Robinson
Land Development

Maritime-Ontario
8800 Campeau Drive
Kanata West Business Park
Servicing and Stormwater Management Report

Prepared For:

Maritime-Ontario Freight Lines Limited

Prepared By:

Robinson Land Development

Project No. 20027
December 2020

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LEGAL NOTIFICATION

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1.0 INTRODUCTION

Robinson Land Development have been retained by Maritime-Ontario Freight Lines Limited to prepare a servicing and stormwater management design for a proposed development located at 8800 Campeau Drive within the Kanata West Business Park (KWBP). The subject site is proposed to be developed into a distribution warehouse and associated parking lot. The property is located north of Campeau Drive and west of Upper Canada Street (refer to **Figure 1 – Key Plan** following page 1).

The subject site is located within the Phase 5 limits of the KWBP. Servicing and stormwater management requirements for Phase 5 have been updated and outlined in the report titled *Design Brief, Kanata West Business Park – Phase 5, 425 Huntmar Drive*, prepared by IBI Group, dated October 2019 (herein referred to as the *IBI Report*). This report will detail the proposed means of servicing the site and provide details on how to meet the stormwater management requirements outlined in the *IBI Report*.

2.0 EXISTING CONDITIONS

The 7.04 hectare subject site is zoned Business Park Industrial Zone (IP13[2166]-h) and is currently undeveloped. The site is bounded by Mineral Extraction Zone (ME) land to the west (existing quarry), Agricultural Zone (AG) land to the north, an undeveloped industrial parcel and Upper Canada Street to the east and Campeau Drive to the south.

The subject site is contained within Block 37, 38 and 39 of the KWBP Master Plan. The KWBP – Phase 5 area includes the construction of Upper Canada Street (from Campeau Drive to Palladium Drive) and the registration of the blocks adjacent to the proposed roadway (i.e. the subject site). As part of the Phase 5 registration, previous Blocks 37, 38 and 39 have been complied into a single parcel, currently referred to as Block 7 (refer to *Figure 6 – Draft Plan*, prepared by IBI Group, in **Appendix A**).

Municipal infrastructure has been installed within the Campeau Drive right-of-way, adjacent to the subject site, as follows:

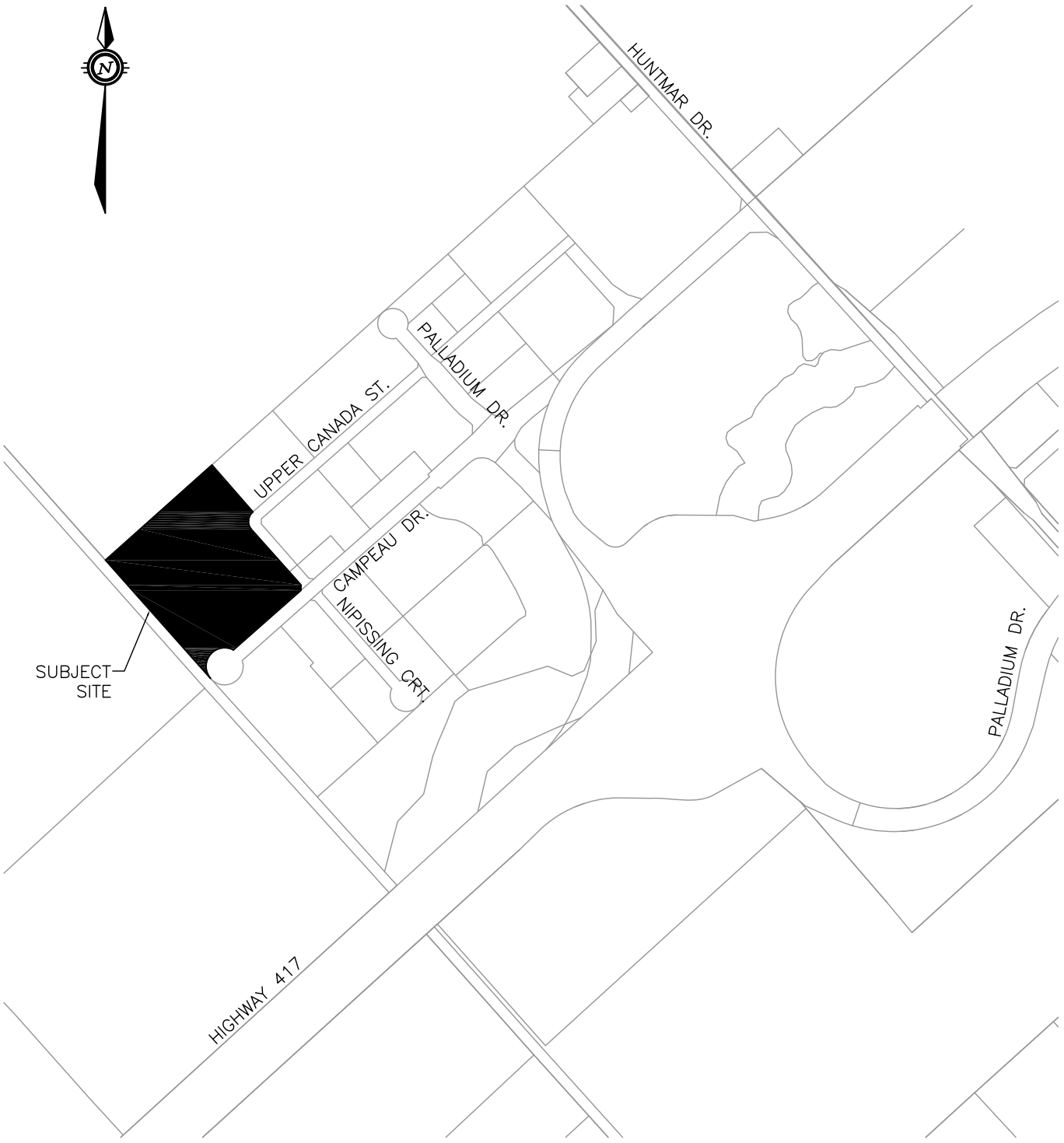
- 250 mm diameter watermain
- 250 mm diameter sanitary sewer
- 1050 mm diameter to 1200 mm diameter storm sewers

Municipal infrastructure has been installed within the Upper Canada Street right-of-way, adjacent to the subject site, as follows:

- 250 mm diameter watermain
- 250 mm diameter sanitary sewer
- 1500 mm diameter to 1650 mm diameter storm sewers

Refer to following KWBP – Phase 5 design drawings, prepared by IBI Group, in **Appendix A** for more details:

- *General Plan of Services, Drawing No. 100*
- *Campeau Drive from STA 19+780 to STA 20+110, Drawing No. 101*
- *Upper Canada Street from Campeau Drive to STA 0+410, Drawing No. 109*



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scale N.T.S.	8800 CAMPEAU DRIVE, KWBP	project no. 20027
date 01/11/20		
drawn by BLM	KEY PLAN	FIG 1.0

3.0 DEVELOPMENT PROPOSAL

The Owner is proposing to develop the subject site into a distribution warehouse and associated parking lot. The proposed building will include approximately 60,000 square feet of warehouse space and an additional 18,720 square feet of office space. The proposed parking lot will include an area for 134 office staff parking spaces, accessed via an entrance connection to Campeau Drive. A secondary entrance connection will provide access to the portion of the parking lot designated for 50 'day cab' tractor parking spaces. A third four lane entrance connection will provide access to the warehouse building and future truck scale. Refer to the Site Plan, prepared by McRobie Architects, in **Appendix B** for more details.

The proposed development will be provided with new water and sanitary services and also include a new storm sewer system to control the site's stormwater to the requirements outlined in the *IBI Report* (refer to **Figure 2 – General Plan of Services** following page 2).

4.0 WATER SERVICING

The subject site will receive water supply via a 200 mm diameter watermain connection to the existing 250 mm diameter watermain on Campeau Drive. An existing 250 mm diameter watermain is also available along Upper Canada Street. Refer to *Figure 4 – Proposed Water Distribution Plan*, prepared by IBI Group for Phase 5 of the KWBP in **Appendix C**. In accordance with the *IBI Report* and City of Ottawa design guidelines, the following watermain design criteria have been utilized for the subject site:

- 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)

4.1 Boundary Conditions

The City of Ottawa provided boundary conditions for the subject site at the proposed connection to the existing 250 mm diameter watermain on Campeau Drive (refer to **Appendix C).** The boundary conditions have been summarized in **Table 1** below:

Table 1 – Boundary Conditions

Demand Scenario	Head (m)	Pressure (psi)
Maximum HGL	161.4	80.2
Peak Hour	156.3	72.9
Max Day Plus Fire	122.6	25.1

4.2 Fire Protection

Two existing hydrants are available on the north-west side of Campeau Drive across the frontage of the subject site. The existing hydrant located approximately 50 metres south-west of Upper Canada Street will be required to be relocated as part of the proposed development works as the hydrant is in conflict with the proposed entrance connection to Campeau Drive. Two existing hydrants are also available on the north-east side of Upper Canada Street, adjacent to the eastern property boundary of the site.

WAREHOUSE BUILDING

OFFICE BUILDING

UPPER CANADA STREET

CAMPEAU DRIVE

LEGEND

- PROPERTY BOUNDARY
- PROPOSED STORM SYSTEM
- PROPOSED SANITARY SYSTEM
- PROPOSED WATER SYSTEM
- EXISTING STORM SYSTEM
- EXISTING SANITARY SYSTEM
- EXISTING WATER SYSTEM

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scale N.T.S.	MARITIME–ONTARIO, KWBP	project no. 20027
date 02/12/20	GENERAL PLAN OF SERVICES	FIG 2
drawn by BLM		

Fire protection for the subject site will be provided by a proposed on-site hydrant which will receive water supply via the proposed 200 mm diameter watermain connection to the existing 250 mm diameter watermain on Campeau Drive. The proposed hydrant will be located within a landscaped island to the front of the main entrance, within 45 metres of the proposed siamese connection for the building.

The required fire flow for the subject site was calculated using the Fire Underwriter's Survey (FUS) long form (refer to **Appendix C**). Based on the building construction and occupancy, the required fire flow is 7,000 Lpm (117 L/s).

4.3 Hydraulic Model Results

The hydraulic model results for Maximum HGL, Peak Hour and Maximum Day + FF have been calculated and summarized in **Table 2** below.

Table 2 – Hydraulic Model Results

Criteria	Boundary Conditions – Head (m)	Modelling Results (psi or Lpm)	Allowable Pressure Range
Peak Hour	156.3	68.5	40 – 80 psi
Max Pressure	161.4	75.8	< 80 psi
Max Day + Fire	122.6	11,556	@ 20 psi

As indicated in **Table 2** above, it has been demonstrated that the subject site can be adequately serviced for both domestic and fire flow demands. Refer to the hydraulic model outputs provided in **Appendix C**.

As noted in *Section 2.4* of the *IBI Report*, pressure reducing valves will be required for all buildings located in Phase 5 of the KWBP since the calculated pressures were expected to be greater than 80 psi (552 kPa). However, as indicated in **Table 2** above, the modelled maximum pressure condition for the subject site has been calculated to be 75.8 psi and therefore a pressure reducing valve (PRV) will not be required.

5.0 SANITARY SERVICING

5.1 Design Criteria

Sanitary flows from the KWBP are conveyed east via the Campeau Drive sanitary sewer system before ultimately being conveyed to the Signature Ridge Pump Station (SRPS) north of Highway 417. Refer to *Figure 5 – Wastewater Plan*, prepared by IBI Group, in **Appendix D**. The municipal sanitary sewer system for Phase 5 of the KWBP has been designed (by IBI Group) based on recommendations from the following reports:

- Kanata West Master Servicing Study (KWMSS), 2006
- City of Ottawa Sewer Design Guidelines, 2012
- Ministry of the Environment Design Guidelines for Sewage Works, 2008
- City of Ottawa Technical Bulletin ISTB-2018-01

The subject site (i.e. Block 7) has been identified as light industrial land use on the *Sanitary Drainage Area Plan,* prepared by IBI Group for the KWBP, provided in **Appendix D**. In keeping with the sanitary sewer design criteria outlined in *Section 3.3* of the *IBI Report*, the following design parameters have been implemented for the subject site:

- Light Industrial Flow: 28,000 L/ha/d

- Peaking Factor: 4.5 (MOE Chart – City of Ottawa Appendix 4-B.1)
- Infiltration Allowance: 0.33 L/s/ha
- Minimum Velocity: 0.60 m/s
- Maximum Velocity: 3.0 m/s

As noted in the *IBI Report*, the Phase 5 lands have been designed to outlet to the existing 300 mm diameter sanitary sewer on Campeau Drive, west of the Palladium Drive roundabout. The sanitary flows to be generated from Block 7 (formerly Block 37, 38, 39) have been allocated within pipe run MH151A to MH150A on Upper Canada Street as noted on the *Sanitary Sewer Design Sheet*, prepared by IBI Group, provided in **Appendix D**.

5.2 Proposed Design

The *IBI Report* has allocated sanitary flows from the subject site within the 250 mm diameter sanitary sewer on Upper Canada Street, however, it is proposed to outlet sanitary flows to the existing 250 mm diameter sanitary sewer on Campeau Drive for the following reasons:

- The orientation of the proposed building and site layout (i.e. main building entrance facing Campeau Drive and entrance connections via Campeau Drive) facilitate a straight-line connection from the building mechanical room to the existing sewer on Campeau Drive.
- In order to maintain a common sewer trench (water, sanitary and storm) and single road cut (for water and sanitary connections), the proposed sanitary sewer outlet must also be to Campeau Drive.

Sanitary flows generated from the subject site will be conveyed by a proposed 200 mm diameter sanitary sewer system to the existing 250 mm diameter sanitary sewer on Campeau Drive (between EXMH99A and EXMH100A). Using the parameters noted above, the peak sanitary design flow for the site has been calculated to be 12.59 L/s. The existing pipe runs on Campeau Drive, EX99A to EX100A and EX100A to EX101A, will have 31.82 L/s and 42.38 L/s of excess capacity respectively after the addition of 12.59 L/s of sanitary flow from the subject site. Therefore, the existing 250 mm diameter sanitary sewer on Campeau Drive (upstream of Upper Canada Street) will have adequate capacity to convey the peak sanitary design flows from the subject site. The proposed sanitary sewers have been designed in accordance with current City of Ottawa standards and in keeping with the design criteria outlined in the *IBI Report*. Refer to the sanitary sewer design sheet in **Appendix D** for more details.

6.0 STORM SERVICING

Storm drainage from the subject site (i.e. Block 37, 38, 39) has been allocated within the existing 1200 mm diameter storm sewer on Campeau Drive, downstream of EXMH101, as indicated on the *storm sewer design sheet*, prepared by IBI Group, provided in **Appendix E.** The existing 1200 mm diameter storm sewer on Campeau Drive conveys stormwater south on Nipissing Court, before being conveyed to the Pond 6 West Facility and ultimately discharging into Feedmill Creek. Refer to *Figure 8 – Proposed Storm Sewer Plan*, prepared by IBI Group, in **Appendix E**. Stormwater runoff from the subject site will be captured by surface inlet grates and conveyed via the proposed on-site storm sewer system to EXMH101 on Campeau Drive. The on-site storm sewers range from 250 mm to 900 mm in diameter and have been designed to convey the full 5 year peak flow and be within the acceptable full flow velocity range of 0.80 m/s to 3.0 m/s in accordance with City of Ottawa standards and the *IBI Report*. Refer to the storm sewer design sheet and Storm Drainage Area Plan (DWG. 20027-STM1) in **Appendix F** for more details.

A secondary storm sewer system is proposed to convey drainage from the roof area to a proposed infiltration gallery (refer to **Section 7.5 - Infiltration**) located within the parking lot. The secondary storm sewer system has been designed to have capacity to convey the fixed flow rate from the roof area based on an assumed rate of 40 L/s/ha (roof drain details to be designed and confirmed by Mechanical Engineer). In the event that infiltration is not being fully achieved, a proposed overflow pipe will convey drainage from the infiltration gallery to proposed STMMH 200. The proposed 900 mm diameter storm sewer downstream of STMMH 200 has been designed to have capacity to convey the full 5 year peak storm from the roof area, however, full to partial infiltration is expected to occur. Refer to the infiltration gallery storm sewer design sheet in **Appendix F** for more details.

7.0 STORMWATER MANAGEMENT DESIGN

7.1 Design Criteria

A dual drainage design, minor and major system, has been utilized for the KWBP. The *IBI Report* provides updated stormwater management design criteria for the Phase 5 portion of the development. The design criteria were prepared in accordance with current City of Ottawa Design Guidelines and with the following overarching reports prepared for the KWBP:

- Kanata West Master Servicing Study (KWMSS), prepared by Stantec and CCI/IBI Group, dated 2006.
- Kanata West Business Park Stormwater Management Report and Pond 6 West Design Brief, prepared by IBI Group, dated November 2015.
- Addendum Report: Kanata West Business Park Stormwater Management Report and Pond 6 East Design Brief, prepared by IBI Group, dated November 2015.

7.2 Minor System

Stormwater runoff from the subject site, which is captured by the proposed on-site storm sewer system, will be conveyed to EXMH101 on Campeau Drive. The minor system design of the KWBP conveys the drainage south via the existing storm sewer system on Nipissing Court, to the Pond 6 West Facility and ultimately to Feedmill Creek. The minor system capture for the proposed blocks tributary to the Pond 6 West Facility is based on the 5 year, 3 hour Chicago simulated flow in accordance with the overarching reports for the KWBP. The subject site (denoted as Area 101A on the *Storm Drainage Area Plan*, prepared by IBI Group, provided in **Appendix E**) has been allocated the following minor system design parameters:

Table 3 – Drainage Area Design Parameters

Area ID	Area (ha)	Minor System Capture (L/s)	Required Storage Volume (m^3)
101A	7.03	1230	780

Notes:
1. Subject site is denoted as Area 101A on the *Storm Drainage Area Plan*, prepared by IBI Group, in **Appendix E**.
2. Parameters as per *Table 4.2* of the *IBI Report*, provided in **Appendix E**.

In accordance with the design criteria outlined in the *IBI Report*, the minor system from the subject site must be restricted to a rate of 1230 L/s for all events up to an including the 100 design storm. In order to control the site's runoff to less than the allowable release rate of 1230

L/s, inlet control devices (ICDs) are proposed to be installed within the outlets of the on-site catch basins. Refer to **Section 7.3 – Release Rates** for more details.

7.3 Release Rates

As noted above, runoff from the subject site must be controlled to a rate of 1230 L/s for all storm events up to and including the 100 year design storm in accordance with the *IBI Report*. In order to control the site's runoff, inlet control devices (ICDs) are proposed to be installed within the outlets of the on-site catch basins. The ICDs have been sized based on the 100 year head (measured from the 100 year ponding elevation to the centreline of orifice elevation) and an allowable outflow. Refer to the ICD calculations in **Appendix F** for more details.

Drainage from the roof areas will be controlled by multiple roof drains before being conveyed to the proposed infiltration gallery (refer to **Section 7.5 – Infiltration**) via the secondary storm sewer system. Although the roof drainage is intended to be infiltrated, an assumed release rate of 40 L/s/ha has been assigned to all roof areas to be conservative. Details for the proposed roof drains shall be designed by the Mechanical Engineer.

Areas of the subject site which cannot be captured by the on-site storm sewer system will flow "uncontrolled" off-site during storm events. Drainage will be conveyed "uncontrolled" to Campeau Drive, Upper Canada Street, to the east, to the north and to the west. These free flow areas must be accounted for in the overall release rate for the site. A summary of the on-site release rates for the 100 year design event has been provided in **Table 4** below:

Table 4 – Summary of Release Rates

Drainage Area	100 Year Release Rate (L/s)
STM1	90.0
STM2	55.0
STM3	80.0
STM4	40.0
STM5	100.0
STM6	40.0
STM7	30.0
STM8	40.0
STM9	70.0
STM10	80.0
STM11	80.0
STM12	55.0
STM13	80.0
STM14	80.0
STM15 + STM16	30.0
STM17	30.0
STM18 (ROOF 1)	2.3[*1]
STM19 (ROOF 2)	26.2[*1]
FF1 (CAMPEAU)	23.5
FF2 (UPPER CANADA)	16.4
FF3 (EAST)	4.8
FF4 (NORTH)	17.7
FF5 (WEST)	14.7
Total =	1085.6
Allowable[*2] =	1230.0
Δ =	144.4

Notes:
1. Roof release rate based on assumed roof drain rate of 40 L/s/ha.
2. Allowable release rate as per *IBI Report*.

As noted in **Table 4** above, the 100 year outflow from the subject site of 1085.6 L/s is less than the allowable rate of 1230 L/s and therefore has been designed in keeping with the *IBI Report*.

7.4 Major System/ Quantity Control

Overland flow from the majority of the KWBP is conveyed from west to east, ultimately to Huntmar Drive (refer to the *SWMHYMO Schematic*, prepared by IBI Group, in **Appendix E**). For the subject site (drainage area 101A), overland flow from the individual on-site ponding areas will cascade south-east, via the parking lot and entrance connections, to Campeau Drive and ultimately to Huntmar Drive. The on-site major system has been designed to pond stormwater to a maximum depth of 0.30 metres before “overtopping” in accordance with City

of Ottawa design standards. A minimum freeboard of 0.30 metres has been provided between the spillover elevations and the adjacent building finished floor elevation.

In accordance with the *IBI Report*, individual blocks within the KWBP are to provide on-site quantity storage control for up to and including the 100 year design storm event (in excess of the allowable release rate of 1230 L/s for the subject site). The *IBI Report* has allocated a required storage volume of 780 m^3 for the subject site (refer to **Table 3** above). Required storage volumes have been calculated for each individual drainage area based on the allowable release rates noted in **Table 4** above. A summary of the required and provided 100 year storage volumes for the on-site drainage areas have been provided in **Table 5** below.

Table 5 – Summary of 100 Year Storage Volumes

Drainage Area	100 Year Required Storage Volume (m^3)	100 Year Provided Storage Volume (m^3)
STM1	254.8	265.3
STM2	190.5	200.8
STM3	172.5	184.7
STM4	131.4	135.7
STM5	258.0	269.7
STM6	209.0	221.7
STM7	198.3	200.5
STM8	51.6	59.6
STM9	0.0	0.0
STM10	0.0	0.0
STM11	0.0	0.0
STM12	0.0	0.0
STM13	0.0	0.0
STM14	0.0	0.0
STM15 + STM16	0.0	0.0
STM17	0.0	0.0
STM17 (ROOF 1)	23.6*2	*3
STM18 (ROOF 2)	272.2*2	*3
FF1 (CAMPEAU)	0.0	0.0
FF2 (UPPER CANADA)	0.0	0.0
FF3 (EAST)	0.0	0.0
FF4 (NORTH)	0.0	0.0
FF5 (WEST)	0.0	0.0
Total =	**780.0*1**	**1538.1**

Notes:
1. Required storage volume of 780 m^3 as per *IBI Report*.
2. Required roof storage based on assumed roof drain rate of 40 L/s/ha.
3. Provided roof storage to be designed by others.
4. Provide storage volumes calculated using Civil3D by Autodesk.

As noted in **Table 5** above, adequate on-site quantity control has been provided for all storm events up to and including the 100 year design storm in keeping with the *IBI Report*. Refer to the storage volume tables provided in **Appendix F** for more details. The outflows from the drainage areas within the central parking lot (STM9, STM10, STM11, STM12, STM13, STM14) and within the landscape areas (STM15, STM16, STM17) have been optimized to eliminate surface ponding for all storm events up to and including the 100 year design storm. Although surface storage will not be required for these drainage areas (for events up to and including the 100 year design storm), quantity storage volume is available as noted on the storage volume tables provided in **Appendix F**.

7.5 Infiltration

The Carp River Watershed/Subwatershed Study (CRWS) provided water balance calculations and outlined infiltration targets within the subwatershed area from the stormwater management perspective, based on soil characteristics. Following the CRWS, infiltration targets for the Kanata West development were established within the KWMSS. That study indicated that a range of 70 to 100 mm/year of runoff be infiltrated from the western portion of the KWBP site. The KWMSS also indicated that post development infiltration rates are to be increased by 25% above these pre-development rates to compensate for areas (i.e. Roadway corridors) that cannot provide infiltration. In keeping with the *IBI Report* and overarching reports for the KWBP, each block will be required to provide engineered infiltration measures (such as infiltration galleries fed by roof drains) to achieve the required infiltration rates as outlined within the KWMSS. For the subject site, a target infiltration range of 87.5 mm/year to 125 mm/year is required (70 to 100 mm/year + 25%).

Drainage from the roof areas will be captured by multiple roof drains (to be designed by Mechanical Engineer) and conveyed via the secondary storm sewer system to a proposed infiltration gallery located within the parking lot. The proposed infiltration gallery has been designed using guidelines from the *Low Impact Development Stormwater Management Planning and Design Guide (*herein referred to as the *LID Manual)*. The proposed infiltration gallery has also been sized to have capacity to detain roof drainage for the 95th percentile storm event for the Ottawa area. Rainfall data has been referenced from the report titled *Runoff Volume Control Targets for Ontario Final Report,* prepared by Aquafor Beech Ltd. and Earthfx Inc. for the Ministry of the Environment & Climate Change (currently known as the Ministry of the Environment, Conservation and Parks), dated October 2016 (herein referred to as the *Aquafor Beech Report*).

Required Storage Volume:

95th Percentile Daily Volume = 0.0279 m (*Aquafor Beech Report Table 3.16,* ***Appendix E***)

Roof Area = 7,126.82 m^2

Required Storage Volume = (0.0279 m) x (7,126.82 m^2) = 198.84 m^3

Provided Storage Volume:

Infiltration Gallery Bottom Area = 500 m^2 (50.0 m length x 10.0 m width)

Infiltration Gallery Depth = 1.0 m

Infiltration Gallery Storage Media Porosity = 0.4 (50 mm diameter clear stone)

Provided Storage Volume = (500 m^2) x (1.0 m) x (0.4) = 200 m^3

As calculated above, the proposed infiltration gallery has been designed to provide 200 m^3 of storage volume which is greater than the 95th percentile daily rainfall volume for the Ottawa area.

Infiltration Target:

Target Infiltration Rate = 87.5 mm/yr to 125 mm/yr
Average Annual Precipitation = 0.925 to 0.950 m (*Aquafor Beech Report Figure 3.41,* ***Appendix E***)
Roof Area = 7,126.82 m^2
Site Area = 70,353.28 m^2

Maximum Average Annual Precipitation = (0.95 m) x (7,126.82 m^2) = 6,770.48 m^3

Maximum Average Site Infiltration Rate = (6,770.48 m^3) / (70,353.28 m^2) x 1000 = 96.2 mm/yr

Maximum Effective Site Infiltration Rate = (96.2 mm/yr) x (0.95) = 91.39 mm/yr

Minimum Average Annual Precipitation = (0.925 m) x (7,126.82 m^2) = 6,592.31 m^3

Minimum Average Site Infiltration Rate = (6,592.31 m^3) / (70,353.28 m^2) x 1000 = 93.70 mm/yr

Minimum Effective Site Infiltration Rate = (93.70 mm/yr) x (0.95) = 89.02 mm/yr

Based on precipitation data from the *Aquafor Beech Report* and site parameters (i.e. total site and roof areas), the minimum effective site infiltration rate has been calculated to be 89.02 mm/year which is within the acceptable range outlined in the *IBI Report* and overarching studies for the area. It should be noted that the infiltration rate calculations for the subject site only consider roof drainage (in keeping with the *IBI Report*) and do not account for the approximately 0.81 hectares of pervious area where natural infiltration of runoff at source will occur.

Section 4.4 of the *LID Manual* states that the maximum allowable depth of a stone reservoir can be calculated using the following equation:

$d_{max} = i * t / V_r$

where:

d_{max} = maximum stone reservoir depth (mm)
i = infiltration rate for native soils (mm/hr)
V_r = void ratio (0.4 for clear stone)
t = time to drain (48 hrs recommended)

Based on the findings of the Geotechnical Investigation prepared by Paterson Group, the native soil percolation time for the subject site has been estimated to be 20 to 50 mins/cm (i.e. infiltration rate of 12 to 30 mm/hr). Refer to percolation rate and borehole information provided in **Appendix E**. To be conservative, the lowest estimated infiltration rate of 12 mm/hr has been used in the equation.

d_{max} = (12 mm/hr) x (48 hrs) / 0.4 = 1440 mm = 1.44 m

The proposed infiltration gallery depth of 1.0 m is less than the maximum allowable depth of 1.44 m calculated using the equation from the *LID Manual*. For applications with an underdrain, the maximum depth is measured below the invert of the underdrain pipe.

Section 4.4 of the *LID Manual* also states that the required footprint surface area of a stone reservoir can be calculated using the following equation:

$A_f = WQV / (d * V_r)$

where:

A_f = footprint surface area (m^2)
WQV = water quality volume (m^3)
d = stone reservoir depth (m)
V_r = void ratio (0.4 for clear stone)

$A = (198.84\ m^3) / (1.0\ m \times 0.4) = 496.8\ m^2$

The proposed infiltration gallery footprint area of 500 m^2 is more than the required footprint area of 496.8 m^2 calculated using the equation from the *LID Manual*. To be conservative, infiltration through the gallery bottom has only been considered, however, lateral infiltration through the sides is expected to occur. Based on the calculations above, it can be concluded that the infiltration gallery has been designed in accordance with the *LID Manual* for depth and footprint area.

7.6 Hydraulic Grade Line (HGL) Analysis

As noted in *Section 4.6* of the *IBI Report*, the hydraulic grade line (HGL) within the storm sewers of the KWBP is dictated by water levels in Feedmill Creek and water levels in the Pond 6 West and Pond 6 East facilities. A summary of the 100 year HGL analysis for the KWBP – Phase 5 has been provided in *Table 4.10* of the *IBI Report* (refer to **Appendix E**). Due to the permanent water level within the Pond 6 West and Pond 6 East Facilities, some of the storm sewers within the KWBP will be partially submerged, which includes the outlet for the subject site (i.e. existing storm sewer on Campeau Drive downstream of EXMH101). To account for this, the *IBI Report* has analysed the submerged sewers within the KWBP system with a 25% sediment accumulation. Refer to *Section 4.6.3* of the *IBI Report* for more details.

An HGL analysis has been prepared for the proposed on-site storm sewer system based on a connection to EXMH101 on Campeau Drive at a 100 year HGL elevation of 103.57 m (modelled by IBI Group using 100 year 12 hour SCS storm event). The HGL analysis determined that the HGL would remain below the top of grate/cover elevations of the on-site storm manholes and catch basins. The HGL will be contained within the storm sewer between STMMH 208 to STMMH 201 and therefore is not of concern for the proposed building service connection. The overflow outlet from the infiltration gallery, downstream of STMMH 304, will connect to STMMH 200 above the HGL elevation and therefore is not expected to impact the performance of the infiltration practices. Refer to the HGL computation sheet in **Appendix F** for more details.

In the event that the on-site storm sewers are surcharged, stormwater runoff will be conveyed to a proper outlet (i.e. Campeau Drive right-of-way) via the major overland flow route (refer to **Section 7.4**) without impacting the on-site building or neighbouring properties.

7.7 Quality Control

The Pond 6 West Facility is located at the western edge of the KWBP, north of Feedmill Creek. The facility provides water quality (and quantity) control for the development west of Palladium Drive (refer to *Figure 2 – Post-Development SWM Drainage Boundaries Overall Site*, prepared by IBI Group, in **Appendix E**). The facility discharges to Feedmill Creek in accordance with the *Kanata West Business Park Stormwater Management Report and Pond 6 West Design*

Brief, prepared by IBI Group. Additional on-site quality control is not required for the subject site as the minor storm system is tributary to the Pond 6 West Facility.

8.0 EROSION AND SEDIMENT CONTROL

Prior to construction and until vegetation has been re-established in disturbed areas, erosion and sediment control measures must be implemented to mitigate the impact on receiving watercourses and existing infrastructure. The following erosion and sediment control (ESC) measures have been proposed for the subject site:

- Limiting the extent of exposed soils at any given time.
- Erosion and sediment control measures shall be maintained until vegetation has been re-established in all disturbed areas. Re-vegetate disturbed areas in accordance with approved Landscape Plan as soon as possible.
- Stockpile soil away (15 metres or greater) from watercourses, drainage features and top of steep slopes.
- Installation of silt sacks between frame and cover on all proposed and existing catch basins and open cover storm manholes until construction is completed.
- Silt fence to be installed and maintained along the property boundaries.
- Install mud mats at all construction entrances.
- During active construction periods, visual inspections shall be undertaken on a weekly basis and after major storm events (>25mm of rain in 24 hour period) on ESC and any damage repaired immediately.
- ESC shall also be assessed (and repaired as required) following significant snowmelt events.
- Visual inspections shall also be undertaken in anticipation of large storm events (or a series of rainfall and/or snowmelt days) that could potentially yield significant runoff volumes.
- Care shall be taken to prevent damage to ESC during construction operations.
- In some cases, barriers may be removed temporarily to accommodate construction operations. The affected barriers shall be reinstated immediately after construction operations are completed.
- ESC should be adjusted during construction to adapt to site features as the site becomes developed.
- ESC shall be cleaned of accumulated sedimentation as required and replaced as necessary.
- During the course of construction, if the Engineer believes that additional prevention methods are required to control erosion and sedimentation, the Contractor shall implement additional measures, as required, to the satisfaction of the Engineer.
- Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification (OPSS) 805.

Refer to the Erosion and Sediment Control Plan (DWG. 20027-ESC1) provided in **Appendix B** for more details.

9.0 CONCLUSIONS

This servicing and stormwater management report has been prepared to support the Site Plan Application for the development of the property located at 8800 Campeau Drive, within the KWBP. The report has detailed the proposed means of servicing the site and provided details on how to meet the stormwater management requirements in accordance with City of Ottawa standards and the overarching IBI Reports prepared for the KWBP. The proposed servicing

and stormwater management designs will be achieved by implementing the following key features:

- Domestic water supply will be provided by a 200 mm diameter watermain connection to the existing 250 mm diameter watermain on Campeau Drive.
- Water supply for fire protection will be provided by a proposed on-site hydrant.
- Sanitary flows will be conveyed to the existing 250 mm diameter sanitary sewer on Campeau Drive via a proposed 200 mm diameter sanitary sewer.
- Stormwater runoff (minor system) will be conveyed by the proposed storm sewer system to EXMH101 on Campeau Drive.
- Stormwater outflows for all storm events up to and including the 100 year design storm will be controlled in accordance with the *IBI Report*.
- On-site storage will be provided for all storm events up to and including the 100 year design storm event.
- Major overland flows will be conveyed to Campeau Drive.
- A proposed infiltration gallery, fed by roof drains, will be utilized to meet the infiltration targets for the site.
- Quality control will be provided by the existing Pond 6 West Facility.
- Erosion and sediment control measures will be implemented prior to construction and maintained until vegetation has been re-established in disturbed areas.

