Site Servicing and Stormwater Management Report
6171 Hazeldean Road, Ottawa, ON

Client:
11654128 Canada Inc.
768 Boulevard St. Joseph
Gatineau, QC

Submitted for:
Zoning By-law Amendment and Plan of Subdivision

Project Name:
6171 Hazeldean Road

Project Number:
OTT-00258780-A0

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Date Submitted:
July 24, 2020

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1 Introduction

1.1 Overview

EXP Services Inc. (EXP) was retained by 11654128 Canada Inc to prepare a Site Servicing and Stormwater Management Report for the proposed redevelopment of 6171 Hazeldean Road in support of a Plan of Subdivision and Zoning By-law Amendment applications.

The 9.02-hectare site is situated along Hazeldean Road as illustrated in **Figure 1-1** below. The site is within the City of Ottawa's urban boundary, outside the Greenbelt, and situated in Ward 6 (Stitsville-Kanata West).

The description of the subject property is noted below:

- Part of Lot 23, Concession 12, Geographic Township of Goulbourn, City of Ottawa.
- Parts 2, 4 and 6 of Plan 4R-23045, consisting of PIN 044871709

The proposed development will consist of twenty (20) single family detached homes, one hundred and fifty-four (154) townhomes, one hundred and eighty (180) condominium units consisting of five 3-storey buildings having 36 units each, and one hundred and seventy five (175) apartment units consisting of one 9-storey mixed-use rental building.

This report will discuss the adequacy of the adjacent municipal watermain, sanitary sewers and storm sewers to provide the required water supply, convey the sewage and stormwater flows that will result from the proposed development. This report provides a design brief for submission, along with the engineering drawings, for City approval.

Figure 1-1 - Site Location

2 Existing Conditions

The existing property is surrounded by the Jackson Trails subdivision, which began development in 2006. The existing site is vacant, with most of the ground surface containing sparse vegetation, fill material from adjacent construction, with a small area of trees in the north-western portion of the site.

The existing site topography slopes in a north easterly direction, ranging in elevation from ±122m to ±116m and having an average slope of 1.8% from west to east, however only 0.5% average slope from south to north.

3 Existing Infrastructure

The property is vacant and there are no existing services within the site. Municipal services stubs are present along the north, south and east sides of the property.

Along the north side of the property a 22.0 metre municipal right-of-way (Samantha Eastop Avenue) was constructed as part of the Potter's Key Subdivision and contains a 300mm watermain stub. Along the easterly property line, a 7.5m wide portion of a wider 12m sewer/water/walkway block is present and contains both sanitary and the storm and sewer stubs for the property. The entire southern property boundary of the site fronts onto Hazeldean Road, which contains both watermain and storm sewers. An existing 200mm watermain stub is provided off the 750mm watermain on Hazeldean Road, near the entrance of the property.

From review of the sewer and watermain mapping, as-built drawings and Utility Central Registry (UCC) plans, the following summarizes the infrastructure within the subject property and the infrastructure on the adjacent streets along the frontage of the property and adjacent offsite infrastructure:

Samantha Eastop Avenue.

- 300mm PVC watermain.
- 300mm PVC storm sewer.

12m walkway block off Bandelier Way.

- 300mm PVC sanitary sewer.
- 1050mm concrete storm sewer.

Hazeldean Road.

- 200mm PVC watermain (stubbed) & 762mm watermain.
- 250mm PVC sanitary sewer.
- 750mm and 825mm concrete storm sewers.
- Gas /Bell / Streetlighting / Hydro.

As-built drawings for key areas in Potter's Key Subdivision were obtained from the City of Ottawa and are included in **Appendix J** for reference.

4 Pre-Consultation / Permits / Approvals

A pre-consultation meeting was held with the City prior to design commencement. This meeting outlined the submission requirements and provided information to assist with the development proposal. The proposed site is located within the Mississippi Valley Conservation Authority (MVCA) jurisdiction, therefore signoff from the MVCA will be required prior to final approval. The MVCA was contacted to confirm the stormwater management quality control requirements. A copy of the correspondence with the MVCA is attached **Appendix G** . Specific design criteria noted in the Pre-Consultation meeting is further described in the relevant sections of this report

It is expected that an Environmental Compliance Approval (ECA) will be required from the Ministry of Environment, Conservation and Parks (MECP), formerly the Ministry of the Environment and Climate Change (MOECC), for the municipal and private Sewage Works. The onsite Sewage Works will include the onsite stormwater works for flow controls and associated stormwater detention. Further discussions with City of Ottawa staff will be required to confirm the ECA requirements and to determine whether a direct submission or Transfer-of-Review submission will be required.

In addition, various design guidelines were referred to in preparing the current report including:

- Bulletin ISDTB-2012-4 (20 June 2012)
  - Technical Bulletin ISDTB-2014-01 (05 February 2014)
  - Technical Bulletin PIEDTB-2016-01 (September 6, 2016)
  - Technical Bulletin ISDTB-2018-01 (21 March 2018)
  - Technical Bulletin ISDTB-2018-04 (27 June 2018)
- Ottawa Design Guidelines – Water Distribution, July 2010 (WDG001), including:
  - Technical Bulletin ISDTB-2014-02 (May 27, 2014)
  - Technical Bulletin ISTB-2018-02 (21 March 2018)
- Stormwater Management Planning and Design Manual, Ontario Ministry of the Environment and Climate Change, March 2003 (SMPDM).
- Design Guidelines for Drinking-Water Systems, Ontario Ministry of the Environment and Climate Change, 2008 (GDWS).
- Fire Underwriters Survey, Water Supply for Public Fire Protection (FUS), 1999.
- Ontario Building Code 2012, Ministry of Municipal Affairs and Housing.

5 Water Servicing

5.1 Existing Water Servicing Conditions

The site is within the City of Ottawa 3W pressure zone and supplied from the Stittsville elevated reservoir, which is within 150 metres from the western limit of the property. As previously noted, a 200 mm watermain has been stubbed off the 762mm watermain on Hazeldean Road, and a 300mm watermain is stubbed at the property line coming off Samantha Eastop Avenue.

5.2 Water Servicing Proposal

The proposed water supply system will consist of 200mm diameter and 250mm diameter watermains and associated appurtenances to provide water for consumption and fire protection. The site will be serviced by connection to the existing stubs at Hazeldean Road and Samantha Eastop Avenue.

The 9-storey high-rise building will require independent and twin watermain feeds, which is the result of the average day water demands exceeding 50 m^3/day. This building will be protected by an automatic sprinkler system and will have a fire department connection (or siamese) located within 45 metres of an adjacent municipally owned fire hydrant. **Figure A4** in **Appendix A** illustrates the proposed water distribution system. Water supply for each single family, townhome or condominium building will be provided by individual water services connecting to the proposed municipal or onsite private watermain. The proposed servicing plan is provided in **Appendix J**

5.3 Water Servicing Design Criteria

The design parameters that were used to establish water and fire flow demands are summarized **Table 1**.

Table 1 - Summary of Water Supply Design Criteria

Design Parameter	Value	Applies
Population Density – Single-family Home	3.4 persons/unit	✓
Population Density – Semi-detached Home	2.7 persons/unit	✓
Population Density – Townhome or Terrace Flat	1.8 persons/unit	✓
Population Density – Bachelor Apartment	1.4 persons/unit	
Population Density – Bachelor + Den Apartment	1.4 persons/unit	
Population Density – One Bedroom Apartment	1.4 persons/unit	✓
Population Density – One Bedroom plus Den Apartment	1.4 persons/unit	
Population Density – Two Bedroom Apartment	2.1 persons/unit	✓
Population Density – Two Bedroom plus Den Apartment	2.1 persons/unit	
Average Day Demands – Residential	350 L/person/day	✓
Average Day Demands – Commercial / Institutional	28,000 L/gross ha/day	✓
Average Day Demands – Light Industrial / Heavy Industrial	35,000 or 55,000 L/gross ha/day	
Maximum Day Peak Factor – Residential	2.5 x Average Day Demands	✓
Maximum Day Demands Peak Factor – Commercial / Institutional	1.5 x Average Day Demands	✓
Peak Hour Factor – Residential	2.5x2.2 = 5.5 x Average Day Demands	✓
Peak Hour Factor – Commercial / Institutional	2.7 x Average Day Demands	✓

Fire Flow Requirements Calculation	FUS	✓
Depth of Cover Required	2.4m	✓
Maximum Allowable Pressure	551.6 kPa (80 psi)	✓
Minimum Allowable Pressure	275.8 kPa (40 psi)	✓
Minimum Allowable Pressure during fire flow conditions	137.9 kPa (20 psi)	✓

5.4 Fire Flow Requirements

Water for fire protection will be available utilizing the proposed fire hydrants located along the adjacent roadways. The required fire flows for all proposed buildings were calculated based on typical values as established by the Fire Underwriters Survey 1999 (FUS). The following equation from the Fire Underwriters document "Water Supply for Public Fire Protection", 1991, was used for calculation of the on-site supply rates required to be supplied by the hydrants:

$F = 200 * C * \sqrt{(A)}$

where:

F	=	Required Fire flow in Litres per minute
C	=	Coefficient related to type of Construction
A	=	Total Floor Area in square metres

The proceeding **Table 2** summarizes the parameters used for estimating the Required Fire Flows (RFF) based on the Fire Underwriters Survey (FUS) and the latest City of Ottawa Technical Bulletins. The RFFs were estimated in accordance with ISTB-2018-02 and based on floor areas provided by the architect. The following summarizes the parameters used for the proposed types of residential buildings

Table 2 : Summary of FUS Method Parameters Used for Proposed Building Types

Design Parameter	Single Family	Townhome	3-Storey Condominium	9-Storey Mixed-Use
Type of Construction (Coeff, C) Wood-Framed (C=1.5), Ordinary (C=1.0), Non-Combustible (C=0.8), Fire-Resistive (C=0.6)	Wood Framed	Wood Framed	Ordinary	Non-Combustible
Occupancy Type Non-combustible (-25%), Limited Combustible (-15%), Combustible (0%), Free Burning (+15%), Rapid Burning (+25%)	Limited Combustible	Limited Combustible	Limited Combustible	Limited Combustible
Sprinkler Protection Sprinkler Conforming to NFPA 13 (-30%), Standard Water Supply (-10%), Fully Supervised Sprinkler (-10%)	None	None	None	Fully Supervised Sprinkler

The following **Table 3** below summaries the individual parameters used and the resultant Required Fire Flows (RFFs) for each building type. Detailed calculations of the RFFs necessary for each building type is provided in **Appendix B.**

Table 3 : Summary of Parameters Used and Estimation of Required Fire Flows (RFF)

	Single Family	Townhomes		Condominium Units					Mixed-Use
		6-unit	8-unit	Bldg A	Bldg B	Bldg C	Bldg D	Bldg E	Bldg E
Construction Coefficient, C	1.5	1.5	1.5	1	1	1	1	1	0.8
Total Floor Area (m2)	243.2	1165.6	773.6	3324	3324	3324	3324	3324	8863.5
Fire Flow prior to reduction (L/min)	5,000	11,000	9,000	13,000	13,000	13,000	13,000	13,000	17,000
Reduction Due to Occupancy	-15%	-15%	-15%	-15%	-15%	-15%	-15%	-15%	-15%
Reduction due to Sprinkler	0%	0%	0%	0%	0%	0%	0%	0%	-50%
Increase due to Exposures	66%	62%	41%	28%	29%	28%	33%	14%	-20%
Capped at 10,000 L/min (167 L/sec) based on ISTB-2018-02" (yes/no)	No	Yes	No	No	No	No	No	No	11,416
Total RFF	117	117	183	233	233	233	250	217	183

The estimated required fire flows (RFFs) based on the FUS Method ranges from 117 L/sec to 250 L/sec.

5.5 Boundary Conditions

Hydraulic Grade Line (HGL) boundary conditions were obtained from the City for design purposes. A copy of the correspondence received from the City is provided in **Appendix G**

The following hydraulic grade line (HGL) boundary conditions are summarized in **Table 4** below:

Table 4 : Boundary Conditions and Pressures Summary

Demand Scenario	Connection #1 – Hazeldean Rd		Connection #2 – Samantha Eastop Ave	
	HGL or Head (m)	Pressure (psi)	HGL or Head (m)	Pressure (psi)
Maximum HGL	160.7	57.2	160.7	59.6
Peak Hour	156.5	51.3	156.3	53.4
Max Day + Fire Flow	156.4	51.1	151.1	46.0

The above noted HGL's are based on a ground elevation of approximately 120.4 m and 118.8 m at Connection #1 and Connection #2 respectively. This results in a system water pressure of 36.1 m (or 51.3 psi) and 37.5 m (or 53.4 psi) at each connection points during peak hour conditions.

5.6 Water Servicing Design

The water servicing requirements for the proposed development is designed in accordance with the City Design Guidelines (July 2010). The following steps indicate the basic methodology that was used in our analysis:

- Estimated water demands under average day, maximum day and peak hour conditions. As the total population estimate was greater than 500, standard residential peaking factors were used, rather than based on MECP Table 3-3 which would be necessary when the design population is than 500 persons.
- Estimated the required fire flow (RFF) based on the Fire Underwriters Survey (FUS).
- Obtained hydraulic boundary conditions (HGL) from the City, based on the above water demands and required fire flows.

- Boundary condition data and water demands were used to estimate the pressure at the proposed junctions, and this was compared to the City's design criteria.

Please refer to **Appendix B** for detailed calculations of the total water demands.

5.7 Estimated Water Demands

Table 5 below summarizes the anticipated domestic water demands for all units under average day, maximum day and peak hour conditions.

Table 5 : Total Water Demand Summary

Water Demand Conditions	Water Demands (L/sec)
Average Day	4.56
Max Day	11.33
Peak Hour	24.90

5.8 Modelling Scenarios

A total of five (6) scenarios were analyzed. The performance of the proposed water distribution system within the development was analyzed under each scenario. The following summarizes the modelling scenarios that were analyzed. Please refer to **Figure A4** in Appendix A which illustrates the water distribution layout.

- Scenario 1A: Average Day (using connection #1)
- Scenario 1B: Max Day Plus Fire Flow (using connection #1)
- Scenario 1C: Peak Hour (using connection #1)
- Scenario 2A: Average Day (using connection #2)
- Scenario 2B: Max Day Plus Fire Flow (using connection #2)
- Scenario 2C: Peak Hour (using connection #2)

5.9 Water Modeling Results

The results of the WaterGEMS modelling under peak hourly conditions are summarized in **Table 6** and **Table 7** below for Scenarios 1A and 2A. These results represent anticipated pressures that would be available assuming a single connection from ether Connection #1 (Hazeldean Rd) or Connection #2 (Samantha Eastop). The complete results for all scenarios are provided in **Appendix C**.

Table 6: Summary of Peak Hour Results of (Scenario 1C)

Junction	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
J-01	122.19	7.77	156.32	48.4
J-02	119.69	1.78	156.32	52.0
J-03	118.67	0.81	156.32	53.4
J-04	118.45	1.20	156.32	53.7
J-05	117.43	1.62	156.31	55.2
J-06	117.02	1.80	156.32	55.8
J-07	118.88	0.84	156.32	53.1

J-08	119.76	0.36	156.33	51.9
J-09	117.12	0.90	156.32	55.6
J-10	120.76	0.00	156.36	50.5
J-11	117.40	1.43	156.31	55.2
J-12	117.30	1.43	156.31	55.4
J-13	118.62	1.43	156.32	53.5
J-14	119.10	1.43	156.32	52.8
J-15	119.20	1.43	156.32	52.7
J-16	119.76	0.00	156.33	51.9
J-17	118.80	0.00	156.32	53.3
J-18	120.40	0.00	156.50	51.2

Table 7: Summary of Peak Hour Results of (Scenario 2C)

Junction	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
J-01	122.19	7.77	156.11	48.1
J-02	119.69	1.78	156.15	51.8
J-03	118.67	0.81	156.18	53.2
J-04	118.45	1.20	156.15	53.5
J-05	117.43	1.62	156.13	54.9
J-06	117.02	1.80	156.12	55.5
J-07	118.88	0.84	156.13	52.9
J-08	119.76	0.36	156.11	51.6
J-09	117.12	0.90	156.11	55.3
J-10	120.76	0.00	156.11	50.2
J-11	117.40	1.43	156.11	54.9
J-12	117.30	1.43	156.10	55.1
J-13	118.62	1.43	156.10	53.2
J-14	119.10	1.43	156.11	52.5
J-15	119.20	1.43	156.11	52.4
J-16	119.76	0.00	156.11	51.6
J-17	118.80	0.00	156.30	53.2
J-18	120.40	0.00	156.11	50.7

The calculated range of working pressures anticipated within the development under peak hour conditions was estimated at between 48.4 psi and 55.8 psi under Scenario 1C, and between 48.1psi and 55.5 psi under Scenario 3C). This meet the minimum 40 psi as per City of Ottawa Guidelines.

Similarly, **Table 8** below provides the Maximum Day Plus Fire Flow results under Scenarios 1B and 2B. It should be noted that the fire flows required at various junctions were determined based on FUS calculations. Complete modelling results are provided in **Appendix C**.

Table 8: Summary of Maximum Day Plus Fire Flow Conditions

Junction Node	FUS Required Fire Flows, RFF (L/sec)	Total Flow Available (L/sec)		Satisfies Fire Flow Constraints fpr Scenario 1B / 2B (True - False)
		For Scenario 1B	For Scenario 2B	
J-01	183.00	>183	>183	True / True
J-02	183.00	>183	>183	True / True
J-03	183.00	>183	>183	True / True
J-04	183.00	>183	>183	True / True
J-05	183.00	>183	>183	True / True

J-06	183.00	>183	>183	True / True
J-07	183.00	>183	>183	True / True
J-08	183.00	>183	>183	True / True
J-09	183.00	>183	>183	True / True
J-10	183.00	>183	>183	True / True
J-11	233.00	>233	< 233 (206)	True / False
J-12	233.00	>233	< 233 (205)	True / False
J-13	250.00	>250	< 233 (202)	True / False
J-14	233.00	>233	< 233 (205)	True / False
J-15	233.00	>233	< 233 (208)	True / False
J-16	183.00	>183	>183	True/ True
J-17	183.00	>183	>183	True/ True
J-18	183.00	>183	< 183 (176)	False

In summary, under Maximum Day + Fire Flow conditions the available fire flows are in excess of the required fire flows (RFF) based on a water distribution system with a connection to both Hazeldean Road and Samantha Eastop Avenue. Based on a single feed connection to Samantha East Avenue, slightly lower fire flows would be available within the distribution system at six (6) junctions. This does not imply that the appropriate fire flows are not available at all buildings, as the total contribution of available fire flows are based on hydrant spacing. Additional details on fire hydrant locations and the availability of fire flows will be provide during detailed design of the subdivision.

No pressure reducing measures are required as operating pressures are within 50 psi and 80 psi. It was estimated that the anticipated pressures under average day demands will range between 54.7 psi and 62 psi.

6 Sewage Servicing

6.1 Existing Sewage Conditions

The site is an open field with no services within the site. There is a stub that comes off the existing sanitary sewer from Bandelier Way that goes up to the property line at was placed for a future development of 6171 Hazeldean Road.

6.2 Proposed Sewage Conditions

The sanitary sewer laterals were sized based on a population flow with an area-based infiltration allowance. A 250mm diameter sanitary sewer laterals are proposed with a minimum 0.44% slope, having a capacity of 19.07 L/sec based on Manning's Equation under full flow conditions. **Table 6-1** below summarizes the design parameters used.

Table 6-1 – Summary of Wastewater Design Criteria / Parameters

Design Parameter	Value	Applies
Population Density – Single-family Home	3.4 persons/unit	✓
Population Density – Semi-detached Home	2.7 persons/unit	✓
Population Density – Duplex	2.3 persons/unit	
Population Density – Townhome (row)	2.7 persons/unit	✓
Population Density – Bachelor Apartment	1.4 persons/unit	
Population Density – Bachelor + Den Apartment	1.4 persons/unit	
Population Density – One Bedroom Apartment	1.4 persons/unit	✓
Population Density – One Bedroom plus Den Apartment	1.4 persons/unit	

Population Density – Two Bedroom Apartment	2.1 persons/unit	✓
Population Density – Two Bedroom plus Den Apartment	2.1 persons/unit	
Average Daily Residential Sewage Flow	280 L/person/day	✓
Average Daily Commercial / Intuitional Flow	28,000 L/gross ha/day	
Average Light / Heavy Industrial Daily Flow	35,000 / 55,000 L/gross ha/day	
Residential Peaking Factor – Harmon Formula (Min = 2.0, Max =4.0, with K=0.8)	$M = 1 + \frac{14}{4 + P^{0.5}} * k$	✓
Commercial Peaking Factor	1.5	
Institutional Peaking Factor	1.5	
Industrial Peaking Factor	As per Table 4-B (SDG002)	
Unit of Peak Extraneous Flow (Dry Weather / Wet Weather)	0.05 or 0.28 L/s/gross ha	
Unit of Peak Extraneous Flow (Total I/I)	0.33 L/s/gross ha	✓

The total estimated peak sanitary flow rate from the proposed property is **14.16 L/sec** (all blocks) based on City Design Guidelines. Sewage rates below include a total infiltration allowance of 0.33 L/ha/sec based on the total gross site area.

Table 6-2 – Summary of Anticipated Sewage Rates

Sewage Condition	Sanitary Sewage Flow (L/sec)
Average Day Sewage Flow	11.18
Infiltration Flow (at 0.33 L/ha/sec)	2.98
Peak Wet Weather Sewage Flow	14.16

The minimum sewer capacity of the 200mm diameter connecting sanitary sewer through the proposed subdivision (with a slope of 0.44%) has a calculated full flow capacity of 19.07 L/sec. The 200mm diameter pipe then connects into the existing sanitary sewer on Bandelier Way with a 300mm diameter pipe downstream of the sewer run.

Based on the Potter's Key Design Brief, the allocated sewage flow from the 6171 Hazeldean site to the sanitary sewer on Bandelier Way is 11.84 L/sec. Therefore, the proposed site is expected to release an additional 2.32 L/sec, however the existing sanitary stub has a capacity of 46.05 L/sec, and will be able to handle to newly proposed flow of 14.16 L/sec.

Also, the downstream sanitary sewer shall now carry 16.29 L/sec compared to the estimated 13.97L/sec, and still falls well below the capacity of the downstream 300mm sanitary sewer with a capacity of 46.05 L/sec as well. See **Appendix H** for the Potter's Key sanitary design sheet for reference.

Therefore, there appears to be no consequence to the additional 2.32 L/sec from the estimated 11.84 L/sec from the Potter's Key SWM report, for a total sewage flow of 14.16 L/sec coming from the 6171 Hazeldean subdivision.

7 Storm Servicing & Stormwater Management

7.1 Background

As the proposed site is located within the Mississippi Valley Conservation Authority (MVCA) jurisdiction, the stormwater works are therefore subject to both MVCA and City of Ottawa (COO) approval.

Furthermore, the site is located within the Carp River Subwatershed and stormwater runoff discharges to Feedmill Creek. A 1050mm storm sewer outlet was provided for the subject site near the south-eastern corner of the site within a 12-metre sewer and drainage easement. This easement connects the subject property to the municipal right-of-way (Bandelier Way). Downstream of the site the storm sewer flows easterly and then northerly approximately 1.1 kilometres where it enters the Jackson Trails Stormwater Management Facility (JTSWMF). This pond was constructed around 2007/2008 to service lands north of Hazeldean Road between Carp Road and Alon Street. The "Jackson Trails Stormwater Management Design Brief" (JTSMDB) was prepared in June 2006 by IBI Group for the design of this SWM facility.

In addition, the City of Ottawa commissioned J.F. Sabourin and Associates (JFSA) to prepare the Feedmill Creek Storm Management Criteria Study (FCSWMCS) which was finalized in April 2018. It is this document that identifies the stormwater criteria necessary for development of the subject site. Just prior to this, Minto Communities Inc (Minto), constructed Potter's Key Subdivision in 2017/2018, which surrounds the subject site on the north and east sides. Sewer and water infrastructure were installed as part of the surrounding subdivision.

7.2 Proposed Storm Servicing

The proposed subject property will be serviced with a conventional stormwater collection system. The storm sewer system will consist of a typical storm system including manholes and catchbasins in the roadway and catchbasins and landscaping inlets in the rear yards. For the rear-yards, perforated storm sewers, as per City landscaping standards, will be used. Due to the stormwater criteria requirements, a stormwater facility (dry pond) is necessary.

The proposed stormwater system is designed in conformance with the latest version of the City of Ottawa Design Guidelines (October 2012). Section 5 "Storm and Combined Sewer Design" and Section 8 "Stormwater Management". A summary of the design criteria that relates to this design report is the proceeding sections below.

7.2.1 Design Criteria & Constraints

From the Feedmill Creek report the following summarizes the design criteria and constraints that will be followed:

- Criteria #1: Extended Detention Control: Onsite storage to control peak flows 0.51 L/ha/sec in the 3hr 15mm 3-hr Chicago storm (Erosion Control).
- Criteria #2: Retention Control: Provide Low-Impact Development Methods (LID) to retain the 5mm 3-hr Storm event (infiltration).
- Criteria #3: Flood Control: Onsite storage to control peak flow storm 100-yr 12hr SCS storm to 8 L/ha/sec.

Other design criteria were taken from the JTSMDB and City of Ottawa SDG002 which apply to the stormwater design are included.

- The storm sewer was sized based on the Rational Method and Manning's Equation under free flow conditions for the 2-year storm using a 10-minute inlet time.
- Minor system capture from this development will be directed to the Jackson Trails SWM Pond and limited to 70 L/s/ha as per the design of the facility.

- The major system has been designed to accommodate on-site detention with sufficient capacity to attenuate the 100-year design storm.
- Overland flow routes are provided.
- The vertical distance from the spill elevation and the ground elevation at the building is at least 150mm.
- The emergency overflow spill elevation is at least 30 cm below the lowest building opening.
- Minimum sewer slopes to be based on minimum velocities for storm sewers of 0.80 m/sec.

Additional comments provided during the pre-consultation meeting, that are also relevant include:

- *By modelling, demonstrate that there are no adverse impact to the existing downstream developments (Potter's Key and Jackson Trails).*
- *Pond may be required for attenuation as per the attached report.*

7.3 Stormwater Design

The methodology used for the design of the storm sewer system is as follows:

- Design storm sewer system based on 2-year storm using the Rational Method.
- Estimate the appropriate number and the location of inlets based on the Macro Grading Plan and preliminary profiles and ensure maximum permitted depth of ponding meets City guidelines.
- Restrict inflow rates to the minor system for each subcatchment to 70 L/ha/sec. This is completed using standard ICD types.
- Ensure allowable discharge rate for the entire site to 70 L/ha/sec for the 9.02-hectare site (or 9.023 ha x 70 = 631.6 L/sec)
- Developed a PCSWMM model of the storm sewer system, to calculate peak flows and runoff volumes. At this Draft Plan stage, the PCSWMM model does not include major system components (dual drainage). The model will be expanded during the detailed design stage.

7.4 Runoff Coefficients

Average runoff coefficients for all catchments were calculated using PCSWMM's area weighting routine. This modelling software has a GIS engine which allows for catchment (or polygon) definition including attributes. The runoff coefficients for all catchments were area weighted to derive at average runoff coefficients based on hard surfaces (concrete or asphalt) having an imperviousness of 95%, soft surfaces (landscaping surfaces) having a percent imperviousness of 5%. The conversion from an imperviousness percent to a runoff coefficient was taken as C = (IMP*0.70) / 100 + 0.20, with the imperviousness (IMP) as a percentage.

The average runoff coefficient for the overall site area under post-development conditions was calculated as 0.57. Runoff coefficients for individual catchment ranged from 0.24 to 0.78. The runoff coefficients for pre-development and post-development catchments are provided summarized in **Table 9** below.

Table 9 – Summary of Runoff Coefficients

Location	Area (hectares)	Pre-Development Runoff Coefficient, C_{AVG}	Post-Development Runoff Coefficient, C_{AVG}
Entire Site	9.0203	0.20	0.57

Runoff coefficients for each subcatchments were used in the storm sewer design sheet and based on the area-weighted values derived in PCSWMM.

7.5 Allowable Release Rate

Minor system capture rate from this development will be directed to the Jackson Trails SWM Pond and limited to 70 L/s/ha as per the design of the facility. The allowable minor system discharge rate for the site is therefore 631.6 L/sec.

7.6 Hydrology

PCSWMM was used to create a hydrologic/hydraulic model of the storm sewer system. The model currently only includes the minor system (storm sewer). The model was developed to estimate peak flows and runoff volumes only at this stage. Calculations of runoff was completed based on the PCSWMM's EPA SWM 5 engine. Catchment parameters were taken from City of Ottawa's SDG002 Design parameters. The following design parameters and assumptions are noted in **Table 10** below:

Table 10 – General Subcatchment Parameters

Parameter	PCSWMM Parameter	Value
Infiltration Loss Method		Horton
Maximum Infiltration Rate	Max. Infil. Rate	76 mm/hr
Minimum Infiltration Rate	Min. Infil. Rate	13.2 mm/hr
Decay Constant (1/hr)	Decay Constant	4.14
Manning N (Impervious)	N Impev	0.013
Manning N (Pervious)	N Perv	0.25
Depression Storage – Pervious Surfaces	Dstore Imperv	1.57 mm
Depression Storage – Impervious Surfaces	Dstore Perv	4.67 mm
Zero Percent Impervious	Zero Imper	25%
Subcatchment Slopes	Slope	2% front yards & back yards

7.6.1 Storm Events Modelled

As this design submission is intended for establishing Draft Plan conditions, only eleven (11) storm events were modelled at this time. At a later stage during detailed design additional storm distributions and durations will be modelled.

- 3-hour 5mm Chicago storm.
- 3-hour 10mm Chicago storm.
- 3-hour 15mm Chicago storm.
- 3-hour 2-year Chicago storm.
- 3-hour 5-year Chicago storm.
- 3-hour 100-year Chicago storm.
- 3-hour 100-year + 20% Chicago storm.
- 12-hour 100-year SCS Type II storm.
- Historical storms occurring July 1, 1979, Aug 4, 1988, August 08, 1996

A Macro Strom Drainage Plan is provided in **Appendix J** and illustrates the subcatchments within the development site.

The following list blow provides the design criteria requirements, followed by **Table 11** which summarizes the results of various storm events. The peak flows and volumes represent model results prior to addition of a detention pond. This was completed to determine the peak flows and volumes prior to the influence of stormwater detention. The addition of a detention pond within the PCSWMM model is further noted in proceeding sections of this report.

- Extended Detention Control. Maximum discharge of 4.6 L/sec in 3-hr 15mm storm event.
- Retention Control (LID). Retain runoff volume for 5mm 3hr storm.
- Flood Control. Maximum discharge of 72.16 L/sec in 12-hr SCS storm event.
- Maximum permitted minor system discharge rate to Bandelier Way storm sewer is 631.6 L/sec.

Table 11 – Summary of Post-Development Flows (Uncontrolled)

Storm Event	Peak Flow (L/sec)	Runoff Volume (m3)
Chicago_3h_5mm	132	189
Chicago_3h_10mm	308	417
Chicago_3h_15mm	468	653
Chicago_3h_25mm	788	1123
Chicago_3h_2yr	1029	1459
Chicago_3h_5yr	1644	2196
Chicago_3h_100yr	2841	4559
Chicago_3h_100yr + 20%	3092	5763
SCS Type II_ 12-hr	1692	5488
Historic_Jul1-79	2298	5545
Historic_Aug4-88	2598	5063
Historic_Aug8-96	2221	4442

7.6.2 Extended Detention Requirements

For Criteria # 1, the extended detention control criteria require that the maximum discharge rate of 0.51 L/ha/sec from development site upstream of the Jackson trails SWM Facility not be exceeded during the 3-hour 15mm storm event. This was established to provide mitigation peak flow increase during frequent storm events and erosion with Feedmill Creek.

From Table 11 above, the peak flow and runoff volume from the 3-hr storm 15mmm is 468 L/sec and 653 m3. PCSWWM's storage function was used to estimate the volume necessary to control to the allowable rate of 4.6 L/sec (9.02 ha x 0.51 L/ha/sec). The volume necessary to control the peak rate to 4.6 L/sec is 616 m3. This is the maximum volume necessary if one were to not consider any upstream storage, where in fact a small portion of the necessary volume will be stored in the rear yards from infiltration. **Table 12** in the next section identifies that only 20% of the total site area represents backyards, and therefore it is appropriate to assume that the same proportion of the total site runoff volume of 653m3 (or 131 m3) can be stored in the rear yards. Based on this, the remaining volume of 522 m3 from other areas will need to be detained within a downstream stormwater facility at a maximum rate of 4.6 L/sec. Additional information is provided in **Section 7.6.4.**

7.6.3 Low Impact Design

For Criteria #2, the Feedmill Creek Stormwater Management Study requires that LID controls be implemented to retain the volume from a 3-hr 5mm rainfall event. There are various LID methods available, however the most appropriate and currently

used method in the City of Ottawa is the infiltration trench and swale. Modifications to the typical trench will be necessary to ensure that the runoff is detained, prior to being captured at inlets.

The peak flow and total runoff volume that occurs during the 5mm storm event is 153.1 L/sec and 187.9 m3 over the entire site. In order to provide the appropriate volume for infiltration, perforated pipes will be utilized in the rear-yards. However, for a typical residential subdivision, only a portion of the rainfall and resultant runoff will be directed towards the rear yards. The following table summarizes the approximate proportion of subcatchments that flow towards varying outlets.

Table 12 – 3-hour 5mm Peak Flows and Runoff Volumes of Various Subcatchments

Storm Event	Area in hectares (% of Total)		Peak Flow in L/sec (% of Total)		Runoff Volume in m^3 (% of Total)	
Backyards	2.36	(26%)	31.4	(21%)	38.4	(20%)
Front yards / right-of-way	3.67	(41%)	83.8	(55%)	100.9	(54%)
Park	0.73	(8%)	0	(0%)	0	(0%)
SWM	0.22	(2%)	0.6	(0%)	0.76	(0%)
Site plan #1	0.5	(6%)	9.2	(6%)	11.2	(6%)
Site plan #2	1.54	(17%)	28.1	(18%)	36.6	(19%)
Totals	9.020		153.1		187.9	

Since only twenty percent (20%) of the total 187.9 m^3 of necessary runoff volume can be infiltrated in rear yard swales, the remaining 148.6 m3 will need to be infiltrated in other areas of the site. Based on this it will be necessary to provide ±149 m3 of retention volume within the proposed downstream stormwater facility (dry pond). This will consist of an additional granular storage area below the bottom of the dry pond. Based on a proposed bottom area of the pond of 1,194 m2, will require a granular depth of 0.31 m3. Additional information on the dry pond is provided in the proceeding section.

7.6.4 Flow Attenuation (Storage)

For criteria # 3, onsite storage is required to control peak flow of the 100-yr 12hr SCS storm to 8 L/ha/sec. From Table 11, the 12-hr SCS storm generates a total runoff volume of ±5,490 m3 and peak runoff rate of ±1,690 L/sec. PCSWMM's storage routine was again used to estimate the preliminary volume necessary based on the allowable discharge rate of 72.16 L/sec during the 12hr 100-yr SCS Type II storm. The total volume required would be 3,912 m3. This represents the total volume for the entire site.

