File: 123843 – 7.3

DESIGN BRIEF
HARDING HEATING AND AIR CONDITIONING (5010779 ONTARIO INC.)
200 NIPISSING COURT
OTTAWA, ON

Development Application File No. **D07-12-20-0031**

Prepared for Harding Heating and Air Conditioning
by IBI Group
March 2020
Revised August 2020

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1 INTRODUCTION

1.1 Scope

IBI Group has been retained by Harding Heating and Air Conditioning (5010779 Ontario 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 2 – Phase 4 on all approved subdivision plans.

The proposed development will be made up of a prefabricated warehouse and showroom facility with some office space use. The facility will house all aspects of the Harding Heating and Air Conditioning business operations. The building footprint is approximately 2,955m^2.

The location of the subject site is shown on **Figure 1.** The site is approximately 1.07 hectares in size and is bounded by SWM Pond 6 West to the south, UPS Canada facility to the west, future development lands to the north and Nipissing Court to the east. The latest aerial photo showing the existing conditions are shown on **Figure 2**. Detailed design drawings for Nipissing Court 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. PG5235-1 dated February 13, 2020 for the Harding site;

Among other items, the reports comment on the following:

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

Generally, the site is relatively flat, sloping from north-west to south-east. The subsurface profile encountered at the test hole locations consists of topsoil underlain by a loose to compact, silty sand to sandy silt layer. Glacial till, consisting of 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 305 mm diameter main on Campeau Drive and a 255 mm main extending from the Kanata West Retail Center towards the SWM pond. These were installed in 2016 as part of the Kanata West Business Park subdivision construction.

Prior to construction of the Harding site, the approved road Nipissing Court will be constructed, within which a 255 mm diameter watermain will be constructed connecting the above noted existing watermains. It is from this future watermain within Nipissing Court that service to the subject site will be provided.

2.2 Watermain Design

The proposed watermain within Nipissing Court, which will provide water service the site, was designed during the Kanata West Business Park – Phase 4 registration (City file number D07-16-14-0003_P4).

The following has been taken from the Water Distribution section of the Kanata West Business Park – Phase 4 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)

Water demands for Phase 4 have been calculated as follows:

Basic Day 2.27 l/s

Max Day 3.41 l/s

Peak Hour 6.14 l/s

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 4 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 11,000l/min was determined. A letter confirming some of the FUS calculation parameters, along with 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 Nipissing Court will provide adequate fire protection.

The water demands used in the KWBP Phase 4 analysis of light industrial correspond to the proposed use of the site and as such the Phase 4 model remains accurate for the site use.

The node in the KWBP model which corresponds to the subject site is J-3. 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) 568.88 kPa

Peak Hour (PKHR) 463.31 kPa

Max Day (MXDY) + Fire 255.39 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 255.39 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 Harding site is shown on the Site Servicing Plan C-001. A 150mm water service is shown connecting to the building from Nipissing Court. The new building will be sprinklered and pressure reducing control will be required as well. Hydraulic modeling results from KWBP Phase 4 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.

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)
Harding HVAC	11,000	2	1	15,200

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 prefabricated warehouse and showroom facility with some office space use. The facility is designed to accommodate 45 persons on site. There are no other significant waste water generators for this site. Sanitary sewer flows are estimated using the specific City of Ottawa identified below.

3.3 Criteria

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

- Minimum Velocity 0.6 m/s
- Maximum Velocity 3.0 m/s
- Manning Roughness Coefficient 0.013
- Total site area 1.07 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 1.00 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 south-east via overland flow towards the Pond 6 West SWM facility. Storm sewers adjacent to the site include a 1950mm dia sewer within Nipissing Court which is the ultimate outlet for the subject lands (note the storm sewer has been constructed, but the road works remain to be completed).

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 122B 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 Harding 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 two infiltration galleries, one on each side of the building, similar to the City's S29 perforated pipe rear yard drainage system, fed by the stormwater flowing from the uncontrolled rooftop. Please refer to the geotechnical report for confirmation of percolation rates used in calculations**.**

The design of the infiltration galleries 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 103.75m (perf pipe invert of 104.35 – 0.6m storage). Based on the geotechnical report the current groundwater in the area is approximately 102.48m.

The proposed infiltration galleries have 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 galleries has been tailored for the proposed Harding 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 123843-001 and 123843-010. Also, detailed design calculations are provided within **Appendix C**. For a memo confirming percolation rates please refer to **Appendix C**.

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)
East	1280	824	13	811
West	4215	2714	1689	1026

Where:

- Annual Runoff Volume is based on rooftop area and 70% of the annual precipitation from rooftops available as runoff
- Overflow Volume is based on building specific infiltration gallery sizing

The required infiltration will be provided by two infiltration galleries (located on either side of the building) fed by rooftop drains. The infiltration galleries will provide an estimated 1837m^3 of infiltration on an annual basis, or 171.70mm/year for the 1.07ha 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 231 l/s.

The site is approximately 1.07 ha and is proposed to comprise of a warehouse and showroom 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 two outlets which connect to the existing 1950mm storm sewer within Palladium Drive. The flows will be controlled with inlet control devices at locations identified on plan C-001 and the CB data table.

Due to some grade differential at the south of the site there will be some uncontrolled overland flows to the SWM facility. Additionally, 100 year flows from the loading dock trench drains have been included in the SWM calculations.

The unrestricted portion of the site is approximately 0.05 ha. Based on the proposed coefficient and Tc=10 min, the 100 yr flow from the uncontrolled area is 23.58 l/s. Based on an allowable release rate of 231 l/s for the site, the controlled portion is limited to 231 l/s – 23.58 l/s = 207.42 l/s.

As noted above, stormwater runoff from the site is directed to the existing Nipissing Court storm sewer system which ultimately outlets to the Pond 6 West 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 Nipissing Court within the maximum 100 year restricted release rate of 207.42 L/s. The flow rate is based on the City requirement to limit 100 year post development flow off site base on approved parameters provided on the KWMSS Storm Sewer Design Sheet. To this end, no negative impact on the existing downstream system is anticipated.

4.5 Onsite Detention

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

structures (underground) was utilized as available storage during the 2 year event. Please refer to the ponding plan 123843-C-600 for more information regarding pond volumes.

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

Ponding depths were limited to 150 mm for the 5 year storm and 350 mm for the 100 year event. In the event of less frequent storms overland flow routes toward Nipissing Court and the Pond 6 West 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, aside from the small uncontrolled areas, major flow does not leave the site via overland flow.

The stormwater management for the site has ensured that there will be no surface ponding during the 2 year storm event.

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)	Excess Storage Provided (m^3)
		5-year	100-year	5-year	100-year		
UNCONTROLLED FLOW							
UN1+UN2	N/A		23.58	N/A	N/A	N/A	N/A
TOTAL UNRESTRICTED RELEASED RATE							
			23.58				
CONTROLLED TO NIPISSING COURT STORM SEWER SYSTEM							
A1, A2, A3, A4, R1, R2	TEMPEST HF	152	152	60.43	207.64	252.29	44.65
A5, A6, A7, L1	TEMPEST HF	55	55	9.57	47.15	55.80	8.65
TOTAL RESTRICTED RELEASED RATE							
			207				

4.6 Quality Control

The site outlets to Kanata West Pond 6 West 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 proposed watermain located in Nipissing Court.
- Sanitary design flows under the proposed condition can be accommodated by the proposed and 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 in structure and parking lot surface ponding in larger events.
- Erosion and sediment control measures have been outlined for the construction of the development.

This report has illustrated that the proposed Harding site can be serviced by the adjacent existing and proposed 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

Terry Brule, P. Eng.
Associate Manager

James Battison C.E.T.

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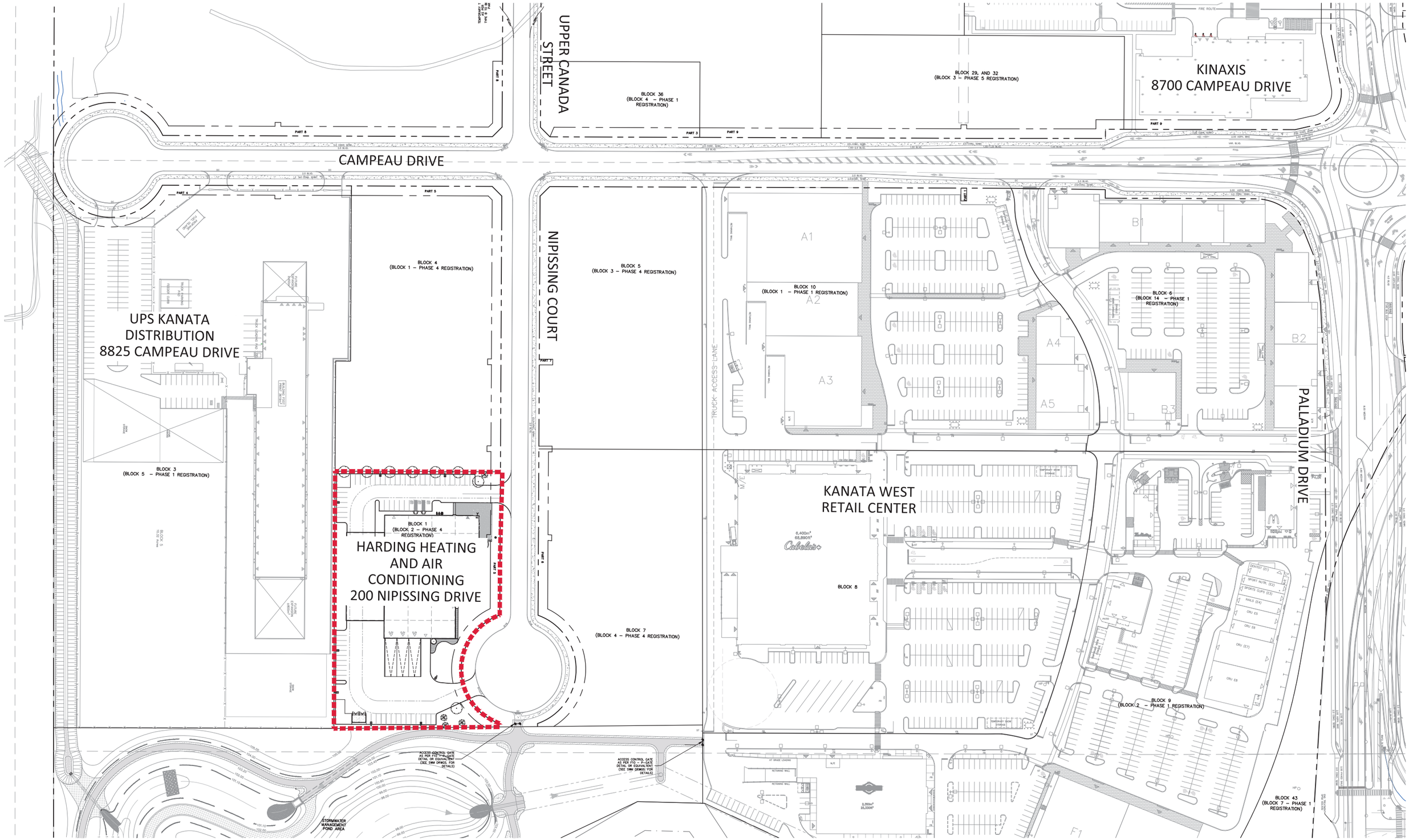

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Scale	Project Title	Drawing Title	Sheet No.
N.T.S.	HARDING HEATING AND AIR CONDITION	LOCATION PLAN	FIGURE 1

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Project Title	Drawing Title	Sheet No.
HARDING HEATING AND AIR CONDITIONING	EXISTING CONDITIONS	FIGURE 2

APPENDIX A

DEIMLING
ARCHITECTURE & INTERIOR DESIGN

17 March 2020

Mr. James Battison
IBI Group
Suite 400, 333 Preston Street
Ottawa, Ontario
K1A 5N4

RE: **CONFIRMATION OF ARCHITECTURAL DESIGN**
HARDING HEATING & AIR CONDITIONING - SITE DEVELOPMENT
200 Nipissing Court, Ottawa, Ontario
Our File No. 19-149

Dear Mr. Battison,

This letter is to confirm that for the purposes of roof water runoff, the proposed design incudes for all rainwater from the roof area(s) to be directed, via slopes and/or gutters, towards soft landscape areas below and not towards any hard paving areas on the site.

We also confirm that the building shall be designed to ISO class of construction; Class 3 (non-combustible). An automatic sprinkler system shall be installed throughout the entire building in accordance with OBC Section 3.2 and NFPA 13.

The expected total number of persons, staff and customers, at any given time in the building is in the order of 45 persons.

We trust this is satisfactory,

Sincerely,

Chris Deimling OAA, President
DEIMLING Architecture & Interior Design

Fire Flow Requirement from Fire Underwriters Survey

Harding HCAV - 200 Nipissing Court

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

Building Footprint	2,955	m^2
Covered Loading	913	m^2
Total	3,868	m^2

Fire Flow

$F = 220C\sqrt{A}$

C	0.8		C =	1.5 wood frame
A	3,868	m^2		1.0 ordinary
				0.8 non-combustible
F	10,946	l/min		0.6 fire-resistive
Use	11,000	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	11,000 l/min		

Sprinkler Adjustment

		-30%	system conforming to NFPA 13
		-50%	complete automatic system
Use	-30%		
Adjustment	-3300 l/min		

Exposure Adjustment

Building Face	Separation (m)	Adjacent Exposed Wall			Exposure Charge *
		Length	Stories	L*H Factor	
north	10.5	50.0	2	100	15%
east	45.0	50.0	2	100	5%
south		50.0	2	100	0%
west	21.0	50.0	2	100	10%
Total					30%

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

Adjustment	3,300	l/min

Required Fire Flow

Total adjustments	-	l/min
Fire flow	11,000	l/min
Use	**11,000**	**l/min**
	183.3	**l/s**

BOUNDARY CONDITIONS

Boundary Conditions For: 14289 Kanata West Business Park

Date of Boundary Conditions: 2019-Apr-15

Provided Information:

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

Number Of Connections: 1

Location:

BOUNDARY CONDITIONS

Results:

Connection #: 1

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

[1]Elevation: **103.910 m**

Notes:

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

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

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

3) Click or tap here to enter text.

Disclaimer

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

Mark Fraser, EIT
Junior Infrastructure Engineer, Suburban Services

PLANNING AND GROWTH MANAGEMENT
URBANISME ET GESTION DE LA CROISSANCE

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Mail: Code 01-14
Email: Mark.Fraser@ottawa.ca

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

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

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IBI **Defining the cities of tomorrow**

Boundary Conditions at KWBP(Campeau Dr.) West

Boundary Conditions at Jun-1:

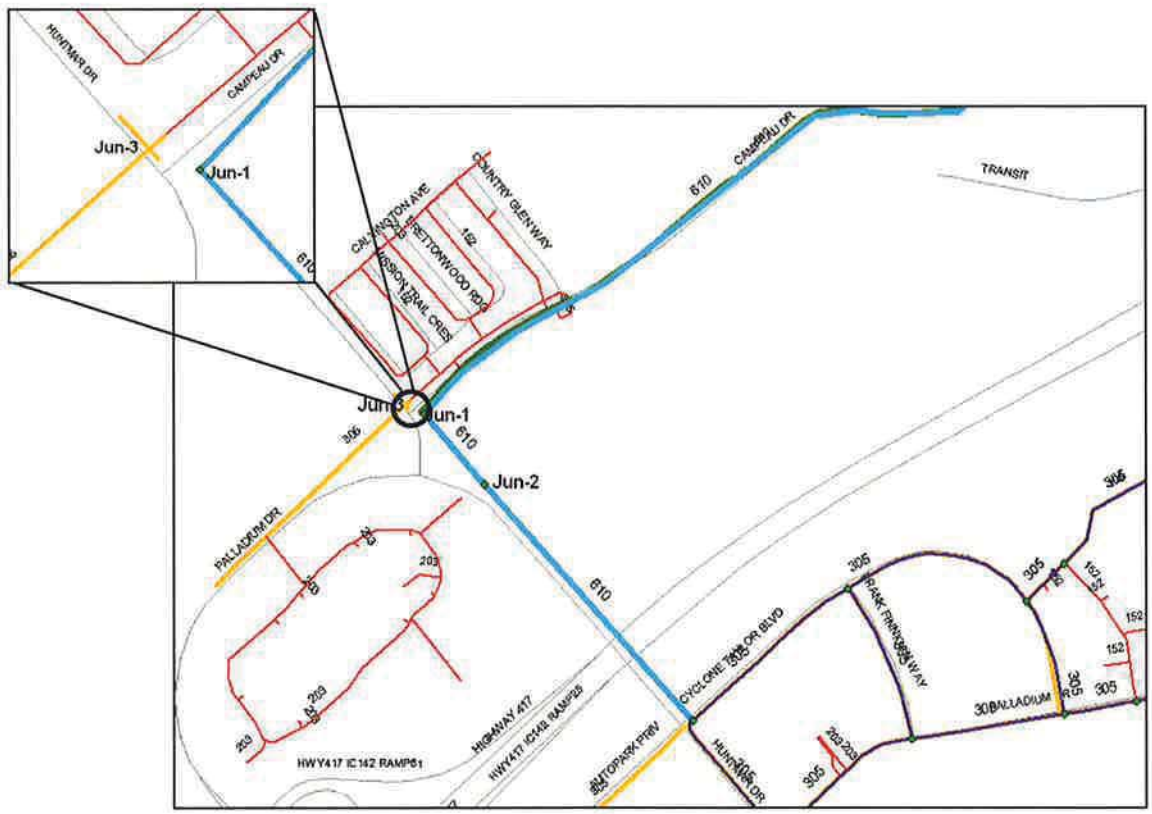
Max HGL = 164.1m
PKHR = 154.1m
MXDY+Fire (216 L/s) =151.1m

