Report
Project: 114312-5.2.2

PATHWAYS
BLOCK 225
SERVICING BRIEF

Prepared for The Regional Group
by IBI GROUP

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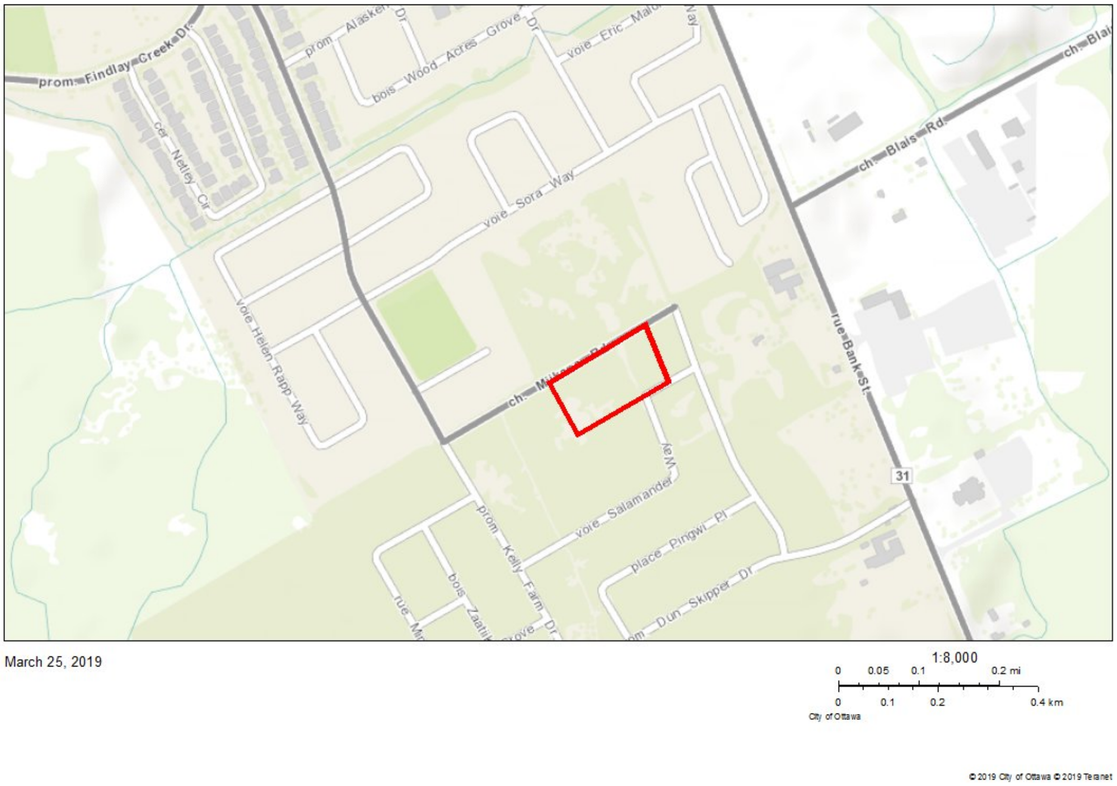
1 INTRODUCTION

Block 225 is located in the south portion of the Leitrim Development Area (LDA), and is part of the Pathways at the Findlay Creek subdivision. IBI Group Professional Services Inc. (IBI Group) has been retained to provide professional engineering services for Block 225. The subject site is approximately 0.90 ha and consists of 34 townhouses.

Block 225 is bounded by Miikana Road to the North, Salamander Way and future park to the south, existing residential land to the east and vacant lands and pathway block to the west. Refer to key plan on **Figure 1.1** for block location.

Figure 1.1 Site Location



The proposed servicing design conforms to current City of Ottawa and MOE design criteria, and no pre-consultation meetings were requested from the Rideau Valley Conservation Authority (RVCA) or the Ministry of Environment of Ontario (MOE).

2 WATER DISTRIBUTION

2.1 Existing Conditions

There is an existing 200mm watermain in Miikana Road to the north of the site, and an existing 250mm watermain in Salamander Way to the south of the site. Two connections to the Miikana Road watermain are proposed for this development.

2.2 Design Criteria

2.2.1 Water Demands

Block 225 consists of 34 townhomes. Per unit population density and consumption rates are taken from **Tables 4.1** and **4.2** of the Ottawa Design Guidelines – Water Distribution and are summarized as follows:

• Single Family	3.4 person per unit
• Townhouse and Semi-Detached	2.7 person per unit
• Average Apartment	1.8 person per unit

• Average Day Demand	350 l/cap/day
• Peak Daily Demand	875 l/cap/day
• Peak Hour Demand	1,925 l/cap/day

A water demand calculation sheet is included in **Appendix A** and the total water demands are summarized as follows:

• Average Day	0.37 l/s
• Maximum Day	0.92 l/s
• Peak Hour	2.04 l/s

2.2.2 System Pressures

The 2010 City of Ottawa Water Distribution Guidelines states that the preferred practice for design of a new distribution system is to have normal operating pressures range between 345 kPa (50 psi) and 552 kPa (80 psi) under maximum daily flow conditions. Other pressure criteria identified in the guidelines are as follows:

Minimum Pressure	Minimum system pressure under peak hour demand conditions shall not be less than 276 kPa (40 psi).
Fire Flow	During the period of maximum day demand, the system pressure shall not be less than 140 kPa (20 psi) during a fire flow event.
Maximum Pressure	Maximum pressure at any point in the distribution system in unoccupied areas shall not exceed 689 kPa (100 psi). In accordance with the Ontario Building/Plumbing Code the maximum pressure should not exceed 552 kPa (80 psi) in occupied areas. Pressure reduction controls may be required for buildings where it is not possible/feasible to maintain the system pressure below 552 kPa.

2.2.3 Fire Flow Rate

In the recent Technical Bulletin 'ISDTB-2014-02, Revisions to Ottawa Design Guidelines – Water,' the fire flow requirements for single detached dwellings and traditional town and row houses can be capped at 10,000 l/min providing that there is a minimum separation of 10 meters between the backs of adjacent units and that the town and row house blocks are limited to 600 square meters of building areas and seven dwelling units. As the residential units in Block 225 are expected to meet the requirements of ISDTB-2014-02, the fire flow rate of 10,000 1/min (166.7 l/s) is used in the fire flow analysis.

2.2.4 Boundary Conditions

The City of Ottawa has provided hydraulic boundary conditions at the two watermain connections to Miikana Road. The City has provided pre and post configuration values. The pre-configuration has the highest maximum HGL valve while the post-configuration has the lower values for peak hour and fire and is used in the analysis. A copy of the Boundary Condition is included in **Appendix A** and summarized as follows:

CRITERIA	HYDRAULIC HEAD	
	CONNECTION 1	CONNECTION 2
Max HGL (Basic Day)	158.3 m	158.3 m
Peak Hour	146.8 m	146.8 m
Max Day + Fire (10,000 l/m)	140.4 m	136.3 m

2.2.5 Hydraulic Model

A computer model for the Block 225 water distribution system has been developed using the InfoWater SA program. The model includes the boundary conditions at Miikana Road and the Private Road.

2.3 Proposed Water Plan

2.3.1 Hydraulic Analysis

Hydraulic analysis was completed using the computer model with the water demands and fire flow rates determined in Sections 2.2.1 and 2.2.3. Fire protection for this site is provided by existing hydrants on Miikana Road and Salamander Way. These hydrants where installed in the Pathways sub-division and the hydraulic analysis is included in the "Design Brief, Pathways at Findlay Creek, 4800 Bank Street (Remer Lands), Phase 1, Leitrim Development Area" August 2017 by IBI Group. Results of the Pathways fire flow analysis and results of the basic day and peak hour scenarios from the Block 225 water model are included in **Appendix A**.

2.3.2 Summary of Results

Results of the hydraulic analysis are summarized as follows:

Pressures (kPa)

- Basic Day (Max HGL)	609.5 – 618.3
- Peak Hour	496.8 – 505.6

Minimum Fire Flow @ 140 kPa Residual Pressure 235.9 l/s.
(From Pathways Design Brief)

A comparison of the results and design criteria is summarized as follows:

Maximum Pressure	All nodes have basic day pressure above 552 kPa, therefore, it is recommended that that all residential units in require pressure reducing valves. The maximum system pressure recorded in the model is 632.9 kPa, the maximum allowable pressure of 689 kPa has not been exceeded in the water distribution system.
Minimum Pressure	All nodes exceed the minimum requirement of 276 kPa during peak hour conditions.
Fire Flow	The minimum design fire flow with a minimum residual pressure of 140 kPa on the existing Miikana Road watermain adjacent to the site is 235.9 l/s which exceeds the requirement of 166.7 l/s (10,000 l/min).

3 WASTEWATER

3.1 Existing Conditions

The Leitrim Pump Station is the wastewater outlet for all developed lands within the LDA, including the subject property. In 2002, the City constructed the station, associated forcemains and outlet sewers in Bank Street and Conroy Road. Sewage from the LDA outlets to the Conroy Road Trunk Sewer eventually discharging to a sewage treatment plant located near the Ottawa River. The Pathways Phase 1 report prepared by IBI Group dated July 2017 confirmed that the existing 375mm Kelly Farm Drive sewer has sufficient capacity for not only the Pathways at Findlay Creek property inclusive of the proposed development.

3.1.1 Verification of Existing Sanitary Sewer Capacity

There is an existing 300mm sanitary sewer in Miikana Road, which connects to the existing 375 mm diameter sub-trunk sewer in Kelly Farm Drive. In the previous Pathways Phase 1 report, the design population for Block 225 was 115.2, see **Appendix B**. In the new site plan, the total population is 91.8, which is less than that of previous report. The block area remains unchanged. Therefore, the existing sanitary sewer has adequate capacity for the subject site, and there will be no negative effect to the downstream sanitary system.

3.1.2 Sanitary Hydraulic Grade Line

Pathways Phase 1 report indicates that the sanitary hydraulic grade line (HGL) in MH 6101A on Miikana Road is 92.39, refer to **Appendix B** for the Pathways Phase 1 Sanitary HGL analysis. The sanitary HGL extended through the subject site have been calculated as follows:

LOCATION	MH #	USF ELEV (M)	SANITARY HGL (M)	FREEBOARD (M)
Miikana Road			92.390	
Private Road	5A	93.70	92.390	1.31
Private Road	4A	93.70	92.391	1.31
Private Road	3A	94.16	92.397	1.76
Private Road	2A	94.26	92.391	1.87
Private Road	1A	94.26	92.711	1.55

All underside of footing elevations have been designed to provide a minimum of 300mm separation between the greater of governing pipe obvert or governing HGL. A copy of the sanitary HGL analysis for Block 225 is provided in **Appendix B**.

3.2 Proposed Sewers

All on-site sewers have been designed to City of Ottawa and MOE design criteria which include but are not limited to the below listed criteria. A copy of the detailed sanitary tributary area plan 400 and the sanitary sewer design sheets are included in **Appendix B** illustrate the population densities and sewers which provide the necessary outlets.

3.2.1 Design Flow:

Average Residential Flow	-	280 l/cap/day
Peak Residential Factor	-	Harmon Formula
Infiltration Allowance	-	0.33 l/sec/Ha

Minimum Pipe Size - 200mm diameter

3.2.2 Population Density:

Single Family - 3.4 person/unit

Townhouse Units - 2.7 person/unit

Apartment Units - 1.8 person/unit

External Low Density Land - 120 units/gross Ha

4 SITE STORMWATER MANAGEMENT

4.1 Objective

The purpose of this evaluation is to prepare the dual drainage design, including the minor and major system, for the Block 225 development. The design includes the assignment of inlet control devices, maximum depth of surface ponding and hydraulic grade line analysis. The evaluation takes into consideration the City of Ottawa Sewer Design Guidelines (OSDG) (October 2012), the February 2014 Technical Bulletin ISDTB-2014-01, the September 2016 Technical Bulletin PIEDTB-2016-01 and the June 2018 Technical Bulletin ISTB-2018-04.

4.2 Design Criteria

The stormwater system was designed following the principles of dual drainage, making accommodations for both major and minor flow.

Some of the key criteria include the following:

• Design Storm	1:2 year return (Ottawa)
• Rational Method Sewer Sizing	
• Initial Time of Concentration	10 minutes
• Runoff Coefficients	
- Landscaped Areas	C = 0.25
- Rear Yard	C = 0.50
- Townhouse with Rear Yard and Road	C = 0.65
- Roof/Driveway with Landscaping	C = 0.76
• Pipe Velocities	0.80 m/s to 3.0 m/s
• Minimum Pipe Size	250 mm diameter (200 mm CB Leads)

4.3 System Concept

According to the Pathways Phase 1 report prepared by IBI Group dated July 2017, the development of the adjacent downstream properties included the expected stormwater servicing needs of the subject property. The existing storm sewers constructed adjacent to the site were oversized to provide the needed capacity for minor storm runoff from the subject site. Minor storm runoff from the subject site will connect to the existing 2400 mmØ sewer in Miikana Road.

4.3.1 Dual Drainage Design

The dual drainage system proposed for the subject site will accommodate both major and minor stormwater runoff. Minor flow from the subject site will be conveyed through the storm sewer network and discharge into the existing 2400 mmØ sewer in Miikana Road.

The balance of the surface flow not captured by the minor system will be conveyed via the major system. Where possible, storage will be provided in street sags or low points within the roadway and once the maximum storage is utilized, the excess flow will cascade to the next downstream street sag. Major flow up to 100-year storm event will be restricted and detained on-site. Emergency overflow will be directed towards Miikana Road.

4.3.2 Proposed Minor System

Using the criteria identified in Section 4.2, the proposed on-site storm sewers were sized accordingly. A detailed storm sewer design sheet and the associated storm sewer drainage area plan is included in **Appendix C**. The general plan of services, depicting all on-site storm sewers can be found in **Appendix A**.

The owner of the site will be responsible for regular maintenance of the on-site sewers, catch basins and inlet control devices (ICDs). Maintenance includes but is not limited to the cost of regular cleaning the structures and ICDs as necessary. The site owner will also be responsible for replacement of damaged or missing catch basin structures, grates or ICDs as needed. Confirmation from the owners will be forwarded directly to the City upon receipt.

4.4 Stormwater Management

4.4.1 Water Quantity Control

The subject site is part of the larger development referred to as the Leitrim Development Area. The stormwater management strategy was outlined in the following reports:

- Addendum to Leitrim Development Area Stormwater Management Environmental Study Report and Pre-Design Volumes 1 and II (IBI Group, July 2005);
- Design Brief and Amendment to MOE Certificate of Approval Findlay Creek Village Stormwater Facility (IBI Group, July 2005);
- Final Serviceability Report Leitrim Development Area City of Ottawa (IBI Group, March 2007).
- 2016 Final Updated Serviceability Report (Class EA OPA76 Areas 8a, 9a and 9b) Leitrim Development Area (IBI Group, September 2016)

The subject site is part of the drainage area which ultimately discharges into the existing Findlay Creek Village Stormwater Facility. The Findlay Creek Village Stormwater Facility was constructed in 2006 and provides water quality control to an Enhanced Level of Protection according to MOE Stormwater Management Planning and Design Guidelines (March 2003).

4.4.2 Water Quantity Control

The subject site will be limited to a release rate of 190 L/s according to Pathways at Findlay Creek Design Brief dated July, 2017. This will be achieved through a combination of inlet control devices (ICD's) at inlet locations, surface storage where possible and underground storage where required.

Surface flows in excess of the site's allowable release rate will be stored on site in strategic surface storage areas or oversized underground pipes and gradually released into the minor system to respect the site's allowable release rate. No overflow is allowed for up to 1:100 year storm event. The maximum surface retention depth located within the developed areas will be limited to 300mm during a 1:100 year event as show on the ponding and grading plans located in **Appendix C.** Overland flow routes will be provided in the grading to permit emergency overland flow.

At the northeast corner of the site, the opportunity to store or capture runoff is limited due to grading constraints and building geometry, and will discharge to Miikana Road uncontrolled. These locations are generally located at the perimeter of the site where it is necessary to tie into public boulevards and adjacent properties or in areas where ponding stormwater is undesirable. These "uncontrolled" areas – 0.01 hectares in total, have an average C value of 0.25. Based on 1:100 year storm uncontrolled flows, the uncontrolled areas generate 1.12 l/s runoff (refer to Section 4.5 for calculation).

4.5 Inlet Controls

The allowable release rate for the 0.68 Ha site is 190 L/s according to previous Pathways Phase 1 report, See Table 4.5 in **Appendix C**. As noted in Section 4.4, a portion of the site will be left to discharge to the Miikana Road at an uncontrolled rate.

Based on a 1:100 year event, the flow from the 0.01 Ha uncontrolled area can be determined as:

$Q_{uncontrolled}$ = $\mathbf{2.78} \times \mathbf{C} \times \mathbf{i_{100yr}} \times \mathbf{A}$ where:

C = Average runoff coefficient of uncontrolled area = 0.25

$\mathbf{i_{100yr}}$ = Intensity of 100-year storm event (mm/hr)

= $1735.688 \times (T_c + 6.014)^{0.820}$ =178.56 mm/hr; where T_c = 10 minutes

A = Uncontrolled Area = 0.01 Ha

Therefore, the uncontrolled release rate can be determined as:

$Q_{uncontrolled}$ = $\mathbf{2.78} \times \mathbf{C} \times \mathbf{i_{100yr}} \times \mathbf{A}$

= 2.78 x 0.25 x 178.56 x 0.01

=**1.12 L/s**

The maximum allowable release rate from the remainder of the site can then be determined as:

$Q_{max\ allowable}$ = $Q_{restricted} - Q_{uncontrolled}$

= 190.00 L/s – 1.12 Ls

= **188.88 L/s**

Based on the aforementioned flow allowance, 9 inlet control devices are proposed for all of the surface drainage. Refer to stormwater management calculations in **Appendix C**. The sum of all restricted flow rates (**188.36 l/s**) is less than the maximum allowable flowrate of 188.88 l/s. Refer to **Appendix C** for detailed calculations and orifice sizing.

Table 4.1 Summary of ICD

LOCATION	AREA (HA)	RELEASE RATE	HEAD (M)	ICD
Area 1	0.316	48.91	3.251	Custom IPEX MHF 114mm Diameter
Area 2-1	0.103	17.01	1.400	Standard IPEX MHF 83mm Diameter
Area 2-2	0.103	33.78	1.380	2 x Standard IPEX MHF 83mm Diameter
Area 2-3	0.092	33.54	1.360	2 x Standard IPEX MHF 83mm Diameter
Area 3	0.081	17.43	1.470	Standard IPEX MHF 83mm Diameter
Area 3R	0.135	16.40	1.300	Standard IPEX MHF 83mm Diameter
Area 5R	0.099	21.28	2.190	Standard IPEX MHF 83mm Diameter
TOTAL	**0.929**	**188.36 l/s**	-	Standard IPEX MHF 83mm Diameter

4.6 Hydrological Evaluation

The hydrological analysis of the proposed dual drainage system was conducted using DDSWMM to confirm the on-site storage requirements for the site. This technique offers a single storm event flow generation and routing. Land use, selected modeling routines, and input parameters are discussed in the following sections. Model files are included on the CD enclosed in Appendix C.

The primary focus of the hydrological analysis was to confirm the on-site storage volume required to satisfy the allowable minor system release from the site. The main hydrological parameters for the subject site are summarized below.

Storms and Drainage Area Parameters

The main hydrology parameters are summarized below and in **Table 4.2**. Supporting calculations are presented in **Appendix C**.

- **Design storms:** The site was evaluated using the following storms:
  - 2 year and 5 year, 3 hour Chicago storm events with a 10 minute time step (for dual drainage evaluation, specifically to confirm no ponding after the storm event);
  - 100 year 3 hour Chicago storm event with a 10 minute time step (to confirm on-site storage requirements); and
  - 100 year 3 hour Chicago storm event + 20% increase in intensity with a 10 minute time step (for a stress test on major flow conveyance as per the City of Ottawa Sewer Design Guidelines).
- **Infiltration:** The selected infiltration losses are consistent with the City of Ottawa Sewer Design Guidelines. The Horton values are as follows: f_o = 76.2 mm/h, f_c = 13.2 mm/h, k = 0.00115 s^{-1}.
- **Area:** Catchment areas are based on the rational method drainage areas with some minor modifications for modelling purposes.
- **Imperviousness:** Imperviousness for the subject site is based on the rational method runoff coefficients as indicated within Drawing 500.
- **Width:** The catchment width was based on the conveyance route length of the drainage area and multiplied by two. The multiplier of two was only used if the drainage area had runoff contribution from both sides of the drainage area.
- **Slope:** The ground slope was based upon the average slope for both impervious and pervious area. Generally, the slope is approximately 2% (0.02 m/m). This assumes a slope of approximately 1% for impervious or road surfaces and 3% for pervious surfaces (lot grading).
- **Detention storage depth:** Detention storage depths of 1.57 mm and 4.67 mm were used for impervious and pervious areas, respectively.
- **Manning's roughness:** Manning's roughness coefficients of 0.013 and 0.25 were used for impervious and pervious areas, respectively.
- **Baseflow:** No baseflow components were assumed for any of the areas contributing runoff to the minor system.
- **Minor system capture:** The minor system capture is based on the ICD design. ICDs are incorporated into the design to maintain the allowable release rate into the existing downstream storm sewer system to protect the minor system from surcharge during infrequent storm events and to utilize the available on-site storage.

  The main hydrological parameters used in the DDSWWM model are summarized in **Table 4.2**. A CD of the model files is provided in **Appendix C**.

- **Major system storage and routing:** The subject site is comprised of sawtooth road profiles and underground storage. Flow is attenuated within low points with potential overflow cascading to the next segment downstream. The total volume at each low point, up to the overflow depth, is the maximum static storage.

  For street segments with ponding, cascading overflow from a low point to a downstream segment utilizes the static storage available plus an additional amount of storage equivalent to the depth required for the flow to cascade over the downstream high point. The attenuation in street sags was evaluated to account for static storage and, if overflow occurs, dynamic storage. Within this report it is referred to as double routing.

  DDSWMM does not have a direct way of coding double routing since it does not allow the user to code dynamic storage over the high point. For this analysis, the method employed is that recommended in the February 2014 City of Ottawa Technical Bulletin (PIEDTB-2016-01). It accounts for overflow from a street segment (regular static storage at a sag) being conveyed to a downstream dummy segment. In other words, a regular low point segment is provided with a downstream dummy segment for further flow attenuation to account for the dynamic ponding during overflow.

  There are no drainage area attributes associated with the dummy segment since it is a segment solely for routing. In addition, there is no inflow to the minor system from these dummy segments. The overflow hydrograph from the upstream catchment is routed in the dummy segment to the next "real" downstream segment. The dummy segments have the following specific characteristics:

  - Segment Length: Equivalent to the length of the maximum static storage from the street segment contributing to it.

  - Road Type: Equivalent to the right-of-way characteristics from the segment contributing to it, but with a longitudinal slope of 0.01% (0.0001 m/m).

  The dummy segments for major system routing have been applied to the analysis of the subject site. The segments are referenced as D1, D2, D3, etc. within the DDSWMM modelling file. The drainage area plan presented in **Drawing 500** does not show the dummy segments, but the DDSWMM output file shows the dummy segments immediately following the corresponding major segment which cascades into that dummy segment.

  Rear yards were considered independently of street segments and rear yard catch basins were incorporated in the DDSWMM model. Simulations were based on the total interception of runoff by the storm inlets. This was done by specifying a one-to-one relationship between approach flow and capture flow. For this particular case, underground storage volumes in rear yards was accounted for as available on-site storage. As per the Technical Bulletin (PIEDTB-2016-01), the effect of flow attenuation due to surface ponding in rear yards has been accounted for by utilizing a constant slope ditch/swale draining to the street. The ditch/swale has a minimum longitudinal slope of 1.5%, a maximum depth of 600mm, and side slopes of 3 horizontal to 1 vertical.

Table 4.2 DDSWMM Hydrological Parameters

DRAINAGE AREA ID	AREA (HA)	D/S SEGMENT ID	IMP RATIO [Tp (h)]	Segment Length (m)	Subcatchment WIDTH (M)	MINOR SYSTEM RESTRICTION (CMS)	AVAILABLE STATIC PONDING (M^3)
1A (1)	0.316	OUT1	0.64	5	10	48.91	61.1
2A (2-1)	0.103	1A	0.80	29.27	58.54	17.01	6.8
2B (2-2)	0.103	2C	0.80	27.14	54.28	33.78	5.5
2C (2-3)	0.092	1A	0.80	25.97	51.94	33.54	4.8
3A (3)	0.081	1A	0.80	52.83	105.66	17.43	8.2
3R	0.135	2A	0.43	95.8	191.6	16.4	13.0
5R	0.099	OUT2	0.43	65.72	131.44	21.28	8.6
UN1	0.009	OUT3	0.10	33.1	66.2	N/A	N/A

4.7 Results of the Hydrological Evaluation

The results of the DDSWMM major system evaluation are summarized in the following sections.

The below **Table 4.3** and **Table 4.4** summarizes the minor system capture for each subcatchment on the subject site for the 2 year and 5 year, 3 hour Chicago storm events. That table demonstrates that there is no ponding on the streets following the storm event.

Table 4.3 DDSWMM Hydrological Model Results for 2 Year 3 Hour Chicago

DRAINAGE AREA ID	MINOR SYSTEM RESTRICTION (l/s)	AVAILABLE STATIC STORAGE (m3)	MINOR SYSTEM CAPTURE	TOTAL STORAGE USED (m3)	OVERFLOW (l/s)
1A (1)	48.91	37.38	28	0	0
2A (2-1)	17.01	3.62	15	0	0
2B (2-2)	33.78	2.34	15	0	0
2C (2-3)	33.54	1.58	14	0	0
3A (3)	17.43	4.99	13	0	0
3R	16.4	13.0	12	0	0
5R	21.28	4.5	9	0	0
UN1	N/A	N/A	N/A	0	0

Table 4.4 DDSWMM Hydrological Model Results for 5 Year 3 Hour Chicago

DRAINAGE AREA ID	MINOR SYSTEM RESTRICTION (l/s)	AVAILABLE STATIC STORAGE (m3)	MINOR SYSTEM CAPTURE	TOTAL STORAGE USED (m3)	OVERFLOW (l/s)
1A (1)	48.91	37.38	40	0	0
2A (2-1)	17.01	3.62	17	1.65	0
2B (2-2)	33.78	2.34	21	0	0
2C (2-3)	33.54	1.58	19	0	0
3A (3)	17.43	4.99	17	0	0
3R	16.4	13.0	16	0	0
5R	21.28	4.5	12	0	0
UN1	N/A	N/A	N/A	0	0

The below **Table 4.5** and **Table 4.6** summarize the cascading overflows for each subcatchment on the subject site for the 100 year 3 hour Chicago storm event and the 100 year Chicago storm increased by 20%, respectively. The cascading overflow is the flow exiting a drainage area when maximum minor system inflow and maximum available ponding has been utilized. The overflow is obtained from the respective DDSWMM output file and is noted in the title in the tables below.

Table 4.5 DDSWMM Hydrological Model Results for 100 Year 3 Hour Chicago

DRAINAGE AREA ID	MINOR SYSTEM RESTRICTION (l/s)	AVAILABLE STATIC STORAGE (m3)	MINOR SYSTEM CAPTURE	TOTAL STORAGE USED (m3)	OVERFLOW (l/s)
1A (1)	48.91	37.38	49	37.38	0
2A (2-1)	17.01	3.62	17	3.62	26
2B (2-2)	33.78	2.34	34	1.42	0
2C (2-3)	33.54	1.58	34	0.17	0
3A (3)	17.43	4.99	17	4.99	2
3R	16.4	13.0	16	13.0	18
5R	21.28	8.61	21	4.06	0
UN1	N/A	N/A	N/A	0	3

The above results indicate that the major system is contained on-site during the 100 year 3 hour Chicago design storm with no major flow from the site in accordance with the previous analysis presented within the Pathways Design Brief.

Table 4.6 DDSWMM Hydrological Model Results for 100 Year 3 Hour Chicago +20%

DRAINAGE AREA ID	MINOR SYSTEM RESTRICTION (l/s)	AVAILABLE STATIC STORAGE (m3)	MINOR SYSTEM CAPTURE	TOTAL STORAGE USED (m3)	OVERFLOW (l/s)
1A (1)	48.91	37.38	49	37.38	97
2A (2-1)	17.01	3.62	17	3.62	38
2B (2-2)	33.78	2.34	34	2.34	16
2C (2-3)	33.54	1.58	34	1.58	20
3A (3)	17.43	4.99	17	4.99	24
3R	16.4	13.0	16	13	26
5R	21.28	8.61	21	8.61	9
UN1	N/A	N/A	N/A	0	3

The above results indicate that the major system flow from the site (summation of 1A, 5R and UN1) is 109 L/s during the 100 year 3 hour Chicago + 20% sensitivity analysis. This closely corresponds to the previous analysis within the Pathways Design Brief, which included an overflow of 128 L/s generated from the site.

The following table summarizes the elevation of dynamic ponding, property line elevation and the garage elevations for the street segments during the 100 year storm event increased by 20%.

Table 4.7 Critical Ponding Locations during the Stress Test and Adjacent Property Elevations

DRAINAGE AREA ID	STATIC PONDING DEPTH (M)	MAX. DEPTH (STATIC + DYNAMIC, WHERE APPLICABLE) (M)	(1) CORRESPONDING ELEVATION (M)	(2) ADJACENT PROPERTY LINE ELEVATION (M)	DIFFERENCE (2) – (1)	(3) ADJACENT CRITICAL ELEVATION		DIFFERENCE (3) – (1)
						LOCATION	(3) ELEVATION (M)	
1A (1)	0.08	0.17	95.41	95.33	-0.08	Block G	95.55	0.14
2A (2-1)	0.10	0.16	96.16	95.98	-0.18	Block A/D	96.30	0.14
2B (2-2)	0.08	0.12	96.12	96.00	-0.12	Block B/E/F	96.30	0.18
2C (2-3)	0.06	0.11	96.08	96.04	-0.04	Block C/F	96.30	0.22
3A (3)	0.17	0.22	96.12	95.81	-0.31	Block H	96.20	0.08

From the comparison in **Table 4.7**, during the 100 year storm event increased by 20%, the major system encroaches the adjacent property line, but remains below the garage opening at all locations .

