0
29-Sep	14.1	0.588	82	48	48	34	48	0	0
30-Sep	25.2	1.050	146	48	48	98	48	0	0
01-Oct	0	0.000	0	0	0	0	0	0	0
02-Oct	0.4	0.017	2	2	2	0	2	0	0
03-Oct	7.8	0.325	45	45	45	0	45	0	0
04-Oct	7.8	0.325	45	45	45	0	45	0	0
05-Oct	6	0.250	35	35	35	0	35	0	0
06-Oct	0.4	0.017	2	2	2	0	2	0	0
07-Oct	0	0.000	0	0	0	0	0	0	0
08-Oct	1	0.042	6	6	6	0	6	0	0
09-Oct	1.2	0.050	7	7	7	0	7	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	60	48	48	12	48	0	0
14-Oct	9	0.375	52	48	48	4	48	0	0
15-Oct	0	0.000	0	0	0	0	0	0	0
16-Oct	0.2	0.008	1	1	1	0	1	0	0
17-Oct	1.6	0.067	9	9	9	0	9	0	0
18-Oct	0	0.000	0	0	0	0	0	0	0
19-Oct	0	0.000	0	0	0	0	0	0	0
20-Oct	0	0.000	0	0	0	0	0	0	0
21-Oct	5.8	0.242	34	34	34	0	34	0	0
22-Oct	0	0.000	0	0	0	0	0	0	0
23-Oct	1	0.042	6	6	6	0	6	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	8	8	8	0	8	0	0
27-Oct	10.9	0.454	63	48	48	15	48	0	0
28-Oct	0	0.000	0	0	0	0	0	0	0
29-Oct	13	0.542	75	48	48	27	48	0	0
30-Oct	0	0.000	0	0	0	0	0	0	0
31-Oct	0	0.000	0	0	0	0	0	0	0

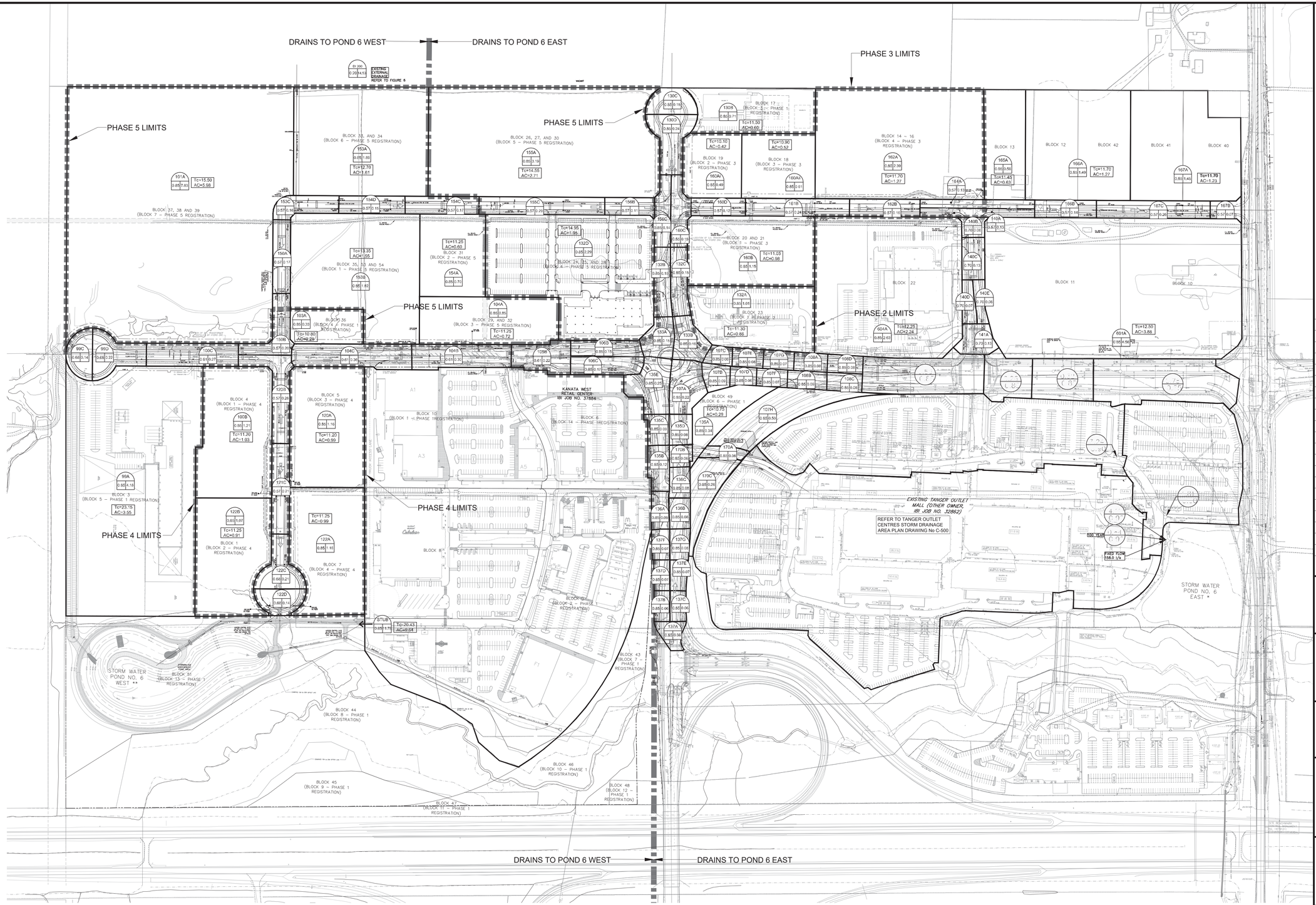
INFILTRATION GALLERY SIZING CALCULATION

DRY YEAR CALCULATION

Roof	6089	m^2	PRECIPITATION DATA APRIL 1 TO OCTOBER 31 (DRY YEAR)		
Effective Runoff	0.95	%	TOT PRECIP DEPTH	405.1	mm
Percolation	0.504	(m/day, avg silty sand)	TOTAL PRECIP VOLUME	2343	m3
INFILTRATION GALLERY SIZING					
Width	5	m	DEVELOPMENT AREA	3.19	ha
Length	42	m			
depth	0.6	m	OVERFLOW VOL	452	m3/year
Number Cells	1				
void ratio	0.38		RUNOFF VOLUME OVERFLOW	19.28%	
	47.88	TOTAL DRYCELL VOL			