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

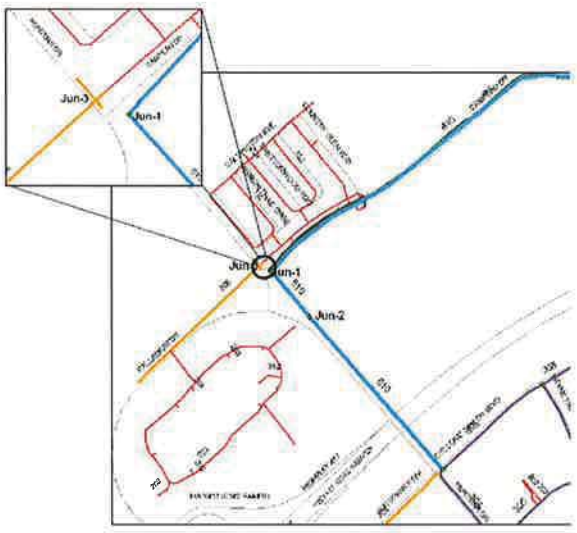
From: Fraser, Mark [Mark.Fraser@ottawa.ca]
Sent: Wednesday, September 17, 2014 9:27 AM
To: Lance Erion
Cc: Ogilvie, Chris; Terry Brule
Subject: RE: Kanata West Business Park - Request for Watermain Boundary Conditions
Attachments: BC_KWBP.PDF; KWBP watermain connections_Requested.pdf

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
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : KANATA WEST BUSINESS PARK
333 HUNTMAR DRIVE - PHASE 4

DEVELOPER : TAGGART REALTY MANAGEMENT

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

NODE	BLOCK No.	RESIDENTIAL UNITS SF	RESIDENTIAL UNITS SD & TH	RESIDENTIAL UNITS ST	RESIDENTIAL POP'N	NON-RESIDENTIAL INDTRL (ha.)	NON-RESIDENTIAL COMM. (ha.)	NON-RESIDENTIAL INST. (ha.)	AVERAGE DAILY DEMAND (l/s) Res.	AVERAGE DAILY DEMAND (l/s) Non-res.	AVERAGE DAILY DEMAND (l/s) Total	MAXIMUM DAILY DEMAND (l/s) Res.	MAXIMUM DAILY DEMAND (l/s) Non-res.	MAXIMUM DAILY DEMAND (l/s) Total	MAXIMUM HOURLY DEMAND (l/s) Res.	MAXIMUM HOURLY DEMAND (l/s) Non-res.	MAXIMUM HOURLY DEMAND (l/s) Total	FIRE DEMAND (l/min)
KWBP																		
PHASE 4																		
J-1	BLOCK 1 & 3						2.37		0.00	1.37	1.37	0.00	2.06	2.06	0.00	3.70	3.70	13,000
J-2	BLOCK 2					1.07			0.00	0.43	0.43	0.00	0.65	0.65	0.00	1.17	1.17	13,000
J-3	BLOCK 4					1.16			0.00	0.47	0.47	0.00	0.70	0.70	0.00	1.27	1.27	13,000
TOTALS		0	0	0	0	2.23	2.37	0.00	0.00	2.27	2.27	0.00	3.41	3.41	0.00	6.14	6.14	

HARDING

ASSUMPTIONS

RESIDENTIAL DENSITIES

- Single Family (SF) 3.4 p / p / u
- Semi Detached (SD) & Townhouse (TI 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

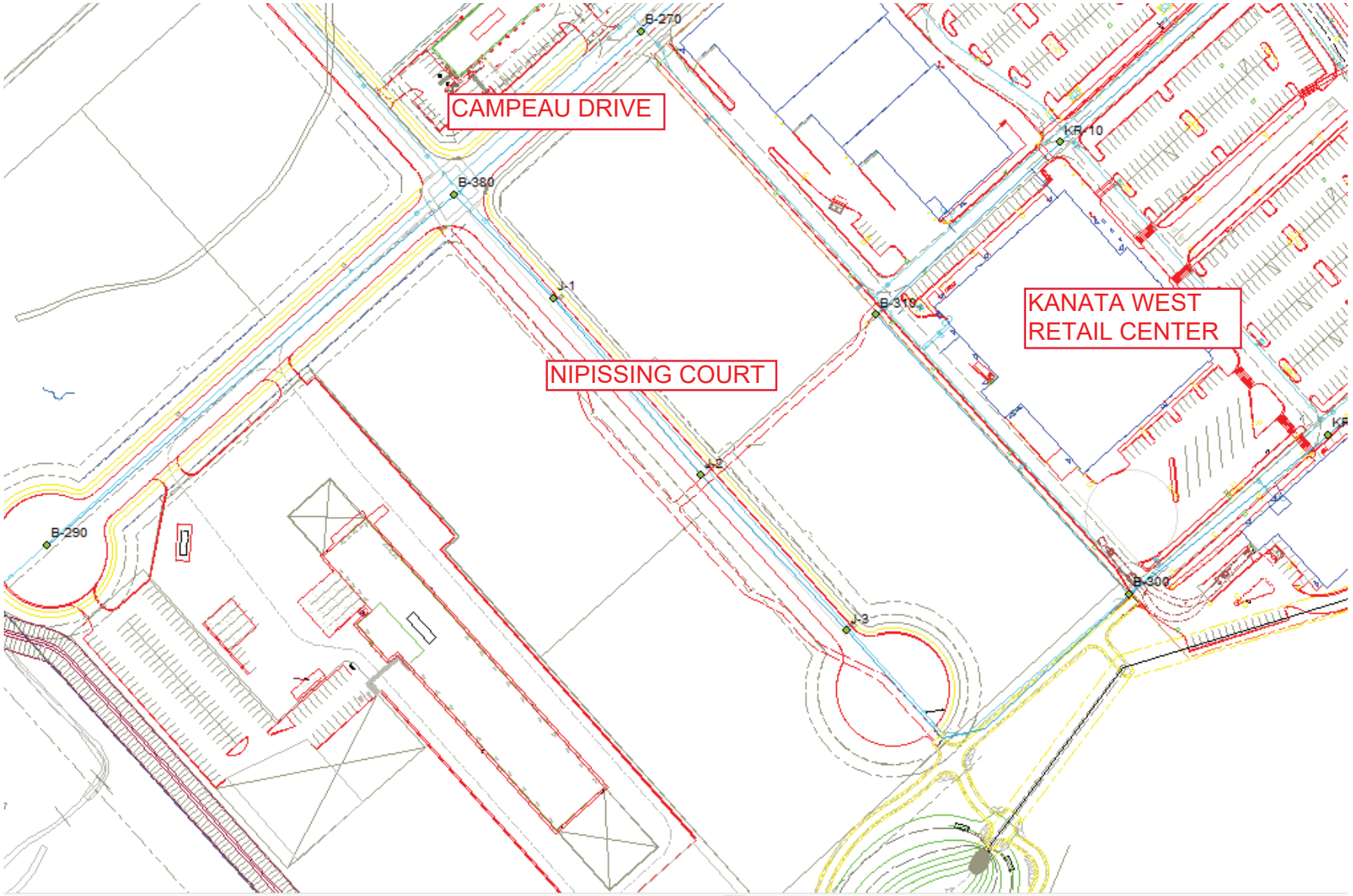
- Residential 1,925 l / cap / day
- Business Park (Industrial) 94,500 l / ha / day
- Employment Area (Commerc 135,000 l / ha / day

FIRE FLOW

- ICI 13,000 l / min

OVERALL KANATA WEST BUSINESS PARK WATER MODEL

PHASE 4 WATER MODEL



		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	☐	B-100	0.48	101.65	164.00	610.98
2	☐	B-110	1.30	101.70	164.01	610.58
3	☐	B-120	1.51	101.35	164.02	614.10
4	☐	B-130	1.34	101.50	163.99	612.35
5	☐	B-140	1.59	101.50	163.98	612.25
6	☐	B-150	1.38	101.65	163.98	610.75
7	☐	B-160	0.52	101.75	163.98	609.77
8	☐	B-170	0.87	101.50	163.98	612.30
9	☐	B-245	1.85	101.00	164.04	617.74
10	☐	B-250	0.00	102.10	164.00	606.61
11	☐	B-255	1.07	102.70	163.99	600.57
12	☐	B-260	0.72	104.50	163.97	582.77
13	☐	B-270	0.41	105.00	163.96	577.73
14	☐	B-290	2.37	106.35	163.95	564.43
15	☐	B-300	0.00	104.60	163.95	581.63
16	☐	B-310	1.17	104.80	163.95	579.67
17	☐	B-315	0.90	102.15	164.00	606.08
18	☐	B-330	0.65	104.30	163.97	584.75
19	☐	B-340	0.77	104.70	163.97	580.82
20	☐	B-345	0.17	104.75	163.97	580.30
21	☐	B-350	0.00	105.00	163.97	577.82
22	☐	B-355	3.60	104.50	163.96	582.63
23	☐	B-360	0.28	105.00	163.96	577.77
24	☐	B-380	1.24	105.75	163.95	570.35
25	☐	J-1	1.37	105.75	163.95	570.35
26	☐	J-2	0.43	105.65	163.95	571.33
27	☐	J-3	0.47	105.90	163.95	568.88
28	☐	JUN-1	0.00	100.20	164.10	626.16
29	☐	JUN-2	0.00	101.50	164.10	613.41
30	☐	JUN-3	0.00	100.25	164.09	625.59
31	☐	KR-10	0.00	105.00	163.96	577.72
32	☐	KR-20	0.00	105.05	163.96	577.28
33	☐	KR-25	0.00	104.90	163.96	578.74
34	☐	KR-35	0.00	104.60	163.96	581.71
35	☐	KR-45	0.00	0.00	163.96	1,606.65
36	☐	KR-55	0.00	104.70	163.96	580.66
37	☐	KR-65	0.00	104.70	163.96	580.66
38	☐	PH3-1	0.00	0.00	163.98	1,606.87
39	☐	PH3-2	0.00	0.00	163.99	1,606.99

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	☐	B-100	1.30	101.65	153.47	507.78
2	☐	B-110	3.50	101.70	153.53	507.89
3	☐	B-120	4.08	101.35	153.59	511.90
4	☐	B-130	3.61	101.50	153.41	508.67
5	☐	B-140	4.30	101.50	153.34	508.03
6	☐	B-150	3.72	101.65	153.32	506.37
7	☐	B-160	1.41	101.75	153.32	505.39
8	☐	B-170	2.36	101.50	153.37	508.33
9	☐	B-245	4.99	101.00	153.72	516.60
10	☐	B-250	0.00	102.10	153.49	503.61
11	☐	B-255	2.88	102.70	153.39	496.73
12	☐	B-260	1.95	104.50	153.29	478.11
13	☐	B-270	1.09	105.00	153.20	472.29
14	☐	B-290	6.39	106.35	153.15	458.63
15	☐	B-300	0.00	104.60	153.19	476.11
16	☐	B-310	3.15	104.80	153.19	474.15
17	☐	B-315	2.43	102.15	153.47	502.92
18	☐	B-330	1.76	104.30	153.30	480.16
19	☐	B-340	2.09	104.70	153.30	476.22
20	☐	B-345	0.45	104.75	153.28	475.52
21	☐	B-350	0.00	105.00	153.26	472.89
22	☐	B-355	9.72	104.50	153.20	477.24
23	☐	B-360	0.75	105.00	153.23	472.59
24	☐	B-380	3.36	105.75	153.18	464.78
25	☐	J-1	3.70	105.75	153.18	464.77
26	☐	J-2	1.17	105.65	153.18	465.75
27	☐	J-3	1.27	105.90	153.18	463.31
28	☐	JUN-1	0.00	100.20	154.09	528.10
29	☐	JUN-2	0.00	101.50	154.09	515.33
30	☐	JUN-3	0.00	100.25	154.04	527.13
31	☐	KR-10	0.00	105.00	153.19	472.26
32	☐	KR-20	0.00	105.05	153.22	472.04
33	☐	KR-25	0.00	104.90	153.22	473.46
34	☐	KR-35	0.00	104.60	153.24	476.59
35	☐	KR-45	0.00	0.00	153.20	1,501.23
36	☐	KR-55	0.00	104.70	153.19	475.20
37	☐	KR-65	0.00	104.70	153.19	475.18
38	☐	PH3-1	0.00	0.00	153.34	1,502.64
39	☐	PH3-2	0.00	0.00	153.42	1,503.40

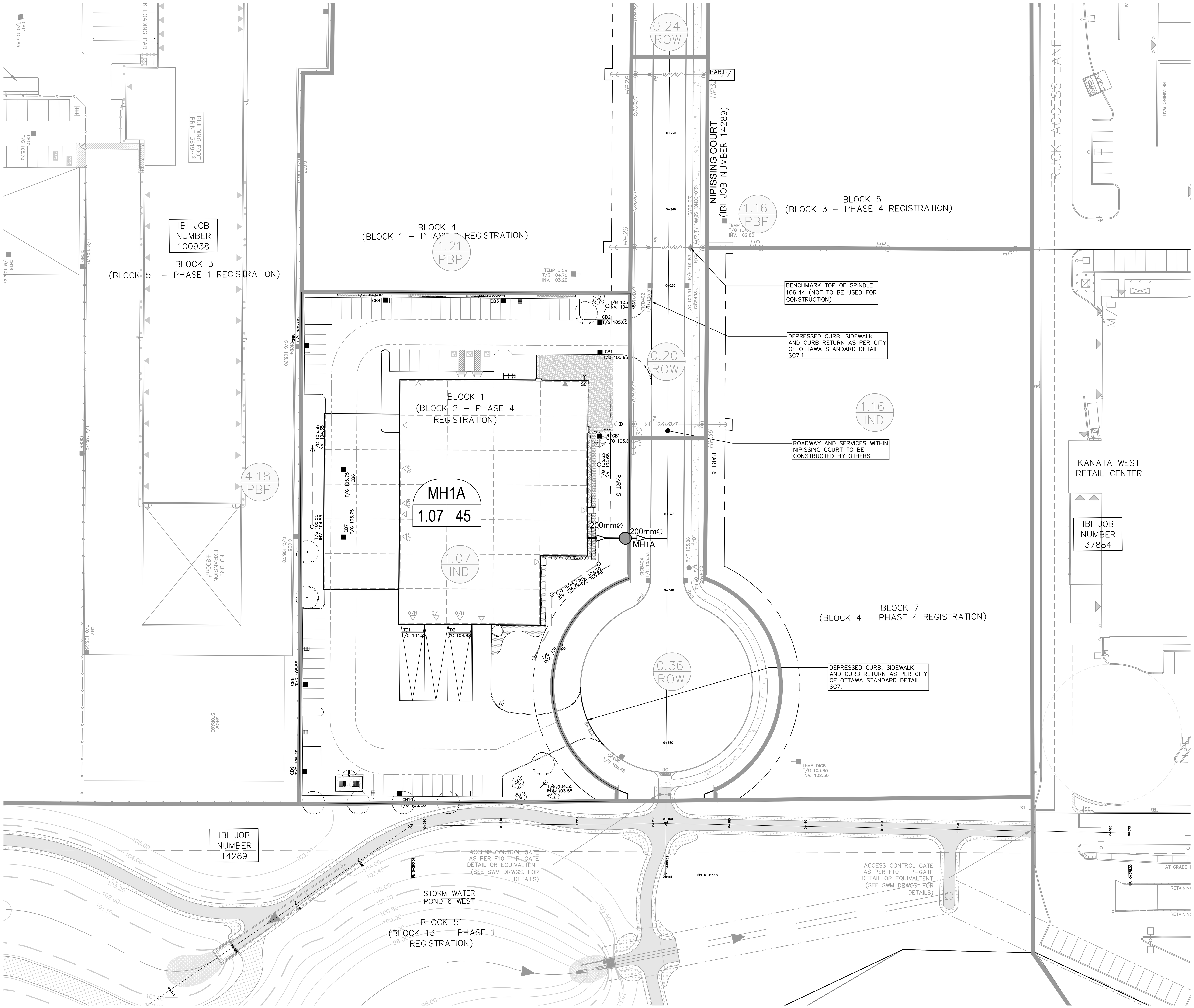
		ID	Total Demand (L/s)	Available Flow at Hydrant (L/s)	Critical Node ID	Critical Node Pressure (kPa)	Critical Node Head (m)	Design Flow (L/s)	Design Pressure (kPa)	Design Fire Node Pressure (kPa)
1	☐	B-100	217.39	394.55	B-100	139.96	115.93	394.55	139.96	139.96
2	☐	B-110	218.61	339.03	B-110	139.96	115.98	339.03	139.96	140.02
3	☐	B-120	218.94	422.60	B-120	139.96	115.63	422.60	139.96	139.96
4	☐	B-130	218.68	253.78	B-130	139.96	115.78	253.78	139.96	139.97
5	☐	B-140	219.06	238.05	B-140	139.96	115.78	238.05	139.96	139.96
6	☐	B-150	218.74	261.23	B-150	139.96	115.93	261.23	139.96	139.97
7	☐	B-160	217.45	335.91	B-160	139.96	116.03	335.91	139.96	139.96
8	☐	B-170	217.98	316.67	B-170	139.96	115.78	316.67	139.96	139.96
9	☐	B-245	219.44	663.63	B-290	107.68	117.34	625.51	139.96	174.85
10	☐	B-250	216.67	518.68	B-290	101.62	116.72	483.57	139.96	178.93
11	☐	B-255	218.27	429.39	B-290	125.09	119.11	417.37	139.96	156.05
12	☐	B-260	217.75	382.10	B-290	122.53	118.85	369.67	139.96	157.48
13	☐	B-270	217.28	295.19	B-290	130.04	119.62	289.61	139.96	150.02
14	☐	B-290	220.22	188.92	B-290	139.96	120.63	188.92	139.96	139.97
15	☐	B-300	216.67	271.10	B-300	139.96	118.88	271.10	139.96	140.01
16	☐	B-310	218.42	225.15	B-310	139.96	119.08	225.15	139.96	139.96
17	☐	B-315	218.02	399.65	B-315	139.96	116.43	399.65	139.96	139.96
18	☐	B-330	217.65	299.51	B-340	136.04	118.58	297.39	139.96	143.89
19	☐	B-340	217.83	231.72	B-340	139.96	118.98	231.72	139.96	139.96
20	☐	B-345	216.92	350.33	B-345	139.96	119.03	350.33	139.96	139.96
21	☐	B-350	216.67	327.72	B-350	139.96	119.28	327.73	139.96	139.96
22	☐	B-355	222.07	313.33	B-355	139.96	118.78	313.33	139.96	139.96
23	☐	B-360	217.09	327.33	B-290	129.68	119.58	320.91	139.96	150.38
24	☐	B-380	218.54	280.42	B-290	133.99	120.02	277.22	139.96	145.93
25	☐	J-1	218.73	268.80	J-1	139.96	120.03	268.80	139.96	140.00
26	☐	J-2	217.32	258.61	J-2	139.96	119.93	258.61	139.96	139.99
27	☐	J-3	217.37	255.39	J-3	139.96	120.18	255.39	139.96	139.99