4.8 Storm Hydraulic Grade Line

Pathways Phase 1 report indicates that the storm hydraulic grade line (HGL) in MH 6102 on Miikana Road is 91.47, refer to **Appendix C** for the Pathways Phase 1 Storm HGL analysis. The storm HGL extended through the subject site have been calculated as follows:

LOCATION	MH #	USF ELEV (M)	STORM HGL (M)	FREEBOARD (M)
Miikana Road			91.470	
Private Road	5	93.70	91.593	2.11
Private Road	4	93.70	92.516	1.18
Private Road	3	94.16	93.080	1.08
Private Road	2	94.26	92.869	1.39
Private Road	1	94.26	93.855	0.41

All underside of footing elevations have been designed to provide a minimum of 300mm separation between the greater of governing pipe obvert or governing HGL. A copy of the storm HGL analysis for Block 225 is provided in **Appendix C**.

5 SOURCE CONTROLS

5.1 General

On site level or source control management of runoff will be provided to provide quality control for the subject lands. Such controls or mitigative measures are proposed for the development not only for final development but also during construction and build out. Some of these measures are:

- flat lot grading;
- split lot drainage;
- Roof-leaders to vegetated areas;
- vegetation planting; and
- groundwater recharge.

5.2 Lot Grading

Residential lots within the development will typically make use of the split drainage runoff concept. In accordance with local municipal standards, all lot grading will be between two and seven percent. All front yard drainage will be directed over landscaped front yards to the roadway system and all rear yard drainage will be directed to a swale drainage system. Typically swales will have slopes of 2%. These measures all serve to encourage individual lot infiltration. Copies of the grading plans have been included in **Appendix D.**

5.3 Roof Leaders

This development will consist of townhomes. It is proposed that roof leaders from these units be constructed such that runoff is directed to grass areas adjacent to the units. This will promote water quality treatment through settling, absorption, filtration and infiltration and a slow release rate to the conveyance network.

5.4 Vegetation

As with most subdivision agreements, the developer will be required to complete a vegetation and planting program. Vegetation throughout the development including planting along roadsides and within public parks provides opportunities to re-create lost natural habitat.

6 CONVEYANCE CONTROLS

6.1 General

Besides source controls, the development also proposes to use several conveyance control measures to improve runoff quality. These will include:

- flat vegetated swales;
- catchbasin and maintenance hole sumps; and
- pervious rear yard drainage.

6.2 Flat Vegetated Swales

The development will make use of relatively flat vegetated swales where possible to encourage infiltration and runoff treatment.

6.3 Catchbasins

All catchbasins within the development, either rear yard or street, will be constructed with minimum 600 mm deep sumps. These sumps trap pollutants, sand, grit and debris which can be mechanically removed prior to being flushed into the minor pipe system. Both rear yard and street catchbasins will be fabricated to OPSD 705.010 or 705.020. All storm sewer maintenance holes servicing local sewers less than 900 mm diameter shall be constructed with a 300 mm sump as per City standards. All street catchbasins should be constructed with two 6m long 450mm diameter perforated subdrains to provide extra stormwater storage.

6.4 Pervious Rear Yard Drainage

Some of the rearyard swales make use of a filter wrapped perforated drainage pipe constructed below the rear yard swale. This perforated system is designed to provide some ground water recharge and generally reduce both volumetric and pollutant loadings that enter the minor pipe system. Typically, a 250 mm diameter perforated pipe wrapped in filter sock is constructed in a crushed clear stone surround at an invert elevation of approximately 0.8 m below grade. However, for the subject development, subdrains in south and east backyards have been oversized to 450mm diameter perforated pipes. In the north backyards, the subdrains have been oversized to 825mm diameter non-perforated pipes to provide adequate storage for stormwater. These pipes are in turn directly connected to rear yard catchbasins structures with solid grates located within the street, at regular intervals as per City Standards.

7 SEDIMENT AND EROSION CONTROL PLAN

7.1 General

During construction, existing stream and conveyance systems can be exposed to significant sediment loadings. Although construction is only a temporary situation, it is proposed to introduce a number of mitigative construction techniques to reduce unnecessary construction sediment loadings. These will include:

- groundwater in trench will be pumped into a filter mechanism prior to release to the environment;
- bulkhead barriers will be installed at the nearest downstream manhole in each sewer which connects to an existing downstream sewer;
- seepage barriers will be constructed in any temporary drainage ditches; and
- silt sacks will remain on open surface structure such as manholes and catchbasins until these structures are commissioned and put into use.

7.2 Trench Dewatering

During construction of municipal services, any trench dewatering using pumps will be discharged into a filter trap made up of geotextile filters and straw bales similar in design to the OPSD 219.240 Dewatering Trap. These will be constructed in a bowl shape with the fabric forming the bottom and the straw bales forming the sides. Any pumped groundwater will be filtered prior to release to the existing surface runoff. The contractor will inspect and maintain the filters as needed including sediment removal and disposal and material replacement as needed.

7.3 Bulkhead Barriers

At the first manhole constructed immediately upstream of an existing sewer, a ½ diameter bulkhead will be constructed over the lower half of the outletting sewer. This bulkhead will trap any sediment carrying flows, thus preventing any construction –related contamination of existing sewers. The bulkheads will be inspected and maintained including periodic sediment removal as needed.

7.4 Seepage Barriers

The presence of road side ditches along Terry Fox Drive, Richardson Road and the proximity of the Carp River necessitates the installation of seepage barriers. These barriers will consist of both the Light Duty Straw Bale Barrier as per OPSD 219.100 or the Light Duty Silt Fence Barrier as per OPSD 219.110 and will be installed in accordance with the sediment and erosion control drawing. The barriers are typically made of layers of straw bales or geotextile fabric staked in place. All seepage barriers will be inspected and maintained as needed.

7.5 Surface Structure Filters

All catchbasins, and to a lesser degree manholes, convey surface water to sewers. However, until the surrounding surface has been completed these structures will be covered to prevent sediment from entering the minor storm sewer system. Until rear yards are sodded or until streets are asphalted and curbed, all catchbasins and manholes will be equipped with geotextile filter socks. These will stay in place and be maintained during construction and build until it is appropriate to remove them.

7.6 Stockpile Management

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

During construction of the deeper municipal services, water, sewers and service connections, imported granular bedding materials are temporarily stockpiled on site. These materials are however quickly used up and generally before any catchbasins are installed. Street catchbasins are installed at the time of roadway construction and rearyard catchbasins are usually installed after base course asphalt is placed.

Contamination of the environment as a result of stockpiling of imported construction materials is generally not a concern since these materials are quickly used and the mitigative measures stated previously, especially the use of filter fabric in catchbasins and manholes help to manage these concerns.

The roadway granular materials are not stockpiled on site. They are immediately placed in the roadway and have little opportunity of contamination. Lot grading sometimes generates stockpiles of native materials. However, this is only a temporary event since the materials are quickly moved off site.

The construction of this development will involve a substantial rock blasting, breaking and crushing operation. Given the existing topography, a substantial cut and fill operation is require in order to construction a development that meets City Standards. As part of this operation, materials will be manipulated onsite, and provided the sediment and erosion control measures are in place, are generally inconsequential to the surrounding environment.

8 ROADS AND NOISE ATTENUATION

Vehicular access to Block 225 is provided by two private entrances from Miikana Road and one private from Salamander Way.

There are 8 on-street visitor parking spots provided.

There are no bus routes proposed within Block 225.

Environmental noise has been evaluated by IBI Group, and recommendations are provided under a separate cover.

9 SOILS

Golder Associates Ltd. was retained to prepare a geotechnical investigation for the proposed mixed use development for the Pathways Phase 1. The objectives of the investigation were to prepare a report to:

- Determine the subsoil and groundwater conditions at the site by means of test pits and boreholes and;
- To provide geotechnical recommendations pertaining to design of the proposed development including construction considerations.

The geotechnical report 13-1121-0083-1046 was prepared by Golder Associates Ltd. in January 2014. A copy of the report is included in **Appendix D**. The report contains recommendations which include but are not limited to the following:

- The maximum permissible grade raise is 2.5m
- In areas where finished grade exceeds grade raise limits, geotechnical reviews are required
- Fill placed below the foundations to meet OPSS Granular ‘A’ or Granular ‘B’ Type II placed in 300 mm lifts compacted to 98% SPMDD.
- Fill for roads to be suitable native material in 300mm lifts compared to 95% SPMDD

Pavement Structure:

LOCAL ROAD	THICKNESS
Asphaltic Concrete	90mm
OPSS Granular A Base	150mm
OPSS Granular B Type II Subbase	375mm

- Pipe bedding and cover; bedding to be minimum 150 mm OPSS Granular ‘A’ up to spring line of pipe. Cover to be 300 mm OPSS A (PUC and concrete pipes) or sand for concrete pipes. Both bedding and cover to be placed in maximum 225 mm lifts compacted to 95% SPMDD.

In general the grading plan for Block 225 adheres to the grade raise constraints noted above. A copy of the grading plans is included in **Appendix D**. For areas that exceed the grade raise limit a light weight fill program will be in place.

10 RECOMMENDATIONS

Water, wastewater and stormwater systems required to develop Pathways Block 225 will be designed in accordance with MOE and City of Ottawa's current level of service requirements.

The use of lot level controls, conveyance controls and end of pipe controls outlined in the report will result in effective treatment of surface stormwater runoff from the site. Adherence to the proposed sediment and erosion control plan during construction will minimize harmful impacts on surface water.

Final detail design will be subject to governmental approval prior to construction, including but not limited to the following:

- Block 225 Commence Work Order: City of Ottawa
- Block 225 ECA (sewers): MECP (Transfer of Review)
- Block 225 Watermain Approval: City of Ottawa
- Block 225 Commence Work Order (utilities): City of Ottawa

Report prepared by:

LICENSED PROFESSIONAL ENGINEER
D.G. Yannoulopoulos
PROVINCE OF ONTARIO

Demetrius Yannoulopoulos, P.Eng.
Director

Ryan Magladry, C.E.T.
Project Designer

J:\114312_Block225\5.2 Reports\5.2.2 Civil\5.2.2.1 Sewers\Submission #2\CTR-Servicing Brief_2019-07.docx

APPENDIX A

PLAN 4M-

I CERTIFY THAT THIS PLAN
IS REGISTERED IN THE LAND REGISTRY OFFICE
FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON NO. 4
AT □□□□□O□CLOCK ON THE □□□□DAY OF □□□□□□□□□□□□□□□
AND ENTERED IN THE PARCEL REGISTER FOR
PROPERTY IDENTIFIERS □□□□□□□□□□□□□□□□□□□□□□□□□□
□□□
AND THE RE□UIRED CONSENTS ARE REGISTERED AS
PLAN DOCUMENT NO.□□□□□□□□□□□

□□□□□□□□□□□□□□□
LAND REGISTRAR

This plan comprises part of the land identified by PIN 04328-3631 and all of the land identified by PIN 04328-3632.

APPROVED UNDER SECTION 51 OF THE PLANNING ACT
BY THE CITY OF OTTAWA.

THIS □□□□□□□□ DAY OF □□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□

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STEPHEN WILLIS□GENERAL MANAGER
PLANNING□INFRASTRUCTURE AND ECONOMIC
DEVELOPMENT DEPARTMENT
CITY OF OTTAWA

PRELIMINARY PLAN OF SUBDIVISION OF
PART OF LOT 21
CONCESSION 4 (RIDEAU FRONT)
Geographic Township of Gloucester
CITY OF OTTAWA

Surveyed by Annis □O□Sullivan □Vollebekk Ltd.

Scale 1 : 1000

40 30 20 10 0 20 40 Metres

Metric

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SURVEYOR□S CERTIFICATE

I CERTIFY THAT :

1. This survey and plan are correct and in accordance with the Surveys Act□the Surveyors Act and the Land Titles Act and the regulations made under them.
2. The Survey was completed on the □□□day of □□□□□□□□□□2018.

□□□□□□□□□□
Date

□□□□□□□□□□□□□□□□□□□□
Andre Roy
Ontario Land Surveyor

OWNER□S CERTIFICATE

THIS IS TO CERTIFY THAT :

1. Lots 1 to 215□both inclusive□Blocks 216 to 245□both inclusive□the Streets□ namely□promenade Cedar Creek Drive□promenade Dun Skipper Drive□ bois Zaatiik Grove□rue Minikan Street□place Pingwi Place□promenade Kelly Farm Drive□voie Salamander Way□voie Spreadwing Way□rue Rallidale Street and placette Viceroy Mews□the Street Widenings□namely□Blocks 246 and 247 and the Reserves□namely□Blocks 248 to 254□both inclusive□have been laid out in accordance with our instructions.
2. The Streets and Street Widenings are dedicated to City of Ottawa as public highways.

Dated the □□□□day
of □□□□□□□□□□□□2018

□□□□□□□□□□□□□□□□□□□□□
David Kardish
Leitrim South Holdings Inc.
I have the authority to bind the corporation.

NOTES AND LEGEND

—□—	denotes	Survey Monument Planted.
—■—	"	Survey Monument Found
SIB	"	Standard Iron Bar.
SSIB	"	Short Standard Iron Bar.
CC	"	Cut Cross.
IB	"	Iron Bar.
CLF	"	Chain Link Fence
BF	"	Board Fence
(AOG)	"	Annis□O□Sullivan□Vollebekk Ltd.
(P1)	"	Plan 4R-29621
(P2)	"	Plan
P□W	"	Post □ Wire
— OHW —	"	Overhead Wires

All planted survey monuments are IB□s unless otherwise noted.

Distances shown on curved limits are Arc distances unless otherwise noted.

Distances shown on this plan are ground distances and can be converted to grid distances by multiplying by the combined scale factor of 0.9999xx.

Bearings are grid□derived from Can-Net 2016 Real Time Network GPS observations on reference points A and B□shown hereon□having a bearing of Nxx°xx'xx"W and are referenced to Specified Control Points 01919760735 and 01919871649, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

Coordinates are derived from Can-Net 2016 Real Time Network GPS observations referenced to Specified Control Points 01919760735 and 01919871649, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

Coordinate values are to urban accuracy in accordance with O. Reg. 216/10.

. 01919760735	Northing	5026903.34	Easting	376968.72
. 01919871649	Northing	5007189.87	Easting	372435.05
. Point A	Northing		Easting	
. Point B	Northing		Easting	

Caution: Coordinates cannot□in themselves□be used to re-establish corners or boundaries shown on this plan.

REVISION SCHEDULE			
NO.	REVISION	DATE	
1	PLAN PREPARED	MAY. 18, 2017	N
2	BLAIS ROAD REALIGNMENT	JULY 5, 2017	N
3	STREET NAMES REVISED	JULY 18, 2017	N
4	STREET NAMES REVISED	JULY 31, 2017	N
5	REVISED LOTS 110 TO 115	OCT. 6, 2017	DG
6	REVISED BLOCK 251 & ADDED STREET PLACETTE VICEROY MEWS	NOV. 1, 2017	DG
7	ADDED RESERVE BLKS 253 & 254	FEB. 27, 2018	N

(11)

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovltd.com

Ontario Land Surveyors

Job No. 19429-17 Regional Pt Lts 21 22 C4 RF GL SUB PHI D7 N

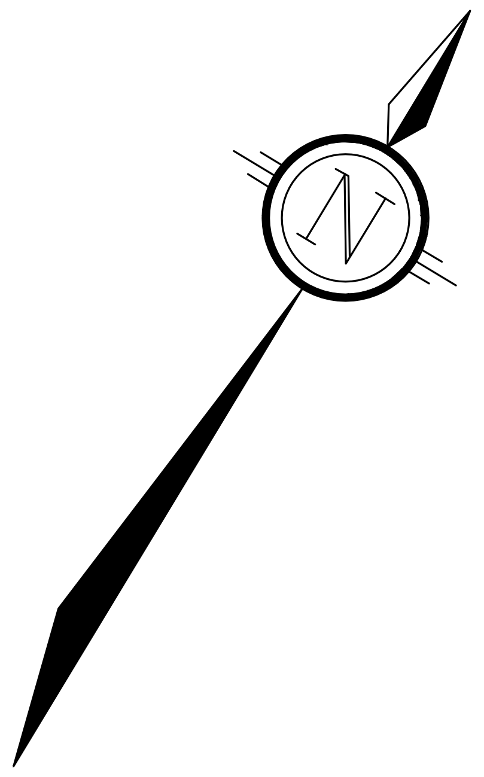
Pathways at Findlay Creek, Block 225 - Zoning Table

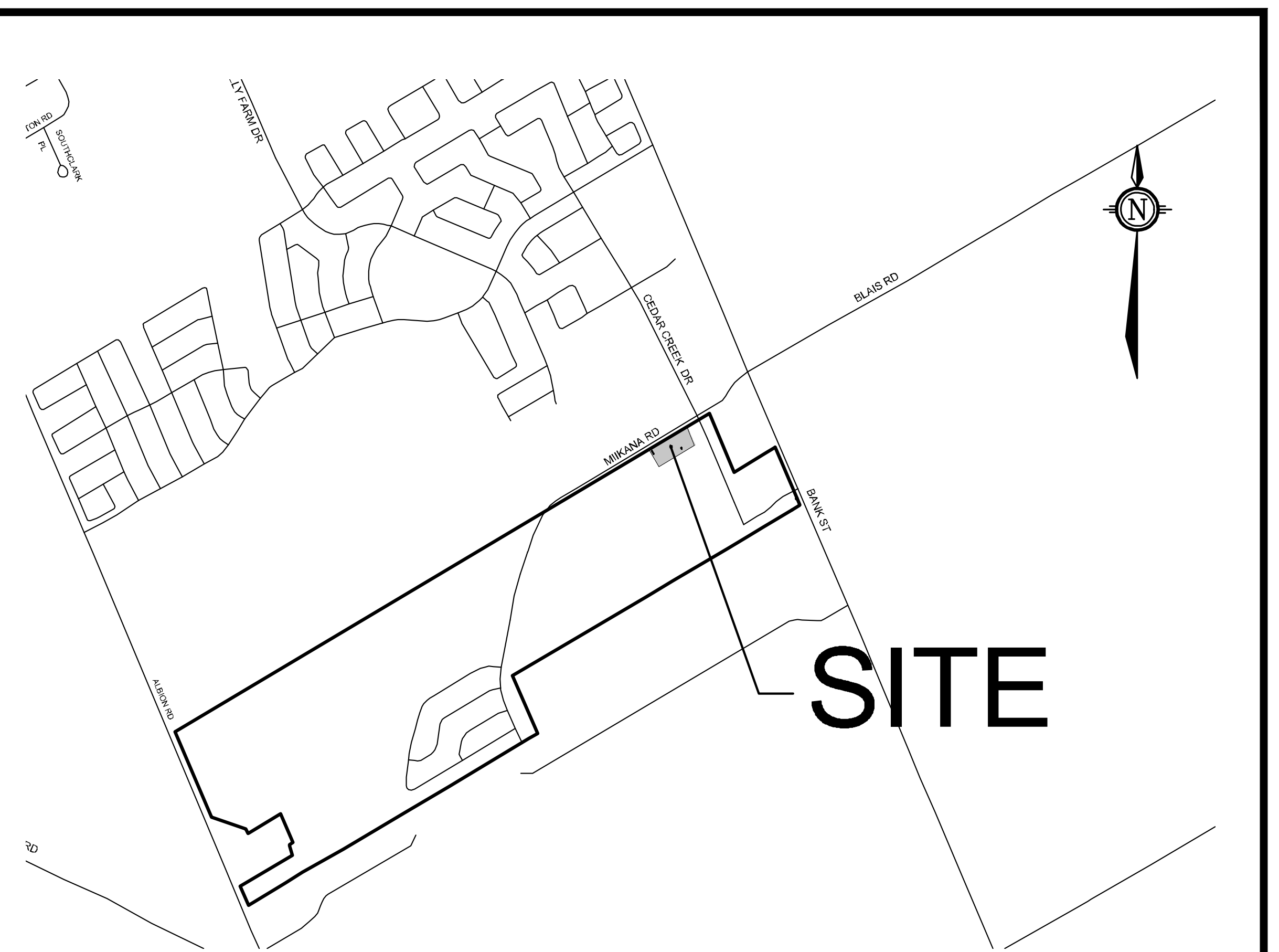
ZONING PROVISIONS - City of Ottawa Zoning By-law 2008-250		
PROVISION	**REQUIRED**	**PROPOSED**
RESIDENTIAL FOURTH DENSITY, SUBZONE Z (R4Z [2370])		
MIN LOT WIDTH (m)	18	133.66
MIN LOT AREA (m^2)	1,400	8980.97
MAX BUILDING HEIGHT (m)	11	9.75 (from grade to roof peak)
MIN FRONT YARD SETBACK (m)	3	4.39
MIN CORNER SIDE YARD SETBACK (m)	3	N/A
MIN REAR YARD SETBACK (m)*	6	3.27
MIN INTERIOR SIDE YARD SETBACK (m)	1.2, but in the case of an abutting vacant lot, a minimum required interior side yard of 1.8	3.14
PARKING RATES		
MIN PARKING SPACE RATE	1 per dwelling unit	1 per dwelling unit
MIN VISITOR PARKING SPACE RATE	0.2 per dwelling unit	1 per dwelling unit + 8 on-street
PLANNED UNIT DEVELOPMENT		
MIN WIDTH OF PRIVATE WAY (m)	6	6
MIN SETBACK FOR ANY WALL OF A RESIDENTIAL USE BUILDING TO A PRIVATE WAY (m)	1.8	2.3
MIN SETBACK FOR ANY GARAGE OR CARPORT ENTRANCE FROM A PRIVATE WAY (m)	5.2	5.2
MIN SEPARATION AREA BETWEEN BUILDINGS WITHIN A PUD – WHERE THE HEIGHT OF ABUTTING BUILDINGS IS LESS THAN OR EQUAL TO 14.5M (m)	1.2	3.3

* Minor Variance Required

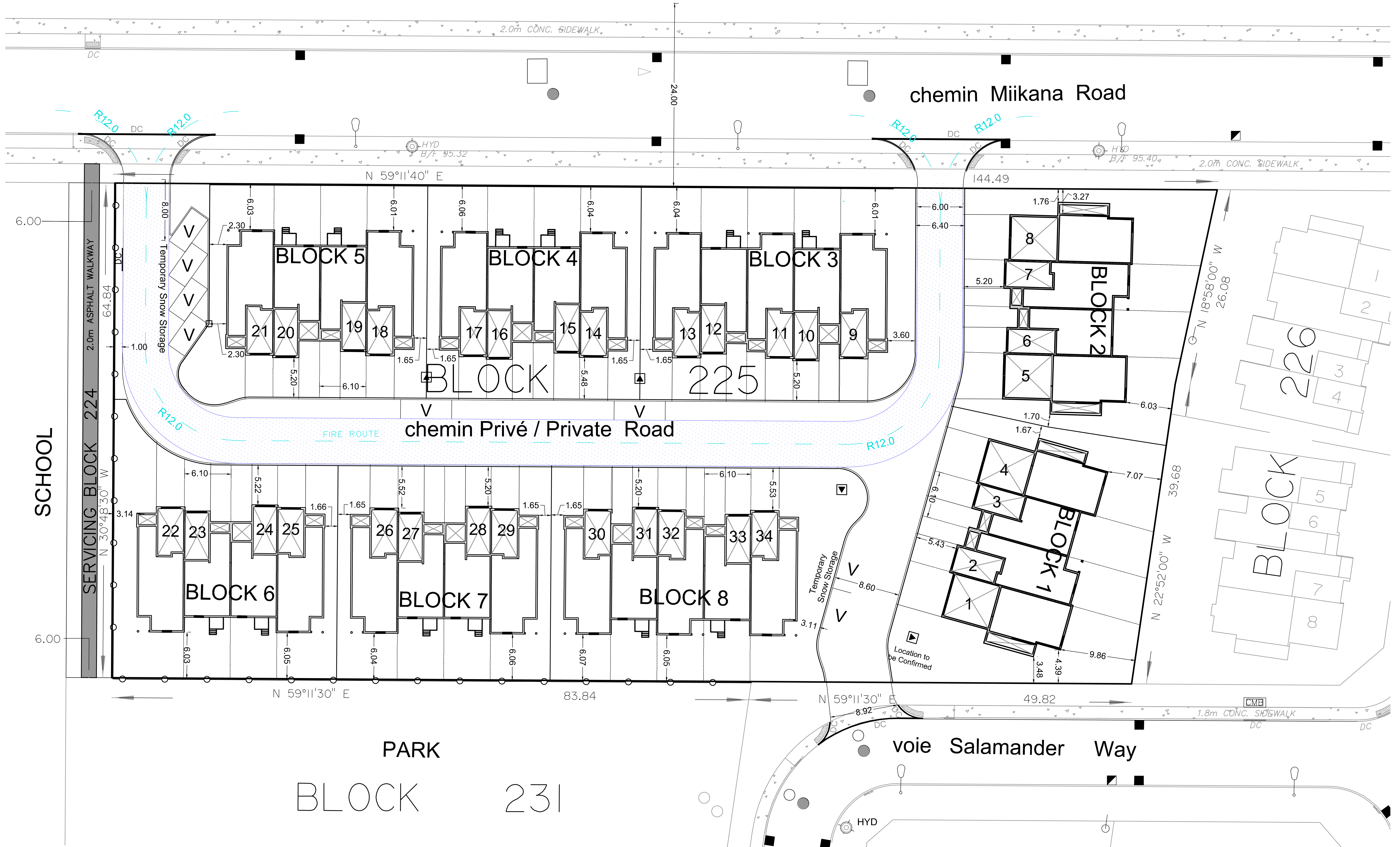
LEGEND

▬	PROPOSED FIRE ROUTE
▨	PROPOSED TWSI (TACTILE WALKING SURFACE INDICATOR)
HYD ⌖	HYDRANT C/W VALVE & LEAD
■	CATCH BASIN
●	SANITARY MANHOLE
☐	STORM MANHOLE
⊸	STREET LIGHT
▲	TRANSFORMER
CMB	COMMUNITY MAILBOX
DC	DEPRESSED CURB
-o-	PROPOSED CHAINLINK FENCE
-□-	PROPOSED WOOD PRIVACY FENCE





KEYPLAN
NOT TO SCALE



NOTE:
THIS PLAN HAS BEEN COMPILED USING LEGAL INFORMATION OBTAINED FROM ANNIS, O'SULLIVAN, VOLLEBEKK LTD., ONTARIO LAND SURVEYORS PRELIMINARY PLAN OF SUBDIVISION (4M-1617); JOB No. 19429-17

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SITE PLAN

BLOCK 225

PART OF LOT 21
CONCESSION 4, RIDEAU FRONT
FORMER CITY OF GLOUCESTER
Now CITY OF OTTAWA
BLOCK 225, PLAN 4M-1617

pathways at FINDLAY CREEK

eqhomes
WWW.EQHOMES.CA

1 : 300

0 6 12 30

No.	REVISION	DATE	BY
3	ISSUED FOR SITE PLAN RESUBMISSION	JUL 18/19	EP
2	ISSUED FOR SITE PLAN RESUBMISSION	JUN 27/19	EP
1	ISSUED FOR SITE PLAN APPLICATION	APR 04/19	EP

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

ISSUED
JULY, 2019

PROJECT No.
117182

DRAWING No.
117182-SP

D07-12-19-0060

BOUNDARY CONDITIONS

Boundary Conditions For: 114312 Block 225 Bank St and Blais Rd

Date of Boundary Conditions: 2019-Mar-27

Provided Information:

Scenario	Demand	
	L/min	L/s
Average Daily Demand	22.2	0.4
Maximum Daily Demand	55.8	0.9
Peak Hour	123.0	2.1
Fire Flow #1 Demand	10,000	166.7

Number Of Connections: 1

Location:

BOUNDARY CONDITIONS

Results:

Pre-Configuration

Connection #: 1

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	158.3	90.7
Peak Hour	156.0	87.4
Max Day Plus Fire (10,000) L/min	140.4	64.7

[1] Elevation: **94.478**

Connection #: 2

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	158.3	90.8
Peak Hour	156.7	88.5
Max Day Plus Fire (10,000) L/min	141.5	66.9

[1] Elevation: **94.478**

Post-Configuration

Connection #: 1

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	147.9	76.2
Peak Hour	146.8	74.7
Max Day Plus Fire (10,000) L/min	140.4	64.35

[1] Elevation: **94.478**

BOUNDARY CONDITIONS

Connection #: 2

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	148.0	75.4
Peak Hour	146.8	73.7
Max Day Plus Fire (10,000) L/min	136.3	58.8

[1]Elevation: **94.478**

Notes:

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

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

2) City of Ottawa Infrastructure Planning Unit recommends to install an isolation valve between the two proposed connection locations submitted in the boundary condition request

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.