In order to establish the necessary requirements, the PCSWMM model was expanded to include a storage node to represent the stormwater facility. Two (2) flow-controlled ORIFICES were added connecting the pond and the outfall, to represent the extended detention and flood control orifices. The following table below summarizes the preliminary dry pond parameters that were used in the model, based on the site plan.

Table 7-1: Dry Pond Stage-Storage Data

Description	Elevation (m)	Depth (m)	Area (m^2)	Volume (m^3)
Top of pond	116.0	2.0	1,500	2,694
Bottom of pond	114.0	0	1,194	0

In order to meet the flood control requirements additional storage beyond the dry pond during the 100yr event will be necessary. The tributary area entering the pond from the subdivision portion of the site (excluded site plan area 2), is 7.49 hectares. The proportional allowable discharge rate for this area is 59.9 L/sec (7.49 ha x 8 L/ha/sec). The storage required to detain this peak rate during the 12hr SCS storm is approximately 3,237 m3.

Preliminary profiles were completed to estimate the surface ponding that is available at sag locations within the right-of-way. A total of 27 catchbasins are illustrated which are service twelve sag locations in the right-of-way. Inlet control devices are necessary in all catchbasins to control runoff to the allowable rate of 631 L/sec (9.02 hectares x 70 L/ha/sec), and due to this ponding in street sag locations will occur.

The estimated surface ponding areas on local streets is ± 290 m3. The locations of the catchbasins and surface ponding areas are illustrated in Figure A7 and Figure A8 in Appendix A.

7.6.5 Storm Sewers

The overall target capture rate for the minor system is 70 L/ha/sec. The following table summarizes the individual stormwater target rates that are necessary to meet the target capture rate of 70 L/ha/sec as required by the Jackson Trails SWM Report. Target capture rates for most areas were increased to 130 L/ha/sec or 135 L/ha/sec to account for the City of Ottawa's NO ponding in the 2-year event on public and private streets. The higher rate represents the approximate 2-year level of service, to avoid ponding, the higher capture rate dictates. The additional flow control at the downstream pond will be necessary to compensate for other areas and meet the overall 70 L/ha/sec.

Table 7-2: Target Capture Rates for Various Areas

Location	Area in hectares	Target Minor System Capture Rate (L/ha/sec
Site plan #1	0.50	130
Site plan #2	1.54	130
Backyards	2.36	70
Front yards / right-of-way	3.67	135
Park	0.73	130

A storm drainage plan is provided in **Appendix J**. A total twenty-eight (28) subcatchments (or drainage areas) within the development site are shown on this drawing with average runoff coefficients calculated for each drainage area.

Average runoff coefficients were calculated for all drainage areas for sizing of the storm sewers. A starting inlet times of 10 minutes were used for uppermost storm sewers. Design sheets for the 2-year sizing of the storm sewer system is included for reference in **Appendix E**. Under the 2-year storm event adequate capacity is provided within the storm sewer system.

In order to meet Criteria # 4 and have NO surface ponding is pubic or private roadways during the 2yr event, the above noted capture rates were used in conjunction with standard inlet control devices (ICDs).

8 Erosion & Sediment Control

During all construction activities, erosion and sedimentation shall be controlled by the following techniques:

- Filter cloth shall be installed between the frame and cover of all adjacent catch basins and catch basin manhole structures.
- Heavy duty silt fencing will be used to control runoff around the construction area. Silt fencing locations are identified on the site grading and erosion control plan.
- A mud mat will be installed at the construction entrance to help avoid mud from being transported to offsite roads.
- Visual inspection shall be completed daily on sediment control barriers and any damage repaired immediately. Care will be taken to prevent damage during construction operations.
- In some cases, barriers may be removed temporarily to accommodate the construction operations. The affected barriers will be reinstated at night when construction is completed.
- Sediment control devices will be cleaned of accumulated silt as required. The deposits will be disposed of as per the requirements of the contract.
- During the course of construction, if the engineer believes that additional prevention methods are required to control erosion and sedimentation, the contractor will install additional silt fences or other methods as required to the satisfaction of the engineer.
- Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification (OPSS) OPSS 805 and City of Ottawa specifications.

9 Conclusions and Recommendations

This Servicing & Stormwater Report outlines the rationale which will be used to service the proposed development. The following summarizes the servicing requirements for the site:

Water

- Domestic water demands of 4.56, 11.33, and 24.90 L/sec was estimated based on City of Ottawa Guidelines.
- Required Fire Flows for all buildings based on the Fire Underwriters Survey (FUS) method at 117L/sec for singles family homes, 167 and 183 L/sec for 6 and 8 unit townhomes, 183 L/sec for the Mixed Use (building f), and between 133 and 250 L/sec for the remaining 3-storey residential units (buildings A-E).
- A WaterGems hydraulic model was prepared to confirm that adequate pressure / flow is available, based on boundary conditions provided by the City of Ottawa. Peak hour pressures of between 48.1 and 55.5 psi is anticipated. This exceeds the City's guideline of 20 psi. Flows in excess of the required fire flows are provided.

Sewage

- The estimated peak sewage flows from the proposed site is 14.1 L/sec. Based on the Potter's Key Design Brief, the allocated sewage flow from the 6171 Hazeldean site to the sanitary sewer on Bandelier Way was 11.84 L/sec. Therefore, the proposed site is expected to release an additional 2.32 L/sec, above the previous estimate. A downstream review of the sanitary sewers indicates appropriate reserve capacity is available to accommodate the additional peak flow.

Stormwater

- An extended detention control criterion requires that the maximum discharge rate of 0.51 L/ha/sec from development site upstream of the Jackson trails SWM Facility not be exceeded during the 3-hour 15mm storm event. The estimated peak flow and runoff volume from the 3-hr storm 15mmm is 468 L/sec and 653 m3 respectively. The volume necessary to control to the allowable rate of 4.6 L/sec (9.02 ha x 0.51 L/ha/sec) is 616 m3. Approximately 131 m3 will be stored in the rear yard during the event and therefore the remaining 522 m3 will need to be detained within a downstream stormwater facility
- Runoff volume control is necessary to retain the volume from a 3-hr 5mm rainfall event. This will be achieved using Low impact Development (LID) methods. The peak flow and total runoff volume that occurs during the 5mm storm event is 153.1 L/sec and 187.9 m3 over the entire site. Within the backyards an infiltration trench and swale will be used. Approximately 187.9 m^3 of necessary runoff volume can be infiltrated in rear yard swales, with the remaining 148.6 m3 will need to be infiltrated within the proposed downstream stormwater facility (dry pond). This will consist of an additional granular storage area below the bottom of the dry pond. Based on a proposed bottom area of the pond of a granular depth of 0.31 m will be necessary.
- The flood control criteria require that onsite storage be provided to control peak flows from the storm 100-yr 12hr SCS storm to 8 L/ha/sec. Both the 3hr Chicago and 12hr SCS storms were analyzed to result in peak flows (and volumes) of 2833 L/sec (4,573 m3) and 1,686 L/sec (5,495 m3) respectively. The volumes required to control to the 72.2 L/sec (9.02 ha*8 L/ha/sec) is 3,911 m3 for the 12hr storm. A downstream stormwater facility (dry pond) will be used in conjunction with roadway ponding. Individual site plans will require flood control to detain runoff to 70 L/ha/sec.
- The storm sewer was sized based on the Rational Method and Manning's Equation under free flow conditions for the 2-year storm using a 10-minute inlet time. Inlet control devices will be used in all catchbasins, with the majority of roadway catchbasins requiring interconnect catchbasins. Capture rates at low points (trap lows) are set to the 2-year runoff rate to ensure NO surface ponding. Minor system capture rates for drainage areas to the right-of-way were set at 130L/sec (±2yr rate)
- A single inlet control device (Tempest LMF-75) within a storm manhole just downstream of the underground chambers will be used to control storm outflow.

10 Legal Notification

This report was prepared by EXP Services Inc. for the account of

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. EXP Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project.

Appendix A – Figures

Figure A2 – Site Location Plan

Figure A3– Site Statistics Plan

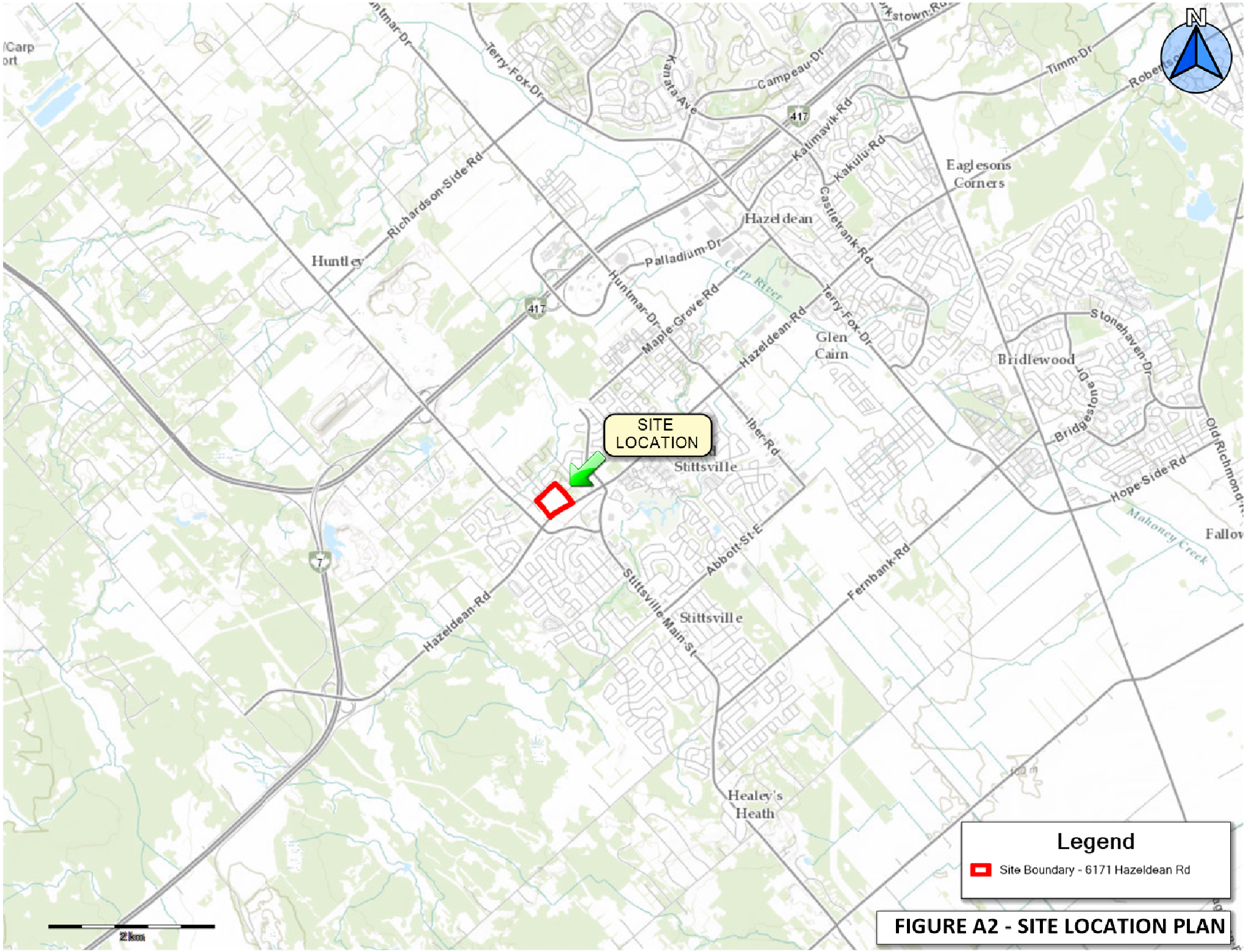
Figure A4 – Water Distribution Plan

Figure A5 – Water Demand Allocation Plan

Figure A6 – Subcatchment Plan

Figure A7 – Catchbasin Plan

Figure A8 – Roadway Ponding Area Plan


N
SITE LOCATION
Stittsville
Huntley
Hazeldean
Eagleson's Corners
Glen Cairn
Bridlewood
Stittsville
Healey's Heath
Carp River
Mahoney Creek
Richardson Side Rd
Terry Fox Dr
Kanata Ave
Campeau Dr
Timm Dr
Kakulu Rd
Castlefrank Rd
Palladium Dr
Huntmar Dr
Maple Grove Rd
Hazeldean Rd
Iber Rd
Stonehaven Dr
Bridgestone Dr
Hope Side Rd
Abbott St E
Stittsville Main St
Fernbank Rd
417
7
2km
Legend
Site Boundary - 6171 Hazeldean Rd
FIGURE A2 - SITE LOCATION PLAN

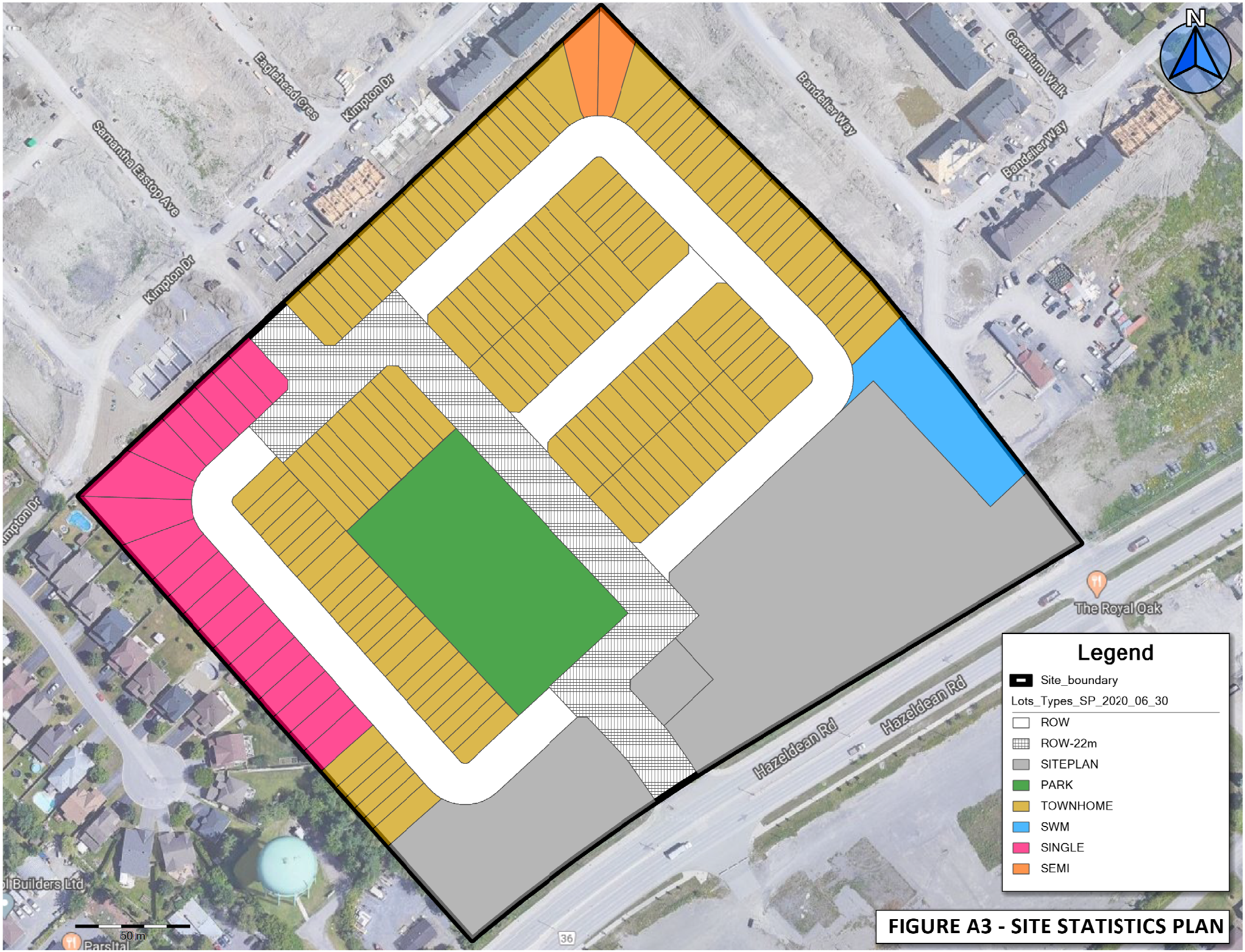


FIGURE A3 - SITE STATISTICS PLAN

exp Services Inc. 100, 2650 Queensview Drive Ottawa, ON K2B 8H6 **www.exp.com**		DESIGN JLF DRAWN SAB DATE JULY 2020 FILE NO 258780	6171 HAZELDEAN ROAD WATER DISTRIBUTION PLAN

SCALE 1:1750

FIGURE NO FIG A3

exp Services Inc.
100, 2650 Queensview Drive
Ottawa, ON K2B 8H6
www.exp.com

DESIGN	JLF
DRAWN	SAB
DATE	JULY 2020
FILE NO	258780

6171 HAZELDEAN ROAD

DEMAND ALLOCATION PLAN

SCALE	1:1750
FIGURE NO	FIG A4

FIGURE A6 - SUBCATCHMENTS

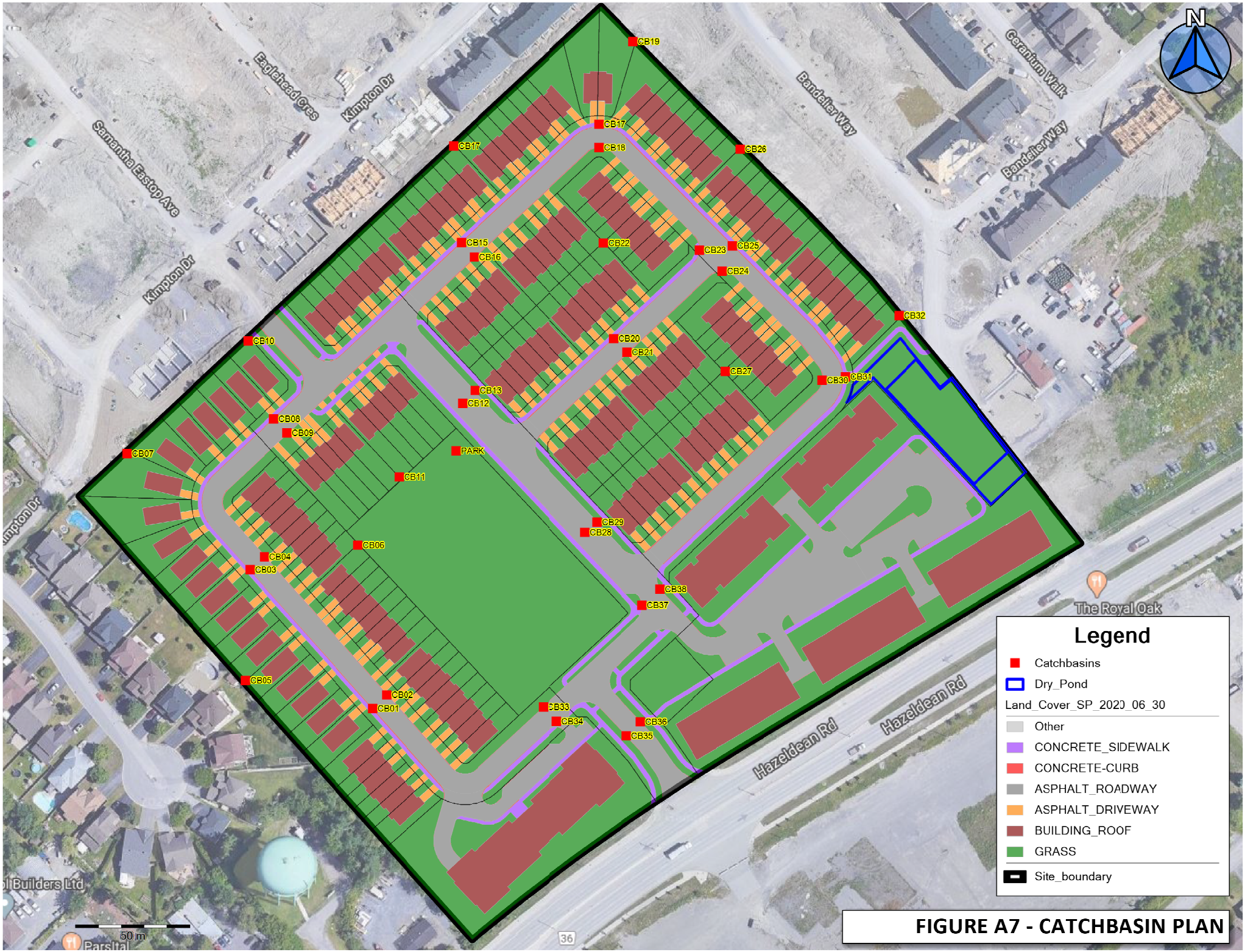


FIGURE A7 - CATCHBASIN PLAN

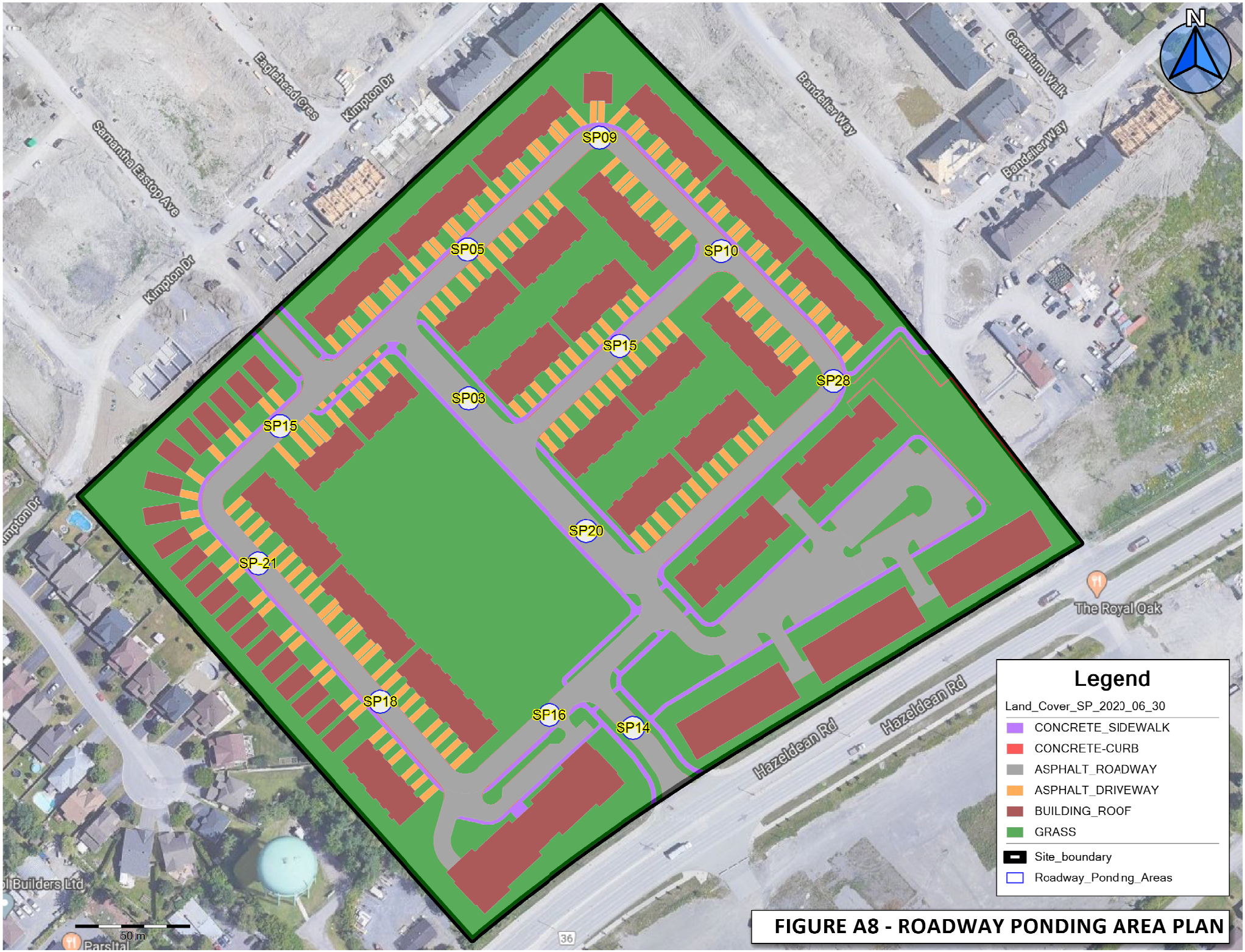


FIGURE A8 - ROADWAY PONDING AREA PLAN

Appendix B – Water Servicing Tables

Table B1 – Water Demand Chart

Table B2 – Summary of Required Fire Flows (RFF) for 6171 Hazeldean Road

Table B3 – Fire Flow Requirements Based on Fire Underwriters Survey (FUS) – Singles

Table B4 – Fire Flow Requirements Based on Fire Underwriters Survey (FUS) – Townhome (6 Towns)

Table B5 – Fire Flow Requirements Based on Fire Underwriters Survey (FUS) – Townhome (8 Towns)

Table B6 – Fire Flow Requirements Based on Fire Underwriters Survey (FUS) – Building A

Table B6 – Fire Flow Requirements Based on Fire Underwriters Survey (FUS) – Building B

Table B7 – Fire Flow Requirements Based on Fire Underwriters Survey (FUS) – Building C

Table B8 – Fire Flow Requirements Based on Fire Underwriters Survey (FUS) – Building D

Table B9 – Fire Flow Requirements Based on Fire Underwriters Survey (FUS) – Building E

Table B10 – Fire Flow Requirements Based on Fire Underwriters Survey (FUS) – Building F (Mixed Use)

TABLE B1
WATER DEMAND CHART

Location: 6171 Hazeldean Rd
Project No: OTT-00258780
Designed by: J.Fitzpatrick
Checked By: B Thomas
Date Revised: July 2020

Water Consumption
Residential = **350** L/cap/day
Commercial = 5.0 L/m^2/day

Population Densities

Single Family	3.4	person/unit
Semi-Detahced	2.7	person/unit
Duplex	2.3	person/unit
Townhome (Row)	2.7	person/unit
Bachelor Apartment	1.4	person/unit
1 Bedroom Apartment	1.4	person/unit
2 Bedroom Apartment	2.1	person/unit
3 Bedroom Apartment	3.1	person/unit
4 Bedroom Apartment	4.1	person/unit
Avg. Apartment	1.8	person/unit

	No. of Residential Units											Residential Demands in (L/sec)					Commercial						Total Demands (L/sec)		
	Singles/Semis/Towns				Apartments								Peaking Factors (x Avg Day)						Peaking Factors (x Avg Day)						
Proposed Buildings	Single Familty	Semi-Detached	Duplex	Townhome	Studio	1 Bedroom	2 Bedroom	3 Bedroom	4 Bedroom	Avg Apt.	Total Persons (pop)	Avg. Day Demand (L/day)	Max Day	Peak Hour	Max Day Demand (L/day)	Peak Hour Demand (L/day)	Area (m^2)	Avg Demand (L/day)	Max Day	Peak Hour	Max Day Demand (L/day)	Peak Hour Demand (L/day)	Avg Day (L/s)	Max Day (L/s)	Max Hour (L/s)
J-1	4			18		89	86				367.4	128,590	2.50	5.50	321,475	707,245	944.7	4,723.5	1.50	2.70	7,085.25	12,753	1.54	3.80	8.33
J-2	14			12							80.0	28,000	2.50	5.50	70,000	154,000							0.32	0.81	1.78
J-3	2			11							36.5	12,775	2.50	5.50	31,938	70,263							0.15	0.37	0.81
J-4				20							54.0	18,900	2.50	5.50	47,250	103,950							0.22	0.55	1.20
J-5		2		25							72.9	25,515	2.50	5.50	63,788	140,333							0.30	0.74	1.62
J-6				30							81.0	28,350	2.50	5.50	70,875	155,925							0.33	0.82	1.80
J-7				14							37.8	13,230	2.50	5.50	33,075	72,765							0.15	0.38	0.84
J-8				7							18.9	6,615	2.50	5.50	16,538	36,383							0.08	0.19	0.42
J-9				15							40.5	14,175	2.50	5.50	35,438	77,963							0.16	0.41	0.90
J-10																									
J-11						16	20				64.4	22,540	2.50	5.50	56,350	123,970							0.26	0.65	1.43
J-12						16	20				64.4	22,540	2.50	5.50	56,350	123,970							0.26	0.65	1.43
J-13						16	20				64.4	22,540	2.50	5.50	56,350	123,970							0.26	0.65	1.43
J-14						16	20				64.4	22,540	2.50	5.50	56,350	123,970							0.26	0.65	1.43
J-15						16	20				64.4	22,540	2.50	5.50	56,350	123,970							0.26	0.65	1.43
J-16																									
J-17																									
J-18																									
Total =	**20**	**2**		**152**		**169**	**186**				**1,111**	**388,850**			**972,125**	**2,138,675**	**945**						**4.56**	**11.33**	**24.90**

TABLE B2

Summary of Required Fire Flows (RFF) for 6171 Hazeldean Road

Type of Resdential	Reference Table	Requried Fire Flow (L/s)
Singles	TABLE B2	117
Townhomes (6 Units)	TABLE B3	167
Townhomes (8 Units)	TABLE B4	183
Building A	TABLE B5	233
Building B	TABLE B6	233
Building C	TABLE B7	233
Building D	TABLE B8	250
Building E	TABLE B9	217
Building F (Mixed Use)	TABLE B10	183

TABLE B3
FIRE FLOW REQUIREMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 1999
Building # / Type: Singles

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input			Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Wood Frame			1.5	
	Ordinary Construction	1					
	Non-combustible Construction	0.8					
	Fire Resistive Construction	0.6					
Input Building Floor Areas (A)			Area	% Used	Area Used	243.2 m²	
	Floor 2		121.6	100%	121.6		
	Floor 1		121.6	100%	121.6		
	Basement		121.6	0%	0		
Fire Flow (F)	F = 220 * C * SQRT(A)						5,146
Fire Flow (F)	Rounded to nearest 1,000						5,000

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-750	4,250
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	No Sprinkler	0%	0	4,250
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Not Standard Water Supply or Unavailable	0%	0	4,250
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Not Fully Supervised or N/A	0%	0	4,250
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposing Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	Side 1	2.4	1	0 to 3	Type A	16	2	32	1B	23%	66%	2,805	7,055
	Side 2	2.4	1	0 to 3	Type A	16	2	32	1B	23%			
	Front	24.4	4	20.1 to 30	Type A	7.6	2	15.2	4A	8%			
	Back	15.48	3	10.1 to 20	Type A	7.6	2	15.2	3A	12%			

Obtain Required Fire Flow		
	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =	7,000
	Total Required Fire Flow (RFF), L/sec =	117
	Can the Total Fire Flow be Capped at 10,000 L/min (167 L/sec) based on "TECHNCAL BULLETIN ISTB-2018-02", (yes/no) =	No
	Total Required Fire Flow (RFF). If RFF < 167 use RFF (L/sec) =	117

Exposure Charges for Exposing Walls of Wood Frame Construction (from Table G5)

Type A	Wood-Frame or non-conbustible
Type B	Ordinary or fire-resisitve with unprotected openings
Type C	Ordinary or fire-resisitve with semi-protected openings
Type D	Ordinary or fire-resisitve with blank wall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
30.1m to 45m	5
> 45.1m	6

TABLE B4
FIRE FLOW REQUIREMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 1999
Building # / Type: Townhomes (6 Units)

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input			Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Wood Frame			1.5	
	Ordinary Construction	1					
	Non-combustible Construction	0.8					
	Fire Resistive Construction	0.6					
Input Building Floor Areas (A)	Floor 3		Area	% Used	Area Used	1165.6 m²	
	Floor 2		582.8	100%	582.8		
	Floor 1		582.8	100%	582.8		
	Basement (At least 50% below grade, not included)		582.8	0%	0		
Fire Flow (F)	F = 220 * C * SQRT(A)						11,266
Fire Flow (F)	Rounded to nearest 1,000						**11,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,650	9,350
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	No Sprinkler	0%	0	9,350
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Not Standard Water Supply or Unavailable	0%	0	9,350
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Not Fully Supervised or N/A	0%	0	9,350
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposing Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	Side 1	8.1	2	3.1 to 10	Type A	14.8	2	29.6	2A	17%	62%	5,797	15,147
	Side 2	2.4	1	0 to 3	Type A	14.8	2	29.6	1A	22%			
	Front	26.6	4	20.1 to 30	Type A	37.9	2	75.8	4C	9%			
	Back	15.3	3	10.1 to 20	Type A	37.9	2	75.8	3C	14%			

Obtain Required Fire Flow		
	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =	**15,000**
	Total Required Fire Flow (RFF), L/sec =	**250**
	Can the Total Fire Flow be Capped at 10,000 L/min (167 L/sec) based on "TECHNCAL BULLETIN ISTB-2018-02", (yes/no) =	**Yes**
	Total Required Fire Flow (RFF). If RFF < 167 use RFF (L/sec) =	**167**

Exposure Charges for Exposing Walls of Wood Frame Construction (from Table G5)

Type A	Wood-Frame or non-conbustible
Type B	Ordinary or fire-resisitve with unprotected openings
Type C	Ordinary or fire-resisitve with semi-protected openings
Type D	Ordinary or fire-resisitve with blank wall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
30.1m to 45m	5
> 45.1m	6

TABLE B5
FIRE FLOW REQUIREMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 1999
Building # / Type: Townhomes (8 Units)

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input			Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Wood Frame			1.5	
	Ordinary Construction	1					
	Non-combustible Construction	0.8					
	Fire Resistive Construction	0.6					
Input Building Floor Areas (A)	Floor 3		Area	% Used	Area Used	773.6 m²	
	Floor 2		773.6	50%	386.8		
	Floor 1		773.6	50%	386.8		
	Basement (At least 50% below grade, not included)		773.6	0%	0		
Fire Flow (F)	F = 220 * C * SQRT(A)						9,179
Fire Flow (F)	Rounded to nearest 1,000						**9,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,350	7,650
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	No Sprinkler	0%	0	7,650
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Not Standard Water Supply or Unavailable	0%	0	7,650
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Not Fully Supervised or N/A	0%	0	7,650
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposing Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	Side 1	27.0	4	20.1 to 30	Type A	14.8	2	29.6	4A	8%	41%	3,137	10,787
	Side 2	0	1	0 to 3	Fire Wall					10%			
	Front	27.8	4	20.1 to 30	Type A	48	2	96	4D	10%			
	Back	10.1	3	10.1 to 20	Type A	29.6	2	59.2	3B	13%			

Obtain Required Fire Flow		
	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =	**11,000**
	Total Required Fire Flow (RFF), L/sec =	**183**
	Can the Total Fire Flow be Capped at 10,000 L/min (167 L/sec) based on "TECHNCAL BULLETIN ISTB-2018-02", (yes/no) =	**No**
	Total Required Fire Flow (RFF). If RFF < 167 use RFF (L/sec) =	**183**

Exposure Charges for Exposing Walls of Wood Frame Construction (from Table G5)

Type A	Wood-Frame or non-conbustible
Type B	Ordinary or fire-resisitve with unprotected openings
Type C	Ordinary or fire-resisitve with semi-protected openings
Type D	Ordinary or fire-resisitve with blank wall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
30.1m to 45m	5
> 45.1m	6