DATE	RAINFALL	RAINFALL INTENSITY (AVG)	RAINWATER AVAILABLE	VOLUME INFLOW TO DRYCELL	VOLUME IN DRY CELL	VOLUME PASSING DRY CELL	INFILTRATION FROM BOTTOM	INFILTRATION FROM SIDES (BOTTOM 1/3)	BALANCE IN DRYCELL
	[MM]	[MM/HR]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]
01-Apr	0	0.000	0	0	0	0	0	0	0
02-Apr	0	0.000	0	0	0	0	0	0	0
03-Apr	0	0.000	0	0	0	0	0	0	0
04-Apr	15	0.625	87	48	48	39	48	0	0
05-Apr	0	0.000	0	0	0	0	0	0	0
06-Apr	0	0.000	0	0	0	0	0	0	0
07-Apr	0.3	0.013	2	2	2	0	2	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	6	6	6	0	6	0	0
13-Apr	1.6	0.067	9	9	9	0	9	0	0
14-Apr	5.9	0.246	34	34	34	0	34	0	0
15-Apr	2.3	0.096	13	13	13	0	13	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	40	40	40	0	40	0	0
23-Apr	4.8	0.200	28	28	28	0	28	0	0
24-Apr	0.3	0.013	2	2	2	0	2	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	62	48	48	15	48	0	0
30-Apr	1.6	0.067	9	9	9	0	9	0	0
01-May	3.8	0.158	22	22	22	0	22	0	0
02-May	0	0.000	0	0	0	0	0	0	0
03-May	11.3	0.471	65	48	48	17	48	0	0
04-May	0	0.000	0	0	0	0	0	0	0
05-May	0	0.000	0	0	0	0	0	0	0
06-May	4.1	0.171	24	24	24	0	24	0	0
07-May	3	0.125	17	17	17	0	17	0	0
08-May	0	0.000	0	0	0	0	0	0	0
09-May	23.4	0.975	135	48	48	87	48	0	0
10-May	0.5	0.021	3	3	3	0	3	0	0
11-May	0	0.000	0	0	0	0	0	0	0
12-May	22.3	0.929	129	48	48	81	48	0	0
13-May	0	0.000	0	0	0	0	0	0	0
14-May	0	0.000	0	0	0	0	0	0	0
15-May	2.3	0.096	13	13	13	0	13	0	0
16-May	0.3	0.013	2	2	2	0	2	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	49	48	48	1	48	0	0
23-May	10	0.417	58	48	48	10	48	0	0
24-May	3.4	0.142	20	20	20	0	20	0	0
25-May	6.2	0.258	36	36	36	0	36	0	0
26-May	1.9	0.079	11	11	11	0	11	0	0
27-May	0.3	0.013	2	2	2	0	2	0	0
28-May	1.3	0.054	8	8	8	0	8	0	0
29-May	1.1	0.046	6	6	6	0	6	0	0
30-May	0	0.000	0	0	0	0	0	0	0
31-May	10.9	0.454	63	48	48	15	48	0	0
01-Jun	0	0.000	0	0	0	0	0	0	0
02-Jun	0.5	0.021	3	3	3	0	3	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	2	2	2	0	2	0	0
13-Jun	12.2	0.508	71	48	48	23	48	0	0
14-Jun	0.3	0.013	2	2	2	0	2	0	0
15-Jun	1.3	0.054	8	8	8	0	8	0	0
16-Jun	11.8	0.492	68	48	48	20	48	0	0
17-Jun	6.4	0.267	37	37	37	0	37	0	0
18-Jun	0.8	0.033	5	5	5	0	5	0	0
19-Jun	0	0.000	0	0	0	0	0	0	0
20-Jun	5.2	0.217	30	30	30	0	30	0	0
21-Jun	3.2	0.133	19	19	19	0	19	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	2	2	2	0	2	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	6	6	6	0	6	0	0
01-Jul	0.5	0.021	3	3	3	0	3	0	0
02-Jul	6.1	0.254	35	35	35	0	35	0	0
03-Jul	0	0.000	0	0	0	0	0	0	0
04-Jul	6.4	0.267	37	37	37	0	37	0	0
05-Jul	0.8	0.033	5	5	5	0	5	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	39	39	39	0	39	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	121	48	48	73	48	0	0
19-Jul	11.5	0.479	67	48	48	19	48	0	0
20-Jul	0	0.000	0	0	0	0	0	0	0
21-Jul	0	0.000	0	0	0	0	0	0	0
22-Jul	0	0.000	0	0	0	0	0	0	0
23-Jul	6.9	0.288	40	40	40	0	40	0	0
24-Jul	9.2	0.383	53	48	48	5	48	0	0
25-Jul	0	0.000	0	0	0	0	0	0	0
26-Jul	0.3	0.013	2	2	2	0	2	0	0
27-Jul	1.3	0.054	8	8	8	0	8	0	0
28-Jul	0	0.000	0	0	0	0	0	0	0
29-Jul	1.1	0.046	6	6	6	0	6	0	0
30-Jul	0.3	0.013	2	2	2	0	2	0	0
31-Jul	4.1	0.171	24	24	24	0	24	0	0
01-Aug	0	0.000	0	0	0	0	0	0	0
02-Aug	8.9	0.371	51	48	48	4	48	0	0
03-Aug	11.5	0.479	67	48	48	19	48	0	0
04-Aug	0.8	0.033	5	5	5	0	5	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	5	5	5	0	5	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	8	8	8	0	8	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	3	3	3	0	3	0	0
18-Aug	0	0.000	0	0	0	0	0	0	0
19-Aug	5.5	0.229	32	32	32	0	32	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	5	5	5	0	5	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	19	19	19	0	19	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	5	5	5	0	5	0	0
01-Sep	0	0.000	0	0	0	0	0	0	0
02-Sep	0.9	0.038	5	5	5	0	5	0	0
03-Sep	8.4	0.350	49	48	48	1	48	0	0
04-Sep	0	0.000	0	0	0	0	0	0	0
05-Sep	0	0.000	0	0	0	0	0	0	0
06-Sep	0	0.000	0	0	0	0	0	0	0
07-Sep	0	0.000	0	0	0	0	0	0	0
08-Sep	0	0.000	0	0	0	0	0	0	0
09-Sep	0.6	0.025	3	3	3	0	3	0	0
10-Sep	4.4	0.183	25	25	25	0	25	0	0
11-Sep	0	0.000	0	0	0	0	0	0	0
12-Sep	3.5	0.146	20	20	20	0	20	0	0
13-Sep	11.7	0.488	68	48	48	20	48	0	0
14-Sep	0	0.000	0	0	0	0	0	0	0
15-Sep	0	0.000	0	0	0	0	0	0	0
16-Sep	0	0.000	0	0	0	0	0	0	0
17-Sep	1.1	0.046	6	6	6	0	6	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	18	18	18	0	18	0	0
21-Sep	1.4	0.058	8	8	8	0	8	0	0
22-Sep	0.6	0.025	3	3	3	0	3	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	28	28	28	0	28	0	0
26-Sep	0.3	0.013	2	2	2	0	2	0	0
27-Sep	0	0.000	0	0	0	0	0	0	0
28-Sep	3.9	0.163	23	23	23	0	23	0	0
29-Sep	2.1	0.088	12	12	12	0	12	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	26	26	26	0	26	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	17	17	17	0	17	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	12	12	12	0	12	0	0
11-Oct	0	0.000	0	0	0	0	0	0	0
12-Oct	1.8	0.075	10	10	10	0	10	0	0
13-Oct	0	0.000	0	0	0	0	0	0	0
14-Oct	8.9	0.371	51	48	48	4	48	0	0
15-Oct	0	0.000	0	0	0	0	0	0	0
16-Oct	0	0.000	0	0	0	0	0	0	0
17-Oct	6.8	0.283	39	39	39	0	39	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	38	38	38	0	38	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	32	32	32	0	32	0	0
31-Oct	0.3	0.013	2	2	2	0	2	0	0