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : **BLOCK 225**
LOCATION : **CITY OF OTTAWA**
DEVELOPER :

FILE: 114312.5.7
DATE PRINTED: 28-Mar-19
DESIGN: LE
PAGE : 1 OF 1

NODE	RESIDENTIAL				NON-RESIDENTIAL			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND
	UNITS			POP'N	INDTRL	COMM.	INST.										
	SF	SD & TH	APT		(ha.)	(ha.)	(ha.)	Res.	Non-res.	Total	Res.	Non-res.	Total	Res.	Non-res.	Total	(l/min)
J-2		8		22				0.09	0.00	0.09	0.22	0.00	0.22	0.48	0.00	0.48	10,000
J-3		12		32				0.13	0.00	0.13	0.33	0.00	0.33	0.72	0.00	0.72	10,000
J-4		6		16				0.07	0.00	0.07	0.16	0.00	0.16	0.36	0.00	0.36	10,000
J-5		3		8				0.03	0.00	0.03	0.08	0.00	0.08	0.18	0.00	0.18	10,000
J-6		2		5				0.02	0.00	0.02	0.05	0.00	0.05	0.12	0.00	0.12	10,000
J-7		3		8				0.03	0.00	0.03	0.08	0.00	0.08	0.18	0.00	0.18	10,000
Totals		34		92						0.37			0.92			2.04	

ASSUMPTIONS

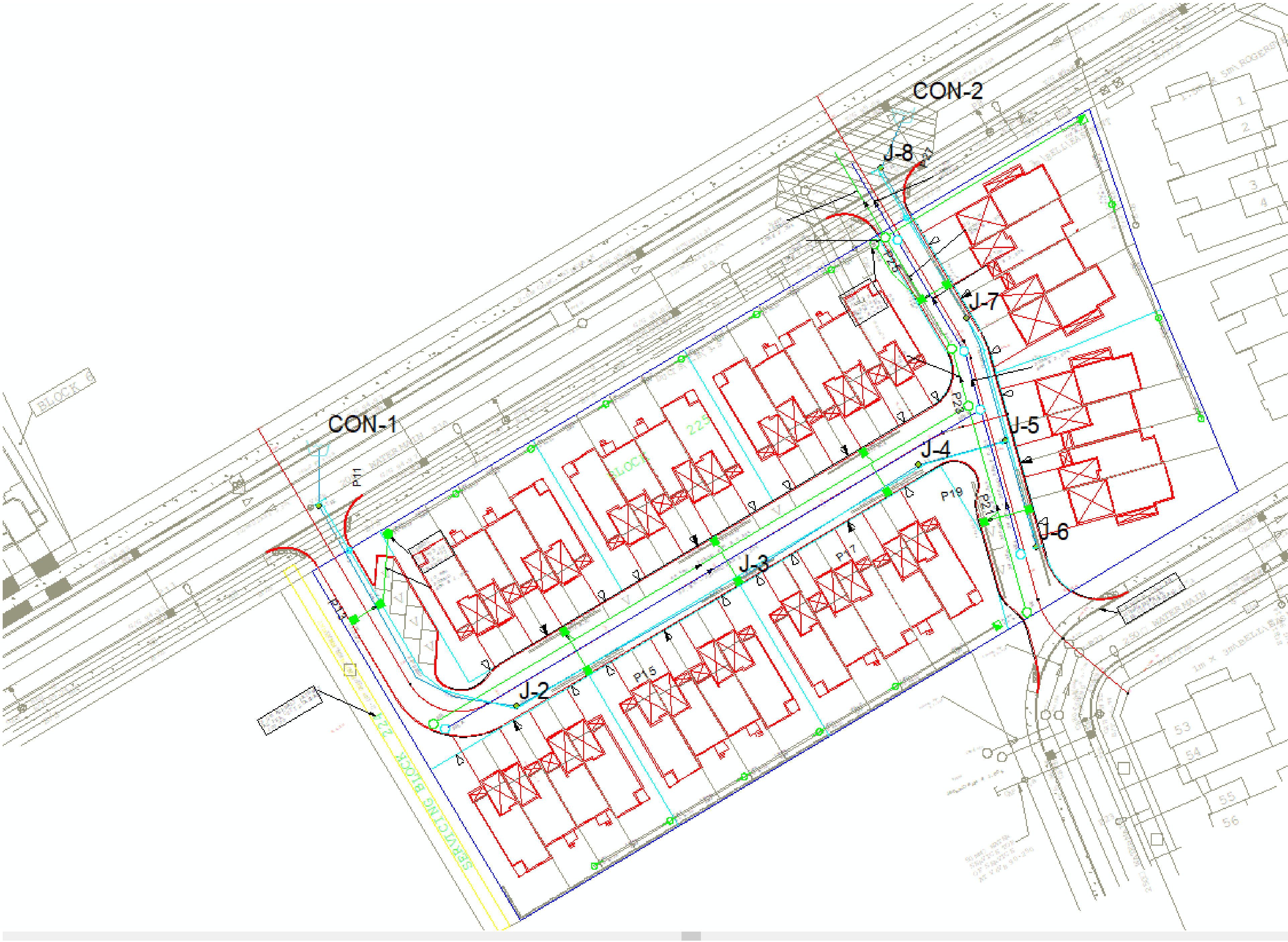
RESIDENTIAL DENSITIES
- Single Family (SF) 3.4 p / p / u
- Semi Detached (SD) & Townhouse (TH) 2.7 p / p / u
- Apartment (APT) 1.8 p / p / u
-Other 66 u / p / ha

AVG. DAILY DEMAND
- Residential 350 l / cap / day
- ICI 50,000 l / ha / day

MAX. DAILY DEMAND
- Residential 875 l / cap / day
- ICI 75,000 l / ha / day

MAX. HOURLY DEMAND
- Residential 1,925 l / cap / day
- ICI 135,000 l / ha / day

FIRE FLOW
- SF, SD, TH & ST 10,000 l / min
- Back to Back TH 12,000 l / min
- ICI 15,000 l / min


CON-2
J-8
J-7
J-5
J-4
J-6
CON-1
J-3
J-2
P11
P13
P15
P17
P19
P21
P23
P25
BLOCK 6
BLOCK
225
SERVICING BLOCK
1
2
3
4
53
54
55
56

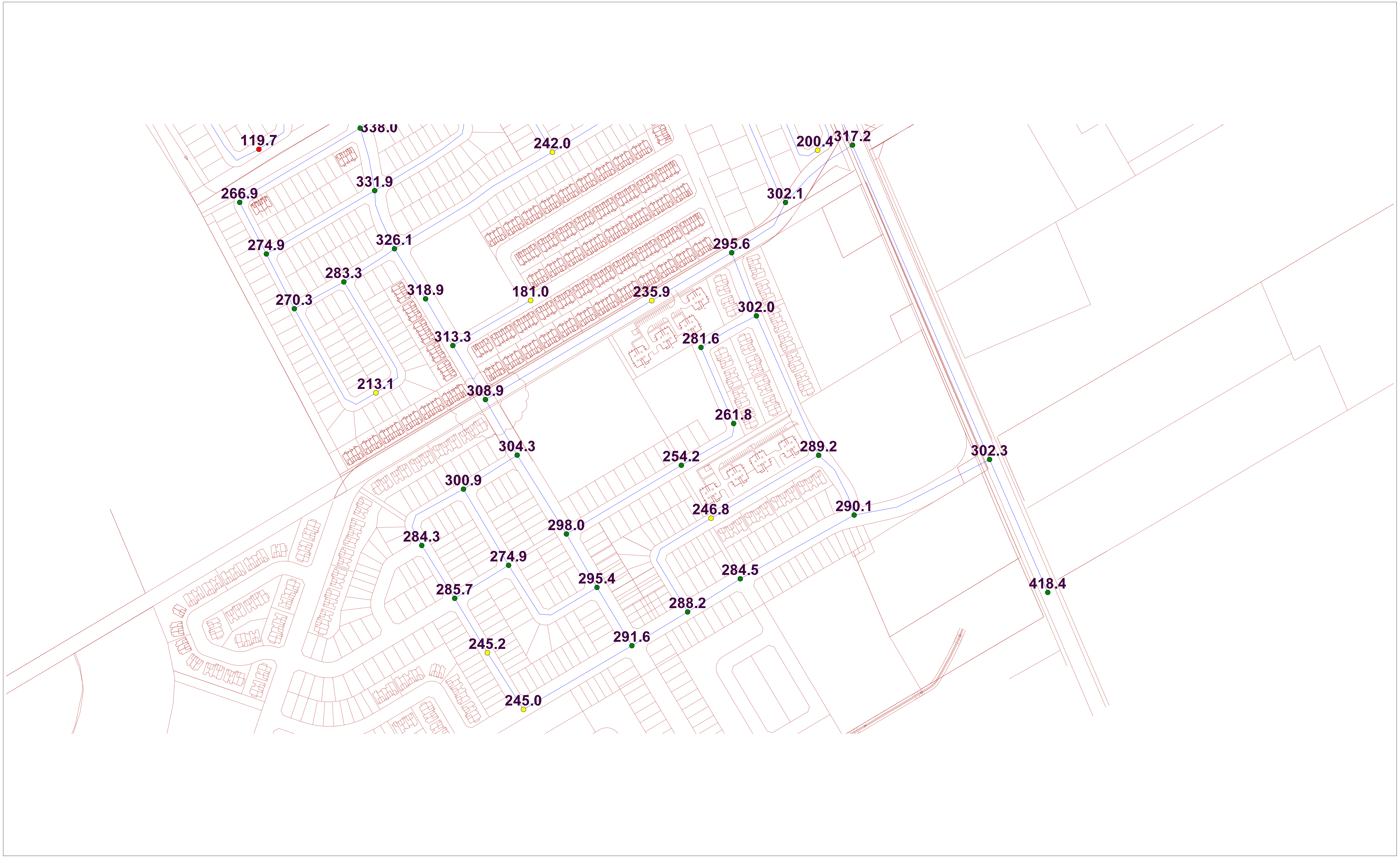
Basci Day (Max HGL) - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)	Water Age (hrs)
1	☐	J-1	0.00	95.25	158.30	617.84	0.00
2	☐	J-2	0.09	96.10	158.30	609.51	0.00
3	☐	J-3	0.13	96.05	158.30	610.00	0.00
4	☐	J-4	0.07	96.10	158.30	609.51	0.00
5	☐	J-5	0.03	95.90	158.30	611.47	0.00
6	☐	J-6	0.02	95.90	158.30	611.47	0.00
7	☐	J-7	0.03	95.20	158.30	618.33	0.00
8	☐	J-8	0.00	95.30	158.30	617.35	0.00

Peak Hour - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)	Water Age (hrs)
1	☐	J-1	0.00	95.25	146.80	505.15	0.00
2	☐	J-2	0.48	96.10	146.80	496.80	0.00
3	☐	J-3	0.72	96.05	146.80	497.28	0.00
4	☐	J-4	0.36	96.10	146.80	496.79	0.00
5	☐	J-5	0.18	95.90	146.80	498.75	0.00
6	☐	J-6	0.12	95.90	146.80	498.75	0.00
7	☐	J-7	0.18	95.20	146.80	505.62	0.00
8	☐	J-8	0.00	95.30	146.80	504.66	0.00

Phase 1 - MXDY + Fire - Design Fireflows (l/s)



Date: Friday, November 18, 2016

Fire Flow Requirement from Fire Underwriters Survey - Pathways Block 225

Building

Floor Area of Largest building	460	m^2
Storeys	2	
Total Floor Area	920	m^2

$F = 220C\sqrt{A}$

C	1.5	
A	920	m^2
F	10,008	l/min
use	10,000	l/min

C =	1.5	wood frame
	1.0	ordinary
	0.8	non-combustible
	0.6	fire-resistive

Occupancy Adjustment

Use	-15%	
Adjustment	-1500	l/min
Fire flow	8,500	l/min

-25%	non-combustible
-15%	limited combustible
0%	combustible
+15%	free burning
+25%	rapid burning

Sprinkler Adjustment

Use	0%	
Adjustment	0	l/min

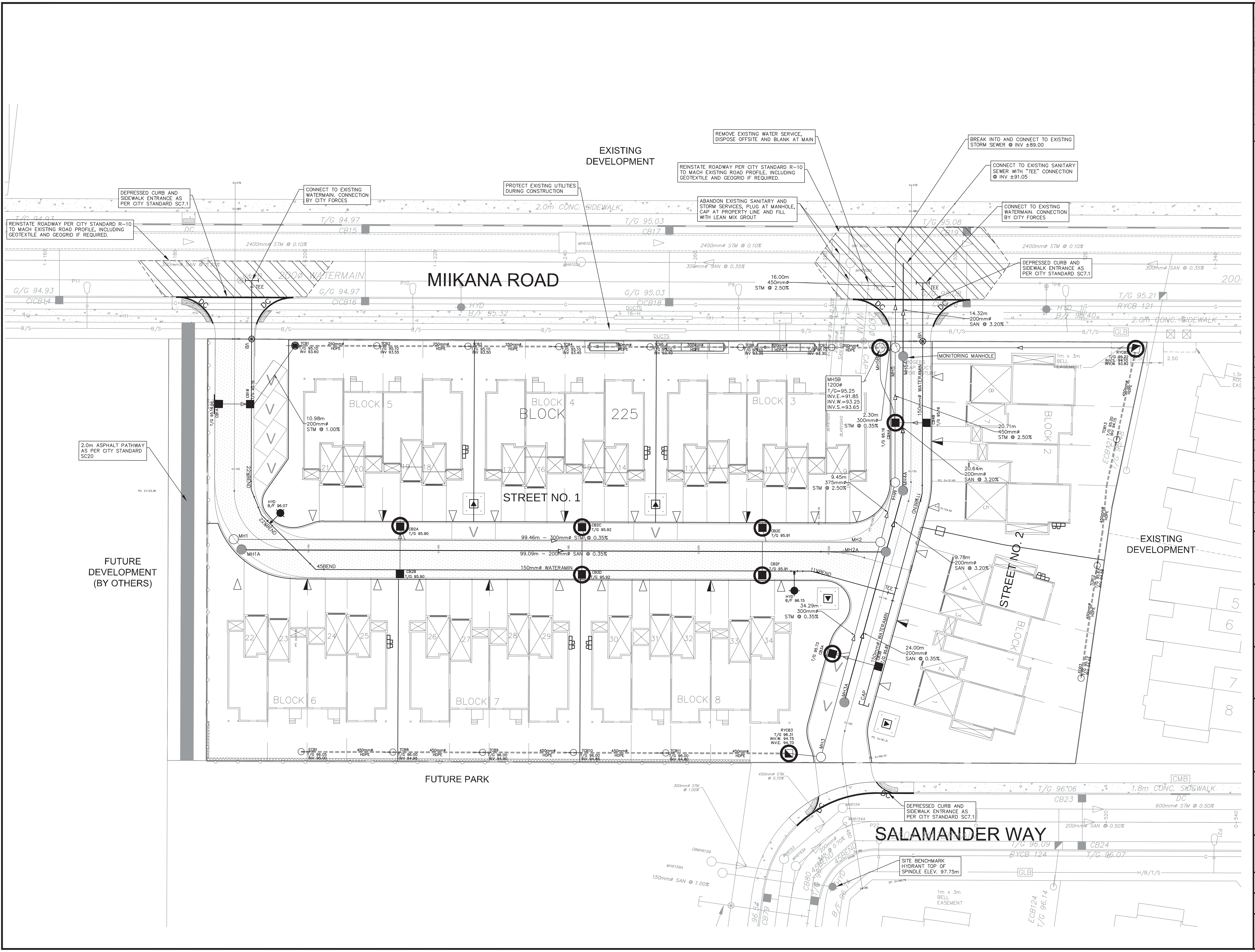
-30%	system conforming to NFPA 13
-50%	complete automatic system

Exposure Adjustment

Building Face	Separation	Charge
north	19.9	12%
east	18.9	12%
south	Greater than 45.0	0%
west	3.5	17%
Total		41%

Separation	Charge
0 to 3m	+25%
3.1 to 10m	+20%
10.1 to 20m	+15%
20.1 to 30m	+10%
30.1 to 45m	+5%

Adjustment	3,485	l/min
Fire flow	11,985	l/min
Use	**12,000**	**l/min**
	200	**l/s**



KEY PLAN
N.T.S.

NOTES:

1. SEE DRAWING C-010 FOR ADDITIONAL DETAILS AND NOTES.
2. SITE BENCHMARK OBTAINED FROM LEGAL SURVEYOR ANNIS O'SULLIVAN VOLLEBEKK LTD.

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2	REVISED AS PER CITY COMMENTS	DGY	19:07:19
1	ISSUED FOR SPA	DGY	19:04:01

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

Project Title
BLOCK 225

D. G. Yannoulopoulos
2019/07/19

Drawing Title
GENERAL PLAN
OF SERVICES

Scale
1:250

Design RM/WZ	Date APRIL 2019
Drawn DPS/WZ	Checked DGY
Project No. 114312	Drawing No. 001

D07-12-19-0060

#________

APPENDIX B

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

SANITARY SEWER DESIGN SHEET

BLOCK 225
CITY OF OTTAWA
PATHWAYS REGIONAL GROUP

LOCATION				RESIDENTIAL										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		RES PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						ICI PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)		FLOW			(L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
														INSTITUTIONAL		COMMERCIAL		INDUSTRIAL																
STREET	AREA ID	FROM MH	TO MH		SF	SD	TH	APT		IND	CUM			IND	CUM	IND	CUM	IND	CUM			IND	CUM	(L/s)	IND	CUM							L/s	(%)
Private Road	A1	MH1A	MH2A	0.67			26			70.2	70.2	3.63	0.82	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.67	0.67	0.22	0.00	0.00	1.05	20.24	99.09	200	0.35	0.624	19.20	94.83%
	A3	MH3A	MH2A	0.11			3			8.1	8.1	3.74	0.10	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.11	0.11	0.04	0.00	0.00	0.14	20.24	24.00	200	0.35	0.624	20.11	99.33%
	A2	MH2A	MH4A	0.06			2			5.4	83.7	3.61	0.98	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.06	0.85	0.28	0.00	0.00	1.26	61.21	9.78	200	3.20	1.887	59.95	97.94%
	A4	MH4A	MH5A	0.09			3			8.1	91.8	3.60	1.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.09	0.94	0.31	0.00	0.00	1.38	61.21	20.64	200	3.20	1.887	59.83	97.74%
		MH5A	*EX. MAIN*							0.0	91.8	3.60	1.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.94	0.31	0.00	0.00	1.38	61.21	14.32	200	3.20	1.887	59.83	97.74%
		MH6101A	*MH6102A*																															
				0.94			34			91.8	TRUE																							

Design Parameters:

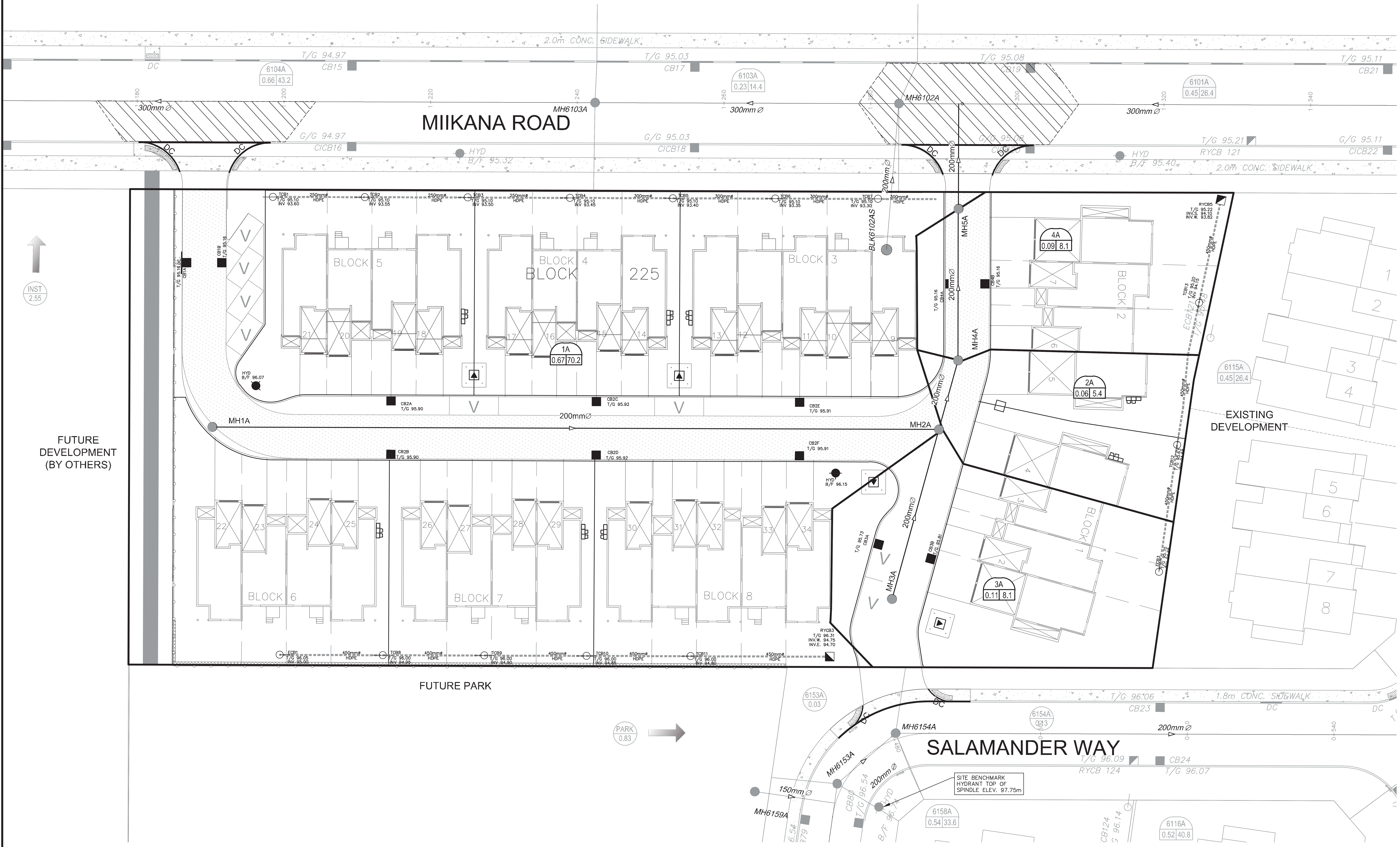
Residential			ICI Areas			
SF	3.4	p/p/u				
TH/SD	2.7	p/p/u	INST	28,000	L/Ha/day	
APT	1.8	p/p/u	COM	28,000	L/Ha/day	
Other	60	p/p/Ha	IND	35,000	L/Ha/day	MOE Chart
				17000	L/Ha/day	

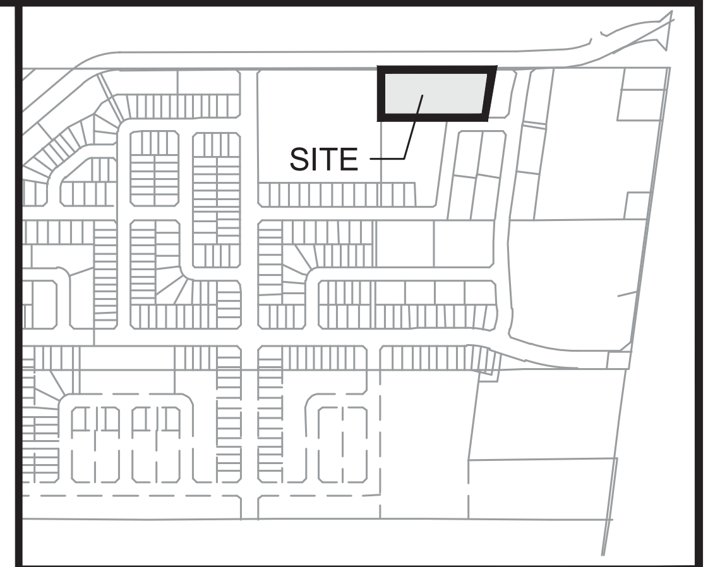
Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 200 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8
where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area,
1.5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

Designed: W.Z.
Checked: R.M.
Dwg. Reference: 114312-501

No.	Revision	Date
1.	Servicing Brief - Submission No. 1	2019-03-29

File Reference:		Date:	Sheet No:
114312.5.7.1		2019-03-29	1 of 1





KEY PLAN

N.T.S.

NOTES:

1. SEE DRAWING C-010 FOR ADDITIONAL DETAILS AND NOTES.
2. SITE BENCHMARK OBTAINED FROM LEGAL SURVEYOR ANNIS O'SULLIVAN VOLLEBEKK LTD.

LEGEND :

6115A	AREA NUMBER
0.81 43.2	POPULATION
	AREA IN HECTARES
➡	FUTURE FLOW DIRECTION
6115A	EXISTING AREA NUMBER
0.81 43.2	EXISTING POPULATION
	AREA IN HECTARES
➡	EXISTING FLOW DIRECTION

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2	REVISED AS PER CITY COMMENTS	DGY	19:07:19
1	ISSUED FOR SPA	DGY	19:04:01

WWW.EQHOMES.CA

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

Project Title

BLOCK 225

D. G. Yannoulopoulos
2019/07/19

Drawing Title

SANITARY DRAINAGE
AREA PLAN

Scale
1:250

Design RM/WZ	Date APRIL 2019
Drawn DPS/WZ	Checked DGY
Project No. 114312	Drawing No. 400

D07-12-19-0060

#________

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

LEGEND
Red text High level sanitary sewer

SANITARY SEWER DESIGN SHEET

Remer Lands Phase 1
City of ottawa
Leitrim South Holdings Inc. (Regional Group)

LOCATION				RESIDENTIAL										ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
														INSTITUTIONAL		COMMERCIAL		INDUSTRIAL															
STREET	AREA ID	FROM MH	TO MH		SF	SD	TH	APT		IND	CUM			IND	CUM	IND	CUM	IND	CUM		IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
Dun Skipper Road	6131C	MH6131C	MH6131A	0.45	7					22.4	22.4	4.00	0.36		0.00		0.00		0.00	0.00	0.45	0.45	0.13		0.00	0.49	39.01	43.00	200	1.30	1.203	38.52	98.75%
Dun Skipper Road	6131A	MH6131A	MH6130A	0.49	8					25.6	48.0	4.00	0.78		0.00		0.00		0.00	0.00	0.49	0.94	0.26		0.00	1.04	61.68	86.07	200	3.25	1.902	60.64	98.31%
Minikan Street	6130A	MH6130A	MH6170A	0.48	11					35.2	83.2	4.00	1.35		0.00		0.00		0.00	0.00	0.48	1.42	0.40		0.00	1.75	48.39	83.57	200	2.00	1.492	46.64	96.39%
Minikan Street	6170A	MH6170A	MH6171A	0.64	14					44.8	128.0	4.00	2.07		0.00		0.00		0.00	0.00	0.64	2.06	0.58		0.00	2.65	50.75	84.42	200	2.20	1.565	48.10	94.78%
					DRAFT 2016 UPDATED SERVICEABILITY REPORT																												
Spreadwing Way	EXT5	BLK3171AW	MH6171A	30.52						1388.8	1388.8	3.70	20.84		0.00		0.00		0.00	0.00	30.52	30.52	8.55		0.00	29.38	45.12	43.00	300	0.20	0.618	15.73	34.88%
Spreadwing Way	6171A	MH6171A	MH6183A	0.15						0.0	1516.8	3.68	22.59		0.00		0.00		0.00	0.00	0.15	32.73	9.16		0.00	31.75	45.12	83.61	300	0.20	0.618	13.36	29.62%
Minikan Street	6176A	MH6176A	MH6172A	0.43	6					19.2	19.2	4.00	0.31		0.00		0.00		0.00	0.00	0.43	0.43	0.12		0.00	0.43	29.63	66.50	200	0.75	0.914	29.20	98.54%
					DRAFT 2016 UPDATED SERVICEABILITY REPORT																												
Viceroy Mews	EXT6	BLK6172AW	MH6172A	0.83	13					41.6	41.6	4.00	0.67		0.00		0.00		0.00	0.00	0.83	0.83	0.23		0.00	0.91	20.24	41.50	200	0.35	0.624	19.34	95.52%
Minikan Street	6172A	MH6172A	MH6173A	0.15	2					6.4	67.2	4.00	1.09		0.00		0.00		0.00	0.00	0.15	1.41	0.39		0.00	1.48	20.24	27.99	200	0.35	0.624	18.76	92.67%
Minikan Street	6173A	MH6173A	MH6174A	0.18	2					6.4	73.6	4.00	1.19		0.00		0.00		0.00	0.00	0.18	1.59	0.45		0.00	1.64	20.24	11.54	200	0.35	0.624	18.61	91.91%
Minikan Street	6174A	MH6174A	MH6175B	0.58	11					35.2	108.8	4.00	1.76		0.00		0.00		0.00	0.00	0.58	2.17	0.61		0.00	2.37	20.24	68.80	200	0.35	0.624	17.87	88.29%
Minikan Street		MH6175B	MH6175A							0.0	108.8	4.00	1.76		0.00		0.00		0.00	0.00	0.00	2.17	0.61		0.00	2.37	45.12	6.00	300	0.20	0.618	42.75	94.75%
Zaatiik Grove	6180A	MH6180A	MH6181A	0.48	8					25.6	25.6	4.00	0.41		0.00		0.00		0.00	0.00	0.48	0.48	0.13		0.00	0.55	34.22	58.50	200	1.00	1.055	33.67	98.39%
Zaatiik Grove	6181A	MH6181A	MH6182A	0.22	2					6.4	32.0	4.00	0.52		0.00		0.00		0.00	0.00	0.22	0.70	0.20		0.00	0.71	34.22	11.58	200	1.00	1.055	33.50	97.91%
Zaatiik Grove	6182A	MH6182A	MH6183A	0.48	7					22.4	54.4	4.00	0.88		0.00		0.00		0.00	0.00	0.48	1.18	0.33		0.00	1.21	54.10	74.74	200	2.50	1.668	52.89	97.76%
Zaatiik Grove		MH6183A	MH6175A							0.0	1571.2	3.66	23.33		0.00		0.00		0.00	0.00	0.00	33.91	9.49		0.00	32.82	45.12	118.54	300	0.20	0.618	12.29	27.25%
Zaatiik Grove	6183A	MH6183B	MH6175D	0.67	12					38.4	38.4	4.00	0.62		0.00		0.00		0.00	0.00	0.67	0.67	0.19		0.00	0.81	37.48	103.00	200	1.20	1.156	36.67	97.84%
Zaatiik Grove		MH6175D	MH6175A							0.0	38.4	4.00	0.62		0.00		0.00		0.00	0.00	0.00	0.67	0.19		0.00	0.81	37.48	6.00	200	1.20	1.156	36.67	97.84%
Minikan Street		MH6175A	MH6106A							0.0	1718.4	3.64	25.31		0.00		0.00		0.00	0.00	0.00	36.75	10.29		0.00	35.60	45.12	85.46	300	0.20	0.618	9.51	21.09%
Minikan Street	6175A	MH6175C	MH6106B	0.58	10					32.0	32.0	4.00	0.52		0.00		0.00		0.00	0.00	0.58	0.58	0.16		0.00	0.68	28.63	69.00	200	0.70	0.883	27.95	97.62%
Minikan Street		MH6106B	MH6106A							0.0	32.0	4.00	0.52		0.00		0.00		0.00	0.00	0.00	0.58	0.16		0.00	0.68	28.63	6.00	200	0.70	0.883	27.95	97.62%
Dun Skipper Road	6132Ac	MH6132A	MH6110A	0.53	9					28.8	28.8	4.00	0.47		0.00		0.00		0.00	0.00	0.53	0.53	0.15		0.00	0.62	43.28	85.00	200	1.60	1.335	42.67	98.58%
					DRAFT 2016 UPDATED SERVICEABILITY REPORT																												
Kelly Farm Drive	EXT1		BLK6110AS	1.34						76.8	76.8	4.00	1.24		0.00		0.00		0.00	0.00	1.34	1.34	0.38										
Kelly Farm Drive	6110Aa	BLK6110AS	MH6110A	0.30	4					12.8	89.6	4.00	1.45		0.00		0.00		0.00	0.00	0.30	1.64	0.46		0.00	1.91	72.58	44.00	200	4.50	2.238	70.67	97.37%
Kelly Farm Drive	6110Ab	MH6110A	MH6109A	0.52	8					25.6	144.0	4.00	2.33		0.00		0.00		0.00	0.00	0.52	2.69	0.75		0.00	3.09	59.26	85.00	200	3.00	1.828	56.18	94.79%
Kelly Farm Drive	6109A	MH6109A	MH6108A	0.56	10					32.0	176.0	4.00	2.85		0.00		0.00		0.00	0.00	0.56	3.25	0.91		0.00	3.76	59.26	81.99	200	3.00	1.828	55.50	93.65%
Salamander Way	6156Ab	MH6156A	MH6155A	0.72	11					35.2	35.2	4.00	0.57		0.00		0.00		0.00	0.00	0.72	0.72	0.20		0.00	0.77	50.75	88.13	200	2.20	1.565	49.98	98.48%
Salamander Way	6155A	MH6155A	MH6108A	0.51	8					25.6	60.8	4.00	0.99		0.00		0.00		0.00	0.00	0.51	1.23	0.34		0.00	1.33	50.75	88.25	200	2.20	1.565	49.42	97.38%
Kelly Farm Drive	6108A	MH6108A	MH6107A	0.33	5					16.0	252.8	4.00	4.10		0.00		0.00		0.00	0.00	0.33	4.81	1.35		0.00	5.44	43.28	60.23	200	1.60	1.335	37.84	87.42%
Kelly Farm Drive	6107A	MH6107A	MH6106A	0.18	1					3.2	256.0	4.00	4.15		0.00		0.00		0.00	0.00	0.18	4.99	1.40		0.00	5.55	43.28	58.91	200	1.60	1.335	37.74	87.19%
Kelly Farm Drive	6106A	MH6106A	*EX. MH647A*	0.19						0.0	2006.4	3.58	29.14		0.00		0.00		0.00	0.00	0.19	42.51	11.90		0.00	41.04	45.12	86.86	300	0.20	0.618	4.08	9.04%
					DRAFT 2016 UPDATED SERVICEABILITY REPORT																												
Miikana Road	EXT7	BLK6105AW	*EX. MH647A*	5.74						379.2	379.2	4.00	6.14		0.00		0.00		0.00	0.00	5.74	5.74	1.61		0.00	7.75	20.24	17.00	200	0.35	0.624	12.49	61.71%