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/k-m)	Status	Flow Reversal Count
1	☐	575	7002	JUN-1	64.97	610.00	120.00	71.43	0.24	0.01	0.13	Open	0
2	☐	505	B-100	B-170	113.62	204.00	110.00	10.13	0.31	0.09	0.83	Open	0
3	☐	491	B-100	B-110	177.45	204.00	110.00	-6.31	0.19	0.06	0.34	Open	0
4	☐	495	B-120	B-130	180.37	204.00	110.00	11.24	0.34	0.18	1.00	Open	0
5	☐	493	B-120	B-110	76.66	204.00	110.00	9.81	0.30	0.06	0.78	Open	0
6	☐	497	B-130	B-140	132.76	204.00	110.00	7.63	0.23	0.06	0.49	Open	0
7	☐	499	B-140	B-150	186.62	204.00	110.00	3.33	0.10	0.02	0.10	Open	0
8	☐	501	B-150	B-160	110.94	204.00	110.00	-0.39	0.01	0.00	0.00	Open	0
9	☐	503	B-170	B-160	99.49	204.00	110.00	7.77	0.24	0.05	0.50	Open	0
10	☐	541	B-245	B-250	147.79	297.00	120.00	41.31	0.60	0.23	1.52	Open	0
11	☐	473	B-245	JUN-3	172.60	297.00	120.00	-46.30	0.67	0.32	1.88	Open	0
12	☐	475	B-250	B-255	157.97	297.00	120.00	26.02	0.38	0.10	0.65	Open	0
13	☐	525	B-250	B-315	178.70	297.00	120.00	10.17	0.15	0.02	0.11	Open	0
14	☐	489	B-250	B-100	104.68	204.00	110.00	5.12	0.16	0.02	0.23	Open	0
15	☐	539	B-255	B-260	192.02	297.00	120.00	23.14	0.33	0.10	0.52	Open	0
16	☐	527	B-260	B-330	166.12	250.00	110.00	-3.89	0.08	0.01	0.05	Open	0
17	☐	537	B-270	B-380	98.74	297.00	120.00	12.49	0.18	0.02	0.17	Open	0
18	☐	599	B-300	KR-65	101.86	250.00	110.00	-3.82	0.08	0.01	0.05	Open	0
19	☐	569	B-310	KR-10	100.75	204.00	110.00	-2.73	0.08	0.01	0.07	Open	0
20	☐	485	B-310	B-300	150.23	204.00	110.00	-0.42	0.01	0.00	0.00	Open	0
21	☐	529	B-330	B-340	112.16	250.00	110.00	2.09	0.04	0.00	0.02	Open	0
22	☐	561	B-345	B-160	156.52	204.00	110.00	-5.97	0.18	0.05	0.31	Open	0
23	☐	559	B-345	B-260	106.53	250.00	110.00	-6.59	0.13	0.01	0.14	Open	0
24	☐	531	B-350	B-345	42.25	250.00	110.00	-12.10	0.25	0.02	0.43	Open	0
25	☐	571	B-355	KR-35	77.53	250.00	110.00	-12.10	0.25	0.03	0.43	Open	0
26	☐	609	B-355	KR-25	87.90	204.00	110.00	-4.16	0.13	0.01	0.16	Open	0
27	☐	533	B-360	B-270	158.01	297.00	120.00	13.58	0.20	0.03	0.19	Open	0
28	☐	477	B-360	B-260	184.36	297.00	120.00	-18.50	0.27	0.06	0.34	Open	0
29	☐	563	B-380	J-1	57.31	250.00	110.00	2.74	0.06	0.00	0.03	Open	0
30	☐	481	B-380	B-290	214.22	250.00	110.00	6.39	0.13	0.03	0.13	Open	0
31	☐	P11	J-1	J-2	91.84	250.00	110.00	-0.96	0.02	0.00	0.00	Open	0
32	☐	565	J-2	J-3	84.71	250.00	110.00	-2.13	0.04	0.00	0.02	Open	0
33	☐	567	J-3	B-300	153.45	250.00	110.00	-3.40	0.07	0.01	0.04	Open	0
34	☐	469	JUN-1	JUN-2	145.95	610.00	120.00	25.13	0.09	0.00	0.02	Open	0
35	☐	453	JUN-1	JUN-3	26.14	297.00	120.00	46.30	0.67	0.05	1.88	Open	0

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/k-m)	Status	Flow Reversal Count
36	☐	507	JUN-2	B-120	112.65	204.00	110.00	25.13	0.77	0.50	4.44	Open	0
37	☐	595	KR-10	B-355	115.51	204.00	110.00	-2.73	0.08	0.01	0.07	Open	0
38	☐	613	KR-20	B-360	36.50	204.00	110.00	-4.16	0.13	0.01	0.16	Open	0
39	☐	611	KR-25	KR-20	34.03	204.00	110.00	-4.16	0.13	0.01	0.16	Open	0
40	☐	593	KR-35	B-350	53.55	250.00	110.00	-12.10	0.25	0.02	0.43	Open	0
41	☐	607	KR-45	B-355	63.51	250.00	110.00	-3.82	0.08	0.00	0.05	Open	0
42	☐	605	KR-55	KR-45	97.32	250.00	110.00	-3.82	0.08	0.00	0.05	Open	0
43	☐	601	KR-65	KR-55	78.29	250.00	150.00	-3.82	0.08	0.00	0.03	Open	0
44	☐	579	PH3-1	PH3-2	156.07	204.00	110.00	-7.74	0.24	0.08	0.50	Open	0
45	☐	627	PH3-1	B-330	86.04	204.00	110.00	7.74	0.24	0.04	0.50	Open	0
46	☐	629	PH3-2	B-315	103.77	204.00	110.00	-7.74	0.24	0.05	0.50	Open	0

APPENDIX B



NOTES:

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

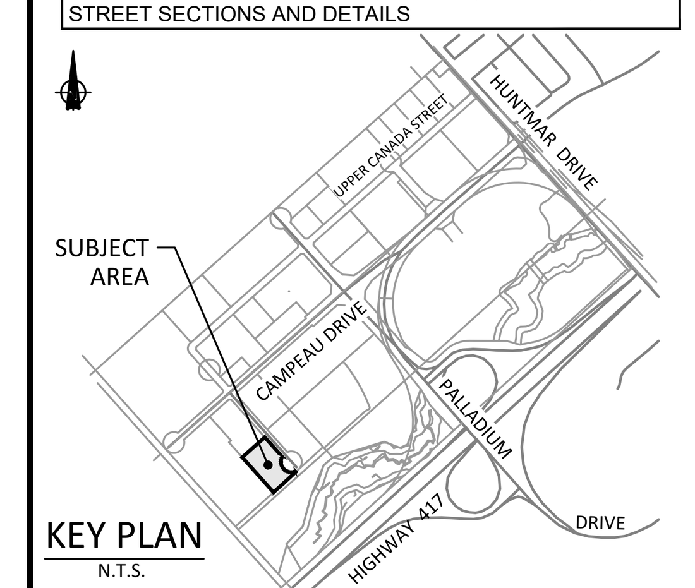
LEGEND :

- 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, 011, 012 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.	2020:08:27
2	REVISED AS PER CITY COMMENTS	T.R.B.	2020:06:17
1	ISSUED FOR SPA	T.R.B.	2020:03:20

5010779
ONTARIO INC.

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

Project Title
Harding HEATING & AIR CONDITIONING
200 NIPISSING COURT, KANATA ON

LICENSED PROFESSIONAL ENGINEER
T. R. BRULE
2020/08/27
PROVINCE OF ONTARIO

Drawing Title
SANITARY DRAINAGE AREA PLAN

Scale 1:500

Design	Date
J.B.	MARCH 2020
Drawn: J.B./D.P.S.	Checked: T.R.B.
Project No.: 123843	Drawing No.: C-400

D07-12-20-0031

#18128

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

Harding HVAC
CITY OF OTTAWA
Taggart Realty Managememnt

LOCATION				RESIDENTIAL										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		RES PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						ICI PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		SF	SD	TH	APT		IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL				IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
														IND	CUM	IND	CUM	IND	CUM															
Harding Site		BLDG	MH1A															1.07	1.07	1.50	0.65	1.07	1.07	0.35			1.00	34.22	9.97	200	1.00	1.055	33.21	97.07%
Harding Site		MH1A	Main															0.00	1.07	1.50	0.65	0.00	1.07	0.35			1.00	34.22	11.00	200	1.00	1.055	33.21	97.07%

Design Parameters:

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

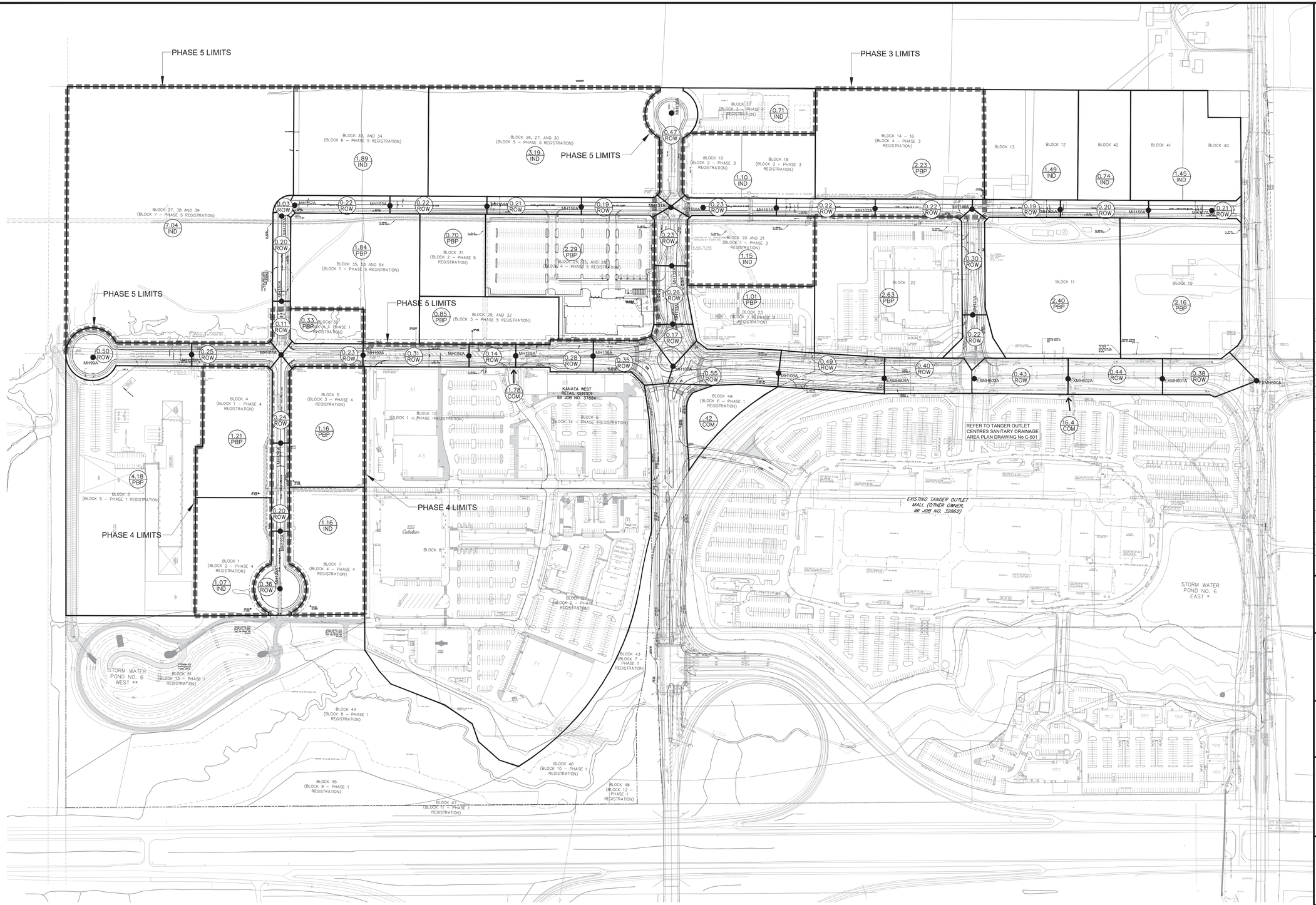
Designed: JEB

Checked: TRB

Dwg. Reference: 123843-C-400

No.	Revision	Date
1.	Issued for Site Plan Application	2020-03-20

File Reference: 123843.7.3 **Date:** 2020-03-20 **Sheet No:** 1 of 1



LEGEND:

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

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

TAGGART REALTY MANAGEMENT

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

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

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

SANITARY SEWER DESIGN SHEET

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

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

HARDING

Design Parameters:

Residential

SF	3.4	p/p/u
TH/SD	2.7	p/p/u
APT	1.8	p/p/u
Other	60	p/p/Ha

ICI Areas

			Peak Factor (PF)
P.B.P.	28,000	L/Ha/day	1.5
COM	28,000	L/Ha/day	1.5
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

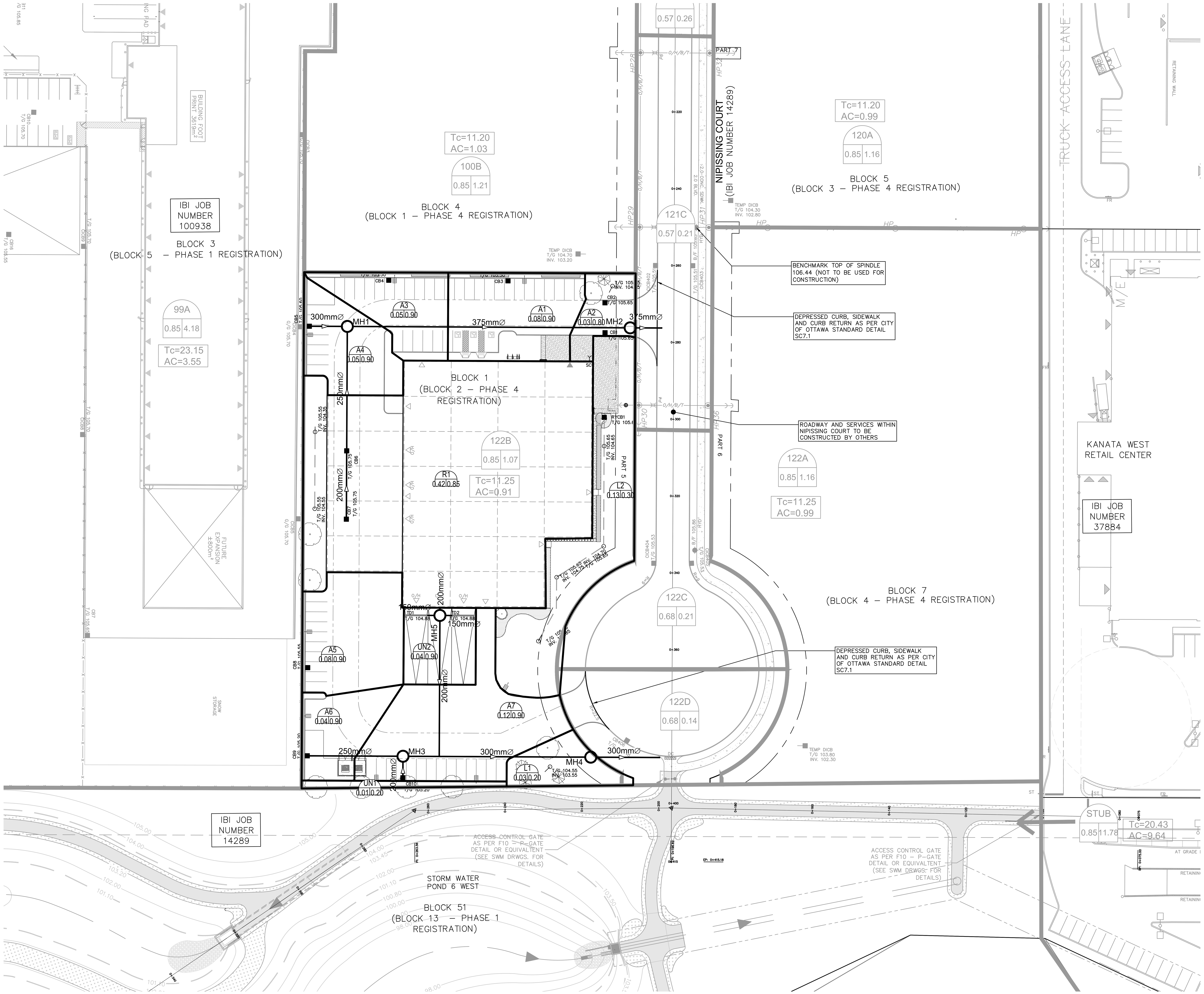
Checked:

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



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 (grey) — 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, 011, 012 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.	2020:08:27
2	REVISED AS PER CITY COMMENTS	T.R.B.	2020:06:17
1	ISSUED FOR SPA	T.R.B.	2020:03:20

5010779
ONTARIO INC.

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

Project Title
Harding HEATING & AIR CONDITIONING
200 NIPISSING COURT, KANATA ON

LICENSED PROFESSIONAL ENGINEER
T. R. BRULE
2020/08/27
PROVINCE OF ONTARIO

Drawing Title
STORM DRAINAGE AREA PLAN

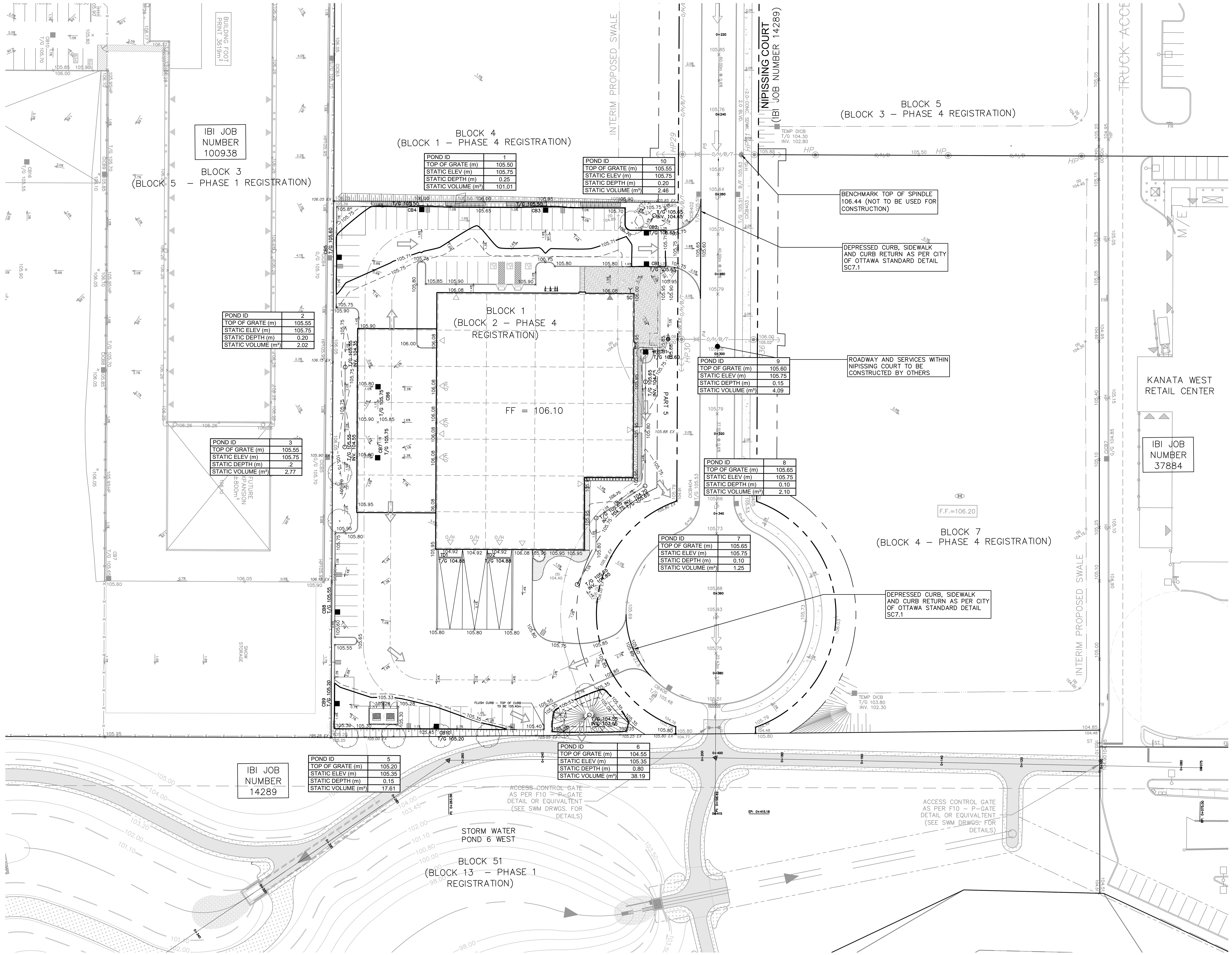
Scale
1:500

Design	Date
J.B.	MARCH 2020
Drawn	**Checked**
J.B./D.P.S.	T.R.B.
Project No.	**Drawing No.**
123843	C-500

D07-12-20-0031

#18128

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



POND ID	1	10	2	3	9	8	7	5	6
TOP OF GRATE (m)	105.50	105.55	105.55	105.55	105.60	105.65	105.65	105.20	104.55
STATIC ELEV (m)	105.75	105.75	105.75	105.75	105.75	105.75	105.75	105.35	105.35
STATIC DEPTH (m)	0.25	0.20	0.20	2	0.15	0.10	0.10	0.15	0.80
STATIC VOLUME (m³)	101.01	2.46	2.02	2.77	4.09	2.10	1.25	17.61	38.19

LEGEND :
- WH — AREA NUMBER
- 0.0 — RUNOFF COEFFICIENT
- 1.01 — AREA IN HECTARES
- DRAINAGE AREA LIMITS
- 100 YEAR PONDING VOLUME LIMIT
- 5 YEAR PONDING ELEVATION
- MAX PONDING ELEVATION
- EMERGENCY FLOW ROUTE FOR STORMWATER ABOVE THE 1:100 EVENT

SEE 010, 011, 012 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.	2020:08:27
2	REVISED AS PER CITY COMMENTS	T.R.B.	2020:06:17
1	ISSUED FOR SPA	T.R.B.	2020:03:20

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200 NIPISSING COURT, KANATA ON

LICENSED PROFESSIONAL ENGINEER
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2020/08/27
PROVINCE OF ONTARIO

Drawing Title
SITE PONDING PLAN

Scale 1:500

Design	Date
J.B.	MARCH 2020
Drawn	Checked
J.B./D.P.S.	T.R.B.
Project No.	Drawing No.
123843	C-600

D07-12-20-0031

#18128

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STORM SEWER DESIGN SHEET

Harding HVAC
City of Ottawa
Taggart Realty Management

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= 0.70	C= 0.80	C= 0.85	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)	(%)
Harding - North	R1	TCB1	CB5-MH1									0.42		0.99	0.99	10.00	0.33	10.33	76.81	104.19	122.14	178.56	76.23	103.41	121.22	177.21		76.23	100.88	27.53	300			1.00	1.383	24.66	24.44%
Harding - North	A4	CB5	MH1										0.05	0.13	1.12	10.33	0.12	10.45	75.55	102.47	120.11	175.58	84.44	114.52	134.24	196.22		84.44	100.88	9.90	300			1.00	1.383	16.45	16.30%
Harding - North	N/A (covered)	CB7	CB6											0.00	0.00	10.00	0.71	10.71	76.81	104.19	122.14	178.56	0.00	0.00	0.00	0.00		0.00	17.79	36.00	200			0.65	0.851	17.79	100.00%
Harding - North	N/A (covered)	CB6	MH1											0.00	0.00	10.71	0.71	11.42	74.20	100.61	117.92	172.36	0.00	0.00	0.00	0.00		0.00	32.39	37.00	250			0.50	0.866	32.39	100.00%
Harding - North	A3, A1, A2, L2	MH1	MH2			0.13					0.03		0.13	0.50	1.62	10.45	0.76	11.22	75.11	101.87	119.40	174.54	121.53	164.82	193.19	282.39		121.53	182.91	73.62	375			1.00	1.604	61.38	33.56%
Harding - North		MH2	Nipissing											0.00	1.62	11.22	0.09	11.30	72.43	98.18	115.06	168.16	117.19	158.85	186.16	272.07		117.19	182.91	8.35	375			1.00	1.604	65.72	35.93%
Harding - South	A5	CB8	CB9										0.08	0.20	0.20	10.00	0.35	10.35	76.81	104.19	122.14	178.56	15.37	20.86	24.45	35.74		15.37	34.22	22.35	200			1.00	1.055	18.84	55.07%
Harding - South	A6	CB9	MH3										0.04	0.10	0.30	10.35	0.34	10.69	75.48	102.36	119.99	175.39	22.66	30.73	36.03	52.66		22.66	62.04	24.92	250			1.00	1.224	39.38	63.47%
Harding - South	L1	ECB11	CB10	0.03										0.02	0.02	10.00	0.77	10.77	76.81	104.19	122.14	178.56	1.28	1.74	2.04	2.98		1.28	27.59	39.22	200			0.65	0.851	26.31	95.36%
Harding - South	A7	CB10	MH3										0.12	0.30	0.32	10.77	0.08	10.84	73.98	100.30	117.56	171.83	23.44	31.79	37.26	54.46		23.44	62.04	5.60	250			1.00	1.224	38.59	62.21%
Harding - South	Loading Dock	MH19	MH3-MH4										0.04	0.10	0.10	10.00	0.58	10.58	76.81	104.19	122.14	178.56	7.69	10.43	12.22	17.87		17.87	34.22	36.52	200			1.00	1.055	16.35	47.77%
Harding - South		MH3	MH4											0.00	0.62	10.84	0.83	11.68	73.71	99.93	117.12	171.19	45.49	61.67	72.28	105.65		45.49									
														0.00	0.10	10.84	0.83	11.68	73.71	99.93	117.12	171.19	7.38	10.00	11.72	17.13		17.13									
																												62.62	71.33	48.88	300			0.50	0.978	8.71	12.21%
Harding - South		MH4	Nipissing											0.00	0.62	11.68	0.31	11.99	70.91	96.09	112.60	164.55	43.76	59.30	69.49	101.55		43.76									
														0.00	0.10	11.68	0.31	11.99	70.91	96.09	112.60	164.55	7.10	9.62	11.27	16.47		16.47									
																												60.23	71.33	18.07	300			0.50	0.978	11.10	15.56%

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: 123843-C-500

No.	Revision	Date
1.	Issued for Site Plan Application	2020-03-20
2.	Revised per City comments	2020-08-27

File Reference: 123843.7.3
Date: 2020-03-20
Sheet No: 1 of 1

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

PROJECT: Harding
DATE: 2020-02-18
FILE: 123843.7.3
REV #: 2
DESIGNED BY: JEB
CHECKED BY: TB

STORMWATER MANAGEMENT

Formulas and Descriptions

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

Maximum Allowable Release Rate

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

	% of original block included in Harding Site	KWBP Minor System Flow (Table 4.2) L/s	Flow to be used in Kinaxis Site L/s
Area ID 122B	100%	231	231

Q_{TOTAL} = 231.00 L/s

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

C =	0.95	Drainage area UN 1+UN2 ave. (increased by 25%)
T_c =	10	min
i_{100yr} =	178.56	mm/hr
$A_{uncontrolled}$ =	0.05	Ha

$Q_{uncontrolled}$ = 23.58 L/s

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

$Q_{max\ allowable}$ = 207.42 L/s

AREA	C	A	AVE
A1	0.9	0.08	0.096
A2	0.8	0.03	0.032
A3	0.9	0.05	0.060
A4	0.9	0.05	0.060
R1	0.85	0.28	0.317
R2	0.70	0.26	0.243
		0.75	**0.808**

AREA	C	A	AVE
A5	0.9	0.08	0.267
A6	0.9	0.04	0.133
A7	0.9	0.12	0.400
L1	0.2	0.03	0.022
		0.27	0.822

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

Drainage Area	***A1, A2, A3, A4, R1, R2***	***Ponding IDs***	***1, 2, 3, 7, 8, 9, 10***	ICD Flow Rate
Area (Ha)	0.750			
C =	0.99	Restricted Flow Q_r (L/s)=	76.00	152

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)***
21	116.30	240.05	76.00	164.05	206.71
23	109.68	226.40	76.00	150.40	207.55
24	106.68	220.19	76.00	144.19	**207.64**
25	103.85	214.36	76.00	138.36	207.53
27	98.66	203.65	76.00	127.65	206.79

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	207.64	115.70	99.44	0.00

In-Pipe Storage

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)	
73.62	0.375	0.110	8.13	
90.64	0.250	0.049	4.45	
43.07	0.200	0.031	1.35	
20.00	0.250	0.049	0.98	*PERF
65.63	0.250	0.049	3.22	*PERF
			18.14	

Drainage Area	***A1, A2, A3, A4, R1, R2***	***Ponding IDs***	***1, 2, 3, 7, 8, 9, 10***	ICD Flow Rate
Area (Ha)	0.750			
C =	0.81	Restricted Flow Q_r (L/s)=	76.00	152

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)***
9	109.79	185.42	76.00	109.42	59.09
11	99.19	167.52	76.00	91.52	60.40
12	94.70	159.93	76.00	83.93	**60.43**
13	90.63	153.06	76.00	77.06	60.11
15	83.56	141.12	76.00	65.12	58.60

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	60.43	115.70	99.44	0.00

Structure Storage

	Number	Depth	Area (m^2)	Volume (m^3)
CBs (600mm x 600mm)	8	1.70	0.36	4.90
MHs (1200mm round)	2	2.20	1.13	4.98
				9.87

Drainage Area	***A1, A2, A3, A4, R1, R2***	***Ponding IDs***	***1, 2, 3, 7, 8, 9, 10***	ICD Flow Rate
Area (Ha)	0.750			
C =	0.81	Restricted Flow Q_r (L/s)=	76.00	152

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	103.57	174.92	76.00	98.92	29.67
7	90.66	153.12	76.00	77.12	32.39
8	85.46	144.32	76.00	68.32	**32.80**
9	80.87	136.58	76.00	60.58	32.71
11	73.17	123.57	76.00	47.57	31.40

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	32.80	115.70	99.44	0.00

Pref - Pipe Storage

Length (m)	Width (m)	Depth(m)	Void Ratio	Pipe Volume	Stone Volume (m^3)
65.63	1.000	1.550	0.38	3.22	35.43
20.00	1.000	1.800	0.38	0.98	36.00
					71.43

Depth of perf pipe storage obtained by taking ponding spill elevation (105.75, minus average pipe invert elevation, minus .1m topsoil, plus 0.6m clear stone depth below perf pipe

Drainage Area	A5, A6, A7, L1	Ponding IDs	4, 5, 6		ICD Flow Rate
Area (Ha)	0.270				
C =	0.99	Restricted Flow Q_r (L/s)=		55.00	55

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	139.89	55.00	84.89	45.84
11	169.91	126.26	55.00	71.26	47.03
12	162.13	120.48	55.00	65.48	**47.15**
13	155.11	115.26	55.00	60.26	47.00
15	142.89	106.18	55.00	51.18	46.07

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	47.15	55.80	7.66	0.00

In-Pipe Storage

Length (m)	Dia (m)	Area (m^2)	Volume (m^3)
24.92	0.250	0.049	1.22
67.40	0.200	0.031	2.12
			3.34

Drainage Area	A5, A6, A7, L1	Ponding IDs	4, 5, 6		ICD Flow Rate
Area (Ha)	0.270				
C =	0.82	Restricted Flow Q_r (L/s)=		55.00	55

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	112.44	55.00	57.44	6.89
4	152.51	93.87	55.00	38.87	9.33
5	141.18	86.89	55.00	31.89	**9.57**
6	131.57	80.98	55.00	25.98	9.35
8	116.11	71.47	55.00	16.47	7.90

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	9.57	55.80	7.66	0.00

Structure Storage

	Number	Depth	Area (m^2)	Volume (m^3)
CSs	3	1.70	0.36	1.84
MHs (1200mm round)	1	2.20	1.13	2.49
				4.32

Drainage Area	A5, A6, A7, L1	Ponding IDs	4, 5, 6		ICD Flow Rate
Area (Ha)	0.270				
C =	0.82	Restricted Flow Q_r (L/s)=		55.00	55

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	102.92	55.00	47.92	0.00
2	133.33	82.06	55.00	27.06	3.25
3	121.46	74.76	55.00	19.76	**3.56**
4	111.72	68.76	55.00	13.76	3.30
6	96.64	59.48	55.00	4.48	1.61

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	3.56	55.80	7.66	0.00

SUMMARY OF INFILTRATION GALLERY CALCULATIONS

AVERAGE SILTY SAND PERCOLATION RATE

annual precipitation (mm)	920
70% available runoff (mm)	644
area (ha)	1.07

								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
Landscape Area	1280	824	1	2.25	68.8	154.8	0.6	3.18%	0.00%	1.59%	26	0	13	798	824	811
Roof	4215	2714	2	2.25	19	42.75	0.6	71.54%	52.87%	62.20%	1942	1435	1689	772	1279	1026
TOTAL		3539											1702			1837