LEGEND:

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

EXISTING TANGER OUTLET CENTRE

- 0.56 / 0.85 — AREA IN HECTARES, RUNOFF COEFFICIENT

No.	REVISIONS	By	Date
20			
19			
18			
17			
16			
15	ISSUED FOR PHASE 5 REGISTRATION	LME	19: 09: 10
14	REVISED AS PER PHASE 4 COMMENTS	LME	19: 07: 25
13	REVISED AS PER PHASE 4 COMMENTS	LME	19: 07: 22
12	REVISED AS PER PHASE 4 COMMENTS	LME	19: 06: 24
11	ISSUED FOR PHASE 4 REGISTRATION	LME	19: 04: 25
10	REVISED AS PER PHASE 3 COMMENTS	LME	19: 03: 08
9	ISSUED FOR PHASE 3 TENDER	LME	19: 01: 11
8	REVISED AS PER PHASE 3 COMMENTS	LME	18: 12: 14
7	REVISED FOR PHASE 3 REGISTRATION	LME	18: 09: 14
6	REVISED FOR PHASE 2 REGISTRATION	LME	18: 04: 20
5	REVISED AS PER CITY COMMENTS	LME	15: 11: 05
4	REVISED AS PER CITY COMMENTS	LME	15: 10: 15
3	REVISED AS PER NEW SITE PLAN AND CITY COMMENTS	LME	15: 06: 19
2	REVISED AS PER CITY COMMENTS	LME	15: 04: 08
1	ISSUED TO CITY FOR APPOVAL	LME	14: 11: 27