Design Parameters:

Residential			ICI Areas			Peak Factor
SF	3.2	p/p/u				
TH/SD	2.4	p/p/u	INST	50,000	L/Ha/day	1.5
APT	1.9	p/p/u	COM	50,000	L/Ha/day	1.5
Other	43	p/p/Ha	IND	35,000	L/Ha/day	MOE Chart
				17000	L/Ha/day	

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 350 L/day 300 L/day
3. Infiltration allowance: 0.28 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+P^0.5))
where P = population in thousands

Designed: WY
Checked: JM
Dwg. Reference: 501, 501A

No.	Revision	Date
1.	City Submission No. 1	11/23/2016
2.	City Submission No. 2	5/12/2017
3.	City Submission No. 3	7/5/2017
4.	Updated Street Name for MOE Submission	8/3/2017

File Reference: 33956.5.7.1
Date: 5/10/2017
Sheet No: 1 of 2

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

SANITARY SEWER DESIGN SHEET

LEGEND
Red text High level sanitary sewer

Remer Lands Phase 1
City of ottawa
Leitrim South Holdings Inc. (Regional Group)

LOCATION				RESIDENTIAL										ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
STREET	AREA ID	FROM MH	TO MH	AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)			(L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
					SF	SD	TH	APT		IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL			IND	CUM		IND	CUM								
														IND	CUM	IND	CUM	IND	CUM													L/s	(%)
Dun Skipper Road	6132Aa	MH6132A	MH6133A	0.64	10					32.0	32.0	4.00	0.52		0.00		0.00		0.00	0.00	0.64	0.64	0.18		0.00	0.70	43.28	82.00	200	1.60	1.335	42.58	98.39%
					DRAFT 2016 UPDATED SERVICEABILITY REPORT																												
Street No. 7	EXT2		BLK6133AS						2.88	123.8	123.8	4.00	2.01		0.00		0.00		0.00	0.00	2.88	2.88	0.81										
Street No. 7	6133Ab	BLK6133AS	MH6133A	0.07						0.0	123.8	4.00	2.01		0.00		0.00		0.00	0.00	0.07	2.95	0.83		0.00	2.83	24.19	44.00	200	0.50	0.746	21.36	88.29%
Dun Skipper Road	6133Aa	MH6133A	MH6134A	0.58	10					32.0	187.8	4.00	3.04		0.00		0.00		0.00	0.00	0.58	4.17	1.17		0.00	4.21	37.48	72.14	200	1.20	1.156	33.27	88.76%
Dun Skipper Road	6134A	MH6134A	MH6135A	0.66	12					38.4	226.2	4.00	3.67		0.00		0.00		0.00	0.00	0.66	4.83	1.35		0.00	5.02	28.63	72.09	200	0.70	0.883	23.61	82.47%
Dun Skipper Road	6135A	MH6135A	MH6136A	0.19	3					9.6	235.8	4.00	3.82		0.00		0.00		0.00	0.00	0.19	5.02	1.41		0.00	5.23	28.63	24.81	200	0.70	0.883	23.40	81.74%
					DRAFT 2016 UPDATED SERVICEABILITY REPORT																												
Easement	EXT3	BLK6145A	MH6146A	2.50						250.8	250.8	4.00	4.06		0.00		0.00		0.00	0.00	2.50	2.50	0.70		0.00	4.76	21.64	22.70	200	0.40	0.667	16.88	77.99%
Easement		MH6146A	MH6136A							0.0	250.8	4.00	4.06		0.00		0.00		0.00	0.00	0.00	2.50	0.70		0.00	4.76	21.64	46.46	200	0.40	0.667	16.88	77.99%
					DRAFT 2016 UPDATED SERVICEABILITY REPORT																												
	EXT4	BLK6138A	MH6138A							0.0	0.0	4.00	0.00		0.00	4.07	4.07		0.00	3.53	4.07	4.07	1.14		0.00	4.67	20.24	20.00	200	0.35	0.624	15.57	76.92%
Dun Skipper Road	6138A	MH6138A	MH6137A	0.08						0.0	0.0	4.00	0.00		0.00		4.07		0.00	3.53	0.08	4.15	1.16		0.00	4.69	20.24	32.25	200	0.35	0.624	15.55	76.81%
Dun Skipper Road	6137A	MH6137A	MH6136A	0.10						0.0	0.0	4.00	0.00		0.00		4.07		0.00	3.53	0.10	4.25	1.19		0.00	4.72	20.24	44.44	200	0.35	0.624	15.52	76.67%
Cedar Creek Drive	6136A	MH6136A	MH6121A	0.04						0.0	486.6	3.98	7.85		0.00		4.07		0.00	3.53	0.04	11.81	3.31		0.00	14.69	20.24	28.03	200	0.35	0.624	5.56	27.45%
Cedar Creek Drive	6121A	MH6121A	MH6120A	0.03						0.0	486.6	3.98	7.85		0.00		4.07		0.00	3.53	0.03	11.84	3.32		0.00	14.69	20.24	12.97	200	0.35	0.624	5.55	27.41%
Cedar Creek Drive	6120A	MH6120A	MH6119A	0.10						0.0	486.6	3.98	7.85		0.00		4.07		0.00	3.53	0.10	11.94	3.34		0.00	14.72	20.24	53.29	200	0.35	0.624	5.52	27.27%
Pingwi Place	6132Ab	MH6132A	MH6161A	0.25	3					9.6	9.6	4.00	0.16		0.00		0.00		0.00	0.00	0.25	0.25	0.07		0.00	0.23	56.22	77.03	200	2.70	1.734	56.00	99.60%
Pingwi Place	6161A	MH6161A	MH6162A	0.22	3					9.6	19.2	4.00	0.31		0.00		0.00		0.00	0.00	0.22	0.47	0.13		0.00	0.44	24.19	11.41	200	0.50	0.746	23.75	98.17%
Pingwi Place	6162A	MH6162A	MH6163A	0.62	14					44.8	64.0	4.00	1.04		0.00		0.00		0.00	0.00	0.62	1.09	0.31		0.00	1.34	20.24	74.88	200	0.35	0.624	18.90	93.37%
Pingwi Place	6163A	MH6163A	MH6164A	0.44			12			28.8	92.8	4.00	1.50		0.00		0.00		0.00	0.00	0.44	1.53	0.43		0.00	1.93	20.24	86.35	200	0.35	0.624	18.31	90.46%
Pingwi Place	6164A	MH6164A	MH6119A	0.40			11			26.4	119.2	4.00	1.93		0.00		0.00		0.00	0.00	0.40	1.93	0.54		0.00	2.47	29.63	86.29	200	0.75	0.914	27.16	91.66%
Block 429	COM	BLK6119AE	MH6119A							0.0	0.0	4.00	0.00		0.00	3.01	3.01		0.00	2.61	3.01	3.01	0.84		0.00	3.46	45.12	20.00	300	0.20	0.618	41.66	92.34%
Cedar Creek Drive	6119A	MH6119A	MH6118A	0.05						0.0	605.8	3.93	9.64		0.00		7.08		0.00	6.15	0.05	16.93	4.74		0.00	20.53	45.12	28.01	300	0.20	0.618	24.58	54.49%
Cedar Creek Drive	6118A	MH6118A	MH6117A	0.07						0.0	605.8	3.93	9.64		0.00		7.08		0.00	6.15	0.07	17.00	4.76		0.00	20.55	45.12	33.76	300	0.20	0.618	24.57	54.45%
Block 443	HD1	BLK6117AW	MH6117A	1.03						129.6	129.6	4.00	2.10		0.00		0.00		0.00	0.00	1.03	1.03	0.29		0.00	2.39	20.24	20.00	200	0.35	0.624	17.85	88.20%
Cedar Creek Drive	6117A	MH6117A	MH6116A	0.55			17			40.8	776.2	3.87	12.16		0.00		7.08		0.00	6.15	0.55	18.58	5.20		0.00	23.51	45.12	75.05	300	0.20	0.618	21.60	47.89%
Cedar Creek Drive	6116A	MH6116A	MH6115A	0.52			17			40.8	817.0	3.85	12.76		0.00		7.08		0.00	6.15	0.52	19.10	5.35		0.00	24.25	59.68	67.16	300	0.35	0.818	35.43	59.36%
Salamander Way	6156Aa	MH6156A	MH6157A	0.29	3					9.6	9.6	4.00	0.16		0.00		0.00		0.00	0.00	0.29	0.29	0.08		0.00	0.24	31.55	74.63	200	0.85	0.973	31.31	99.25%
Salamander Way	6157A	MH6157A	MH6158A	0.07			1			2.4	12.0	4.00	0.19		0.00		0.00		0.00	0.00	0.07	0.36	0.10		0.00	0.30	34.22	12.28	200	1.00	1.055	33.92	99.14%
Salamander Way	6158A	MH6158A	MH6153A	0.54			14			33.6	45.6	4.00	0.74		0.00		0.00		0.00	0.00	0.54	0.90	0.25		0.00	0.99	56.22	106.46	200	2.70	1.734	55.23	98.24%
Block 436	PARK	BLK6153C	MH6153A						0.83	0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.83	0.83	0.23		0.00	0.23	24.19	13.25	200	0.50	0.746	23.96	99.04%
Salamander Way	6153A	MH6153A	MH6154A	0.03						0.0	45.6	4.00	0.74		0.00		0.00		0.00	0.00	0.03	1.76	0.49		0.00	1.23	28.63	10.53	200	0.70	0.883	27.40	95.70%
Salamander Way	6154A	MH6154A	MH6115A	0.13						0.0	45.6	4.00	0.74		0.00		0.00		0.00	0.00	0.13	1.89	0.53		0.00	1.27	24.19	76.18	200	0.50	0.746	22.93	94.76%
Cedar Creek Drive	6115A	MH6115A	MH6101A	0.61			18			43.2	905.8	3.83	14.04		0.00		7.08		0.00	6.15	0.61	21.60	6.05		0.00	26.24	59.68	87.15	300	0.35	0.818	33.44	56.04%
Miikana Road	6101A	MH6101A	MH6102A	0.45			11			26.4	932.2	3.82	14.42		0.00		7.08		0.00	6.15	0.45	22.05	6.17		0.00	26.74	59.68	91.17	300	0.35	0.818	32.94	55.19%
Block 436	HD2	BLK6102AS	MH6102A	0.94						115.2	115.2	4.00	1.87		0.00		0.00		0.00	0.00	0.94	0.94	0.26		0.00	2.13	20.24	20.00	200	0.35	0.624	18.11	89.48%
Miikana Road	6102A	MH6102A	MH6103A	0.23			6			14.4	1061.8	3.78	16.27		0.00		7.08		0.00	6.15	0.23	23.22	6.50		0.00	28.92	59.68	41.44	300	0.35	0.818	30.76	51.54%
Miikana Road	6103A	MH6103A	MH6104A	0.66			18			43.2	1105.0	3.77	16.88		0.00		7.08		0.00	6.15	0.66	23.88	6.69		0.00	29.72	59.68	120.00	300	0.35	0.818	29.97	50.21%
Block 450	INST	BLK6104AS	MH6104A							0.0	0.0	4.00	0.00	2.55	2.55		0.00		0.00	2.21	2.55	2.55	0.71		0.00	2.93	20.24	20.00	200	0.35	0.624	17.32	85.54%
Miikana Road	6104A	MH6104A	MH6105B	0.60			15			36.0	1141.0	3.76	17.39		2.55		7.08		0.00	8.36	0.60	27.03	7.57		0.00	33.32	59.68	114.40	300	0.35	0.818	26.36	44.17%
Miikana Road		MH6105B	*EX. MH647A*							0.0	1141.0	3.76	17.39		2.55		7.08		0.00	8.36	0.00	27.03	7.57		0.00	33.32	45.12	8.00	300	0.20	0.618	11.80	26.15%
Kelly Farm Drive		*EX. MH647A*	*EX. MH742A*	*0.28*			*5*			*12.0*	3538.6	3.38	48.46		2.55		7.08		0.00	8.36	0.28	75.56	21.16		0.00	77.97	101.84	*80.31*	*375*	*0.31*	0.893	23.87	23.43%

Design Parameters:

Residential			ICI Areas			
						Peak Factor
SF	3.2	p/p/u	INST	50,000	L/Ha/day	1.5
TH/SD	2.4	p/p/u	COM	50,000	L/Ha/day	1.5
APT	1.9	p/p/u	IND	35,000	L/Ha/day	MOE Chart
Other	43	p/p/Ha		17000	L/Ha/day	

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 350 L/day 300 L/day
3. Infiltration allowance: 0.28 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+P^0.5))
where P = population in thousands

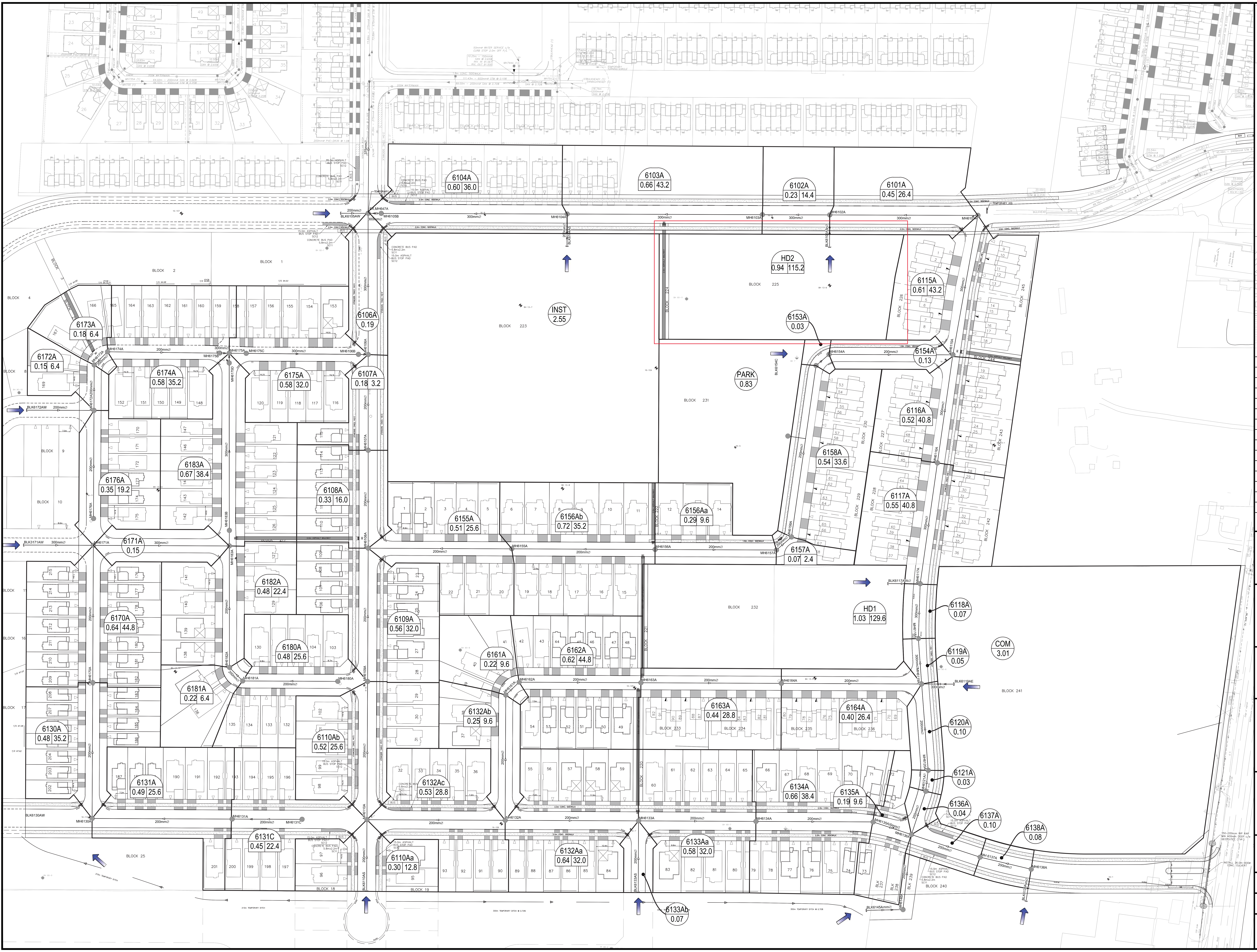
Designed: WY

Checked: JM

Dwg. Reference: 501, 501A

No.	Revision	Date
1.	City Submission No. 1	11/23/2016
2.	City Submission No. 2	5/12/2017
3.	City Submission No. 3	7/5/2017
4.	Updated Street Name for MOE Submission	8/3/2017

File Reference:	Date:	Sheet No:
33956.5.7.1	5/10/2017	2 of 2



REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

Signed ______________________

Date ______________________ 2017

Plan Number ______________________

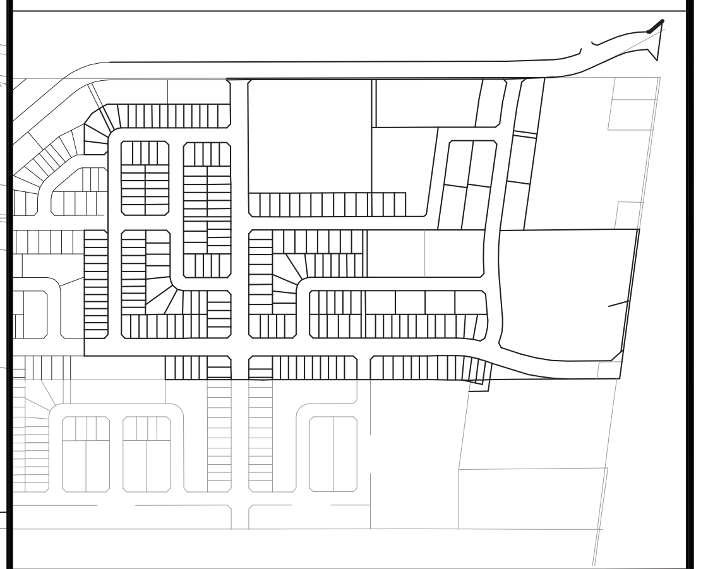
LEGEND :

6115A — AREA NUMBER

0.81 43.2 — POPULATION

AREA IN HECTARES

➡ FUTURE FLOW DIRECTION



No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5	REVISED BLOCK NUMBERS	J.I.M.	2017:08:11
4	RE-SUBMISSION FOR MOECC APPROVAL & REVISED STREET NAMES	J.I.M.	2017:08:02
3	SUBMISSION FOR MOECC APPROVAL	J.I.M.	2017:07:07
2	SUBMISSION No.2 FOR CITY REVIEW	J.I.M.	2017:05:12
1	SUBMISSION No.1 FOR CITY REVIEW	J.I.M.	2016:11:23

LEITRIM SOUTH
HOLDINGS INC.

IBI GROUP
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Ottawa ON K1S 5N4 Canada
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ibigroup.com

Project Title

pathways
at FINDLAY CREEK

LICENSED PROFESSIONAL ENGINEER
J. I. MOFFATT
2017/08/02
PROVINCE OF ONTARIO

N

Drawing Title

SANITARY DRAINAGE
AREA PLAN

Scale
1 : 1000

Design	Date
J.I.M.	NOV 2016
Drawn	**Checked**
D.D.	----
Project No.	**Drawing No.**
33956	501

D07-16-13-0023

#17367

Table 4.11 Sanitary Hydraulic Grade Line for the 100 Year 24 Hour SCS Type II (103.2 mm) and 100 Year 24 Hour SCS Type II (103.2 mm) increased by 20% Storm Events

XPSWMM Node	USF (m)	Finished Grade (m)	Sanitary Hydraulic Grade Line							
			100 Year 24 Hour SCS Type II				100 Year 24 Hour SCS Type II + 20%			
			Sani Inflow Option 1		Sani Inflow Option 2		Sani Inflow Option 1		Sani Inflow Option 2	
	Existing	Existing	HGL (m)*	USF–HGL (m)	HGL (m)†	USF–HGL (m)	HGL (m)*	USF–HGL (m)	HGL (m)†	USF–HGL (m)
	Proposed	*Proposed*								
Zone 6										
608	*94.55*	*96.70*	93.25	1.30	93.25	1.30	93.29	1.26	93.26	1.29
609	*94.20*	*96.35*	93.15	1.05	93.15	1.05	93.19	1.01	93.16	1.04
620	*93.70*	*95.85*	92.74	0.96	92.74	0.96	92.78	0.92	92.75	0.95
630	*93.80*	*95.95*	92.68	1.12	92.68	1.12	92.72	1.08	92.69	1.11
6171	94.30	96.00	92.49	1.81	92.49	1.81	92.53	1.77	92.49	1.81
6183	94.60	96.75	92.40	2.20	92.40	2.20	92.45	2.15	92.41	2.19
6175A	93.65	95.68	92.28	1.37	92.28	1.37	92.32	1.33	92.29	1.36
6106	93.50	95.07	92.19	1.31	92.19	1.31	92.23	1.27	92.19	1.31
646	*92.60*	*94.75*	92.12	0.48	92.12	0.48	92.16	0.44	92.13	0.47
6156	98.00	100.00	96.07	1.93	96.07	1.93	96.07	1.93	96.07	1.93
6115	94.71	96.30	92.44	2.27	92.44	2.27	92.48	2.23	92.45	2.26
6101	n/a	95.38	92.39	n/a	92.39	n/a	92.43	n/a	92.40	n/a
647	92.93	94.95	92.06	0.87	92.06	0.87	92.11	0.82	92.07	0.86

Notes: * HGL results for Option 1 were taken from the results of the XPSWMM model entitled 34738-20170630-MOE1-24SCS100.out or 34738-20170630-MOE1-24SCS120.out and presented on the CD in **Appendix E**.
† HGL results for Option 2 were taken from the results of the XPSWMM model entitled 34738-20170630-MOE2-24SCS100.out or 34738-20170630-MOE2-24SCS120.out and presented on the CD in **Appendix E**.

For the Zone 6 sanitary system, the freeboard criteria is met for the 100 year 24 hour SCS Type II storm and the 100 year 24 hour SCS Type II storm event increased by 20% event for Sanitary Inflow Options 1 and 2.

4.10.3 Storm Hydraulic Grade Line

As noted in **Section 4.9.1**, the LDA sanitary and minor storm sewer systems are hydraulically connected in XPSWMM via the sanitary overflow structures. The hydraulic grade line elevations, for Zone 6 or Phase 1 Pathways at Findlay Creek, for the 100 year 3 hour Chicago and 100 year 3 hour Chicago increased by 20% storm events were found the generate the highest HGL and therefore are summarized in **Tables 4.12 and 4.13** for the local and trunk storm sewers, respectively, for Sanitary Inflow Options 1 and 2. Similar to **Table 4.11**, the "finished grade" column is added to show/confirm the existing vertical relationship between finished road grades and USF elevations. For all future developments within the LDA, the table shows USF at 2.15 m below the recommended final road grades presented in the 2016 Final Updated Serviceability Report. This is a relatively conservative approach.

The storm HGL is reported starting from downstream and moving upstream. The clearance to the existing or proposed underside-of-footing (USF) is also indicated. The resulting HGL for the local

IBI GROUP

SANITARY HYDRAULIC GRADE LINE DESIGN SHEET
PATHWAYS BLOCK 225
CITY OF OTTAWA
REGIONAL GROUP

JOB #: 114312 - 5.7
DATE: 2019-03-29
DESIGN: W.Z. & R.M.
CHECKED: D.G.Y.
REV #: -

Miikana Road Node to MH 1

FRICTION LOSS	FROM MH	TO MH	PIPE ID
BLOCK 225	**Miikana**	**5A**	
INVERT ELEVATION (m)	90.791	91.249	
OBVERT ELEVATION (m)	90.991	91.449	
DIAMETER (mm)			200
LENGTH (m)			14.3
FLOW (l/s)			1.38
HGL (m) ***	**92.390**	**92.390**	**0.000**
MANHOLE COEF K= 0.75	LOSS (m)	0.000	
TOTAL HGL (m)		**92.390**	
MAX. SURCHARGE (mm)		**941**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.2	0.03	0.63	2.500	0.05	1.87	58.63

HYDRAULIC SLOPE = 0.002 %
DESIGN FLOW TO FULL FLOW RATIO (Q 0.024
DESIGN FLOW DEPTH = 0.020

Head loss in manhole simplified method p. 71 (MWDM)
fig1.7.1, Kratio = 0.75 for 45 bends K_L=0.75
Velocity = Flow / Area = 0.04 m/s
HL = K_L * V^2/ 2g

FRICTION LOSS	FROM MH	TO MH	PIPE ID
Block 225	**5A**	**4A**	
INVERT ELEVATION (m)	91.269	91.930	
OBVERT ELEVATION (m)	91.469	92.130	
DIAMETER (mm)			200
LENGTH (m)			20.7
FLOW (l/s)			1.38
HGL (m) ***	**92.390**	**92.391**	**0.000**
MANHOLE COEF K= 0.75	LOSS (m)	0.000	
TOTAL HGL (m)		**92.391**	
MAX. SURCHARGE (mm)		**261**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.2	0.03	0.63	2.500	0.05	1.87	58.57

HYDRAULIC SLOPE = 0.002 %
DESIGN FLOW TO FULL FLOW RATIO (Q 0.024
DESIGN FLOW DEPTH = 0.020

Head loss in manhole simplified method p. 71 (MWDM)
fig1.7.1, Kratio = 0.75 for 45 bends K_L=0.75
Velocity = Flow / Area = 0.04 m/s
HL = K_L * V^2/ 2g

FRICTION LOSS	FROM MH	TO MH	PIPE ID
BLOCK 225	**4A**	**2A**	
INVERT ELEVATION (m)	91.960	92.273	
OBVERT ELEVATION (m)	92.160	92.473	
DIAMETER (mm)			200
LENGTH (m)			9.7
FLOW (l/s)			1.26
HGL (m) ***	**92.391**	**92.391**	**0.000**
MANHOLE COEF K= 0.05	LOSS (m)	0.000	
TOTAL HGL (m)		**92.391**	
MAX. SURCHARGE (mm)		**-82**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.2	0.03	0.63	2.500	0.05	1.87	58.86

HYDRAULIC SLOPE = 0.002 %
DESIGN FLOW TO FULL FLOW RATIO (Q 0.021
DESIGN FLOW DEPTH = 0.020

Head loss in manhole simplified method p. 71 (MWDM)
straight through K_L=0.05
Velocity = Flow / Area = 0.04 m/s
HL = K_L * V^2/ 2g

FRICTION LOSS	FROM MH	TO MH	PIPE ID
BLOCK 225	**2A**	**3A**	
INVERT ELEVATION (m)	92.303	92.387	
OBVERT ELEVATION (m)	92.503	92.587	
DIAMETER (mm)			200
LENGTH (m)			24.0
FLOW (l/s)			0.14
HGL (m) ***	**92.391**	**92.391**	**0.000**
MANHOLE COEF K= 0.05	LOSS (m)	0.000	
TOTAL HGL (m)		**92.397**	
MAX. SURCHARGE (mm)		**-190**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.2	0.03	0.63	0.350	0.05	0.62	19.39

HYDRAULIC SLOPE = 0.025 %
DESIGN FLOW TO FULL FLOW RATIO (Q 0.007
DESIGN FLOW DEPTH = 0.010

Head loss in manhole simplified method p. 71 (MWDM)
straight through K_L=0.05
Velocity = Flow / Area = 0.00 m/s
HL = K_L * V^2/ 2g

SANITARY HYDRAULIC GRADE LINE DESIGN SHEET
PATHWAYS BLOCK 225
CITY OF OTTAWA
REGIONAL GROUP

JOB #: 114312 - 5.7
DATE: 2019-03-29
DESIGN: W.Z. & R.M.
CHECKED: D.G.Y.
REV #: -

FRICTION LOSS	FROM MH	TO MH	PIPE ID
BLOCK 225	**2A**	**1A**	
INVERT ELEVATION (m)	92.333	92.679	
OBVERT ELEVATION (m)	92.533	92.879	
DIAMETER (mm)			200
LENGTH (m)			99.6
FLOW (l/s)			1.05
HGL (m) ***	**92.397**	**92.398**	**0.001**
MANHOLE COEF K= 0.05	LOSS (m)	0.000	
TOTAL HGL (m)		**92.709**	
MAX. SURCHARGE (mm)		**-170**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.2	0.03	0.63	0.350	0.05	0.62	19.32

HYDRAULIC SLOPE = 0.313 %
DESIGN FLOW TO FULL FLOW RATIO (Q 0.054
DESIGN FLOW DEPTH = 0.030

Head loss in manhole simplified method p. 71 (MWDM)
straight through $K_L=0.05$
Velocity = Flow / Area = 0.03 m/s
$HL = K_L * V^2/ 2g$

Miikana Road Sanitary HGL has no impact on the proposed development.