Report Prepared By:

LICENSED PROFESSIONAL ENGINEER
Dec. 2/20
B. L. MACKECHNIE
100199554
PROVINCE OF ONTARIO

Brandon MacKechnie, P.Eng.
Project Engineer

Report Reviewed By:

LICENSED PROFESSIONAL ENGINEER
S. M. CZAHARYNSKI
DEC 2/2020
PROVINCE OF ONTARIO

Sean Czaharynski, P.Eng.
Manager – Land Development

Watermain Analysis Prepared By:

LICENSED PROFESSIONAL ENGINEER
Dec. 2/20
J. P. LEBLANC
PROVINCE OF ONTARIO

Pat Leblanc, P.Eng.
Project Manager

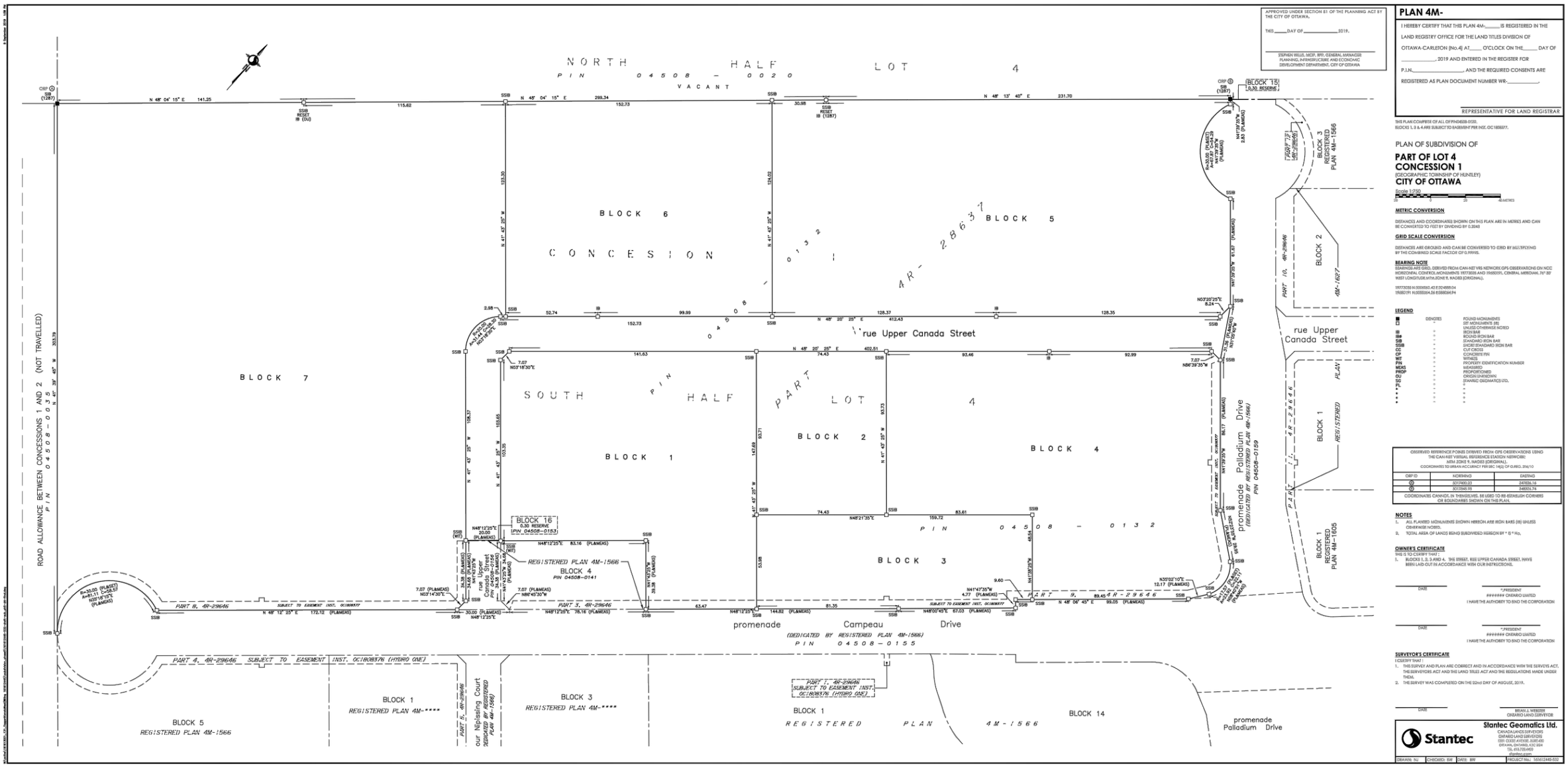
Appendix A

KWBP Figure 6 – Draft Plan (prepared by IBI Group)

KWBP General Plan of Services (prepared by IBI Group)

KWBP Campeau Drive from STA 19+780 to STA 20+410 (prepared by IBI Group)

KWBP Upper Canada Street from Campeau Drive to STA 0+410 (prepared by IBI Group)



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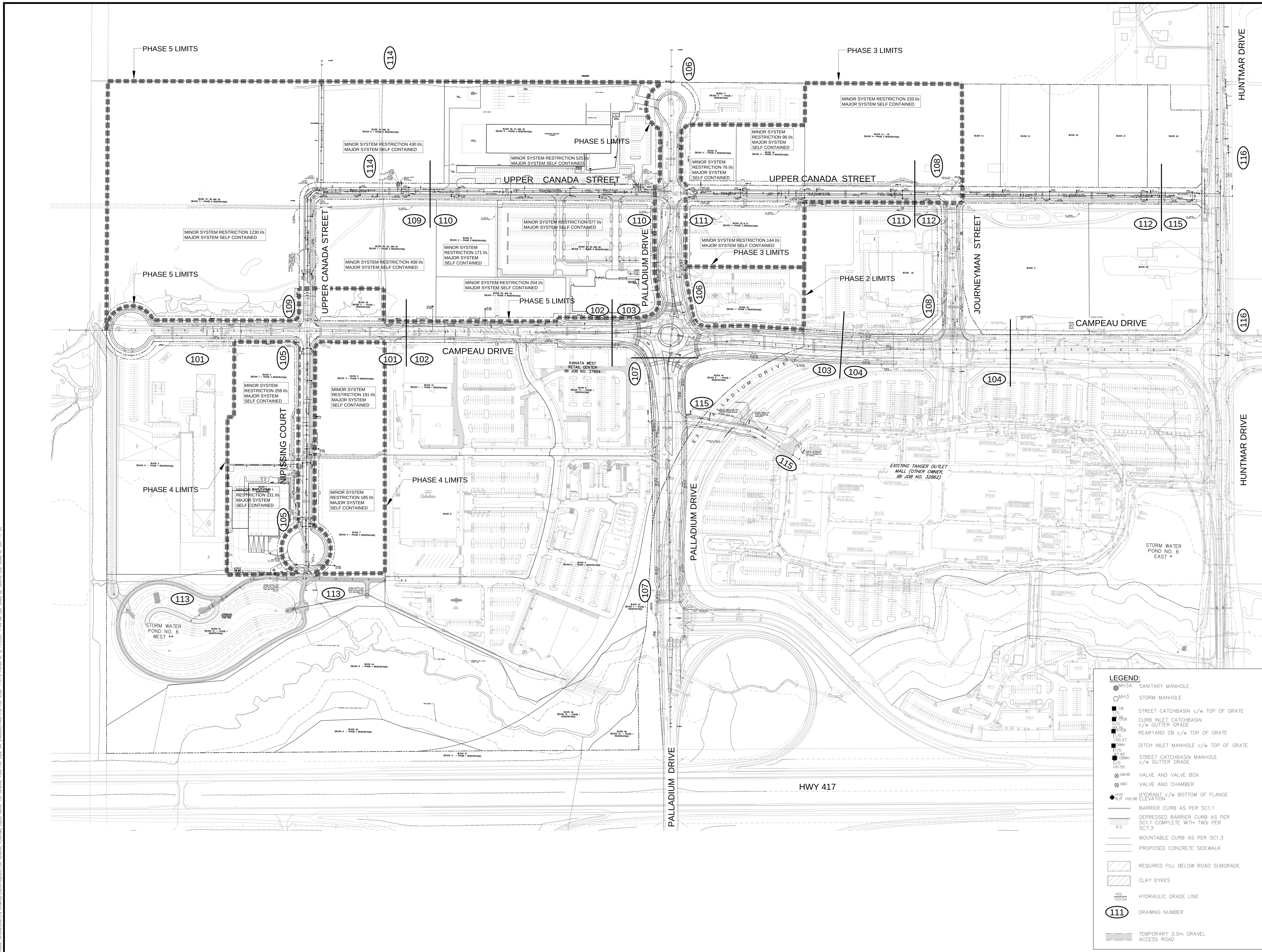
J:\14289_TerraceLands\5.9 Drawings\59civil\current\Phase 5 Figures\14289-Figures-2019-09-11.dwg Sheet Set: ####

Scale	Project Title	Drawing Title	Sheet No.
N.T.S.	KANATA WEST BUSINESS PARK	DRAFT PLAN	FIGURE 6



NOTES:

* REFER TO KANATA WEST BUSINESS PARK STORMWATER MANAGEMENT REPORT AND POND 6 EAST DESIGN REPORT. 337 HUNTMAR DRIVE TANGER OUTLET CENTERS REPORT 32862.5.2.3 REVISION 4 NOVEMBER 2014.

** REFER TO KANATA WEST BUSINESS PARK STORMWATER MANAGEMENT REPORT AND POND 6 WEST DESIGN BRIEF REPORT 14289.5.2.3 SEPTEMBER 2015.

SITE BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR STANTEC GEOMATICS

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

No.	REVISIONS	By	Date
31	ADD SERVICE CONNECTIONS FOR BLOCKS 5 AND 6	LME	20:06:17
30	ISSUED FOR CONSTRUCTION PHASE 4 AND 5	LME	20:05:27
29	ISSUED FOR TENDER PHASE 4 AND 5	LME	20:02:12
28	REVISED AS PER PHASE 5 COMMENTS	LME	19:10:25
27	ISSUED FOR PHASE 5 REGISTRATION	LME	19:09:10
26	ISSUED FOR PHASE 3 CONSTRUCTION	LME	19:08:15
25	REVISED AS PER PHASE 4 COMMENTS	LME	19:07:25
24	REVISED AS PER PHASE 4 COMMENTS	LME	19:07:22
23	REVISED AS PER PHASE 4 COMMENTS	LME	19:06:24
22	ISSUED FOR PHASE 4 REGISTRATION	LME	19:04:25
21	REVISED AS PER PHASE 3 COMMENTS	LME	19:03:08
20	REVISED AS PER PHASE 3 COMMENTS	LME	19:02:11
19	ISSUED FOR PHASE 3 TENDER	LME	19:01:11
18	REVISED AS PER PHASE 3 COMMENTS	LME	18:12:14
17	REVISED FOR PHASE 3 REGISTRATION	LME	18:09:14
16	ADDED CITY FILE NUMBER	LME	18:05:30
15	REVISED FOR PHASE 2 REGISTRATION	LME	18:04:20
14	REVISED DMA CHAMBER IN BLK 10 & RELOCATE HYD. BLK 35/36	LME	16:05:05
13	ISSUED AS PER REVISED CARPENTERS UNION	LME	16:04:25
12	REVISE HYDRANT ON UPPER CANADA ST. AT BLOCK 36 P/L	LME	16:04:20
11	REVISE ENTRANCE TO TANGER MALL FROM PALLADIUM DRIVE	LME	16:03:02
10	RE-ISSUED FOR CONSTRUCTION	LME	16:02:03
9	ISSUED FOR CONSTRUCTION	LME	16:01:19
8	ISSUED FOR MYLARS	LME	16:01:12
7	ISSUED TO TAGGART	LME	15:12:14
6	ISSUED TO TAGGART	LME	15:10:16
5	REVISED AS PER CITY COMMENTS	LME	15:10:15
4	REVISE WM, STM, AND SAN ON CAMPEAU AND UPPER CANADA	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

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

Project Title

KANATA WEST BUSINESS PARK PHASE 5

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

Drawing Title

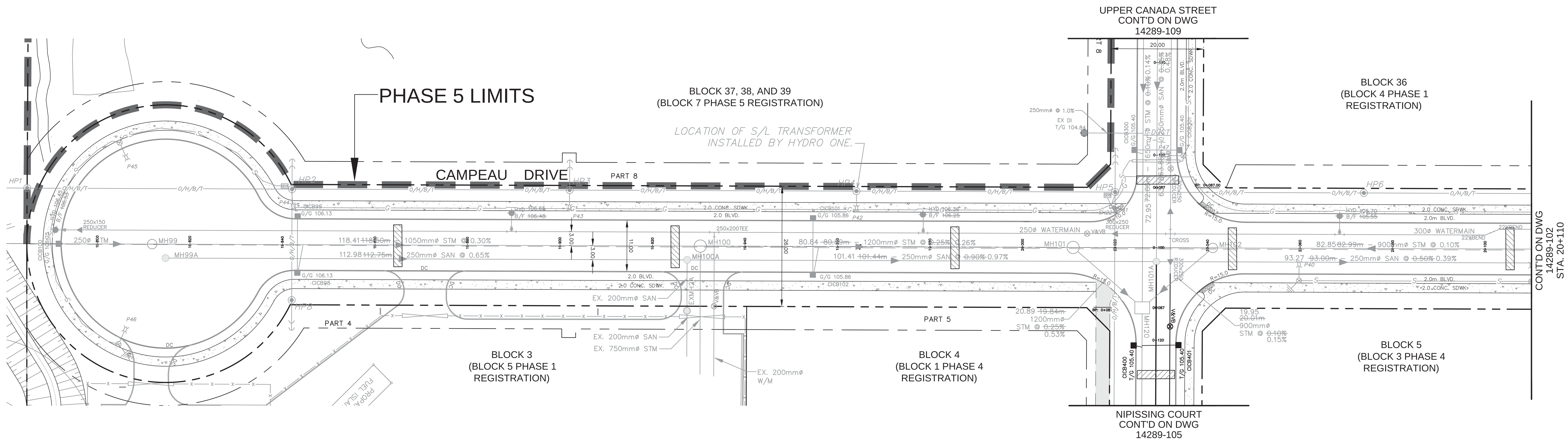
GENERAL PLAN OF SERVICES

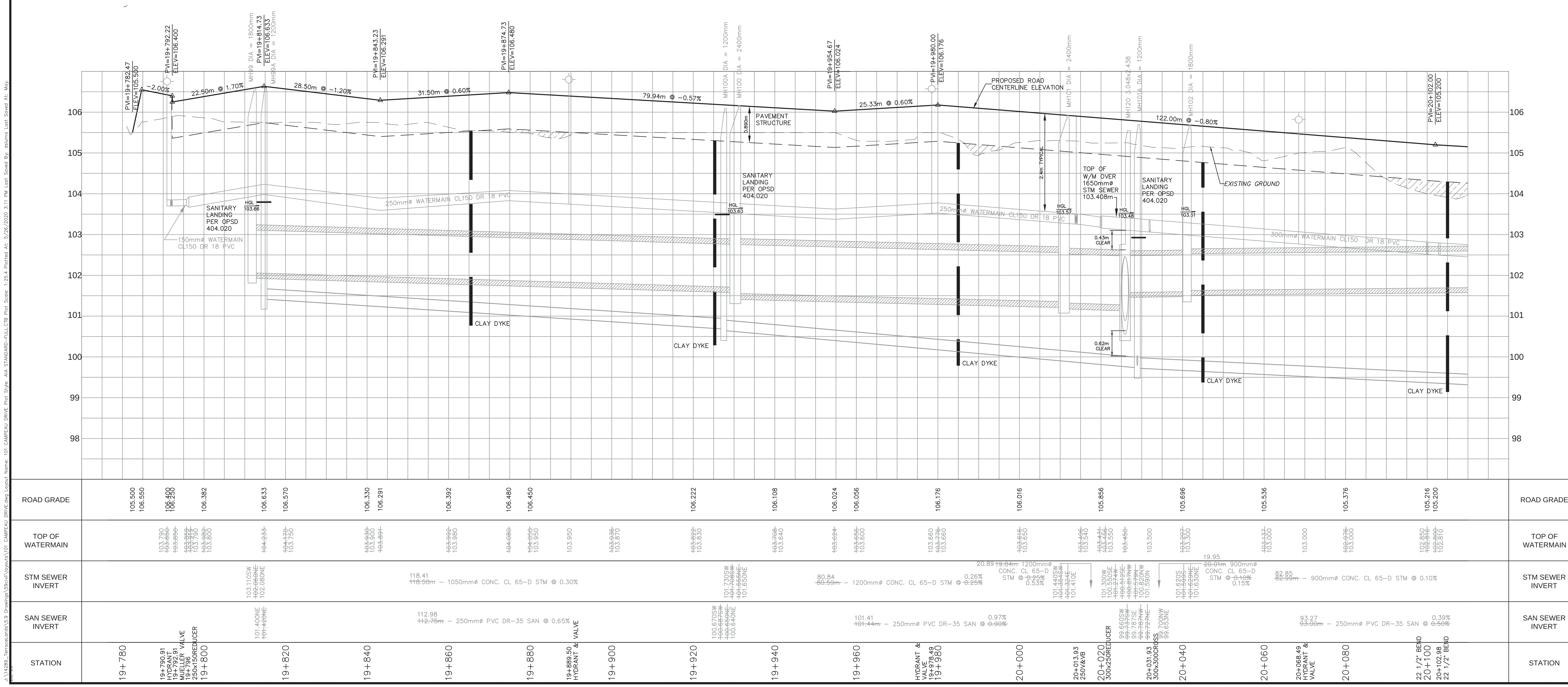
Scale 1:2000

Design	Date
LME	NOV. 2014
Drawn	**Checked**
DPS	TRB
Project No.	**Drawing No.**
14289	100

D07-16-14-0003_P5

#17661





LEGEND:

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

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

No.	REVISIONS	By	Date
14	ISSUED FOR CONSTRUCTION PHASE 4 AND 5	LME	20:05:27
13	ISSUED FOR TENDER PHASE 4 AND 5	LME	20:02:12
12	ISSUED FOR PHASE 5 REGISTRATION	LME	19:09:10
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	REMOVE V&C AT STA 20+102.60	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 5

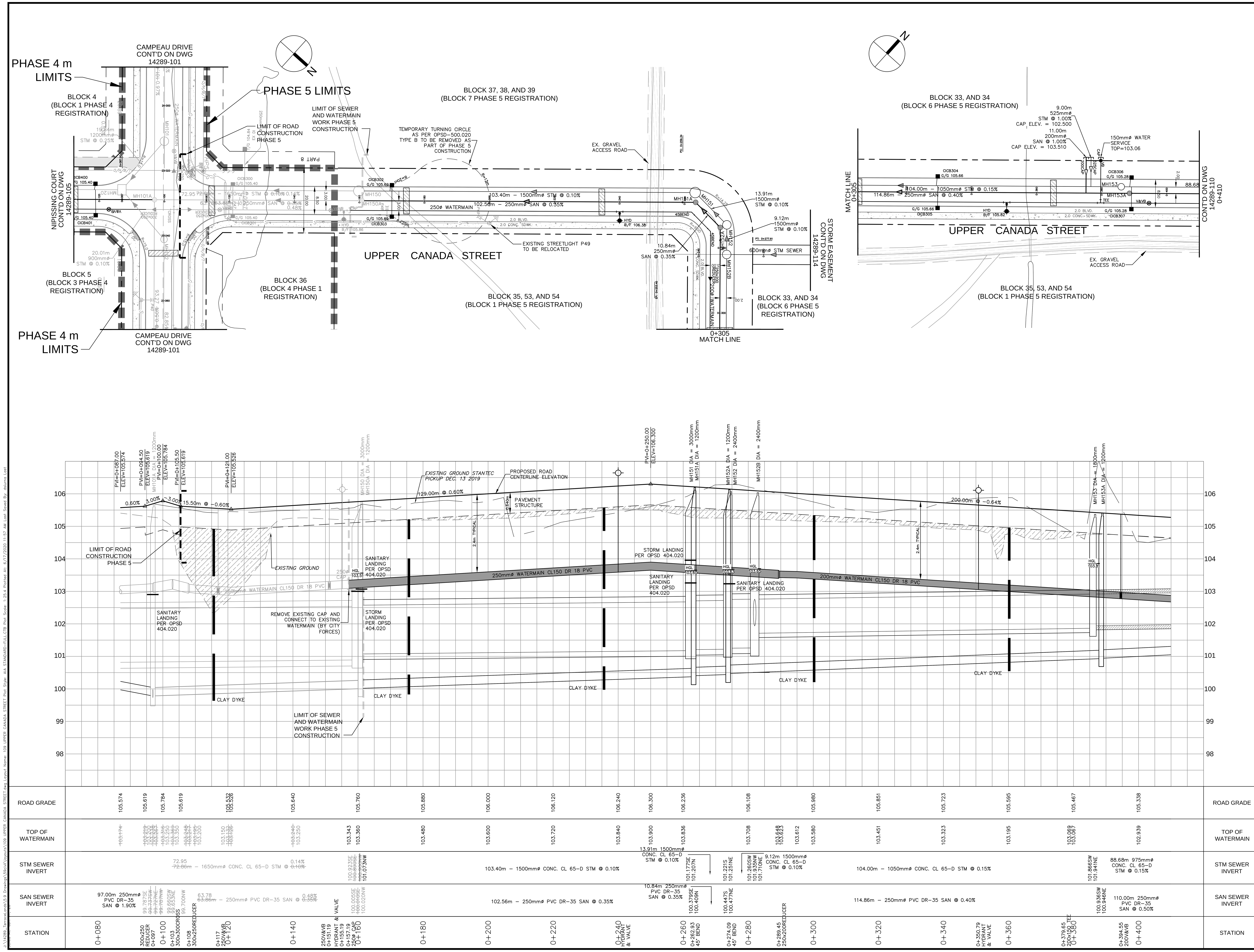
LICENSED PROFESSIONAL ENGINEER
L. M. ERION
13379508
2020/05/27
PROVINCE OF ONTARIO

Drawing Title
CAMPEAU DRIVE
FROM STA 19+780 TO STA 20+110

Scale	HORIZ. SCALE 1:500
	VERT. SCALE 1:50
Design: LME	Date: NOV. 2014
Drawn: DPS	Checked: TRB
Project No.: 14289	Drawing No.: 101

D07-16-14-0003_P5

#17661



LEGEND:

- MH3A SANITARY MANHOLE
- MH3 STORM MANHOLE
- CB T/G 99.76 STREET CATCHBASIN c/w TOP OF GRATE
- CICB G/G 99.76 CURB INLET CATCHBASIN c/w GUTTER GRADE
- RYCB T/G 100.27 REARYARD CB c/w TOP OF GRATE
- DIMH T/G 97.40 DITCH INLET MANHOLE c/w TOP OF GRATE
- CBMH G/G 101.55 STREET CATCHBASIN MANHOLE c/w GUTTER GRADE
- V&VB VALVE AND VALVE BOX
- V&C VALVE AND CHAMBER
- HYD B/F 100.56 HYDRANT c/w BOTTOM OF FLANGE ELEVATION
- BARRIER CURB AS PER SC1.1
- D.C. DEPRESSED BARRIER CURB AS PER SC1.1 COMPLETE WITH TWSI PER SC7.3
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- PROPOSED CONCRETE SIDEWALK
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- 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
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18	ADD SERVICE CONNECTIONS FOR BLOCKS 5 AND 6	LME	20:06:17
17	ISSUED FOR CONSTRUCTION PHASE 4 AND 5	LME	20:05:27
16	ISSUED FOR TENDER PHASE 4 AND 5	LME	20:02:12
15	REVISED AS PER PHASE 5 COMMENTS	LME	19:10:25
14	ISSUED FOR PHASE 5 REGISTRATION	LME	19:09:10
13	REVISED FOR PHASE 3 REGISTRATION	LME	18:09:14
12	ADDED CITY FILE NUMBER	LME	18:05:30
11	REVISED FOR PHASE 2 REGISTRATION	LME	18:04:20
10	RELOCATE V&VB, HYDRANT AND CAP. AT BLOCK 35/36	LME	16:05:05
9	REVISED LIMIT BLK 36, RELOCATE V&VB, HYDRANT AND CAP.	LME	16:04:20
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 PHASE 1 LIMITS	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 5

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

Drawing Title
UPPER CANADA STREET
FROM CAMPEAU DRIVE to STA. 0+410

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

Design	Date
LME	NOV. 2014
Drawn	**Checked**
DPS	TRB
Project No.	**Drawing No.**
14289	109

D07-16-14-0003_P5

#17661

Appendix B

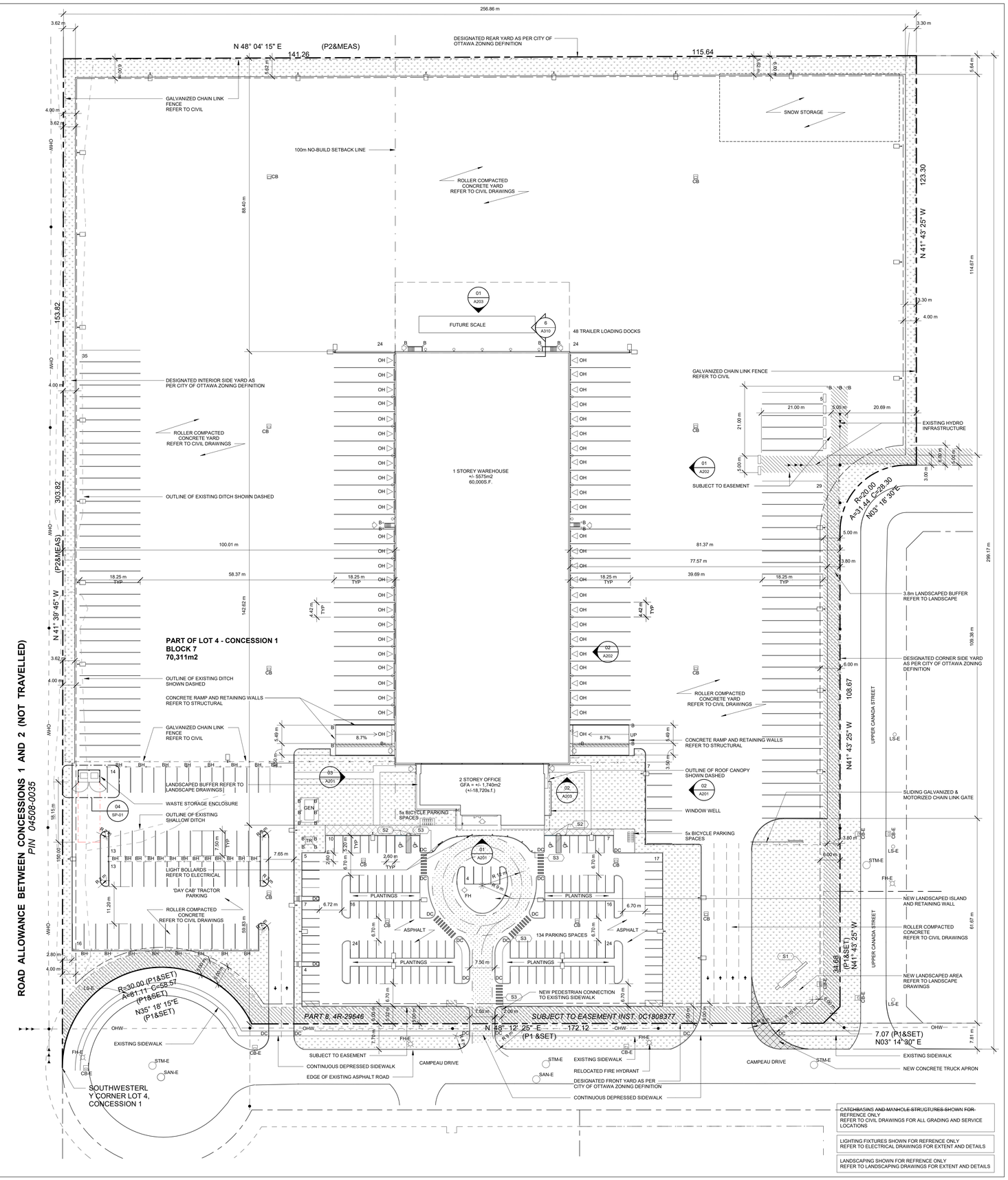
Site Plan
(prepared by McRobie Architects)

Servicing Plans
(DWG. 20027-S1, S2)

Grading Plans
(DWG. 20027-GR1, GR2, GR3)

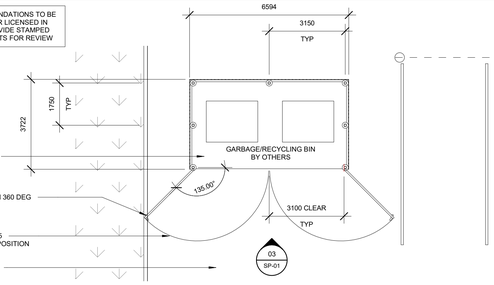
Erosion and Sediment Control Plan
(DWG. 20027-ESC1)

Notes & Details
(DWG. 20027-N1)



05 SP-01 SITE PLAN
Scale: 1 : 500

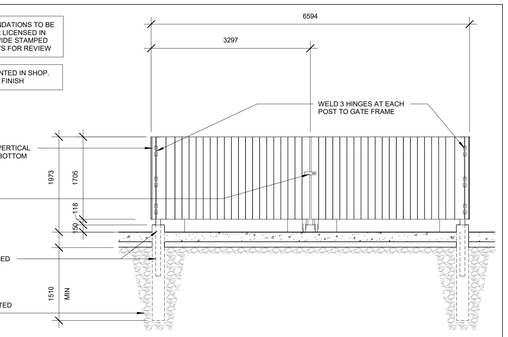
DESIGN OF STRUCTURE AND FOUNDATIONS TO BE BY DELEGATED DESIGN ENGINEER LICENSED IN THE PROVINCE OF ONTARIO. PROVIDE STAMPED SHOP DRAWINGS TO CONSULTANTS FOR REVIEW



04 SP-01 PLAN DETAIL - GARBAGE ENCLOSURE
Scale: 1 : 100

DESIGN OF STRUCTURE AND FOUNDATIONS TO BE BY DELEGATED DESIGN ENGINEER LICENSED IN THE PROVINCE OF ONTARIO. PROVIDE STAMPED SHOP DRAWINGS TO CONSULTANTS FOR REVIEW

ALL STEEL TO BE PRIMED AND PAINTED IN SHOP.
COLOUR: CHARCOAL, SEMI-GLOSS FINISH



03 SP-01 PARTIAL ELEVATION - GARBAGE ENCLOSURE
Scale: 1 : 50

	REQUIRED	PROVIDED
MINIMUM LOT AREA	750m2	70,334m2
MINIMUM LOT WIDTH	NO MINIMUM	297.6m
MINIMUM LOT COVERAGE	55%	10.3%
SETBACKS	FRONT YARD: 6m	FRONT YARD: 59.83m
	INTERIOR SIDE YARD: 4m	INTERIOR SIDE YARD: 100m
	CORNER SIDE YARD: 6m	CORNER SIDE YARD: 81.37m
	REAR YARD: 6m	REAR YARD: 88.4m
MAXIMUM FLOOR SPACE INDEX	2.0	0.103
MAXIMUM BUILDING HEIGHT	22m	12.38m
MINIMUM WIDTH OF LANDSCAPE	ABUTTING A STREET: 3m ALL OTHER CASES: NO MINIMUM	ABUTTING A STREET: 3m (CAMPEAU), 5.32m (UPPER CANADA) ALL OTHER CASES: 1.52m
ACCESSORY SALES AND DISPLAY AREA	MAXIMUM 25% OF THE GROSS FLOOR AREA OF THE PROPOSED BUILDING	N/A
MINIMUM PARKING WAREHOUSE: 0.8/100m2 OF GFA	WAREHOUSE: 58 SPACES	134 SPACES
BARRIER FREE PARKING TYPE A: MINIMUM 3.4m WIDE TYPE B: MINIMUM 2.6m WIDE MINIMUM ACCESS AISLE: 1.5m	4 SPACES (2 TYPE A + 2 TYPE B)	4 SPACES (2 TYPE A + 2 TYPE B)
MINIMUM BICYCLE PARKING WAREHOUSE: 1/1000m2 OF GFA	7 SPACES	10 SPACES
LOADING SPACES	2 SPACES	48 SPACES

02 SP-01 ZONING TABLE
Scale:N/A

SITE PLAN INFORMATION

UNDERLYING TOPOGRAPHICAL INFORMATION IS AS PER A PLAN PREPARED BY STANTEC GEOMATICS LTD, ONTARIO LAND SURVEYORS DATED DECEMBER 20TH, 2019 OF PART OF LOT 4 CONCESSION 1, GEOGRAPHIC TOWNSHIP OF HUNTLEY.

ABBREVIATIONS

AODA : ACCESSIBILITY FOR ONTARIANS WITH DISABILITIES
TWSI : TACTILE WALKING SURFACE INDICATOR

SIGNAGE

S1 NEW ILLUMINATED MONUMENT SIGN
S2 AODA COMPLIANT VERTICAL PARKING SIGN TYPICAL AT EACH AODA PARKING SPACE
S3 FIRE ROUTE SIGNAGE

LINE OF SETBACK AS PER ZONING BY-LAW
PROPERTY LINE
SUBJECT TO EASEMENT
OHW OVERHEAD WIRES
UTILITY POLE
WALL MOUNTED LIGHT FIXTURE REFER TO ELECTRICAL
EXTERIOR LIGHT STANDARD REFER TO ELECTRICAL
GEN GENERATOR
TR TRANSFORMER
BH POST-MOUNTED BLOCK HEATER OUTLETS - DUAL RECEPTACLE
LS-E EXISTING LIGHT STANDARD
NEW SITE LIGHTING FIXTURE REFER TO ELECTRICAL
PRECAST CONCRETE PAVERS
FIRE ROUTE
SOD, REFER TO LANDSCAPE PLAN
NEW SHRUBS, REFER TO LANDSCAPE PLAN
NEW TREE, REFER TO LANDSCAPE PLAN

2.4M HIGH GALVANIZED CHAIN LINK FENCE WITH 3 ROWS OF BARB WIRE
GALVANIZED TRAFFIC BARRIER GUARDRAIL ON STEEL POSTS
BUILDING ENTRANCE
B 203mm DIAMETER CONCRETE-FILLED BOLLARD
OH OVERHEAD DOOR
SC SIAMESE FIRE DEPARTMENT CONNECTION
FH NEW FIRE HYDRANT
FH-E EXISTING FIRE HYDRANT
SAN-E EXISTING MANHOLE - SANITARY
STM-E EXISTING MANHOLE - STORM
CB NEW CATCH BASIN
CB-E EXISTING CATCH BASIN
BARRIER FREE PARKING STALL
NEW HORIZONTAL BICYCLE PARKING
CROSSWALK PAINT MARKINGS
(TWSI) TACTILE WALKING SURFACE INDICATOR
DC DEPRESSED CURB

01 SP-01 SITE PLAN NOTES, LEGEND, AND ABBREVIATIONS
Scale:N/A

MCROBIE
ARCHITECTS + INTERIOR DESIGNERS

OTTAWA, ONTARIO

True North

Project North

Revisions

Revision Number	Description	Date

Project

MARITIME-ONTARIO
OTTAWA

8800 CAMPEAU DRIVE
OTTAWA, ON
K2S 1B9

Drawing

SITE PLAN

Scale As indicated
Stamp

Drawn RH

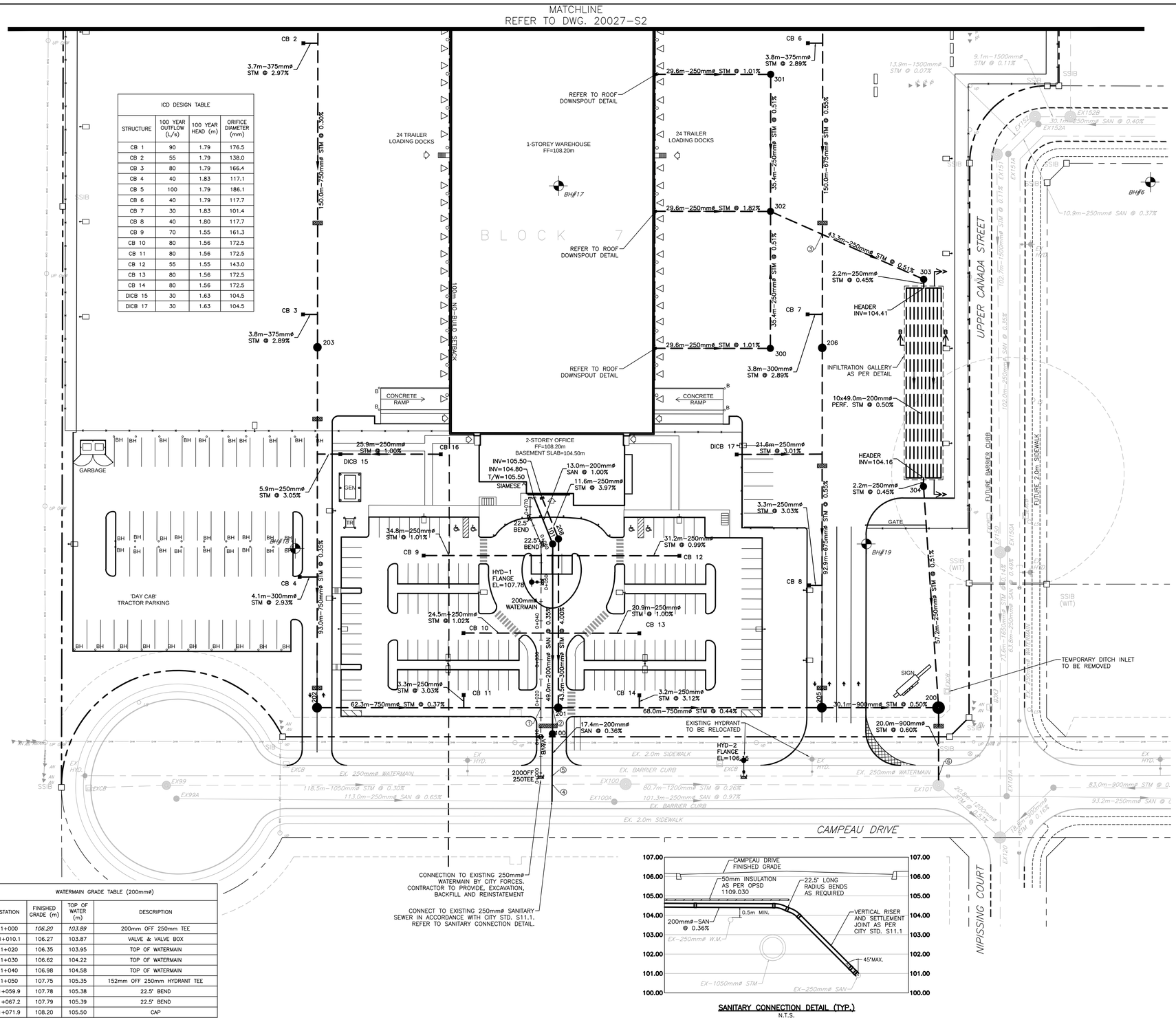
Checked DM

Project No. 19-247

Drawing No. SP-01

Date 2020/07/21

2020-12-01 4:01:13 PM



ICD DESIGN TABLE			
STRUCTURE	100 YEAR OUTFLOW (L/s)	100 YEAR HEAD (m)	ORIFICE DIAMETER (mm)
CB 1	90	1.79	176.5
CB 2	55	1.79	138.0
CB 3	80	1.79	166.4
CB 4	40	1.83	117.1
CB 5	100	1.79	186.1
CB 6	40	1.79	117.7
CB 7	30	1.83	101.4
CB 8	40	1.80	117.7
CB 9	70	1.55	161.3
CB 10	80	1.56	172.5
CB 11	80	1.56	172.5
CB 12	55	1.55	143.0
CB 13	80	1.56	172.5
CB 14	80	1.56	172.5
DICB 15	30	1.63	104.5
DICB 17	30	1.63	104.5

STORM MANHOLE TABLE			
STRUCTURE	STRUCTURE SIZE	T/G ELEV	INVERT
200	2400mmø	105.88	NW=103.83 SW=102.04 SE=101.98
201	1500mmø	106.37	SW=102.67 NW=103.24 NE=102.64
202	1800mmø	106.43	NW=102.96 NE=102.90
203	1500mmø	106.35	NW=103.32 SE=103.29
204	1500mmø	106.46	SE=103.76
205	1800mmø	106.21	NW=102.42 SW=102.34 NE=102.19
206	1500mmø	106.33	NW=102.96 SE=102.93
207	1500mmø	106.46	SE=103.78
208	1200mmø	107.15	NW=105.04 SE=104.98
300	1200mmø	106.44	NW=104.94 SW=105.00
301	1200mmø	106.47	SE=104.94 SW=105.00
302	1200mmø	106.55	SE=104.76 E=104.70 NW=104.76 SW=104.76
303	1200mmø	106.56	W=104.48 SE=104.42
304	1200mmø	106.37	NW=104.15 SE=104.12
EX101	2400mmø	105.88	SW=101.44 E=101.41 NW=101.86

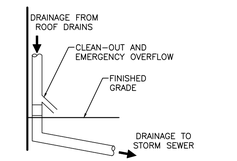
SANITARY MANHOLE TABLE			
STRUCTURE	STRUCTURE SIZE	T/G ELEV	INVERT
100	1200mmø	106.28	NW=104.47 SE=104.44
101	1200mmø	105.93	SE=104.64 NW=104.67

CATCH BASIN TABLE					
STRUCTURE	STRUCTURE SIZE	T/G ELEV	INVERT		GRATE
CB 1	600x600mm	106.42	NE=104.74		S19
CB 2	600x600mm	106.32	NE=104.64		S19
CB 3	600x600mm	106.22	NE=104.54		S19
CB 4	600x600mm	106.15	NE=104.47		S19
CB 5	600x600mm	106.42	NE=104.74		S19
CB 6	600x600mm	106.32	NE=104.64		S19
CB 7	600x600mm	106.22	NE=104.54		S19
CB 8	600x600mm	105.92	NE=104.24		S19
CB 9	600x600mm	107.10	NE=105.42		S19
CB 10	600x600mm	106.64	NE=104.96		S19
CB 11	600x600mm	106.06	SE=104.38		S19
CB 12	600x600mm	107.10	SW=105.42		S19
CB 13	600x600mm	106.64	SW=104.96		S19
CB 14	600x600mm	106.06	SE=104.38		S19
CB 16	600x600mm	106.61	SW=105.41		S19
DICB 15	600x600mm	106.42	SW=104.67 NE=105.15		403.010
DICB 17	600x600mm	106.50	NE=104.75		403.010

SEWER CROSSING TABLE		
CROSSING No.	INVERTS (m)	SEPARATION (m)
1	WATER INV.=103.80	0.25
	STM OBV.=103.55	
2	SAN INV.=104.49	0.94
	STM OBV.=103.55	
3	STM INV.=104.63	0.72
	STM OBV.=103.91	
4	SAN INV.=104.39	1.54
	EX STM OBV.=102.85	
5	SAN INV.=104.40	0.53
	EX WATER OBV.=103.87	
6	EX WATER INV.=103.28	0.38
	STM OBV.=102.90	

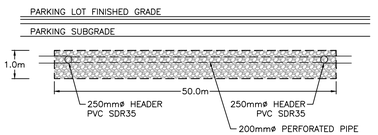
WATERMAIN GRADE TABLE (200mmø)			
STATION	FINISHED GRADE (m)	TOP OF WATER (m)	DESCRIPTION
1+000	*106.20*	*103.89*	200mm OFF 250mm TEE
1+010.1	106.27	103.87	VALVE & VALVE BOX
1+020	106.35	103.95	TOP OF WATERMAIN
1+030	106.62	104.22	TOP OF WATERMAIN
1+040	106.98	104.58	TOP OF WATERMAIN
1+050	107.75	105.35	152mm OFF 250mm HYDRANT TEE
1+059.9	107.78	105.38	22.5° BEND
1+067.2	107.79	105.39	22.5° BEND
1+071.9	108.20	105.50	CAP

SANITARY CONNECTION DETAIL (TYP.)
N.T.S.