TABLE B6
FIRE FLOW REQUIREMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 1999
Building # / Type: Building A

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input			Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Ordinary Construction			1	
	Ordinary Construction	1					
	Non-combustible Construction	0.8					
	Fire Resistive Construction	0.6					
Input Building Floor Areas (A)			Area	% Used	Area Used	3324.0 m²	
	Floor 3		1108	100%	1108		
	Floor 2		1108	100%	1108		
	Floor 1		1108	100%	1108		
Fire Flow (F)	F = 220 * C * SQRT(A)						12,684
Fire Flow (F)	Rounded to nearest 1,000						**13,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,950	11,050
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	No Sprinkler	0%	0	11,050
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Not Standard Water Supply or Unavailable	0%	0	11,050
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Not Fully Supervised or N/A	0%	0	11,050
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separation Dist (m)	Cond	Separation Conditon	Exposing Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	Side 1	11.6	3	10.1 to 20	Type A	21	2	42	3B	13%	28%	3,094	14,144
	Side 2	50	6	> 45.1	Type A	0	3	0	6	0%			
	Front	25.3	4	20.1 to 30	Type A	52.9	2	105.8	4D	10%			
	Back	32.5	5	30.1 to 45	Type A	52.9	3	158.7	5E	5%			

Obtain Required Fire Flow		
	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =	**14,000**
	Total Required Fire Flow (RFF), L/sec =	**233**
	Can the Total Fire Flow be Capped at 10,000 L/min (167 L/sec) based on "TECHNCAL BULLETIN ISTB-2018-02", (yes/no) =	**No**
	Total Required Fire Flow (RFF). If RFF < 167 use RFF (L/sec) =	**233**

Exposure Charges for Exposing Walls of Wood Frame Construction (from Table G5)

Type A	Wood-Frame or non-conbustible
Type B	Ordinary or fire-resisitve with unprotected openings
Type C	Ordinary or fire-resisitve with semi-protected openings
Type D	Ordinary or fire-resisitve with blank wall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
30.1m to 45m	5
> 45.1m	6

TABLE B7
FIRE FLOW REQUIREMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 1999
Building # / Type: Building B

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input			Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Ordinary Construction			1	
	Ordinary Construction	1					
	Non-combustible Construction	0.8					
	Fire Resistive Construction	0.6					
Input Building Floor Areas (A)			Area	% Used	Area Used	3324.0 m²	
	Floor 3		1108	100%	1108		
	Floor 2		1108	100%	1108		
	Floor 1		1108	100%	1108		
Fire Flow (F)	F = 220 * C * SQRT(A)						12,684
Fire Flow (F)	Rounded to nearest 1,000						**13,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,950	11,050
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	No Sprinkler	0%	0	11,050
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Not Standard Water Supply or Unavailable	0%	0	11,050
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Not Fully Supervised or N/A	0%	0	11,050
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposing Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	Side 1	32.1	5	30.1 to 45	Type A	21.0	2	42	5B	5%	29%	3,205	14,255
	Side 2	11.6	3	10.1 to 20	Type A	21.0	3	63	3C	14%			
	Front	27	4	20.1 to 30	Type A	52.9	2	105.8	4D	10%			
	Back	50.1	6	> 45.1	Type A	52.9	3	158.7	6	0%			

Obtain Required Fire Flow		
	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =	**14,000**
	Total Required Fire Flow (RFF), L/sec =	**233**
	Can the Total Fire Flow be Capped at 10,000 L/min (167 L/sec) based on "TECHNCAL BULLETIN ISTB-2018-02", (yes/no) =	**No**
	Total Required Fire Flow (RFF). If RFF < 167 use RFF (L/sec) =	**233**

Exposure Charges for Exposing Walls of Wood Frame Construction (from Table G5)

Type A	Wood-Frame or non-conbustible
Type B	Ordinary or fire-resisitve with unprotected openings
Type C	Ordinary or fire-resisitve with semi-protected openings
Type D	Ordinary or fire-resisitve with blank wall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
30.1m to 45m	5
> 45.1m	6

TABLE B8
FIRE FLOW REQUIREMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 1999
Building # / Type: Building C

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input			Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Ordinary Construction			1	
	Ordinary Construction	1					
	Non-combustible Construction	0.8					
	Fire Resistive Construction	0.6					
Input Building Floor Areas (A)			Area	% Used	Area Used	3324.0 m²	
	Floor 3		1108	100%	1108		
	Floor 2		1108	100%	1108		
	Floor 1		1108	100%	1108		
Fire Flow (F)	F = 220 * C * SQRT(A)						12,684
Fire Flow (F)	Rounded to nearest 1,000						**13,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,950	11,050
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	No Sprinkler	0%	0	11,050
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Not Standard Water Supply or Unavailable	0%	0	11,050
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Not Fully Supervised or N/A	0%	0	11,050
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separation Dist (m)	Cond	Separation Conditon	Exposing Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	Side 1	11.5	3	10.1 to 20	Type A	21.0	3	63	3C	14%	28%	3,094	14,144
	Side 2	28.7	4	20.1 to 30	Type A	8.9	9	80.1	4C	9%			
	Front	32.5	5	30.1 to 45	Type A	52.9	2	105.8	5D	5%			
	Back	50	6	> 45.1	Type A	0	3	0	6	0%			

Obtain Required Fire Flow		
	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =	**14,000**
	Total Required Fire Flow (RFF), L/sec =	**233**
	Can the Total Fire Flow be Capped at 10,000 L/min (167 L/sec) based on "TECHNCAL BULLETIN ISTB-2018-02", (yes/no) =	**No**
	Total Required Fire Flow (RFF). If RFF < 167 use RFF (L/sec) =	**233**

Exposure Charges for Exposing Walls of Wood Frame Construction (from Table G5)

Type A	Wood-Frame or non-conbustible
Type B	Ordinary or fire-resisitve with unprotected openings
Type C	Ordinary or fire-resisitve with semi-protected openings
Type D	Ordinary or fire-resisitve with blank wall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
30.1m to 45m	5
> 45.1m	6

TABLE B9
FIRE FLOW REQUIREMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 1999
Building # / Type: Building D

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input			Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Ordinary Construction			1	
	Ordinary Construction	1					
	Non-combustible Construction	0.8					
	Fire Resistive Construction	0.6					
Input Building Floor Areas (A)			Area	% Used	Area Used	3324.0 m²	
	Floor 3		1108	100%	1108		
	Floor 2		1108	100%	1108		
	Floor 1		1108	100%	1108		
Fire Flow (F)	F = 220 * C * SQRT(A)						12,684
Fire Flow (F)	Rounded to nearest 1,000						**13,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,950	11,050
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	No Sprinkler	0%	0	11,050
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Not Standard Water Supply or Unavailable	0%	0	11,050
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Not Fully Supervised or N/A	0%	0	11,050
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separation Dist (m)	Cond	Separation Conditon	Exposing Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	Side 1	11.5	3	10.1 to 20	Type A	21.0	3	63	3C	14%	33%	3,647	14,697
	Side 2	11.5	3	10.1 to 20	Type A	21.0	3	63	3C	14%			
	Front	36.9	5	30.1 to 45	Type A	52.9	2	105.8	5D	5%			
	Back	50	6	> 45.1	Type A	0	3	0	6	0%			

Obtain Required Fire Flow		
	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =	**15,000**
	Total Required Fire Flow (RFF), L/sec =	**250**
	Can the Total Fire Flow be Capped at 10,000 L/min (167 L/sec) based on "TECHNCAL BULLETIN ISTB-2018-02", (yes/no) =	**No**
	Total Required Fire Flow (RFF). If RFF < 167 use RFF (L/sec) =	**250**

Exposure Charges for Exposing Walls of Wood Frame Construction (from Table G5)

Type A	Wood-Frame or non-conbustible
Type B	Ordinary or fire-resisitve with unprotected openings
Type C	Ordinary or fire-resisitve with semi-protected openings
Type D	Ordinary or fire-resisitve with blank wall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
30.1m to 45m	5
> 45.1m	6

TABLE B10
FIRE FLOW REQUIREMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 1999
Building # / Type: Building E

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input			Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Ordinary Construction			1	
	Ordinary Construction	1					
	Non-combustible Construction	0.8					
	Fire Resistive Construction	0.6					
Input Building Floor Areas (A)			Area	% Used	Area Used	3324.0 m²	
	Floor 3		1108	100%	1108		
	Floor 2		1108	100%	1108		
	Floor 1		1108	100%	1108		
Fire Flow (F)	F = 220 * C * SQRT(A)						12,684
Fire Flow (F)	Rounded to nearest 1,000						**13,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-1,950	11,050
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	No Sprinkler	0%	0	11,050
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Not Standard Water Supply or Unavailable	0%	0	11,050
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Not Fully Supervised or N/A	0%	0	11,050
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposing Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	Side 1	11.5	3	10.1 to 20	Type A	21.0	3	63	3C	14%	14%	1,547	12,597
	Side 2	50	6	> 45.1	Type A	0.0	3	0	6	0%			
	Front	50.4	6	> 45.1	Type A	52.9	2	105.8	6	0%			
	Back	50	6	> 45.1	Type A	0	3	0	6	0%			

Obtain Required Fire Flow		
	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =	**13,000**
	Total Required Fire Flow (RFF), L/sec =	**217**
	Can the Total Fire Flow be Capped at 10,000 L/min (167 L/sec) based on "TECHNCAL BULLETIN ISTB-2018-02", (yes/no) =	**No**
	Total Required Fire Flow (RFF). If RFF < 167 use RFF (L/sec) =	**217**

Exposure Charges for Exposing Walls of Wood Frame Construction (from Table G5)

Type A	Wood-Frame or non-conbustible
Type B	Ordinary or fire-resisitve with unprotected openings
Type C	Ordinary or fire-resisitve with semi-protected openings
Type D	Ordinary or fire-resisitve with blank wall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
30.1m to 45m	5
> 45.1m	6

TABLE B11
FIRE FLOW REQUIREMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 1999
Building # / Type: Building F (Mixed Use)

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute
A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)
C = coefficient related to the type of construction

Task	Options	Multiplier	Input			Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5	Non-combustible Construction			0.8	
	Ordinary Construction	1					
	Non-combustible Construction	0.8					
	Fire Resistive Construction	0.6					
Input Building Floor Areas (A)			Area	% Used	Area Used	8863.5 m²	
	Floor 9		1327	50%	663.5		
	Floor 8		1327	50%	663.5		
	Floor 7		1327	50%	663.5		
	Floor 6		1327	50%	663.5		
	Floor 5		1327	50%	663.5		
	Floor 4		1327	50%	663.5		
	Floor 3		1953	50%	976.5		
	Floor 2		1953	100%	1953		
	Floor 1		1953	100%	1953		
Fire Flow (F)	F = 220 * C * SQRT(A)						16,570
Fire Flow (F)	Rounded to nearest 1,000						**17,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-2,550	14,450
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	Adequate Sprinkler Conforms to NFPA13	-30%	-4,335	10,115
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	-1,445	8,670
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,445	7,225
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposing Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	Side 1	15.8	3	10.1 to 20	Type A	10.8	3	32.4	3B	13%	29%	4,191	11,416
	Side 2	28.7	4	20.1 to 30	Type A	0.0	3	0	4A	8%			
	Front	29.2	4	20.1 to 30	Type A	29.6	2	59.2	4B	8%			
	Back	50	6	> 45.1	Type A	0	3	0	6	0%			

Obtain Required Fire Flow		
	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =	**11,000**
	Total Required Fire Flow (RFF), L/sec =	**183**
	Can the Total Fire Flow be Capped at 10,000 L/min (167 L/sec) based on "TECHNCAL BULLETIN ISTB-2018-02", (yes/no) =	**No**
	Total Required Fire Flow (RFF). If RFF < 167 use RFF (L/sec) =	**183**

Exposure Charges for Exposing Walls of Wood Frame Construction (from Table G5)

Type A	Wood-Frame or non-conbustible
Type B	Ordinary or fire-resisitve with unprotected openings
Type C	Ordinary or fire-resisitve with semi-protected openings
Type D	Ordinary or fire-resisitve with blank wall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
30.1m to 45m	5
> 45.1m	6

Appendix C – WaterGems Output Tables

- Scenario 1A Result Tables (Peak Hour) Based on Single Feed from Connection #1
    - Junction Table
    - Pipe Table
    - Reservoir Table
- Scenario 1B Result Tables (Peak Hour) Based on Single Feed from Connection #1
    - Junction Table
    - Pipe Table
    - Reservoir Table
- Scenario 1C Result Tables (Max Day Plus Fire Flow) Based on Single Feed from Connection #1
    - Junction Table
    - Pipe Table
    - Reservoir Table
    - Fire Flow Report
- Scenario 2A Result Tables (Peak Hour) Based on Single Feed from Connection #2
    - Junction Table
    - Pipe Table
    - Reservoir Table
- Scenario 2B Result Tables (Peak Hour) Based on Single Feed from Connection #2
    - Junction Table
    - Pipe Table
    - Reservoir Table
- Scenario 2C Result Tables (Max Day Plus Fire Flow) Based on Single Feed from Connection #2
    - Junction Table
    - Pipe Table
    - Reservoir Table
    - Fire Flow Report

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Average Day - Boundary Conditon, Location 1

Junction Table - Time: 0.00 hours

Label	Demand (L/s)	Elevation (m)	Hydraulic Grade (m)	Pressure (psi)
J-01	1.54	122.19	160.69	54.7
J-02	0.32	119.69	160.69	58.2
J-03	0.15	118.67	160.69	59.6
J-04	0.22	118.45	160.69	60.0
J-05	0.30	117.43	160.69	61.4
J-06	0.33	117.02	160.69	62.0
J-07	0.15	118.88	160.69	59.4
J-08	0.08	119.76	160.69	58.1
J-09	0.16	117.12	160.69	61.8
J-10	0.00	120.76	160.69	56.7
J-11	0.26	117.40	160.69	61.5
J-12	0.26	117.30	160.69	61.6
J-13	0.26	118.62	160.69	59.7
J-14	0.26	119.10	160.69	59.0
J-15	0.26	119.20	160.69	58.9
J-16	0.00	119.76	160.69	58.1
J-17	0.00	118.80	160.69	59.5
J-18	0.00	120.40	160.70	57.2

Pipe Table - Time: 0.00 hours

Label	Start Node	Stop Node	Diameter (mm)	Length (Scaled) (m)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Hydraulic Grade (Start) (m)	Hydraulic Grade (Stop) (m)
P-1	J-01	J-02	204.0	168	110.0	0.16	0.01	160.69	160.69
P-2	J-02	J-03	204.0	73	110.0	-0.16	0.00	160.69	160.69
P-4	J-03	J-17	250.0	77	110.0	0.00	0.00	160.69	160.69
P-5	J-03	J-04	250.0	41	110.0	-0.31	0.01	160.69	160.69
P-6	J-04	J-07	250.0	76	110.0	-0.66	0.01	160.69	160.69
P-7	J-07	J-08	250.0	72	110.0	-1.11	0.02	160.69	160.69
P-8	J-08	J-16	250.0	19	110.0	-1.77	0.04	160.69	160.69
P-9	J-16	J-10	250.0	46	110.0	-2.85	0.06	160.69	160.69
P-10	J-10	J-18	250.0	89	110.0	-4.55	0.09	160.69	160.70
P-11	J-10	J-01	204.0	68	110.0	1.70	0.05	160.69	160.69
P-12	J-04	J-05	204.0	115	110.0	0.13	0.00	160.69	160.69
P-13	J-05	J-06	204.0	75	110.0	-0.17	0.01	160.69	160.69
P-14	J-06	J-07	204.0	120	110.0	-0.30	0.01	160.69	160.69
P-16	J-09	J-11	204.0	80	110.0	0.22	0.01	160.69	160.69
P-17	J-11	J-12	204.0	25	110.0	-0.04	0.00	160.69	160.69
P-18	J-12	J-13	204.0	41	110.0	-0.30	0.01	160.69	160.69
P-19	J-13	J-14	204.0	23	110.0	-0.56	0.02	160.69	160.69
P-20	J-14	J-15	204.0	10	110.0	-0.82	0.03	160.69	160.69
P-22	J-15	J-16	204.0	41	110.0	-1.08	0.03	160.69	160.69
P-23	J-09	J-08	204.0	118	110.0	-0.58	0.02	160.69	160.69
P-24	J-06	J-09	204.0	71	110.0	-0.19	0.01	160.69	160.69
P-25	R-1	J-18	600.0	29	150.0	4.55	0.02	160.70	160.70
P-26	R-2	J-17	600.0	16	120.0	(N/A)	(N/A)	(N/A)	(N/A)

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Average Day - Boundary Conditon, Location 1

Reservoir Table - Time: 0.00 hours

Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
R-1	160.70	<None>	4.55	160.70
R-2	160.70	<None>	(N/A)	(N/A)

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Peak Hour - Boundary Conditon, Location 1

Junction Table - Time: 0.00 hours

Label	Demand (L/s)	Elevation (m)	Hydraulic Grade (m)	Pressure (psi)
J-01	7.77	122.19	156.32	48.4
J-02	1.78	119.69	156.32	52.0
J-03	0.81	118.67	156.32	53.4
J-04	1.20	118.45	156.32	53.7
J-05	1.62	117.43	156.31	55.2
J-06	1.80	117.02	156.32	55.8
J-07	0.84	118.88	156.32	53.1
J-08	0.36	119.76	156.33	51.9
J-09	0.90	117.12	156.32	55.6
J-10	0.00	120.76	156.36	50.5
J-11	1.43	117.40	156.31	55.2
J-12	1.43	117.30	156.31	55.4
J-13	1.43	118.62	156.32	53.5
J-14	1.43	119.10	156.32	52.8
J-15	1.43	119.20	156.32	52.7
J-16	0.00	119.76	156.33	51.9
J-17	0.00	118.80	156.32	53.3
J-18	0.00	120.40	156.50	51.2

Pipe Table - Time: 0.00 hours

Label	Start Node	Stop Node	Diameter (mm)	Length (Scaled) (m)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Hydraulic Grade (Start) (m)	Hydraulic Grade (Stop) (m)
P-1	J-01	J-02	204.0	168	110.0	1.19	0.04	156.32	156.32
P-2	J-02	J-03	204.0	73	110.0	-0.59	0.02	156.32	156.32
P-4	J-03	J-17	250.0	77	110.0	0.00	0.00	156.32	156.32
P-5	J-03	J-04	250.0	41	110.0	-1.40	0.03	156.32	156.32
P-6	J-04	J-07	250.0	76	110.0	-3.43	0.07	156.32	156.32
P-7	J-07	J-08	250.0	72	110.0	-5.93	0.12	156.32	156.33
P-8	J-08	J-16	250.0	19	110.0	-9.41	0.19	156.33	156.33
P-9	J-16	J-10	250.0	46	110.0	-15.27	0.31	156.33	156.36
P-10	J-10	J-18	250.0	89	110.0	-24.23	0.49	156.36	156.50
P-11	J-10	J-01	204.0	68	110.0	8.96	0.27	156.36	156.32
P-12	J-04	J-05	204.0	115	110.0	0.82	0.03	156.32	156.31
P-13	J-05	J-06	204.0	75	110.0	-0.80	0.02	156.31	156.32
P-14	J-06	J-07	204.0	120	110.0	-1.66	0.05	156.32	156.32
P-16	J-09	J-11	204.0	80	110.0	1.28	0.04	156.32	156.31
P-17	J-11	J-12	204.0	25	110.0	-0.15	0.00	156.31	156.31
P-18	J-12	J-13	204.0	41	110.0	-1.58	0.05	156.31	156.32
P-19	J-13	J-14	204.0	23	110.0	-3.01	0.09	156.32	156.32
P-20	J-14	J-15	204.0	10	110.0	-4.44	0.14	156.32	156.32
P-22	J-15	J-16	204.0	41	110.0	-5.87	0.18	156.32	156.33
P-23	J-09	J-08	204.0	118	110.0	-3.12	0.10	156.32	156.33
P-24	J-06	J-09	204.0	71	110.0	-0.93	0.03	156.32	156.32
P-25	R-1	J-18	600.0	29	150.0	24.23	0.09	156.50	156.50
P-26	R-2	J-17	600.0	16	120.0	(N/A)	(N/A)	(N/A)	(N/A)

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Peak Hour - Boundary Conditon, Location 1

Reservoir Table - Time: 0.00 hours

Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
R-1	156.50	<None>	24.23	156.50
R-2	156.30	<None>	(N/A)	(N/A)

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Max Day Plus Fire Flow - Boundary Conditon, Location 1

Junction Table - Time: 0.00 hours

Label	Demand (L/s)	Elevation (m)	Hydraulic Grade (m)	Pressure (psi)
J-01	3.80	122.19	160.66	54.6
J-02	0.81	119.69	160.65	58.1
J-03	0.37	118.67	160.66	59.6
J-04	0.55	118.45	160.66	59.9
J-05	0.74	117.43	160.65	61.4
J-06	0.82	117.02	160.66	61.9
J-07	0.38	118.88	160.66	59.3
J-08	0.19	119.76	160.66	58.1
J-09	0.41	117.12	160.66	61.8
J-10	0.00	120.76	160.67	56.6
J-11	0.65	117.40	160.66	61.4
J-12	0.65	117.30	160.66	61.5
J-13	0.64	118.62	160.66	59.7
J-14	0.65	119.10	160.66	59.0
J-15	0.65	119.20	160.66	58.8
J-16	0.00	119.76	160.66	58.1
J-17	0.00	118.80	160.66	59.4
J-18	0.00	120.40	160.70	57.2

Pipe Table - Time: 0.00 hours

Label	Start Node	Stop Node	Diameter (mm)	Length (Scaled) (m)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Hydraulic Grade (Start) (m)	Hydraulic Grade (Stop) (m)
P-1	J-01	J-02	204.0	168	110.0	0.43	0.01	160.66	160.65
P-2	J-02	J-03	204.0	73	110.0	-0.38	0.01	160.65	160.66
P-4	J-03	J-17	250.0	77	110.0	0.00	0.00	160.66	160.66
P-5	J-03	J-04	250.0	41	110.0	-0.75	0.02	160.66	160.66
P-6	J-04	J-07	250.0	76	110.0	-1.63	0.03	160.66	160.66
P-7	J-07	J-08	250.0	72	110.0	-2.77	0.06	160.66	160.66
P-8	J-08	J-16	250.0	19	110.0	-4.39	0.09	160.66	160.66
P-9	J-16	J-10	250.0	46	110.0	-7.08	0.14	160.66	160.67
P-10	J-10	J-18	250.0	89	110.0	-11.31	0.23	160.67	160.70
P-11	J-10	J-01	204.0	68	110.0	4.23	0.13	160.67	160.66
P-12	J-04	J-05	204.0	115	110.0	0.33	0.01	160.66	160.65
P-13	J-05	J-06	204.0	75	110.0	-0.41	0.01	160.65	160.66
P-14	J-06	J-07	204.0	120	110.0	-0.75	0.02	160.66	160.66
P-16	J-09	J-11	204.0	80	110.0	0.55	0.02	160.66	160.66
P-17	J-11	J-12	204.0	25	110.0	-0.10	0.00	160.66	160.66
P-18	J-12	J-13	204.0	41	110.0	-0.75	0.02	160.66	160.66
P-19	J-13	J-14	204.0	23	110.0	-1.39	0.04	160.66	160.66
P-20	J-14	J-15	204.0	10	110.0	-2.04	0.06	160.66	160.66
P-22	J-15	J-16	204.0	41	110.0	-2.69	0.08	160.66	160.66
P-23	J-09	J-08	204.0	118	110.0	-1.43	0.04	160.66	160.66
P-24	J-06	J-09	204.0	71	110.0	-0.47	0.01	160.66	160.66
P-25	R-1	J-18	600.0	29	150.0	11.31	0.04	160.70	160.70
P-26	R-2	J-17	600.0	16	120.0	(N/A)	(N/A)	(N/A)	(N/A)

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Max Day Plus Fire Flow - Boundary Conditon, Location 1

Fire Flow Report - Time: 0.00 hours

Label	Fire Flow (Available) (L/s)	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Satisfies Fire Flow Constraints?
J-01	262.14	186.80	265.94	20.0	32.8	True
J-02	249.25	183.81	250.06	20.0	32.0	True
J-03	283.22	183.37	283.59	20.2	20.0	True
J-04	298.21	183.55	298.76	20.0	20.3	True
J-05	260.24	183.74	260.98	20.0	31.8	True
J-06	292.71	183.82	293.53	20.0	23.1	True
J-07	300.00	183.38	300.38	22.4	24.7	True
J-08	300.00	183.19	300.19	25.8	27.7	True
J-09	297.46	183.41	297.87	20.0	24.0	True
J-10	300.00	183.00	300.00	34.6	32.6	True
J-11	264.31	233.65	264.96	20.0	23.2	True
J-12	264.70	233.65	265.35	20.0	22.9	True
J-13	266.20	250.64	266.84	20.0	24.1	True
J-14	274.32	233.65	274.97	20.0	22.2	True
J-15	280.74	233.65	281.39	20.0	20.7	True
J-16	300.00	183.00	300.00	28.0	28.1	True
J-17	234.86	183.00	234.86	20.0	31.5	True
J-18	300.00	183.00	300.00	57.1	54.5	True

Reservoir Table - Time: 0.00 hours

Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
R-1	160.70	<None>	11.31	160.70
R-2	160.70	<None>	(N/A)	(N/A)

6171 Hazeldean Road, Ottawa, ON

Average Day - Boundary Conditon, Location 2

Junction Table - Time: 0.00 hours

Label	Demand (L/s)	Elevation (m)	Hydraulic Grade (m)	Pressure (psi)
J-01	1.54	122.19	160.69	54.7
J-02	0.32	119.69	160.69	58.2
J-03	0.15	118.67	160.69	59.7
J-04	0.22	118.45	160.69	60.0
J-05	0.30	117.43	160.69	61.4
J-06	0.33	117.02	160.69	62.0
J-07	0.15	118.88	160.69	59.4
J-08	0.08	119.76	160.69	58.1
J-09	0.16	117.12	160.69	61.8
J-10	0.00	120.76	160.69	56.7
J-11	0.26	117.40	160.69	61.5
J-12	0.26	117.30	160.69	61.6
J-13	0.26	118.62	160.69	59.7
J-14	0.26	119.10	160.69	59.0
J-15	0.26	119.20	160.69	58.9
J-16	0.00	119.76	160.69	58.1
J-17	0.00	118.80	160.70	59.5
J-18	0.00	120.40	160.69	57.2

Pipe Table - Time: 0.00 hours

Label	Start Node	Stop Node	Diameter (mm)	Length (Scaled) (m)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Hydraulic Grade (Start) (m)	Hydraulic Grade (Stop) (m)
P-1	J-01	J-02	204.0	168	110.0	-1.03	0.03	160.69	160.69
P-2	J-02	J-03	204.0	73	110.0	-1.35	0.04	160.69	160.69
P-4	J-03	J-17	250.0	77	110.0	-4.55	0.09	160.69	160.70
P-5	J-03	J-04	250.0	41	110.0	3.05	0.06	160.69	160.69
P-6	J-04	J-07	250.0	76	110.0	1.95	0.04	160.69	160.69
P-7	J-07	J-08	250.0	72	110.0	1.41	0.03	160.69	160.69
P-8	J-08	J-16	250.0	19	110.0	1.22	0.02	160.69	160.69
P-9	J-16	J-10	250.0	46	110.0	0.51	0.01	160.69	160.69
P-10	J-10	J-18	250.0	89	110.0	0.00	0.00	160.69	160.69
P-11	J-10	J-01	204.0	68	110.0	0.51	0.02	160.69	160.69
P-12	J-04	J-05	204.0	115	110.0	0.88	0.03	160.69	160.69
P-13	J-05	J-06	204.0	75	110.0	0.58	0.02	160.69	160.69
P-14	J-06	J-07	204.0	120	110.0	-0.39	0.01	160.69	160.69
P-16	J-09	J-11	204.0	80	110.0	0.59	0.02	160.69	160.69
P-17	J-11	J-12	204.0	25	110.0	0.33	0.01	160.69	160.69
P-18	J-12	J-13	204.0	41	110.0	0.07	0.00	160.69	160.69
P-19	J-13	J-14	204.0	23	110.0	-0.19	0.01	160.69	160.69
P-20	J-14	J-15	204.0	10	110.0	-0.45	0.01	160.69	160.69
P-22	J-15	J-16	204.0	41	110.0	-0.71	0.02	160.69	160.69
P-23	J-09	J-08	204.0	118	110.0	-0.11	0.00	160.69	160.69
P-24	J-06	J-09	204.0	71	110.0	0.64	0.02	160.69	160.69
P-25	R-1	J-18	600.0	29	150.0	(N/A)	(N/A)	(N/A)	(N/A)
P-26	R-2	J-17	600.0	16	120.0	4.55	0.02	160.70	160.70

6171 Hazeldean Road, Ottawa, ON

Average Day - Boundary Conditon, Location 2

Reservoir Table - Time: 0.00 hours

Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
R-1	160.70	<None>	(N/A)	(N/A)
R-2	160.70	<None>	4.55	160.70

6171 Hazeldean Road, Ottawa, ON

Peak Hour - Boundary Conditon, Location 2

Junction Table - Time: 0.00 hours

Label	Demand (L/s)	Elevation (m)	Hydraulic Grade (m)	Pressure (psi)
J-01	7.77	122.19	156.11	48.1
J-02	1.78	119.69	156.15	51.8
J-03	0.81	118.67	156.18	53.2
J-04	1.20	118.45	156.15	53.5
J-05	1.62	117.43	156.13	54.9
J-06	1.80	117.02	156.12	55.5
J-07	0.84	118.88	156.13	52.9
J-08	0.36	119.76	156.11	51.6
J-09	0.90	117.12	156.11	55.3
J-10	0.00	120.76	156.11	50.2
J-11	1.43	117.40	156.11	54.9
J-12	1.43	117.30	156.10	55.1
J-13	1.43	118.62	156.10	53.2
J-14	1.43	119.10	156.11	52.5
J-15	1.43	119.20	156.11	52.4
J-16	0.00	119.76	156.11	51.6
J-17	0.00	118.80	156.30	53.2
J-18	0.00	120.40	156.11	50.7

Pipe Table - Time: 0.00 hours

Label	Start Node	Stop Node	Diameter (mm)	Length (Scaled) (m)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Hydraulic Grade (Start) (m)	Hydraulic Grade (Stop) (m)
P-1	J-01	J-02	204.0	168	110.0	-5.37	0.16	156.11	156.15
P-2	J-02	J-03	204.0	73	110.0	-7.15	0.22	156.15	156.18
P-4	J-03	J-17	250.0	77	110.0	-24.23	0.49	156.18	156.30
P-5	J-03	J-04	250.0	41	110.0	16.27	0.33	156.18	156.15
P-6	J-04	J-07	250.0	76	110.0	10.37	0.21	156.15	156.13
P-7	J-07	J-08	250.0	72	110.0	7.42	0.15	156.13	156.11
P-8	J-08	J-16	250.0	19	110.0	6.35	0.13	156.11	156.11
P-9	J-16	J-10	250.0	46	110.0	2.40	0.05	156.11	156.11
P-10	J-10	J-18	250.0	89	110.0	0.00	0.00	156.11	156.11
P-11	J-10	J-01	204.0	68	110.0	2.40	0.07	156.11	156.11
P-12	J-04	J-05	204.0	115	110.0	4.70	0.14	156.15	156.13
P-13	J-05	J-06	204.0	75	110.0	3.08	0.09	156.13	156.12
P-14	J-06	J-07	204.0	120	110.0	-2.11	0.06	156.12	156.13
P-16	J-09	J-11	204.0	80	110.0	3.20	0.10	156.11	156.11
P-17	J-11	J-12	204.0	25	110.0	1.77	0.05	156.11	156.10
P-18	J-12	J-13	204.0	41	110.0	0.34	0.01	156.10	156.10
P-19	J-13	J-14	204.0	23	110.0	-1.09	0.03	156.10	156.11
P-20	J-14	J-15	204.0	10	110.0	-2.52	0.08	156.11	156.11
P-22	J-15	J-16	204.0	41	110.0	-3.95	0.12	156.11	156.11
P-23	J-09	J-08	204.0	118	110.0	-0.71	0.02	156.11	156.11
P-24	J-06	J-09	204.0	71	110.0	3.39	0.10	156.12	156.11
P-25	R-1	J-18	600.0	29	150.0	(N/A)	(N/A)	(N/A)	(N/A)
P-26	R-2	J-17	600.0	16	120.0	24.23	0.09	156.30	156.30

6171 Hazeldean Road, Ottawa, ON

Peak Hour - Boundary Conditon, Location 2

Reservoir Table - Time: 0.00 hours

Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
R-1	156.50	<None>	(N/A)	(N/A)
R-2	156.30	<None>	24.23	156.30

6171 Hazeldean Road, Ottawa, ON

Max Day Plus Fire Flow - Boundary Conditon, Location 2

Junction Table - Time: 0.00 hours

Label	Demand (L/s)	Elevation (m)	Hydraulic Grade (m)	Pressure (psi)
J-01	3.80	122.19	151.05	41.0
J-02	0.81	119.69	151.06	44.5
J-03	0.37	118.67	151.07	46.0
J-04	0.55	118.45	151.06	46.3
J-05	0.74	117.43	151.06	47.7
J-06	0.82	117.02	151.06	48.3
J-07	0.38	118.88	151.06	45.7
J-08	0.19	119.76	151.05	44.4
J-09	0.41	117.12	151.05	48.2
J-10	0.00	120.76	151.05	43.0
J-11	0.65	117.40	151.05	47.8
J-12	0.65	117.30	151.05	47.9
J-13	0.64	118.62	151.05	46.0
J-14	0.65	119.10	151.05	45.4
J-15	0.65	119.20	151.05	45.2
J-16	0.00	119.76	151.05	44.4
J-17	0.00	118.80	151.10	45.8
J-18	0.00	120.40	151.05	43.5

Pipe Table - Time: 0.00 hours

Label	Start Node	Stop Node	Diameter (mm)	Length (Scaled) (m)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Hydraulic Grade (Start) (m)	Hydraulic Grade (Stop) (m)
P-1	J-01	J-02	204.0	168	110.0	-2.54	0.08	151.05	151.06
P-2	J-02	J-03	204.0	73	110.0	-3.35	0.10	151.06	151.07
P-4	J-03	J-17	250.0	77	110.0	-11.31	0.23	151.07	151.10
P-5	J-03	J-04	250.0	41	110.0	7.59	0.15	151.07	151.06
P-6	J-04	J-07	250.0	76	110.0	4.85	0.10	151.06	151.06
P-7	J-07	J-08	250.0	72	110.0	3.50	0.07	151.06	151.05
P-8	J-08	J-16	250.0	19	110.0	3.03	0.06	151.05	151.05
P-9	J-16	J-10	250.0	46	110.0	1.26	0.03	151.05	151.05
P-10	J-10	J-18	250.0	89	110.0	0.00	0.00	151.05	151.05
P-11	J-10	J-01	204.0	68	110.0	1.26	0.04	151.05	151.05
P-12	J-04	J-05	204.0	115	110.0	2.19	0.07	151.06	151.06
P-13	J-05	J-06	204.0	75	110.0	1.45	0.04	151.06	151.06
P-14	J-06	J-07	204.0	120	110.0	-0.97	0.03	151.06	151.06
P-16	J-09	J-11	204.0	80	110.0	1.47	0.04	151.05	151.05
P-17	J-11	J-12	204.0	25	110.0	0.82	0.03	151.05	151.05
P-18	J-12	J-13	204.0	41	110.0	0.17	0.01	151.05	151.05
P-19	J-13	J-14	204.0	23	110.0	-0.47	0.01	151.05	151.05
P-20	J-14	J-15	204.0	10	110.0	-1.12	0.03	151.05	151.05
P-22	J-15	J-16	204.0	41	110.0	-1.77	0.05	151.05	151.05
P-23	J-09	J-08	204.0	118	110.0	-0.28	0.01	151.05	151.05
P-24	J-06	J-09	204.0	71	110.0	1.60	0.05	151.06	151.05
P-25	R-1	J-18	600.0	29	150.0	(N/A)	(N/A)	(N/A)	(N/A)
P-26	R-2	J-17	600.0	16	120.0	11.31	0.04	151.10	151.10