TAGGART REALTY MANAGEMENT

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Project Title

KANATA WEST BUSINESS PARK PHASE 5

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

Drawing Title

STORM DRAINAGE AREA PLAN

Scale: 1:2000

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

D07-16-14-0003_P5

#17661

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

4.4.1 Design Storms and Drainage Area Parameters

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

4.4.1.1 Design Storms

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

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

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

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

4.4.1.2 Drainage Area Parameters

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

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

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

Area ID	Area (ha)	IMP (%)		LGI (m)	AVAILABLE/REQUIRED STORAGE (cu-m)	MINOR SYSTEM CAPTURE (l/s)
		TIMP	XIMP			
101A	**7.03**	**0.93**	**0.93**	**327**	**780**	**1230**
150A	**0.17**	**0.53**	**0.53**	**83**	**n/a**	**31**
150B	**0.2**	**0.53**	**0.53**	**75**	**7**	**37**
UPS Site modelled as per approved report "Design Brief UPS Canada Inc. 8825 Campeau Drive (IBI Group, January 2017)						
99C	0.14	0.69	0.69	30	44	33
99D	0.22	0.69	0.69	60	21	45
100C	0.27	0.59	0.59	103	13	49
100B	1.21	0.93	0.93	155	117	259
120A	1.16	0.93	0.93	214	75	191
120B	0.26	0.53	0.53	100	7	45
103A	0.33	0.93	0.93	56	20	104
104C	0.36	0.59	0.59	135	17	62
Kanata West Retail Centre modelled as per approved report "Design Brief Kanata West Retail Centre 3015, 3075 and 3095 Palladium Drive" (IBI Group, July 2017)						
121C	0.21	0.53	0.53	101	49	37
122B	1.07	0.93	0.93	149	103	231
122A	1.16	0.93	0.93	216	73	185
122C	0.21	0.69	0.69	60	21	46
122D	0.14	0.69	0.69	30	24	31
153A	**1.89**	**0.93**	**0.93**	**119**	**190**	**430**
153B	**1.82**	**0.93**	**0.93**	**129**	**180**	**408**
153C	**0.16**	**0.53**	**0.53**	**79**	**n/a**	**29**
154D	**0.15**	**0.53**	**0.53**	**76**	**n/a**	**29**
154A	**0.70**	**0.93**	**0.93**	**81**	**70**	**171**
154C	**0.17**	**0.57**	**0.57**	**82**	**48**	**33**
155C	**0.29**	**0.57**	**0.57**	**141**	**60**	**50**
155A	**3.19**	**0.93**	**0.93**	**160**	**480**	**525**
132D	**2.29**	**0.93**	**0.93**	**157**	**360**	**377**
156B	**0.11**	**0.57**	**0.57**	**56**	**5**	**22**
156C	0.14	0.93	0.93	82	7	40
132B	0.15	0.93	0.93	80	9	43
130C	0.15	0.93	0.93	30	15	41
130B	0.71	0.93	0.93	101	120	111
130D	0.24	0.93	0.93	67	15	62
160C	0.15	0.93	0.93	81	n/a	43
132A	1.01	0.93	0.93	117	132	187
132C	0.15	0.93	0.93	77	4	43
104A	**0.85**	**0.93**	**0.93**	**95**	**90**	**204**
104B	0.3	0.71	0.71	111	65	75
105B	0.22	0.93	0.93	65	n/a	57
106C	0.17	0.93	0.93	82	1	110
135E	0.25	0.93	0.93	50	11	80
106B	0.15	0.93	0.93	82	1	58
133A	0.15	0.93	0.93	57	19	48
133B	0.16	0.93	0.93	57	n/a	74
137A	0.08	0.93	0.93	33	n/a	38
137B/C	0.12	0.93	0.93	36	n/a	57

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

Bold font indicates Phase 5 areas

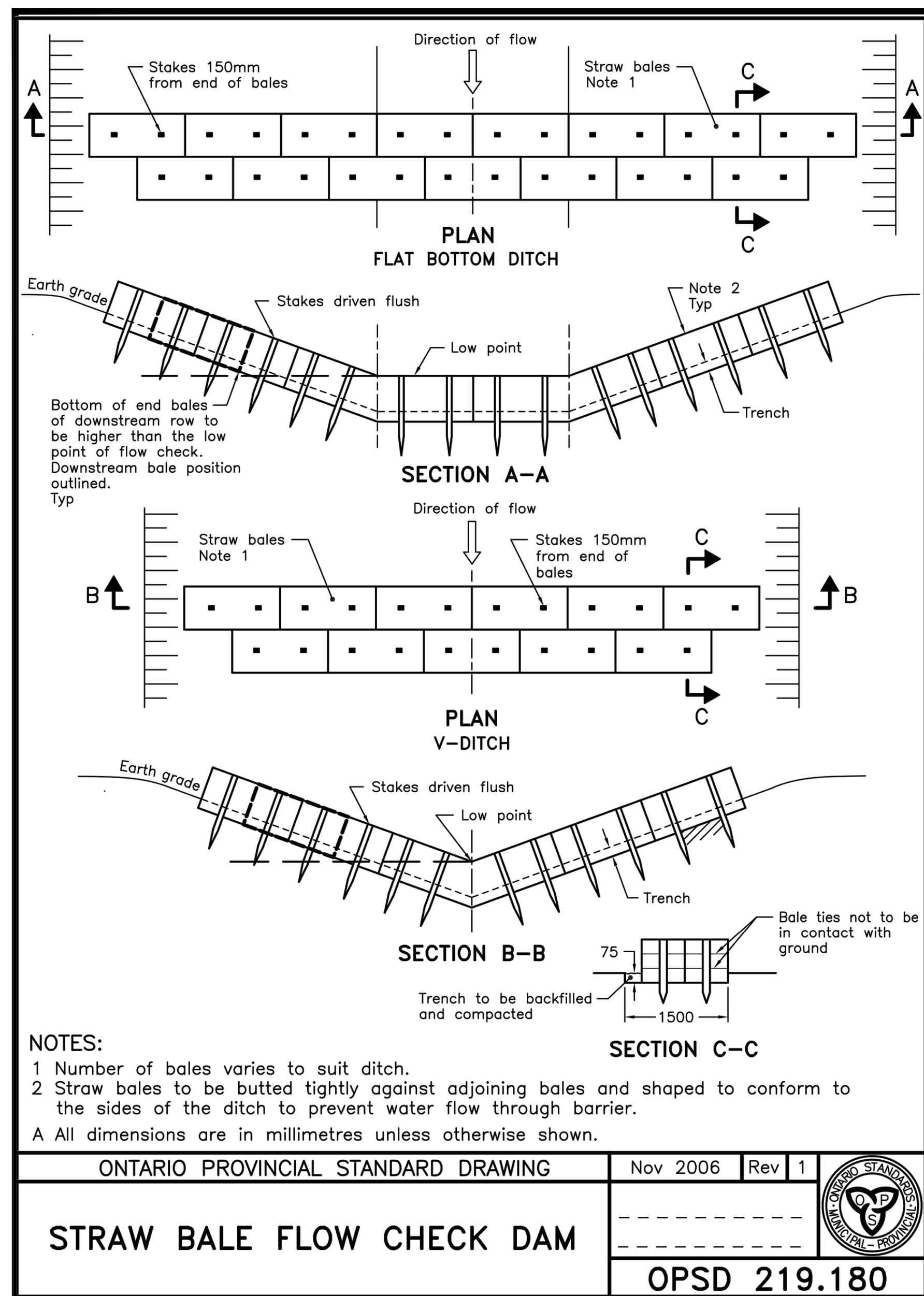
* required to store the 100 year storm event