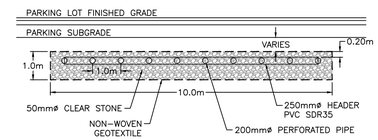


NOTE: ROOF DRAIN AND CORRESPONDING DOWNSPOUT DETAILS TO BE DESIGNED BY MECHANICAL ENGINEER.

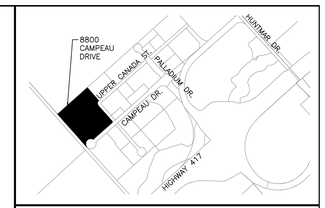
ROOF DOWNSPOUT DETAIL (TYP.)
N.T.S.



INFILTRATION GALLERY SECTION A–A
N.T.S.



INFILTRATION GALLERY SECTION B–B
N.T.S.



KEY PLAN

LEGEND

- PROPERTY BOUNDARY
- CATCH BASIN
- STORM SEWER & MANHOLE
- SANITARY SEWER & MANHOLE
- WATERMAIN
- HYDRANT
- VALVE & VALVE BOX
- SIAMESE CONNECTION
- EXISTING CATCH BASIN
- EXISTING STORM SEWER & MANHOLE
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE & VALVE BOX
- 100m NO-BUILD SETBACK
- CLAY SEAL
- BOREHOLE
- CROSSING NUMBER
- BUILDING ENTRANCE (REFER TO SITE PLAN)
- ◦B BOLLARD (REFER TO SITE PLAN)
- ◦BH BLOCK HEATER POST (REFER TO SITE PLAN)
- LIGHT STANDARD (REFER TO SITE PLAN)
- JERSEY BARRIER (REFER TO SITE PLAN)

NOT FOR CONSTRUCTION

NOTES

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NO.	REVISION DESCRIPTION	DATE	BY
1	ISSUED FOR SITE PLAN APPLICATION	02/12/20	SMC

SCALE
0 5m 10m 20m
HORIZONTAL 1:500

LICENSED PROFESSIONAL ENGINEER S. M. CZARNYJSKI DEC 21/20 PROVINCE OF ONTARIO

Robinson Land Development
350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

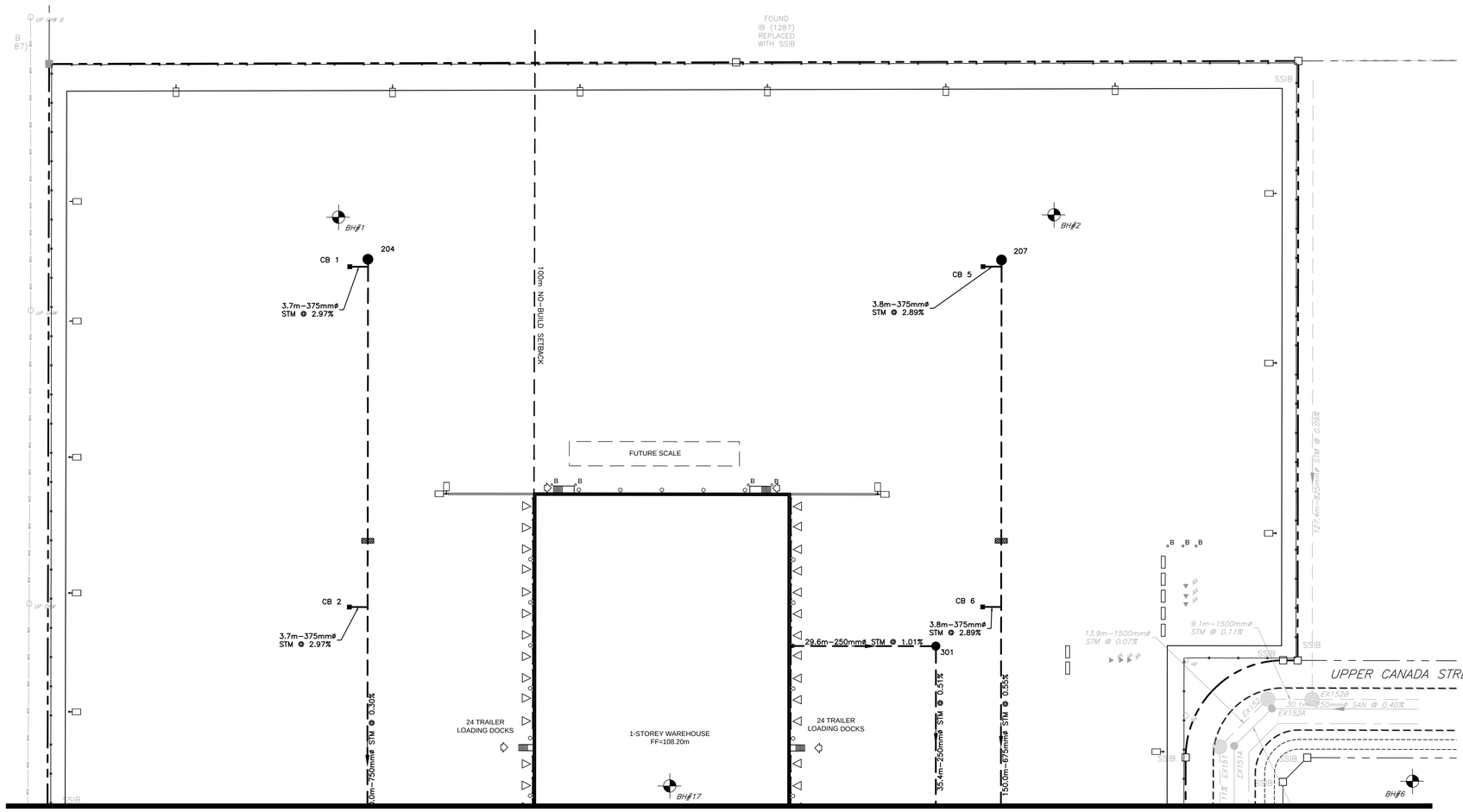
DESIGN	BLM
CHECKED	SMC
DRAWN	BLM
CHECKED	SMC
APPROVED	SMC

MARITIME-ONTARIO FREIGHT LINES LIMITED

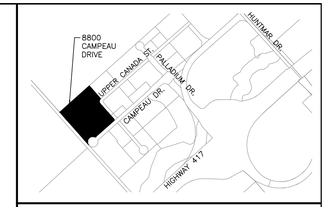
KANATA WEST BUSINESS PARK
8800 CAMPEAU DRIVE, OTTAWA, ON

SERVICING PLAN

PROJECT No.	20027
SURVEY	STANTEC
DATED	DECEMBER 2020
DWG. No:	20027-S1



MATCHLINE
REFER TO DWG. 20027-S1



KEY PLAN

LEGEND

- PROPERTY BOUNDARY
- CATCH BASIN
- STORM SEWER & MANHOLE
- SANITARY SEWER & MANHOLE
- WATERMAIN
- HYDRANT
- VALVE & VALVE BOX
- SIAMESE CONNECTION
- EXISTING CATCH BASIN
- EXISTING STORM SEWER & MANHOLE
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING WATERMAIN
- EXISTING HYDRANT
- EXISTING VALVE & VALVE BOX
- 100m NO-BUILD SETBACK
- CLAY SEAL
- BOREHOLE
- (1) CROSSING NUMBER
- BUILDING ENTRANCE (REFER TO SITE PLAN)
- ◦B BOLLARD (REFER TO SITE PLAN)
- ◦BH BLOCK HEATER POST (REFER TO SITE PLAN)
- LIGHT STANDARD (REFER TO SITE PLAN)
- JERSEY BARRIER (REFER TO SITE PLAN)

STORM MANHOLE TABLE

STRUCTURE	STRUCTURE SIZE	T/G ELEV	INVERT
200	2400mmø	105.88	NW=103.83 SW=102.04 SE=101.98
201	1500mmø	106.37	SW=102.67 NW=103.24 NE=102.64
202	1800mmø	106.43	NW=102.96 NE=102.90
203	1500mmø	106.35	NW=103.32 SE=103.29
204	1500mmø	106.46	SE=103.76
205	1800mmø	106.21	NW=102.42 SW=102.34 NE=102.19
206	1500mmø	106.33	NW=102.96 SE=102.93
207	1500mmø	106.46	SE=103.78
208	1200mmø	107.15	NW=105.04 SE=104.98
300	1200mmø	106.44	NW=104.94 SW=105.00
301	1200mmø	106.47	SE=104.94 SW=105.00
302	1200mmø	106.55	SE=104.76 E=104.70 NW=104.76 SW=104.76
303	1200mmø	106.56	W=104.48 SE=104.42
304	1200mmø	106.37	NW=104.15 SE=104.12
EX101	2400mmø	105.88	SW=101.44 E=101.41 NW=101.86

SANITARY MANHOLE TABLE

STRUCTURE	STRUCTURE SIZE	T/G ELEV	INVERT
100	1200mmø	106.28	NW=104.47 SE=104.44
101	1200mmø	105.93	SE=104.64 NW=104.67

CATCH BASIN TABLE

STRUCTURE	STRUCTURE SIZE	T/G ELEV	INVERT	GRATE
CB 1	600x600mm	106.42	NE=104.74	S19
CB 2	600x600mm	106.32	NE=104.64	S19
CB 3	600x600mm	106.22	NE=104.54	S19
CB 4	600x600mm	106.15	NE=104.47	S19
CB 5	600x600mm	106.42	NE=104.74	S19
CB 6	600x600mm	106.32	NE=104.64	S19
CB 7	600x600mm	106.22	NE=104.54	S19
CB 8	600x600mm	105.92	NE=104.24	S19
CB 9	600x600mm	107.10	NE=105.42	S19
CB 10	600x600mm	106.64	NE=104.96	S19
CB 11	600x600mm	106.06	SE=104.38	S19
CB 12	600x600mm	107.10	SW=105.42	S19
CB 13	600x600mm	106.64	SW=104.96	S19
CB 14	600x600mm	106.06	SE=104.38	S19
CB 16	600x600mm	106.61	SW=105.41	S19
DICB 15	600x600mm	106.42	SW=104.67 NE=105.15	403.010
DICB 17	600x600mm	106.50	NE=104.75	403.010

ICD DESIGN TABLE

STRUCTURE	100 YEAR OUTFLOW (L/s)	100 YEAR HEAD (m)	ORIFICE DIAMETER (mm)
CB 1	90	1.79	176.5
CB 2	55	1.79	138.0
CB 3	80	1.79	166.4
CB 4	40	1.83	117.1
CB 5	100	1.79	186.1
CB 6	40	1.79	117.7
CB 7	30	1.83	101.4
CB 8	40	1.80	117.7
CB 9	70	1.55	161.3
CB 10	80	1.56	172.5
CB 11	80	1.56	172.5
CB 12	55	1.55	143.0
CB 13	80	1.56	172.5
CB 14	80	1.56	172.5
DICB 15	30	1.63	104.5
DICB 17	30	1.63	104.5

NOT FOR CONSTRUCTION

NOTES

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NO.	REVISION DESCRIPTION	DATE	BY
1	ISSUED FOR SITE PLAN APPLICATION	02/12/20	SMC

SCALE
0 5m 10m 20m
HORIZONTAL 1:500

S. M. CZARNAVSKI — LICENSED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO — DEC 21

Robinson Land Development
350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

DESIGN	BLM
CHECKED	SMC
DRAWN	BLM
CHECKED	SMC
APPROVED	SMC

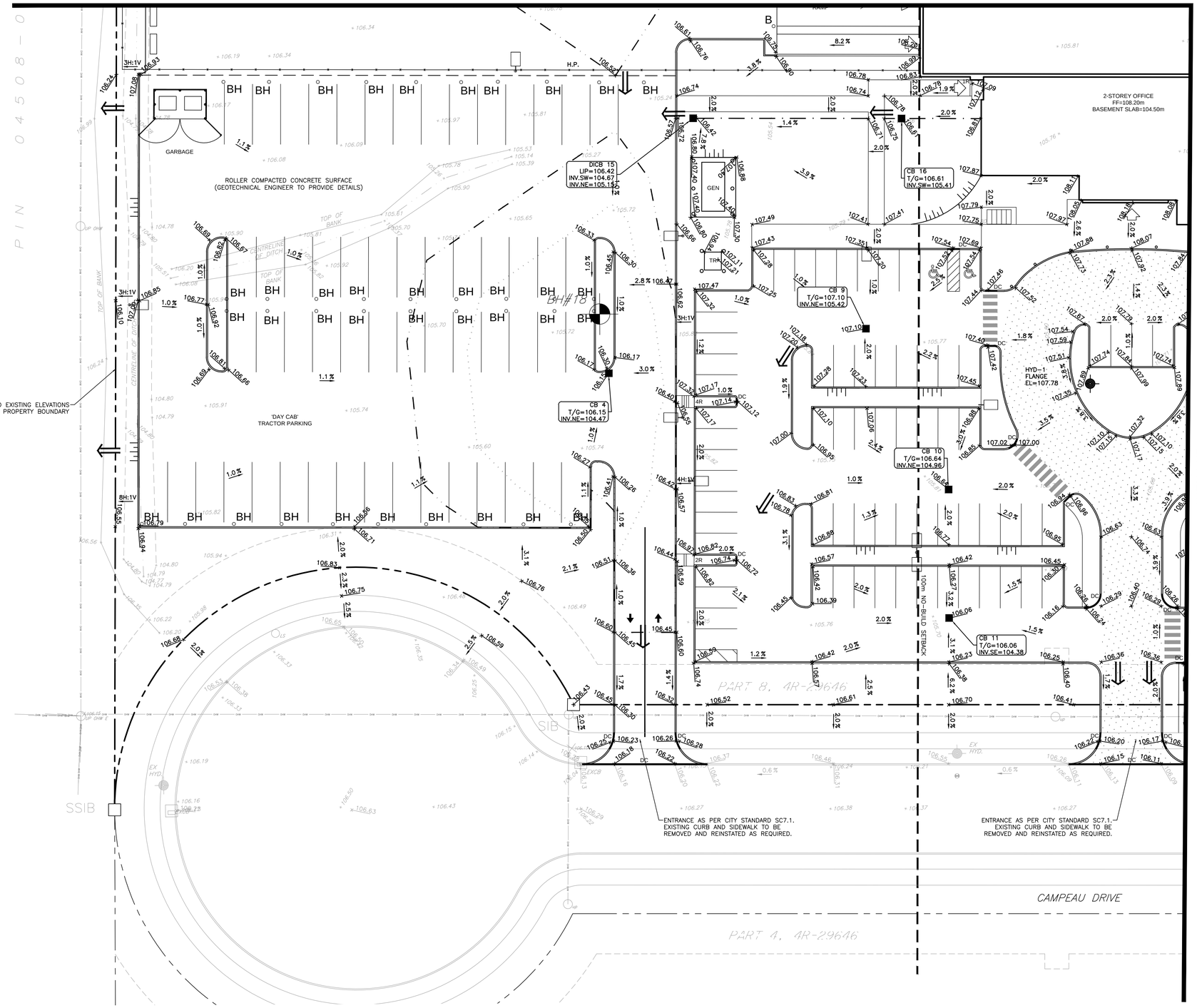
MARITIME-ONTARIO FREIGHT LINES LIMITED

KANATA WEST BUSINESS PARK
8800 CAMPEAU DRIVE, OTTAWA, ON

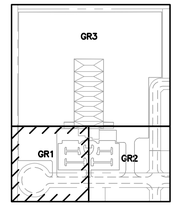
SERVICING PLAN

PROJECT No.	20027
SURVEY	STANTEC
DATED	DECEMBER 2020
DWG. No:	20027-S2

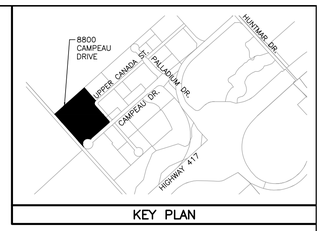
MATCHLINE
REFER TO DWG. 20027-GR3



MATCHLINE
REFER TO DWG. 20027-GR2



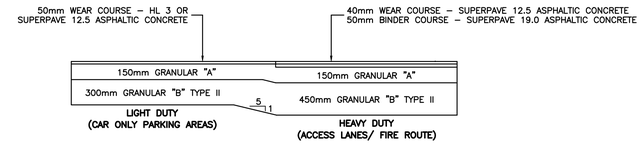
DRAWING KEY PLAN



KEY PLAN

LEGEND

× 106.00	EXISTING ELEVATION
×107.00	PROPOSED GRADE
2.0%	PROPOSED DRAINAGE SLOPE AND DIRECTION
×107.00	IBI GROUP DESIGN GRADE
	PROPERTY BOUNDARY
	CATCH BASIN
	EXISTING CATCH BASIN
	EXISTING HYDRANT
	SWALE
H.P.	HIGH POINT
DC	DEPRESSED CURB
	TERRACING (3H:1V MAX.)
	100m NO-BUILD SETBACK
	5 YEAR PONDING LIMIT
	100 YEAR PONDING LIMIT
	BOREHOLE
	BUILDING ENTRANCE (REFER TO SITE PLAN)
◦B	BOLLARD (REFER TO SITE PLAN)
◦BH	BLOCK HEATER POST (REFER TO SITE PLAN)
	LIGHT STANDARD (REFER TO SITE PLAN)
	MAJOR OVERLAND FLOW ROUTE
	HEAVY DUTY ASPHALT LIMITS



PAVEMENT STRUCTURE DETAIL
N.T.S.

NOT FOR CONSTRUCTION

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NO.	REVISION DESCRIPTION	DATE	BY
1	ISSUED FOR SITE PLAN APPLICATION	02/12/20	SMC

SCALE
0 2m 4m 10m
HORIZONTAL 1:250

ARCHIVED PROFESSIONAL ENGINEER
S. M. CZARNYSKI
DEC 21
PROVINCE OF ONTARIO

Robinson
Land Development
350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

DESIGN	BLM
CHECKED	SMC
DRAWN	BLM
CHECKED	SMC
APPROVED	SMC

MARITIME-ONTARIO
FREIGHT LINES LIMITED

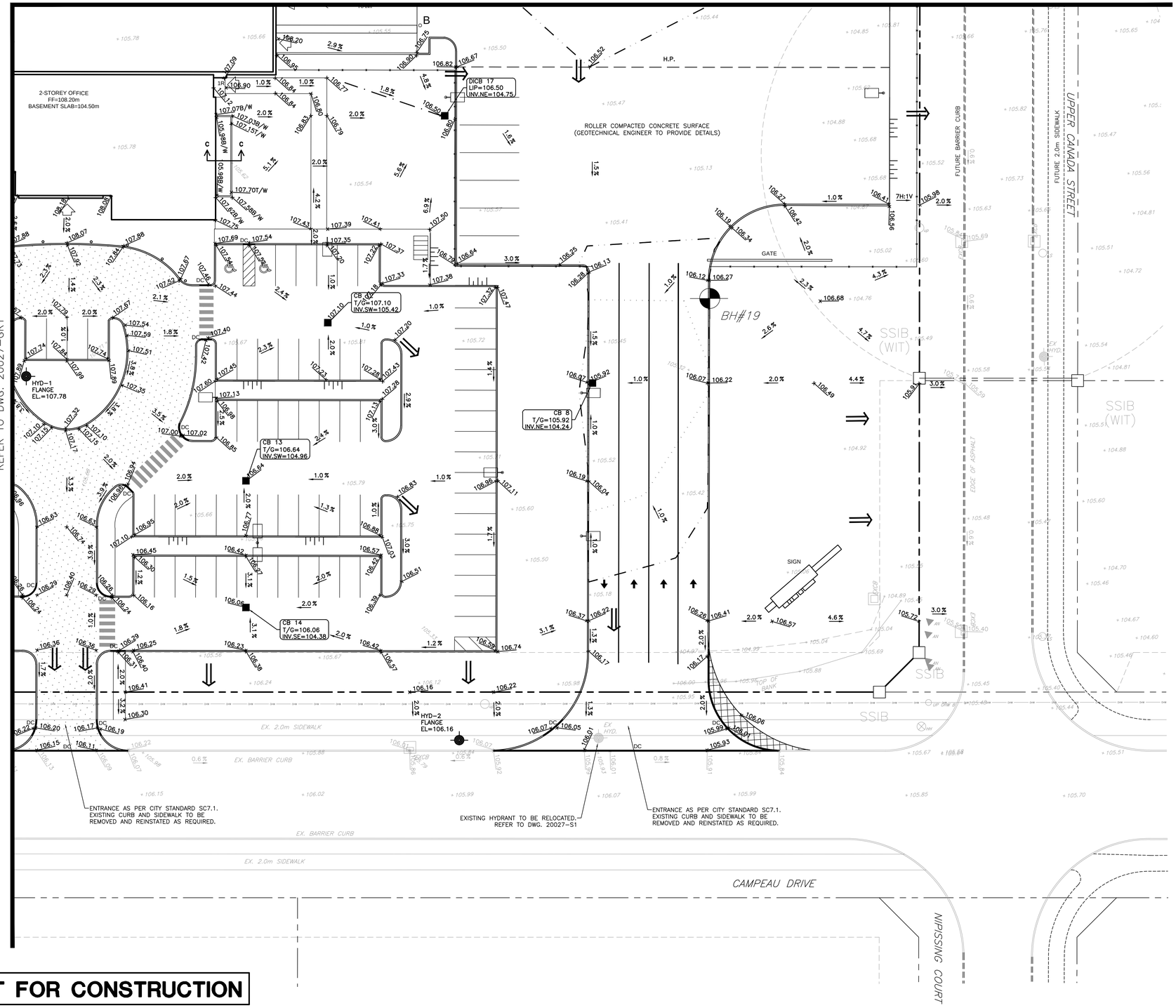
KANATA WEST BUSINESS PARK
8800 CAMPEAU DRIVE, OTTAWA, ON

GRADING PLAN

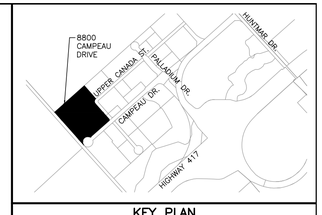
PROJECT No.	20027
SURVEY	STANTEC
DATED	DECEMBER 2020
DWG. No:	20027-GR1

MATCHLINE
REFER TO DWG. 20027-GR3

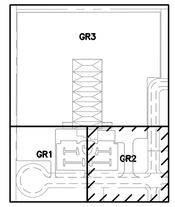
MATCHLINE
REFER TO DWG. 20027-GR1



NOT FOR CONSTRUCTION



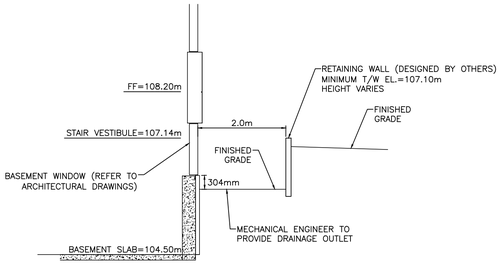
KEY PLAN



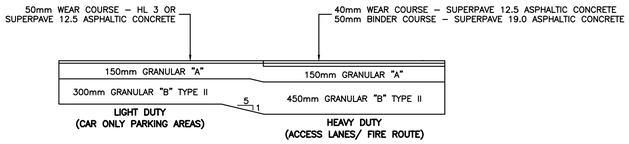
DRAWING KEY PLAN

LEGEND

- EXISTING ELEVATION
- PROPOSED GRADE
- PROPOSED DRAINAGE SLOPE AND DIRECTION
- IBI GROUP DESIGN GRADE
- PROPERTY BOUNDARY
- CATCH BASIN
- EXISTING CATCH BASIN
- EXISTING HYDRANT
- SWALE
- HIGH POINT
- DEPRESSED CURB
- TERRACING (3H:1V MAX.)
- 100m NO-BUILD SETBACK
- 5 YEAR PONDING LIMIT
- 100 YEAR PONDING LIMIT
- BOREHOLE
- BUILDING ENTRANCE (REFER TO SITE PLAN)
- BOLLARD (REFER TO SITE PLAN)
- BLOCK HEATER POST (REFER TO SITE PLAN)
- LIGHT STANDARD (REFER TO SITE PLAN)
- MAJOR OVERLAND FLOW ROUTE
- HEAVY DUTY ASPHALT LIMITS



WINDOW WELL SECTION C-C
N.T.S.



PAVEMENT STRUCTURE DETAIL
N.T.S.

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SCALE
0 2m 4m 10m
HORIZONTAL 1:250

LICENSED PROFESSIONAL ENGINEER
S. M. CZARNYJSKI
DEC 21/20
PROVINCE OF ONTARIO

Robinson
Land Development
350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

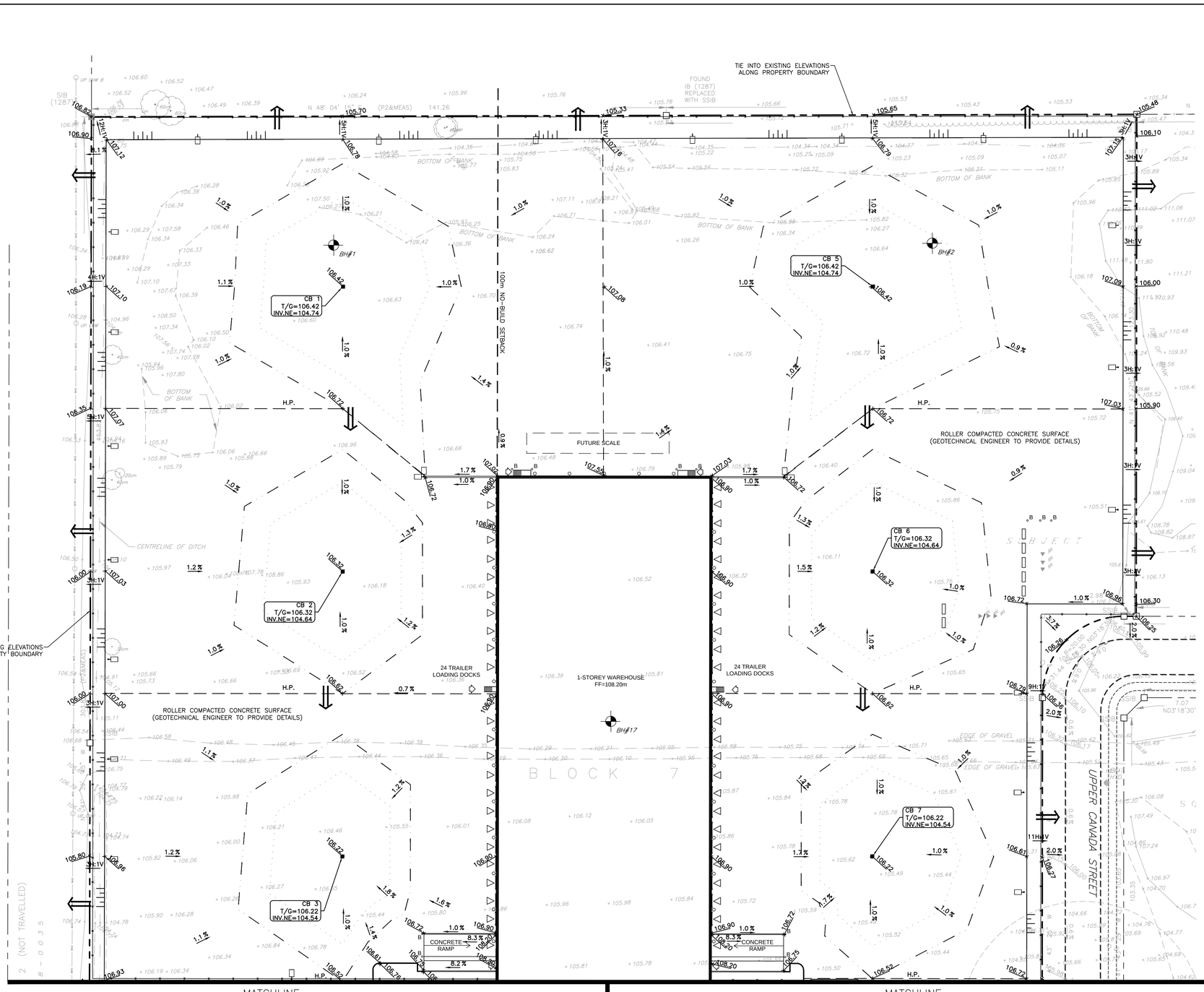
DESIGN	BLM
CHECKED	SMC
DRAWN	BLM
CHECKED	SMC
APPROVED	SMC

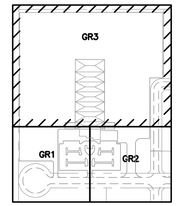
MARITIME-ONTARIO
FREIGHT LINES LIMITED

KANATA WEST BUSINESS PARK
8800 CAMPEAU DRIVE, OTTAWA, ON

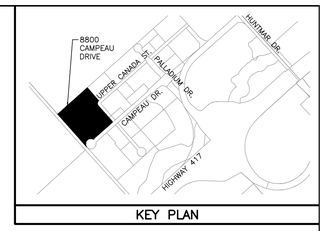
GRADING PLAN

PROJECT No.	20027
SURVEY	STANTEC
DATED	DECEMBER 2020
DWG. No:	20027-GR2





DRAWING KEY PLAN



KEY PLAN

LEGEND

+ 106.00	EXISTING ELEVATION
x 107.00	PROPOSED GRADE
2.0 %	PROPOSED DRAINAGE SLOPE AND DIRECTION
x 107.00	IBI GROUP DESIGN GRADE
	PROPERTY BOUNDARY
	CATCH BASIN
	EXISTING CATCH BASIN
	EXISTING HYDRANT
	SWALE
H.P.	HIGH POINT
DC	DEPRESSED CURB
	TERRACING (3H:1V MAX.)
	100m NO-BUILD SETBACK
	5 YEAR PONDING LIMIT
	100 YEAR PONDING LIMIT
	BOREHOLE
	BUILDING ENTRANCE (REFER TO SITE PLAN)
B	BOLLARD (REFER TO SITE PLAN)
BH	BLOCK HEATER POST (REFER TO SITE PLAN)
	LIGHT STANDARD (REFER TO SITE PLAN)
	JERSEY BARRIER (REFER TO SITE PLAN)
	MAJOR OVERLAND FLOW ROUTE
	HEAVY DUTY ASPHALT LIMITS

NOT FOR CONSTRUCTION

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1	ISSUED FOR SITE PLAN APPLICATION	02/12/20	SMC

SCALE

0 5m 10m 20m

HORIZONTAL 1:500

Robinson Land Development
350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

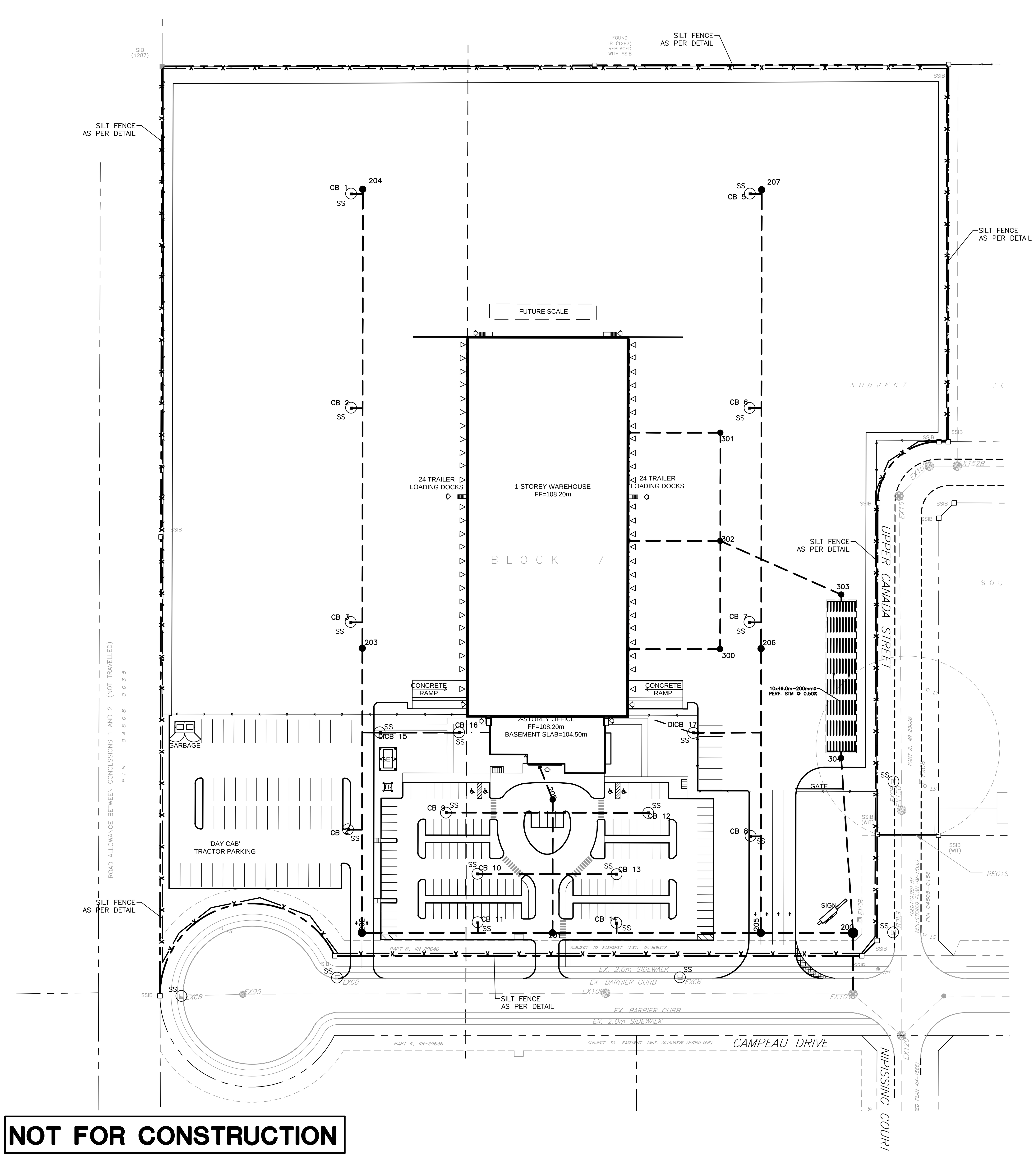
DESIGN	BLM
CHECKED	SMC
DRAWN	BLM
CHECKED	SMC
APPROVED	SMC

MARITIME-ONTARIO FREIGHT LINES LIMITED

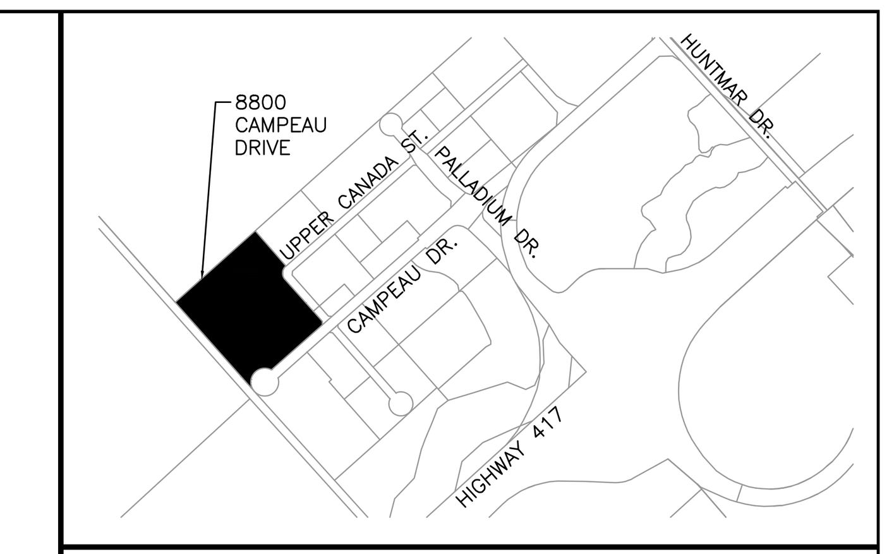
KANATA WEST BUSINESS PARK
8800 CAMPEAU DRIVE, OTTAWA, ON