6171 Hazeldean Road, Ottawa, ON

Max Day Plus Fire Flow - Boundary Conditon, Location 2

Fire Flow Report - Time: 0.00 hours

Label	Fire Flow (Available) (L/s)	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Satisfies Fire Flow Constraints?
J-01	184.05	186.80	187.85	20.0	28.4	True
J-02	222.93	183.81	223.74	20.0	23.4	True
J-03	300.00	183.37	300.37	27.0	22.0	True
J-04	276.42	183.55	276.97	23.5	20.0	True
J-05	225.55	183.74	226.29	20.0	25.2	True
J-06	246.39	183.82	247.21	20.0	21.3	True
J-07	253.62	183.38	254.00	21.5	20.0	True
J-08	238.02	183.19	238.21	20.5	20.0	True
J-09	236.64	183.41	237.05	20.0	21.4	True
J-10	217.36	183.00	217.36	20.0	20.5	True
J-11	205.39	233.65	206.04	20.0	21.9	False
J-12	204.83	233.65	205.48	20.0	21.7	False
J-13	200.99	250.64	201.63	20.0	22.0	False
J-14	204.09	233.65	204.74	20.0	21.3	False
J-15	207.46	233.65	208.11	20.0	20.5	False
J-16	232.70	183.00	232.70	20.9	20.0	True
J-17	300.00	183.00	300.00	45.8	40.9	True
J-18	176.21	183.00	176.21	20.0	26.8	False

Reservoir Table - Time: 0.00 hours

Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
R-1	156.40	<None>	(N/A)	(N/A)
R-2	151.10	<None>	11.31	151.10

Appendix D – Sanitary Servicing Tables

Table D1 – Sanitary Sewer Design Sheet

TABLE D1: SANITARY SEWER CALCULATION SHEET

LOCATION				RESIDENTIAL AREAS AND POPULATIONS												COMMERCIAL			INDUSTRIAL			INSTITUTIONAL		INFILTRATION			TOTAL FLOW (L/s)	SEWER DATA						
					NUMBER OF UNITS							POPULATION				AREA (ha)			AREA (ha)					AREA (ha)										
Street	U/S MH	D/S MH	Area Number	Area (ha)	Singles	Semis	Towns	Batch or 1-Bed Apt.	2-Bed Apt.	3-Bed Apt.	Total Units	INDIV	ACCU	Peak Factor	Peak Flow (L/sec)	INDIV	ACCU	Peak Flow (L/sec)	INDIV	ACCU	Peak Factor (per MOE)	AREA (Ha)	ACCU AREA (Ha)	INDIV	ACCU	INFILT FLOW (L/s)		Nom Dia (mm)	Actual Dia (mm)	Slope (%)	Length (m)	Capacity (L/sec)	Q/Q_{CAP} (%)	Full Velocity (m/s)
9-storey bldg	MH 114	MH113	SA01	0.5051				89	86		175	305.2	305.2	3.46	3.42									0.5051	0.5051	0.17	3.59	200	201.2	1.69	10.04	43.32	0.08	1.35
	MH113	MH112	SA02	0.6120	3		18				21	58.8	364.0	3.43	4.05									0.6120	1.1171	0.37	4.41	200	201.2	1.50	79.33	40.82	0.11	1.27
	MH112	MH111	SA03	0.6570	9		12				21	63	427.0	3.41	4.72									0.6570	1.7741	0.59	5.30	200	201.2	1.55	79.33	41.49	0.13	1.29
	MH111	MH110	SA04	0.1427	2						2	6.8	433.8	3.4	4.78									0.1427	1.9168	0.63	5.41	200	201.2	1.44	9.73	39.99	0.14	1.25
	MH110	MH109	SA05	0.4887	6		5				11	33.9	467.7	3.39	5.14									0.4887	2.4055	0.79	5.93	200	201.2	1.25	67.93	37.26	0.16	1.16
	MH109	MH108	SA06	0.3458			10				10	27	494.7	3.38	5.42									0.3458	2.7513	0.91	6.33	200	201.2	0.73	41.30	28.47	0.22	0.89
	MH108	MH107	SA07	0.8771			31				31	83.7	578.4	3.35	6.28									0.8771	3.6284	1.20	7.48	200	201.2	0.33	115.25	19.14	0.39	0.60
	MH107	MH106	SA08	0.1143		2					2	5.4	583.8	3.35	6.34									0.1143	3.7427	1.24	7.57	200	201.2	0.32	10.79	18.85	0.40	0.59
	MH106	MH105	SA09	0.5033			20				20	54	637.8	3.33	6.88									0.5033	4.2460	1.40	8.28	200	201.2	0.32	69.06	18.85	0.44	0.59
	MH115	MH105	SA10	0.8464			24				24	64.8	64.8	3.63	0.76									0.8464	0.8464	0.28	1.04	200	201.2	1.88	114.99	45.69	0.02	1.42
	MH105	MH104	SA11	0.3459			14				14	37.8	740.4	3.3	7.92									0.3459	5.4383	1.79	9.71	200	201.2	0.33	52.28	19.14	0.51	0.60
	MH104	MH103	SA12	0.1693			6				6	16.2	756.6	3.3	8.09									0.1693	5.6076	1.85	9.94	200	201.2	0.39	25.79	20.81	0.48	0.65
	NH116	MH120	SA13	0.3957			9				9	24.3	24.3	3.69	0.29									0.3957	0.3957	0.13	0.42	200	201.2	3.00	57.16	57.72	0.01	1.80
Block A, C & D	MH117	MH118	SA16	0.8816				48	60		108	193.2	193.2	3.52	2.20									0.8816	0.8816	0.29	2.49	200	201.2	0.65	59.90	26.87	0.09	0.84
Block B & E	MH119	MH118	SA15	0.6521				32	40		72	128.8	322.0	3.45	3.60									0.6521	1.5337	0.51	4.11	200	201.2	0.65	57.90	26.87	0.15	0.84
	MH118	MH120											322.0	3.45	3.60										1.5337	0.51	4.11	200	201.2	0.32	49.85	18.85	0.22	0.59
	NH120	MH103	SA14	0.1640			3				3	8.1	1111.0	3.22	11.59									0.164	7.7010	2.54	14.13	200	201.2	0.32	59.52	18.85	0.75	0.59
	MH103	MH102											1111.0	3.8											7.7010	2.54	2.54	200	201.2	3.13	29.76	58.96	0.04	1.84
	MH102	MH100											1111.0	3.22	11.59										7.7010	2.54	14.13	200	201.2	3.60	17.46	63.23	0.22	1.97
			SA17	0.3695																													
			POND	0.2220																													
			PARK	0.7260																													
				9.019	**20**	**2**	**152**	**169**	**186**		**529**	**1111.0**												**7.7010**			**1007.37**							

Residential Avg. Daily Flow, q (L/p/day) =	280	Commercial Peak Factor =	1.5	(when area >20%)	Peak Population Flow, (L/sec) =	P*q*M/86.4	Unit Type	Persons/Unit	Designed:	Project:
Commercial Avg. Daily Flow (L/gross ha/day) =	28,000		1.0	(when area <20%)	Peak Extraneous Flow, (L/sec) =	I*Ac	Singles	3.4	M. Ghadban, P.Eng.	6171 Hazeldean Road
or L/gross ha/sec =	0.324				Residential Peaking Factor, M =	1 + (14/(4+P^0.5)) * K	Semi-Detached	2.7		
Institutianal Avg. Daily Flow (L/day/ha) =	28,000	Institutional Peak Factor =	1.5	(when area >20%)	A_c = Cumulative Area (hectares)		Townhomes	2.7	Checked:	Location:
or L/gross ha/day =	0.324		1.0	(when area <20%)	P = Population (thousands)		Batchelor or		B. Thomas, P.Eng.	Ottawa, Ontario
Light Industrial Flow (L/gross ha/day) =	35,000						1-bed Apt. Unit	1.4		
or L/gross ha/sec =	0.40509	Residential Correction Factor, K =	0.80		Sewer Capacity, Qcap (L/sec) =	$1/N \; S^{1/2} R^{2/3} A_c$	2-bed Apt. Unit	2.1	File Reference:	Page No:
Light Industrial Flow (L/gross ha/day) =	55,000	Manning N =	0.013		(Manning's Equation)		3-bed Apt. Unit	3.1	258780 Sanitary - Sewer Design Sheet, July 2020.xlsx	**1 of 1**
or L/gross ha/sec =	0.637	Peak extraneous flow, I (L/s/ha) =	0.33	(Total I/I)			4-bed Apt. Unit	3.8		

Appendix E – Stormwater Servicing Tables

Table E1 – 2-Year Storm Sewer Calculation Sheet

Table E2 – 2-Year Storm Sewer Calculation Sheet – Includes Flow Controls

Table E3 – Average Runoff Coefficients for Post-Development

Table E4 – Summary of Post-Development Peak Flows (Uncontrolled and Controlled)

TABLE E1
STORM SEWER CALCULATION SHEET

Return Period Storm = 2-year
Default Inlet Time= 10 (frontyard/row)
Default Inlet Time= 15 (rearyard)
Manning Coefficient = 0.013

Street	Storm MH No:		AREA INFO					PEAK FLOWS (UNRESTRICTED - RATIONAL METHOD)							SEWER DATA											
															Diameter (mm)					Velocity (m/s)			Hydraulic Ratios		
	U/S	D/S	Catch-ment No:	Type	Area (ha)	Accum. Area (ha)	Runoff Coeff, C	Indiv. 2.78*A*R	Accum. 2.78*A*R	Tc (mins)	I (mm/h)	Indiv. Flow	Return Period	Q (L/s)	Act	Nom	Type	Slope (%)	Length (m)	Capacity, Q_{CAP} (L/sec)	Vf	Va	Time in Pipe, Tt (min)	Q/Q_{CAP}	Q_{ICD}/Q_{CAP}	Va/Vf
Street X	214	213	S01	siteplan	0.5051	0.505	0.62	0.871	0.871	10.00	76.81	66.9	2-year	66.9	299.4	300	PVC	1.50	11.303	117.76	1.68	1.19	0.16	0.57	0.57	0.71
	213	212	S18	frontyard	0.3002	0.805	0.72	0.601	1.471	10.16	76.20	45.8	2-year	112.1	366.4	375	PVC	1.50	78.457	201.88	1.94	1.37	0.95	0.56	0.58	0.71
	212	211	S22	backyard	0.1950	1.000	0.45	0.244	1.715	15.00	61.77	15.1	2-year	106.0												
			S27	backyard	0.2487	1.249	0.48	0.332	2.047	15.00	61.77	20.5	2-year	126.5												
			S21	frontyard	0.3350	1.584	0.70	0.652	2.699	11.11	72.79	47.5	2-year	196.5	447.9	450	PVC	1.50	81.457	344.79	2.20	1.55	0.87	0.57	0.62	0.71
	211	210	S17	backyard	0.196	1.780	0.35	0.191	2.890	15.00	61.77	11.8	2-year	178.5	447.9	450	PVC	1.20	10.952	308.39	1.96	1.39	0.13	0.58	0.74	0.71
	210	209	S25	backyard	0.1125	1.893	0.50	0.156	3.046	15.00	61.77	9.7	2-year	188.2												
			S11	frontyard	0.4248	2.317	0.66	0.779	3.826	11.98	69.94	54.5	2-year	267.6	533.0	525	PVC	1.20	67.051	490.50	2.18	1.54	0.73	0.55	0.60	0.71
	225	209	S23	backyard	0.1078	0.108	0.44	0.132	0.132	15.00	61.77	8.1	2-year	8.1	201.2	200	PVC	2.00	32.651	47.10	1.48	0.93	0.59	0.17	0.28	0.63
	209	208				2.425			3.958	12.71	67.76		2-year	268.2	610.0	600	PVC	0.60	41.305	497.04	1.68	1.19	0.58	0.54	0.62	0.71
	227	208	S24	park	0.812	0.812	0.24	0.542	0.542	15.00	61.77	33.5	2-year	33.5												
			S03	frontyard	0.1991	1.011	0.72	0.399	0.940	10.00	76.81	30.6	2-year	72.2	299.4	300	PVC	2.00	55.890	135.98	1.93	1.37	0.68	0.53	0.43	0.71
	208	207	S19	backyard	0.1746	3.611	0.44	0.214	5.111	15.00	61.77	13.2	2-year	315.7												
			S05	frontyard	0.5061	4.117	0.73	1.027	6.138	13.29	66.13	67.9	2-year	405.9	685.0	675	Conc	0.30	117.308	478.82	1.29	1.29	1.52	0.85	0.96	1.00
	207	206	S04	backyard	0.2303	4.347	0.44	0.282	6.420	15.00	61.77	17.4	2-year	396.6												
			S09	frontyard	0.2552	4.602	0.67	0.475	6.896	14.81	62.22	29.6	2-year	429.1	762.0	750	Conc	0.30	12.010	636.13	1.38	1.16	0.17	0.67	0.80	0.84
	206	205	S06	backyard	0.1917	4.794	0.53	0.282	7.178	15.00	61.77	17.4	2-year	443.4	762.0	750	Conc	0.30	68.278	636.13	1.38	1.31	0.87	0.70	0.83	0.95
	215	205	S08	backyard	0.3127	0.313	0.52	0.452	0.452	15.00	61.77	27.9	2-year	27.9												
			S12	backyard	0.3364	0.649	0.50	0.468	0.920	15.00	61.77	28.9	2-year	56.8												
			S15	frontyard	0.3679	1.017	0.75	0.767	1.687	10.00	76.81	58.9	2-year	129.5	366.4	375	PVC	1.50	117.95	201.88	1.94	1.79	1.10	0.64	0.58	0.92
	205	204	S10	frontyard	0.3105	6.122	0.66	0.570	9.434	14.98	61.81	35.2	2-year	583.2	839.0	825	Conc	0.30	53.83	822.30	1.47	1.44	0.62	0.71	0.84	0.98
	204	203	S07	backyard	0.1698	6.291	0.56	0.264	9.699	15.60	60.38	16.0	2-year	585.6	839.0	825	Conc	0.30	27.262	822.30	1.47	1.44	0.32	0.71	0.86	0.98
	221	220													299.4	300	PVC	1.00	11.186	96.15						
	220	218	S14	frontyard	0.1267	0.127	0.66	0.232	0.232	10.00	76.81	17.9	2-year	17.9	299.4	300	PVC	1.00	37.404	96.15	1.37	0.88	0.71	0.19	0.22	0.64
	219	218	S16	frontyard	0.1254	0.125	0.78	0.272	0.272	10.00	76.81	20.9	2-year	20.9	299.4	300	PVC	2.00	37.455	135.98	1.93	1.14	0.55	0.15	0.15	0.59
	218	217				0.252			0.504	10.71	74.17		2-year	37.4	366.4	375	PVC	2.00	46.305	233.11	2.25	1.32	0.58	0.16	0.18	0.59
	217	216	S29	frontyard	0.1124	0.365	0.65	0.203	0.707	11.29	72.17	14.7	2-year	51.1	366.4	375	PVC	2.00	18.652	233.11	2.25	1.48	0.21	0.22	0.24	0.66
	228	216	S20	frontyard	0.1174	0.117	0.73	0.238	0.238	10.00	76.81	18.3	2-year	18.3	251.5	250	PVC	0.65	39.316	48.69	0.98	0.69	0.95	0.38	0.43	0.71
	216	226				0.482			0.946	11.50	71.47		2-year	67.6	447.9	450	PVC	2.00	71.840	398.13	2.54	1.50	0.80	0.17	0.19	0.59
	226	203	S28	frontyard	0.4955	0.977	0.69	0.950	1.896	12.30	68.96	65.5	2-year	130.8	447.9	450	PVC	2.00	59.977	398.13	2.54	1.77	0.56	0.33	0.36	0.70
	203	202				7.269			11.595	15.92	59.68		2-year	692.0	914.0	900	Conc	0.25	10.308	943.19	1.42	1.39	0.12	0.73	0.90	0.98
	202	*POND-IN1*				7.269			11.595	16.04	59.41		2-year	688.9	914.0	900	Conc	0.25	12.930	943.19	1.42	1.39	0.15	0.73	0.90	0.98
	224	223	S02	siteplan	1.6584	1.658	0.62	2.858	2.858	10.00	76.81	219.5	2-year	219.5	447.9	450	PVC	2.00	62.125	398.13	2.54	1.79	0.58	0.55	0.55	0.71
	223	*POND-IN2*				1.658			2.858	10.58	74.66		2-year	213.4	447.9	450	PVC	2.00	67.841	398.13	2.54	1.79	0.63	0.54	0.55	0.71
	Pond-OUT	Control-MH	S13	SWM	0.0958	9.023	0.20	0.053	14.507	16.20	59.08	3.1	2-year	857.1	1068.0	1050	CONC	0.25	2.50	1428.67	1.58	1.42	0.03	0.60	0.75	0.90
	Control-MH	*MHST78511*				9.023			14.507	16.23	59.02		2-year	856.2	1068.0	1050	CONC	0.20	6.00	1277.84	1.41	1.18	0.08	0.67	0.84	0.84
TOTALS =					**9.023**		**0.58**	**14.507**				**1016.2**														

Definitions:
Q = 2.78*AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Watershed Area (hectares)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficients (dimensionless)

Ottawa Rainfall Intensity Values from Sewer Design Guidelines, SDG002

	a	b	c
2-year	732.951	6.199	0.8
5-year	998.071	6.053	0.8
100-year	1735.688	6.014	0.8

Designed:	Project:	
J. Fitzpatrick, P.Eng.	6171 Hazeldean Road	
Checked:	Location:	
B. Thomas, P.Eng.	6171 Hazeldean Road	
Dwg Reference:	File Ref:	Sheet No:
Drawing C09	258780 Storm - Sewer Design Sheets, July 2020 Pond_114m.xlsx	1 of 1

TABLE E2

STORM SEWER CALCULATION SHEET - INCLUDES FLWO CONTORLS

Return Period Storm = 2-year
Default Inlet Time= 10 (frontyard/row)
Default Inlet Time= 15 (rearyard)
Manning Coefficient = 0.013

Street	Storm MH No:		AREA INFO					PEAK FLOWS (UNRESTRICTED - RATIONAL METHOD)							CAPTURED FLOWS BASED ON NUMBER OF INTLETS																														SEWER DATA									
															No. of ICDs		Captured Flows (L/s)		No. of ICDs		Captured Flows (L/s)		No. of ICDs		Captured Flows (L/s)		No. of ICDs		Captured Flows (L/s)		No. of ICDs		Captured Flows (L/s)		No. of ICDs		Captured Flows (L/s)		Custom Captured Flows (L/s)		Indv Captured Flows (L/sec)	diff	Total Captured Flows (L/sec)	Diameter (mm)		Type	Slope (%)	Length (m)	Capacity, Q_{CAP} (L/sec)	Velocity (m/s)		Time in Pipe, Tt (min)	Hydraulic Ratios		
	U/S	D/S	Catch-ment No:	Type	Area (ha)	Accum. Area (ha)	Runoff Coeff, C	Indiv. 2.78*A*R	Accum. 2.78*A*R	Tc (mins)	I (mm/h)	Indiv. Flow	Return Period	Q (L/s)	Indiv	Cum	Indiv	Cum	Indiv	Cum	Indiv	Cum	Indiv	Cum	Indiv	Cum	Indiv.	Cum ul.	Indiv	Cum	Indiv.	Cum ul.	Indiv	Cum	Indiv.	Cum ul.	Indiv	Cum	Indiv.	Cum ul.	Indiv.	Cumul.			Act	Nom					Vf	Va		Q/Q_{CAP}	Q_{ICD}/Q_{CAP}	Va/Vf
															at 13.4 L/sec				at 20.7 L/sec				at 29.3 L/sec				at 38.2 L/sec				at 55.3 L/sec				at 73.7 L/sec																	
															Type X				Type A				Type B				Type C				Type D				Type F																	
	214	213	S01	siteplan	0.5051	0.505	0.62	0.871	0.871	10.00	76.81	66.9	2-year	66.9																										66.9	66.9	66.9		66.9	299.4	300	PVC	1.50	11.303	117.76	1.68	1.19	0.16	0.57	0.57	0.71
	213	212	S18	frontyard	0.3002	0.805	0.72	0.601	1.471	10.16	76.20	45.8	2-year	112.1					1	1	20.7	20.7	1	1	29.3	29.3															66.9	50.0	4.2	116.9	366.4	375	PVC	1.50	78.457	201.88	1.94	1.37	0.95	0.56	0.58	0.71
	212	211	S22	backyard	0.1950	1.000	0.45	0.244	1.715	15.00	61.77	15.1	2-year	106.0					1	2	20.7	41.4		1		29.3															66.9	20.7	5.6	137.6												
			S27	backyard	0.2487	1.249	0.48	0.332	2.047	15.00	61.77	20.5	2-year	126.5					1	3	20.7	62.1		1		29.3															66.9	20.7	0.2	158.3												
			S21	frontyard	0.3350	1.584	0.70	0.652	2.699	11.11	72.79	47.5	2-year	196.5						3		62.1		1		29.3								1	1	55.3	55.3					66.9	55.3	7.8	213.6	447.9	450	PVC	1.50	81.457	344.79	2.20	1.55	0.87	0.57	0.62	0.71
	211	210	S17	backyard	0.196	1.780	0.35	0.191	2.890	15.00	61.77	11.8	2-year	178.5	1	1	13.4	13.4		3		62.1		1		29.3								1		55.3					66.9	13.4	1.6	227.0	447.9	450	PVC	1.20	10.952	308.39	1.96	1.39	0.13	0.58	0.74	0.71
	210	209	S25	backyard	0.1125	1.893	0.50	0.156	3.046	15.00	61.77	9.7	2-year	188.2	1	2	13.4	26.8		3		62.1		1		29.3															66.9	13.4	3.7	240.4												
			S11	frontyard	0.4248	2.317	0.66	0.779	3.826	11.98	69.94	54.5	2-year	267.6		2		26.8		3		62.1		1		29.3								1	2	55.3	110.6					66.9	55.3	0.8	295.7	533.0	525	PVC	1.20	67.051	490.50	2.18	1.54	0.73	0.55	0.60	0.71
	225	209	S23	backyard	0.1078	0.108	0.44	0.132	0.132	15.00	61.77	8.1	2-year	8.1	1	1	13.4	13.4																									13.4	5.3	13.4	201.2	200	PVC	2.00	32.651	47.10	1.48	0.93	0.59	0.17	0.28	0.63
	209	208				2.425			3.958	12.71	67.76		2-year	268.2		3		40.2		3		62.1		1		29.3								2		110.6					66.9			309.1	610.0	600	PVC	0.60	41.305	497.04	1.68	1.19	0.58	0.54	0.62	0.71
	227	208	S24	park	0.812	0.812	0.24	0.542	0.542	15.00	61.77	33.5	2-year	33.5									1	1	29.3	29.3																29.3	-4.2	29.3												
			S03	frontyard	0.1991	1.011	0.72	0.399	0.940	10.00	76.81	30.6	2-year	72.2									1	2	29.3	58.6																29.3	-1.3	58.6	299.4	300	PVC	2.00	55.890	135.98	1.93	1.37	0.68	0.53	0.43	0.71
	208	207	S19	backyard	0.1746	3.611	0.44	0.214	5.111	15.00	61.77	13.2	2-year	315.7	1	4	13.4	53.6		3		62.1		3		87.9								2		110.6					66.9	13.4	0.2	381.1												
			S05	frontyard	0.5061	4.117	0.73	1.027	6.138	13.29	66.13	67.9	2-year	405.9		4		53.6		3		62.1		3		87.9	2	2	76.4	76.4		2		110.6							66.9	76.4	8.5	457.5	685.0	675	Conc	0.30	117.308	478.82	1.29	1.29	1.52	0.85	0.96	1.00
	207	206	S04	backyard	0.2303	4.347	0.44	0.282	6.420	15.00	61.77	17.4	2-year	396.6		4		53.6	1	4	20.7	82.8		3		87.9		2		76.4		2		110.6					66.9	20.7	3.3	478.2												
			S09	frontyard	0.2552	4.602	0.67	0.475	6.896	14.81	62.22	29.6	2-year	429.1		4		53.6		4		82.8	1	4	29.3	117.2		2		76.4		2		110.6					66.9	29.3	-0.3	507.5	762.0	750	Conc	0.30	12.010	636.13	1.38	1.16	0.17	0.67	0.80	0.84
	206	205	S06	backyard	0.1917	4.794	0.53	0.282	7.178	15.00	61.77	17.4	2-year	443.4		4		53.6	1	5	20.7	103.5		4		117.2		2		76.4		2		110.6					66.9	20.7	3.3	528.2	762.0	750	Conc	0.30	68.278	636.13	1.38	1.31	0.87	0.70	0.83	0.95
	215	205	S08	backyard	0.3127	0.313	0.52	0.452	0.452	15.00	61.77	27.9	2-year	27.9									1	1	29.3	29.3																29.3	1.4	29.3												
			S12	backyard	0.3364	0.649	0.50	0.468	0.920	15.00	61.77	28.9	2-year	56.8									1	2	29.3	58.6																29.3	0.4	58.6												
			S15	frontyard	0.3679	1.017	0.75	0.767	1.687	10.00	76.81	58.9	2-year	129.5									2	4	58.6	117.2																58.6	-0.3	117.2	366.4	375	PVC	1.50	117.95	201.88	1.94	1.79	1.10	0.64	0.58	0.92
	205	204	S10	frontyard	0.3105	6.122	0.66	0.570	9.434	14.98	61.81	35.2	2-year	583.2		4		53.6	2	7	41.4	144.9		8		234.4		2		76.4		2		110.6					66.9	41.4	6.2	686.8	839.0	825	Conc	0.30	53.83	822.30	1.47	1.44	0.62	0.71	0.84	0.98
	204	203	S07	backyard	0.1698	6.291	0.56	0.264	9.699	15.60	60.38	16.0	2-year	585.6		4		53.6	1	8	20.7	165.6		8		234.4		2		76.4		2		110.6					66.9	20.7	4.7	707.5	839.0	825	Conc	0.30	27.262	822.30	1.47	1.44	0.32	0.71	0.86	0.98
	221	220																																								299.4	300	PVC	1.00	11.186	96.15						
	220	218	S14	frontyard	0.1267	0.127	0.66	0.232	0.232	10.00	76.81	17.9	2-year	17.9					1	1	20.7	20.7																				20.7	2.8	20.7	299.4	300	PVC	1.00	37.404	96.15	1.37	0.88	0.71	0.19	0.22	0.64
	219	218	S16	frontyard	0.1254	0.125	0.78	0.272	0.272	10.00	76.81	20.9	2-year	20.9					1	1	20.7	20.7																				20.7	-0.2	20.7	299.4	300	PVC	2.00	37.455	135.98	1.93	1.14	0.55	0.15	0.15	0.59
	218	217				0.252			0.504	10.71	74.17		2-year	37.4						2		41.4																				41.4	366.4	375	PVC	2.00	46.305	233.11	2.25	1.32	0.58	0.16	0.18	0.59
	217	216	S29	frontyard	0.1124	0.365	0.65	0.203	0.707	11.29	72.17	14.7	2-year	51.1	1	1	13.4	13.4		2		41.4																				13.4	-1.3	54.8	366.4	375	PVC	2.00	18.652	233.11	2.25	1.48	0.21	0.22	0.24	0.66
	228	216	S20	frontyard	0.1174	0.117	0.73	0.238	0.238	10.00	76.81	18.3	2-year	18.3					1	1	20.7	20.7																				20.7	2.4	21	251.5	250	PVC	0.65	39.316	48.69	0.98	0.69	0.95	0.38	0.43	0.71
	216	226				0.482			0.946	11.50	71.47		2-year	67.6		1		13.4		3		62.1																						75.5	447.9	450	PVC	2.00	71.840	398.13	2.54	1.50	0.80	0.17	0.19	0.59
	226	203	S28	frontyard	0.4955	0.977	0.69	0.950	1.896	12.30	68.96	65.5	2-year	130.8		1		13.4		3		62.1	1	1	29.3	29.3	1	1	38.2	38.2											67.5	2.0	143.0	447.9	450	PVC	2.00	59.977	398.13	2.54	1.77	0.56	0.33	0.36	0.70
	203	202				7.269			11.595	15.92	59.68		2-year	692.0		5		67.0		11		227.7		9		263.7		3		114.6		2		110.6					66.9			850.5	914.0	900	Conc	0.25	10.308	943.19	1.42	1.39	0.12	0.73	0.90	0.98
	202	*POND-IN1*				7.269			11.595	16.04	59.41		2-year	688.9		5		67.0		11		227.7		9		263.7		3		114.6		2		110.6					66.9			850.5	914.0	900	Conc	0.25	12.930	943.19	1.42	1.39	0.15	0.73	0.90	0.98
	224	223	S02	siteplan	1.6584	1.658	0.62	2.858	2.858	10.00	76.81	219.5	2-year	219.5																									219.5	219.5	219.5		219.5	447.9	450	PVC	2.00	62.125	398.13	2.54	1.79	0.58	0.55	0.55	0.71
	223	*POND-IN2*				1.658			2.858	10.58	74.66		2-year	213.4																									219.5			219.5	447.9	450	PVC	2.00	67.841	398.13	2.54	1.79	0.63	0.54	0.55	0.71
	Pond-OUT	Control-MH	S13	SWM	0.0958	9.023	0.20	0.053	14.507	16.20	59.08	3.1	2-year	857.1		5		67.0		11		227.7		9		263.7		3		114.6		2		110.6					286.4		-3.1	1070.0	1068.0	1050	CONC	0.25	2.50	1428.67	1.58	1.42	0.03	0.60	0.75	0.90
	Control-MH	*MHST7851I*				9.023			14.507	16.23	59.02		2-year	856.2		5		67.0		11		227.7		9		263.7		3		114.6		2		110.6					286.4			1070.0	1068.0	1050	CONC	0.20	6.00	1277.84	1.41	1.18	0.08	0.67	0.84	0.84
TOTALS =					**9.023**		**0.58**	**14.507**				**1016.2**			**5**		**67.0**		**11**		**227.7**		**9**		**263.7**		**3**		**114.6**		**2**		**110.6**					**286.4**		**1070.0**													

Definitions:

Q = 2.78*AIR, where

Q = Peak Flow in Litres per second (L/s)

A = Watershed Area (hectares)

I = Rainfall Intensity (mm/h)

R = Runoff Coefficients (dimensionless)

Ottawa Rainfall Intensity Values from Sewer Design Guidelines, SDG002

	a	b	c
2-year	732.951	6.199	0.8
5-year	998.071	6.053	0.8
100-year	1735.688	6.014	0.8

Designed:	Project:	
J. Fitzpatrick, P.Eng.	6171 Hazeldean Road	
Checked:	Location:	
B. Thomas, P.Eng.	6171 Hazeldean Road	
Dwg Reference:	File Ref:	Sheet No:
Drawing C09	258780 Storm - Sewer Design Sheets, July 2020 Pond_114m.xlsx	1 of 1

TABLE E3 - AVERAGE RUNOFF COEFFICIENTS (Post Development)

Runoff Coeffients		$C_{ASPH/CONC}$ = 0.90		C_{ROOF} = 0.90		C_{GRASS} = 0.20				
Area No.	Asphalt / Conc Areas (m^2)	A * C_{ASPH}	Roof Areas (m^2)	A * C_{ROOF}	Grassed Areas (m^2)	A * C_{GRASS}	Sum AC	[1]Total Area (m^2)	[2]C_{AVG}	Comments
S01								5051	0.58	SITEPLAN 1
S02								15361	0.63	SITEPLAN 2
S04								2303	0.44	BACKYARD
S06								1917	0.53	BACKYARD
S07								1698	0.56	BACKYARD
S08								3127	0.52	BACKYARD
S12								3364	0.50	BACKYARD
S17								1960	0.35	BACKYARD
S19								1746	0.46	BACKYARD
S22								1950	0.45	BACKYARD
S23								1078	0.44	BACKYARD
S25								1125	0.50	BACKYARD
S27								2487	0.48	BACKYARD
S03								1991	0.74	RIGHT-OF-WAY
S05								5061	0.72	RIGHT-OF-WAY
S09								2552	0.65	RIGHT-OF-WAY
S10								3105	0.64	RIGHT-OF-WAY
S11								4248	0.65	RIGHT-OF-WAY
S14								1267	0.65	RIGHT-OF-WAY
S15								3679	0.72	RIGHT-OF-WAY
S16								1254	0.66	RIGHT-OF-WAY
S18								3002	0.69	RIGHT-OF-WAY
S20								1174	0.74	RIGHT-OF-WAY
S21								3350	0.68	RIGHT-OF-WAY
S28								4899	0.67	RIGHT-OF-WAY
S29								1124	0.69	RIGHT-OF-WAY
S13								2237	0.26	SWM
S24								8120	0.20	PARK
Total								90230		
[3]Site % IMP = 53.5							Average Runoff Coeff (C_{AVG}) =		= 0.57	

Notes

1) Areas taken from PCSWMM, CAD

2) Cavg From PCSWMM (Area Weighting)

3) Site % IMP From PCSWMM (Area Weighting)

TABLE E4 - SUMMARY OF POST DEVELOPMENT RUNOFF (Uncontrolled and Controlled)