AVERAGE INFILTRATION RATE	171.70
REQUIRED INFILTRATION RATE	106

INFILTRATION GALLERY SIZING CALCULATION

WET YEAR CALCULATION

East Roof	1280	m^2	PRECIPITATION DATA APRIL 1 TO OCTOBER 31 (WET YEAR)			
Effective Runoff	0.7	%	TOT PRECIP DEPTH	800.4	mm	
Percolation	0.504	(m/day, avg sandy silt)	TOTAL PRECIP VOLUME	717	m3	
INFILTRATION GALLERY SIZING			TOT INFILTRATION VOL	694	m3	
Width	2.25	m	DEVELOPMENT AREA	1.07	ha	
Length	68.8	m				
depth	0.6	m	OVERFLOW VOL	23	m3/year	
Number Cells	1					
void ratio	0.38		RUNOFF VOLUME OVERFLOW	3.18%		
	35.2944	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	0	0	0	0	0	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	7	7	7	0	7	0	0
07-Apr	3.4	0.142	3	3	3	0	3	0	0
08-Apr	4.6	0.192	4	4	4	0	4	0	0
09-Apr	4.2	0.175	4	4	4	0	4	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	7	7	7	0	7	0	0
21-Apr	2.8	0.117	3	3	3	0	3	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	8	8	8	0	8	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	2	2	2	0	2	0	0
05-May	8	0.333	7	7	7	0	7	0	0
06-May	1	0.042	1	1	1	0	1	0	0
07-May	1.6	0.067	1	1	1	0	1	0	0
08-May	0.8	0.033	1	1	1	0	1	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	1	1	1	0	1	0	0
16-May	17.4	0.725	16	16	16	0	16	0	0
17-May	0	0.000	0	0	0	0	0	0	0
18-May	11	0.458	10	10	10	0	10	0	0
19-May	30.2	1.258	27	27	27	0	27	0	0
20-May	29.4	1.225	26	26	26	0	26	0	0
21-May	5.9	0.246	5	5	5	0	5	0	0
22-May	26.9	1.121	24	24	24	0	24	0	0
23-May	11.3	0.471	10	10	10	0	10	0	0
24-May	0.4	0.017	0	0	0	0	0	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	7	7	7	0	7	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	9	9	9	0	9	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	1	1	1	0	1	0	0
06-Jun	0	0.000	0	0	0	0	0	0	0
07-Jun	5	0.208	4	4	4	0	4	0	0
08-Jun	0.2	0.008	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	4.8	0.200	4	4	4	0	4	0	0
12-Jun	26.2	1.092	23	23	23	0	23	0	0
13-Jun	1	0.042	1	1	1	0	1	0	0
14-Jun	0	0.000	0	0	0	0	0	0	0
15-Jun	0	0.000	0	0	0	0	0	0	0
16-Jun	5.6	0.233	5	5	5	0	5	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	4	4	4	0	4	0	0
20-Jun	0	0.000	0	0	0	0	0	0	0
21-Jun	0	0.000	0	0	0	0	0	0	0
22-Jun	0	0.000	0	0	0	0	0	0	0
23-Jun	1	0.042	1	1	1	0	1	0	0
24-Jun	27.2	1.133	24	24	24	0	24	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	26	26	26	0	26	0	0
28-Jun	0	0.000	0	0	0	0	0	0	0
29-Jun	0.2	0.008	0	0	0	0	0	0	0
30-Jun	0	0.000	0	0	0	0	0	0	0
01-Jul	0	0.000	0	0	0	0	0	0	0
02-Jul	10	0.417	9	9	9	0	9	0	0
03-Jul	14.8	0.617	13	13	13	0	13	0	0
04-Jul	7.6	0.317	7	7	7	0	7	0	0
05-Jul	14.8	0.617	13	13	13	0	13	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	9	9	9	0	9	0	0
14-Jul	0.4	0.017	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	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	6	6	6	0	6	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	3	3	3	0	3	0	0
26-Jul	31.6	1.317	28	28	28	0	28	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	38	35	35	3	35	0	0
30-Jul	2.4	0.100	2	2	2	0	2	0	0
31-Jul	0	0.000	0	0	0	0	0	0	0
01-Aug	0.6	0.025	1	1	1	0	1	0	0
02-Aug	10.8	0.450	10	10	10	0	10	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	0	0	0	0	0	0	0
06-Aug	4	0.167	4	4	4	0	4	0	0
07-Aug	1.2	0.050	1	1	1	0	1	0	0
08-Aug	2.8	0.117	3	3	3	0	3	0	0
09-Aug	11	0.458	10	10	10	0	10	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	2	2	2	0	2	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	13	13	13	0	13	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	14	14	14	0	14	0	0
22-Aug	0	0.000	0	0	0	0	0	0	0
23-Aug	6.6	0.275	6	6	6	0	6	0	0
24-Aug	0.8	0.033	1	1	1	0	1	0	0
25-Aug	0	0.000	0	0	0	0	0	0	0
26-Aug	3.8	0.158	3	3	3	0	3	0	0
27-Aug	24.2	1.008	22	22	22	0	22	0	0
28-Aug	0.8	0.033	1	1	1	0	1	0	0
29-Aug	0	0.000	0	0	0	0	0	0	0
30-Aug	0	0.000	0	0	0	0	0	0	0
31-Aug	0	0.000	0	0	0	0	0	0	0
01-Sep	0	0.000	0	0	0	0	0	0	0
02-Sep	0.4	0.017	0	0	0	0	0	0	0
03-Sep	0	0.000	0	0	0	0	0	0	0
04-Sep	1.9	0.079	2	2	2	0	2	0	0
05-Sep	5.8	0.242	5	5	5	0	5	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	6	6	6	0	6	0	0
11-Sep	61.8	2.575	55	35	35	20	35	0	0
12-Sep	20.6	0.858	18	18	18	0	18	0	0
13-Sep	5.8	0.242	5	5	5	0	5	0	0
14-Sep	0	0.000	0	0	0	0	0	0	0
15-Sep	8.1	0.338	7	7	7	0	7	0	0
16-Sep	2.3	0.096	2	2	2	0	2	0	0
17-Sep	0	0.000	0	0	0	0	0	0	0
18-Sep	0	0.000	0	0	0	0	0	0	0
19-Sep	0	0.000	0	0	0	0	0	0	0
20-Sep	0.8	0.033	1	1	1	0	1	0	0
21-Sep	0	0.000	0	0	0	0	0	0	0
22-Sep	0	0.000	0	0	0	0	0	0	0
23-Sep	13	0.542	12	12	12	0	12	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	1	1	1	0	1	0	0
29-Sep	14.1	0.588	13	13	13	0	13	0	0
30-Sep	25.2	1.050	23	23	23	0	23	0	0
01-Oct	0	0.000	0	0	0	0	0	0	0
02-Oct	0.4	0.017	0	0	0	0	0	0	0
03-Oct	7.8	0.325	7	7	7	0	7	0	0
04-Oct	7.8	0.325	7	7	7	0	7	0	0
05-Oct	6	0.250	5	5	5	0	5	0	0
06-Oct	0.4	0.017	0	0	0	0	0	0	0
07-Oct	0	0.000	0	0	0	0	0	0	0
08-Oct	1	0.042	1	1	1	0	1	0	0
09-Oct	1.2	0.050	1	1	1	0	1	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	9	9	9	0	9	0	0
14-Oct	9	0.375	8	8	8	0	8	0	0
15-Oct	0	0.000	0	0	0	0	0	0	0
16-Oct	0.2	0.008	0	0	0	0	0	0	0
17-Oct	1.6	0.067	1	1	1	0	1	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	5	5	5	0	5	0	0
22-Oct	0	0.000	0	0	0	0	0	0	0
23-Oct	1	0.042	1	1	1	0	1	0	0
24-Oct	0	0.000	0	0	0	0	0	0	0
25-Oct	0	0.000	0	0	0	0	0	0	0
26-Oct	1.3	0.054	1	1	1	0	1	0	0
27-Oct	10.9	0.454	10	10	10	0	10	0	0
28-Oct	0	0.000	0	0	0	0	0	0	0
29-Oct	13	0.542	12	12	12	0	12	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

East Roof	1280	m^2	PRECIPITATION DATA APRIL 1 TO OCTOBER 31 (DRY YEAR)		
Effective Runoff	0.7	%	TOT PRECIP DEPTH	405.1	mm
Percolation	0.504	(m/day, avg silty sand)	TOTAL PRECIP VOLUME	363	m3
INFILTRATION GALLERY SIZING			TOT INFILTRATION VOL	363	m3
Width	2.25	m	DEVELOPMENT AREA	1.07	ha
Length	68.8	m			
depth	0.6	m	OVERFLOW VOL	0	m3/year
Number Cells	1				
void ratio	0.38		RUNOFF VOLUME OVERFLOW	0.00%	
	35.2944	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	13	13	13	0	13	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	0	0	0	0	0	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	1	1	1	0	1	0	0
13-Apr	1.6	0.067	1	1	1	0	1	0	0
14-Apr	5.9	0.246	5	5	5	0	5	0	0
15-Apr	2.3	0.096	2	2	2	0	2	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	6	6	6	0	6	0	0
23-Apr	4.8	0.200	4	4	4	0	4	0	0
24-Apr	0.3	0.013	0	0	0	0	0	0	0
25-Apr	0	0.000	0	0	0	0	0	0	0
26-Apr	0	0.000	0	0	0	0	0	0	0
27-Apr	0	0.000	0	0	0	0	0	0	0
28-Apr	0	0.000	0	0	0	0	0	0	0
29-Apr	10.8	0.450	10	10	10	0	10	0	0
30-Apr	1.6	0.067	1	1	1	0	1	0	0
01-May	3.8	0.158	3	3	3	0	3	0	0
02-May	0	0.000	0	0	0	0	0	0	0
03-May	11.3	0.471	10	10	10	0	10	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	4	4	4	0	4	0	0
07-May	3	0.125	3	3	3	0	3	0	0
08-May	0	0.000	0	0	0	0	0	0	0
09-May	23.4	0.975	21	21	21	0	21	0	0
10-May	0.5	0.021	0	0	0	0	0	0	0
11-May	0	0.000	0	0	0	0	0	0	0
12-May	22.3	0.929	20	20	20	0	20	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	2	2	2	0	2	0	0
16-May	0.3	0.013	0	0	0	0	0	0	0
17-May	0	0.000	0	0	0	0	0	0	0
18-May	0	0.000	0	0	0	0	0	0	0
19-May	0	0.000	0	0	0	0	0	0	0
20-May	0	0.000	0	0	0	0	0	0	0
21-May	0	0.000	0	0	0	0	0	0	0
22-May	8.4	0.350	8	8	8	0	8	0	0
23-May	10	0.417	9	9	9	0	9	0	0
24-May	3.4	0.142	3	3	3	0	3	0	0
25-May	6.2	0.258	6	6	6	0	6	0	0
26-May	1.9	0.079	2	2	2	0	2	0	0
27-May	0.3	0.013	0	0	0	0	0	0	0
28-May	1.3	0.054	1	1	1	0	1	0	0
29-May	1.1	0.046	1	1	1	0	1	0	0
30-May	0	0.000	0	0	0	0	0	0	0
31-May	10.9	0.454	10	10	10	0	10	0	0
01-Jun	0	0.000	0	0	0	0	0	0	0
02-Jun	0.5	0.021	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	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	0	0	0	0	0	0	0
13-Jun	12.2	0.508	11	11	11	0	11	0	0
14-Jun	0.3	0.013	0	0	0	0	0	0	0
15-Jun	1.3	0.054	1	1	1	0	1	0	0
16-Jun	11.8	0.492	11	11	11	0	11	0	0
17-Jun	6.4	0.267	6	6	6	0	6	0	0
18-Jun	0.8	0.033	1	1	1	0	1	0	0
19-Jun	0	0.000	0	0	0	0	0	0	0
20-Jun	5.2	0.217	5	5	5	0	5	0	0
21-Jun	3.2	0.133	3	3	3	0	3	0	0
22-Jun	0	0.000	0	0	0	0	0	0	0
23-Jun	0	0.000	0	0	0	0	0	0	0
24-Jun	0.3	0.013	0	0	0	0	0	0	0
25-Jun	0	0.000	0	0	0	0	0	0	0
26-Jun	0	0.000	0	0	0	0	0	0	0
27-Jun	0	0.000	0	0	0	0	0	0	0
28-Jun	0	0.000	0	0	0	0	0	0	0
29-Jun	0	0.000	0	0	0	0	0	0	0
30-Jun	1.1	0.046	1	1	1	0	1	0	0
01-Jul	0.5	0.021	0	0	0	0	0	0	0
02-Jul	6.1	0.254	5	5	5	0	5	0	0
03-Jul	0	0.000	0	0	0	0	0	0	0
04-Jul	6.4	0.267	6	6	6	0	6	0	0
05-Jul	0.8	0.033	1	1	1	0	1	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	6	6	6	0	6	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	19	19	19	0	19	0	0
19-Jul	11.5	0.479	10	10	10	0	10	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	6	6	6	0	6	0	0
24-Jul	9.2	0.383	8	8	8	0	8	0	0
25-Jul	0	0.000	0	0	0	0	0	0	0
26-Jul	0.3	0.013	0	0	0	0	0	0	0
27-Jul	1.3	0.054	1	1	1	0	1	0	0
28-Jul	0	0.000	0	0	0	0	0	0	0
29-Jul	1.1	0.046	1	1	1	0	1	0	0
30-Jul	0.3	0.013	0	0	0	0	0	0	0
31-Jul	4.1	0.171	4	4	4	0	4	0	0
01-Aug	0	0.000	0	0	0	0	0	0	0
02-Aug	8.9	0.371	8	8	8	0	8	0	0
03-Aug	11.5	0.479	10	10	10	0	10	0	0
04-Aug	0.8	0.033	1	1	1	0	1	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	1	1	1	0	1	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	1	1	1	0	1	0	0
13-Aug	0	0.000	0	0	0	0	0	0	0
14-Aug	0	0.000	0	0	0	0	0	0	0
15-Aug	0	0.000	0	0	0	0	0	0	0
16-Aug	0	0.000	0	0	0	0	0	0	0
17-Aug	0.6	0.025	1	1	1	0	1	0	0
18-Aug	0	0.000	0	0	0	0	0	0	0
19-Aug	5.5	0.229	5	5	5	0	5	0	0
20-Aug	0	0.000	0	0	0	0	0	0	0
21-Aug	0	0.000	0	0	0	0	0	0	0
22-Aug	0	0.000	0	0	0	0	0	0	0
23-Aug	0.8	0.033	1	1	1	0	1	0	0
24-Aug	0	0.000	0	0	0	0	0	0	0
25-Aug	0	0.000	0	0	0	0	0	0	0
26-Aug	0	0.000	0	0	0	0	0	0	0
27-Aug	3.3	0.138	3	3	3	0	3	0	0
28-Aug	0	0.000	0	0	0	0	0	0	0
29-Aug	0	0.000	0	0	0	0	0	0	0
30-Aug	0	0.000	0	0	0	0	0	0	0
31-Aug	0.8	0.033	1	1	1	0	1	0	0
01-Sep	0	0.000	0	0	0	0	0	0	0
02-Sep	0.9	0.038	1	1	1	0	1	0	0
03-Sep	8.4	0.350	8	8	8	0	8	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	1	1	1	0	1	0	0
10-Sep	4.4	0.183	4	4	4	0	4	0	0
11-Sep	0	0.000	0	0	0	0	0	0	0
12-Sep	3.5	0.146	3	3	3	0	3	0	0
13-Sep	11.7	0.488	10	10	10	0	10	0	0
14-Sep	0	0.000	0	0	0	0	0	0	0
15-Sep	0	0.000	0	0	0	0	0	0	0
16-Sep	0	0.000	0	0	0	0	0	0	0
17-Sep	1.1	0.046	1	1	1	0	1	0	0
18-Sep	0	0.000	0	0	0	0	0	0	0
19-Sep	0	0.000	0	0	0	0	0	0	0
20-Sep	3.1	0.129	3	3	3	0	3	0	0
21-Sep	1.4	0.058	1	1	1	0	1	0	0
22-Sep	0.6	0.025	1	1	1	0	1	0	0
23-Sep	0	0.000	0	0	0	0	0	0	0
24-Sep	0	0.000	0	0	0	0	0	0	0
25-Sep	4.9	0.204	4	4	4	0	4	0	0
26-Sep	0.3	0.013	0	0	0	0	0	0	0
27-Sep	0	0.000	0	0	0	0	0	0	0
28-Sep	3.9	0.163	3	3	3	0	3	0	0
29-Sep	2.1	0.088	2	2	2	0	2	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	4	4	4	0	4	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	3	3	3	0	3	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	2	2	2	0	2	0	0
11-Oct	0	0.000	0	0	0	0	0	0	0
12-Oct	1.8	0.075	2	2	2	0	2	0	0
13-Oct	0	0.000	0	0	0	0	0	0	0
14-Oct	8.9	0.371	8	8	8	0	8	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	6	6	6	0	6	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	6	6	6	0	6	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	5	5	5	0	5	0	0
31-Oct	0.3	0.013	0	0	0	0	0	0	0

INFILTRATION GALLERY SIZING CALCULATION

WET YEAR CALCULATION

West Roof	4215	m^2	PRECIPITATION DATA APRIL 1 TO OCTOBER 31 (WET YEAR)				
Effective Runoff	0.7	%	TOT PRECIP DEPTH	800.4	mm		
Percolation	0.504	(m/day, avg silty sand)	TOTAL PRECIP VOLUME	2361	m3		
INFILTRATION GALLERY SIZING			TOT INFILTRATION VOL	672	m3	2361	
Width	2.25	m	DEVELOPMENT AREA	1.07	ha		
Length	19	m					
depth	0.6	m	OVERFLOW VOL	1689	m3/year		
Number Cells	1						
void ratio	0.38		RUNOFF VOLUME OVERFLOW	71.54%			
	9.747	TOTAL DRYCELL VOL					