GRADING PLAN

PROJECT No.	20027
SURVEY	STANTEC
DATED	DECEMBER 2020
DWG. No:	20027-GR3

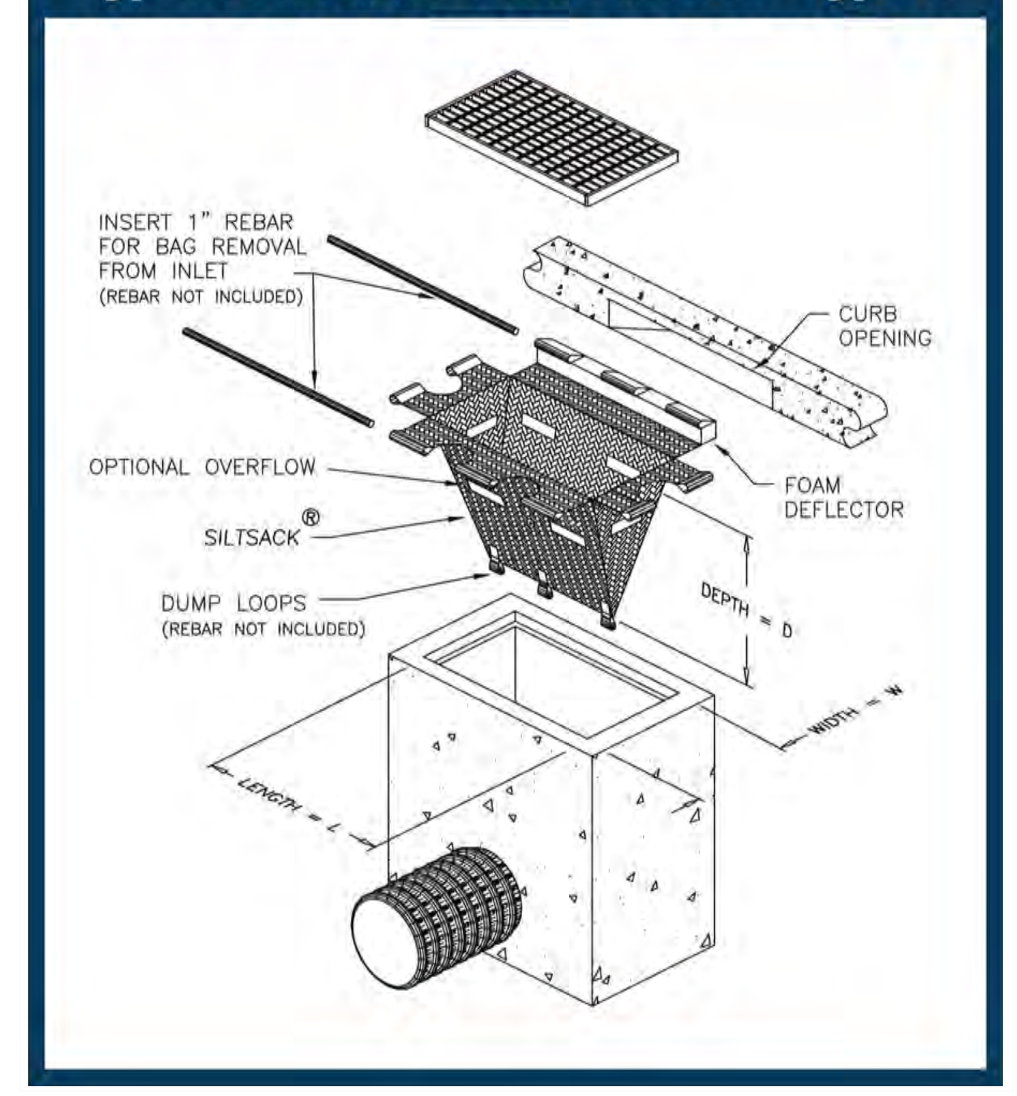


NOT FOR CONSTRUCTION

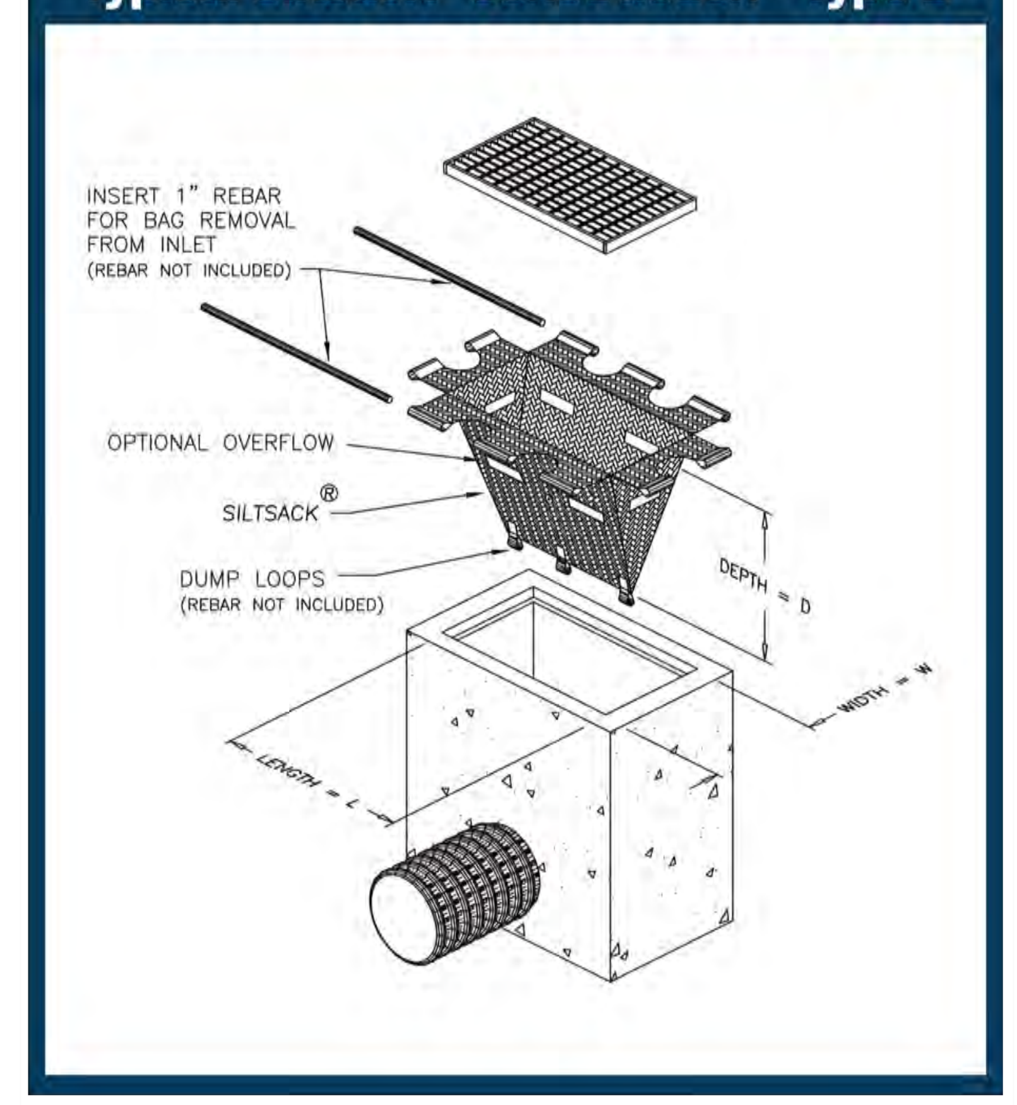


KEY PLAN

Typical Siltsack® Construction - Type A

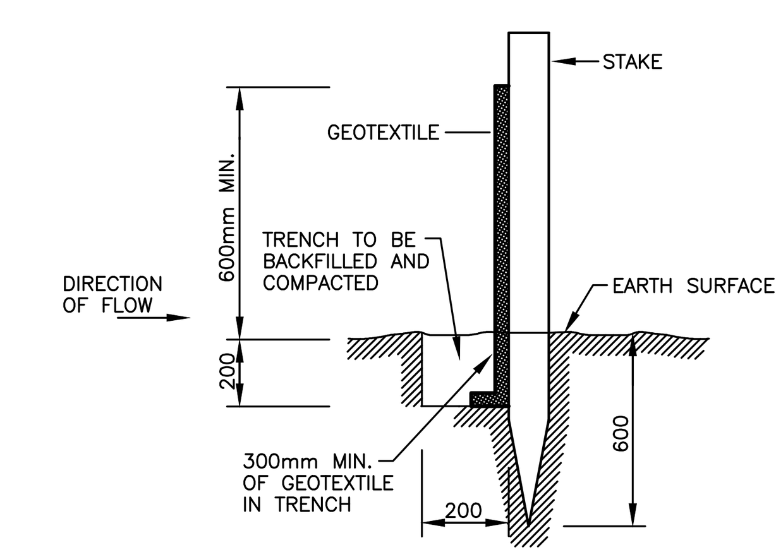


Typical Siltsack® Construction - Type B

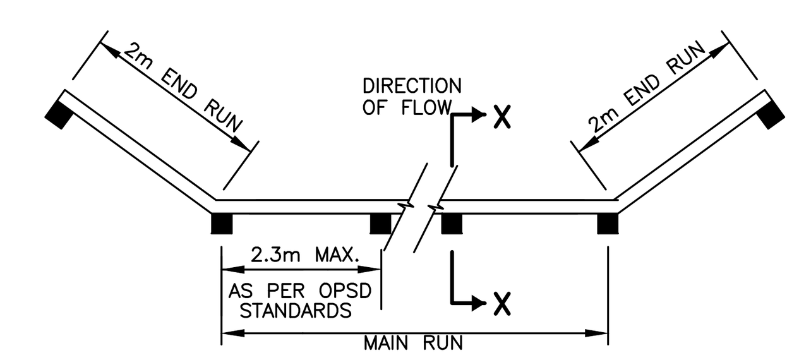


LEGEND

- PROPERTY BOUNDARY
- CATCH BASIN
- EXISTING CATCH BASIN
- STORM SEWER & MANHOLE
- EXISTING STORM SEWER & MANHOLE
- 100m NO-BUILD SETBACK
- SILT FENCE
- SILT SACK UNDER FRAME AND COVER



SECTION X-X
N.T.S.



SILT FENCE BARRIER DETAIL
N.T.S.

NOTES:

1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE ULTIMATE RECEIVING WATERCOURSE DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
2. LIMIT THE EXTENT OF EXPOSED SOILS AT ANY GIVEN TIME.
3. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED UNTIL VEGETATION HAS BEEN RE-ESTABLISHED IN ALL DISTURBED AREAS. RE-VEGETATE DISTURBED AREAS IN ACCORDANCE WITH APPROVED LANDSCAPE PLAN AS SOON AS POSSIBLE.
4. STOCKPILE SOIL AWAY (15 METRES OR GREATER) FROM WATERCOURSES, DRAINAGE FEATURES AND TOP OF STEEP SLOPES.
5. SILT SACKS ARE TO BE PLACED UNDERNEATH THE FRAME AND COVER OF ALL PROPOSED AND EXISTING CATCH BASINS AND OPEN COVER STORM MANHOLES UNTIL CONSTRUCTION IS COMPLETED.
6. A SILT FENCE BARRIER SHALL BE INSTALLED AS PER OPSD 219.1100 WHERE INDICATED AND MAINTAINED AS REQUIRED.
7. DURING ACTIVE CONSTRUCTION PERIODS, VISUAL INSPECTIONS SHALL BE UNDERTAKEN ON A WEEKLY BASIS AND AFTER MAJOR STORM EVENTS (>25mm RAIN IN 24 HOUR PERIOD) ON SEDIMENT CONTROL BARRIERS AND ANY DAMAGE REPAIRED IMMEDIATELY.
8. EROSION AND SEDIMENT CONTROL BARRIERS SHALL ALSO BE ASSESSED (AND REPAIRED AS REQUIRED) FOLLOWING SIGNIFICANT SNOWMELT EVENTS.
9. VISUAL INSPECTIONS SHALL ALSO BE UNDERTAKEN IN ANTICIPATION OF LARGE STORM EVENTS (OR A SERIES OF RAINFALL AND/OR SNOWMELT DAYS) THAT COULD POTENTIALLY YIELD SIGNIFICANT RUNOFF VOLUMES.
10. CARE SHALL BE TAKEN TO PREVENT DAMAGE TO EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION OPERATIONS.
11. IN SOME CASES, BARRIERS MAY BE REMOVED TEMPORARILY TO ACCOMMODATE THE CONSTRUCTION OPERATIONS. THE AFFECTED BARRIERS SHALL BE REINSTATED IMMEDIATELY AFTER CONSTRUCTION OPERATIONS ARE COMPLETED.
12. SEDIMENT CONTROL DEVICES SHALL BE CLEANED OF ACCUMULATED SEDIMENTATION AS REQUIRED AND REPLACED AS NECESSARY.
13. DURING THE COURSE OF CONSTRUCTION, IF THE ENGINEER BELIEVES THAT ADDITIONAL PREVENTION METHODS ARE REQUIRED TO CONTROL EROSION AND SEDIMENTATION, THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL MEASURES, AS REQUIRED, TO THE SATISFACTION OF THE ENGINEER.
14. CONSTRUCTION AND MAINTENANCE REQUIREMENTS FOR EROSION AND SEDIMENT CONTROLS ARE TO COMPLY WITH OPSS 805.

NOTES

THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

NO.	REVISION DESCRIPTION	DATE	BY
1	ISSUED FOR SITE PLAN APPLICATION	02/12/20	SMC

SCALE
HORIZONTAL 1:750

LICENSED PROFESSIONAL ENGINEER
S. M. CZARAFTIUSKI
PROVINCE OF ONTARIO

Robinson Land Development
350 Palladium Drive
Ottawa, ON K2V 1A8
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DESIGN	BLM
CHECKED	SMC
DRAWN	BLM
CHECKED	SMC
APPROVED	SMC

MARITIME-ONTARIO FREIGHT LINES LIMITED

KANATA WEST BUSINESS PARK
8800 CAMPEAU DRIVE, OTTAWA, ON

EROSION AND SEDIMENT CONTROL PLAN

PROJECT No.	20027
SURVEY	STANTEC
DATED	DECEMBER 2020
DWG. No:	20027-ESC1

GENERAL NOTES:

1. ALL WORKS AND MATERIALS SHALL CONFORM TO THE LATEST REVISIONS OF THE STANDARDS AND SPECIFICATIONS OF THE CITY OF OTTAWA AND ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS), AS AMENDED BY THE CITY OF OTTAWA.
2. THE CONTRACTOR SHALL CONFIRM THE LOCATION OF ALL EXISTING UTILITIES WITHIN THE SITE AND ADJACENT WORK AREAS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITIES TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OR REPLACEMENT OF ANY SERVICES OR UTILITIES DISTURBED DURING CONSTRUCTION, TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION.
3. ALL DIMENSIONS AND ELEVATIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER.
4. DESIGN ELEVATIONS GIVEN ARE TO BE ADHERED TO WITH NO CHANGES WITHOUT PRIOR WRITTEN APPROVAL BY ROBINSON LAND DEVELOPMENT.
5. ANY AREAS BEYOND THE LIMIT OF THE SITE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION AT THE CONTRACTOR'S EXPENSE.
6. RELOCATION OF EXISTING SERVICES AND/OR UTILITIES SHALL BE AS SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE ENGINEER AT THE EXPENSE OF THE DEVELOPER.
7. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE "OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS". THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
8. ALL CONSTRUCTION SIGNAGE MUST CONFORM TO THE M.T.O. MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (LATEST AMENDMENT).
9. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
10. THE SUPPORT OF ALL UTILITIES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
11. THE CONTRACTOR WILL BE RESPONSIBLE FOR ADDITIONAL BEDDING OR ADDITIONAL STRENGTH PIPE IF THE MAXIMUM TRENCH WIDTH, AS SPECIFIED BY OPSD, IS EXCEEDED.
12. ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR. REVIEW WITH CONTRACT ADMINISTRATOR AND THE CITY OF OTTAWA PRIOR TO AND TREE CUTTING.
13. REFER TO GEOTECHNICAL INVESTIGATION PREPARED BY PATERSON GROUP, REPORT NO. PG5618–1, DATED NOVEMBER 24, 2020.
14. THE CONTRACTOR IS RESPONSIBLE FOR AND SHALL PROVIDE FOR DEWATERING, SUPPORT AND PROTECTION OF EXCAVATIONS AND TRENCHING AS WELL AS RELEASE OF ANY PUMPED GROUNDWATER IN A CONTROLLED AND APPROVED MANNER.
15. DO NOT CONSTRUCT USING DRAWINGS THAT ARE NOT MARKED "ISSUED FOR CONSTRUCTION".
16. CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT FOR CONSTRUCTION PURPOSES.
17. CLAY SEALS SHALL BE INSTALLED WITHIN SEWER TRENCHES IN ACCORDANCE WITH CITY STANDARD S8.

STORM SEWERS:

1. ALL REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.2 (LATEST AMENDMENT). ALL NON–REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.1 (LATEST AMENDMENT). PIPE SHALL BE JOINTED WITH STD. RUBBER GASKETS AS PER CSA A257.3 (LATEST AMENDMENT).
2. ALL STORM SEWER TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. S6 AND S7 CLASS 'B' UNLESS OTHERWISE SPECIFIED. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY PROJECT GEOTECHNICAL ENGINEER.
3. ALL PVC STORM SEWERS ARE TO BE SDR 35 APPROVED PER C.S.A. B182.2 OR LATEST AMENDMENT, UNLESS OTHERWISE SPECIFIED.
4. STORM MANHOLE FRAME AND COVERS SHALL BE AS PER CITY OF OTTAWA STD. S24.1.
5. STORM SEWER MANHOLES SERVING SEWERS LESS THAN 900mm SHALL BE CONSTRUCTED WITH A 300mm SUMP. FOR STORM SEWERS 900mm AND OVER USE BENCHING IN ACCORDANCE WITH OPSD 701.021.
6. THE STORM SEWER CLASSES HAVE BEEN DESIGNED BASED ON BEDDING CONDITIONS SPECIFIED ABOVE. WHERE THE SPECIFIED TRENCH WIDTH IS EXCEEDED, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE ADDITIONAL BEDDING, A DIFFERENT TYPE OF BEDDING OR A HIGHER PIPE STRENGTH AT HIS OWN EXPENSE AND SHALL ALSO BE RESPONSIBLE FOR EXTRA TEMPORARY AND/OR PERMANENT REPAIRS MADE NECESSARY BY THE WIDENED TRENCH.

SANITARY SEWERS:

1. ALL SANITARY SEWERS SHALL BE PVC SDR 35, IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS.
2. SANITARY SEWER TRENCH AND BEDDING SHALL BE AS PER CITY OF OTTAWA STD. S6 AND S7, CLASS 'B' BEDDING UNLESS OTHERWISE NOTED.
3. ALL SANITARY SERVICES ARE TO BE EQUIPPED WITH APPROVED BACKWATER VALVES.
4. SANITARY MANHOLE FRAME AND COVERS SHALL BE AS PER CITY OF OTTAWA STD. S24.
5. SANITARY SEWER MANHOLES SHALL BE BENCHED AS PER OPSD 701.021.
6. SANITARY PRE–CAST MANHOLE SHALL BE CONSTRUCTED WITH A HIGHER PERCENTAGE OF SILICA FUME IN THE CONCRETE TO MAKE IT MORE DENSE AND LESS SUSCEPTIBLE TO CORROSION OR PINHOLE LEAKS.
7. FOR SANITARY MANHOLES, DEPENDING ON THE ELEVATION OF THE GROUNDWATER TABLE, AND BASED ON THE RECOMMENDATION OF THE PROJECT GEOTECHNICAL CONSULTANT, CRETEX SEALS, OR A SIMILAR PRODUCT, SHALL BE INSTALLED IN THE PRE–CAST MANHOLE SECTION TO JUST BELOW THE MANHOLE FRAME TO PREVENT INFILTRATION.
8. CONTRACTOR SHALL PERFORM LEAKAGE TESTING, IN THE PRESENCE OF THE CONSULTANT, FOR SANITARY SEWERS IN ACCORDANCE WITH OPSS 410 AND OPSS 407. CONTRACTOR SHALL PERFORM VIDEO INSPECTION OF ALL STORM AND SANITARY SEWERS. A COPY OF THE VIDEO AND INSPECTION REPORT SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.
9. IN ACCORDANCE WITH CITY OF OTTAWA STANDARD S11, SANITARY SERVICE CONNECTION REQUIRES APPROVED CONTROLLED SETTLEMENT JOINT.

WATER SUPPLY:

1. ALL PVC WATERMAINS SHALL BE EQUAL TO AWWA C–900 CLASS 150, SDR 18, OR APPROVED EQUAL.
2. WATERMAIN TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD W17, UNLESS OTHERWISE SPECIFIED. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY PROJECT GEOTECHNICAL ENGINEER.
3. ALL PVC WATERMAINS SHALL BE INSTALLED WITH A 10 GAUGE STRANDED COPPER TWU OR RWU TRACER WIRE IN ACCORDANCE WITH CITY OF OTTAWA STD. W36.
4. CATHODIC PROTECTION IS REQUIRED ON ALL METALLIC FITTINGS AS PER CITY OF OTTAWA STD. W40 AND W42.
5. CONTRACTOR TO SUPPLY HYDRANT EXTENSION TO ADJUST THE LENGTH OF HYDRANT BARREL IF REQUIRED.
6. FIRE HYDRANTS SHALL BE INSTALLED AS PER CITY OF OTTAWA STD. W19, AND LOCATED AS PER CITY STD. W18.
7. VALVE IN BOXES SHALL BE INSTALLED AS PER CITY OF OTTAWA STD. W24.
8. WATERMAIN IN FILL AREAS TO BE INSTALLED WITH RESTRAINED JOINTS AS PER CITY OF OTTAWA STD. W25.5 AND W25.6.
9. THRUST BLOCKING OF WATERMAIN TO BE INSTALLED AS PER CITY OF OTTAWA STD. W25.3 AND W25.4.
10. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY CAPS, PLUGS AND BLOW–OFFS AND NOZZLES REQUIRED FOR TESTING AND DISINFECTION OF THE WATERMAIN.
11. INSULATION FOR WATERMAIN CROSSING OVER AND BELOW SEWER SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. W25.2 AND W25, RESPECTIVELY, WHERE WATERMAIN COVER IS LESS THAN 2.4m.
12. AS PER CITY GUIDELINE, THE MINIMUM VERTICAL CLEARANCE BETWEEN WATERMAIN AND SEWER / UTILITY IS 0.25m FOR CROSSING OVER THE SEWER, AS PER CITY STD. W25.2. FOR CROSSING UNDER SEWER, ADEQUATE STRUCTURAL SUPPORT FOR THE SEWERS IS REQUIRED TO PREVENT EXCESSIVE DEFLECTION OF JOINTS AND SETTLING. THE LENGTH OF WATER PIPE SHALL BE CENTERED AT THE POINT OF CROSSING SO THAT THE JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER AS PER CITY STD. W25.
13. CONNECTION TO EXISTING WATERMAIN TO BE PERFORMED BY CITY FORCES. CONTRACTOR TO PROVIDE LABOUR, EQUIPMENT AND MATERIAL REQUIRED FOR EXCAVATION, BEDDING AND REINSTATEMENT.
14. SWABBING, DISINFECTION, AND HYDROSTATIC TESTING TO BE CONDUCTED AS PER CITY OF OTTAWA STANDARDS IN THE PRESENCE OF A CITY INSPECTOR AND/OR CONSULTANT.

ROADWORK SPECIFICATIONS:

1. CONCRETE CURB SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. SC1.1 (BARRIER CURB). PROVISION SHALL BE MADE FOR CURB DEPRESSIONS AT SIDEWALKS AND DRIVEWAYS.
2. ALL BARRIER CURB TO BE 150mm ABOVE FINISHED ASPHALT GRADE UNLESS OTHERWISE NOTED.
3. CONCRETE SIDEWALK SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. SC3 AND SC1.4.
4. PAVEMENT REINSTATEMENT FOR SERVICE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. R10 AND OPSD 509.010, OPSS 310.
5. GRANULAR "A" SHALL BE PLACED TO A MINIMUM THICKNESS OF 300mm AROUND ALL STRUCTURES WITHIN PAVEMENT AREA.
6. ALL GRANULAR FOR ROADS SHALL BE COMPACTED TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY.
7. ASPHALT WEAR COURSE SHALL NOT BE PLACED UNTIL THE VIDEO INSPECTION OF SEWERS & NECESSARY REPAIRS HAVE BEEN CARRIED OUT TO THE SATISFACTION OF THE ENGINEER.
8. SUB–EXCAVATE SOFT AREAS AND FILL WITH GRANULAR 'B' COMPACTED IN MAXIMUM 300mm LIFTS.
9. PEDESTRIAN CURB RAMP WITH BOULEVARD SHALL BE ACCORDANCE WITH CITY OF OTTAWA STD. SC7.
10. ALL EDGES OF DISTURBED PAVEMENT SHALL BE SAW–CUT TO FORM A NEAT AND STRAIGHT LINE PRIOR TO PLACING NEW ASPHALT.
11. PAVEMENT DESIGN AS PER GEOTECHNICAL RECOMMENDATIONS:

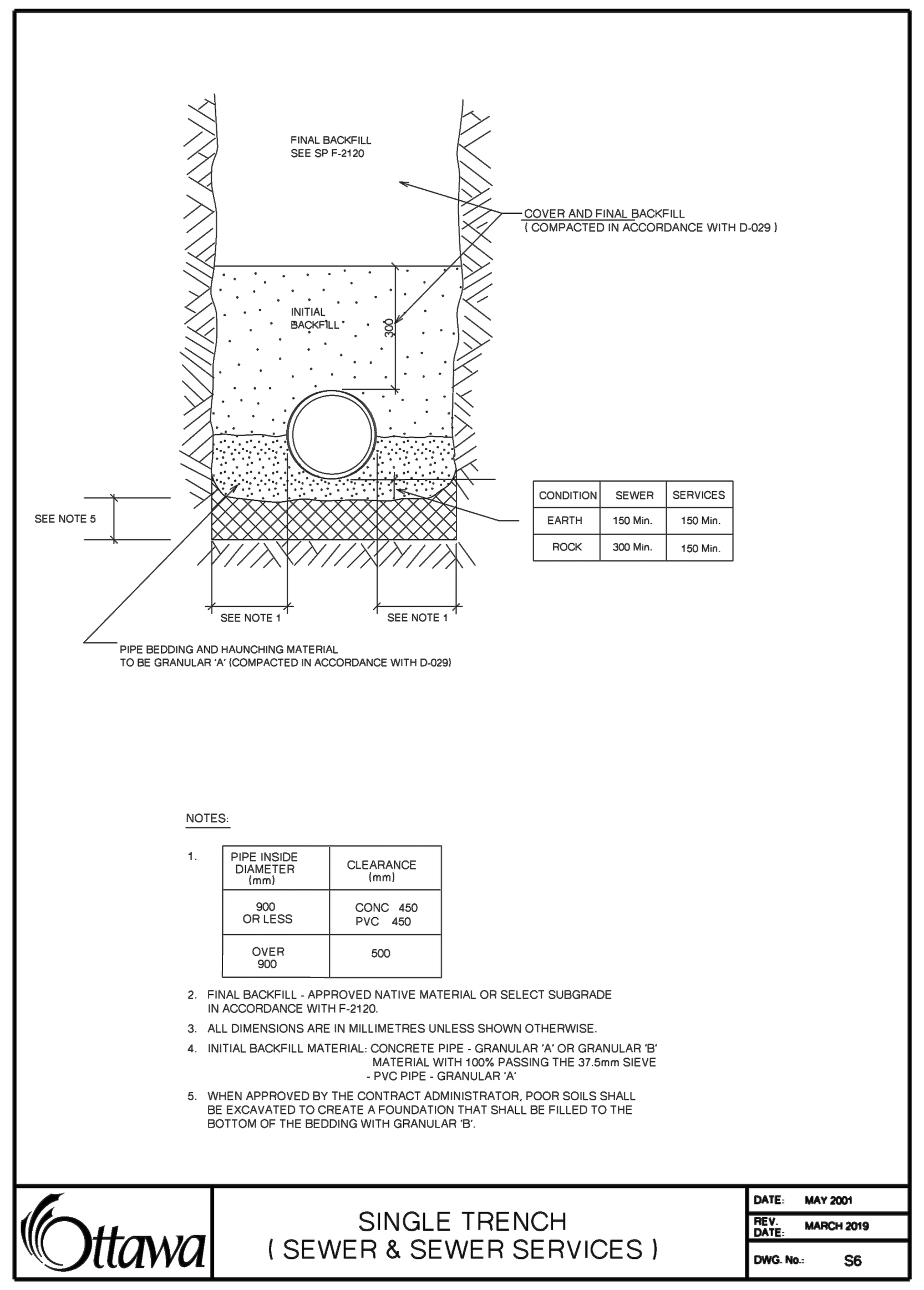
LIGHT DUTY (CAR ONLY PARKING AREAS)

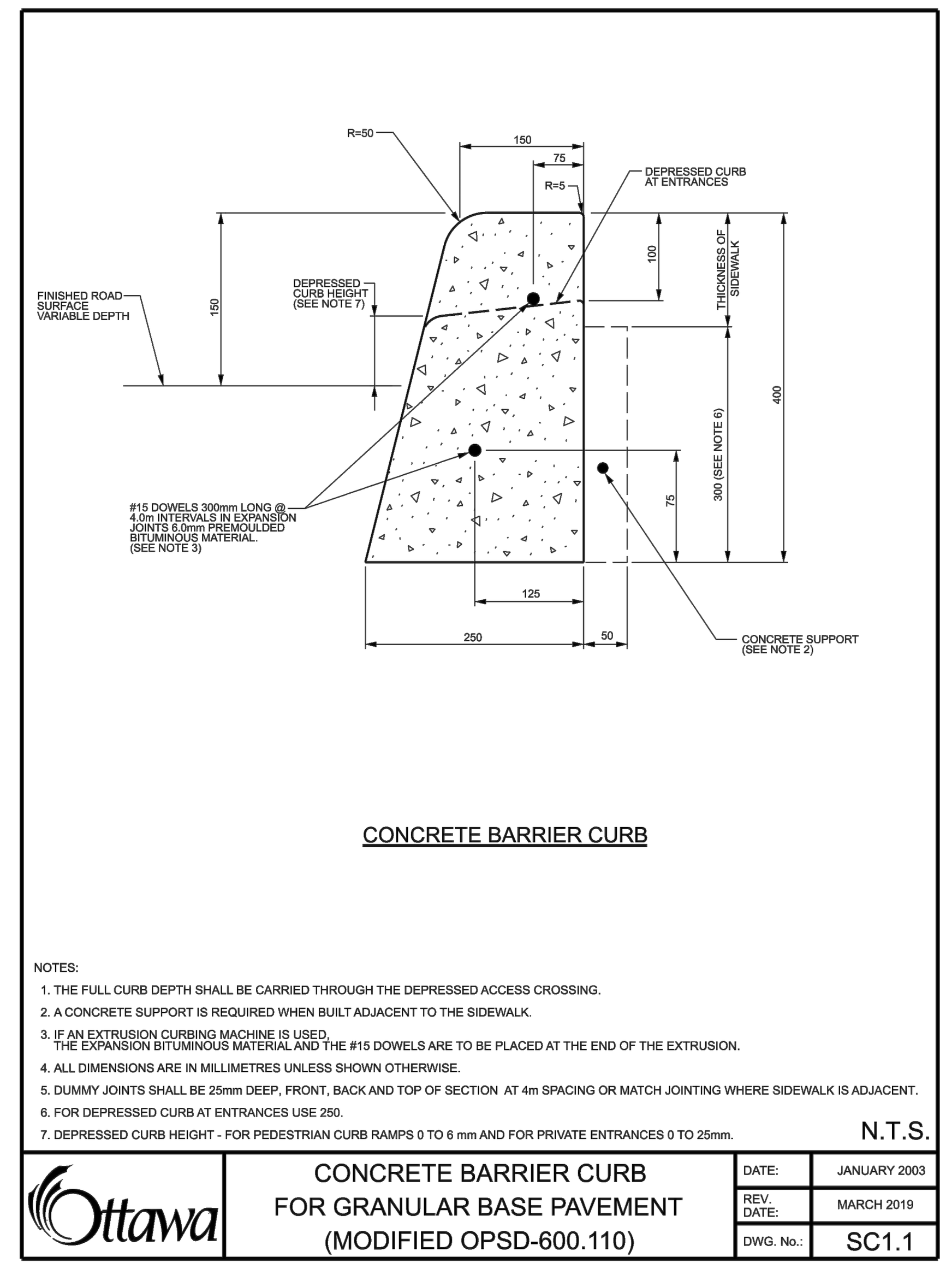
- 50mm WEAR COURSE – HL–3 OR SUPERPAVE 12.5 ASPHALTIC CONCRETE
- 150mm BASE – GRANULAR "A" CRUSHED STONE
- 300mm SUBBASE – GRANULAR "B" TYPE II
- SUBGRADE – EITHER FILL, IN SITU SOIL OR OPSS GRANULAR "B" TYPE I OR II MATERIAL PLACED OVER IN SITU SOIL OR FILL

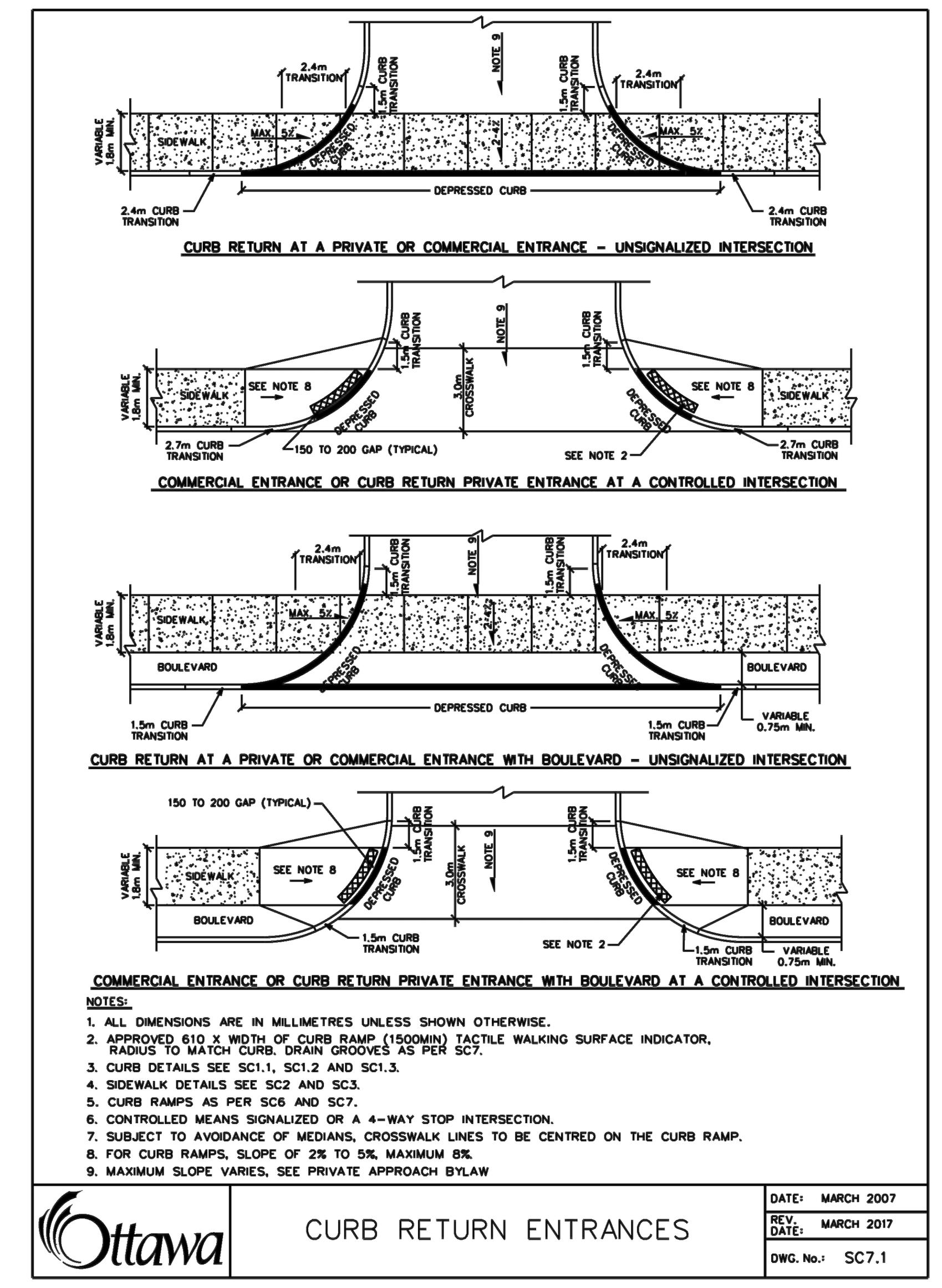
HEAVY DUTY (ACCESS LANES AND HEAVY TRUCK PARKING AREAS)