			Time of	Storm = 2 yr				Storm = 5 yr				Storm = 100 yr				
Area No	Area (ha)	Location	Conc, Tc (min)	C_{AVG}	I_2 (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)	C_{AVG}	I_5 (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)	C_{AVG}	I_{100} (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)	Comments
S01	0.5051	SITEPLAN 1	10	0.58	76.81	62.6	**(65.7)**	0.58	104.19	84.9	**(65.7)**	0.73	178.56	181.8	**(65.7)**	SITEPLAN 1
S02	1.5361	SITEPLAN 2	10	0.63	76.81	206.6	**(199.7)**	0.63	104.19	280.3	**(199.7)**	0.79	178.56	600.5	**(199.7)**	SITEPLAN 2
S04	0.2303	BACKYARD	10	0.44	76.81	21.6		0.44	104.19	29.4		0.55	178.56	62.9		BACKYARD
S06	0.1917	BACKYARD	10	0.53	76.81	21.7		0.53	104.19	29.4		0.66	178.56	63.0		BACKYARD
S07	0.1698	BACKYARD	10	0.56	76.81	20.3		0.56	104.19	27.5		0.70	178.56	59.0		BACKYARD
S08	0.3127	BACKYARD	10	0.52	76.81	34.7		0.52	104.19	47.1		0.65	178.56	100.9		BACKYARD
S12	0.3364	BACKYARD	10	0.50	76.81	35.9		0.50	104.19	48.7		0.63	178.56	104.4		BACKYARD
S17	0.1960	BACKYARD	10	0.35	76.81	14.6	**(159.3)**	0.35	104.19	19.9	**(159.3)**	0.44	178.56	42.6	**(159.3)**	BACKYARD
S19	0.1746	BACKYARD	10	0.46	76.81	17.1		0.46	104.19	23.3		0.58	178.56	49.8		BACKYARD
S22	0.1950	BACKYARD	10	0.45	76.81	18.7		0.45	104.19	25.4		0.56	178.56	54.4		BACKYARD
S23	0.1078	BACKYARD	10	0.44	76.81	10.1		0.44	104.19	13.7		0.55	178.56	29.4		BACKYARD
S25	0.1125	BACKYARD	10	0.50	76.81	12.0		0.50	104.19	16.3		0.63	178.56	34.9		BACKYARD
S27	0.2487	BACKYARD	10	0.48	76.81	25.5		0.48	104.19	34.6		0.60	178.56	74.1		BACKYARD
S03	0.1991	RIGHT-OF-WAY	10	0.74	76.81	31.5		0.74	104.19	42.7		0.93	178.56	91.4		RIGHT-OF-WAY
S05	0.5061	RIGHT-OF-WAY	10	0.72	76.81	77.8		0.72	104.19	105.5		0.90	178.56	226.1		RIGHT-OF-WAY
S09	0.2552	RIGHT-OF-WAY	10	0.65	76.81	35.4		0.65	104.19	48.0		0.81	178.56	102.9		RIGHT-OF-WAY
S10	0.3105	RIGHT-OF-WAY	10	0.64	76.81	42.4		0.64	104.19	57.6		0.80	178.56	123.3		RIGHT-OF-WAY
S11	0.4248	RIGHT-OF-WAY	10	0.65	76.81	59.0		0.65	104.19	80.0		0.81	178.56	171.3		RIGHT-OF-WAY
S14	0.1267	RIGHT-OF-WAY	10	0.65	76.81	17.6		0.65	104.19	23.9		0.81	178.56	51.1		RIGHT-OF-WAY
S15	0.3679	RIGHT-OF-WAY	10	0.72	76.81	56.6	**(495.5)**	0.72	104.19	76.7	**(495.5)**	0.90	178.56	164.4	**(495.5)**	RIGHT-OF-WAY
S16	0.1254	RIGHT-OF-WAY	10	0.66	76.81	17.7		0.66	104.19	24.0		0.83	178.56	51.4		RIGHT-OF-WAY
S18	0.3002	RIGHT-OF-WAY	10	0.69	76.81	44.2		0.69	104.19	60.0		0.86	178.56	128.5		RIGHT-OF-WAY
S20	0.1174	RIGHT-OF-WAY	10	0.74	76.81	18.5		0.74	104.19	25.2		0.93	178.56	53.9		RIGHT-OF-WAY
S21	0.3350	RIGHT-OF-WAY	10	0.68	76.81	48.6		0.68	104.19	66.0		0.85	178.56	141.3		RIGHT-OF-WAY
S28	0.4899	RIGHT-OF-WAY	10	0.67	76.81	70.1		0.67	104.19	95.1		0.84	178.56	203.7		RIGHT-OF-WAY
S29	0.1124	RIGHT-OF-WAY	10	0.69	76.81	16.6		0.69	104.19	22.5		0.86	178.56	48.1		RIGHT-OF-WAY
S13	0.2237	SWM	10	0.26	76.81	12.4		0.26	104.19	16.8		0.33	178.56	36.1		SWM
S24	0.8120	PARK	10	0.20	76.81	34.7	**(105.6)**	0.20	104.19	47.0	**(105.6)**	0.25	178.56	100.8	**(105.6)**	PARK
Totals	9.0230					1084.6	**1025.7**			1471.4	**1025.7**			3152.0	**1025.7**	

Notes

2-yr Storm Intensity, I = 732.951/(Tc+6.199) $^{0.810}$ *(City of Ottawa)*

5-yr Storm Intensity, I = 998.071/(Tc+6.035) $^{0.814}$ *(City of Ottawa)*

100-yr Storm Intensity, I = 1735.688/(Tc+6.014) $^{0.820}$ *(City of Ottawa)*

Time of Concentration (min), Tc = **10 mins** (avg for all subcatchements)

For Flows under column Qcap which are shown in brackets (0.0), denotes flows that are uncontrolled

Allowable Unit Area Release Rate (L/ha/sec) = **135.0** front yards

Allowable Unit Area Release Rate (L/ha/sec) = **70.0** backyards

Allowable Unit Area Release Rate (L/ha/sec) = **130.0** park / siteplans

Appendix F – PCSWMM Information

PCSWMM Report

Preliminary SWM Review

Model 258780_Prop_Rev2A, Chicago_3h_2yr.inp

July 24, 2020

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Profiles

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Figure 4: Node 215 to Node MHST78511 6
Figure 5: Node 221 to Node MHST78511 7
Figure 6: Node 219 to Node MHST78511 8
Figure 7: Node 228 to Node MHST78511 9
Figure 8: Node 224 to Node MHST78511 10

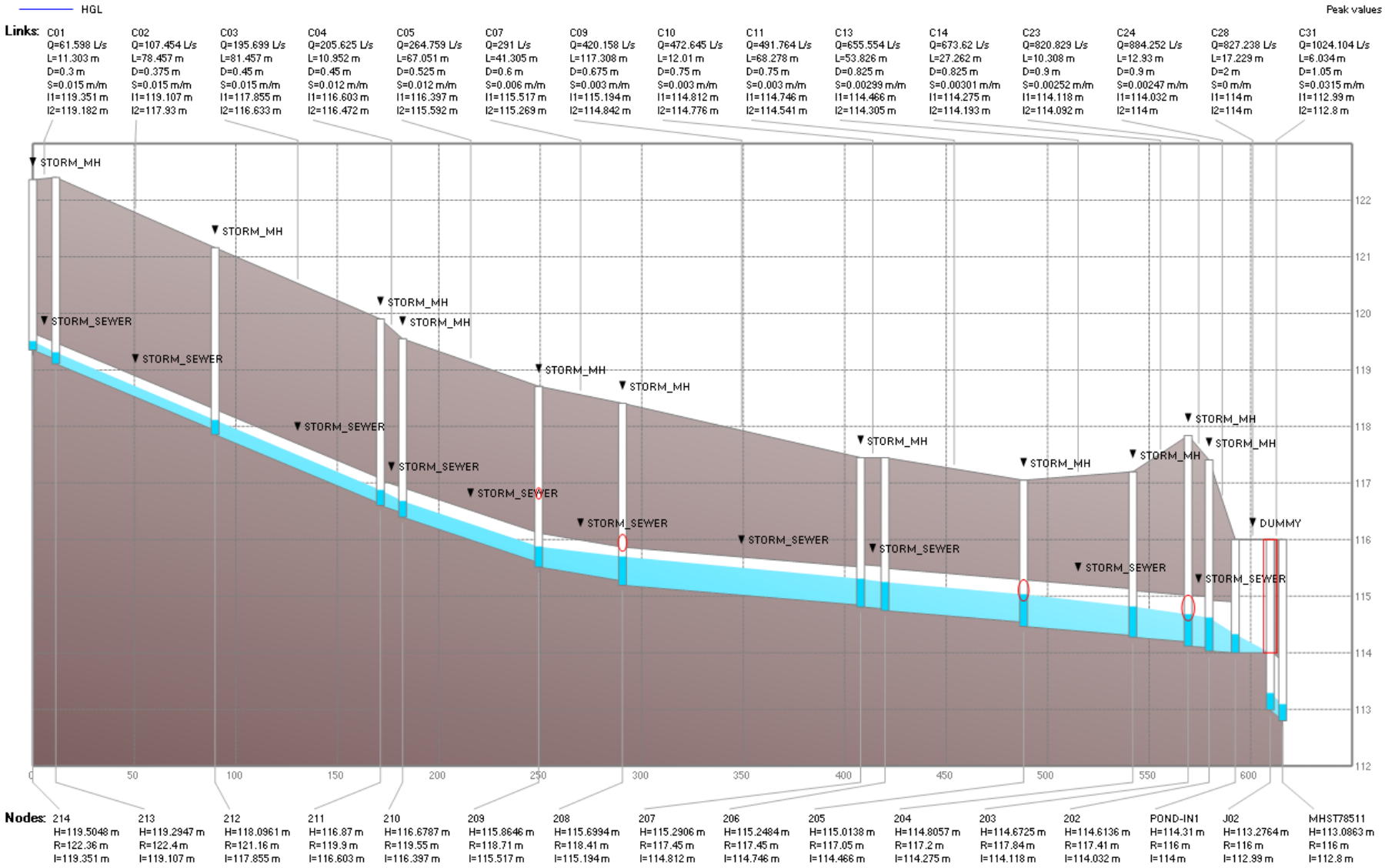

Figure 1: Node 214 to Node MHST78511

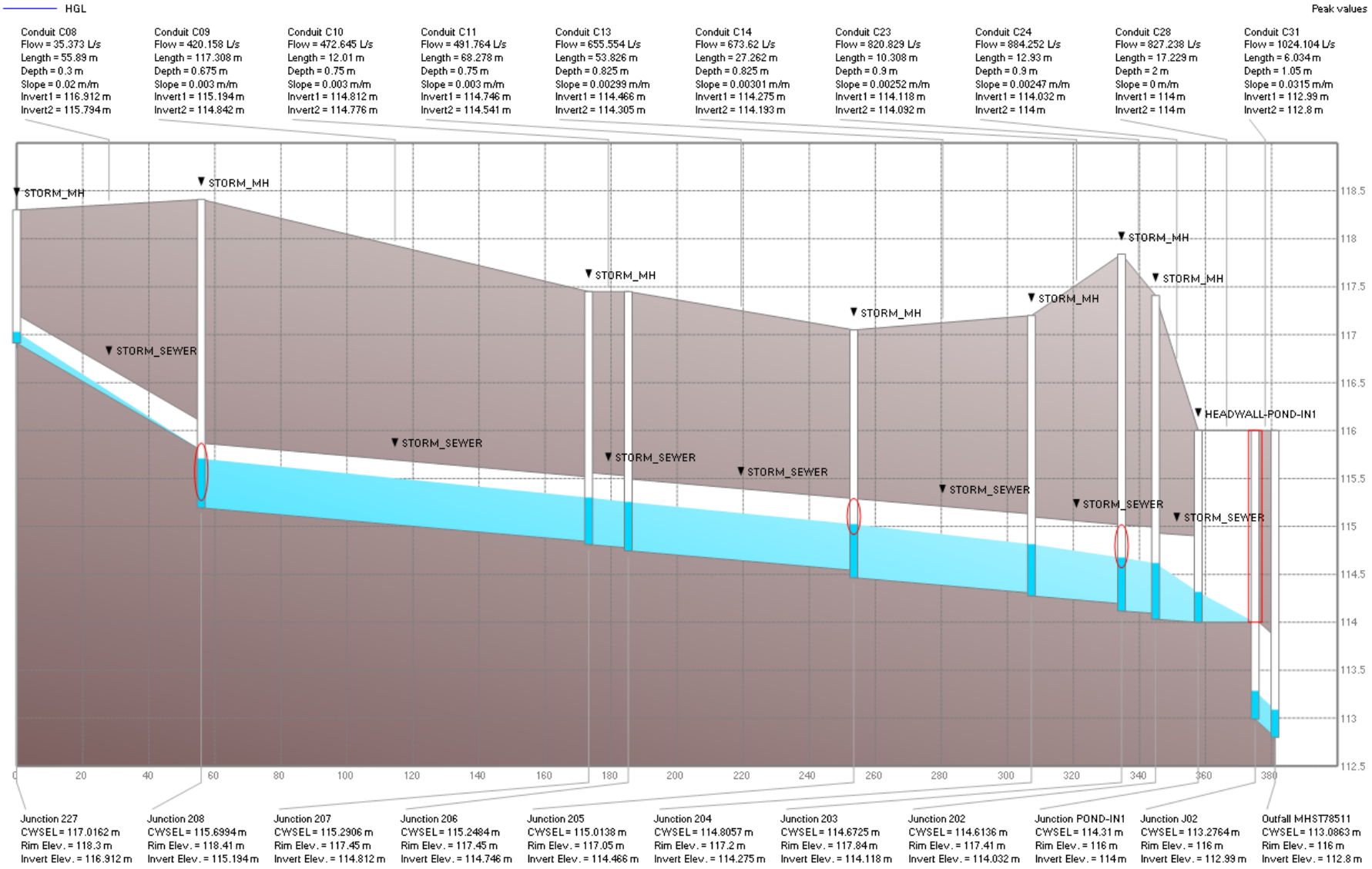

Figure 2: Node 227 to Node MHST78511

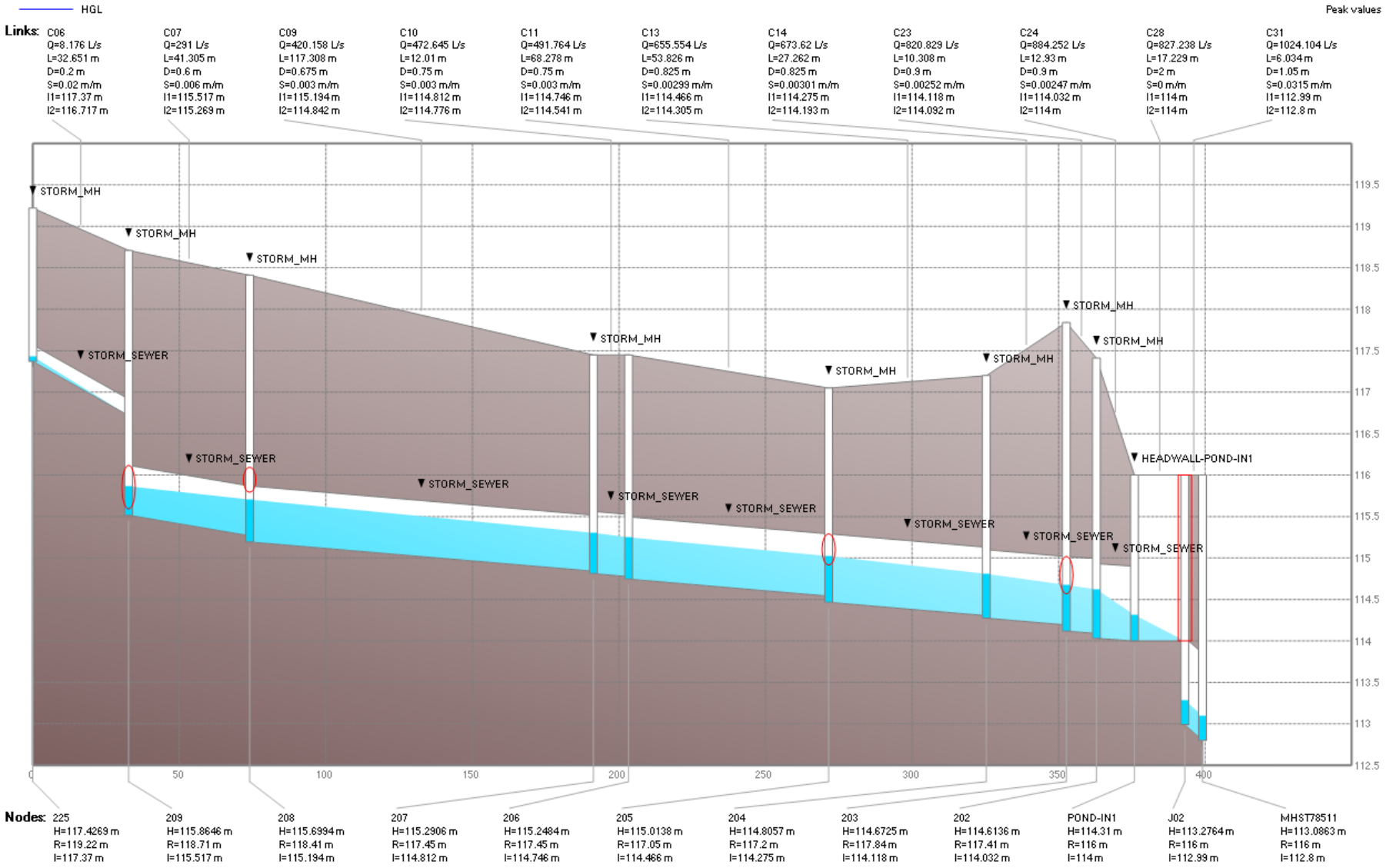

Figure 3: Node 225 to Node MHST78511

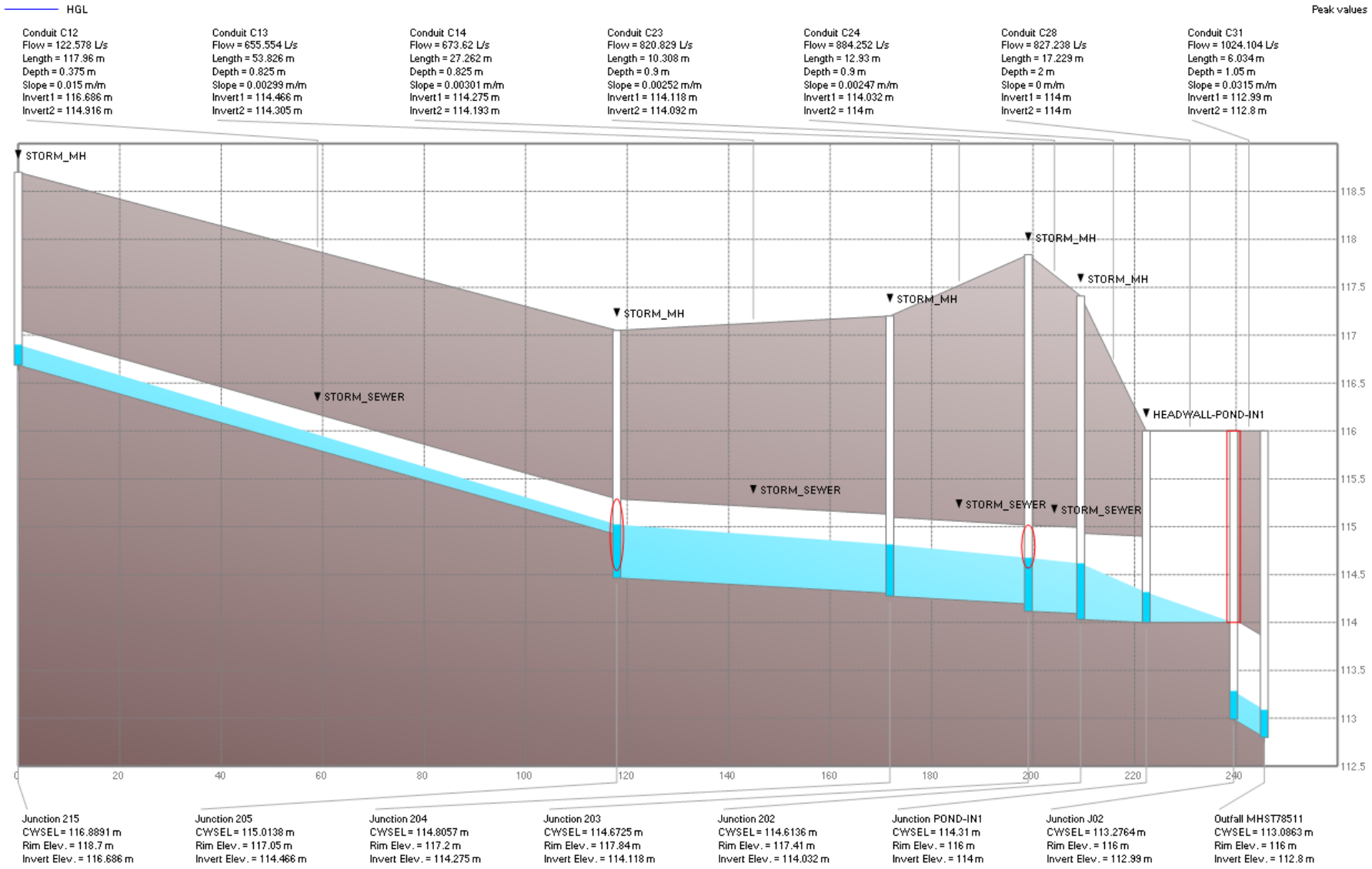

Figure 4: Node 215 to Node MHST78511

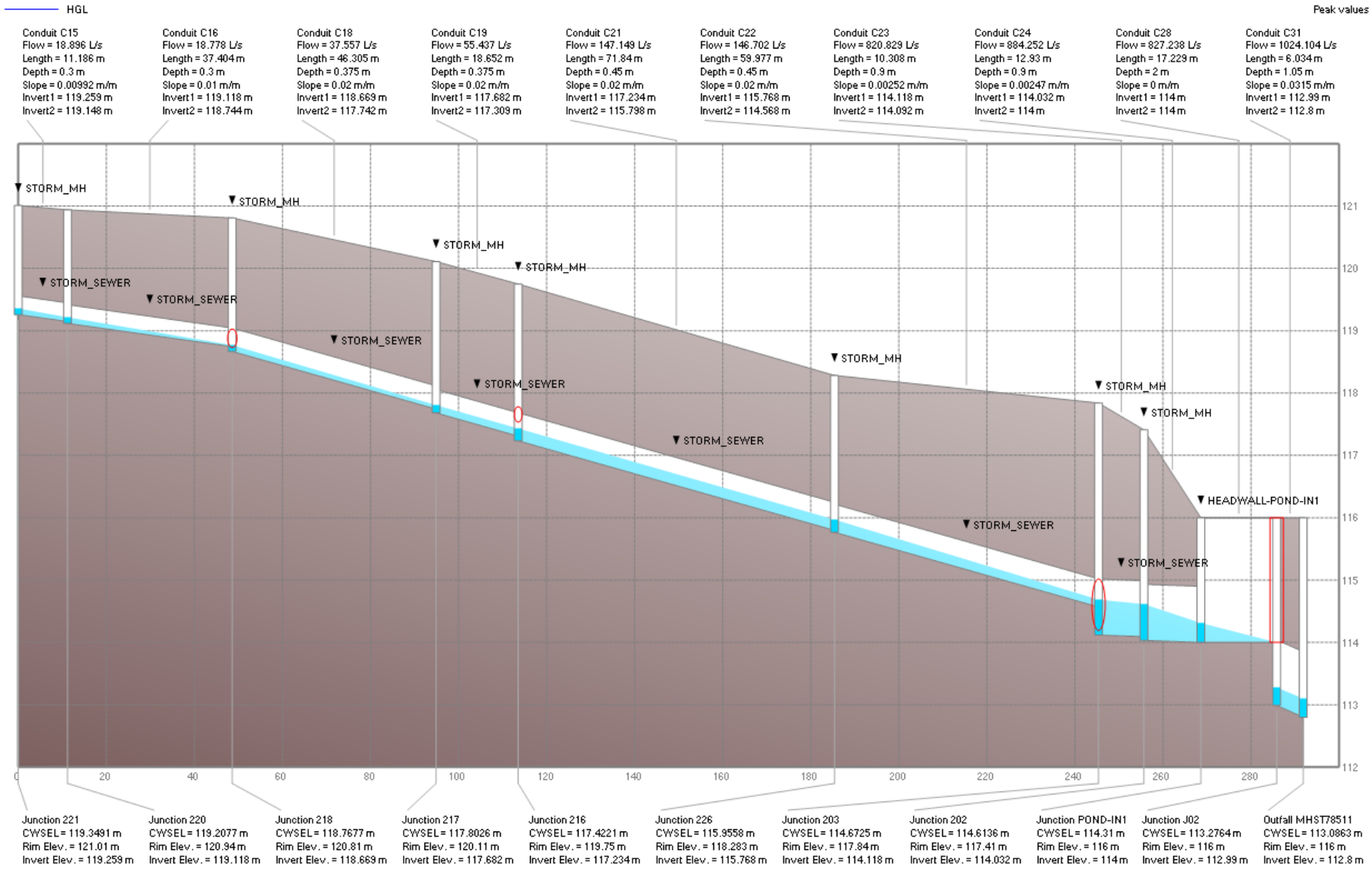

Figure 5: Node 221 to Node MHST78511

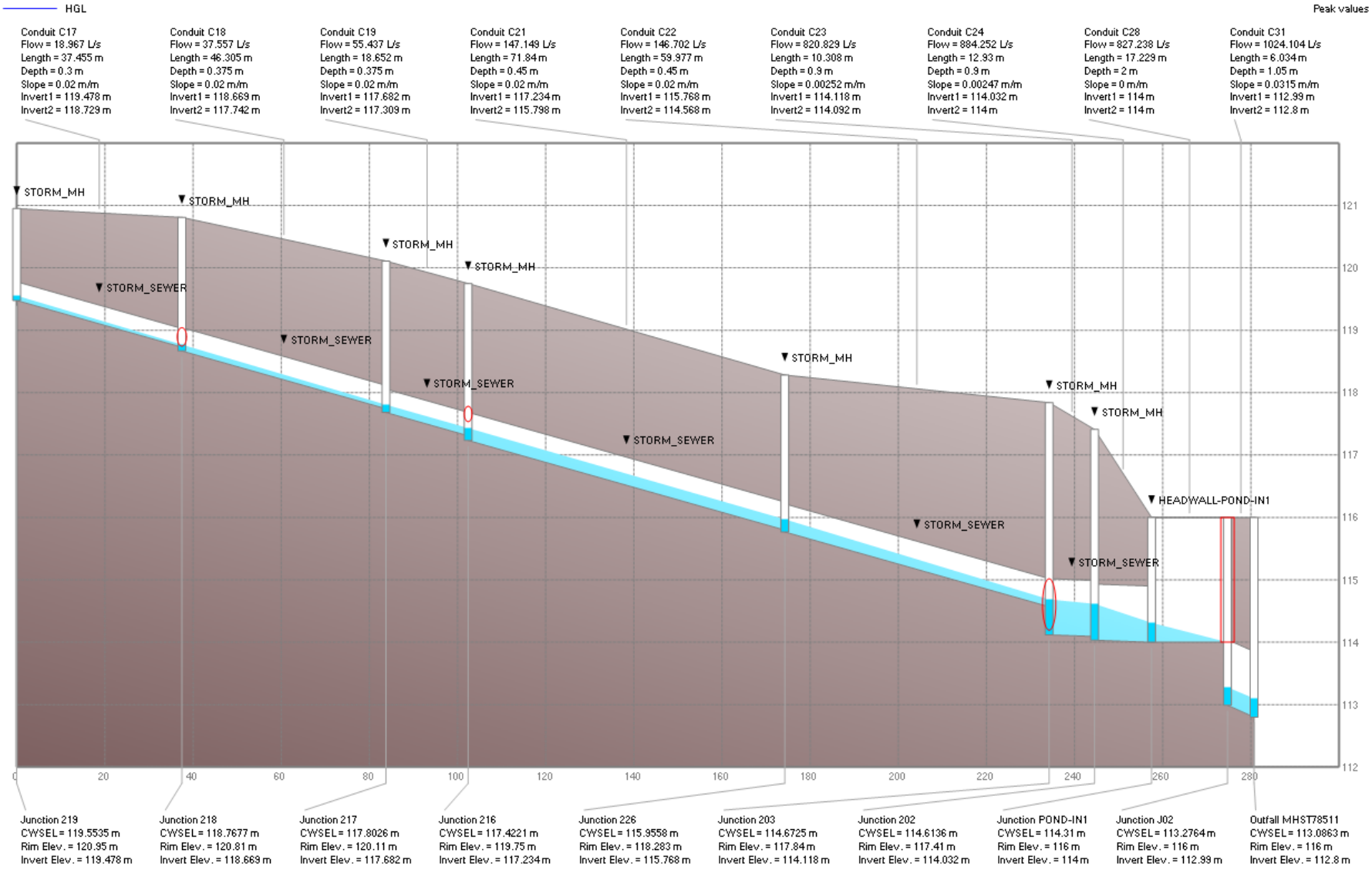

Figure 6: Node 219 to Node MHST78511

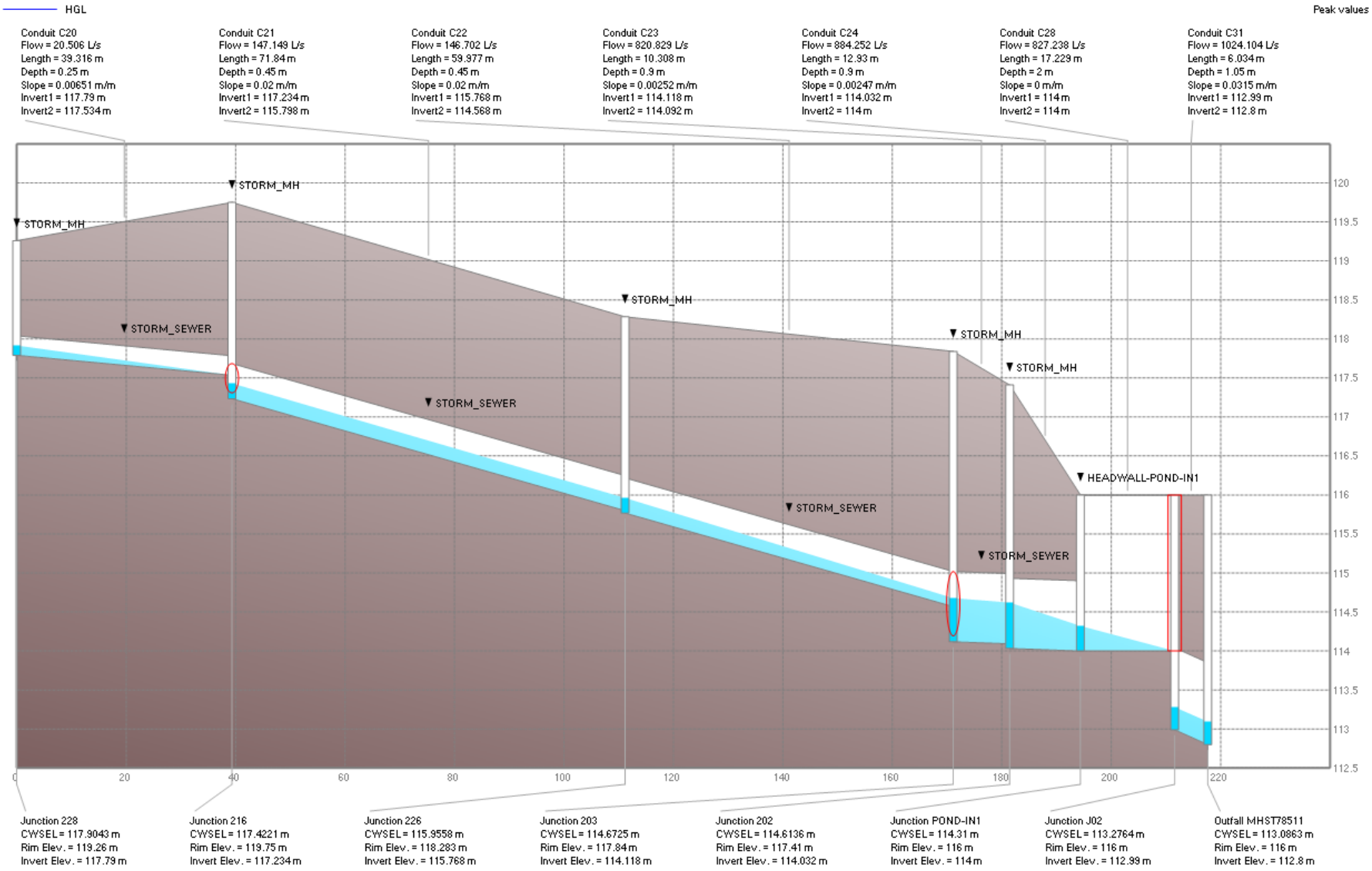

Figure 7: Node 228 to Node MHST78511

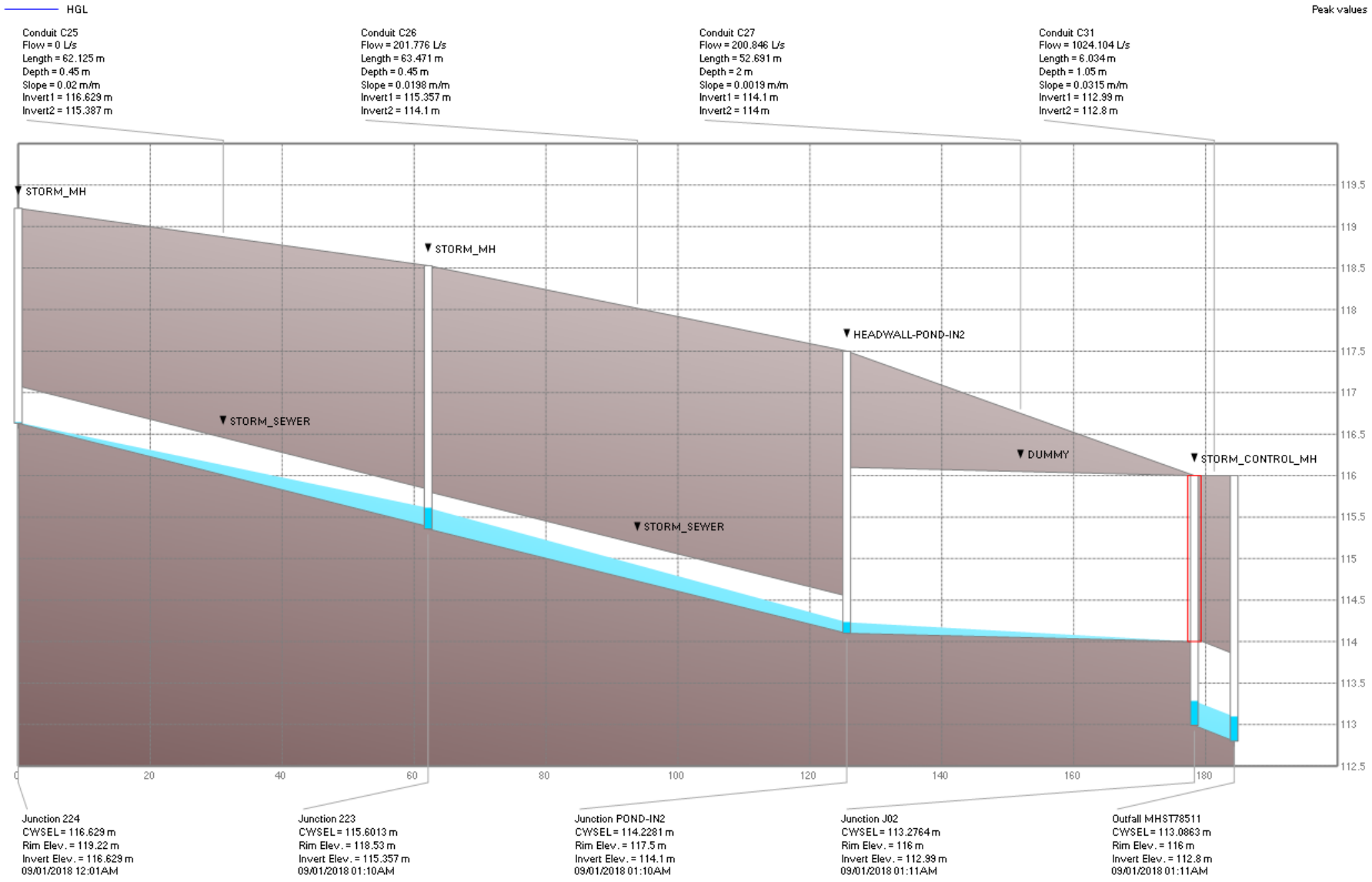

Figure 8: Node 224 to Node MHST78511

PCSWMM Report

Preliminary SWM Review

Model 258780_Prop_Rev2A, Chicago_3h_100yr.inp

July 24, 2020

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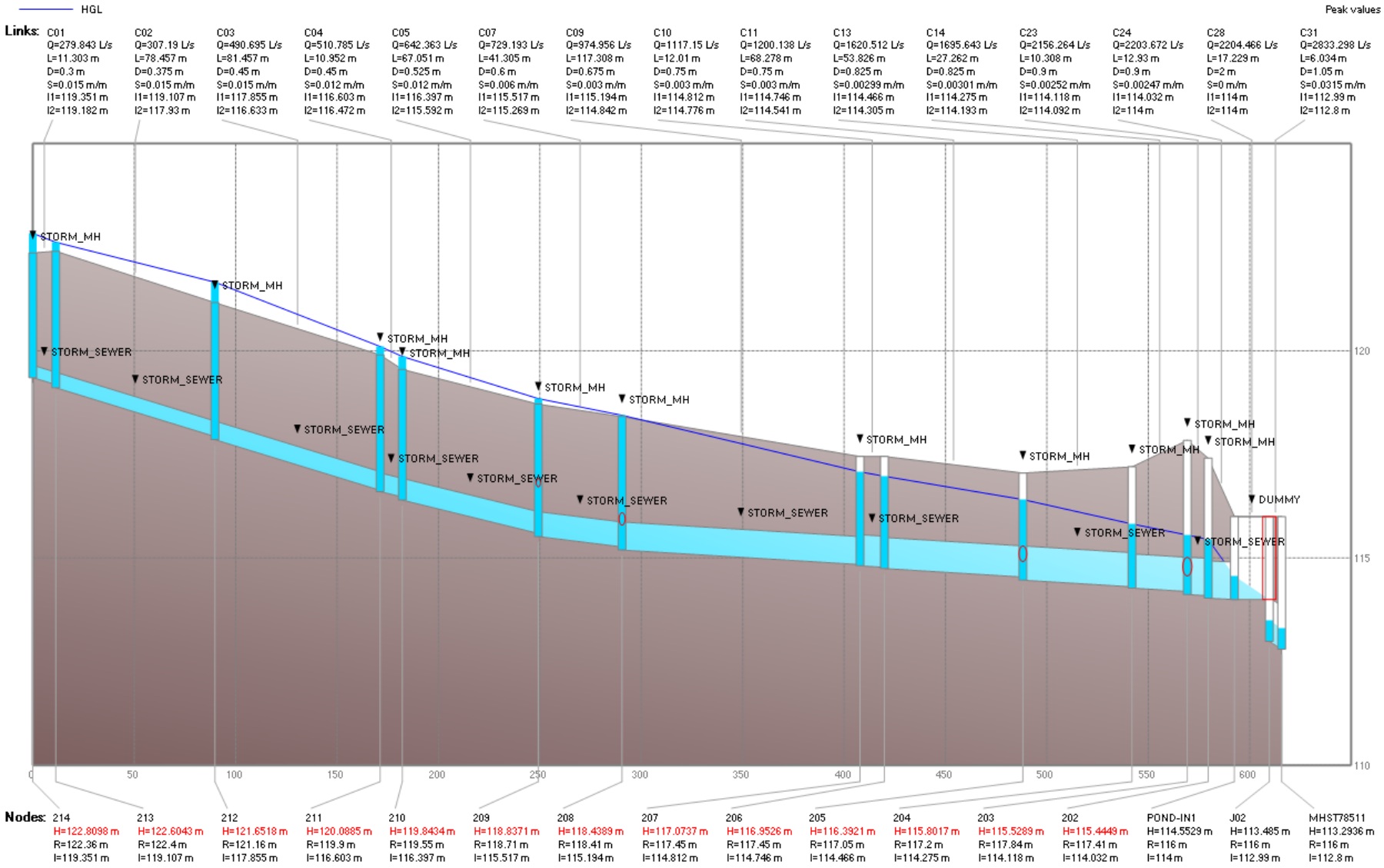