DATE	RAINFALL	RAINFALL INTENSITY (AVG)	RAINWATER AVAILABLE	VOLUME INFLOW TO DRYCELL	VOLUME IN DRY CELL	VOLUME PASSING DRY CELL	INFILTRATION FROM BOTTOM	INFILTRATION FROM SIDES (BOTTOM 1/3)	BALANCE IN DRYCELL
	[MM]	[MM/HR]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]
01-Apr	0.2	0.008	0	0	0	0	0	0	0
02-Apr	0.4	0.017	1	1	1	0	1	0	0
03-Apr	0	0.000	0	0	0	0	0	0	0
04-Apr	0	0.000	0	0	0	0	0	0	0
05-Apr	0	0.000	0	0	0	0	0	0	0
06-Apr	7.8	0.325	23	10	10	13	10	0	0
07-Apr	3.4	0.142	10	10	10	0	10	0	0
08-Apr	4.6	0.192	14	10	10	4	10	0	0
09-Apr	4.2	0.175	12	10	10	3	10	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	24	10	10	14	10	0	0
21-Apr	2.8	0.117	8	8	8	0	8	0	0
22-Apr	0	0.000	0	0	0	0	0	0	0
23-Apr	0	0.000	0	0	0	0	0	0	0
24-Apr	0	0.000	0	0	0	0	0	0	0
25-Apr	0	0.000	0	0	0	0	0	0	0
26-Apr	0	0.000	0	0	0	0	0	0	0
27-Apr	0	0.000	0	0	0	0	0	0	0
28-Apr	0	0.000	0	0	0	0	0	0	0
29-Apr	0	0.000	0	0	0	0	0	0	0
30-Apr	0	0.000	0	0	0	0	0	0	0
01-May	9	0.375	27	10	10	17	10	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	7	7	7	0	7	0	0
05-May	8	0.333	24	10	10	14	10	0	0
06-May	1	0.042	3	3	3	0	3	0	0
07-May	1.6	0.067	5	5	5	0	5	0	0
08-May	0.8	0.033	2	2	2	0	2	0	0
09-May	0	0.000	0	0	0	0	0	0	0
10-May	0	0.000	0	0	0	0	0	0	0
11-May	0	0.000	0	0	0	0	0	0	0
12-May	0	0.000	0	0	0	0	0	0	0
13-May	0	0.000	0	0	0	0	0	0	0
14-May	0	0.000	0	0	0	0	0	0	0
15-May	1	0.042	3	3	3	0	3	0	0
16-May	17.4	0.725	51	10	10	42	10	0	0
17-May	0	0.000	0	0	0	0	0	0	0
18-May	11	0.458	32	10	10	23	10	0	0
19-May	30.2	1.258	89	10	10	79	10	0	0
20-May	29.4	1.225	87	10	10	77	10	0	0
21-May	5.9	0.246	17	10	10	8	10	0	0
22-May	26.9	1.121	79	10	10	70	10	0	0
23-May	11.3	0.471	33	10	10	24	10	0	0
24-May	0.4	0.017	1	1	1	0	1	0	0
25-May	0	0.000	0	0	0	0	0	0	0
26-May	0	0.000	0	0	0	0	0	0	0
27-May	7.8	0.325	23	10	10	13	10	0	0
28-May	0	0.000	0	0	0	0	0	0	0
29-May	0	0.000	0	0	0	0	0	0	0
30-May	0	0.000	0	0	0	0	0	0	0
31-May	0	0.000	0	0	0	0	0	0	0
01-Jun	10.6	0.442	31	10	10	22	10	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	4	4	4	0	4	0	0
06-Jun	0	0.000	0	0	0	0	0	0	0
07-Jun	5	0.208	15	10	10	5	10	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	14	10	10	4	10	0	0
12-Jun	26.2	1.092	77	10	10	68	10	0	0
13-Jun	1	0.042	3	3	3	0	3	0	0
14-Jun	0	0.000	0	0	0	0	0	0	0
15-Jun	0	0.000	0	0	0	0	0	0	0
16-Jun	5.6	0.233	17	10	10	7	10	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	12	10	10	2	10	0	0
20-Jun	0	0.000	0	0	0	0	0	0	0
21-Jun	0	0.000	0	0	0	0	0	0	0
22-Jun	0	0.000	0	0	0	0	0	0	0
23-Jun	1	0.042	3	3	3	0	3	0	0
24-Jun	27.2	1.133	80	10	10	71	10	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	86	10	10	76	10	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	30	10	10	20	10	0	0
03-Jul	14.8	0.617	44	10	10	34	10	0	0
04-Jul	7.6	0.317	22	10	10	13	10	0	0
05-Jul	14.8	0.617	44	10	10	34	10	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	31	10	10	22	10	0	0
14-Jul	0.4	0.017	1	1	1	0	1	0	0
15-Jul	0	0.000	0	0	0	0	0	0	0
16-Jul	0	0.000	0	0	0	0	0	0	0
17-Jul	0	0.000	0	0	0	0	0	0	0
18-Jul	0	0.000	0	0	0	0	0	0	0
19-Jul	0	0.000	0	0	0	0	0	0	0
20-Jul	6.2	0.258	18	10	10	9	10	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	11	10	10	1	10	0	0
26-Jul	31.6	1.317	93	10	10	83	10	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	125	10	10	115	10	0	0
30-Jul	2.4	0.100	7	7	7	0	7	0	0
31-Jul	0	0.000	0	0	0	0	0	0	0
01-Aug	0.6	0.025	2	2	2	0	2	0	0
02-Aug	10.8	0.450	32	10	10	22	10	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	1	1	1	0	1	0	0
06-Aug	4	0.167	12	10	10	2	10	0	0
07-Aug	1.2	0.050	4	4	4	0	4	0	0
08-Aug	2.8	0.117	8	8	8	0	8	0	0
09-Aug	11	0.458	32	10	10	23	10	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	6	6	6	0	6	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	42	10	10	32	10	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	46	10	10	36	10	0	0
22-Aug	0	0.000	0	0	0	0	0	0	0
23-Aug	6.6	0.275	19	10	10	10	10	0	0
24-Aug	0.8	0.033	2	2	2	0	2	0	0
25-Aug	0	0.000	0	0	0	0	0	0	0
26-Aug	3.8	0.158	11	10	10	1	10	0	0
27-Aug	24.2	1.008	71	10	10	62	10	0	0
28-Aug	0.8	0.033	2	2	2	0	2	0	0
29-Aug	0	0.000	0	0	0	0	0	0	0
30-Aug	0	0.000	0	0	0	0	0	0	0
31-Aug	0	0.000	0	0	0	0	0	0	0
01-Sep	0	0.000	0	0	0	0	0	0	0
02-Sep	0.4	0.017	1	1	1	0	1	0	0
03-Sep	0	0.000	0	0	0	0	0	0	0
04-Sep	1.9	0.079	6	6	6	0	6	0	0
05-Sep	5.8	0.242	17	10	10	7	10	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	19	10	10	9	10	0	0
11-Sep	61.8	2.575	182	10	10	173	10	0	0
12-Sep	20.6	0.858	61	10	10	51	10	0	0
13-Sep	5.8	0.242	17	10	10	7	10	0	0
14-Sep	0	0.000	0	0	0	0	0	0	0
15-Sep	8.1	0.338	24	10	10	14	10	0	0
16-Sep	2.3	0.096	7	7	7	0	7	0	0
17-Sep	0	0.000	0	0	0	0	0	0	0
18-Sep	0	0.000	0	0	0	0	0	0	0
19-Sep	0	0.000	0	0	0	0	0	0	0
20-Sep	0.8	0.033	2	2	2	0	2	0	0
21-Sep	0	0.000	0	0	0	0	0	0	0
22-Sep	0	0.000	0	0	0	0	0	0	0
23-Sep	13	0.542	38	10	10	29	10	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	4	4	4	0	4	0	0
29-Sep	14.1	0.588	42	10	10	32	10	0	0
30-Sep	25.2	1.050	74	10	10	65	10	0	0
01-Oct	0	0.000	0	0	0	0	0	0	0
02-Oct	0.4	0.017	1	1	1	0	1	0	0
03-Oct	7.8	0.325	23	10	10	13	10	0	0
04-Oct	7.8	0.325	23	10	10	13	10	0	0
05-Oct	6	0.250	18	10	10	8	10	0	0
06-Oct	0.4	0.017	1	1	1	0	1	0	0
07-Oct	0	0.000	0	0	0	0	0	0	0
08-Oct	1	0.042	3	3	3	0	3	0	0
09-Oct	1.2	0.050	4	4	4	0	4	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	31	10	10	21	10	0	0
14-Oct	9	0.375	27	10	10	17	10	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	5	5	5	0	5	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	17	10	10	7	10	0	0
22-Oct	0	0.000	0	0	0	0	0	0	0
23-Oct	1	0.042	3	3	3	0	3	0	0
24-Oct	0	0.000	0	0	0	0	0	0	0
25-Oct	0	0.000	0	0	0	0	0	0	0
26-Oct	1.3	0.054	4	4	4	0	4	0	0
27-Oct	10.9	0.454	32	10	10	22	10	0	0
28-Oct	0	0.000	0	0	0	0	0	0	0
29-Oct	13	0.542	38	10	10	29	10	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

West Roof	4215	m^2	PRECIPITATION DATA APRIL 1 TO OCTOBER 31 (DRY YEAR)		
Effective Runoff	0.7	%	TOT PRECIP DEPTH	405.1	mm
Percolation	0.504	(m/day, avg silty sand)	TOTAL PRECIP VOLUME	1195	m3
INFILTRATION GALLERY SIZING			TOT INFILTRATION VOL	563	m3
Width	2.25	m	DEVELOPMENT AREA	1.07	ha
Length	19	m			
depth	0.6	m	OVERFLOW VOL	632	m3/year
Number Cells	1				
void ratio	0.38		RUNOFF VOLUME OVERFLOW	52.87%	
	9.747	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	44	10	10	35	10	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	1	1	1	0	1	0	0
08-Apr	0	0.000	0	0	0	0	0	0	0
09-Apr	0	0.000	0	0	0	0	0	0	0
10-Apr	0	0.000	0	0	0	0	0	0	0
11-Apr	0	0.000	0	0	0	0	0	0	0
12-Apr	1	0.042	3	3	3	0	3	0	0
13-Apr	1.6	0.067	5	5	5	0	5	0	0
14-Apr	5.9	0.246	17	10	10	8	10	0	0
15-Apr	2.3	0.096	7	7	7	0	7	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	20	10	10	11	10	0	0
23-Apr	4.8	0.200	14	10	10	4	10	0	0
24-Apr	0.3	0.013	1	1	1	0	1	0	0
25-Apr	0	0.000	0	0	0	0	0	0	0
26-Apr	0	0.000	0	0	0	0	0	0	0
27-Apr	0	0.000	0	0	0	0	0	0	0
28-Apr	0	0.000	0	0	0	0	0	0	0
29-Apr	10.8	0.450	32	10	10	22	10	0	0
30-Apr	1.6	0.067	5	5	5	0	5	0	0
01-May	3.8	0.158	11	10	10	1	10	0	0
02-May	0	0.000	0	0	0	0	0	0	0
03-May	11.3	0.471	33	10	10	24	10	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	12	10	10	2	10	0	0
07-May	3	0.125	9	9	9	0	9	0	0
08-May	0	0.000	0	0	0	0	0	0	0
09-May	23.4	0.975	69	10	10	59	10	0	0
10-May	0.5	0.021	1	1	1	0	1	0	0
11-May	0	0.000	0	0	0	0	0	0	0
12-May	22.3	0.929	66	10	10	56	10	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	7	7	7	0	7	0	0
16-May	0.3	0.013	1	1	1	0	1	0	0
17-May	0	0.000	0	0	0	0	0	0	0
18-May	0	0.000	0	0	0	0	0	0	0
19-May	0	0.000	0	0	0	0	0	0	0
20-May	0	0.000	0	0	0	0	0	0	0
21-May	0	0.000	0	0	0	0	0	0	0
22-May	8.4	0.350	25	10	10	15	10	0	0
23-May	10	0.417	30	10	10	20	10	0	0
24-May	3.4	0.142	10	10	10	0	10	0	0
25-May	6.2	0.258	18	10	10	9	10	0	0
26-May	1.9	0.079	6	6	6	0	6	0	0
27-May	0.3	0.013	1	1	1	0	1	0	0
28-May	1.3	0.054	4	4	4	0	4	0	0
29-May	1.1	0.046	3	3	3	0	3	0	0
30-May	0	0.000	0	0	0	0	0	0	0
31-May	10.9	0.454	32	10	10	22	10	0	0
01-Jun	0	0.000	0	0	0	0	0	0	0
02-Jun	0.5	0.021	1	1	1	0	1	0	0
03-Jun	0	0.000	0	0	0	0	0	0	0
04-Jun	0	0.000	0	0	0	0	0	0	0
05-Jun	0	0.000	0	0	0	0	0	0	0
06-Jun	0	0.000	0	0	0	0	0	0	0
07-Jun	0	0.000	0	0	0	0	0	0	0
08-Jun	0	0.000	0	0	0	0	0	0	0
09-Jun	0	0.000	0	0	0	0	0	0	0
10-Jun	0	0.000	0	0	0	0	0	0	0
11-Jun	0	0.000	0	0	0	0	0	0	0
12-Jun	0.3	0.013	1	1	1	0	1	0	0
13-Jun	12.2	0.508	36	10	10	26	10	0	0
14-Jun	0.3	0.013	1	1	1	0	1	0	0
15-Jun	1.3	0.054	4	4	4	0	4	0	0
16-Jun	11.8	0.492	35	10	10	25	10	0	0
17-Jun	6.4	0.267	19	10	10	9	10	0	0
18-Jun	0.8	0.033	2	2	2	0	2	0	0
19-Jun	0	0.000	0	0	0	0	0	0	0
20-Jun	5.2	0.217	15	10	10	6	10	0	0
21-Jun	3.2	0.133	9	9	9	0	9	0	0
22-Jun	0	0.000	0	0	0	0	0	0	0
23-Jun	0	0.000	0	0	0	0	0	0	0
24-Jun	0.3	0.013	1	1	1	0	1	0	0
25-Jun	0	0.000	0	0	0	0	0	0	0
26-Jun	0	0.000	0	0	0	0	0	0	0
27-Jun	0	0.000	0	0	0	0	0	0	0
28-Jun	0	0.000	0	0	0	0	0	0	0
29-Jun	0	0.000	0	0	0	0	0	0	0
30-Jun	1.1	0.046	3	3	3	0	3	0	0
01-Jul	0.5	0.021	1	1	1	0	1	0	0
02-Jul	6.1	0.254	18	10	10	8	10	0	0
03-Jul	0	0.000	0	0	0	0	0	0	0
04-Jul	6.4	0.267	19	10	10	9	10	0	0
05-Jul	0.8	0.033	2	2	2	0	2	0	0
06-Jul	0	0.000	0	0	0	0	0	0	0
07-Jul	0	0.000	0	0	0	0	0	0	0

08-Jul	0	0.000	0	0	0	0	0	0	0
09-Jul	6.7	0.279	20	10	10	10	10	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	62	10	10	52	10	0	0
19-Jul	11.5	0.479	34	10	10	24	10	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	20	10	10	11	10	0	0
24-Jul	9.2	0.383	27	10	10	17	10	0	0
25-Jul	0	0.000	0	0	0	0	0	0	0
26-Jul	0.3	0.013	1	1	1	0	1	0	0
27-Jul	1.3	0.054	4	4	4	0	4	0	0
28-Jul	0	0.000	0	0	0	0	0	0	0
29-Jul	1.1	0.046	3	3	3	0	3	0	0
30-Jul	0.3	0.013	1	1	1	0	1	0	0
31-Jul	4.1	0.171	12	10	10	2	10	0	0
01-Aug	0	0.000	0	0	0	0	0	0	0
02-Aug	8.9	0.371	26	10	10	17	10	0	0
03-Aug	11.5	0.479	34	10	10	24	10	0	0
04-Aug	0.8	0.033	2	2	2	0	2	0	0
05-Aug	0	0.000	0	0	0	0	0	0	0
06-Aug	0	0.000	0	0	0	0	0	0	0
07-Aug	0	0.000	0	0	0	0	0	0	0
08-Aug	0.8	0.033	2	2	2	0	2	0	0
09-Aug	0	0.000	0	0	0	0	0	0	0
10-Aug	0	0.000	0	0	0	0	0	0	0
11-Aug	0	0.000	0	0	0	0	0	0	0
12-Aug	1.3	0.054	4	4	4	0	4	0	0
13-Aug	0	0.000	0	0	0	0	0	0	0
14-Aug	0	0.000	0	0	0	0	0	0	0
15-Aug	0	0.000	0	0	0	0	0	0	0
16-Aug	0	0.000	0	0	0	0	0	0	0
17-Aug	0.6	0.025	2	2	2	0	2	0	0
18-Aug	0	0.000	0	0	0	0	0	0	0
19-Aug	5.5	0.229	16	10	10	6	10	0	0
20-Aug	0	0.000	0	0	0	0	0	0	0
21-Aug	0	0.000	0	0	0	0	0	0	0
22-Aug	0	0.000	0	0	0	0	0	0	0
23-Aug	0.8	0.033	2	2	2	0	2	0	0
24-Aug	0	0.000	0	0	0	0	0	0	0
25-Aug	0	0.000	0	0	0	0	0	0	0
26-Aug	0	0.000	0	0	0	0	0	0	0
27-Aug	3.3	0.138	10	10	10	0	10	0	0
28-Aug	0	0.000	0	0	0	0	0	0	0
29-Aug	0	0.000	0	0	0	0	0	0	0
30-Aug	0	0.000	0	0	0	0	0	0	0
31-Aug	0.8	0.033	2	2	2	0	2	0	0
01-Sep	0	0.000	0	0	0	0	0	0	0
02-Sep	0.9	0.038	3	3	3	0	3	0	0
03-Sep	8.4	0.350	25	10	10	15	10	0	0
04-Sep	0	0.000	0	0	0	0	0	0	0
05-Sep	0	0.000	0	0	0	0	0	0	0
06-Sep	0	0.000	0	0	0	0	0	0	0
07-Sep	0	0.000	0	0	0	0	0	0	0
08-Sep	0	0.000	0	0	0	0	0	0	0
09-Sep	0.6	0.025	2	2	2	0	2	0	0
10-Sep	4.4	0.183	13	10	10	3	10	0	0
11-Sep	0	0.000	0	0	0	0	0	0	0
12-Sep	3.5	0.146	10	10	10	1	10	0	0
13-Sep	11.7	0.488	35	10	10	25	10	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	3	3	3	0	3	0	0
18-Sep	0	0.000	0	0	0	0	0	0	0
19-Sep	0	0.000	0	0	0	0	0	0	0
20-Sep	3.1	0.129	9	9	9	0	9	0	0
21-Sep	1.4	0.058	4	4	4	0	4	0	0
22-Sep	0.6	0.025	2	2	2	0	2	0	0
23-Sep	0	0.000	0	0	0	0	0	0	0
24-Sep	0	0.000	0	0	0	0	0	0	0
25-Sep	4.9	0.204	14	10	10	5	10	0	0
26-Sep	0.3	0.013	1	1	1	0	1	0	0
27-Sep	0	0.000	0	0	0	0	0	0	0
28-Sep	3.9	0.163	12	10	10	2	10	0	0
29-Sep	2.1	0.088	6	6	6	0	6	0	0
30-Sep	0	0.000	0	0	0	0	0	0	0
01-Oct	0	0.000	0	0	0	0	0	0	0
02-Oct	4.5	0.188	13	10	10	4	10	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	9	9	9	0	9	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	6	6	6	0	6	0	0
11-Oct	0	0.000	0	0	0	0	0	0	0
12-Oct	1.8	0.075	5	5	5	0	5	0	0
13-Oct	0	0.000	0	0	0	0	0	0	0
14-Oct	8.9	0.371	26	10	10	17	10	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	20	10	10	10	10	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	19	10	10	10	10	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	16	10	10	6	10	0	0
31-Oct	0.3	0.013	1	1	1	0	1	0	0

PRODUCT INFORMATION: TEMPEST HF & MHF ICD

Product Description

Our HF, HF Sump and MHF ICD's are designed to accommodate catch basins or manholes with sewer outlet pipes 6" in diameter or larger. Any storm sewer larger than 12" may require custom modification. However, IPEX can custom build a TEMPEST device to accommodate virtually any storm sewer size.