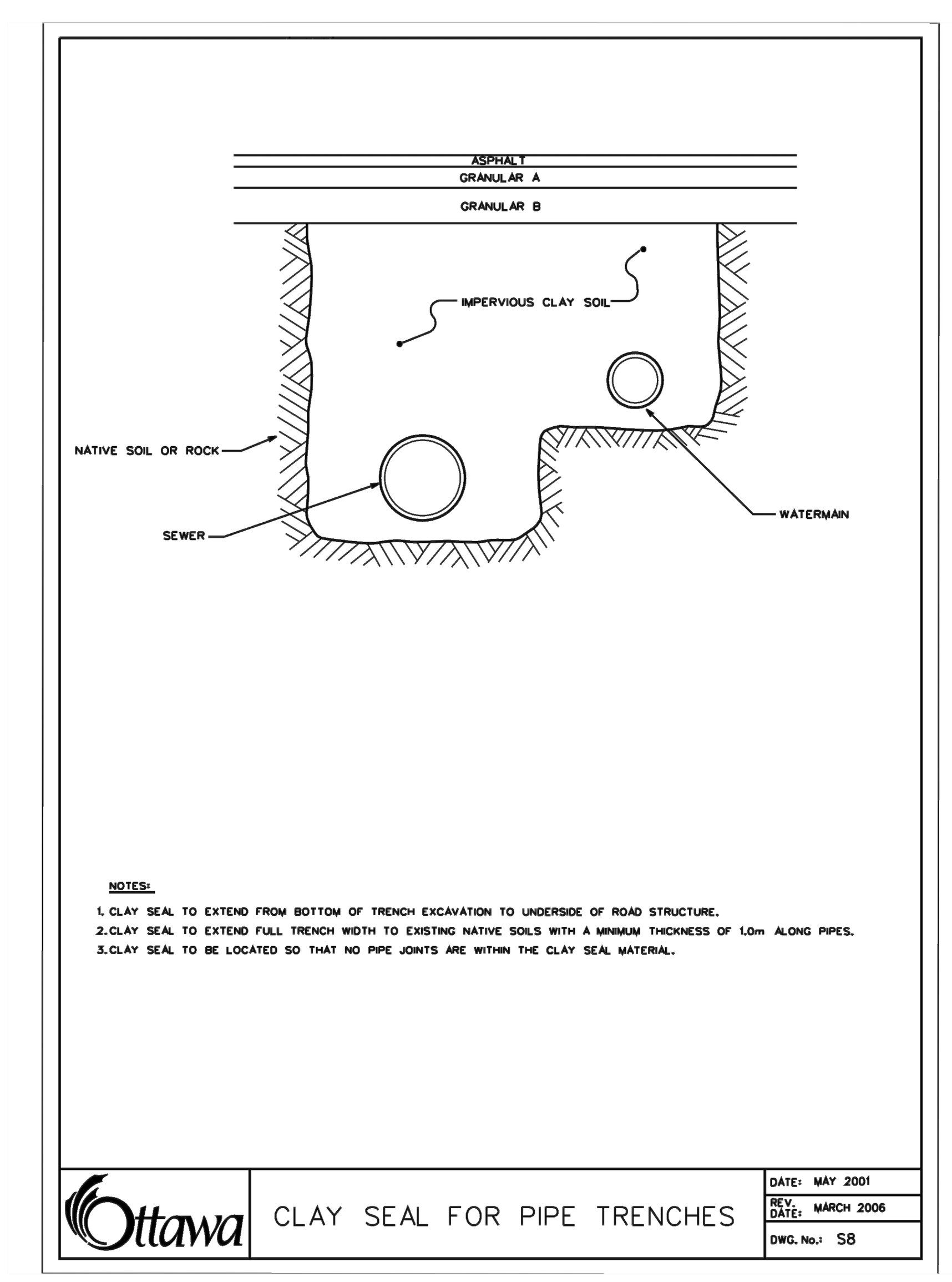
- 40mm WEAR COURSE – SUPERPAVE 12.5 ASPHALTIC CONCRETE
- 50mm BINDER COURSE – SUPERPAVE 19.0 ASPHALTIC CONCRETE
- 150mm BASE – GRANULAR "A" CRUSHED STONE
- 450mm SUBBASE – GRANULAR "B" TYPE II
- SUBGRADE – EITHER FILL, IN SITU SOIL OR OPSS GRANULAR "B" TYPE I OR II MATERIAL PLACED OVER IN SITU SOIL OR FILL

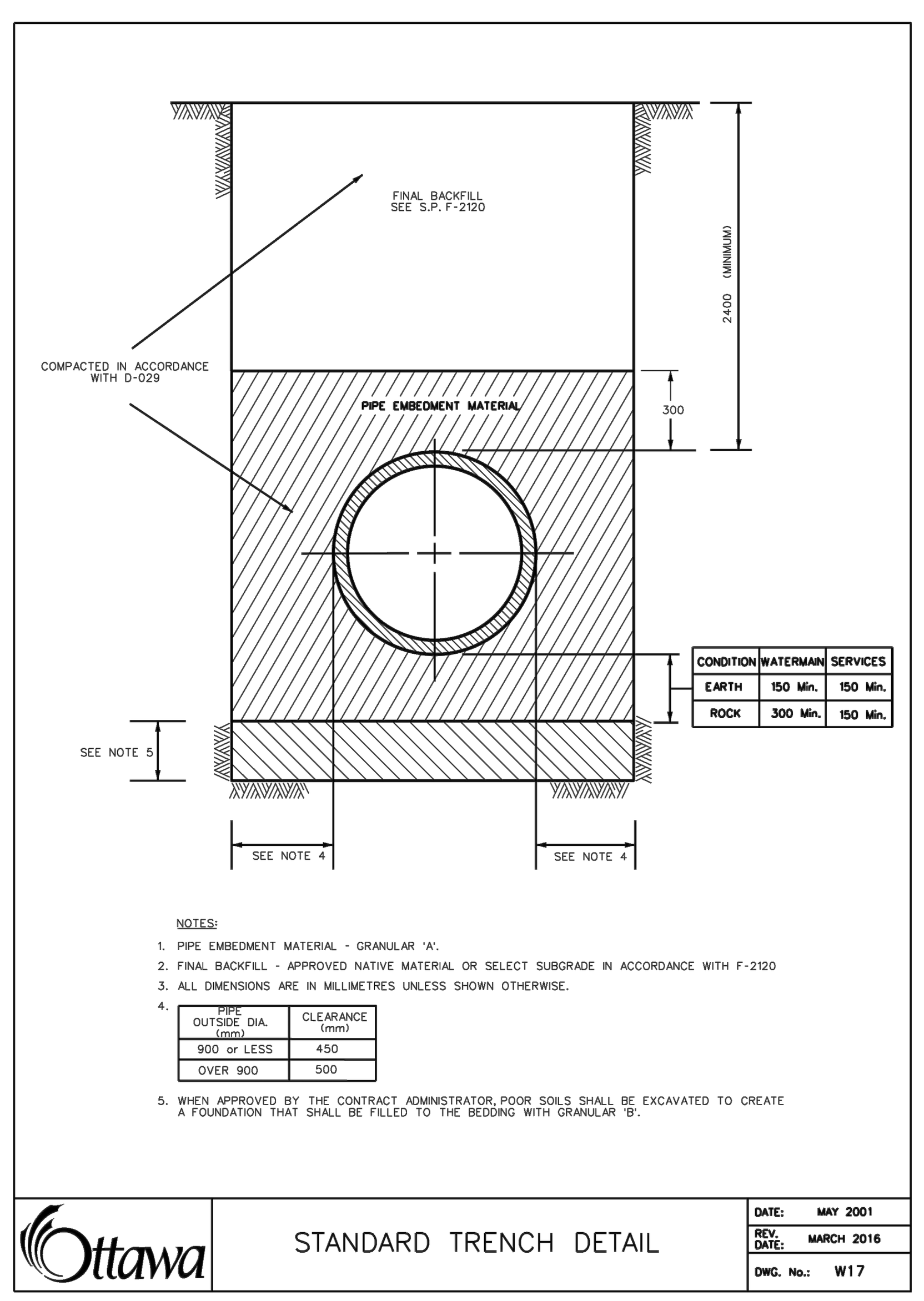
NOT FOR CONSTRUCTION

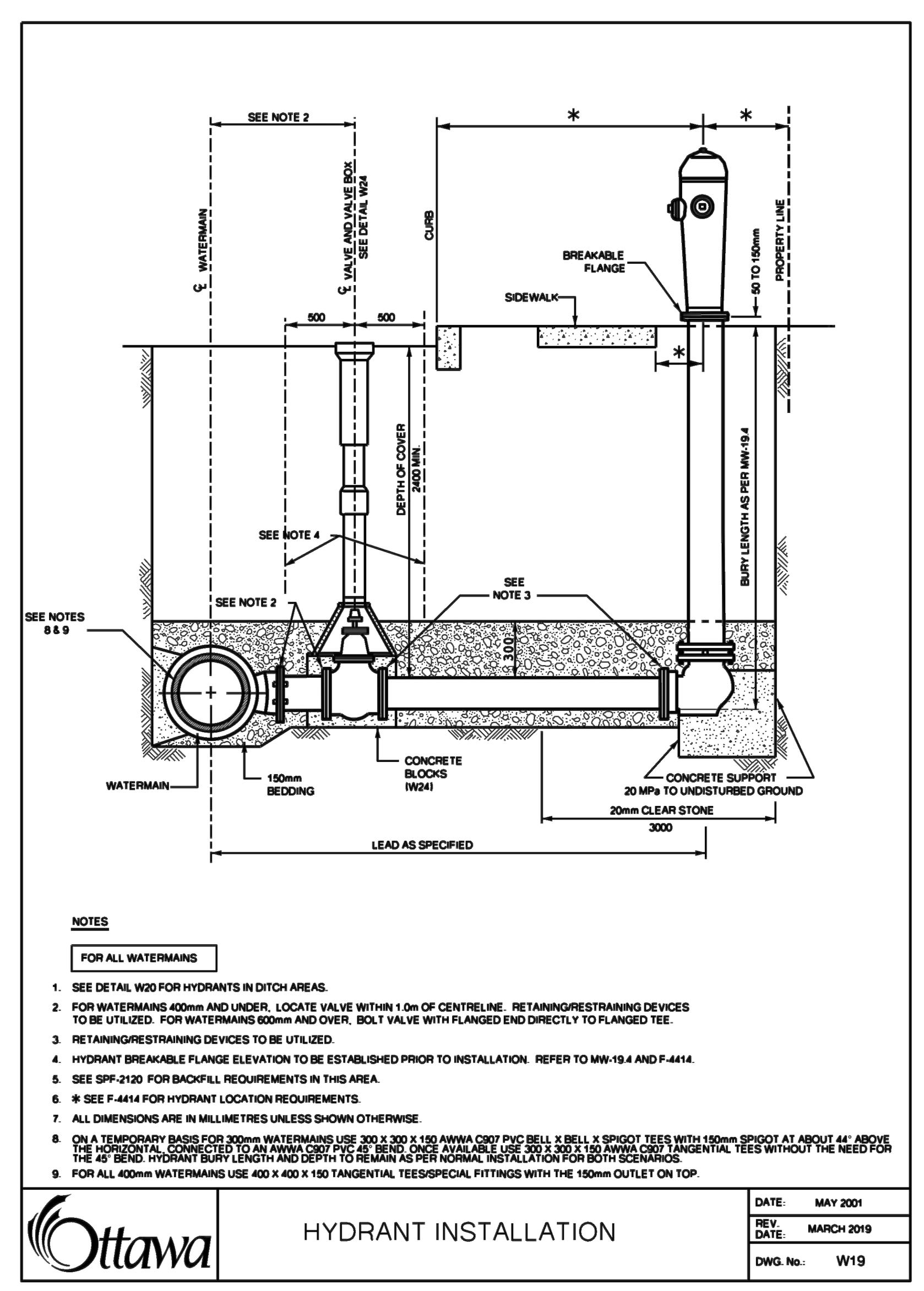


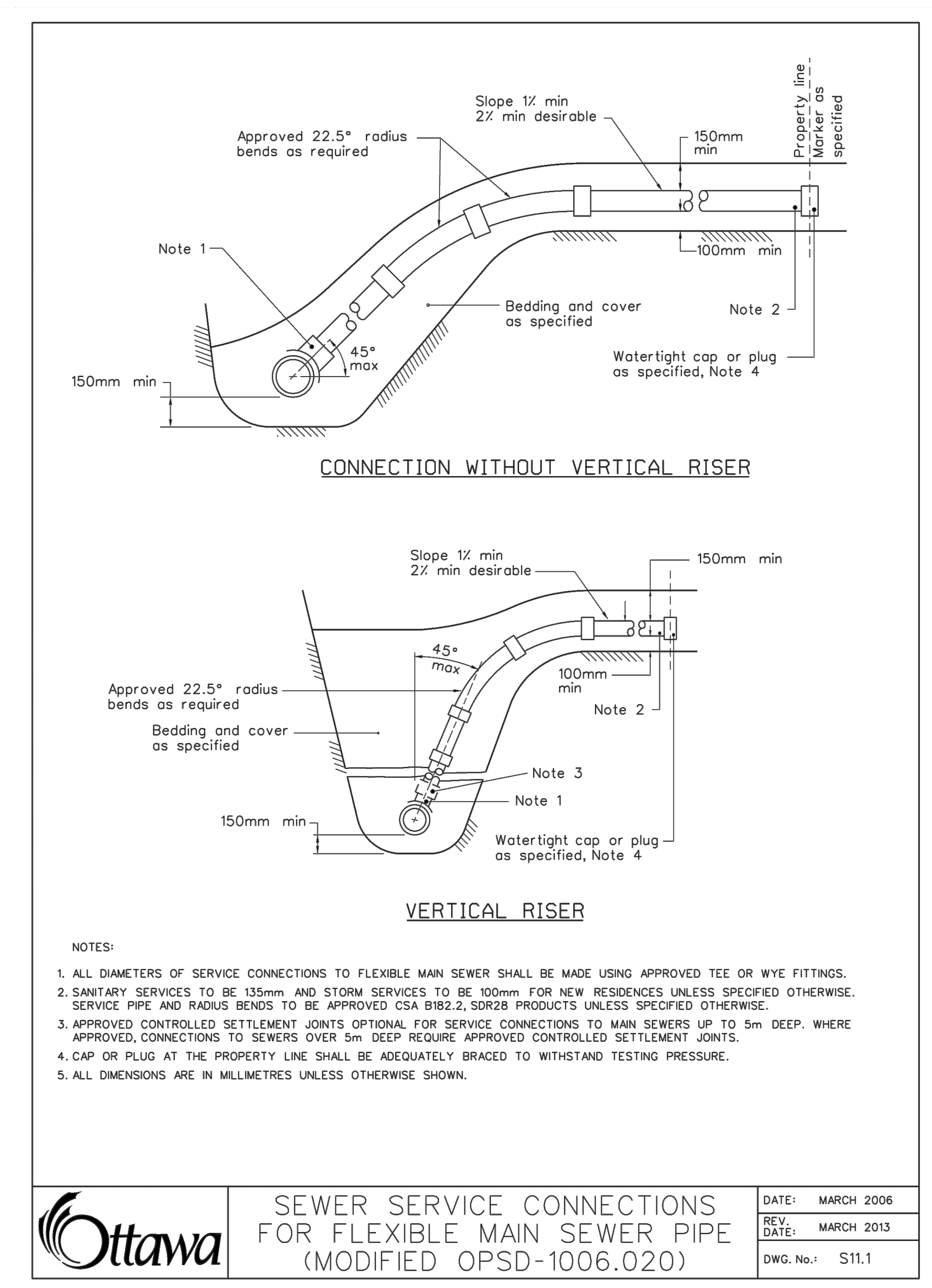


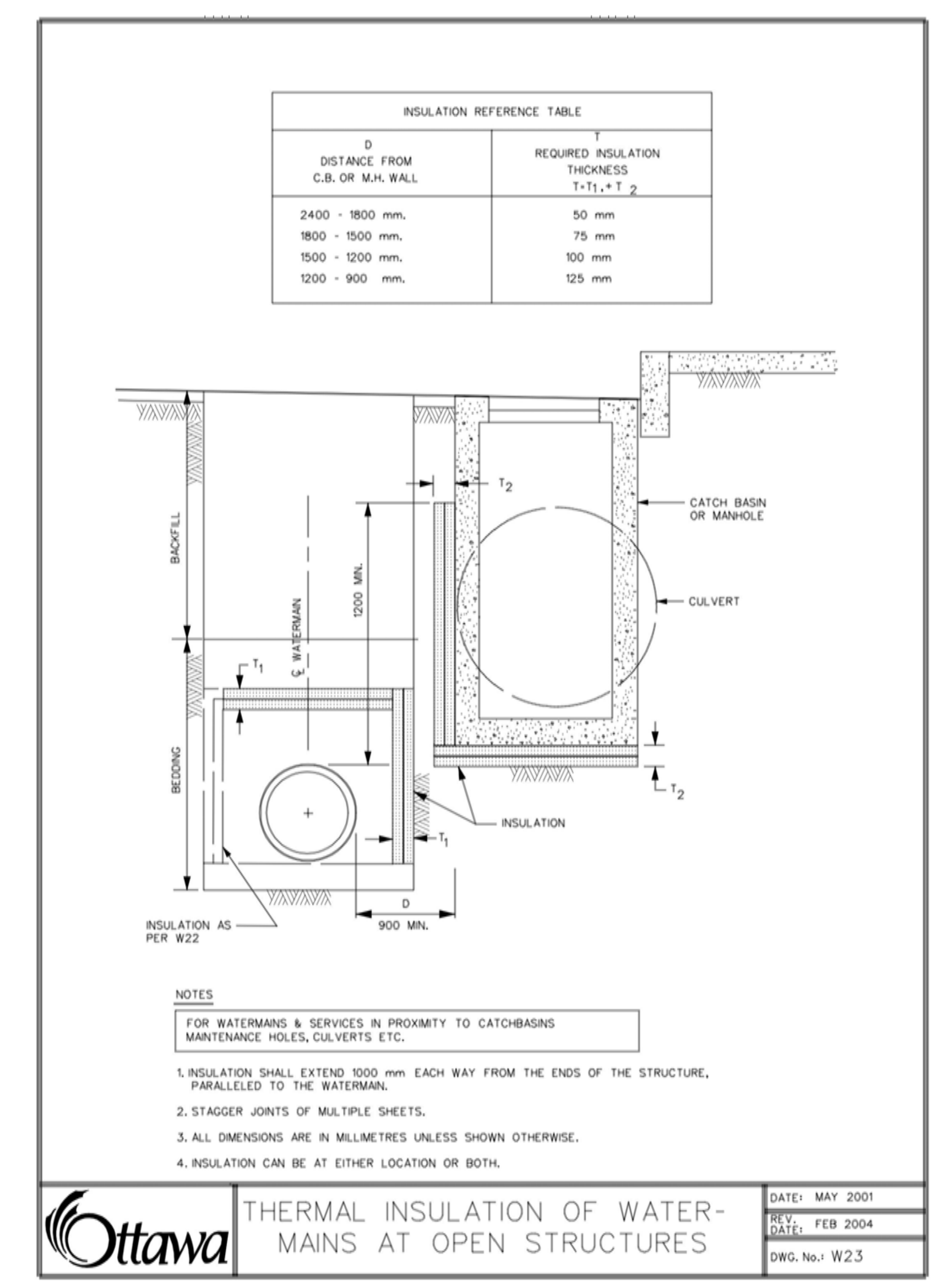












NOTES

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NO.	REVISION DESCRIPTION	DATE	BY
1	ISSUED FOR SITE PLAN APPLICATION	02/12/20	SMC

SCALE

Robinson Land Development
350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

DESIGN	BLM
CHECKED	SMC
DRAWN	BLM
CHECKED	SMC
APPROVED	SMC

MARITIME-ONTARIO FREIGHT LINES LIMITED

KANATA WEST BUSINESS PARK
8800 CAMPEAU DRIVE, OTTAWA, ON

NOTES & DETAILS

PROJECT No.	20027
SURVEY	STANTEC
DATED	DECEMBER 2020
DWG. No:	20027-N1

Appendix C

KWBP Figure 4 – Water Distribution Plan (prepared by IBI Group)

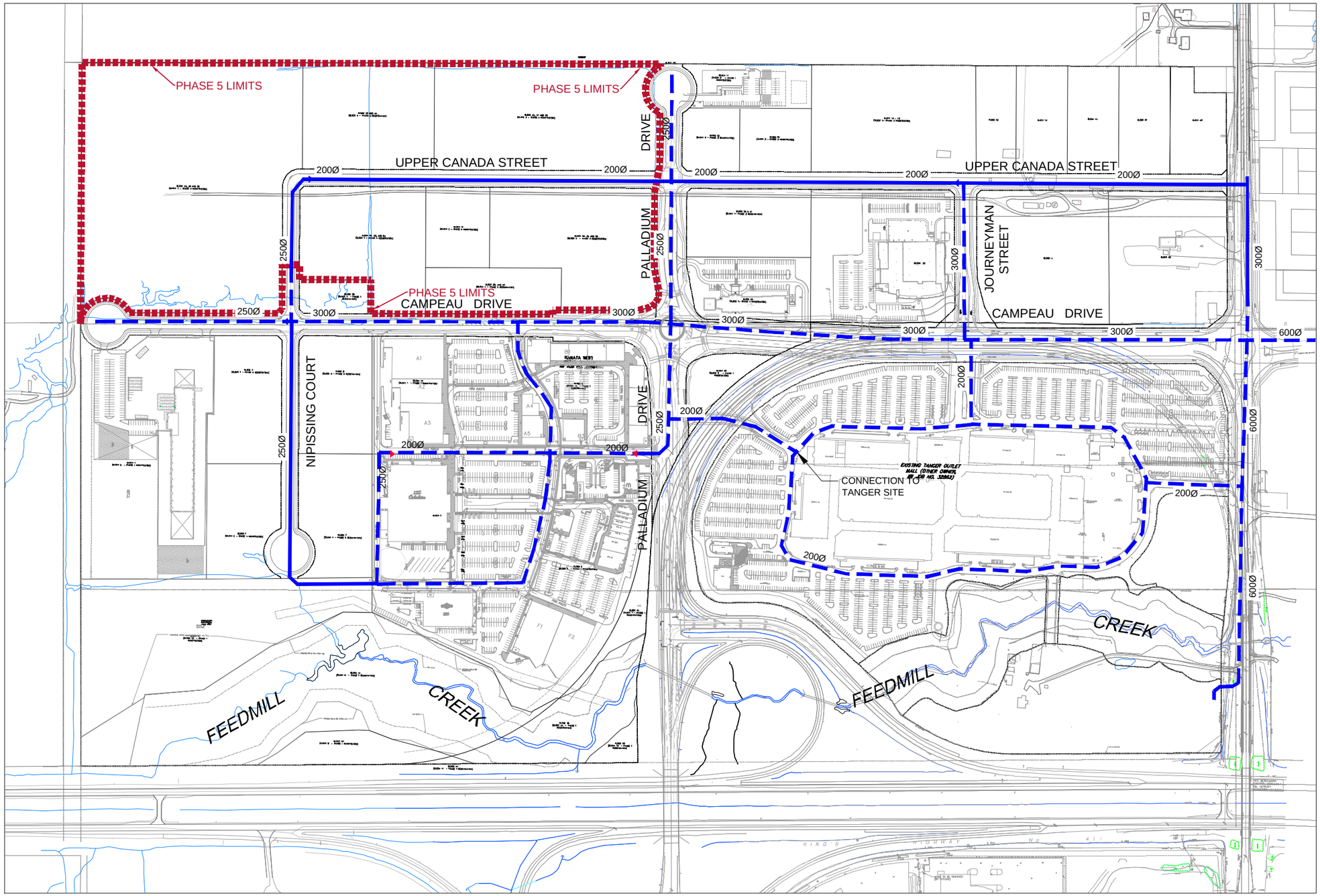
Boundary Conditions

Boundary Condition Model

FUS Long Form

Water Model Outputs

Watermain Design Sheet



LEGEND

- 300Ø — EXISTING WATERMAIN AND DIAMETER
- 300Ø — PROPOSED WATERMAIN AND DIAMETER
- 300Ø — FUTURE WATERMAIN AND DIAMETER

J:\14289_TerraceLands\5.9 Drawings\59civil\current\Phase 5 Figures\14289-Figures-2019-09-11.dwg Sheet Set: ####

Plot Style: AIA STANDARD COLOR-HALF.CTB Plot Scale: 0.039:1 Plotted At: Sep. 11, 19 8:26 AM Printed By: DON SIURNA Last Saved By: DSIURNA Last Saved At: Sep. 11, 19

Scale	Project Title	Drawing Title	Sheet No.
IBI N.T.S.	KANATA WEST BUSINESS PARK	PROPOSED WATER DISTRIBUTION PLAN	FIGURE 4

Boundary Conditions
8800 Campeau Drive

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	161	2.69
Maximum Daily Demand	242	4.03
Peak Hour	436	7.26
Fire Flow Demand #1	9,000	150.00

Location

Results

Connection 1 – Campeau Dr.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	161.4	80.2
Peak Hour	156.3	72.9
Max Day plus Fire 1	122.6	25.1

[1] Ground Elevation = 104.98 m

Connection 2 – Upper Canada St.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	161.4	80.2
Peak Hour	156.3	72.9
Max Day plus Fire 1	136.0	44.1

[1] Ground Elevation = 104.99 m

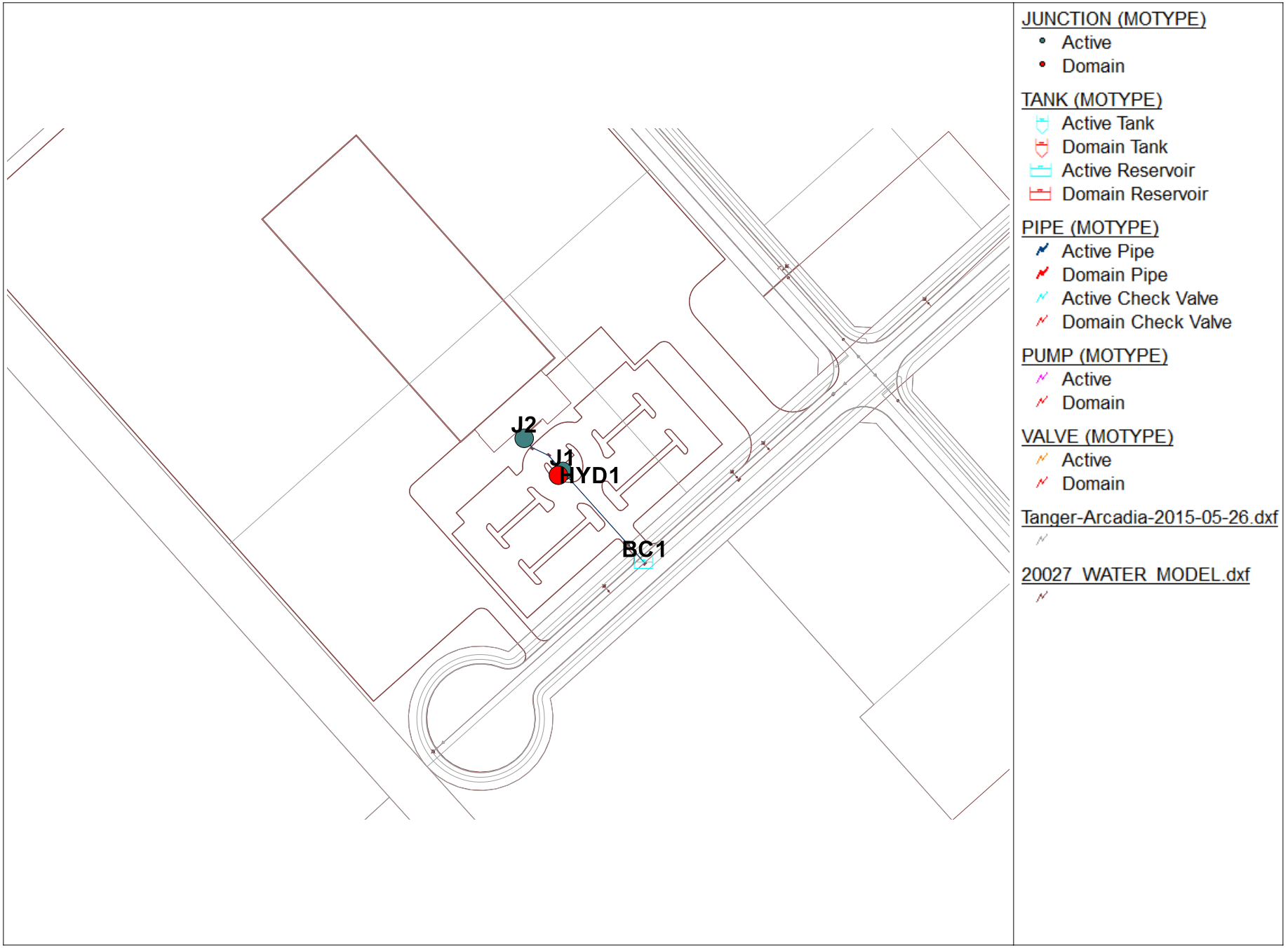
Notes

1. A second connection to the watermain is required since the basic day demand is above 50m^3/d.
2. 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.

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.

MARATIME



Prepared By:

Date: 26/11/2020 10:01:10 AM

FUS Fire Flow Calculations

Calculations Based on 1999 Publication "Water Supply for Public Fire Protection" by Fire Underwriters' Survey (FUS)

Robinson Consultants

Project #: 20027
Project Name: Maritime Ontario - Kanata West
Date: 27-Oct-20 Building Type/Description/Name: Commercial Warehouse

Table A: Fire Underwriters Survey Determination of Required Fire Flow - Long Method

Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)
		Framing Material						
1	**Choose Frame Used for Construction of Unit**	Coefficient related to type of construction (C)	Wood Frame	1.5	Fire resistive construction (> 2 hrs)	0.6	m	
			Ordinary Construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (< 2 hrs)	0.7				
			Fire resistive construction (> 2 hrs)	0.6				
		Floor Space Area						
2	**Choose Type of Housing (if TH, Enter Number of Units per TH Block)**	Type of Housing	Single Family	1	Other (comm, ind, etc.)	1	Units	
			Townhouse - indicate # of units	1				
			Other (comm, ind, etc.)	1				
2.2	**# of Storeys**	Number of Floors/Storeys in the Unit (do not include basement):			2	2	Storeys	
2.3	**Length-height factor**	Length	North Side	52.7	Length-Height factor	105.4	m.Storeys	
			East Side	124.0	Length-Height factor	248	m.Storeys	
			South Side	52.7	Length-Height factor	105.4	m.Storeys	
			West Side	124.0	Length-Height factor	248	m.Storeys	
3	**Enter Ground Floor Area of One Unit**	Enter Ground Floor Area (A) of One Unit Only:			6132	6132	Area in Square Metres (m^2)	
		Measurement Units	Square Feet (ft^2)	0.09290304	Square Metres (m2)			
			Square Metres (m^2)	1				
			Hectares (ha)	10,000				
4	**Obtain Required Fire Flow Without Reductions**	Required Fire Flow (without reductions or increases per FUS) (F=220*C*√A), round to nearest 1000 L/min						**10000**
5	**Apply Factors Affecting Burning**	**Reductions/Increases Due to Factors Affecting Burning**						
5.1	**Choose Combustibility of Building Contents**	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Combustible	0	N/A	**10000**
			Limited Combustible	-0.15				
			Combustible	0				
			Free burning	0.15				
			Rapid Burning	0.25				
5.2	**Choose Reduction Due to Presence of Sprinklers**	Sprinkler reduction	Complete Automatic Sprinkler Protection	-0.5	Complete Automatic Sprinkler Protection	-0.5	N/A	**-5000**
			None	0				
5.3	**Choose Separation Distance Between Units**	Exposure Distance Between Units	North Side	50	5%	0.2	N/A	**2000**
			East Side	50	5%			
			South Side	50	5%			
			West Side	50	5%			
6	**Obtain Required Fire Flow, Duration & Volume**				***Total Required Fire Flow, rounded to nearest 1000 L/min:***			**7000**
					Total Required Fire Flow (above) in L/s:			**116.666667**
					Required Duration of Fire Flow (hrs)			**2**
					Required Volume of Fire Flow (m^3)			**840**

Note: The most current FUS document should be referenced before design to ensure that the above figures are consistent with the intent of the Guidelines

Legend	
	Drop down menu - choose option, or enter value
	No information, No input required

		ID	Demand (Lpm)	Elevation (m)	Head (m)	Pressure (psi)
1		HYD1	0.00	107.78	161.40	76.22
2		J1	0.00	107.20	161.40	77.04
3		J2	161.40	108.10	161.39	75.76

	ID	Demand (Lpm)	Elevation (m)	Head (m)	Pressure (psi)
1	HYD1	0.00	107.78	156.28	68.94
2	J1	0.00	107.20	156.28	69.77
3	J2	435.60	108.10	156.27	68.47

		ID	Total Demand (Lpm)	Critical Fire Node ID	Adjusted Fire-Flow (Lpm)	Available Flow at Hydrant (Lpm)
1		HYD1	6,959.95	HYD1	11,556.07	11,556.43

		ID	Design Flow (Lpm)
1		HYD1	11,556.07

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness
1		P1	BC1	J1	51.01	203.00	110.00
2		P2	J1	HYD1	2.39	152.00	100.00
3		P3	J1	J2	21.49	203.00	110.00

WATERMAIN DESIGN SHEET

Maritime Ontario - Kanata West

Project No. 20027

TABLE

Junction Node Number	RESIDENTIAL POPULATION ACTUAL COUNT				NON-RES		AVG. DAILY DEMAND (l/s)				MAX. DAILY DEMAND (l/s)				MAX. HOURLY DEMAND (l/s)			
	Low Density	Medium Density	High Density	Total Population	COMM. (HA)	INST. (HA)	RES.	IND.	INST.	TOTAL	RES.	IND.	INST.	TOTAL	RES.	IND.	INST.	TOTAL
J1					6.64			2.69		2.69		4.03		4.03		7.26		7.26
Total					6.64			2.69		2.69		4.03		4.03		7.26		7.26

Residential Densities

Low Density (SFH's) =	3.4	cap/unit
Medium Density (Townhouses) =	2.7	cap/unit
High Density (Apartments) =	1.8	cap/unit

Avg. Daily Demand:			Max. Daily Demand:		Max. Hourly Demand:	
Residential =	350	L/cap/day	2.5	x Avg. Day	2.2	x Max. Day
Commercial =	60000	L/ha/day	1.5	x Avg. Day	1.8	x Max. Day
Institutional =	15000	L/ha/day	1.5	x Avg. Day	1.8	x Max. Day
Industrial Light =	35000	L/ha/day	1.5	x Avg. Day	1.8	x Max. Day