APPENDIX C

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

STORM SEWER DESIGN SHEET

BLOCK 225
CITY OF OTTAWA
PATHWAYS REGIONAL GROUP

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW															SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.25	C= 0.40	C= 0.50	C= 0.57	C= 0.65	C= 0.69	C= 0.70	C= 0.76	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr)	
																															DIA	W	H			(L/s)	(%)
Private Road	1	CBMH5C	MH5B						0.316					0.57	0.57	10.00	0.79	10.79	76.81	104.19	122.14	178.56	43.86	59.50	69.74	101.96		43.86	1,058.89	90.50	825			0.50	1.919	1015.04	95.86%
		MH5B	MH5											0.00	0.57	10.79	0.05	10.83	73.91	100.22	117.46	171.68	42.21	57.22	67.07	98.03	50.71	42.21	59.68	2.38	300			0.35	0.818	17.48	29.28%
	2-1 & 2-2 & 2-3	MH1	MH2									0.298		0.63	0.63	10.00	2.03	12.03	76.81	104.19	122.14	178.56	48.36	65.60	76.90	112.42	85.10	48.36	59.68	99.46	300			0.35	0.818	11.32	18.98%
	3 & 3R	MH3	MH2				0.135					0.081		0.36	0.36	10.00	0.70	10.70	76.81	104.19	122.14	178.56	27.60	37.44	43.89	64.16	34.13	27.60	59.68	34.29	300			0.35	0.818	32.08	53.76%
		MH2	MH4											0.00	0.99	12.03	0.06	12.09	69.81	94.58	110.82	161.94	69.04	93.54	109.60	160.15		69.04	289.21	9.45	375			2.50	2.537	220.17	76.13%
	5R	MH4	MH5				0.099							0.14	1.70	12.09	0.12	12.21	69.62	94.32	110.51	161.48	118.18	160.11	187.61	274.13	18.33	118.18	470.28	20.71	450			2.50	2.865	352.10	74.87%
		MH5	*EX. MAIN*											0.00	1.70	12.21	0.09	12.30	69.25	93.81	109.92	160.61	117.56	159.25	186.59	272.64		117.56	470.28	16.00	450			2.50	2.865	352.73	75.00%
		MH6101	*MH6102*																																		
							0.23		0.32			0.38		1.70	TRUE												188.27										
													0.93	TOTAL AREA TO SEWER																							
													0.01	UNCONTROLLED RELEASE OFFSITE																							
													0.94	TOTAL SITE AREA																							

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

Notes:
1. Mannings coefficient (n) = 0.013

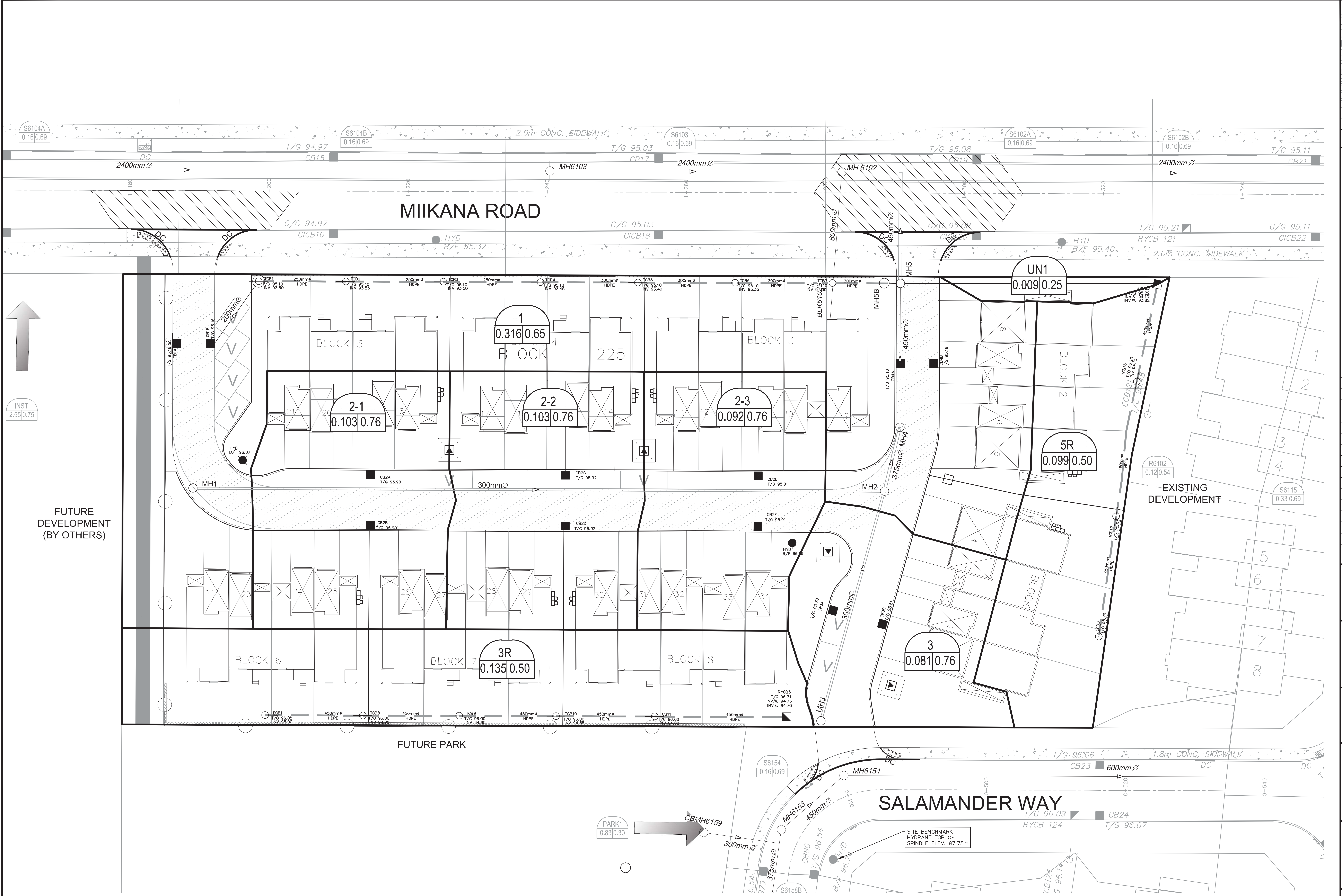
Designed: W.Z.

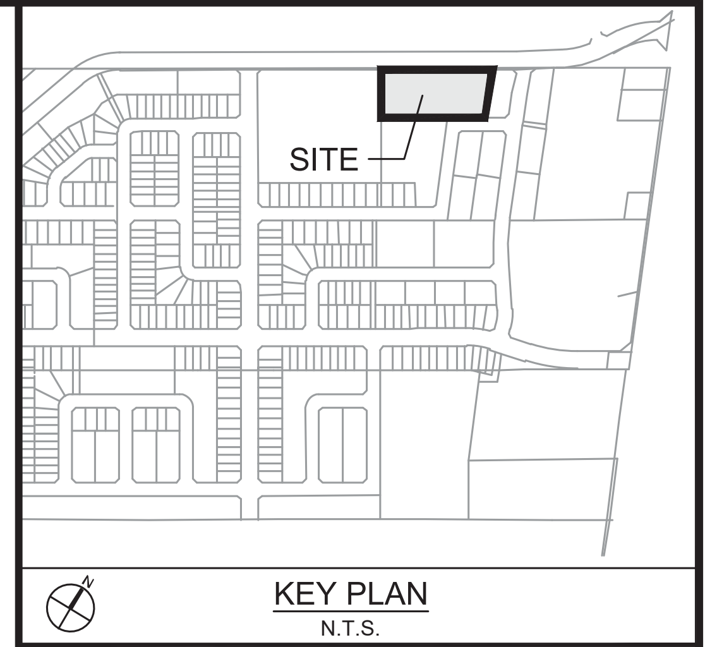
Checked: R.M.

Dwg. Reference: 114312-500

No.	Revision	Date
1.	Servicing Brief - Submission No. 1	2019-03-29

File Reference:	Date:	Sheet No:
114312.5.7.1	2019-03-29	1 of 1





KEY PLAN
N.T.S.

NOTES:

1. SEE DRAWING C-010 FOR ADDITIONAL DETAILS AND NOTES.
2. SITE BENCHMARK OBTAINED FROM LEGAL SURVEYOR ANNIS O'SULLIVAN VOLLEBEKK LTD.

LEGEND :

6115A	AREA NUMBER
43.2	POPULATION
0.81	AREA IN HECTARES
➡	FUTURE FLOW DIRECTION
6115A	EXISTING AREA NUMBER
43.2	EXISTING POPULATION
0.81	AREA IN HECTARES
➡	EXISTING FLOW DIRECTION

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2	REVISED AS PER CITY COMMENTS	DGY	19:07:19
1	ISSUED FOR SPA	DGY	19:04:01

eQhomes
WWW.EQHOMES.CA

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

Project Title

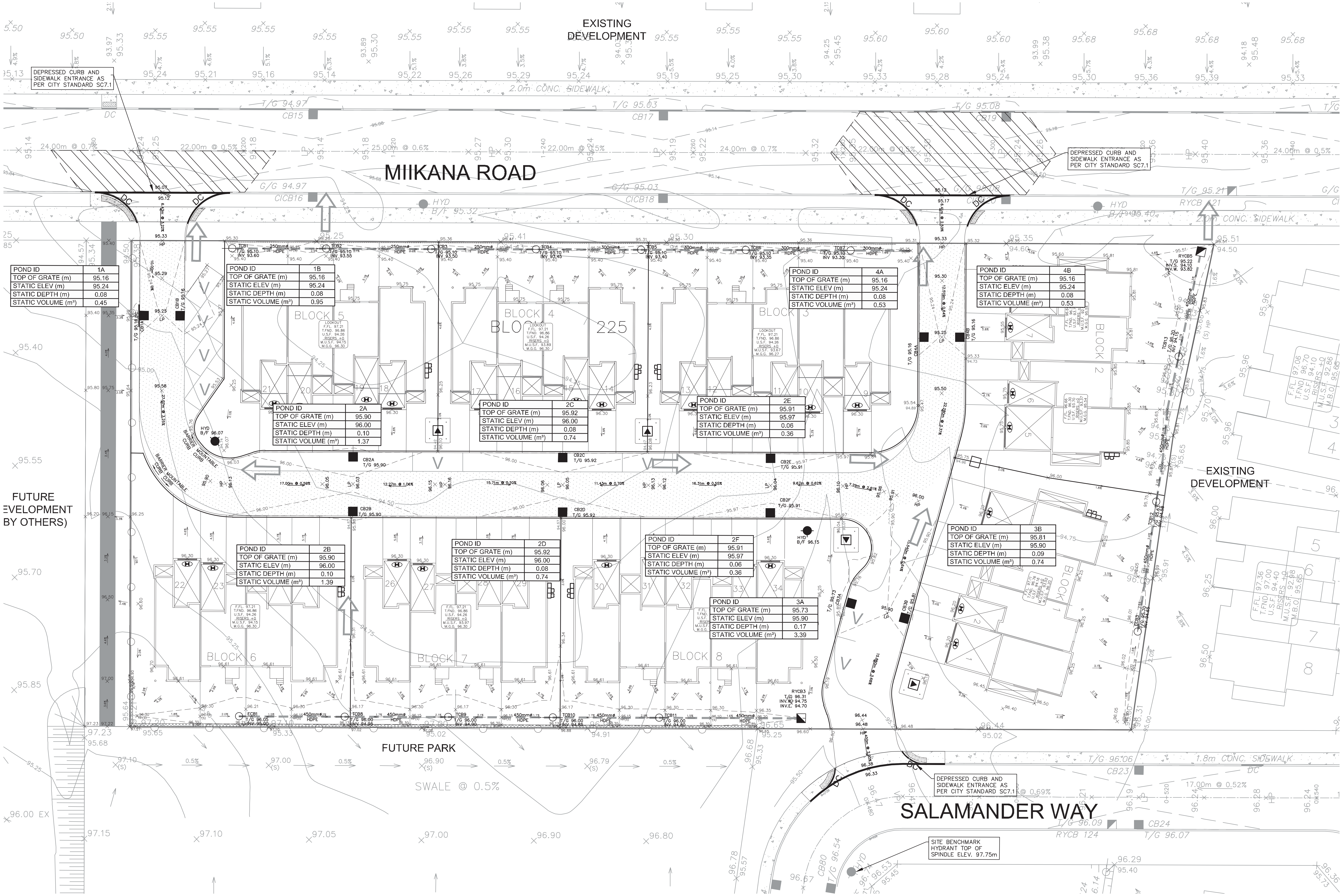
D. G. Yannoulopoulos
2019/07/19

Drawing Title

STORM DRAINAGE
AREA PLAN

Scale 1:250	
Design RM/WZ	Date APRIL 2019
Drawn DPS/WZ	Checked DGY
Project No. 114312	Drawing No. 500

D07-12-19-0060



POND ID	1A
TOP OF GRATE (m)	95.16
STATIC ELEV (m)	95.24
STATIC DEPTH (m)	0.08
STATIC VOLUME (m³)	0.45

POND ID	1B
TOP OF GRATE (m)	95.16
STATIC ELEV (m)	95.24
STATIC DEPTH (m)	0.08
STATIC VOLUME (m³)	0.95

POND ID	4A
TOP OF GRATE (m)	95.16
STATIC ELEV (m)	95.24
STATIC DEPTH (m)	0.08
STATIC VOLUME (m³)	0.53

POND ID	4B
TOP OF GRATE (m)	95.16
STATIC ELEV (m)	95.24
STATIC DEPTH (m)	0.08
STATIC VOLUME (m³)	0.53

POND ID	2A
TOP OF GRATE (m)	95.90
STATIC ELEV (m)	96.00
STATIC DEPTH (m)	0.10
STATIC VOLUME (m³)	1.37

POND ID	2C
TOP OF GRATE (m)	95.92
STATIC ELEV (m)	96.00
STATIC DEPTH (m)	0.08
STATIC VOLUME (m³)	0.74

POND ID	2E
TOP OF GRATE (m)	95.91
STATIC ELEV (m)	95.97
STATIC DEPTH (m)	0.06
STATIC VOLUME (m³)	0.36

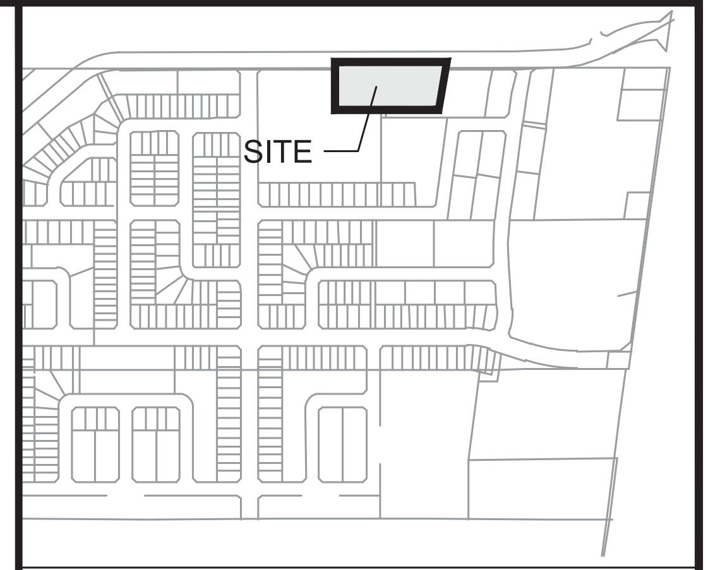
POND ID	3B
TOP OF GRATE (m)	95.81
STATIC ELEV (m)	95.90
STATIC DEPTH (m)	0.09
STATIC VOLUME (m³)	0.74

POND ID	2B
TOP OF GRATE (m)	95.90
STATIC ELEV (m)	96.00
STATIC DEPTH (m)	0.10
STATIC VOLUME (m³)	1.39

POND ID	2D
TOP OF GRATE (m)	95.92
STATIC ELEV (m)	96.00
STATIC DEPTH (m)	0.08
STATIC VOLUME (m³)	0.74

POND ID	2F
TOP OF GRATE (m)	95.91
STATIC ELEV (m)	95.97
STATIC DEPTH (m)	0.06
STATIC VOLUME (m³)	0.36

POND ID	3A
TOP OF GRATE (m)	95.73
STATIC ELEV (m)	95.90
STATIC DEPTH (m)	0.17
STATIC VOLUME (m³)	3.39



KEY PLAN
N.T.S.

NOTES:

1. SEE DRAWING C-010 FOR ADDITIONAL DETAILS AND NOTES.
2. SITE BENCHMARK OBTAINED FROM LEGAL SURVEYOR ANNIS O'SULLIVAN VOLLEBEKK LTD.

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2	REVISED AS PER CITY COMMENTS	DGY	19:07:19
1	ISSUED FOR SPA	DGY	19:04:01

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IBI GROUP
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tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title
BLOCK 225

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2019/07/19
PROVINCE OF ONTARIO

N

Drawing Title
PONDING PLAN

Scale
1:250

Design
RM/WZ

Date
APRIL 2019

Drawn
DPS/WZ

Checked
DGY

Project No.
114312

Drawing No.
600

D07-12-19-0060

#________

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

LEGEND

Black text 5 year event curve design
Red text 10 year event curve design (Earl Armstrong Road)

STORM SEWER DESIGN SHEET

Pathways at FINDLAY CREEK
City of Ottawa
Leitrim South Holdings Inc. (Regional Group)

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW													SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.15	C= 0.30	C= 0.40	C= 0.54	C= 0.61	C= 0.65	C= 0.69	C= 0.71	C= 0.75	C= 0.80	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)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)	
																													DIA	W	H			(L/s)	(%)
	EXT 1			DRAFT 2016 UPDATED SERVICEABILITY REPORT											0.92			11.23																	
Kelly Farm Drive	S6110B	BLK6110S	MH6110					0.33						0.56	1.48	11.23	0.26	11.49	98.12	114.98	168.05	145.17				145.17	214.00	45.00	300			4.50	2.933	68.83	32.16%
Dun Skipper Road	S6132A, R6132D	MH6132	MH6110				0.11	0.21						0.52	0.52	10.00	0.67	10.67	104.19	122.14	178.56	54.31				54.31	231.37	82.00	375			1.60	2.029	177.06	76.53%
Kelly Farm Drive	S6110A	MH6110	MH6109					0.29						0.49	2.49	11.49	0.47	11.96	96.95	113.61	166.03	241.66				241.66	515.17	88.69	450			3.00	3.138	273.51	53.09%
Kelly Farm Drive	R6109	MH6109	MH6108				0.31							0.47	2.96	11.96	0.45	12.41	94.88	111.18	162.45	280.66				280.66	515.17	85.00	450			3.00	3.138	234.51	45.52%
Salamander Way	S6156A, R6156A-B	MH6156	MH6155				0.44	0.21						1.02	1.02	10.00	0.76	10.76	104.19	122.14	178.56	105.93				105.93	142.67	88.69	300			2.00	1.955	36.74	25.75%
Salamander Way	S6155A-B, R6155	MH6155	MH6108				0.54	0.43						1.54	2.56	10.76	0.74	11.50	100.36	117.63	171.93	256.58				256.58	325.82	88.07	450			1.20	1.985	69.25	21.25%
Kelly Farm Drive	S6108A-B,R6108A-B	MH6108	MH6107				0.46	0.36						1.30	6.82	12.41	0.44	12.85	92.99	108.95	159.18	633.76				633.76	1,109.24	79.65	675			1.60	3.003	475.48	42.87%
Kelly Farm Drive	S6107	MH6107	MH6106					0.25						0.42	7.24	12.85	0.23	13.08	91.21	106.86	156.12	660.34				660.34	1,109.24	41.01	675			1.60	3.003	448.90	40.47%
Dun Skipper Road	R6131B	MH6131B	MH6131				0.54							0.81	0.81	10.00	0.49	10.49	104.19	122.14	178.56	84.46				84.46	115.02	46.00	300			1.30	1.576	30.56	26.57%
Dun Skipper Road	S6131A-B	MH6131	MH6130					0.49						0.83	1.64	10.49	0.50	10.98	101.69	119.20	174.23	166.94				166.94	329.75	86.07	375			3.25	2.892	162.81	49.37%
Minikan Street	S6130, R6130	MH6130	MH6170				0.10	0.25						0.57	2.22	10.98	0.52	11.51	99.28	116.35	170.05	219.96				219.96	420.63	80.58	450			2.00	2.562	200.67	47.71%
Minikan Street	S6170, R6170	MH6170	MH6171				0.25	0.36						0.99	3.20	11.51	0.55	12.06	96.86	113.50	165.87	310.08				310.08	441.17	88.94	450			2.20	2.687	131.08	29.71%
	EXT 6			DRAFT 2016 UPDATED SERVICEABILITY REPORT											62.99			24.12																	
Spreadwing Way		BLK3171W	MH6171											0.00	62.99	24.12	0.34	24.46	62.34	72.92	106.33	3,926.53				3,926.53	7,005.73	40.00	2100			0.15	1.959	3079.20	43.95%
Spreadwing Way	S6171, R6171	MH6171	MH6183				0.32	0.15						0.73	66.92	24.46	0.71	25.17	61.77	72.25	105.35	4,134.00				4,134.00	7,005.73	83.00	2100			0.15	1.959	2871.73	40.99%
Zaatiik Grove		MH6180	MH6181											0.00	0.00	10.00	0.74	10.74	104.19	122.14	178.56	0.00				0.00	100.88	61.25	300			1.00	1.383	100.88	100.00%
Zaatiik Grove	S6181, R6181	MH6181	MH6182				0.47	0.29						1.20	1.20	10.74	0.12	10.86	100.45	117.73	172.08	120.27				120.27	182.91	11.82	375			1.00	1.604	62.64	34.25%
Zaatiik Grove	S6182, R6182	MH6182	MH6183				0.31	0.20						0.80	2.00	10.86	0.52	11.38	99.85	117.03	171.05	199.90				199.90	289.21	79.10	375			2.50	2.537	89.31	30.88%
Zaatiik Grove	S6183A-B, R6183	MH6183	MH6175				0.26	0.38						1.03	69.96	25.17	1.01	26.17	60.63	70.91	103.39	4,241.85				4,241.85	7,005.73	118.56	2100			0.15	1.959	2763.88	39.45%
Minikan Street	S6176, R6176A-B	MH6176	MH6172				0.46	0.05						0.78	0.78	10.00	0.83	10.83	104.19	122.14	178.56	80.79				80.79	158.41	69.50	375			0.75	1.389	77.62	49.00%
	EXT 7			DRAFT 2016 UPDATED SERVICEABILITY REPORT											1.50			12.90																	
Viceroy Mews		BLK6172W	MH6172											0.00	1.50	12.90	0.74	13.64	91.02	106.63	155.78	136.64				136.64	200.65	40.00	525			0.20	0.898	64.01	31.90%
Minikan Street	S6172	MH6172	MH6173					0.11						0.19	2.46	13.64	0.53	14.17	88.22	103.33	150.94	217.28				217.28	402.33	27.82	750			0.12	0.882	185.04	45.99%
Minikan Street	S6173, R6173	MH6173	MH6174				0.40	0.31						1.13	3.59	14.17	0.22	14.39	86.34	101.13	147.71	309.91				309.91	402.33	11.80	750			0.12	0.882	92.41	22.97%
Minikan Street		MH6174	MH6175											0.00	3.59	14.39	1.38	15.77	85.58	100.23	146.38	307.16				307.16	402.33	73.12	750			0.12	0.882	95.16	23.65%
Minikan Street	S6175	MH6175	MH6106					0.18						0.31	73.86	26.17	0.78	26.95	59.08	69.10	100.73	4,363.59				4,363.59	7,005.73	91.44	2100			0.15	1.959	2642.14	37.71%
Kelly Farm Drive	S6106, R6106	MH6106	MH6105				0.27	0.24						0.81	81.91	26.95	0.74	27.69	57.95	67.76	98.78	4,746.28				4,746.28	7,005.73	86.86	2100			0.15	1.959	2259.45	32.25%
	EXT 8			DRAFT 2016 UPDATED SERVICEABILITY REPORT											12.34			18.40																	
Miikana Road		BLK6105W	MH6105											0.00	12.34	18.40	0.25	18.65	73.97	86.58	126.36	913.03				913.03	1,575.26	20.00	1200			0.15	1.349	662.23	42.04%
Miikana Road	S6105A-C	MH6105	MH6104							0.48				0.92	95.17	27.69	1.12	28.81	56.91	66.55	97.00	5,416.41				5,416.41	8,166.82	117.89	2400			0.10	1.749	2750.41	33.68%
Block 450	INST	BLK6102S	MH6104									2.55		5.32	5.32	12.00	0.25	12.25	94.70	110.96	162.13	503.47				503.47	636.13	21.00	750			0.30	1.395	132.66	20.85%
Miikana Road	S6104A-B	MH6104	MH6103							0.32				0.61	0.61	0.00	1.14	1.14	230.48	271.61	398.62	141.48				141.48	8,166.82	119.43	2400			0.10	1.749	8025.35	98.27%
Miikana Road	S6103	MH6103	MH6102							0.16				0.31	95.48	28.81	0.40	29.21	55.42	64.79	94.42	5,290.92				5,290.92	8,166.82	42.00	2400			0.10	1.749	2875.90	35.21%
Block 436	HD2	BLK6102S	MH6102										0.94	2.09	2.09	12.00	0.36	12.36	94.70	110.96	162.13	197.97				197.97	286.47	21.00	600			0.20	0.982	88.50	30.89%
Miikana Road	S6102A-B, R6102	MH6102	MH6101				0.12			0.32				0.79	98.36	29.21	0.92	30.13	54.90	64.19	93.54	5,400.36				5,400.36	8,166.82	96.27	2400			0.10	1.749	2766.46	33.87%

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

Designed: W.Y.

Checked: J.M.