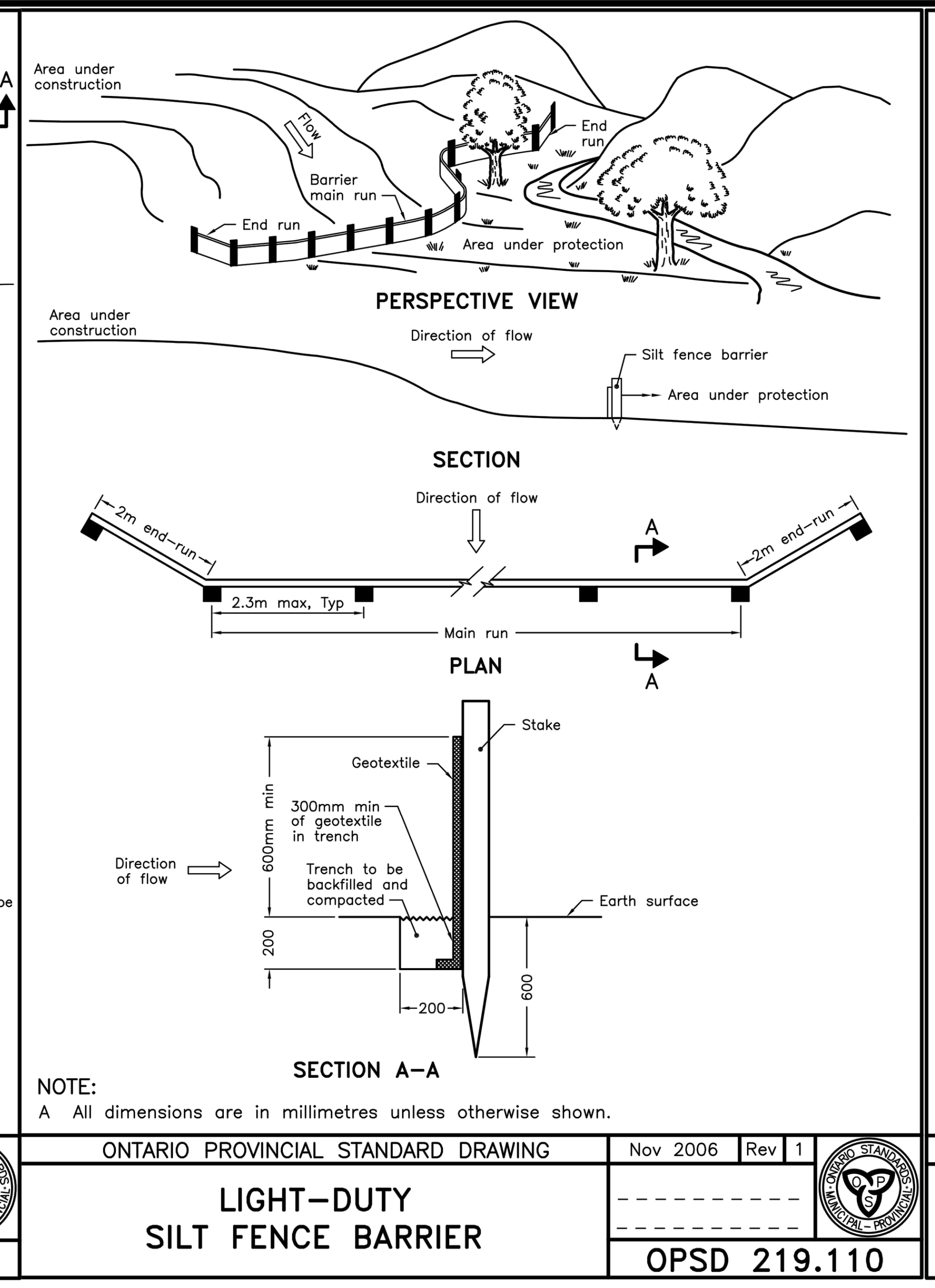
ϕ Block 2 – Phase 3 Registration

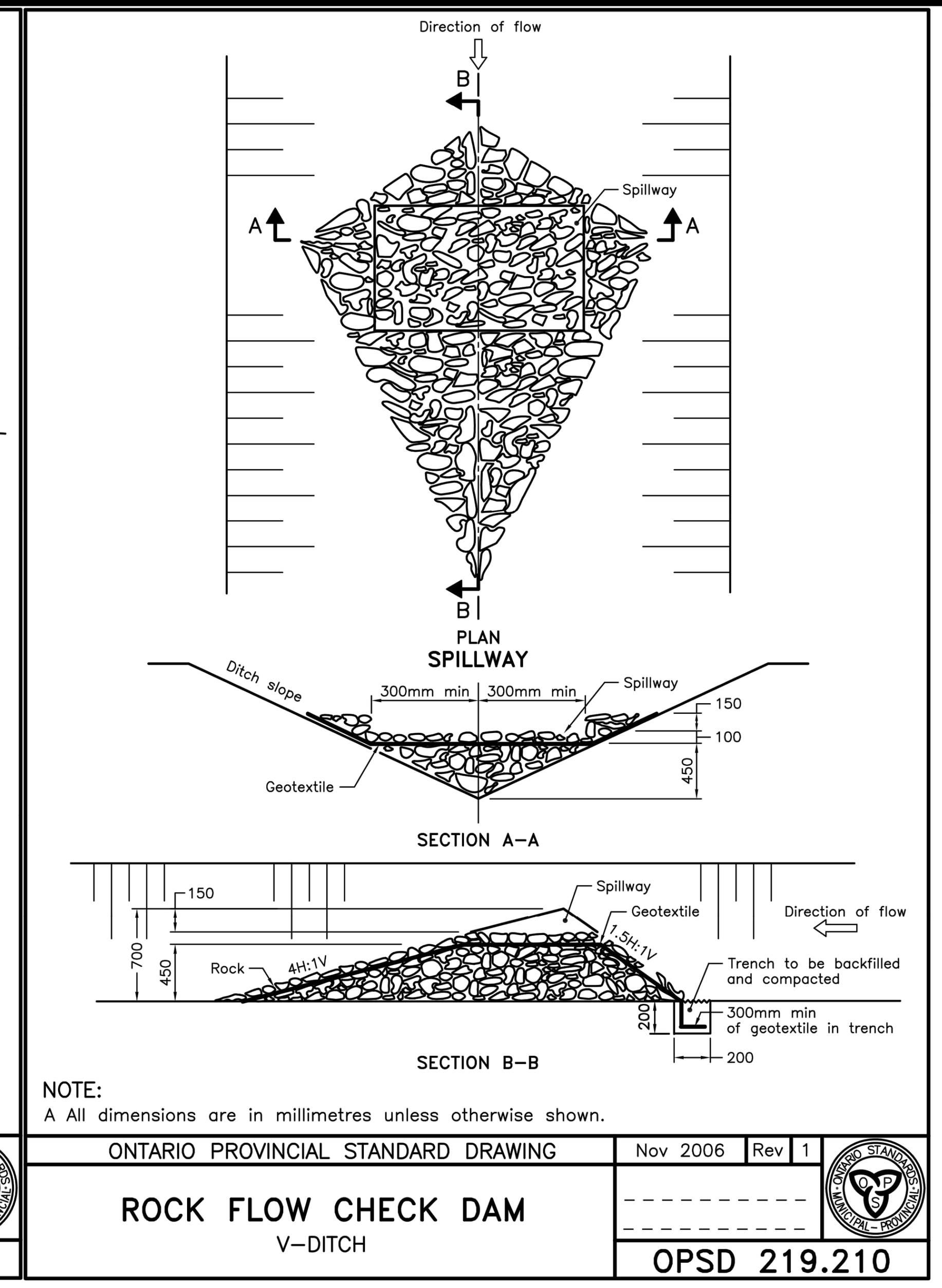
θ Block 3 – Phase 3 Registration

TBD – To Be Determined at Site Plan Application

APPENDIX D







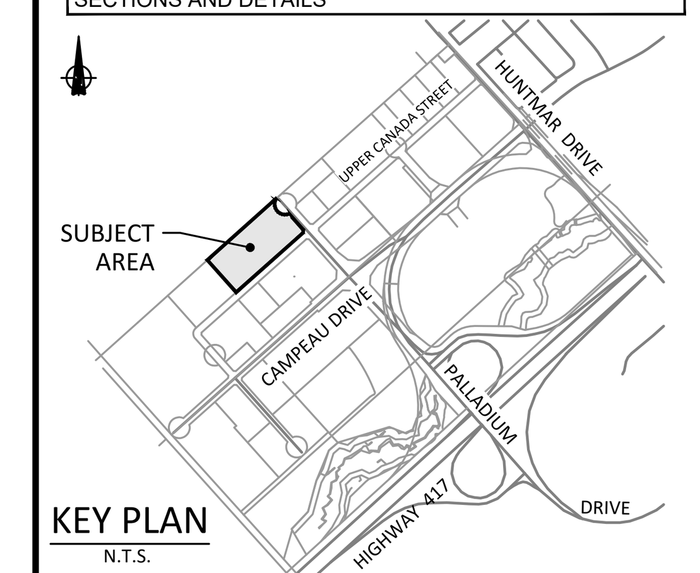
NOTES:

1. SILT FENCE TO BE ERECTED PRIOR TO EARTH WORKS BEING COMMENCED. SILT FENCE TO BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED OR UNTIL START OF SUBSEQUENT PHASE.
2. STRAW BALE SEDIMENT TRAPS TO BE CONSTRUCTED IN EXISTING ROAD SIDE DITCHES. TRAPS TO REMAIN AND BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED.
3. SILT SACK TO BE PLACED AND MAINTAINED UNDER COVER OF ALL CATCHBASINS. GEOTEXTILE SILT SACK IN STREET CBs TO REMAIN UNTIL ALL CURBS ARE CONSTRUCTED. GEOTEXTILE FABRIC IN RYCBs TO REMAIN UNTIL VEGETATION IS ESTABLISHED. ALL CATCHBASINS TO BE REGULARLY INSPECTED AND CLEANED, AS NECESSARY, UNTIL SOD AND CURBS ARE CONSTRUCTED.
4. CONTRACTOR TO PROVIDE DETAILS ON LOCATION(S) AND DESIGN OF DEWATERING TRAP(S) PRIOR TO COMMENCING WORK. CONTRACTOR ALSO RESPONSIBLE FOR MAINTAINING TRAP(S) AND ADJUSTING SIZE(S) IF DEEMED REQUIRED BY THE ENGINEER DURING CONSTRUCTION.
5. CONTRACTOR TO PROTECT EXISTING CATCHBASINS WITH FILTER CLOTH UNDER THE COVERS TO TRAP SEDIMENTATION. REFER TO IDENTIFIED STRUCTURES.

LEGEND :