Figure 1: Node 214 to Node MHST78511

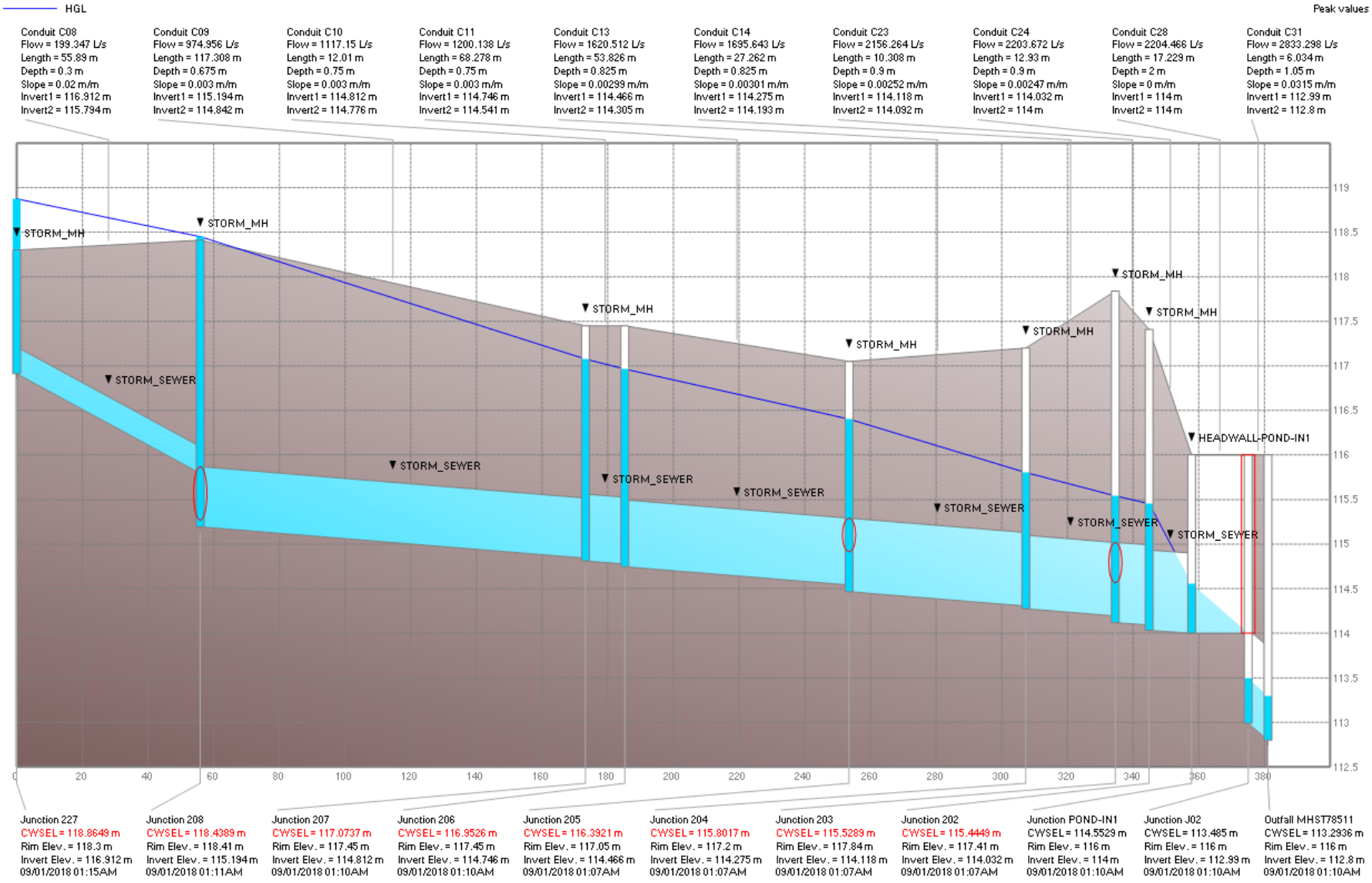

Figure 2: Node 227 to Node MHST78511

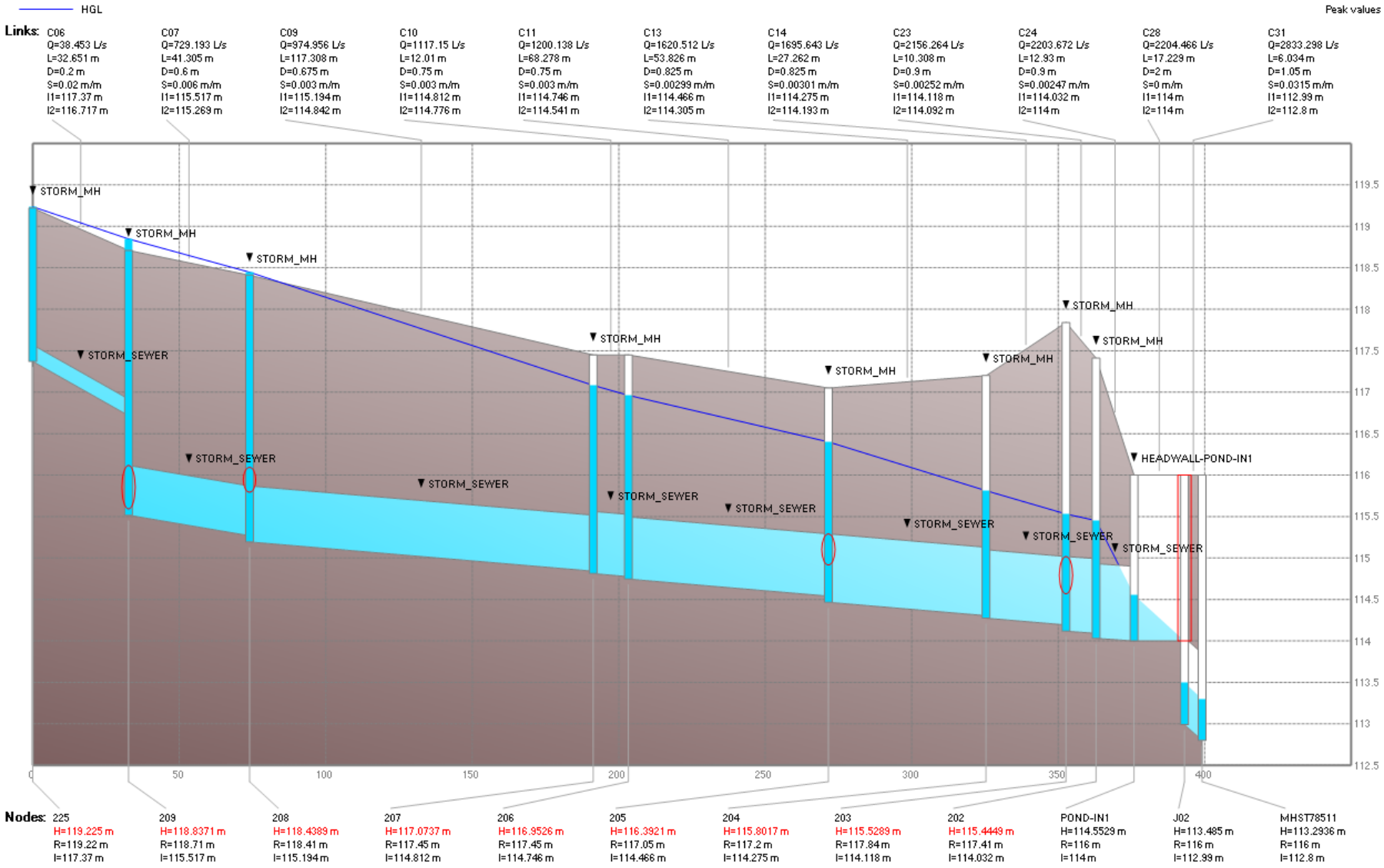

Figure 3: Node 225 to Node MHST78511

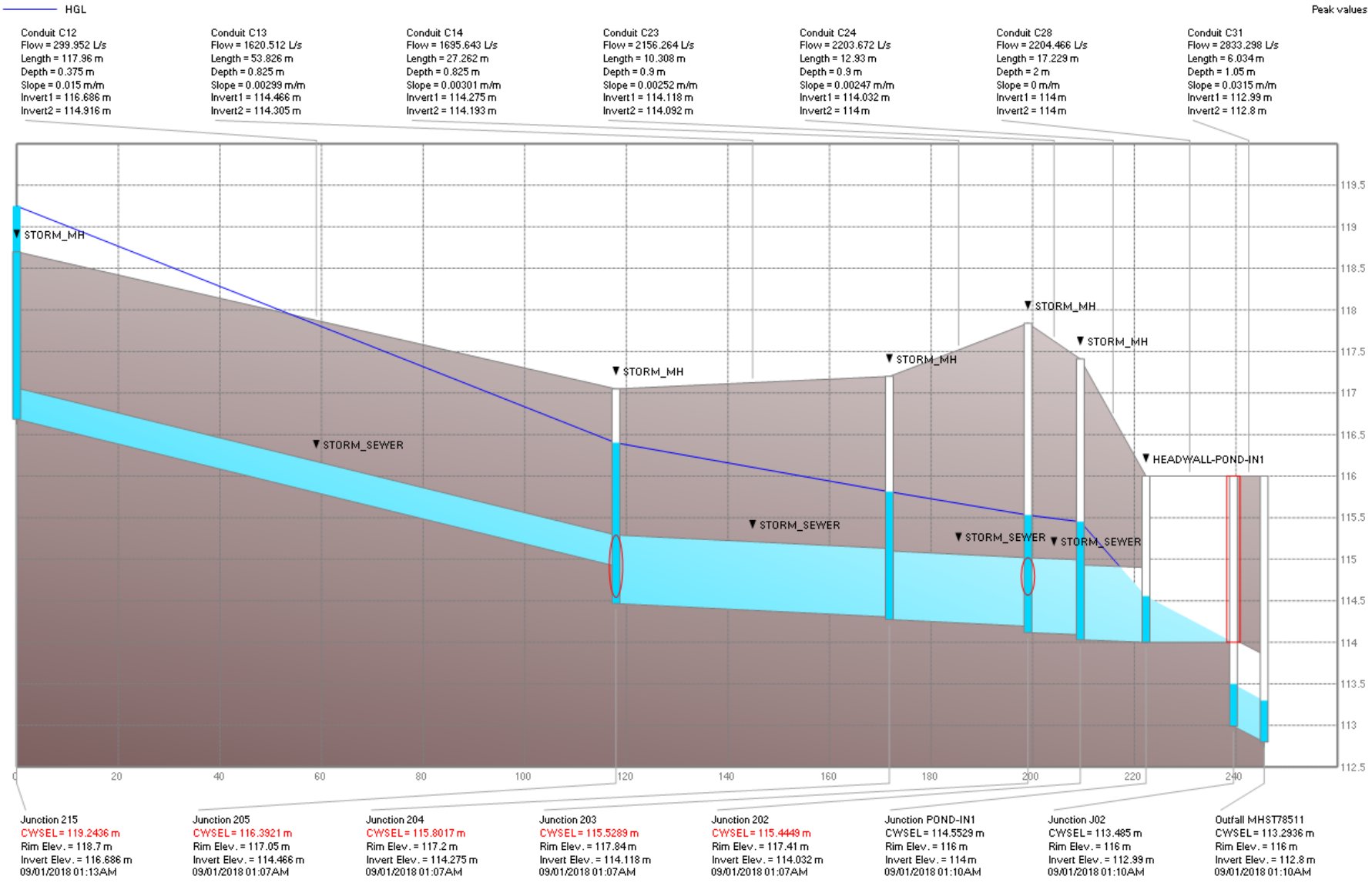

Figure 4: Node 215 to Node MHST78511

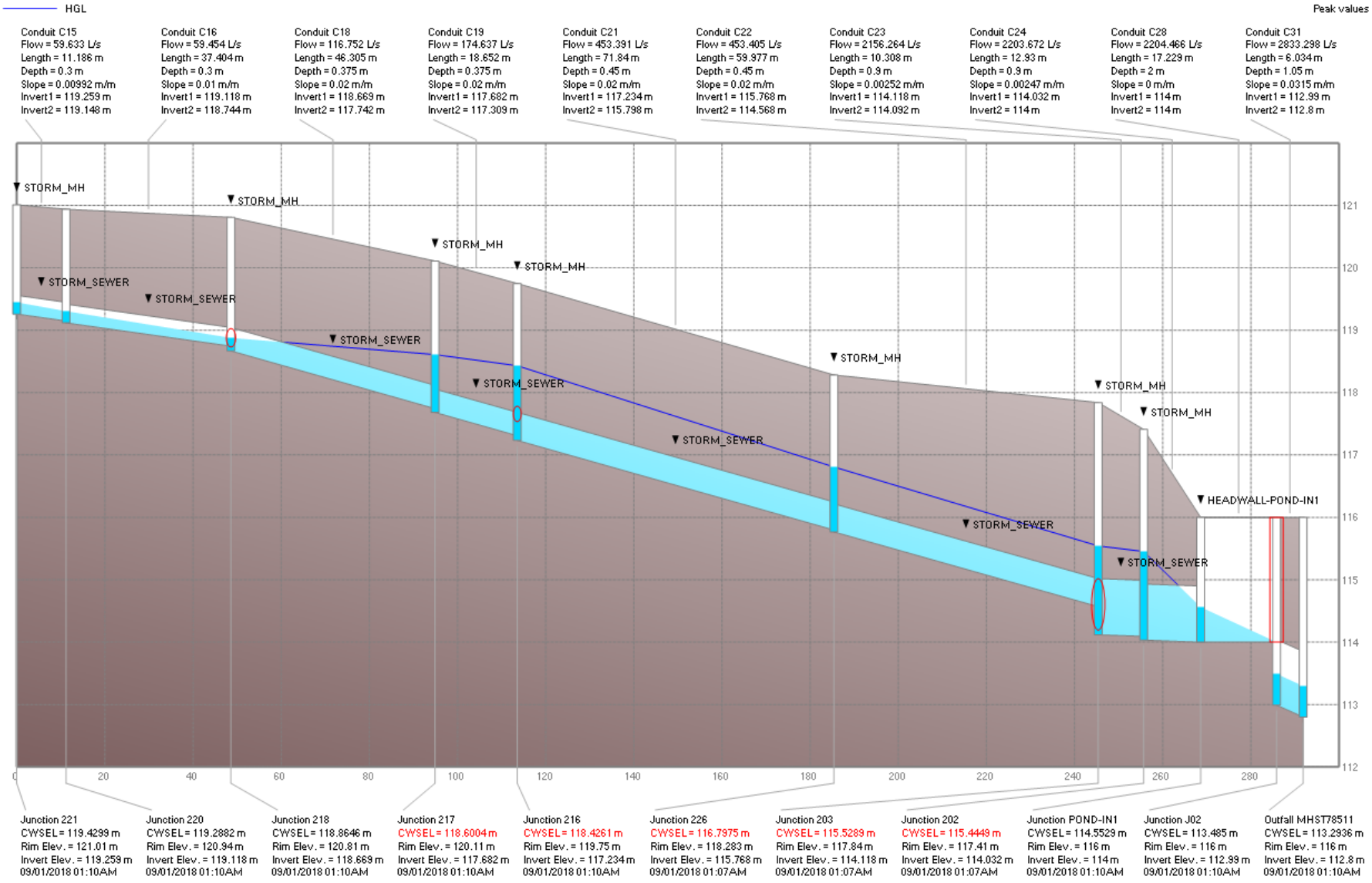

Figure 5: Node 221 to Node MHST78511

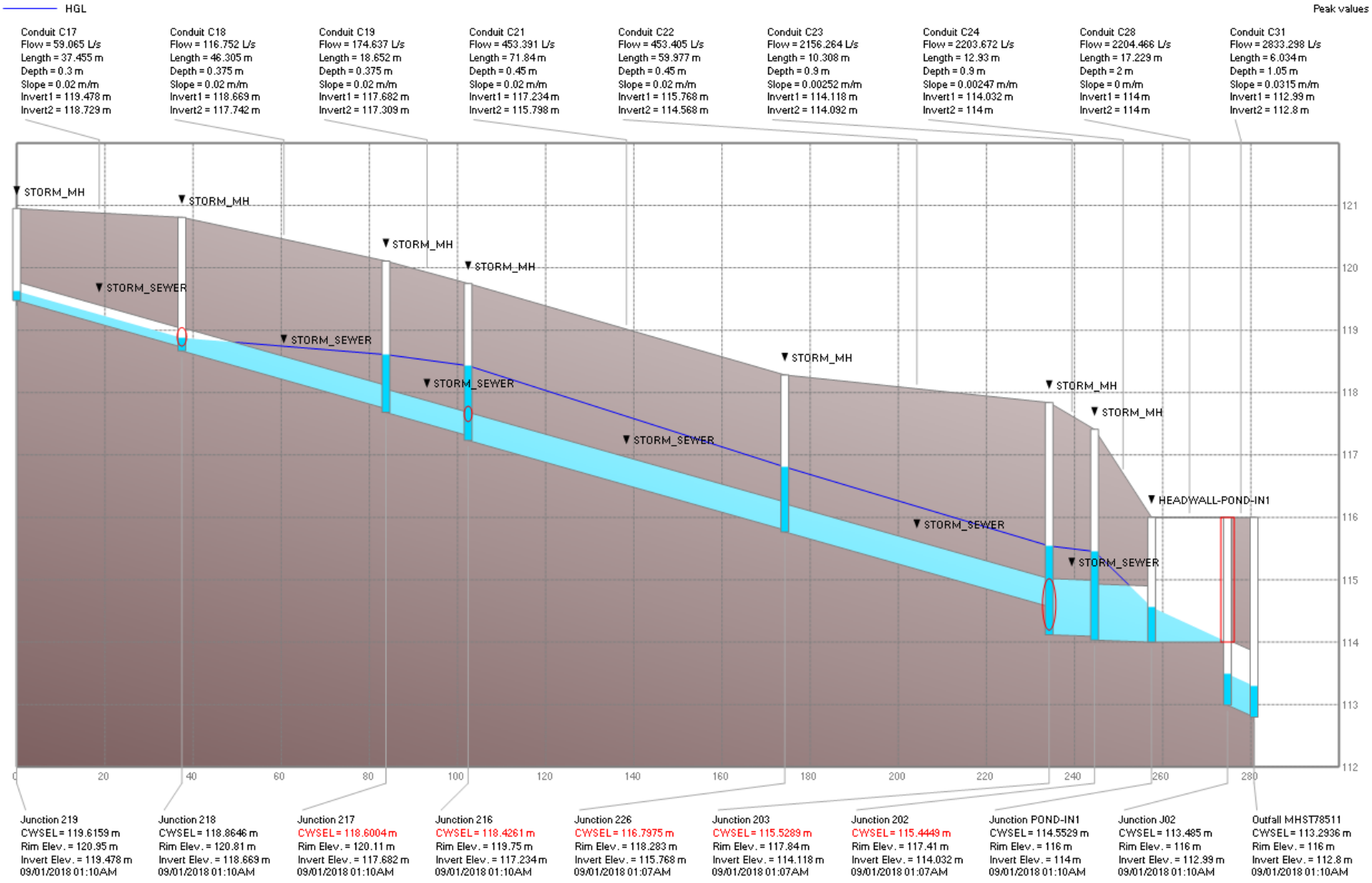

Figure 6: Node 219 to Node MHST78511

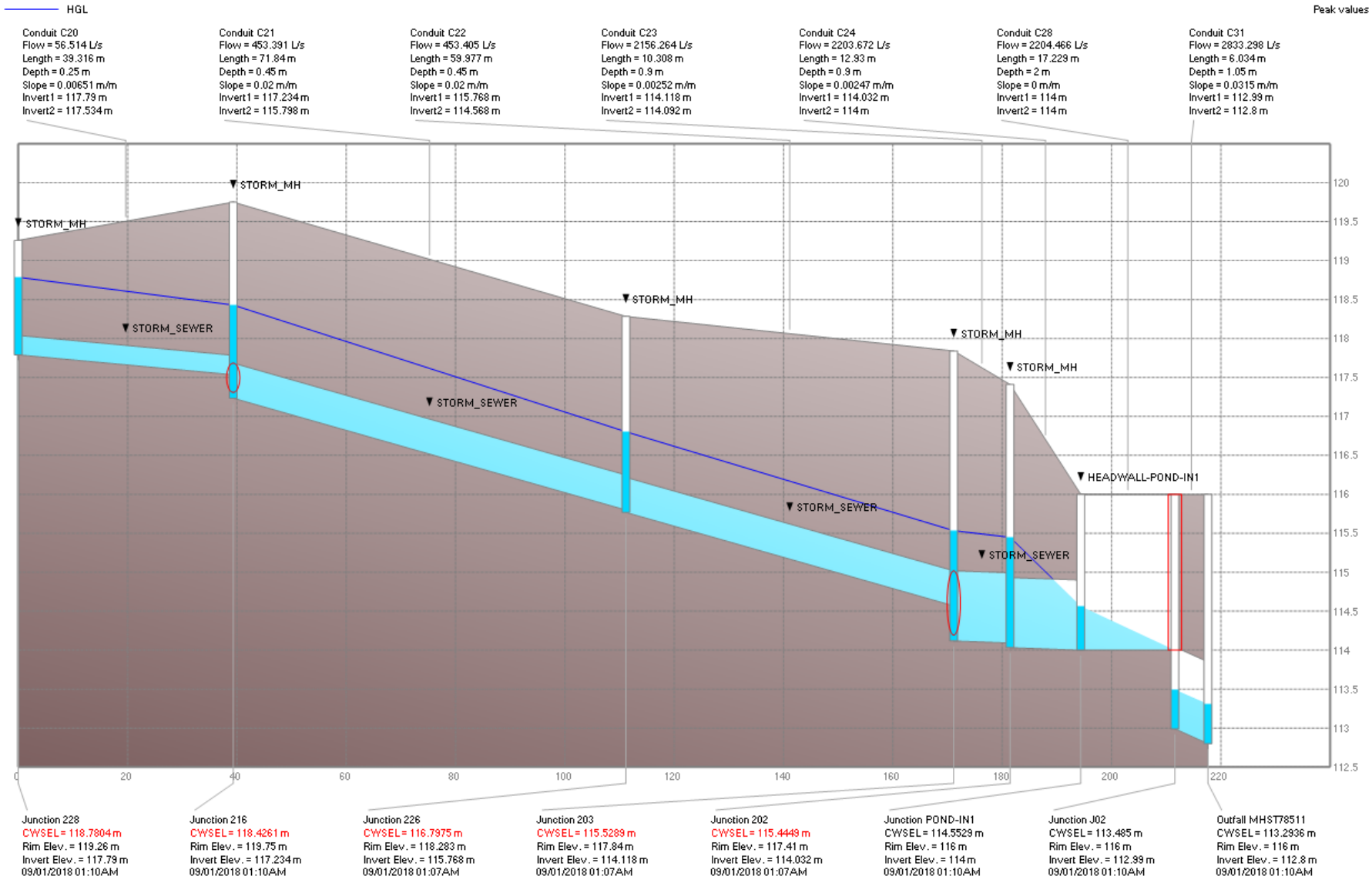

Figure 7: Node 228 to Node MHST78511

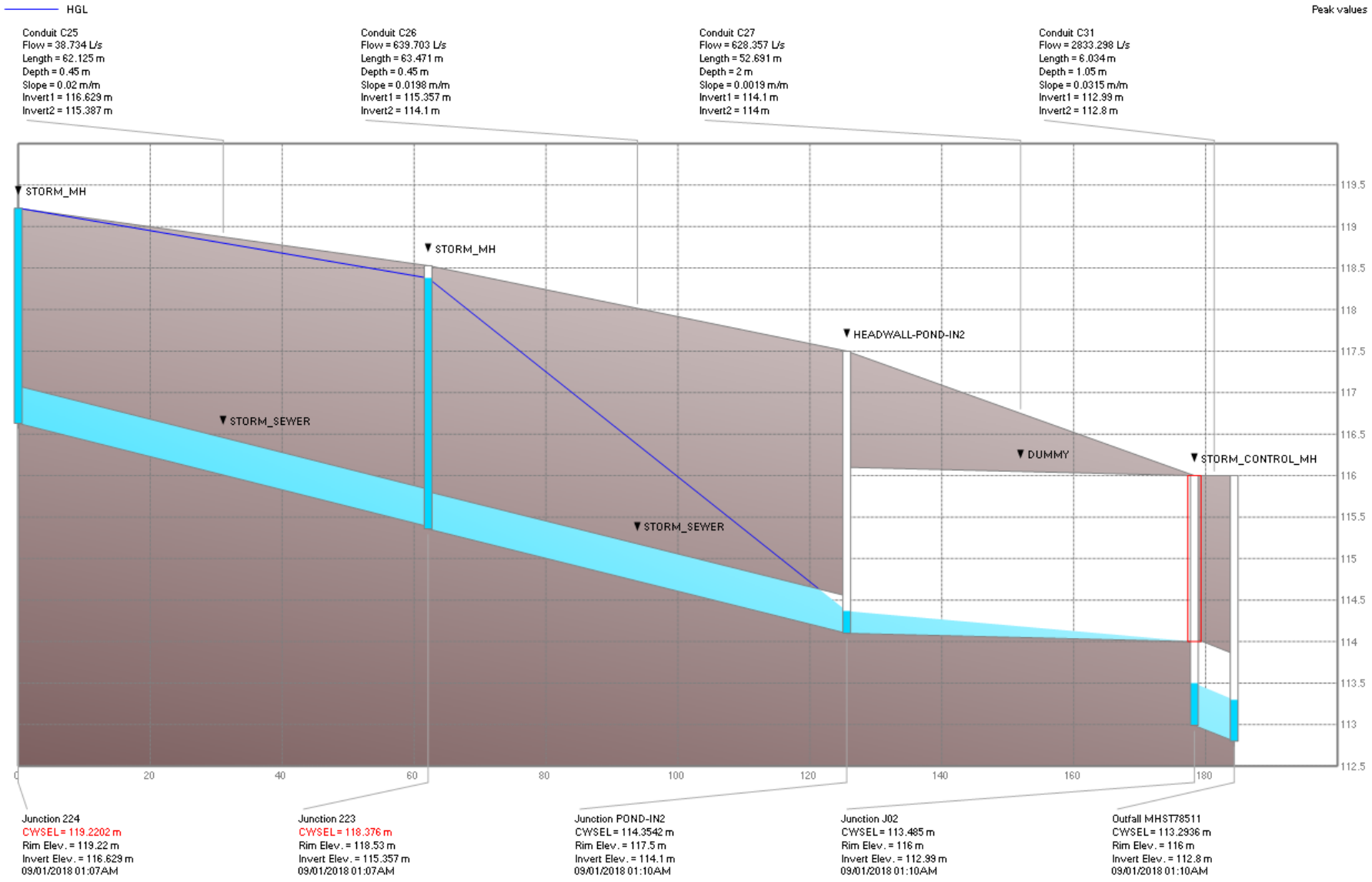

Figure 8: Node 224 to Node MHST78511

Appendix G – Consultation / Correspondence

Email on Water System Boundary Conditions

Email Received from MCVA on Stormwater Management Requirements

Pre-Consultation Meeting Minutes

Boundary Conditions
6171 Hazledean Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	276	4.60
Maximum Daily Demand	678	11.30
Peak Hour	1,494	24.90
Fire Flow Demand #1	15,000	250.00

Location

Results

Connection 1 – Hazledean Rd.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.7	57.2
Peak Hour	156.5	51.3
Max Day plus Fire 1	156.4	51.1

[1] Ground Elevation = 120.4 m

Connection 2 – Samantha Eastop Ave.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.7	59.6
Peak Hour	156.3	53.4
Max Day plus Fire 1	151.1	46.0

[1] Ground Elevation = 118.8 m

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.

Moe Ghadban

From: Matt Craig <mcraig@mvc.on.ca>
Sent: Thursday, April 30, 2020 11:08 AM
To: Moe Ghadban
Cc: Bruce Thomas; Jason Fitzpatrick
Subject: RE: Request for SWM Criteria for 6171 Hazeldean Road
Attachments: jacksontrails-stormwaterdesign.pdf

Hi Moe attached is the report – an invoice of $50.00 will follow, along with my previous comments please consider:

Development should follow the SWM criteria set out in the Feedmill Creek SWM Criteria Study. There are runoff volume capture requirements for retention control (LIDs) based on 5 or 10mm rainfall depend on the drainage area specified in the report.

- Please check the Carp subwatershed study for other requirements,
- Feedmill Creek has some level of temperature mitigation requirement as the creek has tolerant Coldwater fisheries.
- MVCA completes a stream watch survey of Feedmill in 2015. The report is here: http://mvc.on.ca/wp-content/uploads/2015/02/CSW2015_Feedmill-Creek-Final-Report.pdf

Regards

Matt Craig | Manager of Planning and Regulations | Mississippi Valley Conservation Authority

www.mvc.on.ca |t. 613 253 0006 ext. 226| f. 613 253 0122 | mcraig@mvc.on.ca

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From: Moe Ghadban <Moe.Ghadban@exp.com>
Sent: April 24, 2020 4:05 PM
To: Matt Craig <mcraig@mvc.on.ca>
Cc: Bruce Thomas <bruce.thomas@exp.com>; Jason Fitzpatrick <jason.fitzpatrick@exp.com>
Subject: Request for SWM Criteria for 6171 Hazeldean Road

Hi Matt,

We are preparing a site servicing and stormwater report for site plan application for a proposed subdivision at 6171 Hazeldean Road. The proposed subdivision consists of twenty (20) single homes, one-hundred and fifty-four (154)

townhomes, five (5) 3-storey condominium buildings (36 units each), and a 9-storey mixed use rental building (160 units). Please see the attached site plan. As the site is within the MVCA's jurisdiction we are requesting CA's clarification on the stormwater management requirements.

In the City of Ottawa's pre-consultation notes, they mentioned that quality control will be provided in the Jackson Trails SWM Pond. The "Jackson Trails Stormwater Management Design Brief" dated June 2006, an Enhanced Level of Protection (80 % removal of Total Suspended Solids).

As required by the City, as noted in the pre-consultation meeting, we are emailing the Conservation Authority to provide any additional water quality requirements for the proposed development.

Also, the City of Ottawa was not able to locate the following reports:

- Feedmill Creek Stormwater Management Criteria Study Draft Final Report (July 2016, JFSA and Coldwater Consulting Ltd.)
- Jackson Trails Stormwater Management Design Brief" dated June 2006

If you have either of those reports on file, could you please share them with us?

Thank you for your review and input.