Dwg. Reference: 500, 500A

No.	Revision	Date
1.	City Submission No. 1	11/23/2016
2.	City Submission No. 2	5/12/2017
3.	City Submission No. 3	7/6/2017
4.	Updated Street Name for MOE Submission	8/3/2017

File Reference:	Date:	Sheet No:
33956.5.7.1	5/10/2017	1 of 2

IBI GROUP
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LEGEND
Black text 5 year event curve design
Red text 10 year event curve design (Earl Armstrong Road)

STORM SEWER DESIGN SHEET

Pathways at FINDLAY CREEK
City of Ottawa
Leitrim South Holdings Inc. (Regional Group)

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW													SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.15	C= 0.30	C= 0.40	C= 0.54	C= 0.61	C= 0.65	C= 0.69	C= 0.71	C= 0.75	C= 0.80	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)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)	
																													DIA	W	H			(L/s)	(%)
	EXT 2			DRAFT 2016 UPDATED SERVICEABILITY REPORT											4.92			12.88																	
Street No. 7	S6133B	BLK6133S	MH6133					0.20						0.34	5.25	12.88	0.33	13.21	91.10	106.72	155.91	478.64				478.64	1,296.87	47.00	825			0.75	2.350	818.23	63.09%
Dun Skipper Road	S6132B, R6132A, R6132C	MH6132	MH6133				0.70	0.20						1.39	1.39	10.00	1.04	11.04	104.19	122.14	178.56	144.83				144.83	149.72	82.07	375			0.67	1.313	4.89	3.27%
Dun Skipper Road	S6133A, R6133	MH6133	MH6134				0.16	0.30						0.75	7.39	13.21	0.40	13.61	89.81	105.21	153.69	663.99				663.99	1,640.43	71.48	825			1.20	2.973	976.44	59.52%
Dun Skipper Road	R6134	MH6134	MH6135				0.20							0.30	7.69	13.61	0.52	14.13	88.32	103.45	151.12	679.48				679.48	1,580.10	74.61	900			0.70	2.406	900.63	57.00%
Dun Skipper Road	S6135	MH6135	MH6136					0.18						0.31	8.00	14.13	0.20	14.33	86.47	101.28	147.93	691.68				691.68	1,580.10	28.36	900			0.70	2.406	888.43	56.23%
				DRAFT 2016 UPDATED SERVICEABILITY REPORT																															
				DRAFT 2016 UPDATED SERVICEABILITY REPORT																															
	EXT 4	BLK900	MH6140									4.04		8.42	16.42	15.74	0.16	15.90	81.24	95.13	138.90	1,334.13				1,742.71	2,490.17	16.00	1350			0.20	1.685	747.46	30.02%
	EXT 5	BLK900	MH6140									2.06		4.30	4.30	15.74	0.16	15.90	81.24	95.13	138.90		408.58			1,742.71	2,490.17	16.00	1350			0.20	1.685	747.46	30.02%
Dun Skipper Road	S6140A-C	MH6140	MH6139							0.22				0.42	16.84	15.90	0.73	16.63	80.76	94.57	138.07	1,360.38				1,766.55	2,156.55	64.00	1350			0.15	1.460	390.00	18.08%
		MH6140	MH6139											0.00	4.30	15.90	0.73	16.63	80.76	94.57	138.07		406.17			1,766.55	2,156.55	64.00	1350			0.15	1.460	390.00	18.08%
Dun Skipper Road	S6139	MH6139	MH6138							0.08				0.15	17.00	16.63	0.38	17.01	78.64	92.07	134.41	1,336.66				1,732.10	2,156.55	33.27	1350			0.15	1.460	424.45	19.68%
		MH6139	MH6138											0.00	4.30	16.63	0.38	17.01	78.64	92.07	134.41		395.44			1,732.10	2,156.55	33.27	1350			0.15	1.460	424.45	19.68%
Dun Skipper Road	S6138	MH6138	MH6137							0.08				0.15	17.15	17.01	0.38	17.39	77.58	90.83	132.59	1,330.61				1,720.72	2,156.55	33.26	1350			0.15	1.460	435.83	20.21%
		MH6138	MH6137											0.00	4.30	17.01	0.38	17.39	77.58	90.83	132.59		390.11			1,720.72	2,156.55	33.26	1350			0.15	1.460	435.83	20.21%
Dun Skipper Road		MH6137	MH6136											0.00	17.15	17.39	0.46	17.84	76.56	89.62	130.82	1,313.04				1,697.97	2,156.55	39.90	1350			0.15	1.460	458.57	21.26%
		MH6137	MH6136											0.00	4.30	17.39	0.46	17.84	76.56	89.62	130.82		384.93			1,697.97	2,156.55	39.90	1350			0.15	1.460	458.57	21.26%
Temp Ditch		DI 1	BLK6145		6.71									5.60	5.60	49.35	0.01	49.36	38.01	44.39	64.57	212.72				212.72	448.66	1.00	525			1.00	2.008	235.93	52.59%
				DRAFT 2016 UPDATED SERVICEABILITY REPORT																															
Easement	EXT 3	BLK6145	MH6146									2.50		5.21	9.51	12.00	0.26	12.26	94.70	110.96	162.13	900.33				900.33	1,280.55	25.77	975			0.30	1.662	380.22	29.69%
Easement	S6146	MH6146	MH6136					0.21						0.36	9.86	12.26	0.52	12.77	93.61	109.68	160.25	923.30				923.30	1,280.55	51.42	975			0.30	1.662	357.24	27.90%
Cedar Creek Drive		MH6136	BEND6121											0.00	35.01	17.84	0.23	18.08	75.37	88.22	128.77	2,638.86				3,017.79	3,297.98	25.33	1500			0.20	1.808	280.19	8.50%
		BEND6121	MH6120											0.00	35.01	18.08	0.12	18.20	74.77	87.52	127.74	2,618.06				2,993.99	3,297.98	13.56	1500			0.20	1.808	303.99	9.22%
		MH6136	BEND6121											0.00	4.30	17.84	0.23	18.08	75.37	88.22	128.77		378.93			3,017.79	3,297.98	25.33	1500			0.20	1.808	280.19	8.50%
		BEND6121	MH6120											0.00	4.30	18.08	0.12	18.20	74.77	87.52	127.74		375.93			2,993.99	3,297.98	13.56	1500			0.20	1.808	303.99	9.22%
Cedar Creek Drive	S6120, R6120	MH6120	MH6119				0.14			0.17				0.54	35.55	18.08	0.52	18.60	74.77	87.52	127.74	2,658.16				3,034.08	3,297.98	56.40	1500			0.20	1.808	263.90	8.00%
		MH6120	MH6119											0.00	4.30	18.08	0.52	18.60	74.77	87.52	127.74		375.93			3,034.08	3,297.98	56.40	1500			0.20	1.808	263.90	8.00%
Pingwi Place	S6132C, R6132B	MH6132	MH6161				0.34	0.17						0.80	0.80	10.00	0.64	10.64	104.19	122.14	178.56	83.22				83.22	101.94	76.86	250			2.70	2.012	18.72	18.37%
Pingwi Place		MH6161	MH6162											0.00	0.80	10.64	0.12	10.76	100.95	118.32	172.94	80.62				80.62	182.91	11.65	375			1.00	1.604	102.29	55.92%
Pingwi Place	S6162	MH6162	MH6163					0.21						0.36	1.15	10.76	1.39	12.14	100.35	117.62	171.92	115.89				115.89	200.65	74.71	525			0.20	0.898	84.76	42.24%
Pingwi Place	S6163, R6163	MH6163	MH6164				0.24			0.23				0.80	1.96	12.14	1.21	13.36	94.08	110.24	161.07	184.05				184.05	265.43	86.36	525			0.35	1.188	81.37	30.66%
Pingwi Place	S6164A-B, R6164	MH6164	MH6119				0.33			0.38				1.22	3.18	13.36	0.87	14.22	89.27	104.58	152.76	283.94				283.94	388.55	90.57	525			0.75	1.739	104.60	26.92%
Block 429	COM	BLK6119	MH6119									3.01		6.28	6.28	12.00	0.22	12.22	94.70	110.96	162.13	594.30				594.30	844.60	17.00	900			0.20	1.286	250.30	29.64%
Cedar Creek Drive	S6118	MH6119	BEND6118							0.14				0.27	45.27	18.60	0.19	18.79	73.49	86.01	125.53	3,327.09				3,696.53	4,039.18	25.02	1500			0.30	2.214	342.66	8.48%
		BEND6118	MH6117											0.00	45.27	18.79	0.26	19.05	73.03	85.48	124.74	3,306.54				3,673.69	4,039.18	35.20	1500			0.30	2.214	365.50	9.05%
		MH6119	BEND6118											0.00	4.30	18.60	0.19	18.79	73.49	86.01	125.53		369.43			3,696.53	4,039.18	25.02	1500			0.30	2.214	342.66	8.48%
		BEND6118	MH6117											0.00	4.30	18.79	0.26	19.05	73.03	85.48	124.74		367.14			3,673.69	4,039.18	35.20	1500			0.30	2.214	365.50	9.05%
Block 443	HD1	BLK6117W	MH6117										1.02	2.27	2.27	12.00	0.30	12.30	94.70	110.96	162.13	214.82				214.82	320.28	20.00	600			0.25	1.097	105.46	32.93%
Cedar Creek Drive	S6117	MH6117	MH6116							0.27				0.52	48.06	19.05	0.51	19.56	72.41	84.74	123.66	3,479.86				3,843.83	4,362.82	73.12	1500			0.35	2.392	518.99	11.90%
		MH6117	MH6116											0.00	4.30	19.05	0.50	19.56	72.41	84.74	123.66		363.97			3,843.83	4,362.82	72.31	1500			0.35	2.392	518.99	11.90%
Cedar Creek Drive	S6116, R6116A-B	MH6116	MH6115				0.27			0.34				1.06	49.12	19.56	0.41	19.97	71.23	83.36	121.64	3,498.73				3,856.77	5,214.57	69.61	1500			0.50	2.859	1357.80	26.04%
Cedar Creek Drive		MH6116	MH6115											0.00	4.30	19.56	0.40	19.96	71.23	83.36	121.64		358.04			3,856.77	5,214.57	69.28	1500			0.50	2.859	1357.80	26.04%
Salamander Way	S6156B, R6156C	MH6156	MH6157				0.11	0.24						0.57	0.57	10.00	0.93	10.93	104.19	122.14	178.56	59.61				59.61	93.01	71.45	300			0.85	1.275	33.40	35.91%
Salamander Way		MH6157	MH6158											0.00	0.57	10.93	0.15	11.08	99.50	116.62	170.45	56.93				56.93	100.88	12.31	300			1.00	1.383	43.95	43.57%
Salamander Way	S6158A-B, R6158	MH6158	MH6153				0.25			0.35				1.05	1.62	11.08	0.67	11.75	98.80	115.79	169.23	159.94				159.94	300.55	105.99	375			2.70	2.636	140.61	46.78%
Block 438 (Park)	PARK1	BLK6153B	MH6153		0.83									0.69	0.69	11.00	0.16	11.16	99.19	116.25	169.91	68.66				68.66	100.88	13.00	300			1.00	1.383	32.22	31.94%
Salamander Way		MH6153	MH6154											0.00	2.31	11.75	0.13	11.88	95.76	112.22	163.98	221.31				221.31	248.85	11.90	450			0.70	1.516	27.54	11.07%
Salamander Way	S6154, R6154	MH6154	MH6115				0.26			0.16				0.70	3.01	11.88	0.86	12.75	95.20	111.55	163.00	286.37				286.37	452.94	80.33	600			0.50	1.552	166.57	36.78%
Cedar Creek Drive	S6115	MH6115	MH6101							0.33				0.63	52.76	19.97	0.51	20.48	70.32	82.30	120.08	3,710.31				4,063.81	5,214.57	88.17	1500			0.50	2.859	1150.76	22.07%
Cedar Creek Drive		MH6115	MH6101											0.00	4.30	19.96	0.52	20.48	70.33	82.30	120.08		353.50			4,063.81	5,214.57	88.50	1500			0.50	2.859	1150.76	22.07%
Miikana Road	S6101A-B,R6101	MH6101	BLK6101				0.15			0.14				0.49	151.62	30.13	0.23	30.36	53.77	62.86	91.59	8,151.91				8,421.89	12,912.88	38.34	2400			0.25	2.765	4490.99	34.78%
Miikana Road		MH6101	BLK6101											0.00	4.30	30.13	0.23	30.36	53.77	62.86	91.59		269.98			8,421.89	12,912.88	38.34	2400			0.25	2.765	4490.99	34.78%
Dun Skipper culvert				31.15										12.99	12.99	92.20	0.39	92.59	23.84	27.80	40.35	309.73				309.73	452.94	36.00	600			0.50	1.552	143.21	31.62%

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

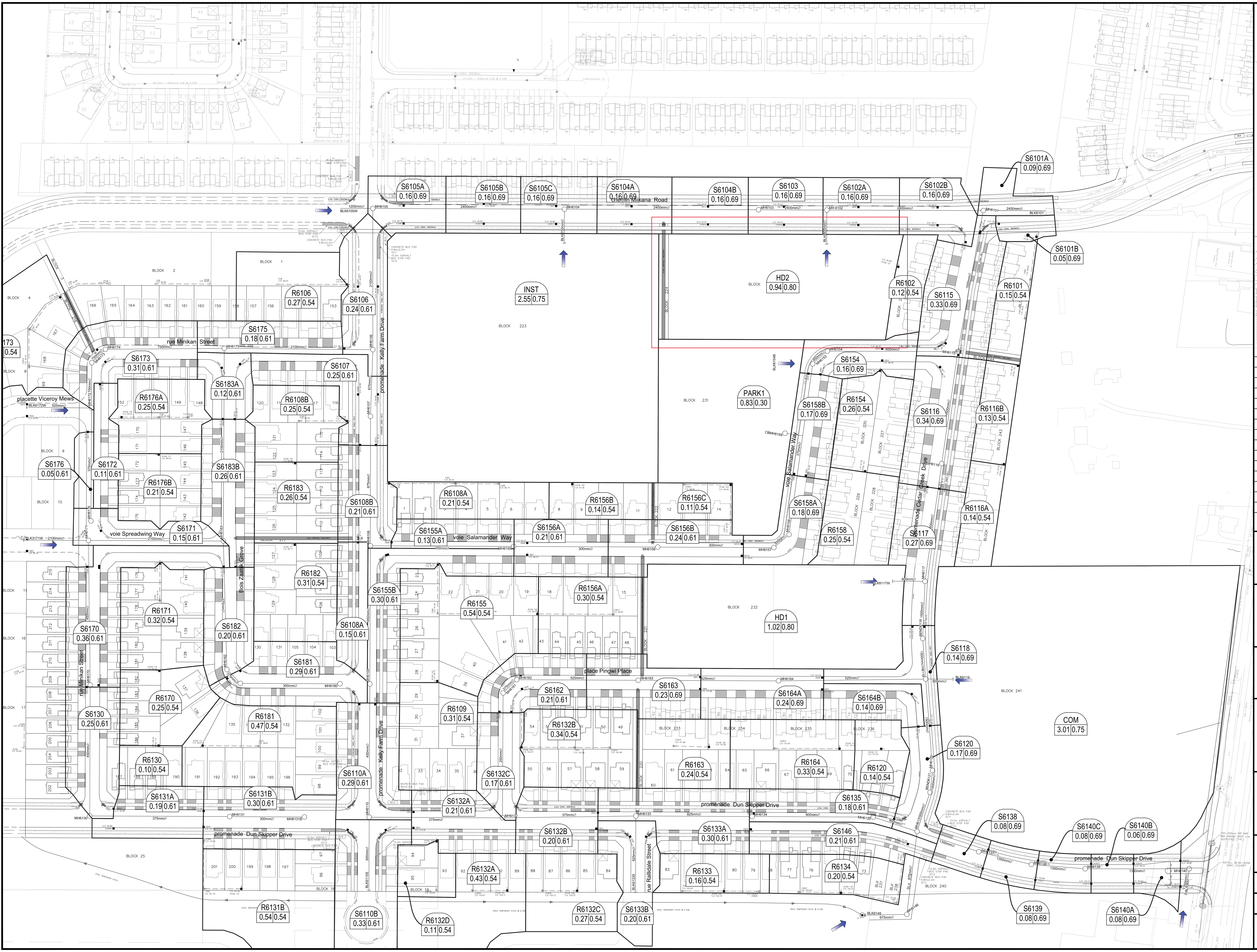
Designed: W.Y.

Checked: J.M.

Dwg. Reference: 500, 500A

No.	Revision	Date
1.	City submission No. 1	11/23/2016
2.	City Submission No. 2	5/12/2017
3.	City Submission No. 3	7/6/2017
4.	Updated Street Name for MOE Submission	8/3/2017

File Reference:	Date:	Sheet No:
33956.5.7.1	5/10/2017	2 of 2



REVIEWED BY
DEVELOPMENT REVIEW SERVICES BRANCH

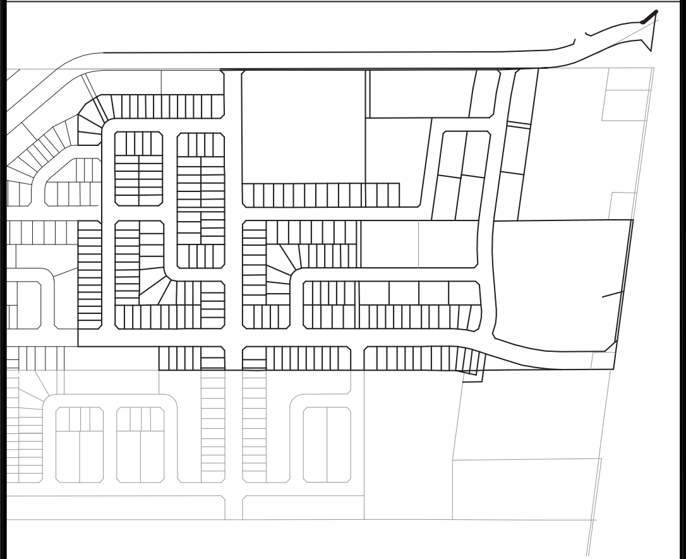
Signed ______________________

Date ______________________ 2017

Plan Number ______________________

LEGEND :

S168	AREA NUMBER
0.69	RUNOFF COEFFICIENT
2.01	AREA IN HECTARES
➡	FUTURE MINOR FLOW DIRECTION



No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5	REVISED BLOCK NUMBERS	J.I.M.	2017:08:11
4	RE-SUBMISSION FOR MOECC APPROVAL & REVISED STREET NAMES	J.I.M.	2017:08:02
3	SUBMISSION FOR MOECC APPROVAL	J.I.M.	2017:07:07
2	SUBMISSION No.2 FOR CITY REVIEW	J.I.M.	2017:05:12
1	SUBMISSION No.1 FOR CITY REVIEW	J.I.M.	2016:11:23

LEITRIM SOUTH
HOLDINGS INC.

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Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

pathways
at FINDLAY CREEK

J. I. MOFFATT
2017/08/02

Drawing Title

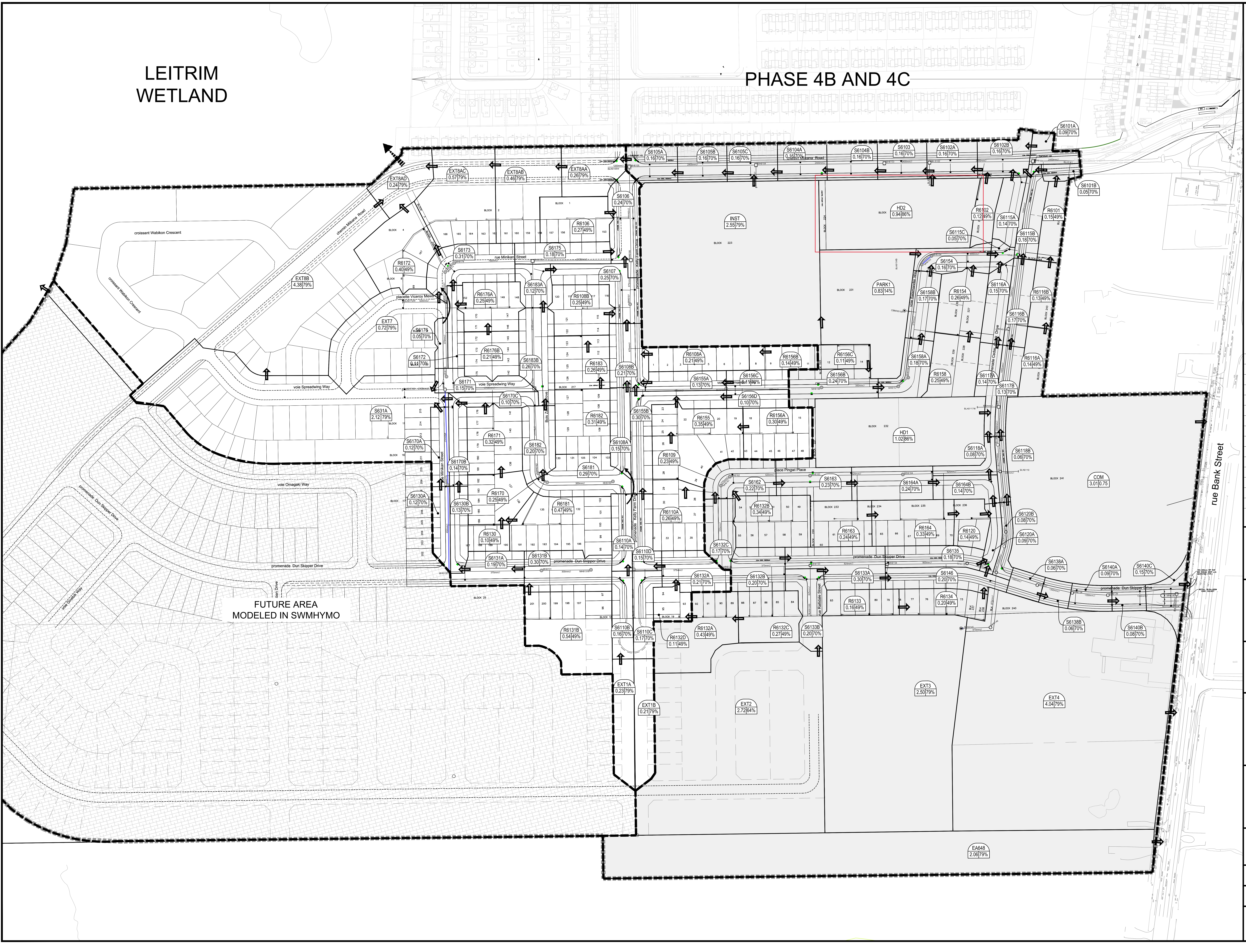
STORM DRAINAGE
AREA PLAN

Scale 1 : 1000

Design J.I.M.	Date NOV 2016
Drawn D.D.	Checked ----
Project No. 33956	Drawing No. 500

D07-16-13-0023

#17367



LEGEND:

▨ PHASE 1 EAST DRAINAGE AREA MODELED IN DDSWMM

☐ PHASE 1 WEST DRAINAGE AREA MODELED IN DDSWMM

▨ FUTURE DRAINAGE AREA MODELED IN DDSWMM

PHASE 1 DRAINAGE BOUNDARY

DDSWMM MODELS DRAINAGE BOUNDARIES

SUBCATCHMENT DRAINAGE BOUNDARY

S208 — AREA ID
0.19 | 71 — Imp.(%)/Tp.(hr)
AREA (ha)

⇨ MAJOR FLOW

➡ MAJOR FLOW TO WETLAND

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5	REVISED BLOCK NUMBERS	D.D.	2017:08:11
4	RE-SUBMISSION FOR MOECC APPROVAL & REVISED STREET NAMES	R.B.	2017:08:02
3	SUBMISSION FOR MOECC APPROVAL	R.B.	2017:07:07
2	SUBMISSION NO.2 FOR CITY REVIEW	R.B.	2017:05:12
1	SUBMISSION NO.1 FOR CITY REVIEW	R.B.	2016:11:23

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ibigroup.com

Project Title

pathways
at FINDLAY CREEK

LICENSED PROFESSIONAL ENGINEER
R.F.D.BROWN
100078940
2017/08/02
PROVINCE OF ONTARIO

N

Drawing Title

DDSWMM SCHEMATIC

Scale
1:1500

Design R.B.	Date NOV 2016
Drawn J.F.	Checked R.B.
Project No. 33956	Drawing No. 700

D07-XX-XX-XXXX

#17367

† Pathways at Findlay Creek Phase 1 West modeled flow is from the DDSWMM output file 33956-PH1W-3CHI2.out, 33956-PH1W-3CHI5.out and 33956-PH1W-3CHI100.out which are all presented on the CD in **Appendix E**.

The assigned size of the inlet control devices (ICDs) for the subject site was optimized using DDSWMM. ICDs are incorporated into the stormwater management design to protect the minor system from surcharge during major storm events. The ICDs used for Phase 1 are provided on **Drawing 010**. It should be noted that due to the increased minor system capture at low points flow, there were a few instances where the flow restriction into the minor system was the capacity of the CB inlet. These include one CB on S6115B, one CB on S6183A, one CB on S6107 (indicated in bold in **Table 4.4**). Calculations demonstrating the capacity of the CBs within a road sag is presented in **Appendix E**. In addition, there are two instances where the CB lead is the restriction for the inflow to the minor system. These include S6115B and S6155B. Calculations supporting the lead size for the inflow restriction are provided in **Appendix E**.

For those areas within Phase 1 which will require a separate site stormwater design and analysis, the following table summarizes the assumed inflow rate and minimum on-site storage required for their design.

Table 4.5 Summary of Minimum On-Site Storage and Minor System Inflow Rate for External Development Lands to Phase 1

Drainage Area		Land Use	IMP Ratio (%)	Minimum On-Site Storage Required (m^3)*	Minor System Inflow Rate (l/s)
Segment ID	Area (ha)				
EXT3	2.50	High Density	79	125.00	469
HD1	1.02	High Density	86	100.00	206
PARK1	0.83	Park	14	150.00	38
HD2	0.94	High Density	86	115.00	190
INST	2.55	School	79	290.00	476
EXT4	4.06	Commercial	79	462.00	760
COM	3.01	Commercial	79	345.00	562

** The on-site storage noted was used to evaluate Phase 1. As a minimum this on-site storage should be provided.*

4.9.3 Simulation Results

Minor system hydrographs generated in DDSWMM were downloaded to the XPSWMM model for hydraulic grade line analysis (refer to **Section 4.10**).

The storage available on-site and its maximum depth and the results of the DDSWMM evaluation for the subject site are presented in **Table 4.6**. Also included in **Table 4.6**, is the duration of ponding and depth of ponding for the 2 year, 5 year, 100 year and July 1, 1979 historical storm events. The ponding plan for the subject site is presented on **Drawing 751**. The DDSWMM output files are presented in **Appendix E**.

Calculation Sheet: Overflow From Typical Road Ponding Area

User Input Characteristics

Road Cross-Slope	3.0	%
Right-of-Way Cross-Slope	3.5	%
Curb Height	0.15	m
Manning's Roughness for Road	0.013	
Manning's Roughness for Right-Of-Way	0.025	

Note: Overflow calculations performed based on Manning's Equation, where $Q = R_h^{2/3} S^{1/2} A / n$, and:

Q = overflow (m^3/s)

R_h = hydraulic radius

A = area (m^2)

n = Manning's roughness coefficient

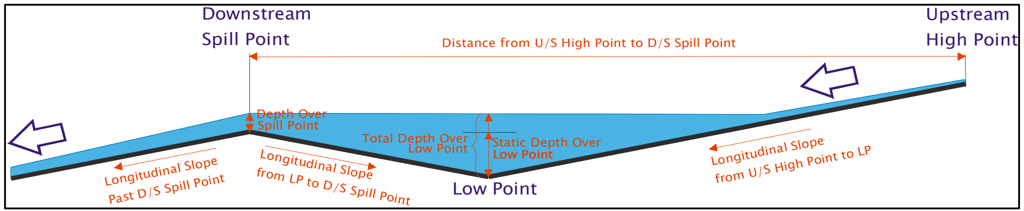
S = friction slope (m/m), as simulated in XPSWMM for a range of longitudinal road slopes downstream of the spill point of the road ponding area:

0.50 - 0.74% longitudinal slope = 0.15% friction slope

0.75 - 1.24% longitudinal slope = 0.16% friction slope

1.25 - 3.74% longitudinal slope = 0.17% friction slope

3.75 - 5.00% longitudinal slope = 0.18% friction slope



Depth Over Spill Point (m)	Overflow (m^3/s)											
	0.50% - 0.74% D/S Slope			0.75% - 1.24% D/S Slope			1.25% - 3.74% D/S Slope			3.75% - 5.00% D/S Slope		
	5.5 m Road	8.5 m Road	11.0 m Road	5.5 m Road	8.5 m Road	11.0 m Road	5.5 m Road	8.5 m Road	11.0 m Road	5.5 m Road	8.5 m Road	11.0 m Road
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.015	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
0.020	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
0.025	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.004
0.030	0.005	0.005	0.005	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006
0.035	0.008	0.008	0.008	0.008	0.008	0.008	0.009	0.009	0.009	0.009	0.009	0.009
0.040	0.011	0.011	0.011	0.012	0.012	0.012	0.012	0.012	0.012	0.013	0.013	0.013
0.045	0.016	0.016	0.016	0.016	0.016	0.016	0.017	0.017	0.017	0.017	0.017	0.017
0.050	0.021	0.021	0.021	0.021	0.021	0.021	0.022	0.022	0.022	0.023	0.023	0.023
0.055	0.027	0.027	0.027	0.028	0.028	0.028	0.029	0.029	0.029	0.029	0.029	0.029
0.060	0.034	0.034	0.034	0.035	0.035	0.035	0.036	0.036	0.036	0.037	0.037	0.037
0.065	0.042	0.042	0.042	0.043	0.043	0.043	0.045	0.045	0.045	0.046	0.046	0.046
0.070	0.051	0.051	0.051	0.053	0.053	0.053	0.054	0.054	0.054	0.056	0.056	0.056
0.075	0.061	0.061	0.061	0.063	0.063	0.063	0.065	0.065	0.065	0.067	0.067	0.067
0.080	0.073	0.073	0.073	0.075	0.075	0.075	0.078	0.078	0.078	0.080	0.080	0.080
0.085	0.087	0.086	0.086	0.090	0.088	0.088	0.093	0.091	0.091	0.096	0.094	0.094
0.090	0.104	0.100	0.100	0.108	0.103	0.103	0.111	0.106	0.106	0.114	0.109	0.109
0.095	0.123	0.115	0.115	0.127	0.119	0.119	0.131	0.123	0.123	0.134	0.126	0.126
0.100	0.142	0.132	0.132	0.147	0.136	0.136	0.151	0.141	0.141	0.156	0.145	0.145
0.105	0.163	0.150	0.150	0.168	0.155	0.155	0.173	0.160	0.160	0.178	0.165	0.165
0.110	0.184	0.170	0.170	0.190	0.176	0.176	0.196	0.181	0.181	0.202	0.187	0.187
0.115	0.207	0.192	0.192	0.214	0.198	0.198	0.220	0.204	0.204	0.226	0.210	0.210
0.120	0.230	0.215	0.215	0.238	0.222	0.222	0.245	0.229	0.229	0.252	0.235	0.235
0.125	0.255	0.240	0.240	0.263	0.247	0.247	0.271	0.255	0.255	0.279	0.262	0.262
0.130	0.280	0.269	0.266	0.290	0.278	0.275	0.299	0.287	0.283	0.307	0.295	0.291
0.135	0.307	0.304	0.294	0.317	0.314	0.304	0.327	0.323	0.313	0.336	0.333	0.322
0.140	0.334	0.340	0.324	0.345	0.351	0.335	0.356	0.362	0.345	0.366	0.372	0.355
0.145	0.363	0.377	0.356	0.375	0.390	0.368	0.386	0.402	0.379	0.397	0.413	0.390
0.150	0.392	0.417	0.390	0.405	0.430	0.402	0.417	0.443	0.415	0.429	0.456	0.427
0.155	0.422	0.458	0.425	0.436	0.473	0.439	0.450	0.487	0.453	0.463	0.501	0.466
0.160	0.454	0.500	0.463	0.469	0.517	0.479	0.483	0.532	0.493	0.497	0.548	0.508
0.165	0.486	0.544	0.503	0.502	0.562	0.520	0.518	0.580	0.536	0.533	0.596	0.552
0.170	0.520	0.590	0.556	0.537	0.610	0.574	0.553	0.629	0.592	0.569	0.647	0.609
0.175	0.555	0.638	0.610	0.573	0.659	0.630	0.590	0.679	0.650	0.607	0.699	0.669
0.180	0.590	0.687	0.667	0.610	0.710	0.689	0.629	0.732	0.710	0.647	0.753	0.731
0.185	0.627	0.738	0.726	0.648	0.763	0.750	0.668	0.786	0.773	0.687	0.809	0.795
0.190	0.665	0.791	0.787	0.687	0.817	0.813	0.708	0.842	0.838	0.729	0.867	0.862
0.195	0.705	0.846	0.851	0.728	0.873	0.879	0.750	0.900	0.906	0.772	0.926	0.932
0.200	0.745	0.902	0.917	0.770	0.931	0.947	0.793	0.960	0.976	0.817	0.988	1.004
0.205	0.787	0.960	0.985	0.813	0.991	1.017	0.838	1.022	1.048	0.862	1.052	1.078
0.210	0.830	1.020	1.055	0.857	1.053	1.089	0.884	1.085	1.123	0.909	1.117	1.155
0.215	0.874	1.081	1.127	0.903	1.117	1.164	0.931	1.151	1.200	0.958	1.184	1.235
0.220	0.920	1.144	1.202	0.950	1.182	1.241	0.979	1.218	1.280	1.008	1.254	1.317
0.225	0.967	1.210	1.279	0.999	1.249	1.321	1.029	1.288	1.362	1.059	1.325	1.401
0.230	1.015	1.277	1.358	1.048	1.318	1.403	1.081	1.359	1.446	1.112	1.398	1.488
0.235	1.065	1.345	1.440	1.100	1.389	1.487	1.133	1.432	1.533	1.166	1.474	1.577
0.240	1.116	1.416	1.523	1.152	1.462	1.573	1.188	1.507	1.622	1.222	1.551	1.669
0.245	1.168	1.488	1.610	1.206	1.537	1.662	1.243	1.584	1.713	1.279	1.630	1.763
0.250	1.222	1.563	1.698	1.262	1.614	1.754	1.300	1.664	1.808	1.338	1.712	1.860
0.255	1.277	1.639	1.789	1.318	1.693	1.847	1.359	1.745	1.904	1.398	1.795	1.959
0.260	1.333	1.717	1.881	1.377	1.773	1.943	1.419	1.828	2.003	1.460	1.881	2.061
0.265	1.391	1.797	1.977	1.437	1.856	2.042	1.481	1.913	2.104	1.524	1.968	2.165
0.270	1.450	1.879	2.074	1.498	1.940	2.142	1.544	2.000	2.208	1.589	2.058	2.272
0.275	1.511	1.962	2.174	1.561	2.027	2.245	1.609	2.089	2.314	1.656	2.150	2.382
0.280	1.574	2.048	2.276	1.625	2.115	2.351	1.675	2.180	2.423	1.724	2.244	2.494
0.285	1.638	2.136	2.381	1.691	2.206	2.459	1.743	2.274	2.535	1.794	2.340	2.608
0.290	1.703	2.225	2.488	1.759	2.298	2.569	1.813	2.369	2.648	1.865	2.438	2.725
0.295	1.770	2.317	2.597	1.828	2.393	2.682	1.884	2.467	2.765	1.939	2.538	2.845
0.300	1.838	2.410	2.708	1.899	2.490	2.797	1.957	2.566	2.883	2.014	2.641	2.967
0.305	1.908	2.506	2.822	1.971	2.588	2.915	2.032	2.668	3.005	2.090	2.745	3.092
0.310	1.980	2.603	2.939	2.045	2.689	3.035	2.108	2.772	3.128	2.169	2.852	3.219
0.315	2.053	2.703	3.057	2.120	2.792	3.157	2.186	2.878	3.255	2.249	2.961	3.349
0.320	2.128	2.805	3.178	2.198	2.897	3.282	2.265	2.986	3.383	2.331	3.072	3.482
0.325	2.204	2.908	3.302	2.277	3.004	3.410	2.347	3.096	3.515	2.415	3.186	3.617
0.330	2.282	3.014	3.427	2.357	3.113	3.540	2.430	3.208	3.649	2.500	3.301	3.755
0.335	2.362	3.121	3.556	2.440	3.224	3.672	2.515	3.323	3.785	2.588	3.419	3.895
0.340	2.443	3.231	3.686	2.524	3.337	3.807	2.601	3.440	3.924	2.677	3.540	4.038
0.345	2.527	3.343	3.819	2.609	3.453	3.945	2.690	3.559	4.066	2.768	3.662	4.184
0.350	2.611	3.457	3.955	2.697	3.570	4.085	2.780	3.680	4.210	2.861	3.787	4.332
0.355	2.698	3.573	4.093	2.786	3.690	4.227	2.872	3.804	4.357	2.955	3.914	4.484
0.360	2.786	3.691	4.233	2.877	3.812	4.372	2.966	3.929	4.507	3.052	4.043	4.637
0.365	2.876	3.811	4.376	2.970	3.936	4.520	3.062	4.057	4.659	3.150	4.175	4.794
0.370	2.968	3.934	4.522	3.065	4.063	4.670	3.159	4.188	4.814	3.251	4.309	4.953
0.375	3.061	4.058	4.669	3.161	4.191	4.823	3.259	4.320	4.971	3.353	4.446	5.115
0.380	3.156	4.185	4.820	3.260	4.322	4.978	3.360	4.455	5.131	3.457	4.584	5.280
0.385	3.253	4.314	4.973	3.360	4.455	5.136	3.463	4.592	5.294	3.564	4.725	5.447
0.390	3.352	4.445	5.128	3.462	4.591	5.296	3.569	4.732	5.459	3.672	4.869	5.617
0.395	3.453	4.578	5.286	3.566	4.728	5.459	3.676	4.874	5.627	3.782	5.015	5.790