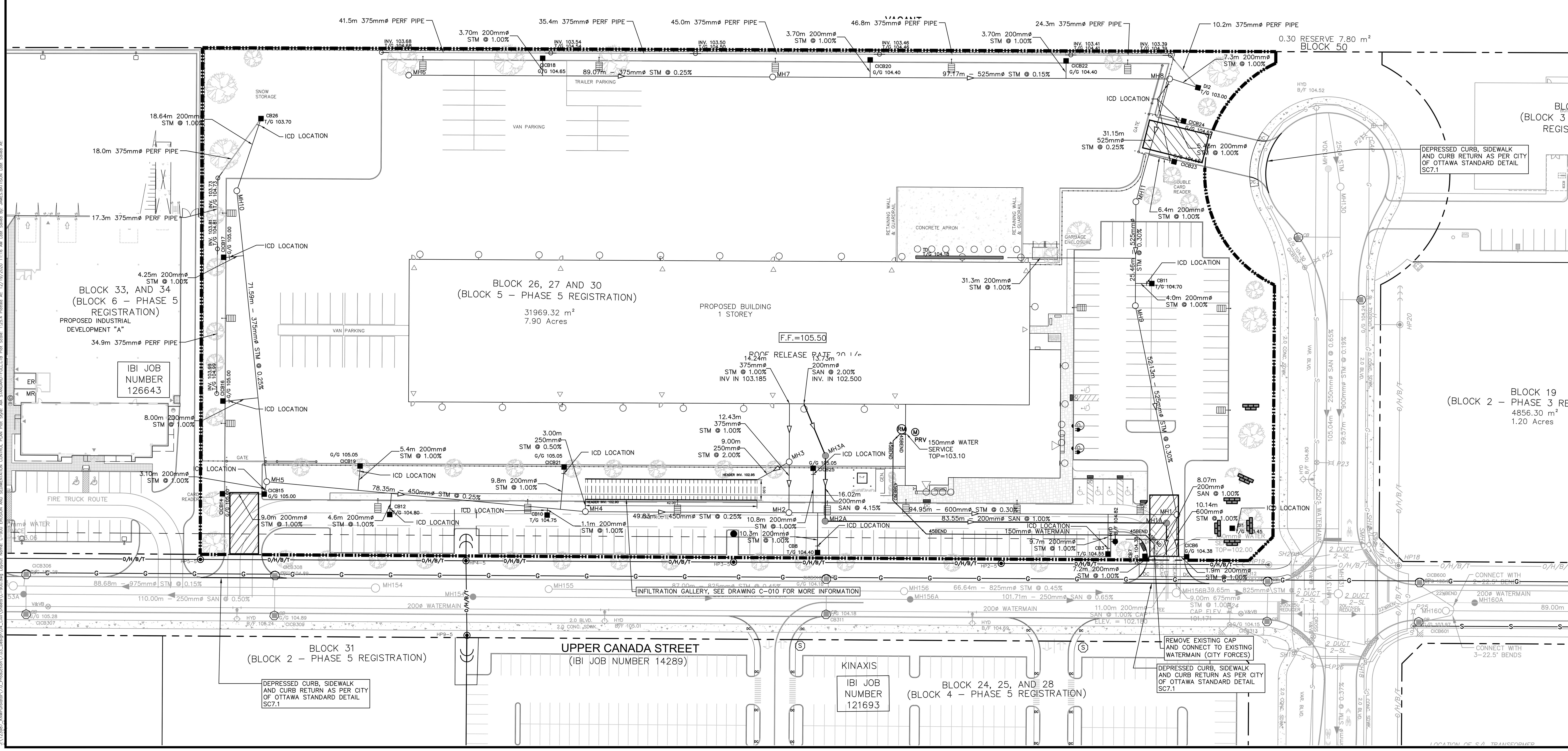
- LIGHT DUTY SILT FENCE AS PER OPSD-219.110
- SNOW FENCE
- STRAW BALE CHECK DAM AS PER OPSD-219.180
- ROCK CHECK DAM AS PER OPSD-219.210
- SILT SACK PLACED UNDER EXISTING CB COVER
- TEMPORARY MUD MAT 0.15m THICK 50mm CLEAR STONE ON NON WOVEN FILTER CLOTH (15.0 × 7.0)

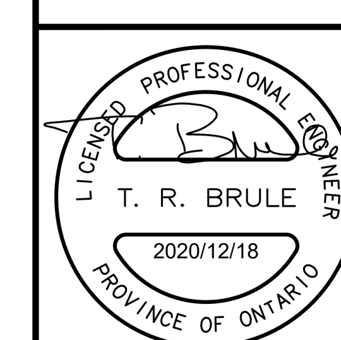
SEE 010, FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS



KEY PLAN
N.T.S.

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3	REVISED AS PER CITY COMMENTS	T.R.B.	2020:12:18
2	ISSUED FOR 30% REVIEW	T.R.B.	2020:11:13
1	ISSUED FOR SPA	T.R.B.	2020:09:17