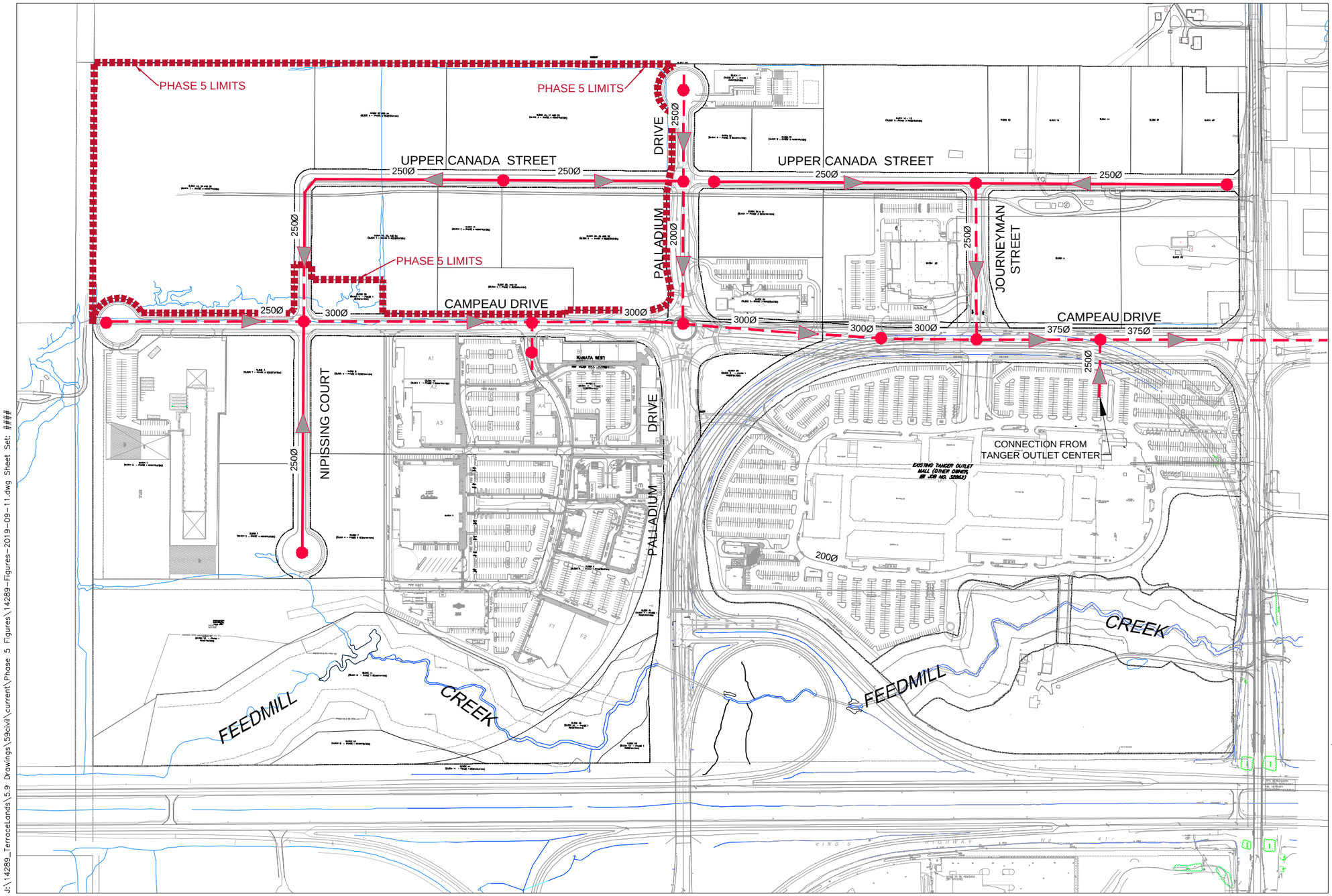
Appendix D

KWBP Figure 5 – Wastewater Plan
(prepared by IBI Group)

KWBP Sanitary Drainage Area Plan
(prepared by IBI Group)

KWBP Sanitary Sewer Design Sheet
(prepared by IBI Group)

Sanitary Sewer Design Sheet



N

LEGEND

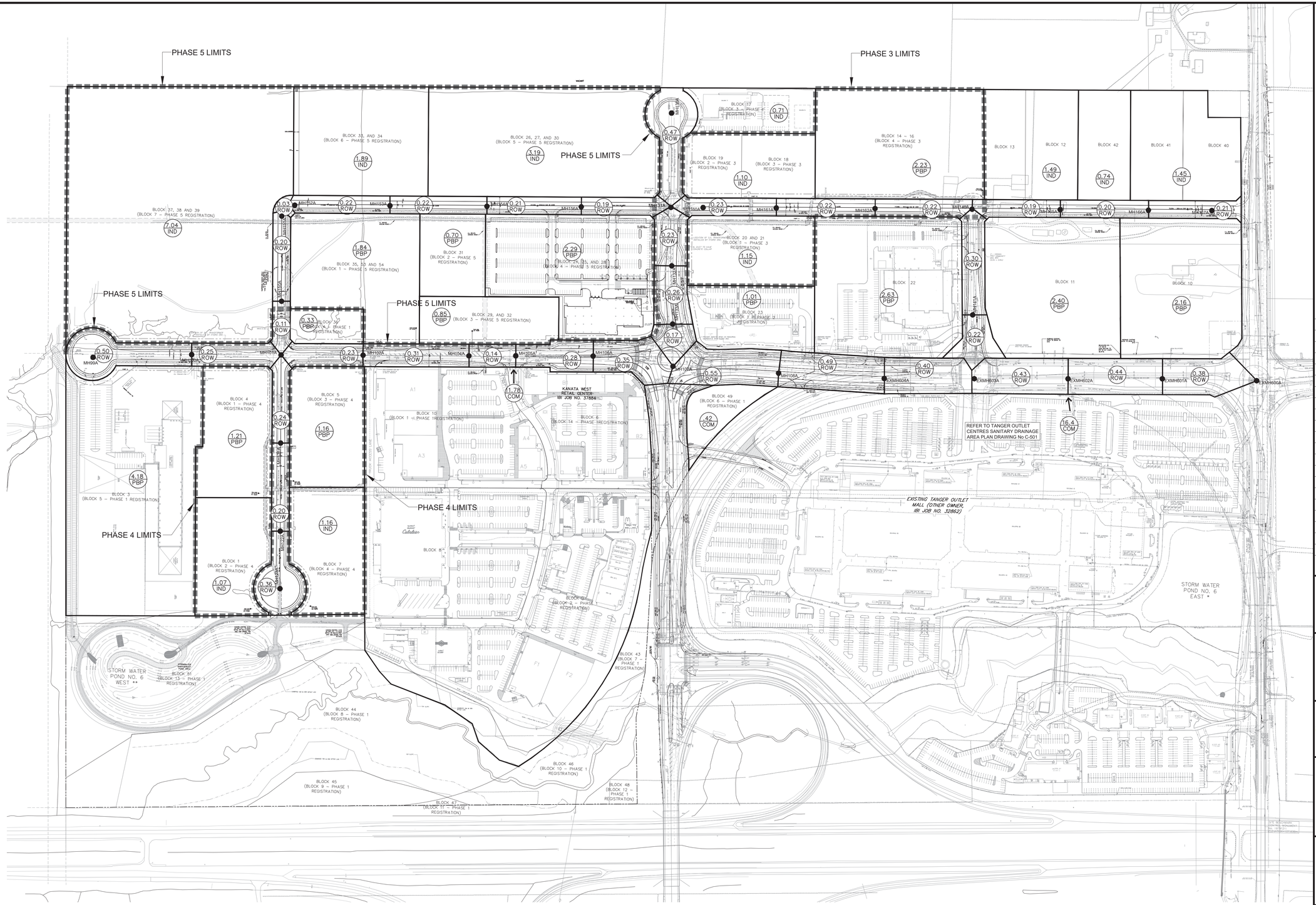
300Ø — EXISTING WASTE WATER AND DIAMETER

300Ø — PROPOSED WASTE WATER AND DIAMETER

J:\14289_TerraceLands\5.9 Drawings\59civil\current\Phase 5 Figures\14289-Figures-2019-09-11.dwg Sheet Set: ####

Plot Style: AIA STANDARD COLOR-HALF.CTB Plot Scale: 0.039:1 Plotted At: Sep. 11, 19 8:27 AM Printed By: DON SIURNA Last Saved By: DSIURNA Last Saved At: Sep. 11, 19

Scale	Project Title	Drawing Title	Sheet No.
IBI N.T.S.	KANATA WEST BUSINESS PARK	PROPOSED WASTEWATER PLAN	FIGURE 5



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. ENGLISH
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\3.5D1 SANITARY DRAINAGE AREA PLAN.dwg Layout Name: 5D1 SANITARY DRAINAGE AREA PLAN Plot Style: AIA STANDARD.ctb(LITE) Plot Scale: 1:1(1:1) Plotted At: 10/24/2019 2:25 PM Last Saved By: dsouza Last Saved At: 10/24/2019 2:25 PM

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*																												

Design Parameters:

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

Notes:

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

Designed: LME

Checked:

Dwg. Reference: 14289-501

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

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

SANITARY SEWER DESIGN SHEET
for
MARITIME-ONTARIO
8800 CAMPEAU DRIVE, KWBP

LOCATION			AREA (ha)		INDUSTRIAL FLOW				PIPE						
STREET	FROM MH	TO MH	INDIVIDUAL	CUMM.	PEAK FACTOR	PEAK IND. FLOW (L/s)	EXTRAN. FLOW (L/s)	PEAK DESIGN FLOW (L/s)	LENGTH (m)	DIAMETER (mm)	SLOPE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	EXCESS CAPACITY (L/s)	PERCENT FULL
TO CAMPEAU DRIVE SANITARY SEWER															
PARKING LOT	BLDG	101	7.04	7.04	4.50	10.27	2.32	12.59	13.0	201.16	1.00	33.34	1.05	20.75	37.76
PARKING LOT	101	100	0.00	7.04	4.50	10.27	2.32	12.59	49.0	201.16	0.35	19.73	0.62	7.14	63.83
PARKING LOT	100	MAIN	0.00	7.04	4.50	10.27	2.32	12.59	17.4	201.16	0.36	20.01	0.63	7.42	62.93
CAMPEAU DRIVE	*EX99A*	*EX100A*	*4.18*	*11.22*		*12.30*	*3.86*	*16.17*	*113.0*	*250.00*	*0.65*	*47.99*	*0.98*	*31.82*	*33.69*
CAMPEAU DRIVE	*EX100A*	*EX101A*	*0.00*	*11.22*		*12.30*	*3.95*	*16.25*	*101.3*	*250.00*	*0.97*	*58.63*	*1.19*	*42.38*	*27.72*

DESIGN PARAMETERS

Average Daily Flow =		L/person/day
Comm./Inst. Flow =		L/s/ha
Light Industrial Flow =	28000	L/ha/d
Maximum Residential Peak Factor =	4.0	
Harmon - Correction Factor (K) =	0.8	
Peaking Factor =	4.5	(MOE Chart - City of Ottawa Appendix 4-B.1)
Extraneous Flow =	0.33	L/s/ha
Minimum Full Flow Velocity =	0.60	m/s
Maximum Full Flow Velocity =	3.0	m/s
Manning's Coefficient (n) =	0.013	

Notes:
1. Sanitary sewer design parameters in accordance IBI Report for KWBP - Phase 5
2. Refer to drawing Campeau Drive from STA 19+780 to STA 20+110, Drawing No. 101, prepared by IBI Group.
3. Refer to KWBP sanitary sewer design sheet, prepared by IBI Group.

Appendix E

KWBP Storm Sewer Design Sheet (prepared by IBI Group)

KWBP Figure 8 – Proposed Storm Sewer Plan (prepared by IBI Group)

KWBP Storm Drainage Area Plan (prepared by IBI Group)

KWBP Table 4.2 – Drainage Area Parameters (prepared by IBI Group)

KWBP SWMHYMO Schematic (prepared by IBI Group)

KWBP Table 4.10 – Summary of Hydraulic Grade Line (prepared by IBI Group)

Aquafor Beech Report Excerpts

Percolation and Borehole Information

KWBP Figure 2 – Post-Development SWM Drainage Boundaries Overall Site (prepared by IBI Group)

IBI GROUP

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

STORM SEWER DESIGN SHEET

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

LOCATION				AREA (Ha)											RATIONAL DESIGN FLOW												SEWER DATA								
STREET	AREA ID	FROM MH	TO MH	C= 0.20	C= 0.57	C= 0.57	C= 0.61	C= 0.68	C= 0.68	C= 0.70	C= 0.85	C= 0.85	C= 0.90	C= 0.90	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (Syr) (L/s)	(%)
KANATA WEST BUSINESS PARK - Block numbers based on overall concept plan of subdivision																																		
Journeyman St.		*MH140*	*MH141*												*0.00*	*19.28*	*16.32*			*79.51*	*93.10*	*135.92*	*1,533.17*												
						0.13				*0.32*					*0.83*	*2.96*	*16.32*	*0.95*	*17.27*	*79.51*	*93.10*	*135.92*			*402.03*		*1,935.2*	*2,784.1*	*107.00*	*1350*			*0.25*	*1.884*	*848.9*	*30.5%*
		MH141	*MH141B*												*0.00*	*19.28*	*17.27*			*76.88*	*90.00*	*131.37*	*1,482.33*												
										0.13					*0.25*	*3.21*	*17.27*	*0.54*	*17.81*	*76.88*	*90.00*	*131.37*			*421.81*		*1,904.1*	*2,156.5*	*47.35*	*1350*			*0.15*	*1.460*	*252.4*	*11.7%*
Journeyman St.		*Stub*	*MH 603*												*0.00*	*19.28*	*17.81*			*75.46*	*88.33*	*128.92*	*1,454.94*												
															0.00	*3.21*	*17.81*	*0.33*	*18.14*	*75.46*	*88.33*	*128.92*			*413.95*		*1,868.9*	*1,363.9*	*18.02*	*1350*			*0.06*	*0.923*	*-505.0*	*-37.0%*
Campeau Drive		*603*	*602*												*0.00*	*47.54*	*19.70*			*70.93*	*83.00*	*121.11*	*3,372.06*												
												0.26			*0.61*	*15.30*	*19.70*	*0.71*	*20.41*	*70.93*	*83.00*	*121.11*			*1,853.06*		*5,225.1*	*3,971.3*	*92.77*	*1500*			*0.29*	*2.177*	*-1253.8*	*-31.6%*
		602	*601*												*0.00*	*47.54*	*20.41*			*69.37*	*81.18*	*118.44*	*3,298.20*												
												0.32			*0.76*	*16.06*	*20.41*	*0.53*	*20.94*	*69.37*	*81.18*	*118.44*			*1,901.67*		*5,199.9*	*4,362.8*	*76.05*	*1500*			*0.35*	*2.392*	*-837.0*	*-19.2%*
Tanger	*Blocks 10, 11*	*601*	*9*								*4.56*				*10.78*	*58.32*	*20.94*			*68.26*	*79.87*	*116.52*	*3,980.92*												
												0.78			*1.84*	*17.90*	*20.94*	*0.87*	*21.80*	*68.26*	*79.87*	*116.52*			*2,085.72*		*6,066.6*	*5,730.3*	*96.86*	*1950*			*0.15*	*1.859*	*-336.4*	*-5.9%*
Tanger		*9*	*12*										*3.24*		*8.11*	*66.43*	*21.80*			*66.52*	*77.83*	*113.53*	*4,418.87*												
															0.00	*17.90*	*21.80*	*0.81*	*22.62*	*66.52*	*77.83*	*113.53*			*2,032.17*	*18.00*	*6,469.0*	*5,749.5*	*90.76*	*1950*			*0.15*	*1.865*	*-719.6*	*-12.5%*
Tanger		*12*	*13*										*1.81*		*4.53*	*70.95*	*22.62*			*64.99*	*76.03*	*110.89*	*4,611.14*												
															0.00	*17.90*	*22.62*	*0.22*	*22.83*	*64.99*	*76.03*	*110.89*			*1,984.84*	*18.00*	*6,614.0*	*5,749.5*	*24.54*	*1950*			*0.15*	*1.865*	*-864.5*	*-15.0%*
Tanger		*13*	*Pond 6E*										*4.11*		*10.28*	*81.24*	*22.83*			*64.59*	*75.56*	*110.20*	*5,246.78*												
														0.84	*2.10*	*20.00*	*22.83*	*0.08*	*22.92*	*64.59*	*75.56*	*110.20*			*2,204.06*	*153.00*	*7,603.8*	*7,005.7*	*9.99*	*2100*			*0.15*	*1.959*	*-598.1*	*-8.5%*
KANATA WEST BUSINESS PARK																																			
Upper Canada St.	Block31,33,34	**MH154**	**MH153**								**2.59**				**6.12**	**6.12**	**12.70**			**91.81**	**107.56**	**157.14**	**561.88**					**641.6**	**905.5**	**120.00**	**975**			**0.15**	**1.175**	**263.92**	**29.15%**
						0.32									**0.51**	**0.51**	**12.70**	**1.70**	**14.40**	**91.81**	**107.56**	**157.14**			**79.68**											
Upper Canada St.	**Blocks 35, 53, 54**	**MH153**	**MH152B**								**1.82**				**4.30**	**10.42**	**14.40**			**85.54**	**100.18**	**146.32**	**891.39**												
						0.16									**0.25**	**0.76**	**14.40**	**1.10**	**15.51**	**85.54**	**100.18**	**146.32**			**111.29**		**1002.7**	**1,103.3**	**81.80**	**1050**			**0.15**	**1.234**	**100.65**	**9.12%**
	External Drainage	**DI200**	**MH152B**	14.53											**8.08**	**8.08**	**30.00**	**2.48**	**32.48**	**53.93**	**63.05**	**91.87**	**435.66**					**435.7**	**473.6**	**127.45**	**825**			**0.10**	**0.858**	**37.89**	**8.00%**
Upper Canada St.		**MH152B**	**MH152**												**0.00**	**18.50**	**14.40**			**85.54**	**100.18**	**146.32**	**1,582.43**												
															0.00	**0.76**	**14.40**	**1.07**	**15.47**	**85.54**	**100.18**	**146.32**			**111.29**		**1693.7**	**2,332.0**	**81.80**	**1500**			**0.10**	**1.278**	**638.30**	**27.37%**
	Blocks 39	**MH152**	**MH151**												**0.00**	**18.50**	**15.47**			**82.07**	**96.11**	**140.33**	**1,518.31**												
															0.00	**0.76**	**15.47**	**0.18**	**15.65**	**82.07**	**96.11**	**140.33**			**106.74**		**1625.0**	**2,332.0**	**13.91**	**1500**			**0.10**	**1.278**	**706.98**	**30.32%**
		MH151	**MH150**												**0.00**	**18.50**	**15.65**			**81.51**	**95.45**	**139.37**	**1,507.97**												
						0.17									**0.27**	**1.03**	**15.65**	**1.35**	**17.00**	**81.51**	**95.45**	**139.37**			**143.55**		**1651.5**	**2,332.0**	**103.40**	**1500**			**0.10**	**1.278**	**680.50**	**29.18%**
		MH150	**MH120**												**0.00**	**18.50**	**17.00**			**77.61**	**90.86**	**132.64**	**1,435.79**												
						0.20									**0.32**	**1.35**	**17.00**	**0.89**	**17.89**	**77.61**	**90.86**	**132.64**			**178.65**		**1614.4**	**3,006.9**	**72.86**	**1650**			**0.10**	**1.362**	**1392.42**	**46.31%**
Campeau Drive	*Block 3*	*MH99*	*MH100*								*4.18*				*9.88*	*9.88*	*11.70*			*96.00*	*112.49*	*164.38*	*948.19*												
									0.36						*0.68*	*0.68*	*11.70*	*1.13*	*12.83*	*96.00*	*112.49*	*164.38*			*111.87*		*1060.1*	*1,560.3*	*118.50*	*1050*			*0.30*	*1.746*	*500.29*	*32.06%*
		MH100	*MH101*												*0.00*	*9.88*	*12.83*			*91.29*	*106.95*	*156.24*	*901.68*												
							0.27								*0.46*	*1.14*	*12.83*	*0.76*	*13.59*	*91.29*	*106.95*	*156.24*			*177.87*		*1079.6*	*2,073.9*	*80.84*	*1200*			*0.26*	*1.776*	*994.37*	*47.95%*
	Block 37, 38, 39	*MH101*	*MH120*								*7.03*				*16.61*	*26.49*	*15.50*			*81.98*	*95.99*	*140.17*	*2,171.48*												
															0.00	*1.14*	*15.50*	*0.14*	*15.64*	*81.98*	*95.99*	*140.17*			*159.57*		*2331.0*	*2,961.0*	*20.89*	*1200*			*0.53*	*2.536*	*630.00*	*21.28%*
Campeau Drive	*Block 32, 29*	*MH104*	*MH103*								*0.85*				*2.01*	*2.01*	*11.25*			*98.02*	*114.88*	*167.89*	*196.89*												
							0.66								*1.12*	*1.12*	*11.25*	*2.33*	*13.58*	*98.02*	*114.88*	*167.89*			*187.90*		*384.8*	*473.6*	*120.00*	*825*			*0.10*	*0.858*	*88.76*	*18.74%*
	Block 36	*MH103*	*MH102*								*0.33*				*0.78*	*2.79*	*13.58*			*88.44*	*103.60*	*151.33*	*246.61*												
															0.00	*1.12*	*13.58*	*1.52*	*15.10*	*88.44*	*103.60*	*151.33*			*169.37*		*416.0*	*597.2*	*82.99*	*900*			*0.10*	*0.909*	*181.24*	*30.35%*
		MH102	*MH120*												*0.00*	*2.79*	*15.10*			*83.23*	*97.47*	*142.33*	*232.08*												
															0.00	*1.12*	*15.10*	*0.37*	*15.47*	*83.23*	*97.47*	*142.33*			*159.30*		*391.4*	*597.2*	*20.01*	*900*			*0.10*	*0.909*	*205.85*	*34.47%*
Nipissing Court	*Blocks 4, 5*	*MH120*	*MH121*								*2.37*				*5.60*	*53.38*	*17.89*			*75.25*	*88.09*	*128.57*	*4,016.75*												
						0.26									*0.41*	*4.02*	*17.89*	*0.74*	*18.63*	*75.25*	*88.09*	*128.57*			*516.40*		*4533.2*	*6,120.8*	*88.44*	*1950*			*0.17*	*1.985*	*1587.62*	*25.94%*
		MH121	*MH122*		*0.21*										*0.33*	*53.71*	*18.63*			*73.40*	*85.92*	*125.38*	*3,942.57*												
															0.00	*4.02*	*18.63*	*0.73*	*19.36*	*73.40*	*85.92*	*125.38*			*503.61*		*4446.2*	*7,119.4*	*100.84*	*1950*			*0.23*	*2.309*	*2673.27*	*37.55%*
	Blocks 1, 7	*MH122*	*MH123*						*0.35*		*2.23*				*5.93*	*59.64*	*19.36*			*71.69*	*83.90*	*122.43*	*4,275.61*												
															0.00	*4.02*	*19.36*	*0.77*	*20.13*	*71.69*	*83.90*	*122.43*			*491.73*		*4767.3*	*6,638.9*	*99.19*	*1950*			*0.20*	*2.154*	*1871.57*	*28.19%*
Future	*Blocks 8, 9*	*MH (215)*	*MH123*								*11.78*				*27.84*	*27.84*	*20.70*	*0.24*	*20.94*	*68.75*	*80.45*	*117.37*	*1,913.77*					*1,913.8*	*3,006.9*	*20.00*	*1650*			*0.10*	*1.362*	*1093.09*	*36.35%*
West Pond Outlet		*MH123*	*Outlet*												*0.00*	*87.48*	*20.13*			*69.97*	*81.88*	*119.47*	*6,121.06*												
															0.00	*4.02*	*20.13*	*0.87*	*21.00*	*69.97*	*81.88*	*119.47*			*479.86*		*6600.9*	*10,648.2*	*119.64*	*2400*			*0.17*	*2.280*	*4047.31*	*38.01%*
Future	*Blocks X,X*	*MH XX*	*MHXX*	*Grey = Constructed*																															

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

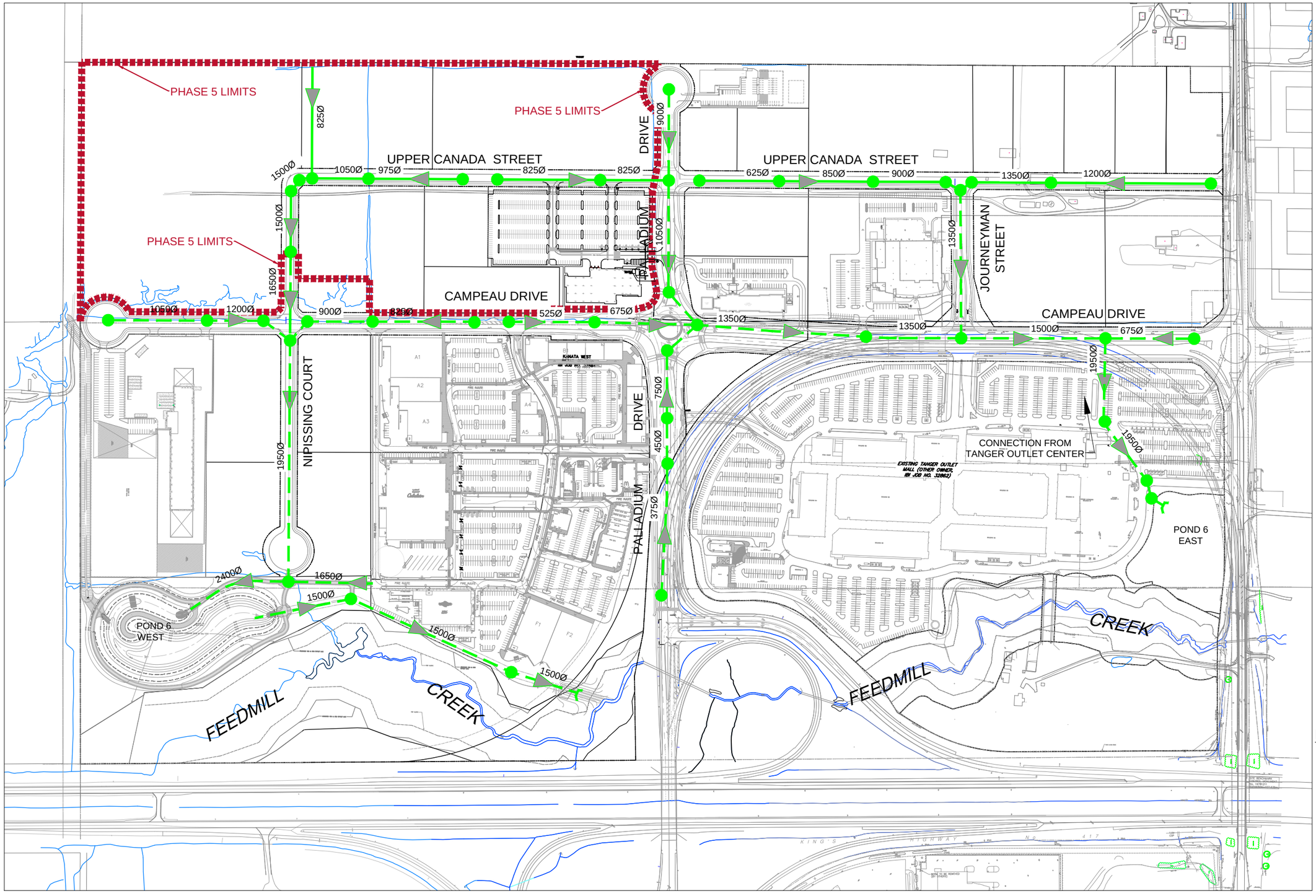
Notes:
1. Mannings coefficient (n) = 0.013

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

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

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

File Reference: 14289.5.7.1 | **Date:** 2019-11-06 | **Sheet No:** 2 of 2



LEGEND

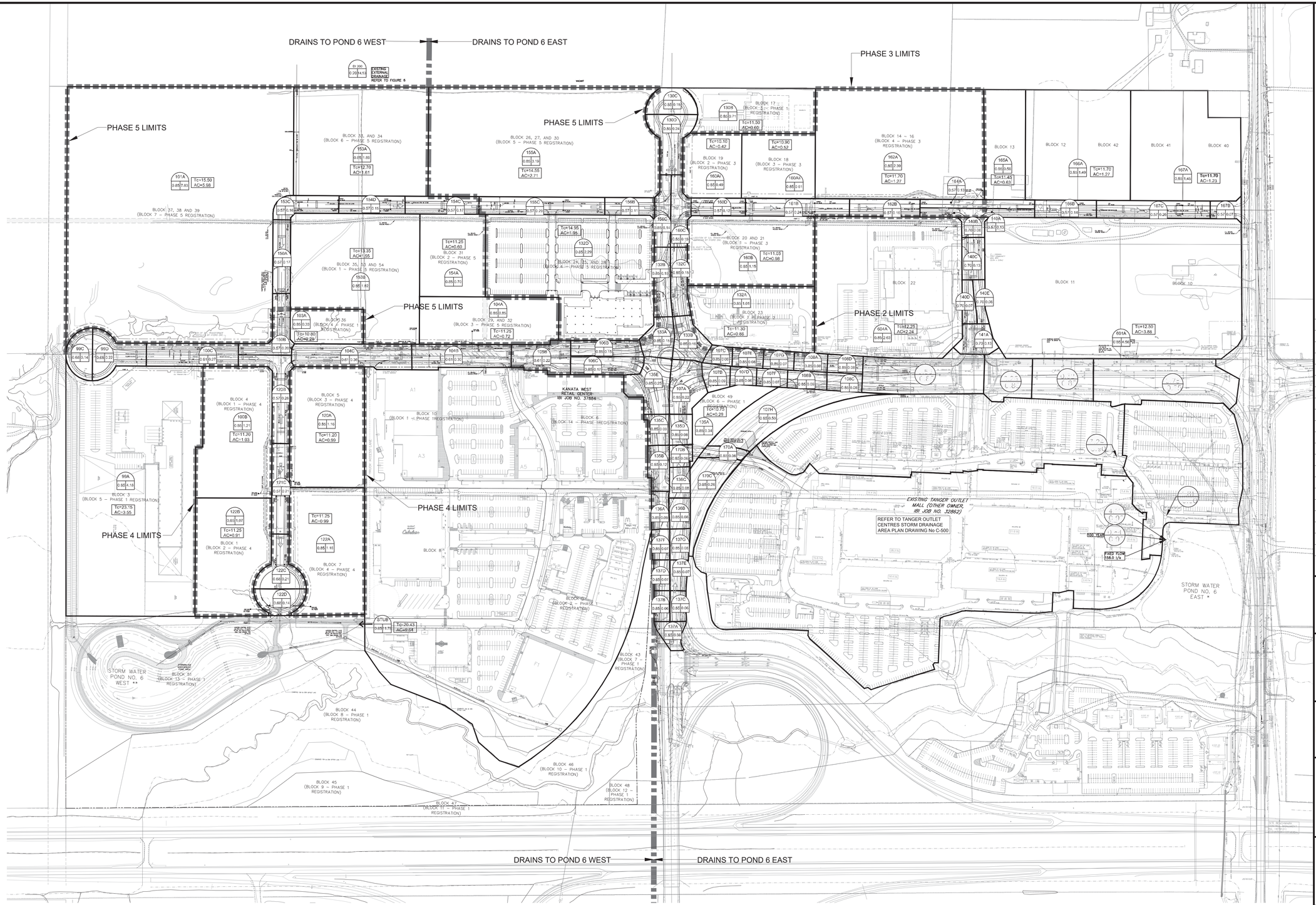
300Ø EXISTING STORM SEWER AND DIAMETER

300Ø PROPOSED STORM SEWER AND DIAMETER

J:\14289_TerraceLands\5.9 Drawings\59civil\current\Phase 5 Figures\14289-Fig8-2019-09-11.dwg Sheet Set: ####

Plot Style: AIA STANDARD COLOR-HALF.CTB Plot Scale: 0.042:1 Plotted At: Oct. 17, 19 1:41 PM Printed By: DON SIURNA Last Saved By: DSIURNA Last Saved At: Oct. 17, 19

Scale	Project Title	Drawing Title	Sheet No.
IBI N.T.S.	KANATA WEST BUSINESS PARK	PROPOSED STORM SEWER PLAN	FIGURE 8



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. ENGLISH — 100162508 — PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO — 2019/09/10

Drawing Title

STORM DRAINAGE AREA PLAN

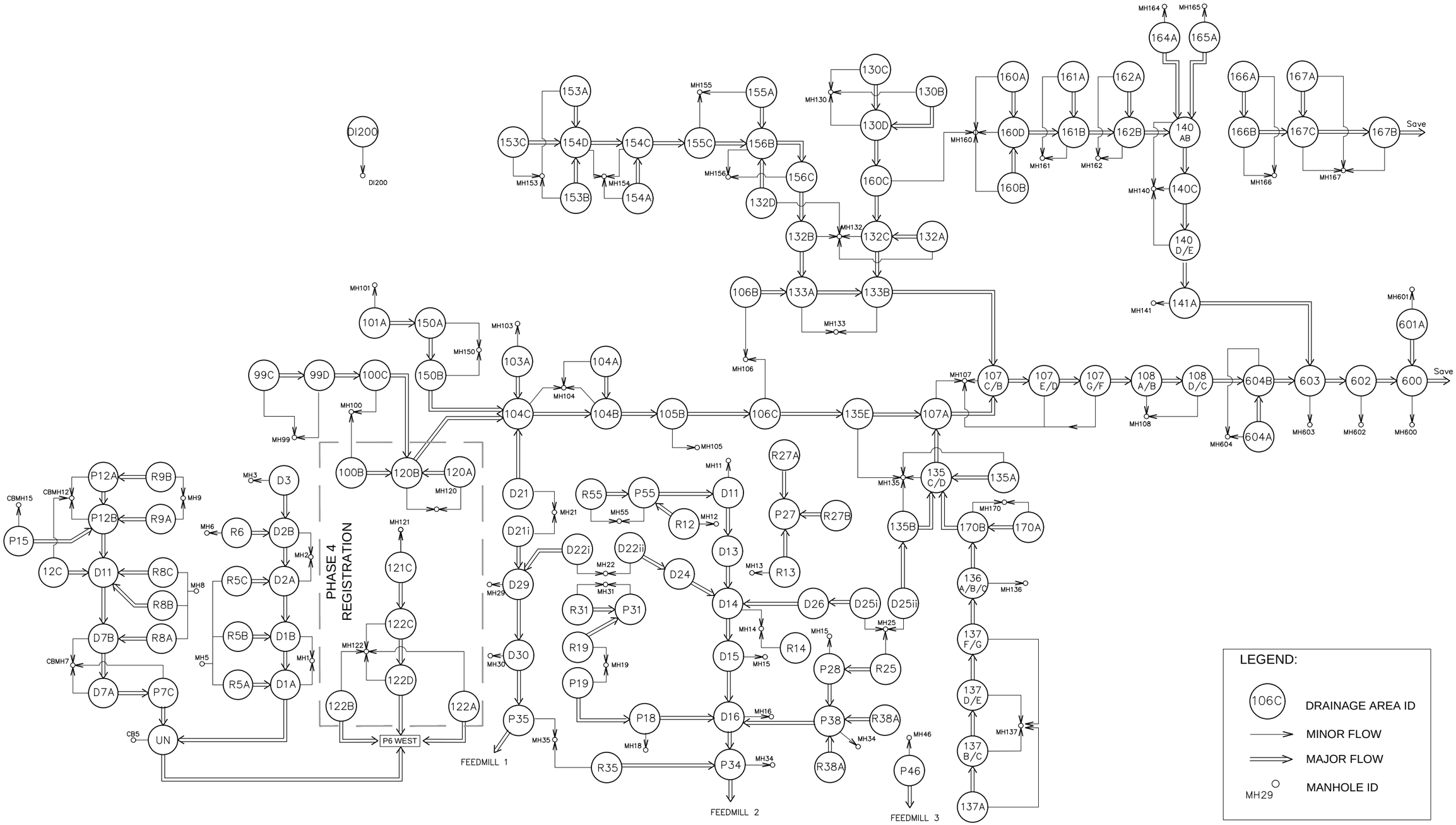
Scale 1:2000

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

D07-16-14-0003_P5

#17661

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



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Scale

IBI

N.T.S.

Project Title

KANATA WEST BUISINESS PARK
PHASE 5 REGISTRATION

Drawing Title

OVERALL
SWMHYMO SCHEMATIC

Sheet No.