Calculation Sheet: Overflow From Typical Road Ponding Area

User Input Characteristics

Road Cross-Slope	3.0	%
Right-of-Way Cross-Slope	3.5	%
Curb Height	0.15	m
Manning's Roughness for Road	0.013	
Manning's Roughness for Right-Of-Way	0.025	

Note: Overflow calculations performed based on Manning's Equation, where $Q = R_h^{2/3} S^{1/2} A / n$, and:

Q = overflow (m^3/s)

R_h = hydraulic radius

A = area (m^2)

n = Manning's roughness coefficient

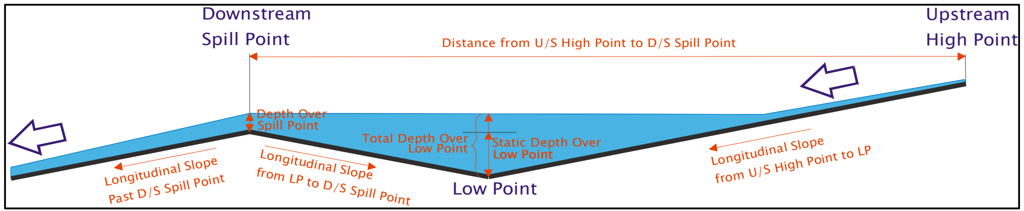
S = friction slope (m/m), as simulated in XPSWMM for a range of longitudinal road slopes downstream of the spill point of the road ponding area:

0.50 - 0.74% longitudinal slope = 0.15% friction slope

0.75 - 1.24% longitudinal slope = 0.16% friction slope

1.25 - 3.74% longitudinal slope = 0.17% friction slope

3.75 - 5.00% longitudinal slope = 0.18% friction slope



Depth Over Spill Point (m)	Overflow (m^3/s)											
	0.50% - 0.74% D/S Slope			0.75% - 1.24% D/S Slope			1.25% - 3.74% D/S Slope			3.75% - 5.00% D/S Slope		
	5.5 m Road	8.5 m Road	11.0 m Road	5.5 m Road	8.5 m Road	11.0 m Road	5.5 m Road	8.5 m Road	11.0 m Road	5.5 m Road	8.5 m Road	11.0 m Road
0.400	3.555	4.713	5.446	3.672	4.868	5.625	3.785	5.018	5.798	3.895	5.163	5.966
0.405	3.659	4.851	5.609	3.780	5.010	5.793	3.896	5.164	5.972	4.009	5.314	6.145
0.410	3.766	4.991	5.775	3.889	5.155	5.964	4.009	5.313	6.148	4.125	5.467	6.326
0.415	3.874	5.133	5.943	4.001	5.301	6.138	4.124	5.465	6.327	4.243	5.623	6.510
0.420	3.984	5.278	6.113	4.114	5.451	6.314	4.241	5.618	6.508	4.364	5.781	6.697
0.425	4.096	5.424	6.287	4.230	5.602	6.493	4.360	5.774	6.693	4.486	5.942	6.887
0.430	4.209	5.573	6.462	4.347	5.756	6.674	4.481	5.933	6.880	4.611	6.105	7.079
0.435	4.325	5.724	6.641	4.467	5.912	6.859	4.604	6.094	7.070	4.738	6.271	7.275
0.440	4.443	5.878	6.822	4.588	6.071	7.046	4.729	6.257	7.262	4.867	6.439	7.473
0.445	4.562	6.034	7.005	4.712	6.231	7.235	4.857	6.423	7.458	4.998	6.609	7.674
0.450	4.684	6.192	7.192	4.837	6.395	7.427	4.986	6.592	7.656	5.131	6.783	7.878
0.455	4.807	6.352	7.380	4.965	6.561	7.623	5.118	6.762	7.857	5.266	6.958	8.085
0.460	4.933	6.515	7.572	5.095	6.729	7.820	5.251	6.936	8.061	5.404	7.137	8.295
0.465	5.060	6.680	7.766	5.226	6.899	8.021	5.387	7.112	8.268	5.543	7.318	8.507
0.470	5.190	6.848	7.963	5.360	7.072	8.224	5.525	7.290	8.477	5.685	7.501	8.723
0.475	5.321	7.018	8.163	5.496	7.248	8.430	5.665	7.471	8.690	5.829	7.687	8.942
0.480	5.455	7.190	8.365	5.634	7.426	8.639	5.807	7.654	8.905	5.976	7.876	9.163
0.485	5.591	7.365	8.570	5.774	7.606	8.851	5.952	7.840	9.123	6.124	8.067	9.388
0.490	5.728	7.542	8.777	5.916	7.789	9.065	6.098	8.029	9.344	6.275	8.261	9.615
0.495	5.868	7.721	8.987	6.061	7.974	9.282	6.247	8.220	9.568	6.428	8.458	9.845
0.500	6.010	7.903	9.201	6.207	8.162	9.502	6.398	8.414	9.795	6.584	8.657	10.079

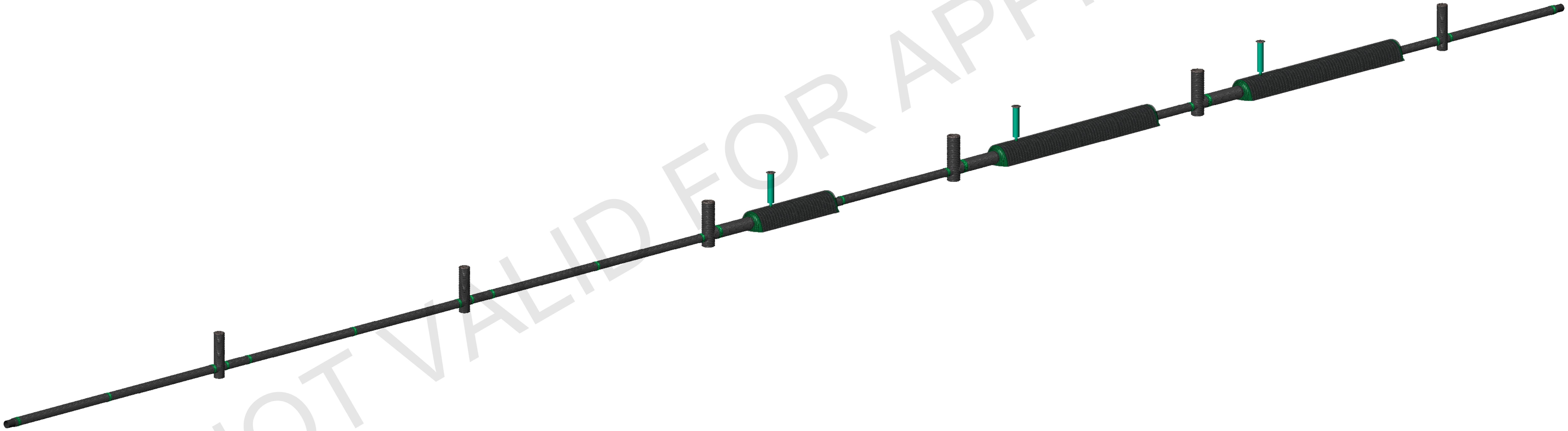
SOLENO
Mastering Storm Water

SC05697 SOLENO HYDROSTOR HS75 SYSTEM 10 CHAMBERS 26.6m^3

PROJECT: 76 SALAMANDER WAY
JOB LOCATION:
CONTACT:
OWNER/ENGINEERING FIRM/CONTRACTOR NAME:

Paul Antoine
Sales Representative
Tel: 613-292-4094
Email:
pantoine@soleno.com

David Kanters
Engineer, Technical Service
Tel: 416-347-2799
Email:
dkanters@soleno.com



1. INSTALLATION MUST BE MADE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
2. SYSTEM IS DESIGNED TO WITHSTAND TRAFFIC LOAD CSA CL-625 AND AASHTO H-20.
3. HS75 CHAMBERS MUST BE MINIMALLY BACKFILLED WITH 150 mm (6'') OF CRUSHED STONE AND 300 mm (12'') OF GRANULAR MATERIAL COMPACTED AT 90% P.M.
4. HYDROSTOR GEOGRID FOR FOUNDATION STABILIZATION IS CONSIDERED UNDER ALL THE CHAMBERS.

THIS DRAWING IS NOT VALID FOR APPROVAL. DETAILED DRAWINGS WILL BE SUBMITTED FOR APPROVAL AFTER RECEPTION OF PURCHASE ORDER.

2019-07-18

SC05697 SOLENO HYDROSTOR HS75 SYSTEM 10 CHAMBERS 26.6m³

Paul Antoine
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David Kanters
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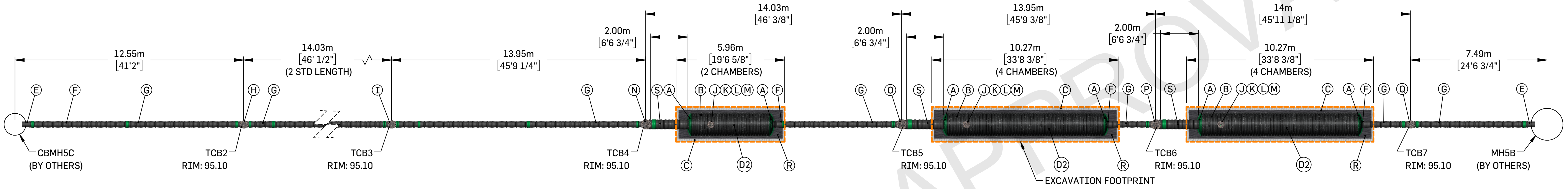
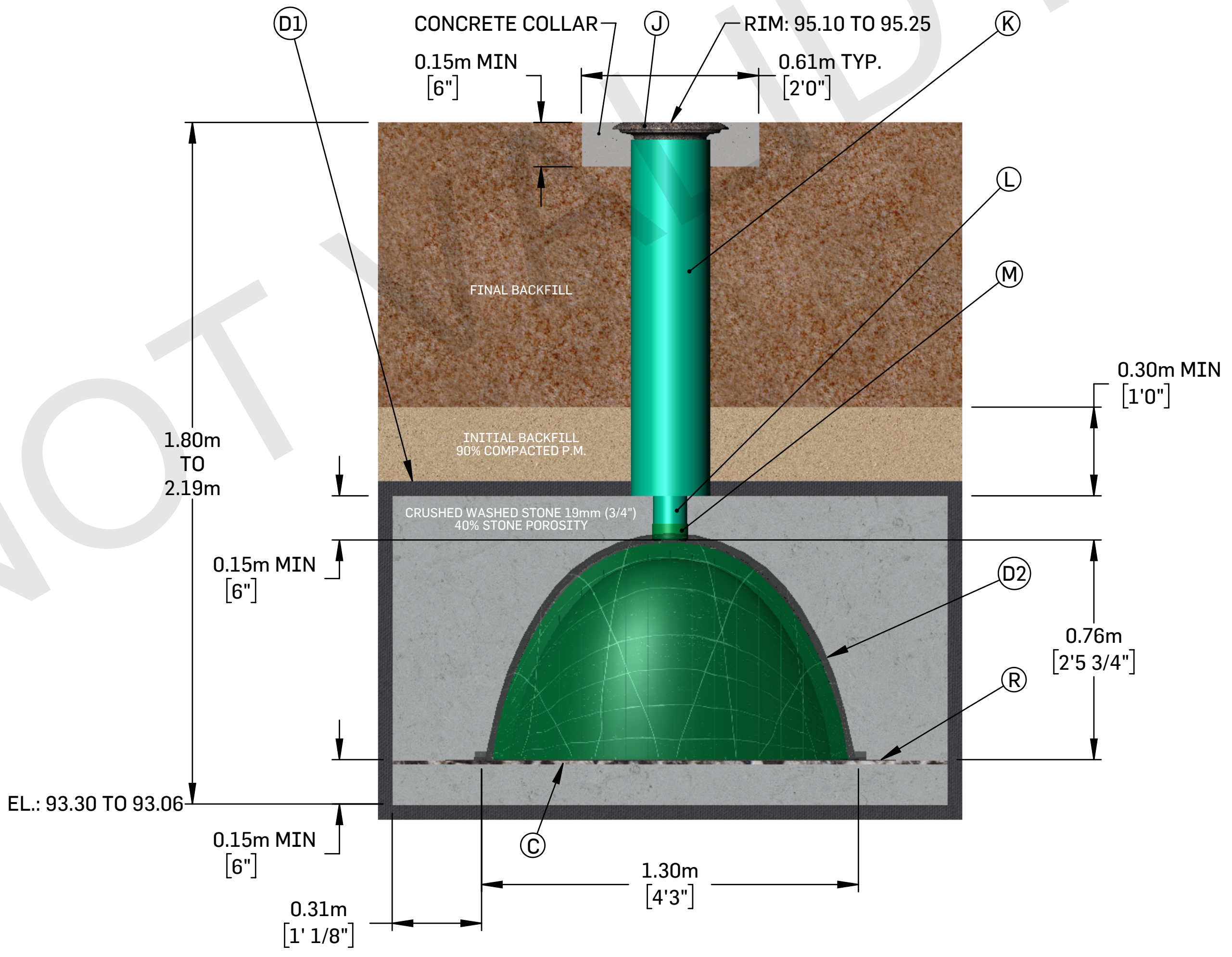




NOTE: SYSTEM STORAGE PROVIDED = 6.5 cu.m + 2 X 11.6 cu.m. = 29.7 cu.m.
STORAGE PROVIDED FROM CHAMBER BOTTOM TO TOP OF
SYSTEM STONE = 5.8 cu.m. + 2 X 10.4 cu.m. + 26.6 cu.m.

PART	DESCRIPTION	QTY
A	HYDROSTOR END CAP HS75	6
B	HYDROSTOR CHAMBER HS75	10
C	STABILIZATION NETTING HYDROSTOR	1
D1	SOLENO TX-90 SEPARATION NONWOVEN GEOTEXTILE, ABOVE, UNDER AND ON THE SIDES	2
D2	SOLENO TX-90 SEDIMENTATION NONWOVEN GEOTEXTILE, 1 LAYER OVER THE ROW	
E	MANHOLE ADAPTER FORMAT PVC 300mm (12") DR35	2
F	STD LENGTH 6m (236") SOLFLO MAX 300mm (12")	2
G	STD LENGTH 6m (236") SOLFLO MAX 300mm (12") BIGC	11
H	TCB2. CORRUGATED AREA DRAIN/CATCH BASIN SOLFLO MAX 375mm (15") WITH INLET SOLFLO MAX 300mm (12") BIGC AND OUTLET SOLFLO MAX 300mm (12"). FRAME AND GRATE S-375HC	1
I	TCB3. CORRUGATED AREA DRAIN/CATCH BASIN SOLFLO MAX 375mm (15") WITH INLET SOLFLO MAX 300mm (12") BIGC AND OUTLET SOLFLO MAX 300mm (12"). FRAME AND GRATE S-375HC	1
J	ADJUSTABLE FRAME AND COVER 250mm (10")	3
K	PVC PIPE ACCESS WELL 250mm (10") (PROVIDED BY OTHER)	-
L	PVC PIPE ACCESS WELL 100mm (4") (PROVIDED BY OTHER)	-
M	MANHOLE ADAPTER FORMAT PVC 100mm (4") DR35	3
N	TCB4. CORRUGATED AREA DRAIN/CATCH BASIN SOLFLO MAX 450mm (18") WITH INLET SOLFLO MAX 300mm (12") BIGC AND OUTLET SOLFLO MAX 450mm (18"). FRAME AND GRATE S-450HC	1
O	TCB5. CORRUGATED AREA DRAIN/CATCH BASIN SOLFLO MAX 450mm (18") WITH INLET SOLFLO MAX 300mm (12") BIGC AND OUTLET SOLFLO MAX 450mm (18"). FRAME AND GRATE S-450HC	1
P	TCB6. CORRUGATED AREA DRAIN/CATCH BASIN SOLFLO MAX 450mm (18") WITH INLET SOLFLO MAX 300mm (12") BIGC AND OUTLET SOLFLO MAX 450mm (18"). FRAME AND GRATE S-450HC	1
Q	TCB7. CORRUGATED AREA DRAIN/CATCH BASIN SOLFLO MAX 375mm (15") WITH INLET SOLFLO MAX 300mm (12") BIGC AND OUTLET SOLFLO MAX 300mm (12"). FRAME AND GRATE S-375HC	1
R	SOLENO 2006W SEDIMENTATION WOVEN GEOTEXTILE, 2 LAYERS UNDER THE ROW	1
S	STD LENGTH 6m (236") SOLFLO MAX 450mm (18") BIGC	3

THIS DRAWING IS NOT VALID FOR APPROVAL. DETAILED DRAWINGS WILL BE SUBMITTED FOR APPROVAL AFTER RECEPTION OF PURCHASE ORDER.

2019-07-18

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

PROJECT: Pathways Block 225
DATE: 2019-03-29
FILE: 114312-5.7
REV #: -
DESIGNED BY: W.Z.
CHECKED BY: R.M.

UNDERGROUND STORAGE CALCULATIONS - Pathways Block 225

Structure Storage — Area 2-1

	Base	Top	Height	diameter	X-sec Area	Volume
CB 2A	94.600	95.90	1.30	600	0.360	0.47
CB 2B	94.600	95.90	1.30	600	0.360	0.47
					Total	0.94

TOTAL STORAGE Area 2-1 0.94

Structure Storage — Area 2-2

	Base	Top	Height	diameter	X-sec Area	Volume
CB 2C	94.620	95.92	1.30	600	0.360	0.47
CB 2D	94.620	95.92	1.30	600	0.360	0.47
					Total	0.94

TOTAL STORAGE Area 2-2 0.94

Structure Storage — Area 2-3

	Base	Top	Height	diameter	X-sec Area	Volume
CB 2E	94.610	95.91	1.30	600	0.360	0.47
CB 2F	94.610	95.91	1.30	600	0.360	0.47
					Total	0.94

TOTAL STORAGE Area 2-3 0.94

Structure Storage — Area 3

	Base	Top	Height	diameter	X-sec Area	Volume
CB 2A	94.430	95.73	1.30	600	0.360	0.47
CB 2B	94.430	95.73	1.30	600	0.360	0.47
					Total	0.94

TOTAL STORAGE Area 3 0.94

Pipe Storage — Area3R

From	To	Length	Diameter	X-sec Area	Volume
ECB 1	TCB 8	14.08	450	0.159	2.24
TCB 8	TCB 9	13.83	450	0.159	2.20
TCB 9	TCB 10	13.95	450	0.159	2.22
TCB 10	TCB 11	14.20	450	0.159	2.26
TCB 11	RYCB 3	19.57	450	0.159	3.11
				Total	12.03

Structure Storage — Area3R

	Base	Top	Height	diameter	X-sec Area	Volume
ECB 1	95.000	96.00	1.00	300	0.071	0.07
TCB 8	94.950	96.00	1.05	300	0.071	0.07
TCB 9	94.900	96.00	1.10	300	0.071	0.08
TCB 10	94.850	96.00	1.15	300	0.071	0.08
TCB 11	94.800	96.00	1.20	300	0.071	0.08
RYCB 3	94.800	96.00	1.20	600	0.360	0.43
					Total	0.82

TOTAL STORAGE Area3R 12.85

Pipe Storage Area 5R

From	To	Length	Diameter	X-sec Area	Volume
ECB 3	TCB 12	17.50	450	0.159	2.78
TCB 12	TCB 13	19.62	450	0.159	3.12
TCB 13	RYCB 5	14.32	450	0.159	2.28
				Total	8.18

Structure Storage Area 5R

	Base	Top	Height	diameter	X-sec Area	Volume
ECB 3	94.650	95.20	0.55	300	0.071	0.04
TCB 12	94.580	95.20	0.62	300	0.071	0.04
TCB 13	94.150	95.20	1.05	300	0.071	0.07
RYCB 5	93.920	95.20	1.28	600	0.360	0.46
					Total	0.62

TOTAL STORAGE Area 5R 8.80

Pipe Storage Area 1

From	To	Length	Diameter	X-sec Area	Volume
CB 1A	CB 1B	6.00	200	0.031	0.19
CB 1B	TCB 1	10.98	250	0.049	0.54
TCB 1	TCB 2	12.55	250	0.049	0.62
TCB 2	TCB 3	14.03	250	0.049	0.69
TCB 3	TCB 4	13.95	250	0.049	0.68
TCB 4	TCB 5	8.52	300	0.071	0.60
TCB 5	TCB 6	3.76	300	0.071	0.27
TCB 6	TCB 7	3.76	300	0.071	0.27
TCB 7	MH 5B	7.99	300	0.071	0.56
Seleno HS75 Storage System (chambers, ends, and granulars only)					26.60
				Total	31.02

Structure Storage Area 1

	Base	Top	Height	diameter	X-sec Area	Volume
CB 1A	93.860	95.16	1.30	600	0.360	0.47
CB 1B	93.860	95.16	1.30	600	0.360	0.47
CB 4A	93.860	95.16	1.30	600	0.360	0.47
CB 4C	93.860	95.16	1.30	600	0.360	0.47
MH 5B	92.000	95.25	3.25	1200	1.131	3.68
TCB 1	93.600	95.10	1.50	300	0.071	0.11
TCB 2	93.550	95.10	1.55	300	0.071	0.11
TCB 3	93.500	95.10	1.60	300	0.071	0.11
TCB 4	93.450	95.10	1.65	300	0.071	0.12
TCB 5	93.400	95.10	1.70	300	0.071	0.12
TCB 6	93.350	95.10	1.75	300	0.071	0.12
TCB 7	93.300	95.10	1.80	300	0.071	0.13
					Total	6.36

TOTAL STORAGE Area 1 37.38

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

PROJECT: Pathways Block 225
DATE: 2019-03-29
FILE: 114312-5.9
REV #: -
DESIGNED BY: W.Z.
CHECKED BY: R.M.

ORIFICE SIZING

Orifice coefficients	
Cv =	0.60
Cv =	0.65

							Theoretical		Recommended	
	Invert	**Diameter**	**Centre ICD**	**Max. Pond Elevation**	**Hydraulic Head**	**Target Flow**	**Orifice**	**Actual Flow**	**Orifice**	**Actual Flow**
	(m)	**(mm)**	**(m)**	**(m)**	**(m)**	**(l/s)**	**(m)**	**(l/s)**	**(m)**	**(l/s)**
Area 1	91.849	300	91.999	95.25	3.251	52.50	0.1343	67.89	0.114	48.91
Area 2-1	94.500	200	94.600	96.00	1.400	17.00	0.0827	17.00	0.083	17.01
Area 2-2	94.520	200	94.620	96.00	1.380	34.00	0.0827	17.00	0.083	33.78
Area 2-3	94.510	200	94.610	95.97	1.360	34.00	0.0827	17.00	0.083	33.54
Area 3	94.330	200	94.430	95.90	1.470	17.00	0.0827	17.00	0.083	17.43
Area 3R	94.910	200	95.010	96.31	1.300	17.00	0.0827	16.00	0.083	16.40
Area 5R	93.220	200	93.320	95.51	2.190	17.00	0.0708	16.00	0.083	21.28
						188.50				**188.36**

Table 4.13 Storm Hydraulic Grade Line – South Sub-Trunk for the 100 Year 3 Hour Chicago and 100 Year 3 Hour Chicago increased by 20% Storm Events

XPSWMM Node	USF (m)	Finished Grade (m)	Storm Hydraulic Grade Line							
			100 Year 3 Hour Chicago				100 Year 3 Hour Chicago + 20%			
	Existing	Existing	Sani Inflow Option 1		Sani Inflow Option 2		Sani Inflow Option 1		Sani Inflow Option 2	
	Proposed	*Proposed*	HGL (m)*	USF–HGL (m)	HGL (m)†	USF–HGL (m)	HGL (m)*	USF–HGL (m)	HGL (m)†	USF–HGL (m)
South Sub-Trunk										
S790	91.75	93.80	89.22	2.53	89.22	2.53	89.26	2.50	89.25	2.50
S791C	n/a	94.50	89.58	n/a	89.59	n/a	89.63	n/a	89.64	n/a
S792	92.68	94.53	89.89	2.79	89.89	2.79	89.95	2.73	89.95	2.73
S647	92.68	94.61	90.45	2.23	90.46	2.22	90.55	2.13	90.55	2.13
S649	n/a	95.05	91.08	n/a	91.08	n/a	91.20	n/a	91.20	n/a
S6101	n/a	95.38	91.32	n/a	91.32	n/a	91.45	n/a	91.45	n/a
S6102	93.38	95.25	91.47	1.91	91.47	1.91	91.60	1.78	91.60	1.78
S6103	93.48	95.18	91.54	1.94	91.54	1.94	91.67	1.81	91.67	1.81
S6104	92.98	94.98	91.70	1.28	91.70	1.28	91.83	1.15	91.84	1.14
S6105	92.93	94.95	91.89	1.04	91.89	1.04	92.04	0.89	92.05	0.88
S6106	93.50	95.07	92.18	1.32	92.18	1.32	92.36	1.14	92.36	1.14
S6175	93.65	95.68	92.39	1.26	92.39	1.26	92.61	1.04	92.61	1.04
S6183	94.60	96.75	92.60	2.00	92.60	2.00	92.87	1.73	92.87	1.73
S6171	94.30	96.00	92.72	1.58	92.72	1.58	93.01	1.29	93.01	1.29
BLK3171W	94.50	95.94	92.76	1.74	92.76	1.74	93.05	1.45	93.05	1.45
S631	*93.70*	*95.85*	92.85	0.85	92.85	0.85	93.15	0.55	93.15	0.55
S630	*93.80*	*95.95*	92.99	0.81	92.99	0.81	93.30	0.50	93.30	0.50
S620	*94.00*	*96.15*	93.17	0.83	93.17	0.83	93.49	0.51	93.49	0.51
S609	*94.20*	*96.35*	93.25	0.95	93.25	0.95	93.58	0.62	93.58	0.62
S608	*94.55*	*96.70*	93.32	1.23	93.32	1.23	93.65	0.90	93.65	0.90

Notes: * HGL results for Option 1 were taken from the results of the XPSWMM model entitled 34738-20170630-MOE1-3CHI100.out or 34738-20170630-MOE1-3CHI120.out and presented on the CD in **Appendix E**.
† HGL results for Option 2 were taken from the results of the XPSWMM model entitled 34738-20170630-MOE2-3CHI100.out or 34738-20170630-MOE2-3CHI120.out and presented on the CD in **Appendix E**.