Regards,

Moe Ghadban, P.Eng
EXP | Engineering Designer
t : +1.613.688.1899 | m : +1.613.808.4089 | e : moe.ghadban@exp.com
2650 Queensview Drive
Suite 100
Ottawa, ON K2B 8H6
CANADA

6171 Hazeldean Road
Pre-Consultation Meeting Minutes

Location: Room 4102E, City Hall
Date: December 13, 930 to 1030am

Attendee	Role	Organization
Stream Shen	Planner	City of Ottawa
Santhosh Kuruvilla	Project Manager (Civil)	
Matt Ippersiel	Urban Designer	
Neeti Paudel	Project Manager (Transportation)	
Matthew Hayley	Planner (Environment)	
Mark Richardson	Forester	
Samantha Gatchene	Planning Assistant	
Justyna Garbos	Planner (Parks)	
Jaime Posen	Planner	Fotenn
Bruce Thomas	Engineer (Civil)	EXP
Phil Desmarais	Engineer (Transportation)	
Carmine Zayoun	Owner	GNCR

Comments from Applicant

1. The applicant is proposing a residential subdivision with approximately 388 units comprised of singles, towns, stacked towns, low-rise apartments and potentially some commercial uses on the ground floor.
2. The stacked townhomes and low-rise apartments are proposed to be condominiums with private streets.
3. There is a proposed servicing easement and pathway block connecting to Brandelier Way.

Planning Comments

1. This is a pre-consultation for a Major Zoning By-law Amendment and Plan of Subdivision application. Application form, timeline and fees can be found here.
2. Please consider an enhanced rear yard setback for homes backing onto Lloyd Alex Crescent.

3. Please consider placing the park along Samantha Eastop extension and in proximity to the proposed townhome blocks to provide additional on-street parking availabilities.
4. Please incorporate a pathway connection to Samantha Eastop from the proposed cul-de-sac.
5. Please confirm if the Archeological Assessment has been completed as part of Potter's Key subdivision.
6. Consider traffic calming along the Samantha Eastop extension to Hazeldean.
7. Please consult with the Ward Councillor prior to submission.

Urban Design Comments

1. In general, the proposed size of blocks is good.
2. Relocate the main entry point on Hazeldean Road to have it align with the existing break in the median and Samantha Eastop Ave.
3. The north-south local road in this location should:
    a. Maintain the right-of-way width on Samantha Eastop Ave.
    b. Have the number of driveways facing onto it minimized by orienting lots to have their sideyards abut the street.
    c. Ensure adequate space for street trees, on-street parking, and other traffic calming measures to slow traffic and discourage cut-through traffic.
4. Eliminate the cul-de-sac by incorporating it into the grid street network.
5. From an urban design perspective, a more central location for the park would be the preference. Face as many front doors towards the park as possible.
6. If the park is to be relocated and will be increased in sized, look for opportunities to have it offset the street grid and discourage cut-through traffic on the main north-south street. Depending on where it is located the park could potentially terminate the view into the community from Hazeldean.
7. Locate higher density units on Hazeldean and especially towards the south-east corner of the site. Try to locate as much of the surface parking in the south-east corner of the site as possible to have it couple with the likely future parking lot on the adjacent site to the east. Avoid rear-lotting units onto Hazeldean where possible.
8. Avoid having townhouses back onto the existing singles on Lloydalex Crescent.
9. This project will not subject to review with the Urban Design Review Panel. Only required if the buildings are above four storeys.

Engineering Comments

- See attached study (Feedmill Creek Stormwater Management Criteria Study) for the stormwater management criteria (quantity & quality) for the subject development
    - Minor system capture from this development will be directed to the Jackson Trails SWM Pond and limited to 70 L/s/ha as per the design of the facility
    - Major system storage to be provided on-site
- Quality control will be provided in Jackson Trails SWM Pond
- Provide emergency overland flow route
    - By modelling, demonstrate that there are no adverse impact to the existing downstream developments (Potter's Key and Jackson Trails)
- Demonstrate that the existing downstream minor system (sanitary and storm) in Potter's Key and Jackson Trails are adequately sized to receive flow from this development
- Watermain stubs are available for servicing this land, one at Samantha Eastop Avenue. and one at Hazeldean Road (closer to west property line)
- Sewer stubs are available within Potter's Key Subdivision for connection
- Pond may be required for attenuation as per the attached report
- Feedmill Creek restoration fee is applicable (approximately $100, 000.00) and it will be included in the development charges
- Other charges may be applicable due to upsizing sewers or watermain or other works by other developers (e.g. Tartan, Minto, others)
    - Please contact Minto, Tartan, etc. for information
- Reference other previously approved reports (e.g. Stormwater Management, Watermain, Strom Sewer and Sanitary Sewer Design Brief - Potter's Key Subdivision, Jackson Trails Stormwater Management Design Brief)
- For engineering related questions please contact Santhosh Kuruvilla

Transportation Comments

1. Follow Traffic Impact Assessment Guidelines – Traffic Impact Assessment will be required.
    a. Start this process immediately.

   b. If a traffic signal is proposed on Hazeldean at the proposed street or access, this will trigger a RMA. Please note other proposed road works on Hazeldean may also trigger a RMA.
      i. Request base mapping as soon as possible. Contact Engineering Services (https://ottawa.ca/en/city-hall/planning-and-development/engineering-services)
   c. Applicant advised that their application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable)

2. Location of Intersection:
3. The location of the third leg intersecting with Hazeldean will have to be reviewed further in the TIA. If the intersection is to be signalized, there are concerns with the close proximity of the proposed signalized intersection and the existing signalized access east of the site.
4. If the third leg is proposed approximately 283m east of Carp Road aligning to the possible future access south of Hazeldean and connecting straight to Samantha Eastop Avenue, cut through traffic issues and speeding issues are of concern. Consider reconfiguration of the internal local street and implementation of traffic calming measures for review.
5. Please note that the road works including the traffic signal (if proposed) is not DC applicable and developer's responsibility.
6. In general, include traffic calming measures on roads within the limits of the subdivision to limit vehicular speed and improve pedestrian safety
   a. Traffic calming measures shall reference best management practices from the Canadian Guide to Neighbourhood Traffic Calming, published by the Transportation Association of Canada, and/or Ontario Traffic Manual
   b. These measures may include either vertical or horizontal features (such measures shall not interfere with stormwater management and overland flow routing), including but not limited to:
      i. intersection or mid block narrowings, chicanes, medians;
      ii. speed humps, speed tables, raised intersections, raised pedestrian crossings;
      iii. road surface alterations (for example, use of pavers or other alternate materials, provided these are consistent with the City's Official Plan polices related to Design Priority Areas);
      iv. pavement markings/signage; and
      v. temporary/seasonal installations such as flexi posts or removable bollards.
7. Site triangles at the following locations on the final plan will be required:

a. Local Road to Local Road: 3 metre x 3 metres
b. Local to Arterial Road: 5 metre x 5 metres

8. Noise Impact Studies required for the following:
    a. Road
9. On site plan:
    a. Show all details of the boundary roads up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks
    b. Turning templates will be required for showing the largest vehicle to access the site; required for internal movements and at all accesses
    c. Show all curb radii measurements; ensure that all curb radii are reduced as much as possible
    d. Show road and sidewalk widths
10. Pavement marking and signage plan will be required
11. Geometric design road design drawings will be required with the first submission of detailed design

Parks Comments

1. Parks will take parkland calculated using the rates specified in Part II, Section 3 of Parkland Dedication By-law No. 2009-95:
    a. One hectare (ha) for every 300 single/townhouse dwelling units and
    b. Prorated proportionally to the gross floor area that each use occupies within the apartment buildings
        i. 10 percent for residential and
        ii. Two percent for retail
2. A rough calculation based on the 1 ha/300 dwelling unit rate indicates that a park of at least 0.9 ha is needed whereas the proposed park is significantly smaller (0.005 ha)
3. Two smaller parks are not desirable because they are more costly to maintain
4. A rectangular park is preferred because it can better support active recreational uses (i.e., play structures, sports fields)
5. There is an opportunity to retain trees within the woodlot by relocating the park to the northwest corner of the site
    a. Parks is open to negotiating a combination of parkland and cash if the park is enlarged and some trees are retained

6. The park is to be developer-built. The developer can opt out and provide money instead. This can be discussed throughout the process and closer to draft approval.
    a. The park shall be built within two years of registration
    b. Please refer to the Park Development Manual for more information regarding park development
    c. A Facility Fit Plan will be required prior to draft approval

Environment Comments

1. An EIS is triggered to address Endangered and threatened species habitat. It will also need to address potential significant woodlands and significant wildlife habitat.
2. Look at street design to ensure street trees can be implemented.

Forestry Comments

1. a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City; an approved TCR is a requirement of Site Plan or Plan of Subdivision approval
2. any removal of privately-owned trees 10cm or larger in diameter requires a tree permit issued under the Urban Tree Conservation Bylaw; the permit is based on the approved TCR
3. any removal of City-owned trees will require the permission of Forestry Services who will also review the submitted TCR
4. for this site, the TCR may be combined with the EIS (if one is required) provided all information is clearly displayed
5. the TCR must list all trees on site by species, diameter and health condition – separate stands of trees may be combined using averages
6. the TCR must address all trees with a critical root zone that extends into the developable area – all trees that could be impacted by the construction that are outside the developable area need to be addressed.
7. trees with a trunk that crosses/touches a property line are considered co-owned by both property owners; permission from the adjoining property owner must be obtained prior to the removal of co-owned trees
8. If trees are to be removed, the TCR must clearly show where they are, and document the reason they can not be retained – please provide a plan showing retained and removed treed areas
9. All retained trees must be shown and all retained trees within the area impacted by the development process must be protected as per City guidelines listed on Ottawa.ca

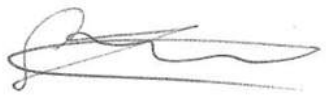
10. the City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
11. Please ensure newly planted trees have an adequate soil volume for their size at maturity
12. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca

Please refer to the links to "Guide to preparing studies and plans" and fees for general information. Additional information is available related to building permits, development charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

Please contact me at stream.shen@ottawa.ca or at 613-580-2424 extension 24488 if you have any questions.

Sincerely,



Stream Shen MCIP RPP
Planner II
Development Review - West

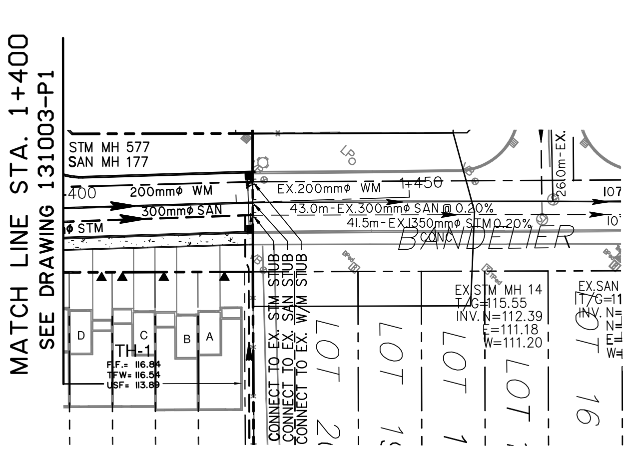
Appendix H – Background Information

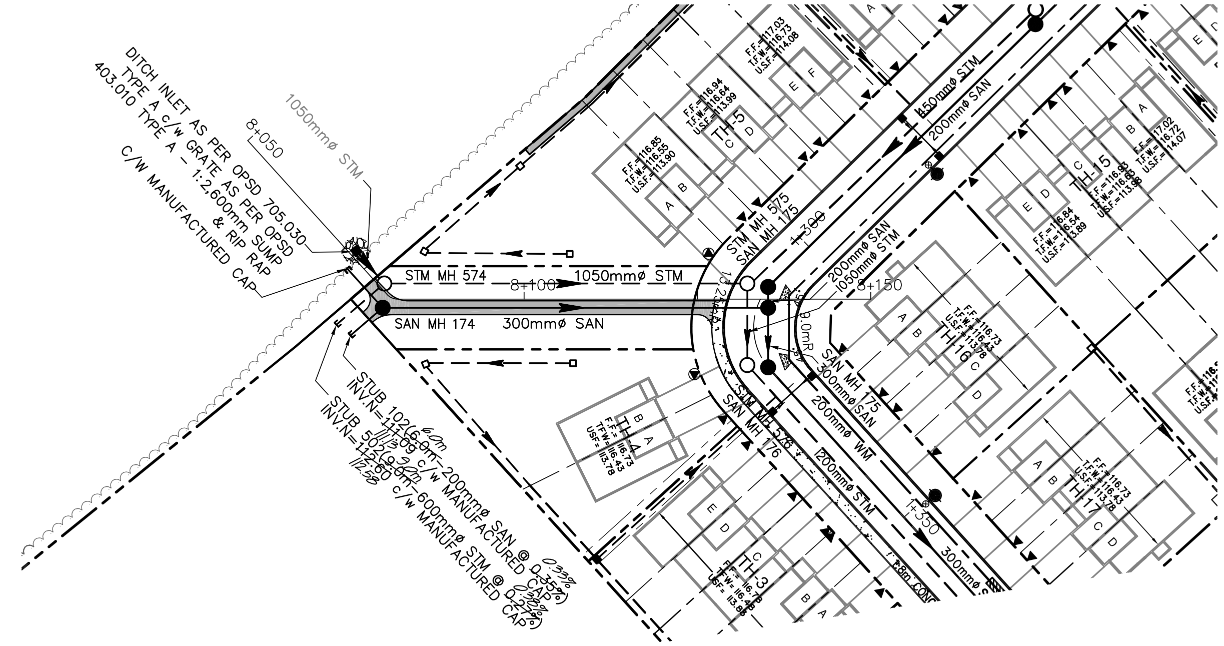
Excerpt pages from Potters Key Subnivium Drawings, Atrel Engineering. (10 pages)

Excerpt pages from 'Stormwater Management, Watermain, Storm Sewer and Sanitary Sewer Design Brief, Potter's Key Subdivision, Atrel Eng. (Cover + 1 page)

Excerpt pages form "Feedmill Creek stormwater Management Criteria Study". (Cover + 1 page)

MATCH LINE STA. 1+400
SEE DRAWING 131003-P1





LEGEND:

(COW) CUT OFF WALL (1.5m WIDE) AS PER CITY STANDARD S8

(SL) SAFETY LANDING

OUTSIDE PROPOSED DEVELOPMENT

TEST PIT REFUSAL

NOTES:

1. WATERMAIN CROSSING BELOW AND OVER SEWERS AS PER CITY STD W25 AND STD W25.2 RESPECTIVELY.
2. THERMAL INSULATION OF WATERMAIN NEAR OPEN STRUCTURES AS PER CITY STD W23.

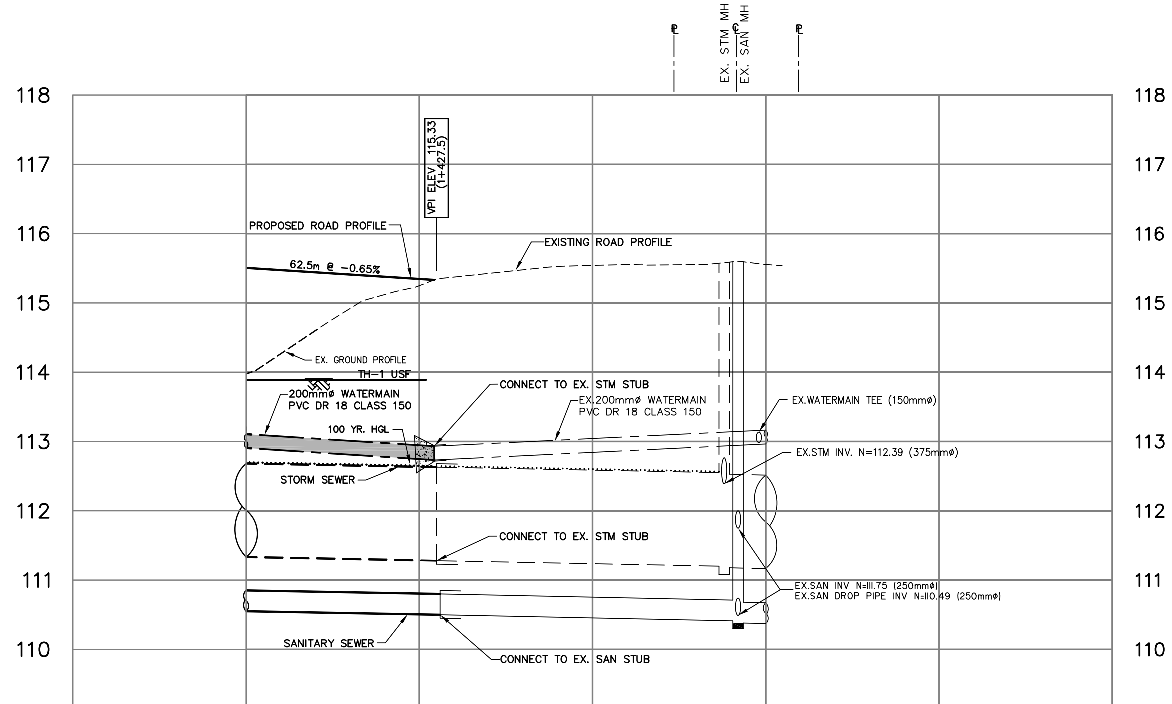
RECORD DRAWING

JANUARY 03, 2018

THIS "RECORD DRAWING" HAS BEEN PREPARED BASED ON INSPECTIONS AND OBSERVATIONS UNDERTAKEN BY FIELD STAFF DURING KEY STAGES OF CONSTRUCTION AND ON INFORMATION SUBMITTED, IN PART BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, ATREL ENGINEERING LTD IS NOT RESPONSIBLE FOR ITS ACCURACY, OR FOR ERRORS OR OMISSIONS THAT MAY HAVE BEEN INCORPORATED INTO THIS DRAWING AS A RESULT.

OVERLAND DRIVE

BANDELIER WAY

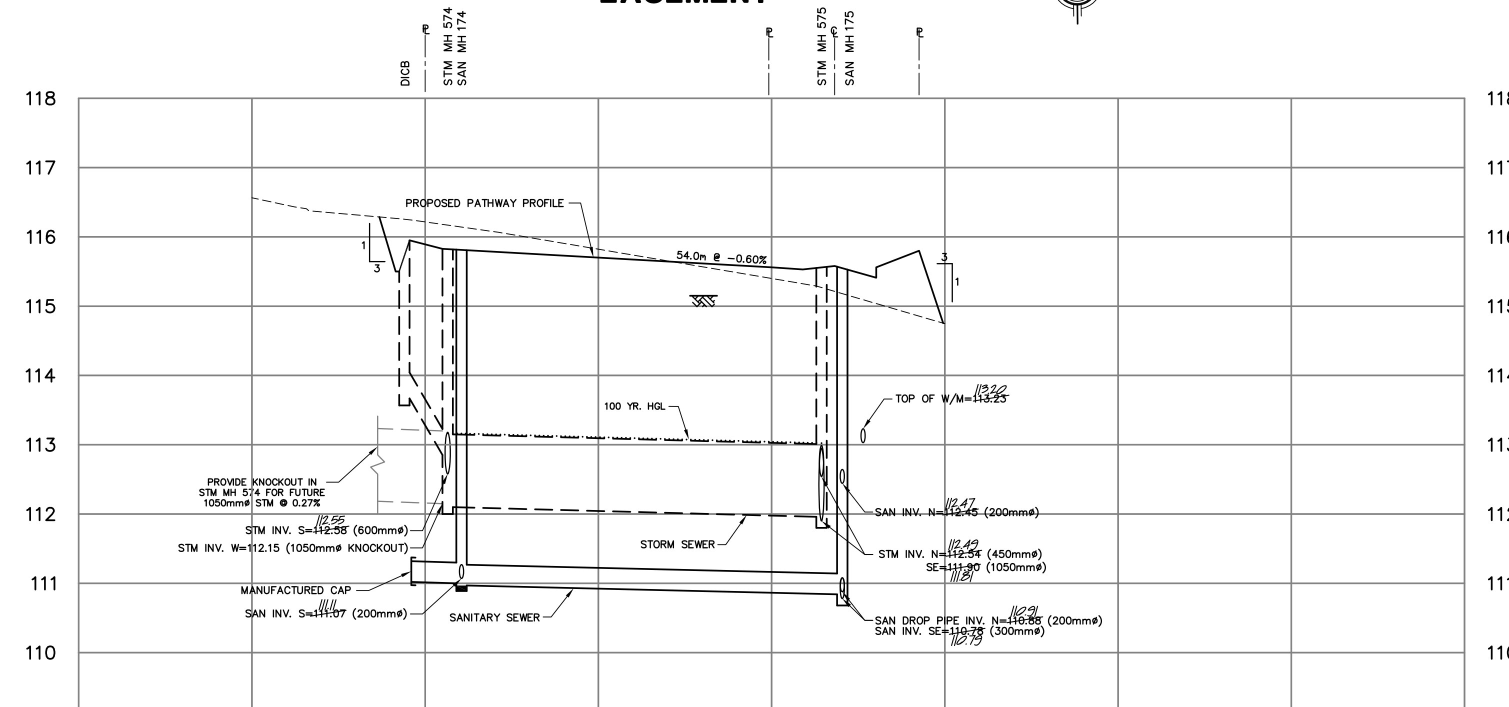


℄ ROAD ELEVATION	115.51					115.35 / 115.33										
TOP OF WATERMAIN ELEVATION	~~113.11~~ 113.13					112.94 ~~112.95~~ ~~±112.93~~ 112.94										
STORM SEWER INVERT	36.5m ~~36.5m~~-1350mmø STM @~~0.20%~~ 0.23% CONC 50D					111.30 ~~111.28~~ 111.28			41.5m-1350mmø STM @~~0.20%~~ 0.23% CONC 50D					111.20 / 111.18		
SANITARY SEWER INVERT	38.0m ~~38.0m~~-300mmø SAN @~~0.20%~~ 0.19% CONC 140D					110.49 ~~110.50~~ 110.50			43.0m-300mmø SAN @~~0.20%~~ 0.19% CONC 140D					110.41 / 110.38		
EXISTING ℄ R.O.W. ELEVATION	113.98	114.27	114.60	114.92	115.12	115.25	115.37	115.43	115.48	115.53	115.54	115.55	115.55	115.55	115.59	115.56
CHAINAGE	1+400					1+425 / 1+427.5 / 1+428					1+450				1+469 / 1+471	1+475

CHAINAGE (continued): 1+500, 1+525

BANDELIER WAY

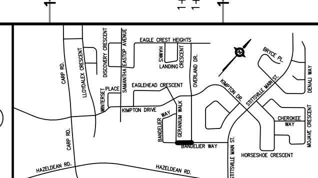
EASEMENT



℄ OF PATHWAY ELEVATION						115.86					115.71					115.56	115.53	115.58	115.41		
TOP OF WATERMAIN ELEVATION																					
STORM SEWER INVERT	5.0m ~~5.0m~~-375mmø STM @~~22.0%~~ 24.2% PVC SDR 35				113.82 ~~113.82~~	112.61 ~~112.72~~ ~~112.12~~ 112.09					53.0m ~~53.0m~~-1050mmø STM @~~0.30%~~ 0.45% CONC 50D						~~111.96~~ 111.85				
SANITARY SEWER INVERT	7.5m ~~7.5m~~-300mmø SAN @~~0.23%~~ 0.23% PVC SDR 35				111.03 ~~111.02~~	111.01 ~~111.00~~ ~~110.97~~ 110.98			55.5m ~~55.5m~~-300mmø SAN @~~0.23%~~ 0.22% PVC SDR 35									~~110.84~~ 110.86			
EXISTING ℄ R.O.W. ELEVATION	116.56	116.46	116.36	116.32	116.27	116.22	116.14	116.07	115.99	115.91	115.82	115.74	115.65	115.57	115.48	115.40	115.32	115.19	115.04	114.89	114.75
CHAINAGE						8+072 / 8+072.5 / 8+075 / 8+078.5 / 8+080					8+100					8+125	9+132.2	8+135.2			8+150

NOTE:

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



No.	REVISION △-APPLIES WHEN DRAWING MODIFIED	DATE	BY
4	AS PER CITY COMMENTS	DEC. 06/16	JMD
5	FOR ORDERING	FEB. 3/17	JMD
6	AS PER CITY COMMENTS	FEB. 9/17	JMD
7	ISSUED FOR TENDER	FEB. 23/17	JMD
8	ISSUED FOR CONSTRUCTION	MAR. 31/17	JMD
9	SUBMITTED FOR APPROVAL	APR. 12/17	JMD
10	ISSUED FOR ROAD CONSTRUCTION	MAY 17/17	JMD
11	REVISED COMPOSITE UTILITY PLAN	JUNE 06/17	AGS
12	AS PER CITY COMMENTS	AUG. 02/17	AGS
13	*RECORD DRAWINGS*	JAN. 03/18	AGS

SCALE
1:500 HORIZONTAL (5m 0 15m)
1:50 VERTICAL (0.5m 0 1.5m)

DESIGN VLL
CHECKED AGS
DRAWN MAL
CHECKED AGS
APPROVED AGS

ATREL Engineering Ltd Ltée
Engineers - Ingénieurs
1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

CITY OF OTTAWA
POTTER'S KEY SUBDIVISION (STITTSVILLE)

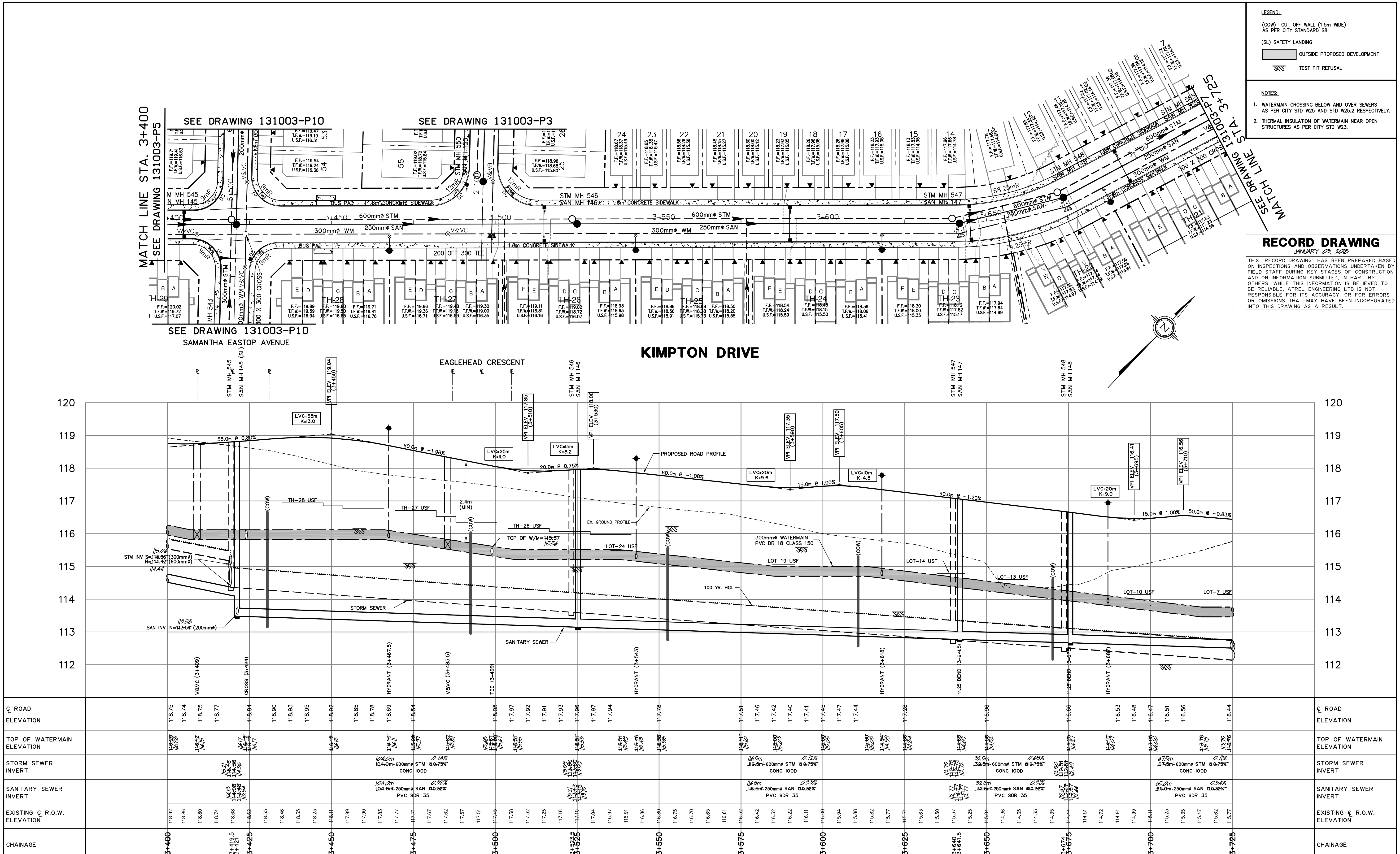
MINTO COMMUNITIES INC.

CLIENT No. 148
PROJECT No. 131003
DATE JANUARY, 2014

PLAN AND PROFILE
BANDELIER WAY
STATION 1+400 TO STATION 1+725

DRAWING No. 131003-P2

D07-16-14-0013



LEGEND:

(COW) CUT OFF WALL (1.5m WIDE) AS PER CITY STANDARD S8

(SL) SAFETY LANDING

OUTSIDE PROPOSED DEVELOPMENT

TEST PIT REFUSAL

NOTES:

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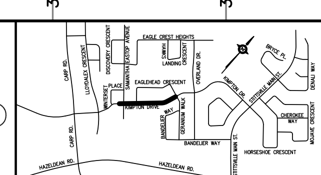

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DESIGN	VLL
CHECKED	AGS
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APPROVED	AGS

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CLIENT No. 148
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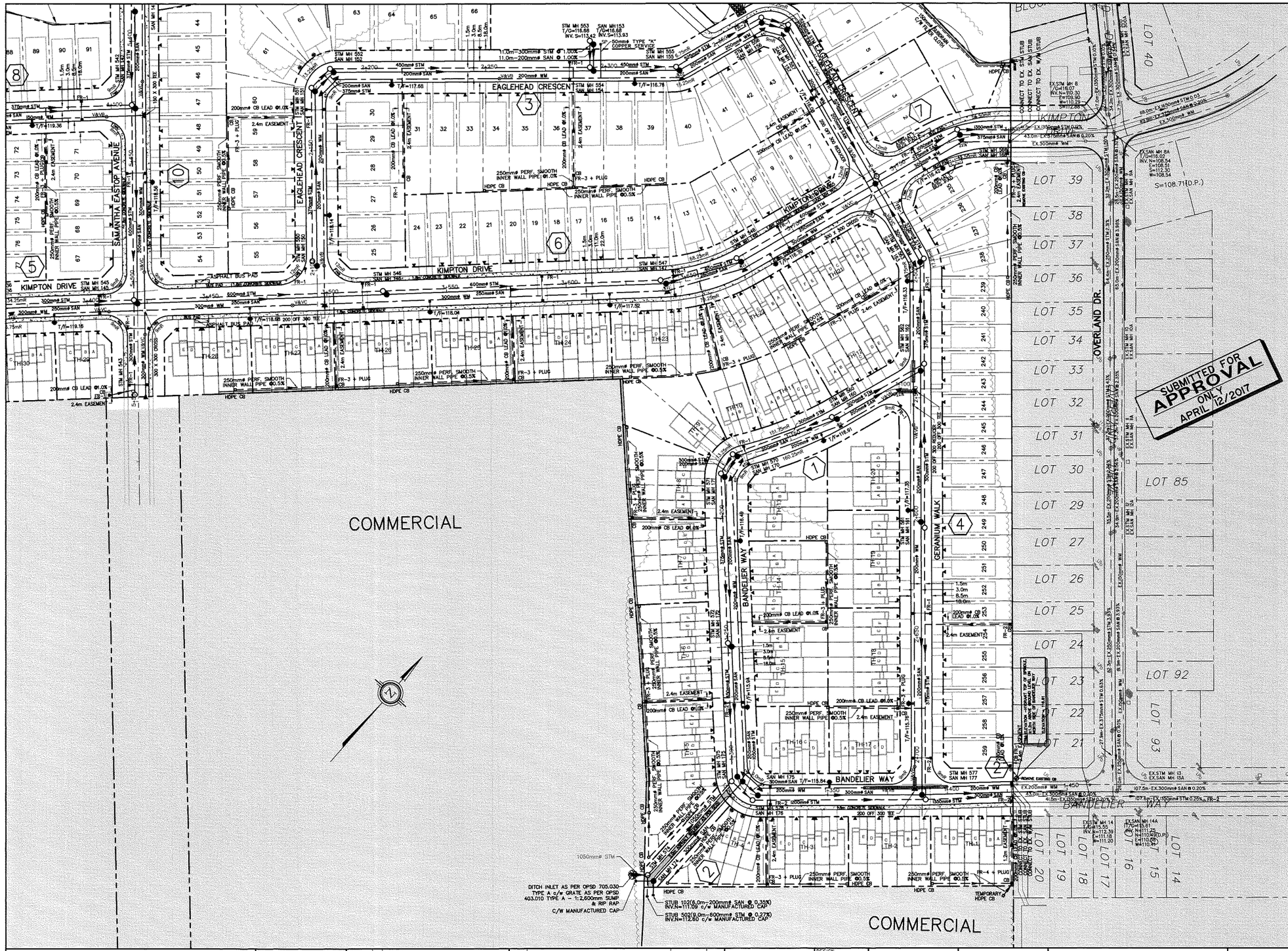
DATE JANUARY, 2014

PLAN AND PROFILE
KIMPTON DRIVE
STATION 3+400 TO STATION 3+725

DRAWING No. 131003-P6

D07-16-14-0013



NOTES:

1. CONSTRUCT ALL WATERMAIN TO CITY OF OTTAWA'S STANDARD AND SPECIFICATIONS. BEDDING SHALL BE AS PER OPSD 1102.01 AND OPSD 1102.02
2. PROVIDE INSULATION AT CATCHBASINS IN ACCORDANCE WITH CITY OF OTTAWA'S STANDARD DRAWING W23.
3. INSTALL ALL SERVICES IN ACCORDANCE WITH CITY OF OTTAWA'S STANDARD DRAWING R21, W26, W36, W38 AND S11.1.
4. PROVIDE CATHODIC PROTECTION TO CITY OF OTTAWA'S STANDARDS AND SPECIFICATIONS.
5. RESTRAIN ALL BENDS, TEES, AND CAPS TO CITY OF OTTAWA'S STANDARDS AND SPECIFICATIONS.
6. ALL SERVICES SHALL BE PLACED AT A DISTANCE OF 1/3 FROM SIDE PROPERTY LINE.
7. ALL SIDEWALKS SHALL BE HANDICAP ACCESSIBLE AND AS PER CITY STANDARD SC4, SC6 AND SC7.2.
8. ALL CONNECTION TO EXISTING WM STUB BY CITY OF OTTAWA EXCAVATION, BACKFILL AND REINSTATEMENT BY CONTRACTOR.
9. CONNECT TO EXISTING W/M VIA T.V.S. VALVE CHAMBER AS PER CITY OF OTTAWA STANDARD W11.1
10. CONNECT TO EX. SAN AND STM STUBS.
11. IN AREAS WHERE SERVICE TRENCHES ARE LOCATED WITHIN 3 METRES OF RESIDENTIAL FOUNDATION, SUCH AS REAR YARD CATCHBASIN LEADS, IT WILL BE NECESSARY TO BACKFILL THE PORTION OF THE TRENCH BELOW THE FOUNDATION LEVEL WITH ENGINEERED FILL.
12. FOR THRUST BLOCK DESIGN, ON THE WATERMAIN, A SOIL BEARING CAPACITY OF 20 KPA CAN BE USED. (REFER TO 131003-T01 FOR DESIGN)
13. ALL STORM SEWERS 900mm AND GREATER TO BE BENCHED. ALL SANITARY MANHOLES TO BE BENCHED. SEWER SHALL HAVE CLASS "B" BEDDING.
14. THE CITY OF OTTAWA WILL NOT PERMIT ANY ENCROACHMENTS ONTO ANY REAR YARD CATCH BASIN LEAD DRAINAGE EASEMENTS.
15. ALL STORM AND SANITARY SERVICES ARE TO BE EQUIPPED WITH A BACKWATER VALVES. AS PER CITY STANDARD S14 AND S14.2.
16. ALL HYDRANTS ARE TO BE LOCATED AS PER CITY OF OTTAWA STANDARD DRAWING W19 AND INSTALLED AS PER W19.
17. CONTRACTOR IS TO REPAIR BENCHING TO ALL EXISTING SAN MH PRIOR TO CONNECTIONS.
18. SPECIAL PIPE BEDDING AND COVER IS REQUIRED IN AREAS OF GRAY SILTY CLAY AND SHALL BE INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO BACKFILL
19. CURBS SHALL BE DEPRESSED AT EVERY ENTRANCE CROSSING AS PER CITY STANDARD SC1.1 AND SC7.1
20. PERFORATED PIPE FOR REAR YARD SHALL BE INSTALLED AS PER CITY STANDARD S29.
21. ALL SANITARY AND STORM MANHOLE COVERS SHALL BE INSTALLED AS PER THE CORRESPONDING CITY OF OTTAWA STANDARD DETAIL DRAWING (REFER TO 131003-T01).