Table 4.10 Summary of Hydraulic Grade Line during the 100 year 12 hour SCS Storm and 100 year 3 hour Chicago Storm

LOCATION		MH	FINISHED FLOOR ELEVATION (M)	100 YEAR 12 HOUR SCS		100 YEAR 3 HOUR CHICAGO		100 YEAR 12 HOUR SCS +20%		100 YEAR 3 HOUR CHICAGO +20%	
				HGL (M)	FB (M)	HGL (M)	FB (M)	HGL (M)	FB (M)	HGL (M)	FB (M)
POND 6 WEST	NIPISSING COURT	P6WEST	**N/A**	103.26	N/A	102.93	N/A	103.71	N/A	103.28	N/A
		123	**105.37 (T/G)**	103.28	2.09	102.94	2.43	103.73	1.64	103.30	2.07
		122	**106.20**	103.34	2.86	102.97	3.23	103.76	2.44	103.32	2.88
		121	**106.20**	103.40	2.90	103.03	3.27	103.78	2.52	103.34	2.96
		120	**106.30**	103.48	2.83	103.07	3.23	103.83	2.47	103.41	2.89
	UPPER CANADA ST	150	**106.00**	103.51	2.49	103.09	2.91	103.86	2.14	103.45	2.55
		151	**106.00**	103.60	2.40	103.14	2.86	103.91	2.09	103.54	2.46
		152	**105.90**	103.63	2.27	103.17	2.73	103.92	1.98	103.58	2.32
		152B	**105.85**	103.65	2.20	103.19	2.66	103.93	1.92	103.60	2.25
		153	**105.85**	103.81	2.04	103.34	2.51	104.03	1.82	103.74	2.11
		154	**105.80**	103.82	1.98	103.35	2.45	104.05	1.75	103.76	2.04
	CAMPEAU DR.	99	**106.70**	103.66	3.04	103.16	3.54	103.91	2.79	103.56	3.14
		100	**106.75**	103.60	3.15	103.16	3.60	103.87	2.88	103.54	3.21
		101	**106.60**	103.57	3.03	103.13	3.47	103.88	2.72	103.51	3.09
		102	**106.00**	103.51	2.49	103.08	2.92	103.85	2.15	103.44	2.57
		103	**105.85**	103.63	2.22	103.25	2.60	103.95	1.90	103.54	2.31
		104	**105.45**	103.71	1.74	103.33	2.12	104.01	1.44	103.62	1.83
POND 6 EAST	CAMPEAU DR.	P6EAST	**N/A**	98.40	N/A	98.37	N/A	98.55	N/A	98.48	N/A
		13	**100.42 (T/G)**	98.50	1.92	98.44	1.98	98.71	1.71	98.56	1.86
		12	**101.30 (T/G)**	98.71	2.59	98.56	2.74	98.96	2.34	98.77	2.53
		9	**101.38 (T/G)**	98.96	2.42	98.77	2.61	99.30	2.08	99.07	2.31
		600	**102.60**	99.51	3.09	99.22	3.38	100.02	2.58	99.78	2.82
		601	**102.60**	99.43	3.17	99.21	3.39	99.93	2.67	99.69	2.91
		602	**102.70**	100.00	2.70	99.72	2.98	100.70	2.00	100.39	2.31
		603	**103.30**	100.47	2.83	100.16	3.14	101.32	1.98	100.94	2.36
		604	**103.30**	100.84	2.47	100.52	2.78	101.87	1.43	101.42	1.88
		108	**104.00**	101.06	2.94	100.76	3.24	102.24	1.76	101.73	2.27
		107	**104.00**	101.30	2.70	101.02	2.98	102.64	1.36	102.07	1.93
		106	**105.10**	101.34	3.76	101.09	4.01	102.78	2.32	102.14	2.96
		105	**105.45**	101.42	4.03	101.41	4.04	102.93	2.52	102.16	3.29
	JOURNEYMAN ST	141	**102.70**	100.58	2.12	100.26	2.44	101.44	1.26	101.05	1.65
		140	**102.70**	100.70	2.00	100.37	2.33	101.57	1.13	101.17	1.53
	UPPER CANADA ST	164	**102.90**	100.70	2.20	100.38	2.52	101.57	1.33	101.17	1.73
		165	**102.90**	100.72	2.18	100.39	2.51	101.59	1.31	101.19	1.71
		166	**102.55**	100.75	1.80	100.56	1.99	101.62	0.93	101.21	1.34
		167	**102.20**	100.79	1.41	100.55	1.65	101.63	0.57	101.22	0.98
		163	**102.90**	100.75	2.15	100.43	2.47	101.62	1.28	101.22	1.68
		162	**103.25**	100.99	2.26	100.65	2.60	101.87	1.38	101.45	1.80
		161	**103.90**	101.09	2.81	100.74	3.16	101.97	1.93	101.54	2.36
		160	**104.25**	101.29	2.96	100.89	3.36	102.17	2.08	101.72	2.53
	PALLADIUM DR	134	**104.60**	101.45	3.15	101.14	3.46	102.86	1.74	102.18	2.42
		135	**104.60**	101.77	2.83	101.42	3.18	103.24	1.36	102.38	2.22
		136	**105.42 (T/G)**	102.51	2.91	102.56	2.86	103.86	1.57	102.59	2.84
		137	**107.79 (T/G)**	104.57	3.22	104.65	3.14	105.13	2.66	104.65	3.14
		133	**104.00**	101.48	2.52	101.21	2.79	102.86	1.14	102.29	1.71
		132	**104.00**	101.71	2.29	101.45	2.55	103.11	0.89	102.55	1.45
		131	**105.10**	101.80	3.30	101.54	3.56	103.23	1.87	102.66	2.44
		130	**104.95**	101.81	3.14	101.56	3.39	103.30	1.65	102.68	2.27
	UPPER CANADA ST	156	**104.36 (T/G)**	102.03	2.33	101.83	2.53	103.50	0.86	102.93	1.43
		155	**104.93 (T/G)**	102.19	2.74	102.13	2.80	103.65	1.28	103.08	1.85

(Model Files: 14289-100YRSCS-2019-08-27.out, 32862-100YRSCS-2019-08-27.out, 14289-100YRCHI-2019-08-27.out, 32862-100YRCHI-2019-08-27.out, 14289-100YRSCS20%-2019-08-27.out, 32862-100YRSCS20%-2019-08-27.out, 14289-100YRCHI20%-2019-08-27.out, 32862-100YRCHI20%-2019-08-27.out)

The hydraulic grade line will be at least 1.41m below the T/G or finished floor elevation within the proposed Phase 5 of the KWBP. A summary of all results of the computer simulations are presented within **Appendix C**. It should be noted that the Kanata West Business Park will be comprised of typical commercial type buildings constructed using slab on grade foundation type (ie no basement).

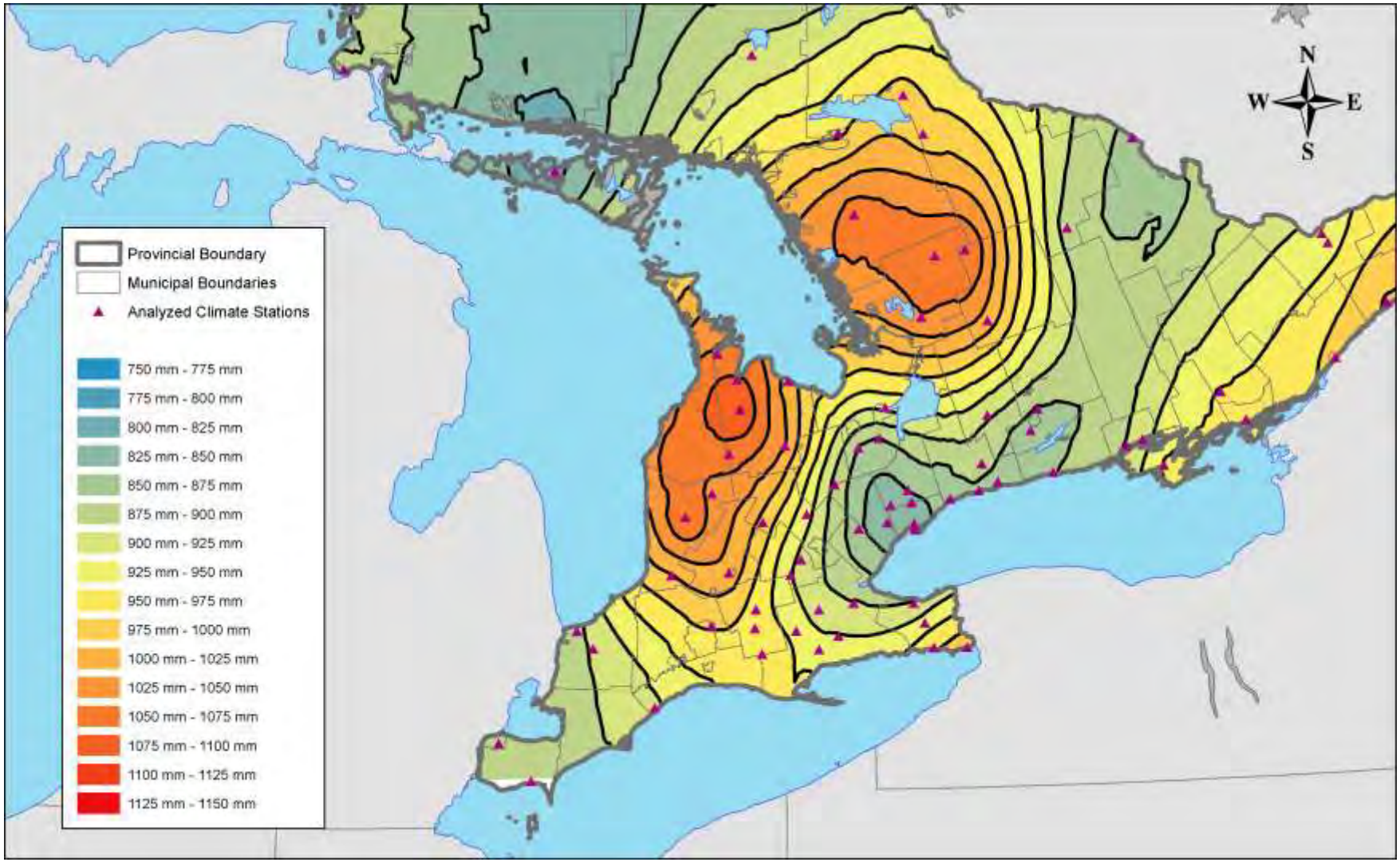

Figure 3.41 - Average annual precipitation in southern Ontario (1970-2005).

Table 3.16 - 90th and 95th Percentile event daily rainfall volumes from daily climate data collected proximal to the City of Ottawa.

Station Name	Annual Average		Number of Years in Analysis	90th Percentile Daily Volume (mm)				95th Percentile Daily Volume (mm)			
	Precipitation* (mm)	Oct. to Apr. Rainfall) (mm)		All Rainfall Events		Apr. 1st - Oct. 31st		All Rainfall Events		Apr. 1st - Oct. 31st	
				2 mm Cut-off	5 mm Cut-off	2 mm Cut-off	5 mm Cut-off	2 mm Cut-off	5 mm Cut-off	2 mm Cut-off	5 mm Cut-off
OTTAWA CDA	910	583	36	21.2	25.8	21.8	25.8	27.2	31.4	27.4	31.8
OTTAWA MACDONALD-CARTIER INT'L A	935	580	36	22.0	26.6	22.6	26.8	28.6	34.4	29.0	35.0
Average	922	581	36	21.6	26.2	22.2	26.3	27.9	32.9	28.2	33.4

3.7.3.3 Windsor

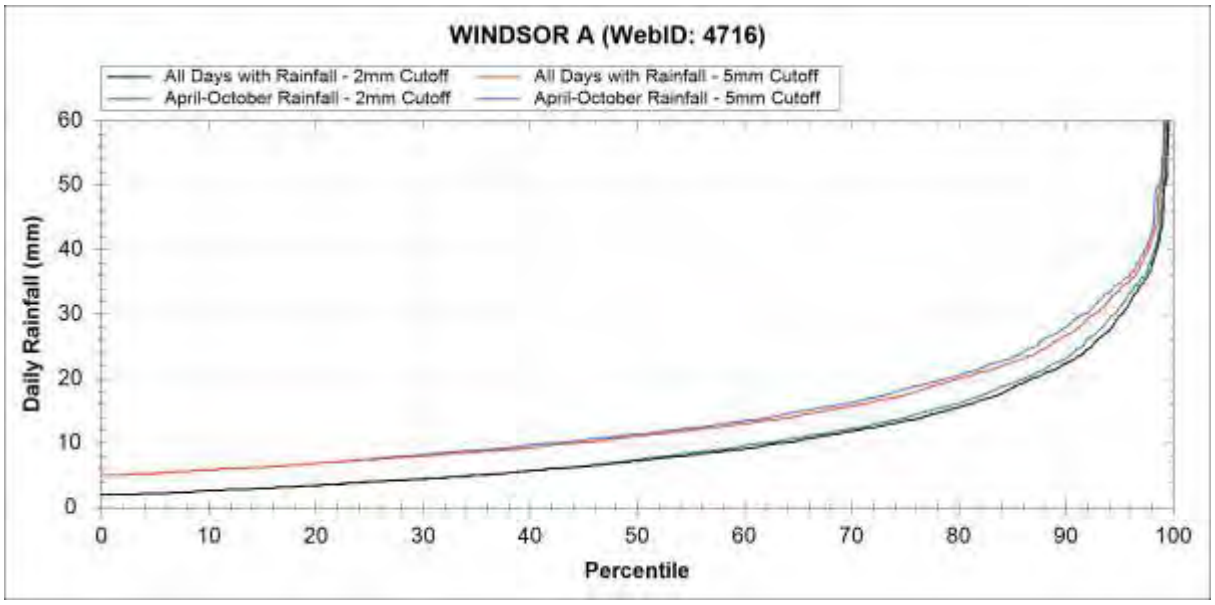

Figure 3.59 - Daily rainfall frequency curves derived from daily rainfall data at ECCC climate station WINDSOR A.

5.8 Percolation Rates

Infiltration galleries are anticipated to be located beneath the asphaltic parking areas within the subject site. Paterson completed a detailed hydrogeological investigation of the lands southwest of the subject site as part of previous phases of the Kanata West Business Park in order to establish hydraulic conductivity and percolation time of in-situ materials.

It is anticipated that a silty sand will be encountered at the base of the infiltration galleries during the installation and will affect the rate of stormwater infiltration into the underlying material. The percolation rate was interpreted from the hydraulic conductivity which was estimated based on previous investigations within the area and on experience. Based on these values, the average percolation rate (T-Time) was estimated to be within the ranges in Table 4.

Table 4 - Estimated Percolation Rates

Material	Hydraulic Conductivity - k (m/sec)	Percolation (T-time) - (mins/cm)
Silty Fine Sand [1]	**$1x10^{-7}$ to $1x10^{-8}$**	**20 to 50**

[1] - Values are based upon site specific testing carried out at a nearby phase of the development

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Commercial Development - Huntmar Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

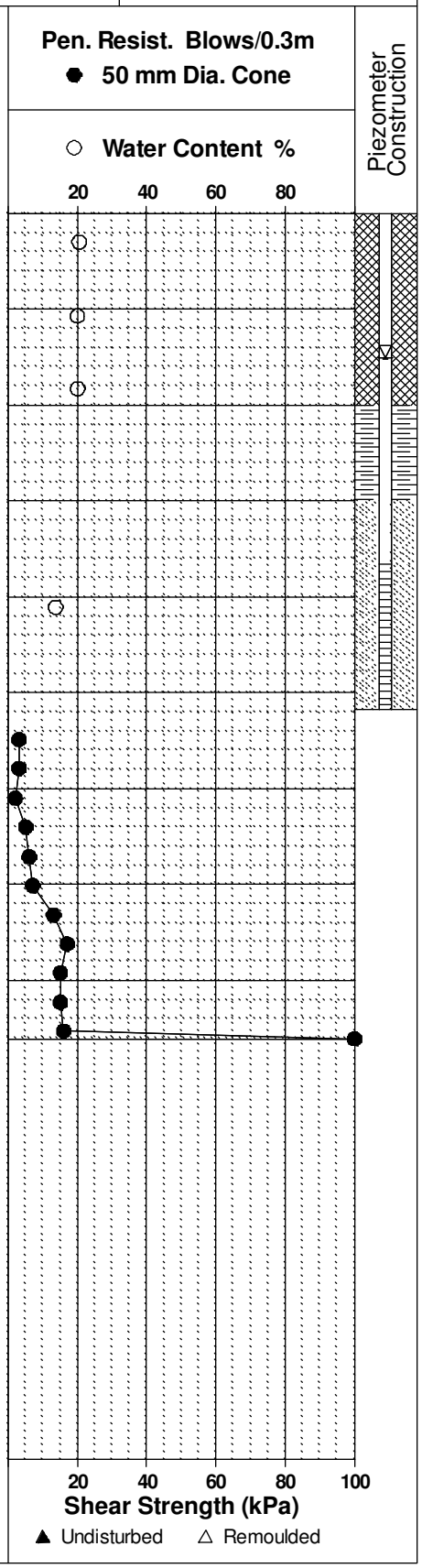
FILE NO. PG3115

REMARKS

HOLE NO. BH 1

BORINGS BY CME 55 Power Auger **DATE** January 15, 2014

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	105.99
TOPSOIL 0.28		AU	1				
Compact, brown **SILTY FINE SAND**		SS	2	71	11	1	104.99
- grey by 1.5m depth		SS	3	54	11	2	103.99
2.97		SS	4	25	13	3	102.99
GLACIAL TILL: Grey silty sand with gravel, cobbles and boulders		SS	5	58	3	4	101.99
		SS	6	67	17	5	100.99
5.18		SS	7	50	3		
Dynamic Cone Penetration Test commenced at 5.18m depth.						6	99.99
Inferred **GLACIAL TILL**						7	98.99
8.61						8	97.99
End of Borehole							
Practical DCPT refusal at 8.61m depth							
(GWL @ 1.5m depth based on field observations)							



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SOIL PROFILE AND TEST DATA

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Proposed Commercial Development - Huntmar Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG3115

REMARKS

HOLE NO. BH 2

BORINGS BY CME 55 Power Auger **DATE** January 15, 2014

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	104.99
TOPSOIL 0.36		AU	1				
Brown **SILTY CLAY,** trace sand 0.69		AU	2				
		SS	3	100	14	1	103.99
		SS	4	83	12	2	102.99
Compact, brown **SILTY FINE SAND**		SS	5	71	8		
- grey by 3.0m depth		SS	6	58	9	3	101.99
		SS	7	54	6	4	100.99
		SS	8	58	10	5	99.99
		SS	9	58	12		
6.02						6	98.99
GLACIAL TILL: Grey silty sand with gravel, cobbles and boulders, trace clay 6.70		SS	10	67	24		
End of Borehole							
(GWL @ 1.8m depth based on field observations)							

Pen. Resist. Blows/0.3m
● **50 mm Dia. Cone**

○ **Water Content %**

20 40 60 80

Piezometer Construction

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

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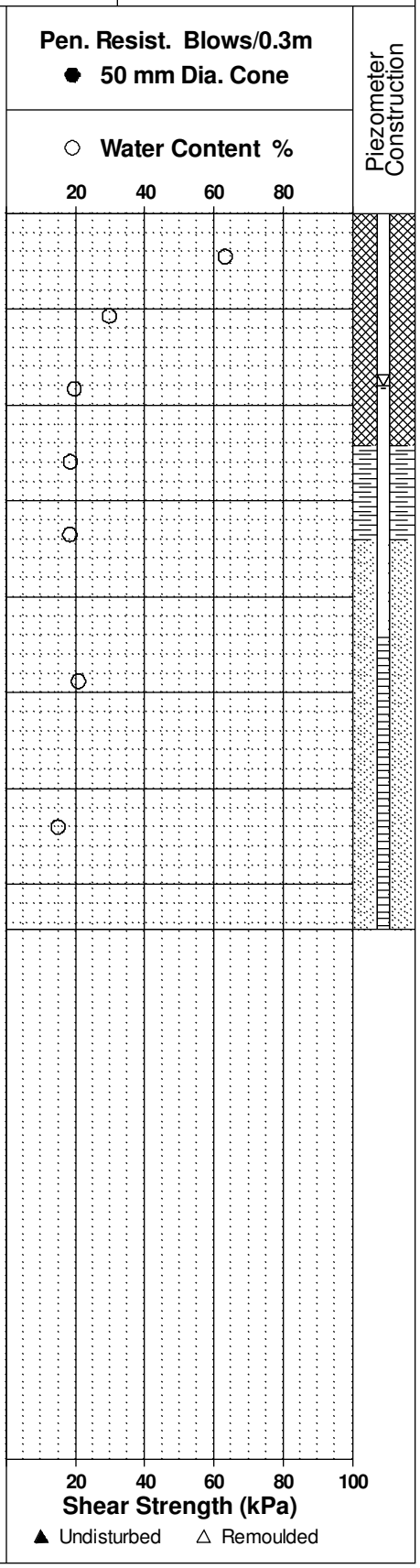
FILE NO. PG3115

REMARKS

HOLE NO. BH16

BORINGS BY CME 55 Power Auger **DATE** January 15, 2014

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	104.94
TOPSOIL 0.28		AU	1				
Very stiff, brown **SILTY CLAY,** trace sand		SS	2	100	6	1	103.94
1.45		SS	3	83	25	2	102.94
		SS	4	83	22		
Compact, grey-brown **SILTY FINE SAND**		SS	5	67	20	3	101.94
5.18		SS	6	67	15	4	100.94
GLACIAL TILL: Grey silty sand with clay, gravel, cobbles and boulders		SS	7	54	1	5	99.94
7.47						6	98.94
End of Borehole						7	97.94
Practical refusal to augering at 7.47m depth							
(GWL @ 1.8m depth based on field observations)							



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FILE NO. PG3115

REMARKS

HOLE NO. BH17

BORINGS BY CME 55 Power Auger **DATE** January 15, 2014

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	105.68
TOPSOIL 0.30							
		SS	1	83	10	1	104.68
		SS	2	54	8	2	103.68
		SS	3	67	2		
Loose, grey **SILTY FINE SAND**		SS	4	62	3	3	102.68
		SS	5	67	8	4	101.68
		SS	6	67	5	5	100.68
		SS	7	54	2		
6.00						6	99.68
GLACIAL TILL: Grey silty sand with clay, gravel, cobbles and boulders 6.70		SS	8	50	3		
End of Borehole							
(GWL @ 2.0m depth based on field observations)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

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DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG3115

REMARKS

HOLE NO. BH18

BORINGS BY CME 55 Power Auger **DATE** January 15, 2014

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	105.53		
TOPSOIL 0.20		AU	1						
		SS	2	83	11	1	104.53		
		SS	3	62	13	2	103.53		
Compact to loose, brown **SILTY FINE SAND**		SS	4	67	9				
- grey by 3.0m depth		SS	5	58	7	3	102.53		
		SS	6	58	10	4	101.53		
		SS	7	71	7	5	100.53		
		SS	8	67	6				
		SS	9	50	3	6	99.53		
6.70									
End of Borehole									
(GWL @ 1.5m depth based on field observations)									

20 40 60 80

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

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DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG3115

REMARKS

HOLE NO. BH19

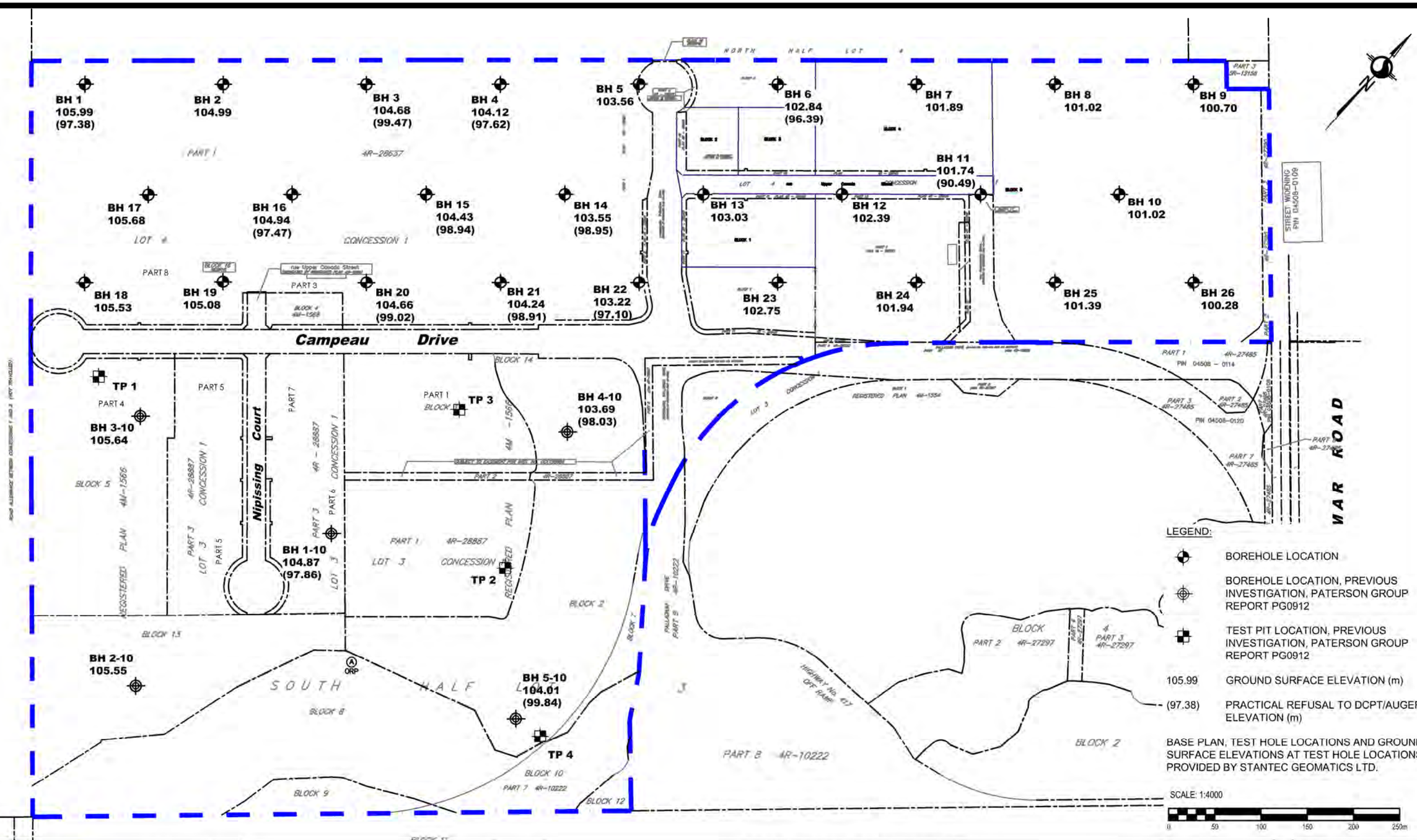
BORINGS BY CME 55 Power Auger **DATE** January 15, 2014

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	105.08
TOPSOIL 0.23							
		SS	1	62	12	1	104.08
		SS	2	71	1	2	103.08
Compact o very loose, brown **SILTY FINE SAND**		SS	3	62	1		
- grey-brown by 2.2m depth		SS	4	67	8	3	102.08
- trace gravel below 3.0m depth		SS	5	83	1	4	101.08
- grey by 3.7m depth		SS	6	25	3	5	100.08
5.26							
GLACIAL TILL: Grey silty sand with gravel, cobbles and boulders		SS	7	100	14	6	99.08
		SS	8	100	32		
6.70							
End of Borehole							
(GWL @ 2.0m depth based on field observations)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone
○ Water Content %
20 40 60 80

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded



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NO.	REVISIONS	DATE	INITIAL
1	BASE PLAN UPDATED	18/09/2018	DJG

TAGGART GROUP OF COMPANIES

GEOTECHNICAL INVESTIGATION
PROPOSED COMMERCIAL DEVELOPMENT
WEST OTTAWA LAND HOLDINGS - HUNTMAR DRIVE

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:4000	Date: 09/2018
Drawn by: RCG	Report No.: PG3115-1
Checked by: CB	Dwg. No.: PG3115-1
Approved by: DJG	Revision No.: 1

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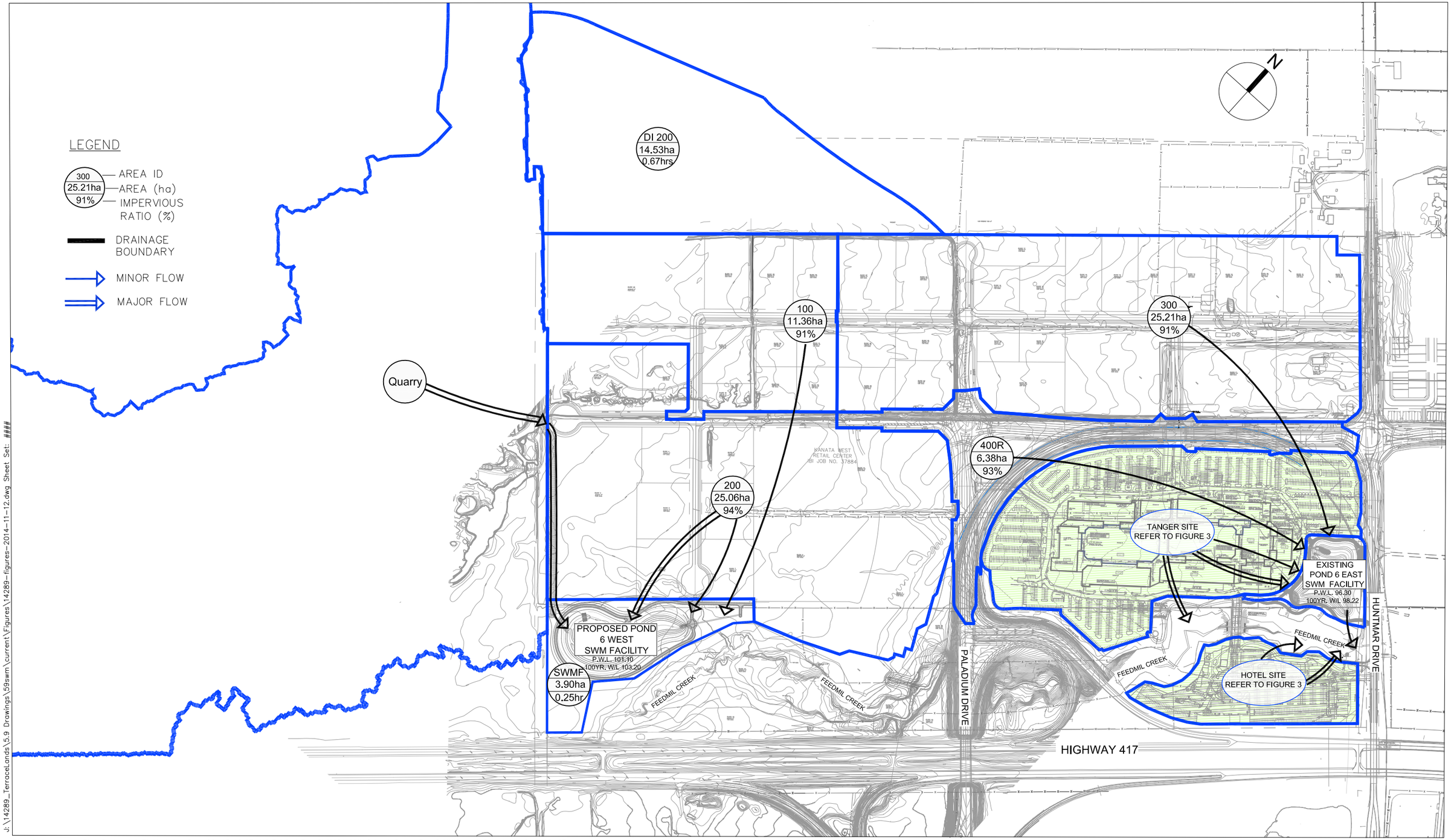

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Plot Style: ---- Plot Scale: 1:1 Plotted At: Sep. 28, 15 10:17 AM Printed By: SLAVICA VUKIC Last Saved By: SVUKIC Last Saved At: Sep. 28, 15

IBI GROUP

Scale

N.T.S.

Project Title

TANGER OUTLETS CENTRE STORMWATER MANAGEMENT FACILITY

Drawing Title

POST-DEVELOPMENT SWM DRAINAGE BOUNDARIES OVERALL SITE

Sheet No.

FIGURE 2

Appendix F

Storm Sewer Design Sheet

Storm Drainage Area Plan
(DWG. 20027-STM1)

Infiltration Gallery Storm Sewer Design Sheet

Runoff Coefficient Calculations

Free Flow Calculations

ICD Calculations

Storage Volume Tables

HGL Computation Sheet

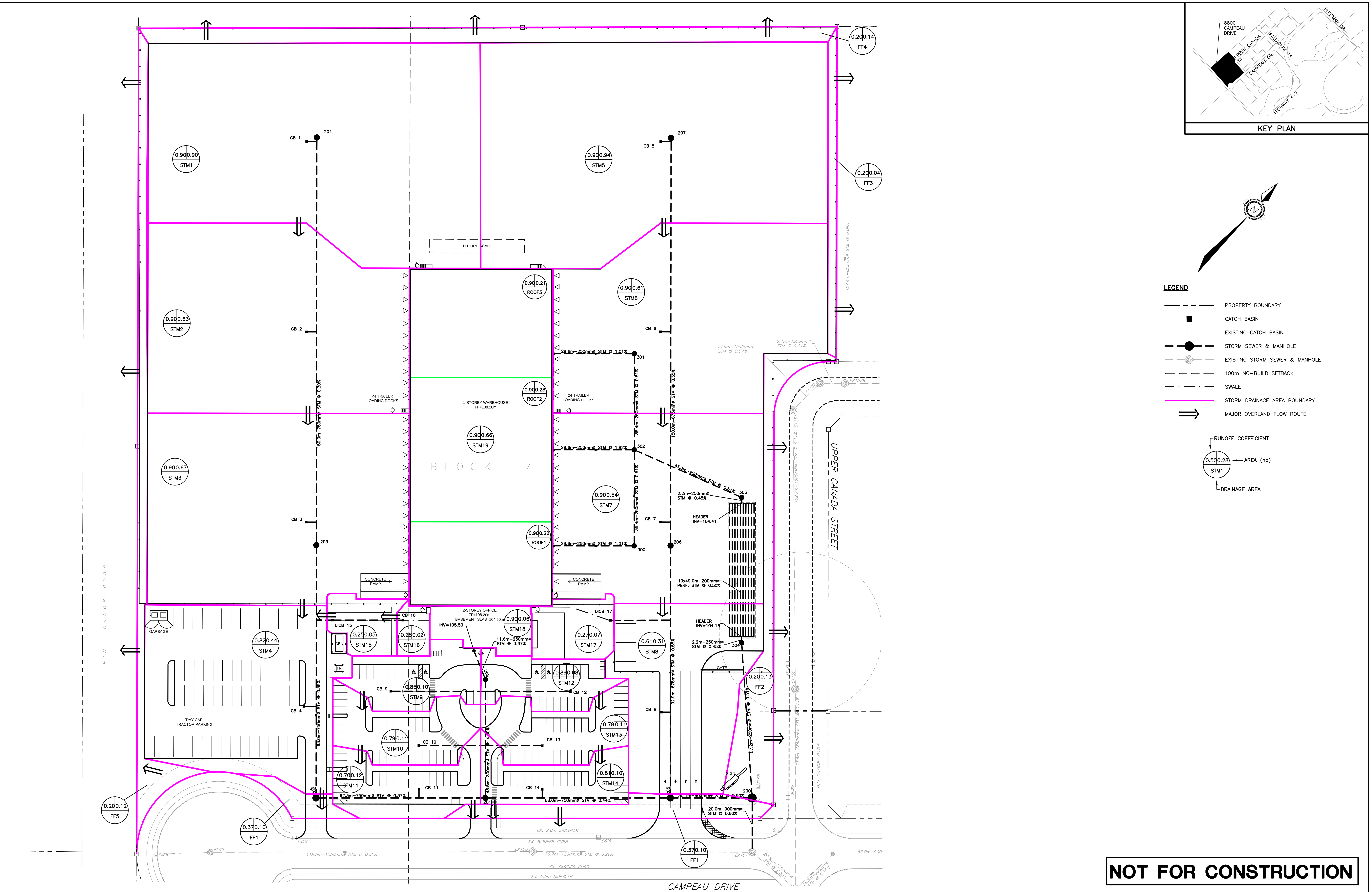
STORM SEWER DESIGN SHEET
for
MARITIME-ONTARIO, CAMPEAU DRIVE, KWBP

LOCATION				AREA (ha)		INDIV. 2.78AR	ACCUM. 2.78AR	TIME OF CONC. (min)	5 YR RAINFALL INTENSITY (mm/hr)	5 YR PEAK FLOW (L/s)	PROPOSED SEWER						
DRAINAGE AREA	STREET NAME	FROM MH	TO MH	TOTAL AREA	C						PIPE DIA. (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	PERCENT FULL
STM1	PARKING LOT	CB 1	MAIN	0.90	0.90	2.25	2.25	10.00	104.19	234.64	366.4	2.97	3.7	284.36	2.70	0.02	83%
STM2	PARKING LOT	CB 2	MAIN	0.63	0.90	1.58	1.58	10.00	104.19	164.15	366.4	2.97	3.7	284.36	2.70	0.02	58%
STM3	PARKING LOT	CB 3	MAIN	0.67	0.90	1.68	1.68	10.00	104.19	174.93	366.4	2.89	3.8	280.50	2.66	0.02	62%
	PARKING LOT	204	203	0.00	0.00	0.00	5.51	10.02	104.07	573.06	762.0	0.30	150.0	636.77	1.40	1.79	90%
STM4	PARKING LOT	CB 4	MAIN	0.44	0.82	1.01	1.01	10.00	104.19	105.44	299.4	2.93	4.1	164.75	2.34	0.03	64%
STM16	LANDSCAPE	CB 16	DICB 15	0.02	0.28	0.02	0.02	10.00	104.19	1.78	251.5	1.00	25.9	60.46	1.22	0.35	3%
STM15	LANDSCAPE	DICB 15	MAIN	0.05	0.25	0.04	0.05	10.35	102.36	5.38	251.5	3.05	5.9	105.59	2.13	0.05	5%
	PARKING LOT	203	202	0.00	0.00	0.00	6.57	11.81	95.50	627.53	762.0	0.35	93.0	687.79	1.51	1.03	91%
STM11	PARKING LOT	CB 11	MAIN	0.12	0.70	0.23	0.23	10.00	104.19	23.44	251.5	3.03	3.3	105.24	2.12	0.03	22%
	PARKING LOT	202	201	0.00	0.00	0.00	6.80	12.84	91.25	620.13	762.0	0.37	62.3	707.17	1.55	0.67	88%
STM5	PARKING LOT	CB 5	MAIN	0.94	0.90	2.36	2.36	10.00	104.19	245.64	366.4	2.89	3.8	280.50	2.66	0.02	88%
STM6	PARKING LOT	CB 6	MAIN	0.61	0.90	1.52	1.52	10.00	104.19	158.42	366.4	2.89	3.8	280.50	2.66	0.02	56%
STM7	PARKING LOT	CB 7	MAIN	0.54	0.90	1.35	1.35	10.00	104.19	140.47	299.4	2.89	3.8	163.62	2.32	0.03	86%
	PARKING LOT	207	206	0.00	0.00	0.00	5.23	10.03	104.05	543.78	686.0	0.55	150.0	651.51	1.76	1.42	83%
STM17	LANDSCAPE	DICB 17	MAIN	0.07	0.27	0.05	0.05	10.00	104.19	5.06	251.5	3.01	21.6	104.89	2.11	0.17	5%
STM8	PARKING LOT	CB 8	MAIN	0.31	0.63	0.55	0.55	10.00	104.19	56.81	251.5	3.03	3.3	105.24	2.12	0.03	54%
	PARKING LOT	206	205	0.00	0.00	0.00	5.82	11.45	97.13	565.30	686.0	0.55	92.9	651.51	1.76	0.88	87%
STM18	PARKING LOT	BLDG	208	0.06	0.90	0.14	0.14	10.00	104.19	14.83	251.5	3.97	11.6	120.52	2.43	0.08	12%
STM9	PARKING LOT	CB 9	MAIN	0.10	0.85	0.22	0.22	10.00	104.19	23.40	251.5	1.01	34.8	60.76	1.22	0.47	39%
STM12	PARKING LOT	CB 12	MAIN	0.08	0.89	0.20	0.20	10.00	104.19	20.91	251.5	0.99	31.2	60.16	1.21	0.43	35%
STM13	PARKING LOT	CB 13	MAIN	0.11	0.79	0.25	0.25	10.00	104.19	26.19	251.5	1.00	20.9	60.46	1.22	0.29	43%
STM10	PARKING LOT	CB 10	MAIN	0.11	0.79	0.25	0.25	10.00	104.19	26.24	251.5	1.02	24.5	61.06	1.23	0.33	43%
STM10	PARKING LOT	208	201	0.00	0.00	0.00	1.07	10.47	101.75	108.97	299.4	4.00	43.5	192.50	2.73	0.27	57%

STORM SEWER DESIGN SHEET
for
MARITIME-ONTARIO, CAMPEAU DRIVE, KWBP

LOCATION				AREA (ha)		INDIV. 2.78AR	ACCUM. 2.78AR	TIME OF CONC. (min)	5 YR RAINFALL INTENSITY (mm/hr)	5 YR PEAK FLOW (L/s)	PROPOSED SEWER						
DRAINAGE AREA	STREET NAME	FROM MH	TO MH	TOTAL AREA	C						PIPE DIA. (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	PERCENT FULL
STM14	PARKING LOT	CB 14	MAIN	0.10	0.81	0.21	0.21	10.00	104.19	22.34	251.5	3.12	3.2	106.79	2.15	0.02	21%
	PARKING LOT	201	205	0.00	0.00	0.00	8.08	13.51	88.70	716.81	762.0	0.44	68.0	771.17	1.69	0.67	93%
	PARKING LOT	205	200	0.00	0.00	0.00	13.90	14.18	86.30	1199.68	914.0	0.50	30.1	1335.22	2.04	0.25	90%
STM19	PARKING LOT	304	200	0.66	0.90	1.64	1.64	10.00	104.19	170.85	251.5	0.51	57.2	43.18	0.87	1.10	
	PARKING LOT	200	*EX101*	0.00	0.00	0.00	15.54	14.43	85.45	1328.04	914.0	0.60	20.0	1462.66	2.23	0.15	91%

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations. $I = 998.071 / (T + 6.053)^{0.814}$ (T= time in minutes)
2. Peak Flow = Accummulated 2.78AR x Rainfall Intensity
3. Full Flow Velocity: MIN. = 0.80 m/s; MAX. = 3.0 m/s (City of Ottawa Sewer Design Guidelines, v.2012)



NOT FOR CONSTRUCTION

NOTES

THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

NO.	REVISION DESCRIPTION	DATE	BY
1	ISSUED FOR SITE PLAN APPLICATION	02/12/20	SMC

SCALE

HORIZONTAL 1:750

S. M. CZARNIETSKI

Robinson Land Development

350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

DESIGN	BLM
CHECKED	SMC
DRAWN	BLM
CHECKED	SMC
APPROVED	SMC

MARITIME-ONTARIO FREIGHT LINES LIMITED

KANATA WEST BUSINESS PARK
8800 CAMPEAU DRIVE, OTTAWA, ON

STORM DRAINAGE AREA PLAN

PROJECT No.	20027
SURVEY	STANTEC
DATED	DECEMBER 2020
DWG. No:	20027-STM1

STORM SEWER DESIGN SHEET - INFILTRATION GALLERY
for
MARITIME-ONTARIO, CAMPEAU DRIVE, KWBP

LOCATION				AREA (ha)		INDIV. 2.78AR	ACCUM. 2.78AR	TIME OF CONC. (min)	5 YR RAINFALL INTENSITY (mm/hr)	5 YR PEAK FLOW (L/s)	FIXED FLOW (L/s)	PROPOSED SEWER						
DRAINAGE AREA	STREET NAME	FROM MH	TO MH	TOTAL AREA	C							PIPE DIA. (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	PERCENT FULL
ROOF1	PARKING LOT	RD1	300	0.22	0.90	0.55	0.55	10.00	104.19	57.69	8.85	251.5	1.01	29.6	60.76	1.22	0.40	15%
	PARKING LOT	300	302	0.00	0.00	0.00	0.55	10.40	102.11	56.54	8.85	251.5	0.51	35.4	43.18	0.87	0.68	21%
ROOF2	PARKING LOT	RD2	302	0.28	0.90	0.70	0.70	10.00	104.19	72.90	11.19	251.5	1.82	29.6	81.56	1.64	0.30	14%
ROOF3	PARKING LOT	RD3	301	0.21	0.90	0.53	0.53	10.00	104.19	55.27	8.48	251.5	1.01	29.6	60.76	1.22	0.40	14%
	PARKING LOT	301	302	0.00	0.00	0.00	0.53	10.40	102.11	54.16	8.48	251.5	0.51	35.4	43.18	0.87	0.68	20%
	PARKING LOT	302	303	0.00	0.00	0.00	1.78	11.08	98.81	176.25	28.52	251.5	0.51	43.3	43.18	0.87	0.83	66%
	PARKING LOT	303	304	0.00	0.00	0.00	1.78	11.91	95.07	169.59	28.52	251.5	0.50	53.5	42.75	0.86	1.04	67%
	PARKING LOT	304	200	0.00	0.00	0.00	1.78	12.95	90.83	162.03	28.52	251.5	0.51	57.2	43.18	0.87	1.10	66%

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations. $I = 998.071 / (T + 6.053)^{0.814}$ (T= time in minutes)
2. Peak Flow = Accummulated 2.78AR x Rainfall Intensity
3. Full Flow Velocity: MIN. = 0.80 m/s; MAX. = 3.0 m/s (City of Ottawa Sewer Design Guidelines, v.2012)
4. Fixed flow is based on assumed roof drain rate of 40 L/s/ha.