TAGGART REALTY MANAGEMENT

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

Project Title

Purolator
DISTRIBUTION KANATA
1400 UPPER CANADA STREET,

Drawing Title

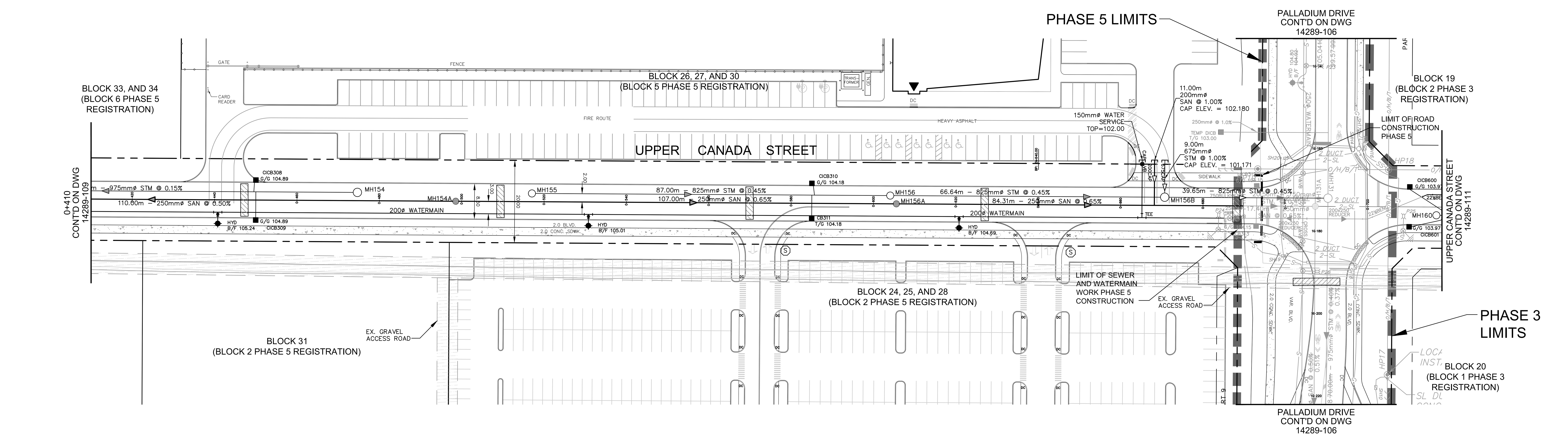
EROSION AND SEDIMENTATION CONTROL PLAN

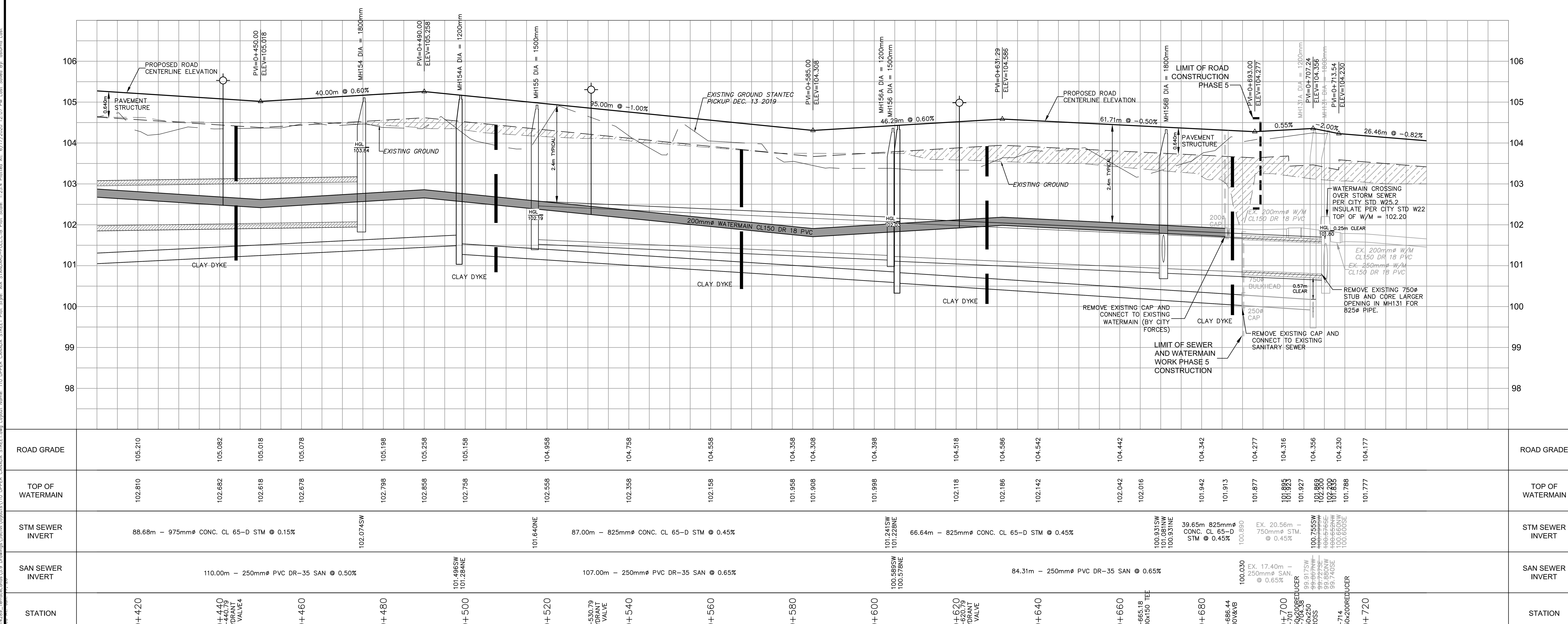
Scale

Design	Date
J.B.	AUG . 2020
Drawn	Checked
J.B/D.P.S.	T.R.B.
Project No.	Drawing No.
123987	C-900

CITY PLAN No. 18260
CITY FILE No. D07-12-20-0125

APPENDIX E





LEGEND:

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

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

No.	REVISIONS	By	Date
20			
19			
18			
17			
16			
15	ADD SERVICE CONNECTIONS FOR BLOCKS 5 AND 6	LME	20:06:17
14	ISSUED FOR CONSTRUCTION PHASE 4 AND 5	LME	20:05:27
13	ISSUED FOR TENDER PHASE 4 AND 5	LME	20:02:12
12	REVISED AS PER PHASE 5 COMMENTS	LME	19:10:25
11	ISSUED FOR PHASE 5 REGISTRATION	LME	19:09:10
10	REVISED FOR PHASE 3 REGISTRATION	LME	18:09:14
9	ADDED CITY FILE NUMBER	LME	18:05:30
8	REVISED FOR PHASE 2 REGISTRATION	LME	18:04:20
7	ISSUED FOR CONSTRUCTION	LME	16:01:19
6	ISSUED FOR MYLARS	LME	16:01:12
5	ISSUED TO TAGGART	LME	15:12:14
4	REVISED AS PER CITY COMMENTS	LME	15:10:15
3	REVISED AS PER NEW SITE PLAN AND CITY COMMENTS	LME	15:06:19
2	REVISED AS PER CITY COMMENTS	LME	15:04:08
1	ISSUED TO CITY FOR APPROVAL	LME	14:11:27

TAGGART REALTY MANAGEMENT

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Project Title
KANATA WEST BUSINESS PARK PHASE 5

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
13379508
2020/06/17
PROVINCE OF ONTARIO

Drawing Title
UPPER CANADA STREET
FROM STA. 0+410 TO PALLADIUM DRIVE

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

Design	Date
LME	NOV. 2014
Drawn: DPS	Checked: TRB
Project No.: 14289	Drawing No.: 110

D07-16-14-0003_P5

#17661