The HGL results presented in **Tables 4.12 and 4.13** indicate that the minimum 0.3 m clearance between the USF and HGL is maintained across the subject site and along the south sub-trunk storm sewer for Sanitary Inflow Options 1 and 2 for the 100 year 3 hour Chicago and the 100 year 3 hour Chicago increased by 20% storm event.

IBI GROUP

STORM HYDRAULIC GRADE LINE DESIGN SHEET
PATHWAYS BLOCK 225
CITY OF OTTAWA
REGIONAL GROUP

JOB #: 114312 - 5.7
DATE: 2019-03-29
DESIGN: W.Z. & R.M.
CHECKED: D.G.Y.
REV #: -

Miikana Road Node to MH 1

FRICTION LOSS	FROM MH	TO MH	PIPE ID
BLOCK 225	**Miikana**	**5**	
INVERT ELEVATION (m)	89.860	90.260	
OBVERT ELEVATION (m)	90.310	90.710	
DIAMETER (mm)			450
LENGTH (m)			16.0
FLOW (l/s)			188.27
HGL (m) ***	**91.470**	**91.540**	**0.070**
MANHOLE COEF K= 0.75	LOSS (m)	0.054	
TOTAL HGL (m)		**91.593**	
MAX. SURCHARGE (mm)		**883**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.45	0.16	1.41	2.500	0.11	2.83	450.56

HYDRAULIC SLOPE = 0.77 %
DESIGN FLOW TO FULL FLOW RATIO (Q 0.418
DESIGN FLOW DEPTH = 0.203

Head loss in manhole simplified method p. 71 (MWDM)
fig1.7.1, Kratio = 0.75 for 45 bends K_L=0.75
Velocity = Flow / Area = 1.18 m/s
HL = K_L * V^2/ 2g

FRICTION LOSS	FROM MH	TO MH	PIPE ID
Block 225	**5**	**4**	
INVERT ELEVATION (m)	91.840	92.358	
OBVERT ELEVATION (m)	92.290	92.808	
DIAMETER (mm)			450
LENGTH (m)			20.7
FLOW (l/s)			119.23
HGL (m) ***	**91.840**	**91.876**	**0.036**
MANHOLE COEF K= 0.75	LOSS (m)	0.022	
TOTAL HGL (m)		**92.516**	
MAX. SURCHARGE (mm)		**-293**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.45	0.16	1.41	2.500	0.11	2.84	450.67

HYDRAULIC SLOPE = 3.26 %
DESIGN FLOW TO FULL FLOW RATIO (Q 0.265
DESIGN FLOW DEPTH = 0.158

Head loss in manhole simplified method p. 71 (MWDM)
fig1.7.1, Kratio = 0.75 for 45 bends K_L=0.75
Velocity = Flow / Area = 0.75 m/s
HL = K_L * V^2/ 2g

FRICTION LOSS	FROM MH	TO MH	PIPE ID
BLOCK 225	**4**	**2**	
INVERT ELEVATION (m)	92.463	92.699	
OBVERT ELEVATION (m)	92.838	93.074	
DIAMETER (mm)			375
LENGTH (m)			9.5
FLOW (l/s)			119.23
HGL (m) ***	**92.516**	**92.559**	**0.044**
MANHOLE COEF K= 0.05	LOSS (m)	0.003	
TOTAL HGL (m)		**92.868**	
MAX. SURCHARGE (mm)		**-206**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.375	0.11	1.18	2.500	0.09	2.50	276.35

HYDRAULIC SLOPE = 3.71 %
DESIGN FLOW TO FULL FLOW RATIO (Q 0.431
DESIGN FLOW DEPTH = 0.169

Head loss in manhole simplified method p. 71 (MWDM)
straight through K_L=0.05
Velocity = Flow / Area = 1.08 m/s
HL = K_L * V^2/ 2g

FRICTION LOSS	FROM MH	TO MH	PIPE ID
BLOCK 225	**2**	**3**	
INVERT ELEVATION (m)	92.794	92.914	
OBVERT ELEVATION (m)	93.094	93.214	
DIAMETER (mm)			300
LENGTH (m)			34.3
FLOW (l/s)			34.13
HGL (m) ***	**92.868**	**92.911**	**0.043**
MANHOLE COEF K= 0.05	LOSS (m)	0.001	
TOTAL HGL (m)		**93.079**	
MAX. SURCHARGE (mm)		**-135**	

MANNING FORMULA - FLOWING FULL

DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.3	0.07	0.94	0.350	0.08	0.81	57.17

HYDRAULIC SLOPE = 0.62 %
DESIGN FLOW TO FULL FLOW RATIO (Q 0.597
DESIGN FLOW DEPTH = 0.165

Head loss in manhole simplified method p. 71 (MWDM)
straight through K_L=0.05
Velocity = Flow / Area = 0.48 m/s
HL = K_L * V^2/ 2g

IBI GROUP

STORM HYDRAULIC GRADE LINE DESIGN SHEET
PATHWAYS BLOCK 225
CITY OF OTTAWA
REGIONAL GROUP

JOB #: 114312 - 5.7
DATE: 2019-03-29
DESIGN: W.Z. & R.M.
CHECKED: D.G.Y.
REV #: -

FRICTION LOSS	FROM MH	TO MH	PIPE ID
BLOCK 225	**2**	**1**	
INVERT ELEVATION (m)	92.834	93.182	
OBVERT ELEVATION (m)	93.134	93.482	
DIAMETER (mm)			300
LENGTH (m)			99.5
FLOW (l/s)			85.10
HGL (m) ***	**93.079**	**93.850**	**0.771**
MANHOLE COEF K= 0.05	LOSS (m)	0.004	
TOTAL HGL (m)		**93.854**	
MAX. SURCHARGE (mm)		**372**	

MANNING FORMULA - FLOWING FULL

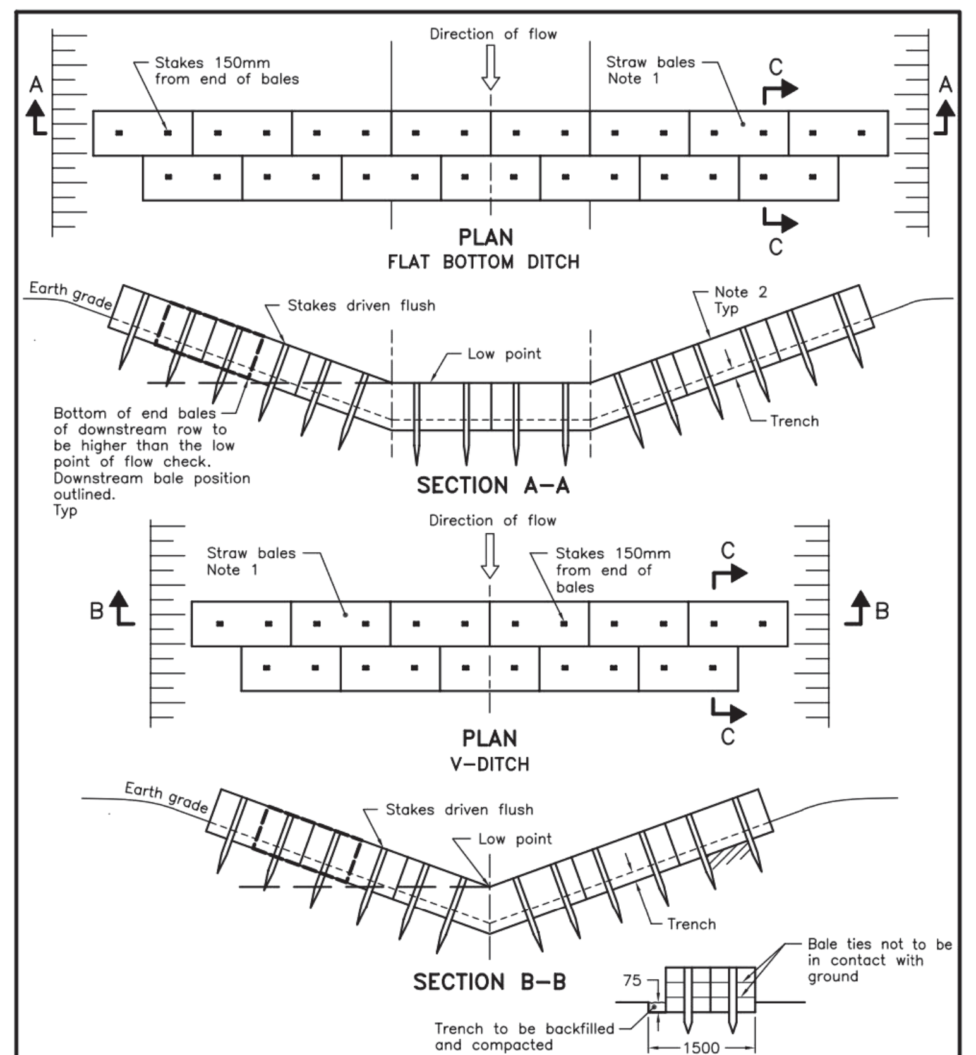
DIA (m)	Area (m2)	Perim. (m)	Slope (%)	Hyd.R. (m)	Vel. (m/s)	Q (l/s)
0.3	0.07	0.94	0.350	0.08	0.81	57.16

HYDRAULIC SLOPE =	0.78 %
DESIGN FLOW TO FULL FLOW RATIO (Q	1.000
DESIGN FLOW DEPTH =	0.300

Head loss in manhole simplified method p. 71 (MWDM)
straight through K_L=0.05
Velocity = Flow / Area = 1.20 m/s
$HL = K_L * V^2/ 2g$

Miikana Road Storm HGL has no negative impact on the proposed development.

APPENDIX D

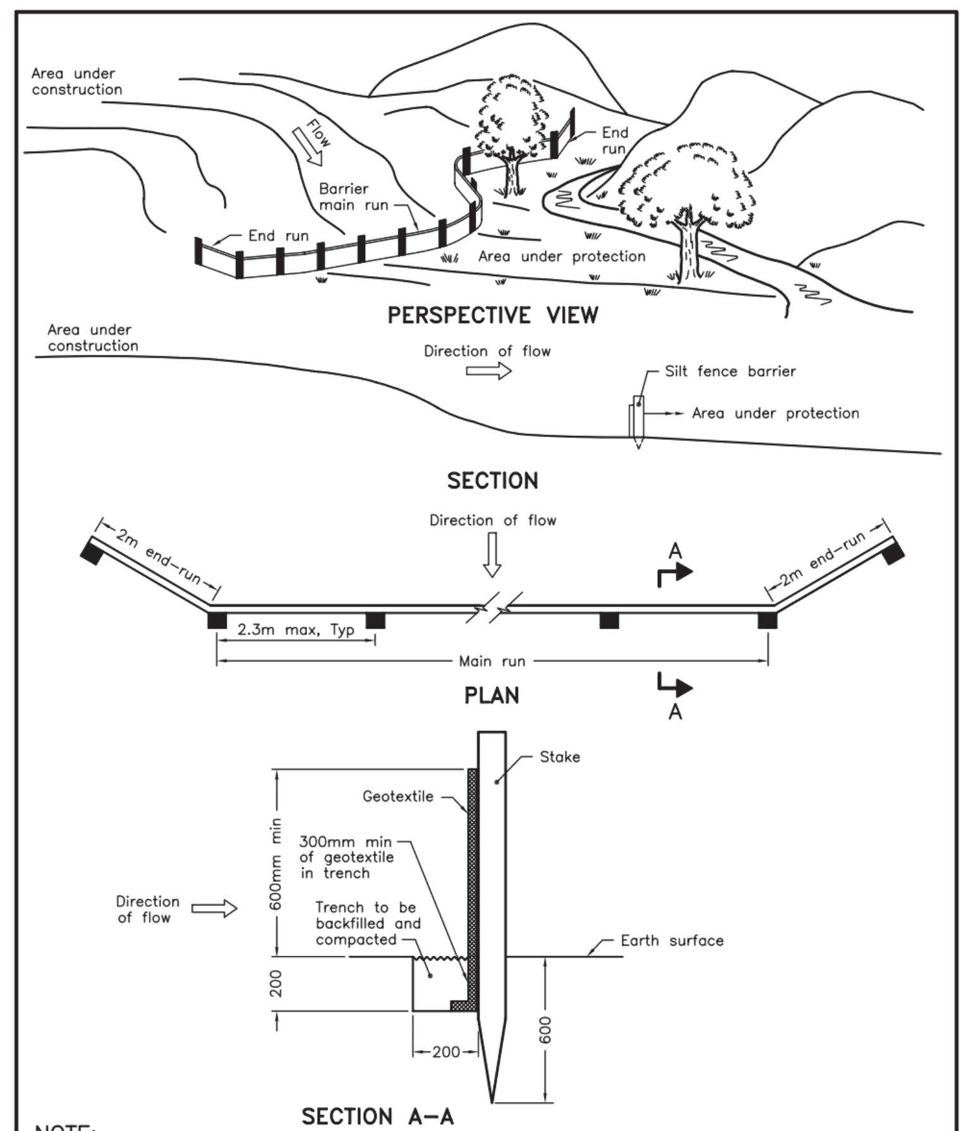


NOTES:
1 Number of bales varies to suit ditch.
2 Straw bales to be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2006 | Rev 1

STRAW BALE FLOW CHECK DAM

OPSD 219.180

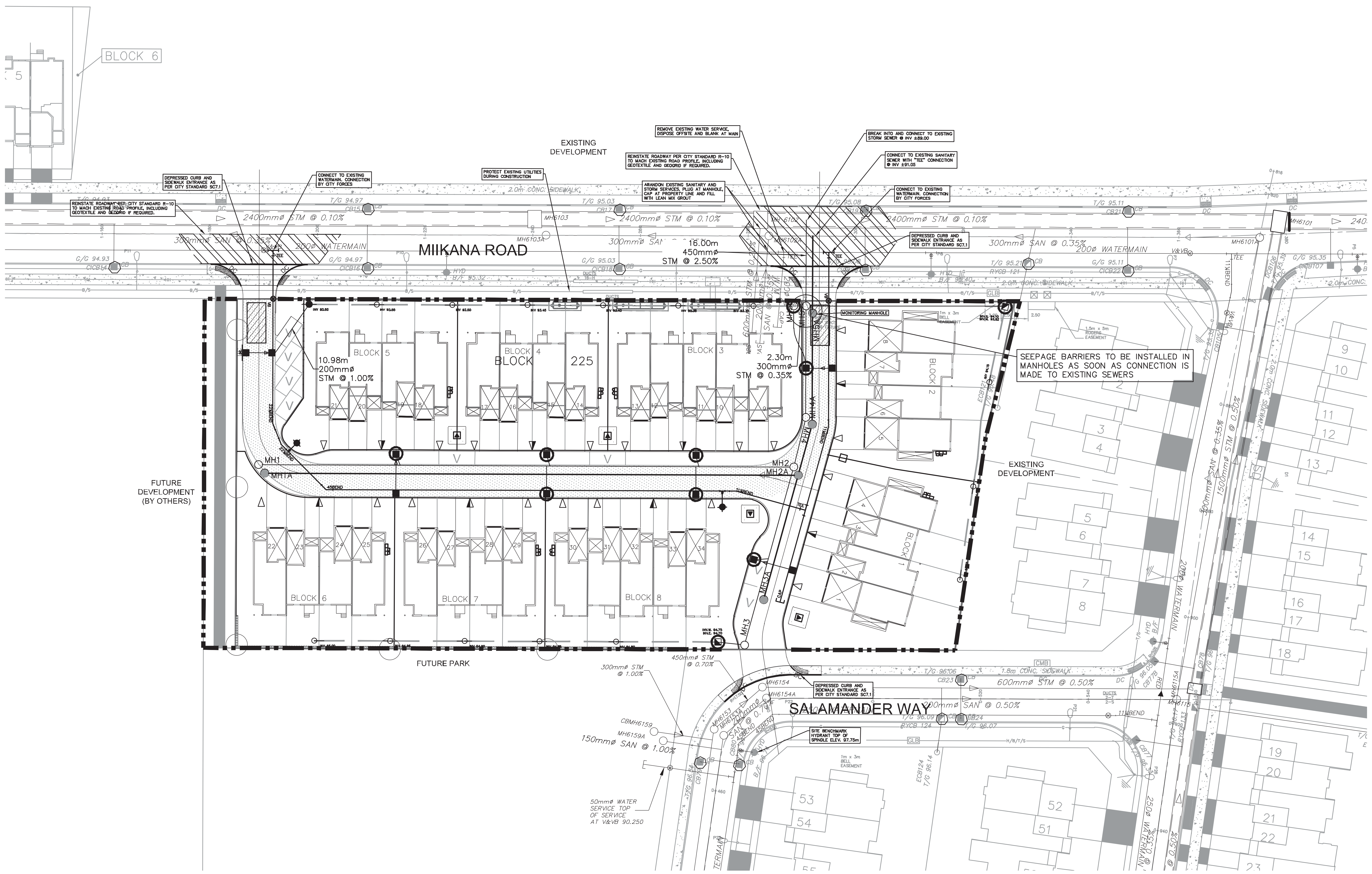


NOTE:
A All dimensions are in millimetres unless otherwise shown.

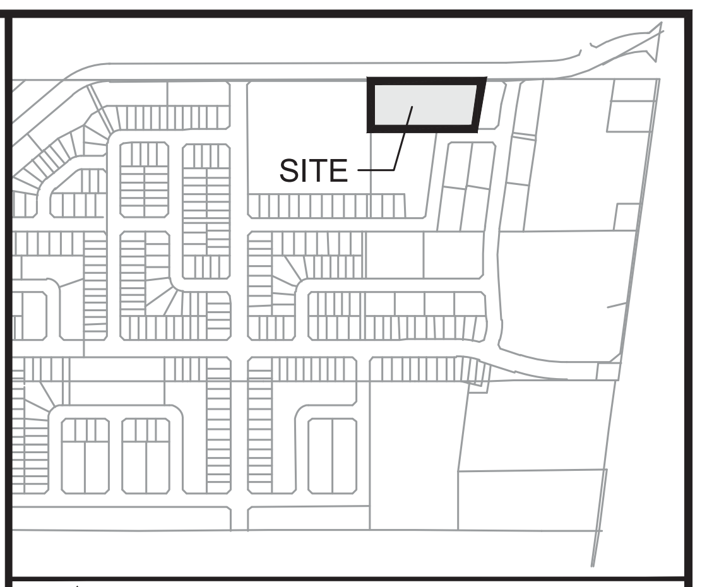
ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2006 | Rev 1

LIGHT–DUTY SILT FENCE BARRIER

OPSD 219.110



NOTES:
1. SILT FENCE TO BE ERECTED PRIOR TO EARTH WORKS BEING COMMENCED. SILT FENCE TO BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED OR UNTIL START OF SUBSEQUENT PHASE.
2. STRAW BALE SEDIMENT TRAPS TO BE CONSTRUCTED IN EXISTING ROAD SIDE DITCHES. TRAPS TO REMAIN AND BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED.
3. SILT SACK TO BE PLACED AND MAINTAINED UNDER COVER OF ALL CATCHBASINS. GEOTEXTILE SILT SACK IN STREET CBs TO REMAIN UNTIL ALL CURBS ARE CONSTRUCTED. GEOTEXTILE FABRIC IN RYCBs TO REMAIN UNTIL VEGETATION IS ESTABLISHED. ALL CATCHBASINS TO BE REGULARLY INSPECTED AND CLEANED, AS NECESSARY, UNTIL SOD AND CURBS ARE CONSTRUCTED.
4. WORKS NOTED ABOVE ARE TO BE INSTALLED, INSPECTED, MAINTAINED AND ULTIMATELY REMOVED BY SERVICING CONTRACTOR.
5. THIS IS A "LIVING DOCUMENT" AND MAY BE MODIFIED IN THE EVENT THE PROPOSED CONTROL MEASURES ARE INSUFFICIENT



KEY PLAN
N.T.S.

NOTES:
1. SEE DRAWING C-010 FOR ADDITIONAL DETAILS AND NOTES.
2. SITE BENCHMARK OBTAINED FROM LEGAL SURVEYOR ANNIS O'SULLIVAN VOLLEBEKK LTD.

LEGEND :

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

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2	REVISED AS PER CITY COMMENTS	DGY	19:07:19
1	ISSUED FOR SPA	DGY	19:04:01

WWW.EQHOMES.CA

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

Project Title
BLOCK 225

D. G. Yannoulopoulos
2019/07/19

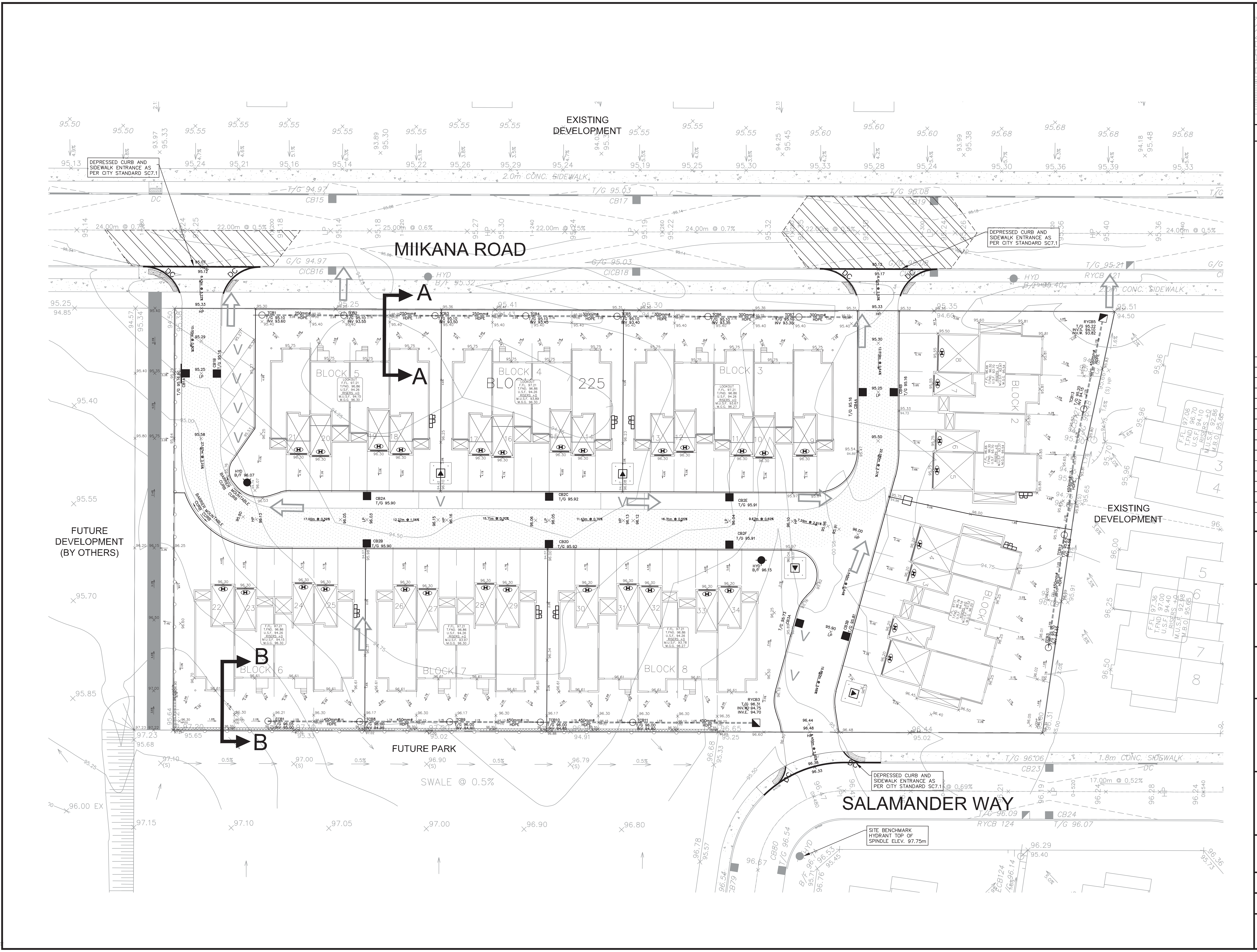
Drawing Title
SEDIMENT AND EROSION CONTROL PLAN

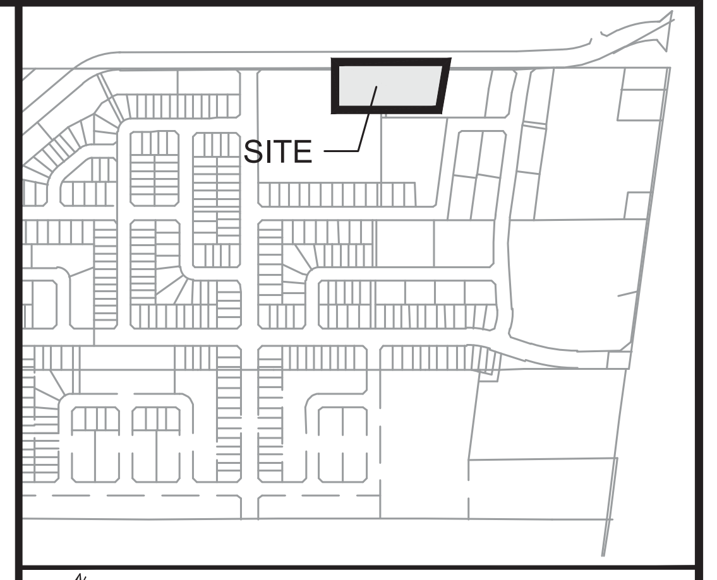
Scale
1:500

Design RM/WZ
Date APRIL 2019
Drawn DPS/WZ
Checked DGY
Project No. 114312
Drawing No. 900

D07-12-19-0060

#





KEY PLAN
N.T.S.

NOTES:

1. SEE DRAWING C-010 FOR ADDITIONAL DETAILS AND NOTES.
2. SITE BENCHMARK OBTAINED FROM LEGAL SURVEYOR ANNIS O'SULLIVAN VOLLEBEKK LTD.

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2	REVISED AS PER CITY COMMENTS	DGY	19:07:19
1	ISSUED FOR SPA	DGY	19:04:01

eQ homes
WWW.EQHOMES.CA

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

Project Title
BLOCK 225

D. G. Yannoulopoulos
2019/09/19

Drawing Title
GRADING PLAN

Scale
1:250

Design RM/WZ	Date APRIL 2019
Drawn DPS/WZ	Checked DGY
Project No. 114312	Drawing No. 200

D07-12-19-0060

#________

J:\114312_Block225\5.9 Drawings\59civil\layouts\200 GRADING PLAN.dwg Layout Name: 200 GRADING PLAN Plot Style: AIA STANDARD-FULL.CTB Plot Scale: 1:25.4 Plotted At: 7/19/2019 10:07 AM Last Saved By: DSIURNA Last Saved At: Jul. 19,

GOLDER

TECHNICAL MEMORANDUM

DATE July 8, 2019 **Project No.** 18113515 (2000)

TO Josh Kardish
Regional Group Inc. c/o eQ Homes

FROM Christine Ko, P.Eng. **EMAIL Christine_Ko@golder.com**

RESPONSE TO CITY COMMENTS
PROPOSED RESIDENTIAL DEVELOPMENT
76 SALAMANDER WAY
OTTAWA, ONTARIO

Golder Associates Ltd. (Golder) previously carried out a geotechnical investigation at or in close proximity to the proposed residential development located at 76 Salamander Way (hereinafter referred as “Site”) in Ottawa, Ontario and the results of that investigation were provided in a report to Leitrim South Holdings Inc. and 4840 Bank Street Ltd. titled “*Geotechnical Investigation, Proposed Residential Development, Remer and Idone Lands, Ottawa, Ontario*” dated January 2017 (report number 13-1121-0083 (1046)).

This technical memorandum summarizes our response to the comments (File No. D07-12-19-0060) received from the City of Ottawa, through Regional Group Inc. (Regional), on June 25, 2019 pertaining to the subsurface information and recommendations provided in the above geotechnical report for this proposed development area, within which 76 Salamander Way is located.

City Comment

9) Confirm that any grade raises, as indicated on the grading plan, are acceptable.

Golder Response

The results of the geotechnical investigation carried out by Golder indicate the subsurface conditions at this Site generally consist of topsoil overlying sands and silts, and followed by bouldery glacial till, which is in turn underlain by bedrock. Based on the above and as noted in the geotechnical report, from a foundation design perspective there is no practical restriction on the thickness of grade raise fill that may be placed above original ground surface within the proposed residential development area.

Golder has reviewed the following grading plan prepared by IBI Group (IBI) for the 76 Salamander Way development.

- Grading Plan, Project No. 114312, Drawing No. 200, Revision 1, Revised April 1, 2019.

Upon review, the grading plan was found to be in accordance with the recommendations provided in Golder’s report from a grading perspective and therefore considered acceptable from a geotechnical point of view.

City Comment

10) Clarify the soil type class.

Golder Response

Based on the measured groundwater levels in the adjacent boreholes, the groundwater levels at this Site range from about 2 to 4.5 metres below the ground surface.

For basement excavations above the groundwater level, the overburden may be considered as Type 3 soils in accordance with the Occupational Health and Safety Act of Ontario (OHSA) and the excavation side slopes should be stable in the short term at 1H:1V.

If the basement excavations extend below the groundwater level (which is not expected to be the case for this site and considering the proposed single basement depth), the overburden may be considered as Type 4 soils and the excavation side slopes will need to be cut back at 3H:1V per OHSA.

City Comment

11) Indicate the locations where light weight fill are going to be used.

Golder Response

As noted in our response to Comment No. 9 above, the proposed grading at this site using typical soil or rock fill material is considered acceptable from a geotechnical point of view. In addition, based on the grading plan by IBI, there is sufficient earth cover (for frost protection purposes) over the footing bearing surfaces at the front and rear of the houses (i.e., greater than the 1.5 metres required for frost protection). Therefore, light weight fill is not considered to be required for the proposed Site development.

Closure

We trust that this memo provides sufficient information for your present requirements. If you have any questions concerning this memo, please don't hesitate to contact the undersigned.

Yours truly,

GOLDER ASSOCIATES LTD.

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https://golderassociates.sharepoint.com/sites/101230/deliverables/geotech/18113515-2000-001-tm-rev0-city comments-0807_19.docx

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