Available in 5 preset flow curves, these ICDs have the ability to provide constant flow rates: 9lps (143 gpm) and greater

Product Function

TEMPEST HF (High Flow): designed to manage moderate to higher flows 15 L/s (240 gpm) or greater and prevent the propagation of odour and floatables. With this device, the cross-sectional area of the device is larger than the orifice diameter and has been designed to limit head losses. The HF ICD can also be ordered without flow control when only odour and floatable control is required.

TEMPEST HF (High Flow) Sump: The height of a sewer outlet pipe in a catch basin is not always conveniently located. At times it may be located very close to the catch basin floor, not providing enough sump for one of the other TEMPEST ICDs with universal back plate to be installed. In these applications, the HF Sump is offered. The HF Sump offers the same features and benefits as the HF ICD; however, is designed to raise the outlet in a square or round catch basin structure. When installed, the HF sump is fixed in place and not easily removed. Any required service to the device is performed through a clean-out located in the top of the device which can be often accessed from ground level.

TEMPEST MHF (Medium to High Flow): The MHF plate or plug is designed to control flow rates 9 L/s (143 gpm) or greater. It is not designed to prevent the propagation of odour and floatables.

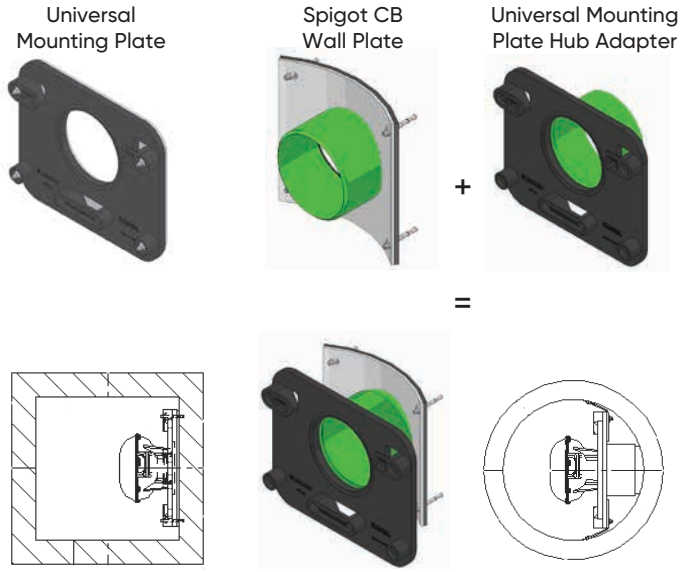
Product Construction

The HF, HF Sump and MHF ICDs are built to be light weight at a maximum weight of 6.8 Kg (14.6 lbs).

Product Applications

The HF and MHF ICD's are available to accommodate both square and round applications:

Square Application **Round Application**



The HF Sump is available to accommodate low to no sump applications in both square and round catch basins:

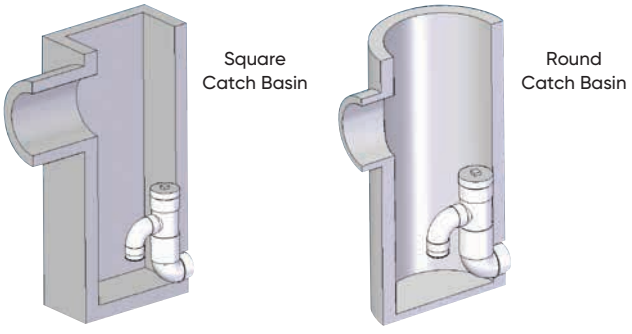
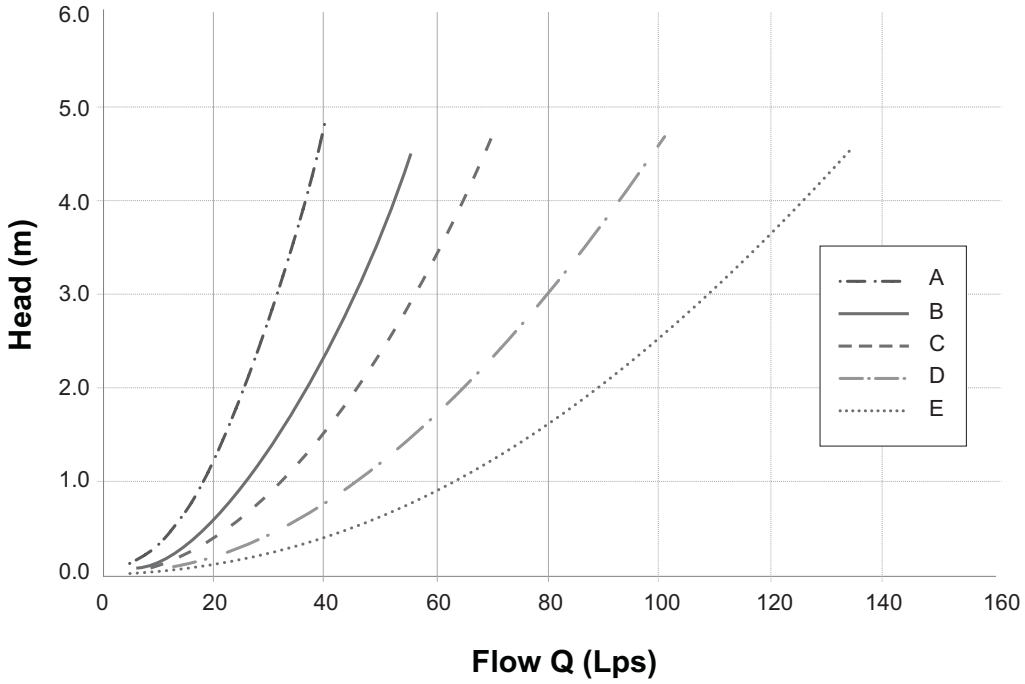
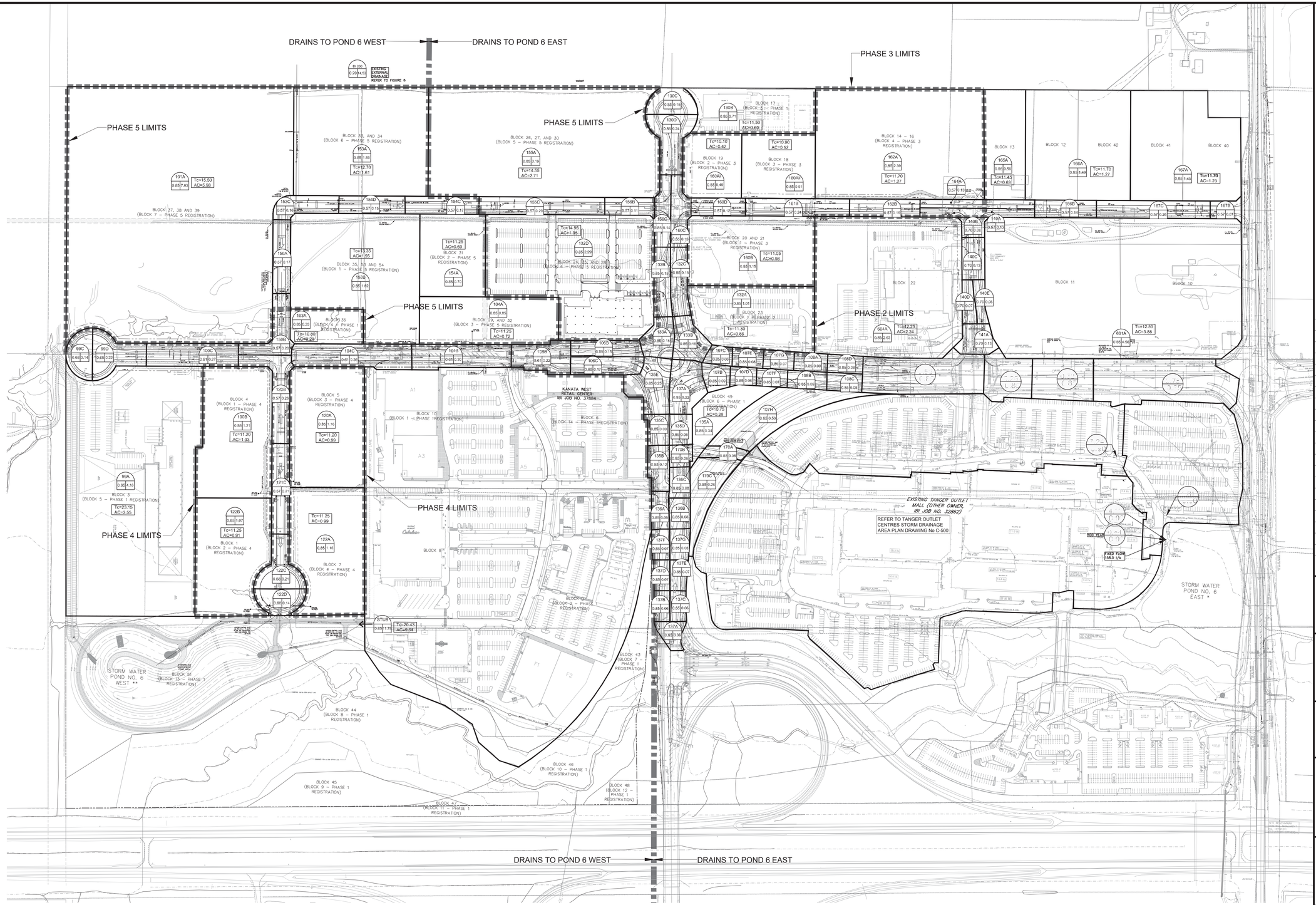


Chart 3: HF & MHF Preset Flow Curves





LEGEND:

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

EXISTING TANGER OUTLET CENTRE

- 0.56 / 0.85 — AREA IN HECTARES, RUNOFF COEFFICIENT

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

TAGGART REALTY MANAGEMENT

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

Project Title

KANATA WEST BUSINESS PARK PHASE 5

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

Drawing Title

STORM DRAINAGE AREA PLAN

Scale: 1:2000

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

D07-16-14-0003_P5

#17661

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

patersongroup **memorandum**

consulting engineers

re:	**Geotechnical Review - Percolation Rates Estimation** **Proposed Commercial Building - Kanata West Business Park - Phase 4** **Block 2 - Nipissing Court - Ottawa**
to:	IBI Group - **Mr. James Battison** - james.battison@ibigroup.com
cc:	Taggart Realty Management - **Mr. Braden Walker** - braden.walker@taggart.ca
date:	March 06, 2020
file:	PG5235-MEMO.01

Further to your request and authorization, Paterson Group (Paterson) carried out a review of the available information from the geotechnical programs to establish a percolation rate for the soil materials encountered at the subject site. This current memorandum should be read in conjunction with our geotechnical Report PG5235-1 dated February 13, 2020.

Background

Based on our findings, during the geotechnical investigation, the subsurface profile encountered at the test hole locations consists of topsoil underlain by a loose to compact silty sand to sandy silt layer. A glacial till deposit, consisting of a compact to dense grey silty sand with clay, gravel, cobbles and boulders was encountered underlying the sandy silty in all of the test holes. Practical refusal to augering was encountered in BH1-10 at a depth of 7.0 m. Also, practical refusal to DCPT was encountered at a depth of 6.8 m in BH2-20. Reference should be made to the Soil Profile and Test Data sheets appended for the study area.

Geotechnical Reccomendations

Paterson has completed a detailed hydrogeological investigation of the lands south of the subject site as part of previous phases of the Kanata West Business Park. These investigations were aimed to establish a hydraulic conductivity and percolation rates at the in-situ soils. Varying strata will be encountered during construction and will affect the rate of stormwater infiltration into the underlying material. The calculations for the infiltration galleries should be reviewed to correspond with the appropriate percolation rates given the appropriate strata. The percolation rate was interpreted from the hydraulic conductivity which was estimated based on the range of grain size distribution for the proposed development area. Based on these values, the average percolation rate (T-Time) was estimated to be within the ranges in Table 1.

Table 1 - Estimated Percolation Rates		
Material	**Hydraulic Conductivity - k (m/sec)**	**Percolation (T-time) (mins/cm)**
Silty Sand[1]	**1×10^{-4} to 1×10^{-5}**	**8 to 20**
Sandy Silt [1]	**1×10^{-7} to 1×10^{-8}**	**20 to 50**
[1] - Values are based upon site specific testing carried out at a nearby phase of the development.		

We trust that this information satisfies your requirements.

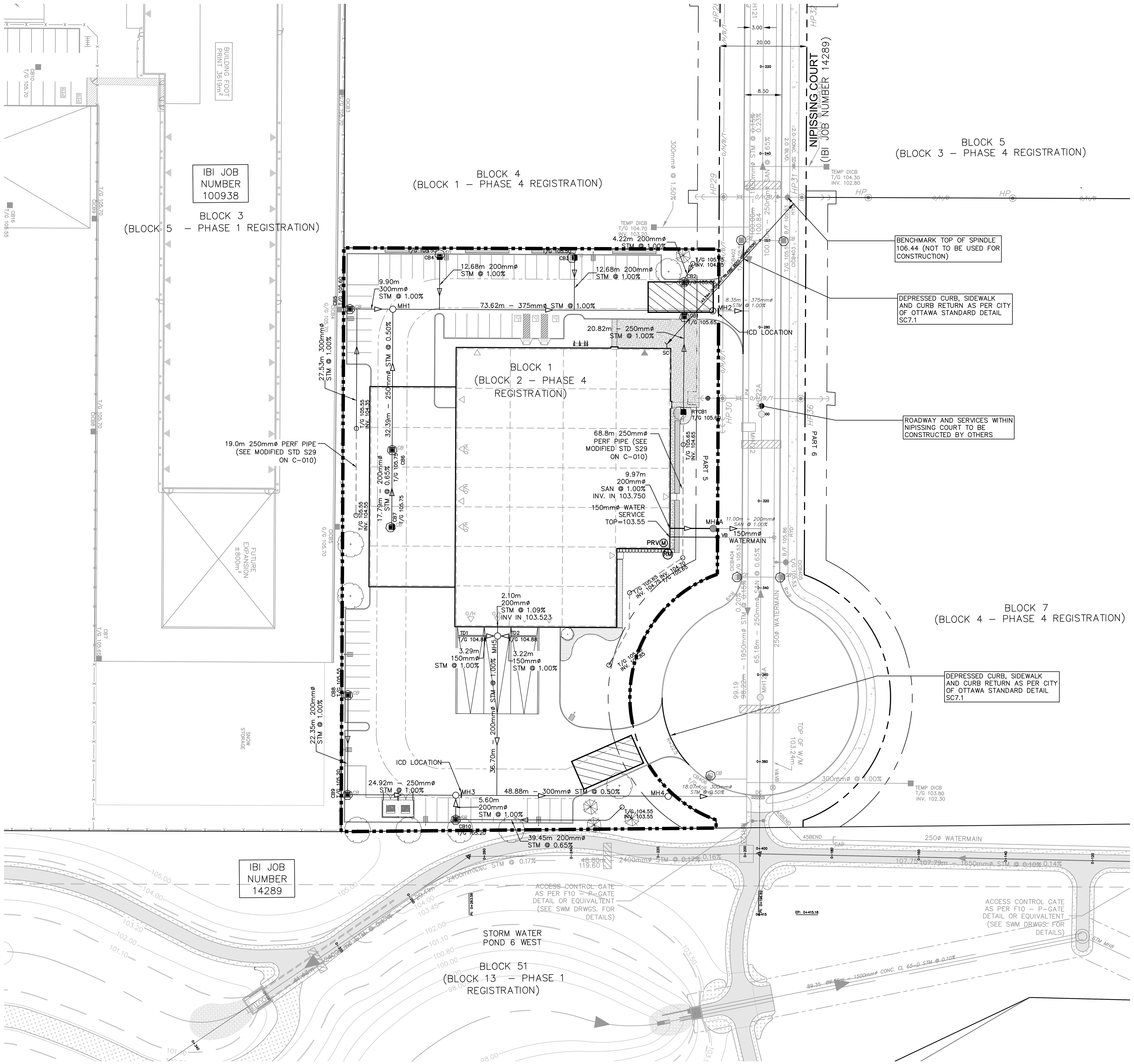
Best Regards,

Paterson Group Inc.