Runoff Coefficient Calculations

Development Condition	Impervious Area (ha)	Pervious Area (ha)	Gravel Area (ha)	Total Area (ha)	C	C (100 YR)	Percent Impervious (%)
PRE	0.00	6.96	0.08	7.04	0.21	0.26	1.2
POST	6.15	0.89	0.00	7.04	0.81	1.00	87.3

Sub-Drainage Area Runoff Coefficient Calculations

Drainage Area ID	Impervious Area (ha)	Pervious Area (ha)	Gravel Area (ha)	Total Area (ha)	C	C (100 YR)	Percent Impervious (%)
STM1	0.90	0.00	0.00	0.90	0.90	1.00	100.0
STM2	0.63	0.00	0.00	0.63	0.90	1.00	100.0
STM3	0.67	0.00	0.00	0.67	0.90	1.00	100.0
STM4	0.39	0.05	0.00	0.44	0.82	1.00	89.1
STM5	0.94	0.00	0.00	0.94	0.90	1.00	100.0
STM6	0.61	0.00	0.00	0.61	0.90	1.00	100.0
STM7	0.54	0.00	0.00	0.54	0.90	1.00	100.0
STM8	0.19	0.12	0.00	0.31	0.63	0.78	60.8
STM9	0.09	0.01	0.00	0.10	0.85	1.00	92.6
STM10	0.10	0.02	0.00	0.11	0.79	0.99	85.0
STM11	0.08	0.03	0.00	0.12	0.70	0.88	71.5
STM12	0.08	0.00	0.00	0.08	0.89	1.00	99.1
STM13	0.10	0.02	0.00	0.11	0.79	0.99	84.8
STM14	0.08	0.01	0.00	0.10	0.81	1.00	87.0
STM15	0.00	0.05	0.00	0.05	0.25	0.31	7.3
STM16	0.00	0.02	0.00	0.02	0.28	0.34	10.8
STM17	0.01	0.06	0.00	0.07	0.27	0.34	9.8
STM18 (ROOF 1)	0.06	0.00	0.00	0.06	0.90	1.00	100.0
STM19 (ROOF 2)	0.66	0.00	0.00	0.66	0.90	1.00	100.0
FF1 (CAMPEAU)	0.03	0.08	0.00	0.10	0.37	0.47	24.8
FF2 (UPPER CANADA)	0.00	0.13	0.00	0.13	0.20	0.25	0.0
FF3 (EAST)	0.00	0.04	0.00	0.04	0.20	0.25	0.0
FF4 (NORTH)	0.00	0.14	0.00	0.14	0.20	0.25	0.0
FF5 (WEST)	0.00	0.12	0.00	0.12	0.20	0.25	0.0

Runoff Coefficients:

C impervious = 0.90

C pervious = 0.20

C gravel = 0.80

C_{100} = C * 1.25 (Max. 1.0)

Free Flow Calculations - FF1 (CAMPEAU)

Given:

Area (ha) = 0.10

C = 0.37

C (100 YR) = 0.47

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)
5 Year	5	141.2	14.9
	10	**104.2**	**11.0**
	15	83.6	8.8
	20	70.3	7.4
	25	60.9	6.4
	30	53.9	5.7
100 Year	5	242.7	31.9
	10	**178.6**	**23.5**
	15	142.9	18.8
	20	120.0	15.8
	25	103.8	13.7
	30	91.9	12.1

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method. Q=2.78CiA
3. C (100 YR) = C + 25% (Max. 1.0)

Free Flow Calculations - FF2 (UPPER CANADA)

Given:

Area (ha) = 0.13

C = 0.20

C (100 YR) = 0.25

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)
5 Year	5	141.2	10.3
	10	**104.2**	**7.6**
	15	83.6	6.1
	20	70.3	5.1
	25	60.9	4.5
	30	53.9	4.0
100 Year	5	242.7	22.2
	10	**178.6**	**16.4**
	15	142.9	13.1
	20	120.0	11.0
	25	103.8	9.5
	30	91.9	8.4

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method. Q=2.78CiA
3. C (100 YR) = C + 25% (Max. 1.0)

Free Flow Calculations - FF5 (WEST)

Given:

Area (ha) = 0.12

C = 0.20

C (100 YR) = 0.25

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)
5 Year	5	141.2	9.3
	10	**104.2**	**6.8**
	15	83.6	5.5
	20	70.3	4.6
	25	60.9	4.0
	30	53.9	3.5
100 Year	5	242.7	19.9
	10	**178.6**	**14.7**
	15	142.9	11.7
	20	120.0	9.9
	25	103.8	9.5
	30	91.9	7.5

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method. Q=2.78CiA
3. C (100 YR) = C + 25% (Max. 1.0)

Free Flow Calculations - FF3 (EAST)

Given:

Area (ha) = 0.04

C = 0.20

C (100 YR) = 0.25

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)
5 Year	5	141.2	3.1
	10	**104.2**	**2.3**
	15	83.6	1.8
	20	70.3	1.5
	25	60.9	1.3
	30	53.9	1.2
100 Year	5	242.7	6.6
	10	**178.6**	**4.8**
	15	142.9	3.9
	20	120.0	3.3
	25	103.8	2.8
	30	91.9	2.5

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method. Q=2.78CiA
3. C (100 YR) = C + 25% (Max. 1.0)

Free Flow Calculations - FF4 (NORTH)

Given:

Area (ha) = 0.14

C = 0.20

C (100 YR) = 0.25

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)
5 Year	5	141.2	11.2
	10	**104.2**	**8.3**
	15	83.6	6.6
	20	70.3	5.6
	25	60.9	4.8
	30	53.9	4.3
100 Year	5	242.7	24.1
	10	**178.6**	**17.7**
	15	142.9	14.2
	20	120.0	11.9
	25	103.8	9.5
	30	91.9	9.1

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method. Q=2.78CiA
3. C (100 YR) = C + 25% (Max. 1.0)

Inlet Control Device Calculations

Structure	Drainage Area	Outlet Pipe Inv. Elev. (m)	Outlet Pipe Diam. (m)	C/L Orifice Elev. (m)	T/G Elev. (m)	Max. Ponding Depth (m)	Max. Ponding Elev. (m)	Max. Head (m)	100 Yr. Ponding Depth (m)	100 Yr. Ponding Elev. (m)	100 Yr. Head (m)	100 Yr. Outflow (L/s)	Orifice Area (m^2)	Orifice Diameter (mm)	Orifice Type
CB 1	STM1	104.74	0.375	104.93	106.42	0.30	106.72	1.79	"100 Year El. = Maximum El."			90.0	0.024	176.5	Circular, slide
CB 2	STM2	104.64	0.375	104.83	106.32	0.30	106.62	1.79	"100 Year El. = Maximum El."			55.0	0.015	138.0	Circular, slide
CB 3	STM3	104.54	0.375	104.73	106.22	0.30	106.52	1.79	"100 Year El. = Maximum El."			80.0	0.022	166.4	Circular, slide
CB 4	STM4	104.47	0.300	104.62	106.15	0.30	106.45	1.83	"100 Year El. = Maximum El."			40.0	0.011	117.1	Circular, slide
CB 5	STM5	104.74	0.375	104.93	106.42	0.30	106.72	1.79	"100 Year El. = Maximum El."			100.0	0.027	186.1	Circular, slide
CB 6	STM6	104.64	0.375	104.83	106.32	0.30	106.62	1.79	"100 Year El. = Maximum El."			40.0	0.011	117.7	Circular, slide
CB 7	STM7	104.54	0.300	104.69	106.22	0.30	106.52	1.83	"100 Year El. = Maximum El."			30.0	0.008	101.4	Circular, slide
CB 8	STM8	104.24	0.250	104.37	105.92	0.30	106.22	1.86	0.24	106.16	1.80	40.0	0.011	117.7	Circular, slide
CB 9	STM9	105.42	0.250	105.55	107.10	0.10	107.20	1.66	0.00	107.10	1.55	70.0	0.020	161.3	Circular, slide
CB 10	STM10	104.96	0.250	105.09	106.64	0.19	106.83	1.75	0.00	106.64	1.56	80.0	0.023	172.5	Circular, slide
CB 11	STM11	104.38	0.250	104.51	106.06	0.30	106.36	1.86	0.00	106.06	1.56	80.0	0.023	172.5	Circular, slide
CB 12	STM12	105.42	0.250	105.55	107.10	0.10	107.20	1.66	0.00	107.10	1.55	55.0	0.016	143.0	Circular, slide
CB 13	STM13	104.96	0.250	105.09	106.64	0.19	106.83	1.75	0.00	106.64	1.56	80.0	0.023	172.5	Circular, slide
CB 14	STM14	104.38	0.250	104.51	106.06	0.30	106.36	1.86	0.00	106.06	1.56	80.0	0.023	172.5	Circular, slide
DICB 15	STM15	104.67	0.250	104.80	106.42	0.30	106.72	1.93	0.00	106.42	1.63	30.0	0.009	104.5	Circular, slide
DICB 17	STM16	104.75	0.250	104.88	106.50	0.30	106.80	1.93	0.00	106.50	1.63	30.0	0.009	104.5	Circular, slide
								Total =				980.0			

Notes:
1. Maximum ponding depth is measured from the maximum ponding elevation to the T/G elevation; 100 year ponding depth is measured from the 100 year ponding elevation to the T/G elevation.
2. Maximum head is measured from the maximum ponding elevation to the centreline of orifice elevation; 100 year head is measured from the 100 year ponding elevation to the centreline of orifice elevation.
3. Orifice Area = (Q/1000) / 0.62(2*9.81*H_{100})^0.5

ICD outflow optimized to eliminate surface ponding for all storm events up to and including the 100 year design event. Orifice diameter calculated using 100 year head; 100 year ponding assumed to occur at structure T/G elevation.

Storage Volume Calculations - STM1 (CB 1)

Given:

Area (ha) =	0.90	Release Rate (L/s) =	90.0
C =	0.90		
C (100 YR) =	1.00	Available Storage Volume (m^3) =	265.3

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	5	141.2	317.9	90.0	227.9	68.4
	10	104.2	234.6	90.0	144.6	86.8
	15	**83.6**	**188.2**	**90.0**	**98.2**	**88.4**
	20	70.3	158.2	90.0	68.2	81.8
	25	60.9	137.1	90.0	47.1	70.7
	30	53.9	121.4	90.0	31.4	56.6
100 Year	15	142.9	357.5	90.0	267.5	240.8
	20	120.0	300.1	90.0	210.1	252.2
	25	**103.8**	**259.8**	**90.0**	**169.8**	**254.8**
	30	91.9	229.9	90.0	139.9	251.8
	35	82.6	206.6	90.0	116.6	244.9
	40	75.1	188.0	90.0	98.0	235.3

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM2 (CB 2)

Given:

Area (ha) =	0.63	Release Rate (L/s) =	55.0
C =	0.90		
C (100 YR) =	1.00	Available Storage Volume (m^3) =	200.8

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	5	141.2	222.4	55.0	167.4	50.2
	10	104.2	164.2	55.0	109.2	65.5
	15	**83.6**	**131.6**	**55.0**	**76.6**	**69.0**
	20	70.3	110.7	55.0	55.7	66.8
	25	60.9	95.9	55.0	40.9	61.4
	30	53.9	85.0	55.0	30.0	53.9
100 Year	20	120.0	210.0	55.0	155.0	186.0
	25	103.8	181.8	55.0	126.8	190.2
	30	**91.9**	**160.8**	**55.0**	**105.8**	**190.5**
	35	82.6	144.6	55.0	89.6	188.1
	40	75.1	131.5	55.0	76.5	183.7
	45	69.1	120.9	55.0	65.9	177.9

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM3 (CB 3)

Given:

Area (ha) =	0.67	Release Rate (L/s) =	80.0
C =	0.90		
C (100 YR) =	1.00	Available Storage Volume (m^3) =	184.7

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	5	141.2	237.0	80.0	157.0	47.1
	10	**104.2**	**174.9**	**80.0**	**94.9**	**57.0**
	15	83.6	140.3	80.0	60.3	54.3
	20	70.3	117.9	80.0	37.9	45.5
	25	60.9	102.2	80.0	22.2	33.4
	30	53.9	90.5	80.0	10.5	19.0
100 Year	10	178.6	333.1	80.0	253.1	151.9
	15	142.9	266.6	80.0	186.6	167.9
	20	**120.0**	**223.8**	**80.0**	**143.8**	**172.5**
	25	103.8	193.7	80.0	113.7	170.6
	30	91.9	171.4	80.0	91.4	164.5
	35	82.6	154.0	80.0	74.0	155.5

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM4 (CB 4)

Given:

Area (ha) =	0.44	Release Rate (L/s) =	40.0
C =	0.82		
C (100 YR) =	1.00	Available Storage Volume (m^3) =	135.7

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	5	141.2	142.9	40.0	102.9	30.9
	10	104.2	105.4	40.0	65.4	39.3
	15	**83.6**	**84.6**	**40.0**	**44.6**	**40.1**
	20	70.3	71.1	40.0	31.1	37.3
	25	60.9	61.6	40.0	21.6	32.4
	30	53.9	54.6	40.0	14.6	26.2
100 Year	15	142.9	175.5	40.0	135.5	122.0
	20	120.0	147.3	40.0	107.3	128.8
	25	**103.8**	**127.6**	**40.0**	**87.6**	**131.4**
	30	91.9	112.9	40.0	72.9	131.1
	35	82.6	101.4	40.0	61.4	129.0
	40	75.1	92.3	40.0	52.3	125.5

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM5 (CB 5)

Given:

Area (ha) =	0.94	Release Rate (L/s) =	100.0
C =	0.90		
C (100 YR) =	1.00	Available Storage Volume (m^3) =	269.7

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	5	141.2	332.8	100.0	232.8	69.9
	10	**104.2**	**245.6**	**100.0**	**145.6**	**87.4**
	15	83.6	197.0	100.0	97.0	87.3
	20	70.3	165.6	100.0	65.6	78.7
	25	60.9	143.6	100.0	43.6	65.3
	30	53.9	127.1	100.0	27.1	48.8
100 Year	15	142.9	374.3	100.0	274.3	246.9
	20	120.0	314.2	100.0	214.2	257.1
	25	**103.8**	**272.0**	**100.0**	**172.0**	**258.0**
	30	91.9	240.6	100.0	140.6	253.2
	35	82.6	216.3	100.0	116.3	244.3
	40	75.1	196.8	100.0	96.8	232.4

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM6 (CB 6)

Given:

Area (ha) =	0.61	Release Rate (L/s) =	40.0
C =	0.90		
C (100 YR) =	1.00	Available Storage Volume (m^3) =	221.7

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	10	104.2	158.4	40.0	118.4	71.0
	15	83.6	127.0	40.0	87.0	78.3
	20	**70.3**	**106.8**	**40.0**	**66.8**	**80.2**
	25	60.9	92.6	40.0	52.6	78.9
	30	53.9	82.0	40.0	42.0	75.6
	35	48.5	73.8	40.0	33.8	70.9
100 Year	25	103.8	175.4	40.0	135.4	203.2
	30	91.9	155.2	40.0	115.2	207.4
	35	**82.6**	**139.5**	**40.0**	**99.5**	**209.0**
	40	75.1	126.9	40.0	86.9	208.7
	45	69.1	116.6	40.0	76.6	207.0
	50	64.0	108.0	40.0	68.0	204.1

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM7 (CB 7)

Given:

Area (ha) =	0.54	Release Rate (L/s) =	30.0
C =	0.90		
C (100 YR) =	1.00	Available Storage Volume (m^3) =	200.5

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	15	83.6	112.6	30.0	82.6	74.4
	20	70.3	94.7	30.0	64.7	77.6
	25	**60.9**	**82.1**	**30.0**	**52.1**	**78.1**
	30	53.9	72.7	30.0	42.7	76.9
	35	48.5	65.4	30.0	35.4	74.4
	40	44.2	59.6	30.0	29.6	71.0
100 Year	35	82.6	123.7	30.0	93.7	196.8
	40	75.1	112.6	30.0	82.6	198.1
	45	**69.1**	**103.4**	**30.0**	**73.4**	**198.3**
	50	64.0	95.8	30.0	65.8	197.4
	55	59.6	89.3	30.0	59.3	195.7
	60	55.9	83.7	30.0	53.7	193.4

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM8 (CB 8)

Given:

Area (ha) =	0.31	Release Rate (L/s) =	40.0
C =	0.63		
C (100 YR) =	0.78	Available Storage Volume (m^3) =	92.2

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	**5**	**141.2**	**77.0**	**40.0**	**37.0**	**11.1**
	10	104.2	56.8	40.0	16.8	10.1
	15	83.6	45.6	40.0	5.6	5.0
	20	70.3	38.3	40.0	-1.7	-2.0
	25	60.9	33.2	40.0	-6.8	-10.2
	30	53.9	29.4	40.0	-10.6	-19.1
100 Year	5	242.7	165.4	40.0	125.4	37.6
	10	178.6	121.7	40.0	81.7	49.0
	15	**142.9**	**97.4**	**40.0**	**57.4**	**51.6**
	20	120.0	81.7	40.0	41.7	50.1
	25	103.8	70.8	40.0	30.8	46.2
	30	91.9	62.6	40.0	22.6	40.7

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM9 (CB 9)

Given:

Area (ha) =	0.10	Release Rate (L/s) =	70.0
C =	0.85		
C (100 YR) =	1.00	Available Storage Volume (m^3) =	3.7

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	5	141.2	31.7	70.0	-38.3	-11.5
	10	104.2	23.4	70.0	-46.6	-28.0
	15	83.6	18.8	70.0	-51.2	-46.1
	20	70.3	15.8	70.0	-54.2	-65.1
	25	60.9	13.7	70.0	-56.3	-84.5
	30	53.9	12.1	70.0	-57.9	-104.2
100 Year	5	242.7	64.3	70.0	-5.7	-1.7
	10	178.6	47.3	70.0	-22.7	-13.6
	15	142.9	37.8	70.0	-32.2	-28.9
	20	120.0	31.8	70.0	-38.2	-45.9
	25	103.8	27.5	70.0	-42.5	-63.8
	30	91.9	24.3	70.0	-45.7	-82.2

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM10 (CB 10)

Given:

Area (ha) =	0.11	Release Rate (L/s) =	80.0
C =	0.79		
C (100 YR) =	0.99	Available Storage Volume (m^3) =	16.6

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	5	141.2	35.6	80.0	-44.4	-13.3
	10	104.2	26.2	80.0	-53.8	-32.3
	15	83.6	21.0	80.0	-59.0	-53.1
	20	70.3	17.7	80.0	-62.3	-74.8
	25	60.9	15.3	80.0	-64.7	-97.0
	30	53.9	13.6	80.0	-66.4	-119.6
100 Year	5	242.7	76.4	80.0	-3.6	-1.1
	10	178.6	56.2	80.0	-23.8	-14.3
	15	142.9	45.0	80.0	-35.0	-31.5
	20	120.0	37.8	80.0	-42.2	-50.7
	25	103.8	32.7	80.0	-47.3	-71.0
	30	91.9	28.9	80.0	-51.1	-91.9

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM11 (CB 11)

Given:

Area (ha) =	0.12	Release Rate (L/s) =	80.0
C =	0.70		
C (100 YR) =	0.88	Available Storage Volume (m^3) =	66.9

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	5	141.2	31.8	80.0	-48.2	-14.5
	10	104.2	23.4	80.0	-56.6	-33.9
	15	83.6	18.8	80.0	-61.2	-55.1
	20	70.3	15.8	80.0	-64.2	-77.0
	25	60.9	13.7	80.0	-66.3	-99.4
	30	53.9	12.1	80.0	-67.9	-122.2
100 Year	5	242.7	68.3	80.0	-11.7	-3.5
	10	178.6	50.2	80.0	-29.8	-17.9
	15	142.9	40.2	80.0	-39.8	-35.8
	20	120.0	33.7	80.0	-46.3	-55.5
	25	103.8	29.2	80.0	-50.8	-76.2
	30	91.9	25.8	80.0	-54.2	-97.5

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM12 (CB 12)

Given:

Area (ha) =	0.08	Release Rate (L/s) =	55.0
C =	0.89		
C (100 YR) =	1.00	Available Storage Volume (m^3) =	4.6

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	5	141.2	28.3	55.0	-26.7	-8.0
	10	104.2	20.9	55.0	-34.1	-20.5
	15	83.6	16.8	55.0	-38.2	-34.4
	20	70.3	14.1	55.0	-40.9	-49.1
	25	60.9	12.2	55.0	-42.8	-64.2
	30	53.9	10.8	55.0	-44.2	-79.5
100 Year	5	242.7	54.5	55.0	-0.5	-0.2
	10	178.6	40.1	55.0	-14.9	-8.9
	15	142.9	32.1	55.0	-22.9	-20.6
	20	120.0	26.9	55.0	-28.1	-33.7
	25	103.8	23.3	55.0	-31.7	-47.5
	30	91.9	20.6	55.0	-34.4	-61.9

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM13 (CB 13)

Given:

Area (ha) =	0.11	Release Rate (L/s) =	80.0
C =	0.79		
C (100 YR) =	0.99	Available Storage Volume (m^3) =	16.6

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	5	141.2	35.5	80.0	-44.5	-13.4
	10	104.2	26.2	80.0	-53.8	-32.3
	15	83.6	21.0	80.0	-59.0	-53.1
	20	70.3	17.7	80.0	-62.3	-74.8
	25	60.9	15.3	80.0	-64.7	-97.0
	30	53.9	13.6	80.0	-66.4	-119.6
100 Year	5	242.7	76.3	80.0	-3.7	-1.1
	10	178.6	56.1	80.0	-23.9	-14.3
	15	142.9	44.9	80.0	-35.1	-31.6
	20	120.0	37.7	80.0	-42.3	-50.8
	25	103.8	32.6	80.0	-47.4	-71.1
	30	91.9	28.9	80.0	-51.1	-92.0

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM14 (CB 14)

Given:

Area (ha) =	0.10	Release Rate (L/s) =	80.0
C =	0.81		
C (100 YR) =	1.00	Available Storage Volume (m^3) =	66.7

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	5	141.2	30.3	80.0	-49.7	-14.9
	10	104.2	22.3	80.0	-57.7	-34.6
	15	83.6	17.9	80.0	-62.1	-55.9
	20	70.3	15.1	80.0	-64.9	-77.9
	25	60.9	13.1	80.0	-66.9	-100.4
	30	53.9	11.6	80.0	-68.4	-123.2
100 Year	5	242.7	64.3	80.0	-15.7	-4.7
	10	178.6	47.3	80.0	-32.7	-19.6
	15	142.9	37.9	80.0	-42.1	-37.9
	20	120.0	31.8	80.0	-48.2	-57.9
	25	103.8	27.5	80.0	-52.5	-78.7
	30	91.9	24.3	80.0	-55.7	-100.2

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM15 + STM16 (DICB 15)

Given:

Area (ha) =	0.07	Release Rate (L/s) =	30.0
C =	0.26		
C (100 YR) =	0.32	Available Storage Volume (m^3) =	18.3

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	5	141.2	7.4	30.0	-22.6	-6.8
	10	104.2	5.5	30.0	-24.5	-14.7
	15	83.6	4.4	30.0	-25.6	-23.0
	20	70.3	3.7	30.0	-26.3	-31.6
	25	60.9	3.2	30.0	-26.8	-40.2
	30	53.9	2.8	30.0	-27.2	-48.9
100 Year	5	242.7	15.9	30.0	-14.1	-4.2
	10	178.6	11.7	30.0	-18.3	-11.0
	15	142.9	9.4	30.0	-20.6	-18.5
	20	120.0	7.9	30.0	-22.1	-26.5
	25	103.8	6.8	30.0	-23.2	-34.8
	30	91.9	6.0	30.0	-24.0	-43.1

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM17 (DICB 17)

Given:

Area (ha) =	0.07	Release Rate (L/s) =	30.0
C =	0.27		
C (100 YR) =	0.34	Available Storage Volume (m^3) =	16.0

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	5	141.2	6.9	30.0	-23.1	-6.9
	10	104.2	5.1	30.0	-24.9	-15.0
	15	83.6	4.1	30.0	-25.9	-23.3
	20	70.3	3.4	30.0	-26.6	-31.9
	25	60.9	3.0	30.0	-27.0	-40.6
	30	53.9	2.6	30.0	-27.4	-49.3
100 Year	5	242.7	14.7	30.0	-15.3	-4.6
	10	178.6	10.8	30.0	-19.2	-11.5
	15	142.9	8.7	30.0	-21.3	-19.2
	20	120.0	7.3	30.0	-22.7	-27.3
	25	103.8	6.3	30.0	-23.7	-35.5
	30	91.9	5.6	30.0	-24.4	-44.0

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - STM18 (ROOF 1)

Given:

Area (ha) =	0.06	Release Rate[*5] (L/s) =	2.3
C =	0.90		
C (100 YR) =	1.00	Available Storage Volume[*6] (m^3) =	n/a

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	25	60.9	8.7	2.3	6.4	9.6
	30	53.9	7.7	2.3	5.4	9.7
	35	**48.5**	**6.9**	**2.3**	**4.6**	**9.7**
	40	44.2	6.3	2.3	4.0	9.6
	45	40.6	5.8	2.3	3.5	9.5
	50	37.7	5.4	2.3	3.1	9.3
100 Year	50	64.0	10.1	2.3	7.8	23.5
	55	59.6	9.4	2.3	7.2	23.6
	60	**55.9**	**8.8**	**2.3**	**6.6**	**23.6**
	65	52.6	8.3	2.3	6.1	23.6
	70	49.8	7.9	2.3	5.6	23.5
	75	47.3	7.5	2.3	5.2	23.4

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)
5. Roof release rate based on assumed roof drain rate of 40 L/s/ha.
6. Available roof storage volume to be confirmed by others.

Storage Volume Calculations - STM19 (ROOF 2)

Given:

Area (ha) =	0.66	Release Rate[*5] (L/s) =	26.2
C =	0.90		
C (100 YR) =	1.00	Available Storage Volume[*6] (m^3) =	n/a

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
5 Year	25	60.9	99.9	26.2	73.6	110.5
	30	53.9	88.4	26.2	62.2	112.0
	35	**48.5**	**79.6**	**26.2**	**53.3**	**112.0**
	40	44.2	72.5	26.2	46.2	111.0
	45	40.6	66.6	26.2	40.4	109.1
	50	37.7	61.7	26.2	35.5	106.6
100 Year	50	64.0	116.5	26.2	90.3	270.9
	55	59.6	108.6	26.2	82.4	272.0
	60	**55.9**	**101.8**	**26.2**	**75.6**	**272.2**
	65	52.6	95.9	26.2	69.7	271.8
	70	49.8	90.7	26.2	64.5	270.9
	75	47.3	86.1	26.2	59.9	269.5

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Available storage volume calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)
5. Roof release rate based on assumed roof drain rate of 40 L/s/ha.
6. Available roof storage volume to be confirmed by others.

HYDRAULIC GRADE LINE COMPUTATION FORM

From Manhole	To Manhole	U/S Invert	D/S Invert	U/S Obvert	D/S Obvert	Slope	TW	Diameter D_o	Area	Hydraulic Radius	5 Year Peak Flow Q_o	Length L_o	Velocity V_o	Velocity Head $V_o^2/2g$	Friction Slope Sf_o	Friction Loss H_f	Angle of Deflection at U/S MH	Hydraulic Loss at MH*[1]	EGL_o	EGL_i	HGL_o	HGL_i	Ground Elev.	Surcharge Depth	Free Board
		m	m	m	m	m/m	m	m	m^2	m	m^3/s	m	m/s	m	m/m	m	degrees	m	m	m	m	m	m	m	m
EX101	200	101.98	101.86	102.89	102.77	0.0060	103.57	0.914	0.66	0.23	1.3476	20.0	2.05	0.22	0.0051	0.102	50	0.0989	103.79	103.99	103.57	103.77	105.93	0.88	2.16
200	205	102.19	102.04	103.10	102.95	0.0050	103.77	0.914	0.66	0.23	1.2194	30.1	1.86	0.18	0.0042	0.126	90	0.2325	103.95	104.31	103.77	104.13	106.10	1.03	1.97
205	201	102.64	102.34	103.40	103.10	0.0044	104.13	0.762	0.46	0.19	0.7310	68.0	1.60	0.13	0.0040	0.269	0	0.0026	104.26	104.53	104.13	104.40	106.21	1.00	1.81
201	202	102.90	102.67	103.66	103.43	0.0037	104.40	0.762	0.46	0.19	0.6348	62.3	1.39	0.10	0.0030	0.186	0	0.0020	104.50	104.69	104.40	104.59	106.37	0.93	1.78
202	203	103.29	102.96	104.05	103.72	0.0035	104.59	0.762	0.46	0.19	0.6428	93.0	1.41	0.10	0.0031	0.285	90	0.1337	104.69	105.11	104.59	105.01	106.43	0.96	1.42
203	204	103.76	103.32	104.52	104.08	0.0029	105.01	0.762	0.46	0.19	0.5874	150.0	1.29	0.08	0.0026	0.384	0	0.0017	105.09	105.48	105.01	105.39	106.34	0.87	0.95
EX101	200	101.98	101.86	102.89	102.77	0.0060	103.57	0.914	0.66	0.23	1.344	20.0	2.05	0.21	0.0051	0.101	50	0.0984	103.78	103.98	103.57	103.77	105.93	0.88	2.16
200	205	102.19	102.04	103.10	102.95	0.0050	103.77	0.914	0.66	0.23	1.216	30.1	1.85	0.18	0.0042	0.125	90	0.2310	103.94	104.30	103.77	104.13	106.10	1.02	1.97
205	201	102.64	102.34	103.40	103.10	0.0045	104.13	0.762	0.46	0.19	0.720	70.8	1.58	0.13	0.0038	0.272	0	0.0025	104.25	104.53	104.13	104.40	106.21	0.98	1.81
201	208	104.98	103.24	105.28	103.54	4.0000	104.40	0.299	0.07	0.07	0.109	43.5	1.55	0.12	0.0128	0.559	90	0.1613	104.52	105.24	104.40	105.12	106.37	-0.16	1.25
208	BLDG	105.50	105.04	105.75	105.29	3.9700	105.12	0.252	0.05	0.06	0.015	11.6	0.30	0.00	0.0006	0.007	30	0.0010	105.13	105.13	105.12	105.13	107.85	-0.62	2.72
EX101	200	101.98	101.86	102.89	102.77	0.0060	103.57	0.914	0.66	0.23	1.344	20.0	2.05	0.21	0.0051	0.101	50	0.0984	103.78	103.98	103.57	103.77	105.93	0.88	2.16
200	205	102.19	102.04	103.10	102.95	0.0050	103.77	0.914	0.66	0.23	1.216	30.1	1.85	0.18	0.0042	0.125	90	0.2310	103.94	104.30	103.77	104.13	106.10	1.02	1.97
205	206	102.93	102.42	103.62	103.11	0.0055	104.13	0.686	0.37	0.17	0.572	92.9	1.55	0.12	0.0042	0.395	90	0.1612	104.25	104.80	104.13	104.68	106.21	1.07	1.53
206	207	103.78	102.96	104.47	103.65	0.0055	104.68	0.686	0.37	0.17	0.550	150.0	1.49	0.11	0.0039	0.589	0	0.0023	104.79	105.39	104.68	105.27	106.33	0.81	1.06
EX101	200	101.98	101.86	102.89	102.77	0.0060	103.57	0.914	0.66	0.23	1.347	20.0	2.05	0.21	0.0051	0.102	50	0.0989	103.78	103.99	103.57	103.77	105.93	0.88	2.16
200	304	HGL is contained within storm sewer																							

Notes:
1. From "Sewer Bend Loss Coefficient Design Chart", Appendix 6-B, City of Ottawa Sewer Design Guidelines, 2004

Designed: BLM
Checked:
Dwg. Reference:

Project: Maritime-Ontario Distribution Warehouse
Location: 8800 Campeau Drive, KWBP, Ottawa, ON
Project No.: 20027
Date: November 1st, 2020
Page **1 of 1**

From "Sewer Bend Loss Coefficient Design Chart", Appendix 6-B, City of Ottawa Sewer Design Guidelines, 2004

Deflection Angle	Bend Loss Coefficient
0	0.02
30	0.22
50	0.46
90	1.32