Hian De Freitas, MASc.

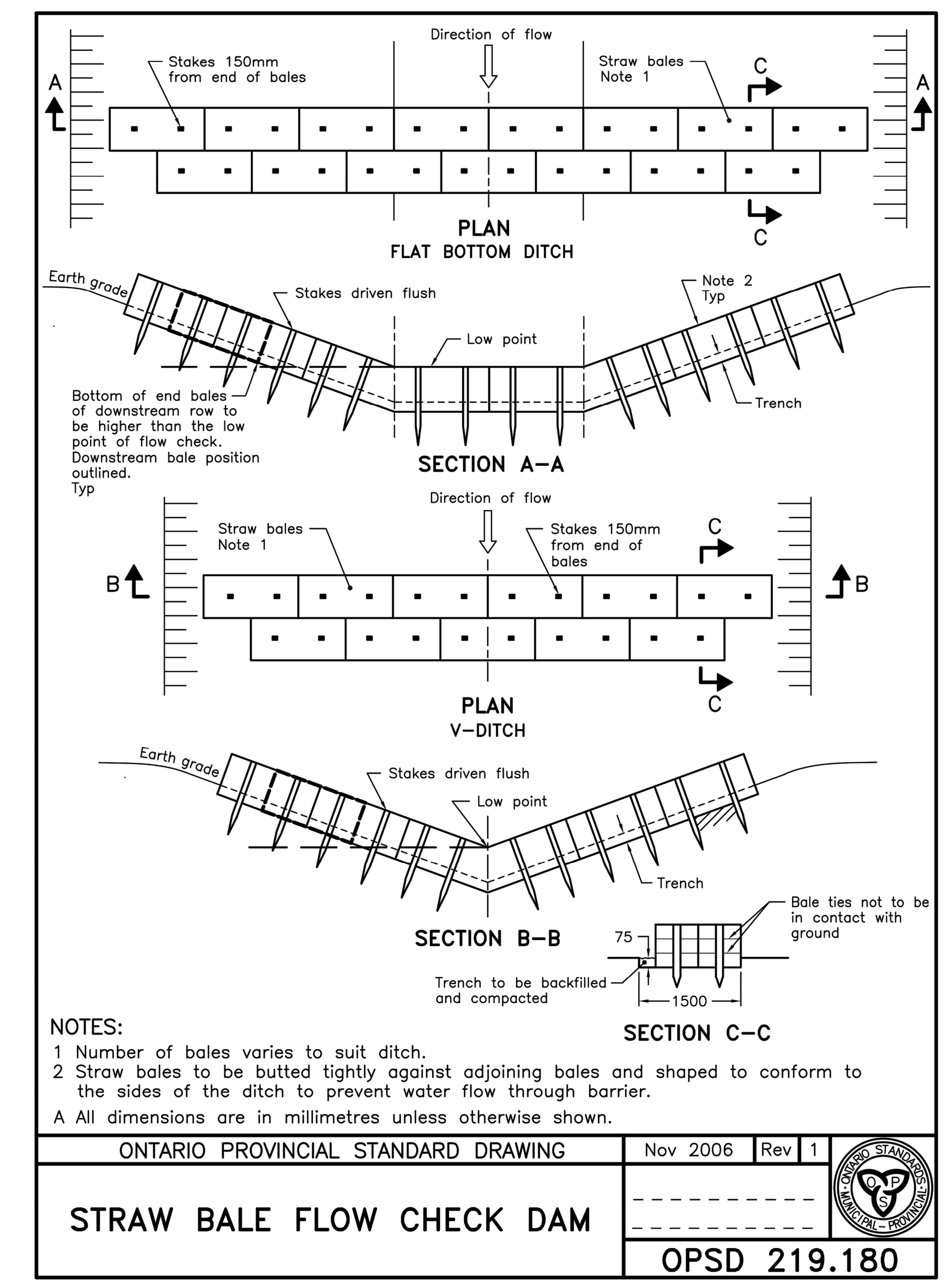
Faisal I. Abou-Seido, P.Eng.

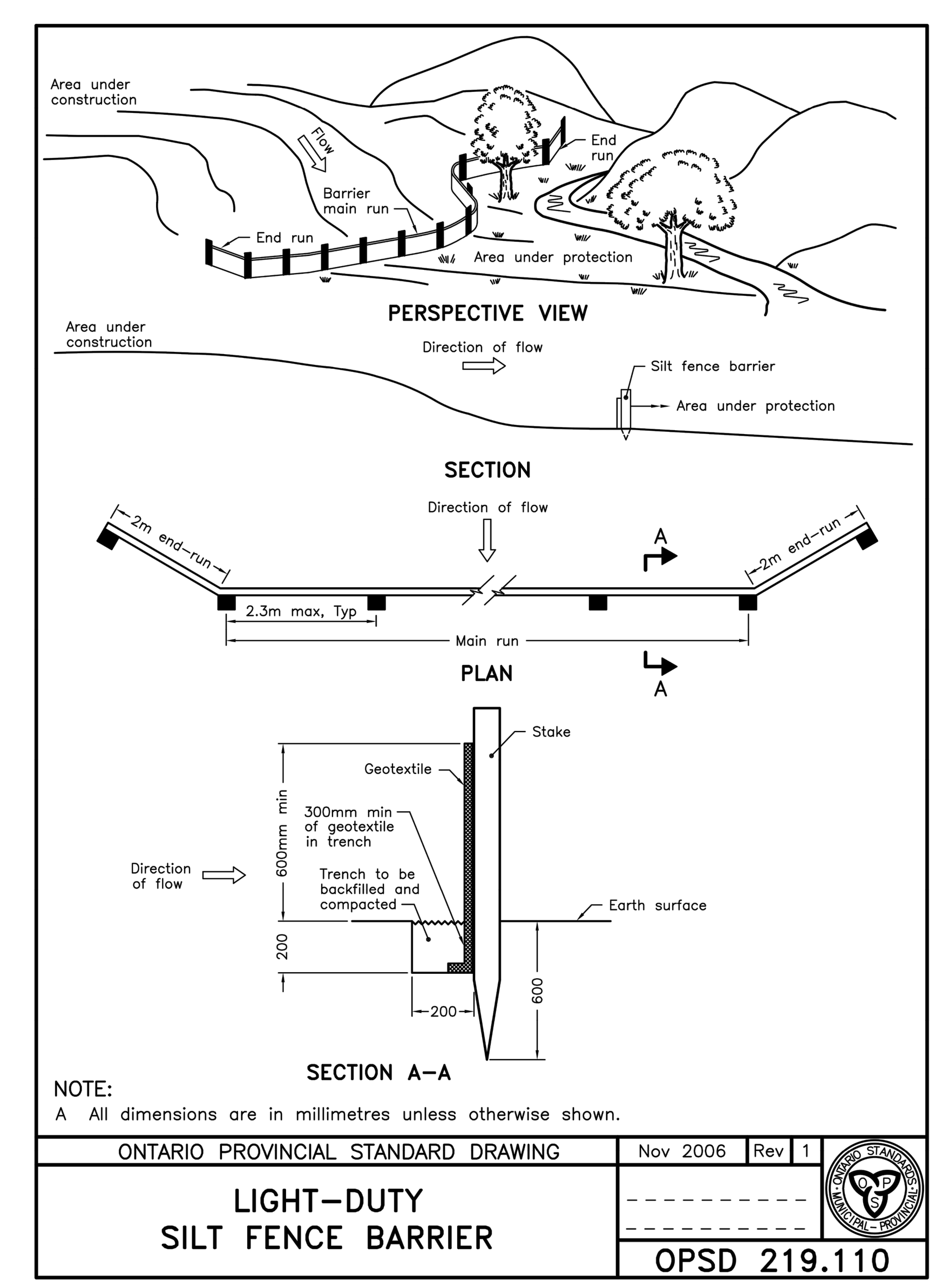
APPENDIX D



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 SEDIMENT CAPTURE FILTER SOCKS (SILT SACK) UNDER THE COVERS TO TRAP SEDIMENTATION. REFER TO IDENTIFIED STRUCTURES.





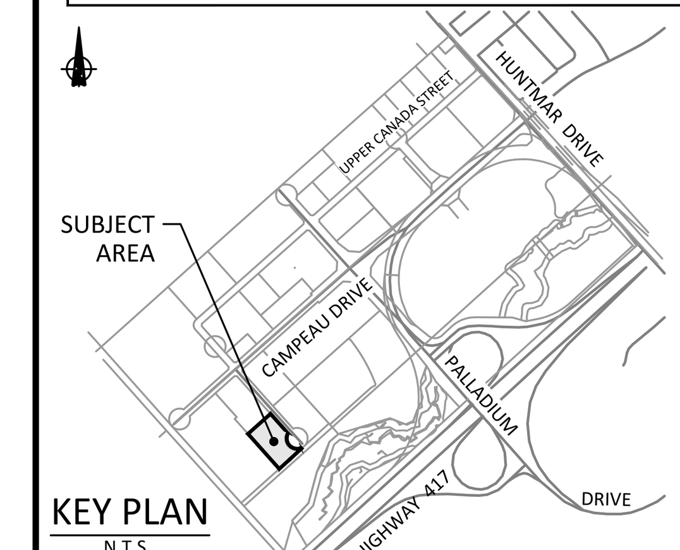
LEGEND :

- 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 (15.00 × 7.00)

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, 011, 012 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.	2020:08:27
2	REVISED AS PER CITY COMMENTS	T.R.B.	2020:06:17
1	ISSUED FOR SPA	T.R.B.	2020:03:20

5010779 ONTARIO INC.

IBI GROUP
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Project Title
Harding HEATING & AIR CONDITIONING
200 NIPISSING COURT, KANATA ON

LICENSED PROFESSIONAL ENGINEER
T. R. BRULE
2020/08/27
PROVINCE OF ONTARIO

Drawing Title
EROSION AND SEDIMENT CONTROL PLAN

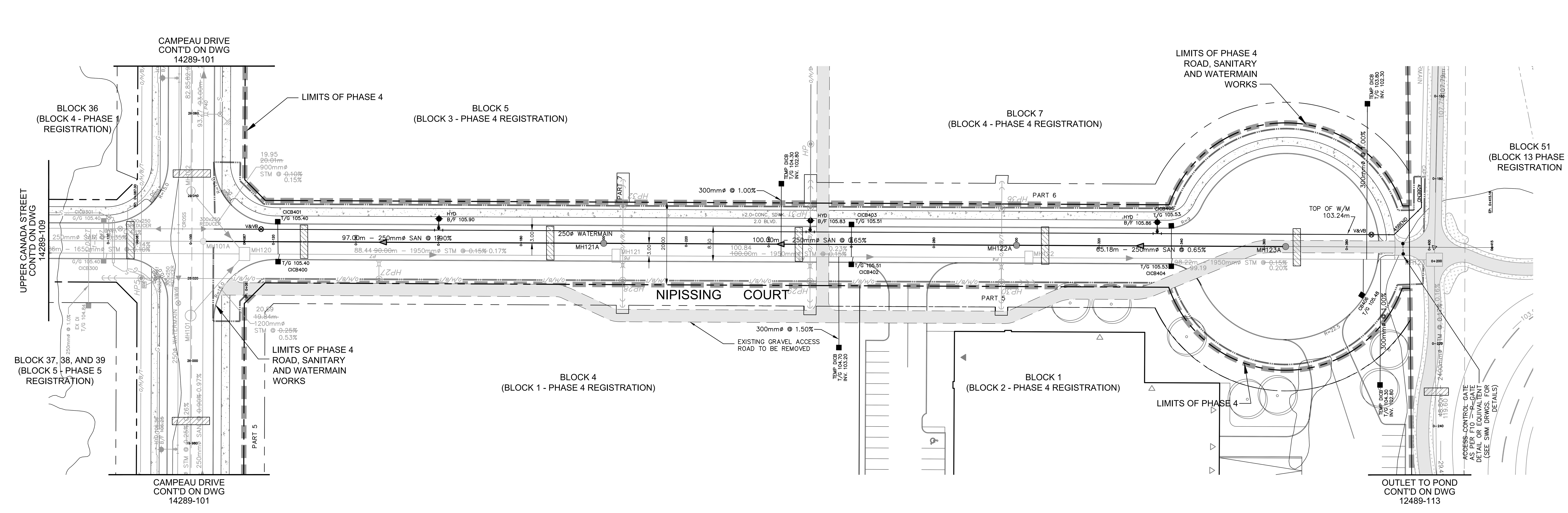
Scale 1:500

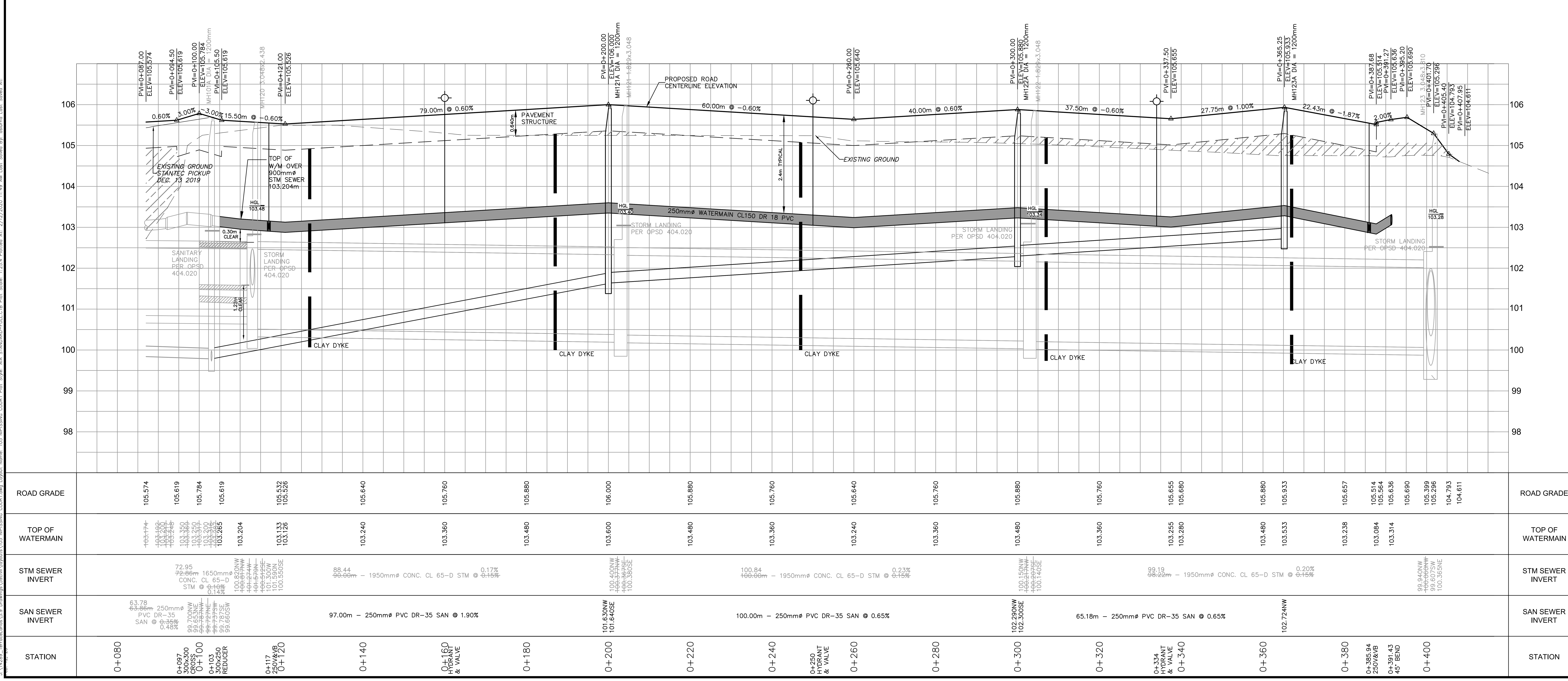
Design: J.B.	Date: MARCH 2020
Drawn: J.B./D.P.S.	Checked: T.R.B.
Project No.: 123843	Drawing No.: C-900

D07-12-20-0031

#18128

APPENDIX E





LEGEND:

- MH3A SANITARY MANHOLE
- 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
16	ISSUED FOR TENDER PHASE 4 AND 5	LME	20:02:12
15	REVISED AS PER PHASE 4 COMMENTS	LME	19:07:25
14	REVISED AS PER PHASE 4 COMMENTS	LME	19:07:22
13	REVISED AS PER PHASE 4 COMMENTS	LME	19:06:24
12	ISSUED FOR PHASE 4 REGISTRATION	LME	19:04:25
11	REVISED FOR PHASE 3 REGISTRATION	LME	18:09:14
10	ADDED CITY FILE NUMBER	LME	18:05:30
9	REVISED FOR PHASE 2 REGISTRATION	LME	18:04:20
8	ISSUED FOR CONSTRUCTION	LME	16:01:19
7	ISSUED FOR MYLARS	LME	16:01:12
6	ISSUED TO TAGGART	LME	15:12:14
5	REVISED AS PER CITY COMMENTS	LME	15:10:15
4	REVISE STORM AND SANITARY ON UPPER CANADA STREET	LME	15:08:19
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 4

LICENSED PROFESSIONAL ENGINEER L. M. ERION 13379508 2020/02/12 PROVINCE OF ONTARIO

Drawing Title

NIPISSING COURT

FROM CAMPEAU DRIVE TO STA. 0+407.950

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

Design	Date
LME	NOV. 2014
Drawn	**Checked**
DPS	TRB
Project No.	**Drawing No.**
14289	105

D07-16-14-0003_P4

#17661