REVIEWED BY DEVELOPMENT REVIEW BRANCH

Signed _____ for James Hall

Date _____ 2017

Plan Number _____

LEGEND

- EXISTING TREE LINE
- EXISTING TREES
- EXISTING FENCE
- EXISTING FIRE HYDRANT
- EXISTING VALVE AND VALVE CHAMBER
- EX.V&VB — EXISTING VALVE AND VALVE BOX
- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- EXISTING CATCHBASIN
- EXISTING LIGHT POLE
- EXISTING HYDRO POST
- EXISTING SIGN
- Transf. — EX. PADMOUNT HYDRO TRANSFORMER
- BPed — EXISTING BELL PEDESTAL
- TVPed — EXISTING CABLE PEDESTAL
- SIB — EXISTING STANDARD IRON BAR
- EXISTING WATERMAIN
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- PROPOSED WATERMAIN
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- 45° — PROPOSED BEND C/W THRUSTBLOCK (SPECIAL DESIGN)
- PROPOSED CAP C/W THRUSTBLOCK (SPECIAL DESIGN)
- V&VB — PROPOSED VALVE AND VALVE BOX
- V&VC — PROPOSED VALVE AND VALVE CHAMBER
- PROPOSED FIRE HYDRANT
- DICB — PROPOSED DITCH INLET CATCHBASIN AS PER OPSD 705.030 C/W 3H:1V SLOPED GRATE
- PROP. HDPE CB AS PER CITY OF OTTAWA STANDARD S30, AND DETAIL IN DRAWING 131003-T01
- PROPOSED CATCHBASIN
- PROPOSED RETAINING WALLS
- PROPOSED INSULATION (SEE PROFILES FOR DETAILS)
- T/F=114.83 — PROPOSED TOP OF FLANGE ELEVATION
- HOUSE SERVICE
- HOUSE SERVICE IN DRIVEWAY
- NON-TYPICAL HOUSE SERVICE
- FR-1 + PLUG — FLOW RESTRICTOR AND PLUG WHERE APPLICABLE (SEE 131003 TD-1 FOR DETAILS)
- 9mR — CURB RADIUS
- TWSI — TACTILE WALKING SURFACE INDICATORS
- OUTSIDE PROPOSED DEVELOPMENT
- 3 — PROFILE NUMBER

TBM-ELEVATION =HYDRANT TOP OF SPINDLE, ±1.3m ABOVE GROUND LEVEL ON NORTH SIDE OF BANDELIER WAY
ELEVATION = 116.81

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

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1	SUBMITTED FOR APPROVAL	MAY 05/16	JMD
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7	ISSUED FOR TENDER	FEB. 23/17	JMD
8	ISSUED FOR CONSTRUCTION	MAR. 31/17	JMD
9	SUBMITTED FOR APPROVAL	APR. 12/17	JMD

SCALE 1:750 (8m 0 24m)

DESIGN AGS · CHECKED JMD · DRAWN SAB · CHECKED AGS · APPROVED JMD

LICENSED PROFESSIONAL ENGINEER A.G.Y. SAUVE 100142393 Apr. 12, 2017 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER J.M. DECOEUR April 12, 2017 PROVINCE OF ONTARIO

ATREL Engineering Ltd.
Engineers - Ingénieurs
1-2084 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M8
TEL.: (613) 446-7423

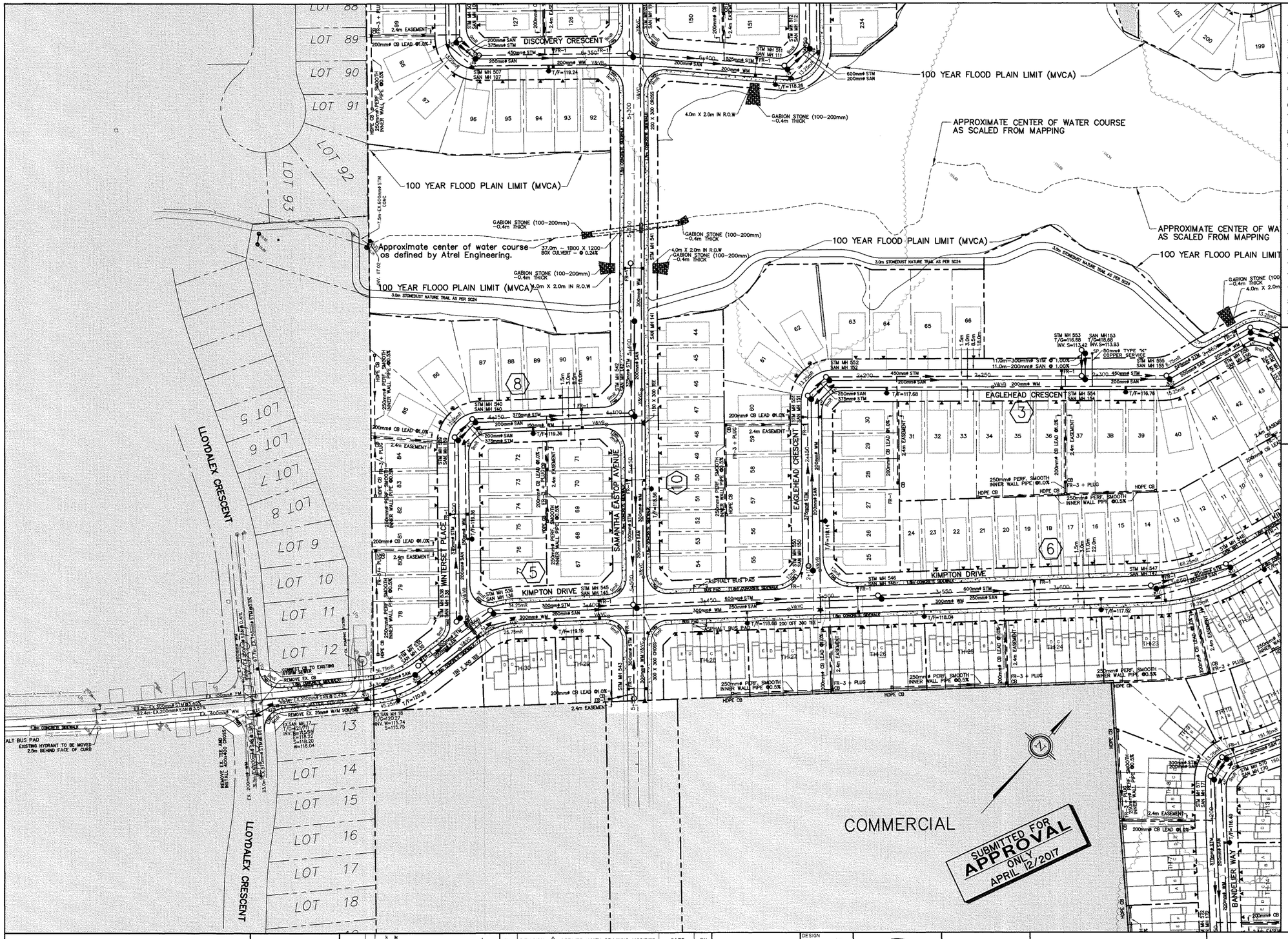
CITY OF OTTAWA
POTTER'S KEY SUBDIVISION (STITTSVILLE)

MINTO COMMUNITIES INC.

CLIENT No. 148
PROJECT No. 131003
DATE JANUARY, 2014
DRAWING No. 131003-SI

PLAN
GENERAL PLAN OF SERVICES

D07-16-14-0013



NOTES:

1. CONSTRUCT ALL WATERMAIN TO CITY OF OTTAWA'S STANDARD AND SPECIFICATIONS. BEDDING SHALL BE AS PER OPSD 1102.01 AND OPSD 1102.02
2. PROVIDE INSULATION AT CATCHBASINS IN ACCORDANCE WITH CITY OF OTTAWA'S STANDARD DRAWING W23.
3. INSTALL ALL SERVICES IN ACCORDANCE WITH CITY OF OTTAWA'S STANDARD DRAWING R21, W26, W36, W38 AND S11.1.
4. PROVIDE CATHODIC PROTECTION TO CITY OF OTTAWA'S STANDARDS AND SPECIFICATIONS.
5. RESTRAIN ALL BENDS, TEES, AND CAPS TO CITY OF OTTAWA'S STANDARDS AND SPECIFICATIONS.
6. ALL SERVICES SHALL BE PLACED AT A DISTANCE OF 1/3 FROM SIDE PROPERTY LINE.
7. ALL SIDEWALKS SHALL BE HANDICAP ACCESSIBLE AND AS PER CITY STANDARD SC4, SC6 AND SC7.2.
8. ALL CONNECTION TO EXISTING WM STUB BY CITY OF OTTAWA EXCAVATION, BACKFILL AND REINSTATEMENT BY CONTRACTOR.
9. CONNECT TO EXISTING W/M VIA T.V.S. VALVE CHAMBER AS PER CITY OF OTTAWA STANDARD W1.1
10. CONNECT TO EX. SAN AND STM STUBS.
11. IN AREAS WHERE SERVICE TRENCHES ARE LOCATED WITHIN 3 METRES OF RESIDENTIAL FOUNDATION, SUCH AS REAR YARD CATCHBASIN LEADS, IT WILL BE NECESSARY TO BACKFILL THE PORTION OF THE TRENCH BELOW THE FOUNDATION LEVEL WITH ENGINEERED FILL.
12. FOR THRUST BLOCK DESIGN, ON THE WATERMAIN, A SOIL BEARING CAPACITY OF 20 KPA CAN BE USED. (REFER TO 131003-T01 FOR DESIGN)
13. ALL STORM SEWERS 900mm AND GREATER TO BE BENCHED. ALL SANITARY MANHOLES TO BE BENCHED. SEWER SHALL HAVE CLASS "B" BEDDING.
14. THE CITY OF OTTAWA WILL NOT PERMIT ANY ENCROACHMENTS ONTO ANY REAR YARD CATCH BASIN LEAD DRAINAGE EASEMENTS.
15. ALL STORM AND SANITARY SERVICES ARE TO BE EQUIPPED WITH A BACKWATER VALVES. AS PER CITY STANDARD S14 AND S14.2.
16. ALL HYDRANTS ARE TO BE LOCATED AS PER CITY OF OTTAWA STANDARD DRAWING W18 AND INSTALLED AS PER W19.
17. CONTRACTOR IS TO REPAIR BENCHING TO ALL EXISTING SAN MH PRIOR TO CONNECTIONS.
18. SPECIAL PIPE BEDDING AND COVER IS REQUIRED IN AREAS OF GRAY SILTY CLAY AND SHALL BE INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO BACKFILL.
19. CURBS SHALL BE DEPRESSED AT EVERY ENTRANCE CROSSING AS PER CITY STANDARD SC1.1 AND SC7.1
20. PERFORATED PIPE FOR REAR YARD SHALL BE INSTALLED AS PER CITY STANDARD S29.
21. ALL SANITARY AND STORM MANHOLE COVERS SHALL BE INSTALLED AS PER THE CORRESPONDING CITY OF OTTAWA STANDARD DETAIL DRAWING (REFER TO 131003-T01).

REVIEWED BY DEVELOPMENT REVIEW BRANCH
Signed *Per Signed for James Ho*
Date 04 21 2017
Plan Number 7314

LEGEND

- EXISTING TREE LINE
- EXISTING TREES
- EXISTING FENCE
- EXISTING FIRE HYDRANT
- EXISTING VALVE AND VALVE CHAMBER
- EXISTING VALVE AND VALVE BOX
- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- EXISTING CATCHBASIN
- EXISTING LIGHT POLE
- EXISTING HYDRO POST
- EXISTING SIGN
- EX PADMOUNT HYDRO TRANSFORMER
- EXISTING BELL PEDESTAL
- EXISTING CABLE PEDESTAL
- EXISTING STANDARD IRON BAR
- EXISTING WATERMAIN
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- PROPOSED WATERMAIN
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED BEND C/W THRUSTBLOCK (SPECIAL DESIGN)
- PROPOSED CAP C/W THRUSTBLOCK (SPECIAL DESIGN)
- PROPOSED VALVE AND VALVE BOX
- PROPOSED VALVE AND VALVE CHAMBER
- PROPOSED FIRE HYDRANT
- PROPOSED DITCH INLET CATCHBASIN AS PER OPSD 705.030 C/W 3H:1V SLOPED GRATE
- PROP. HDPE CB AS PER CITY OF OTTAWA STANDARD S30, AND DETAIL IN DRAWING 131003-T01
- PROPOSED CATCHBASIN
- PROPOSED RETAINING WALLS
- PROPOSED INSULATION (SEE PROFILES FOR DETAILS)
- T/F=114.83 PROPOSED TOP OF FLANCE ELEVATION
- HOUSE SERVICE
- HOUSE SERVICE IN DRIVEWAY
- NON-TYPICAL HOUSE SERVICE
- FR-1 + PLUG FLOW RESTRICTOR AND PLUG WHERE APPLICABLE (SEE 131003 T0-1 FOR DETAILS)
- 9mR CURB RADIUS
- TWSI TACTILE WALKING SURFACE INDICATORS
- OUTSIDE PROPOSED DEVELOPMENT
- (3) PROFILE NUMBER

TBM-ELEVATION =HYDRANT TOP OF SPINDLE, 61.3m ABOVE GROUND LEVEL ON NORTH SIDE OF BANDELIER WAY
ELEVATION = 118.61

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SCALE 1:750 (8m 0 24m)

DESIGN AGS
CHECKED JMD
DRAWN SAB
CHECKED AGS
APPROVED JMD

LICENSED PROFESSIONAL ENGINEER A. G. Y. SAUVE 100142393 Apr. 12, 2017 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER J.M.J. DECOEUR April 12, 2017 PROVINCE OF ONTARIO

ATREL Engineering Ltd.
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TEL.: (613) 446-7423

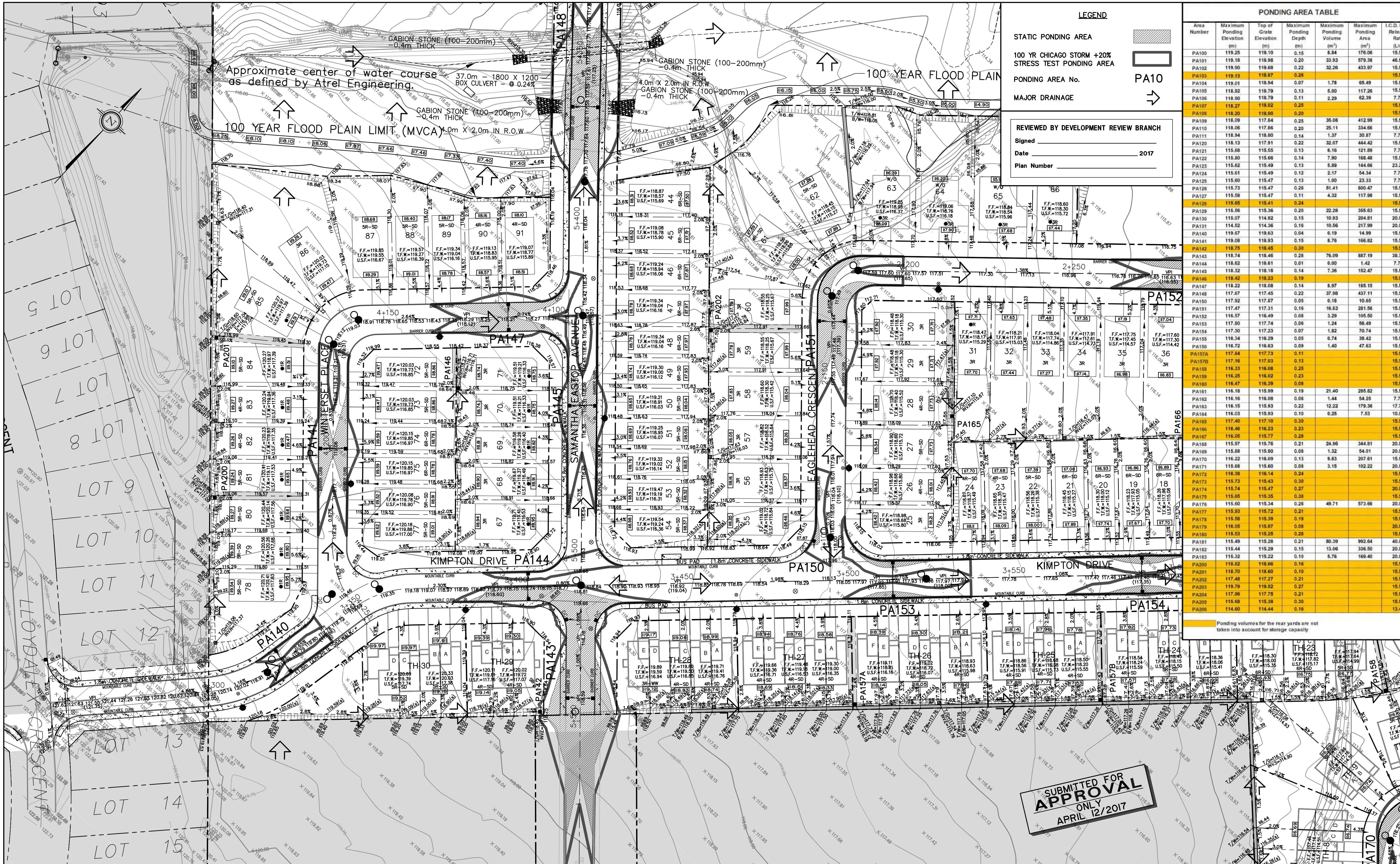
CITY OF OTTAWA
POTTER'S KEY SUBDIVISION (STITTSVILLE)

MINTO COMMUNITIES INC.

PLAN
GENERAL PLAN OF SERVICES

CLIENT No. 148
PROJECT No. 131003
DATE JANUARY, 2014
DRAWING No. 131003-S2

D07-16-14-0013



LEGEND

STATIC PONDING AREA

100 YR CHICAGO STORM +20% STRESS TEST PONDING AREA

PONDING AREA No. — PA10

MAJOR DRAINAGE

REVIEWED BY DEVELOPMENT REVIEW BRANCH

Signed ______________________

Date ______________________ 2017

Plan Number ______________________

PONDING AREA TABLE

Area Number	Maximum Ponding Elevation (m)	Top of Grate Elevation (m)	Maximum Ponding Depth (m)	Maximum Ponding Volume (m^3)	Maximum Ponding Area (m^2)	I.C.D. Flow Release Rate (L/s)
PA100	119.25	119.10	0.15	8.84	176.06	15.50
PA101	119.18	118.98	0.20	33.93	579.38	46.50
PA102	119.90	119.68	0.22	32.26	433.97	15.50
PA103	119.13	118.87	0.26			15.50
PA104	119.01	118.94	0.07	1.78	65.49	15.50
PA105	118.92	118.79	0.13	5.00	117.26	15.50
PA106	118.90	118.79	0.11	2.29	62.39	7.75
PA107	118.27	118.02	0.25			15.50
PA108	118.20	118.00	0.20			15.50
PA109	118.09	117.84	0.25	35.08	412.99	15.50
PA110	118.06	117.86	0.20	25.11	334.66	15.50
PA111	118.94	118.80	0.14	1.37	30.87	7.75
PA120	118.13	117.91	0.22	32.07	444.42	15.50
PA121	115.68	115.55	0.13	6.16	121.89	7.75
PA122	115.80	115.66	0.14	7.90	168.48	15.50
PA123	115.62	115.49	0.13	5.89	144.66	23.25
PA124	115.61	115.49	0.12	2.17	54.34	7.75
PA125	115.60	115.47	0.13	1.00	23.33	7.75
PA126	115.73	115.47	0.26	51.41	600.47	15.50
PA127	115.58	115.47	0.11	4.32	117.98	15.50
PA128	115.65	115.41	0.24			15.50
PA129	115.56	115.36	0.20	22.28	355.63	15.50
PA130	115.07	114.92	0.15	10.93	204.81	20.00
PA131	114.52	114.36	0.16	10.56	217.99	20.00
PA140	119.67	119.63	0.04	0.19	14.99	15.50
PA141	119.08	118.93	0.15	8.76	166.82	15.50
PA142	118.75	118.45	0.30			15.50
PA143	118.74	118.46	0.28	76.09	887.19	38.75
PA144	118.62	118.61	0.01	0.00	1.42	7.75
PA145	118.32	118.18	0.14	7.36	152.47	15.50
PA146	118.42	118.23	0.19			15.50
PA147	118.22	118.08	0.14	8.97	185.15	15.50
PA148	117.67	117.45	0.22	37.98	437.11	15.50
PA150	117.92	117.87	0.05	0.18	10.65	15.50
PA151	117.47	117.31	0.16	16.83	281.56	15.50
PA152	116.57	116.49	0.08	3.29	105.50	15.50
PA153	117.80	117.74	0.06	1.24	56.49	15.50
PA154	117.30	117.23	0.07	1.82	70.74	15.50
PA155	116.34	116.29	0.05	0.74	38.42	15.50
PA156	116.72	116.63	0.09	1.40	47.63	15.50
PA157A	117.84	117.73	0.11			15.50
PA157B	117.16	117.03	0.13			15.50
PA158	116.33	116.08	0.25			15.50
PA159	116.25	116.02	0.23			15.50
PA160	116.47	116.39	0.08			15.50
PA161	116.18	115.99	0.19	21.40	285.82	15.50
PA162	116.16	116.08	0.08	1.44	54.25	7.75
PA163	116.15	115.93	0.22	12.22	179.36	17.75
PA164	116.03	115.93	0.10	0.25	7.53	10.00
PA165	117.40	117.10	0.30			15.50
PA166	116.46	116.23	0.23			15.50
PA167	116.05	115.77	0.28			15.50
PA168	115.97	115.76	0.21	24.96	344.81	20.00
PA169	115.88	115.80	0.08	1.32	54.01	20.00
PA170	116.22	116.09	0.13	9.63	207.61	15.50
PA171	115.68	115.60	0.08	3.15	102.22	20.00
PA172	116.38	116.14	0.24			15.50
PA173	115.73	115.43	0.30			15.50
PA174	115.74	115.47	0.27			20.00
PA175	115.65	115.35	0.30			15.50
PA176	115.60	115.34	0.26	49.71	573.66	20.00
PA177	115.93	115.72	0.21			15.50
PA178	115.58	115.39	0.19			15.50
PA179	116.05	115.97	0.08			20.00
PA180	115.53	115.25	0.28			15.50
PA181	115.49	115.28	0.21	80.39	992.64	40.00
PA182	115.44	115.29	0.15	13.06	336.50	20.00
PA183	115.32	115.22	0.10	5.76	169.40	20.00
PA200	118.82	118.66	0.16			15.50
PA201	118.70	118.60	0.10			15.50
PA202	117.48	117.27	0.21			15.50
PA203	119.79	119.52	0.27			15.50
PA204	117.96	117.75	0.21			15.50
PA205	115.68	115.38	0.30			15.50
PA206	114.60	114.44	0.16			13.40

Ponding volumes for the rear yards are not taken into account for storage capacity

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8	ISSUED FOR CONSTRUCTION	MAR. 31/17	JMD
9	SUBMITTED FOR APPROVAL	APR. 12/17	JMD

SCALE 1:500 HORIZONTAL

DESIGN AGS
CHECKED JMD
DRAWN SAB
CHECKED AGS
APPROVED JMD

LICENSED PROFESSIONAL ENGINEER A. G. Y. SAUVE 100142393 Apr. 12, 2017 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER J.M.J.DECOEUR April 12/2017 PROVINCE OF ONTARIO

ATREL Engineering Ltd Ltée
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CITY OF OTTAWA
POTTER'S KEY SUBDIVISION (STITTSVILLE)

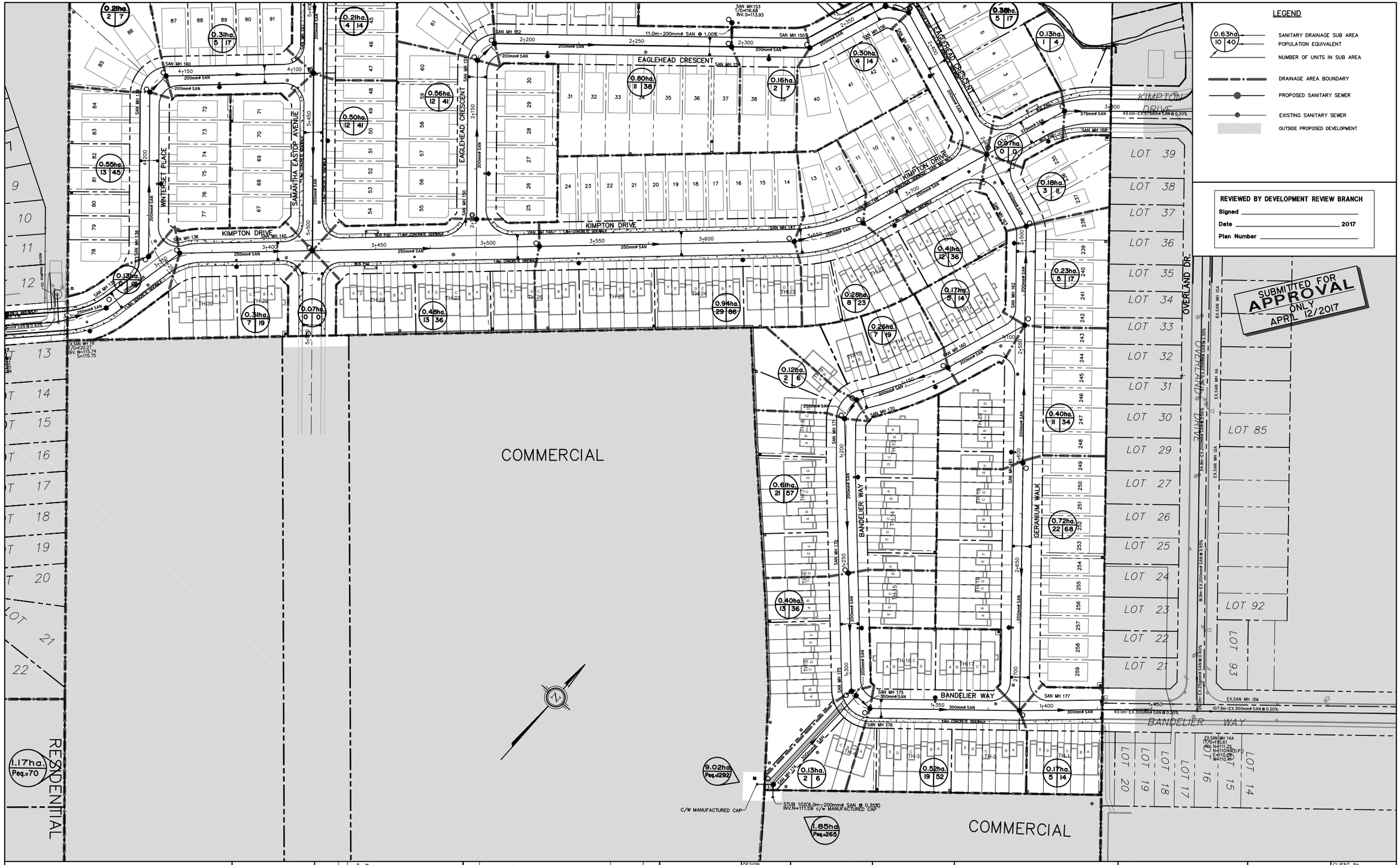
MINTO COMMUNITIES INC.

CLIENT No. 148
PROJECT No. 131003
DATE JANUARY, 2014

PLAN
PONDING AREA PLAN

DRAWING No. 131003-PA3

D07-16-14-0013



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8	ISSUED FOR CONSTRUCTION	MAR. 31/17	JMD
9	SUBMITTED FOR APPROVAL	APR. 12/17	JMD

SCALE 1:750 (8m 0 24m)

DESIGN AGS
CHECKED JMD
DRAWN PNC
CHECKED AGS
APPROVED JMD

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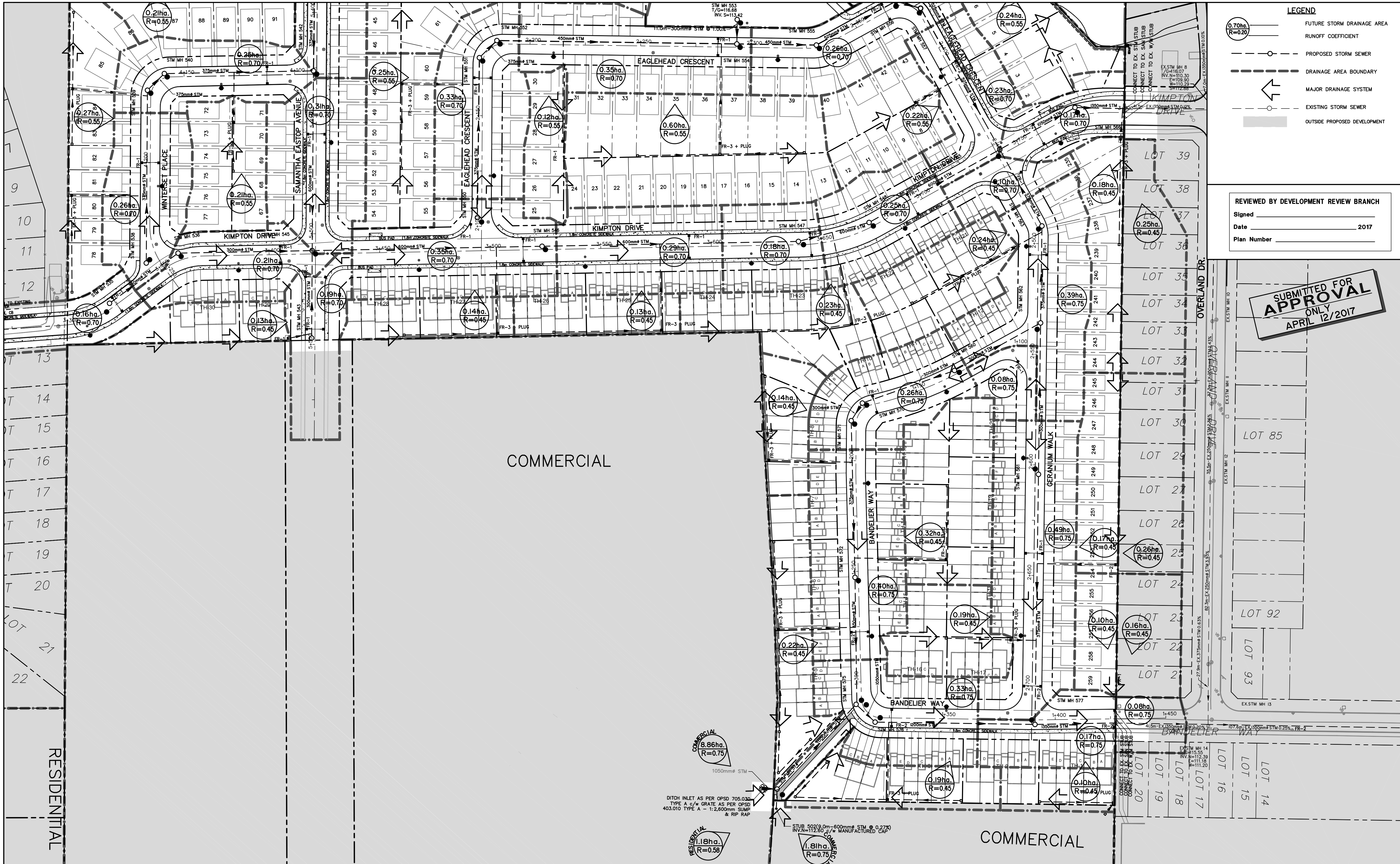
CITY OF OTTAWA
POTTER'S KEY SUBDIVISION (STITTSVILLE)

MINTO COMMUNITIES INC.

PLAN
SANITARY DRAINAGE AREA PLAN

CLIENT No. 148
PROJECT No. 131003
DATE JANUARY, 2014
DRAWING No. 131003-SANI

D07-16-14-0013



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8	ISSUED FOR CONSTRUCTION	MAR. 31/17	JMD
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SCALE 1:750 (8m 0 24m)

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CHECKED JMD
DRAWN PNC
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APPROVED JMD

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CITY OF OTTAWA
POTTER'S KEY SUBDIVISION (STITTSVILLE)

MINTO COMMUNITIES INC.

CLIENT No. 148
PROJECT No. 131003
DATE JANUARY, 2014

PLAN
STORM DRAINAGE AREA PLAN

DRAWING No. 131003-STM1

D07-16-14-0013

MINTO COMMUNITIES INC.

STORMWATER MANAGEMENT, WATERMAIN, STORM SEWER AND SANITARY SEWER

DESIGN BRIEF

PART OF LOT 23 AND 24
CONCESSION 12

POTTER'S KEY SUBDIVISION

CITY OF OTTAWA

FEBRUARY 2017

ATREL Engineering Ltd Ltée
Engineers - Ingénieurs

(Revision 5)

SANITARY SEWER COMPUTATION FORM

DATE: **February 2017**
DESIGNED BY: VLL
CHECKED BY: AGS

PROJECT: **POTTER'S KEY SUBDIVISION**
CLIENT: Minto Communities Inc.
PROJECT #: 131003
BY: ATREL ENGINEERING LTD

q= 350 l/cap.day
I= 0.28 l/ha.s
PVC/CONC N= 0.013
OTHER N= 0.024

Table 20
Single dwelling= 3.4 person/unit
Townhouse= 2.7 person/unit

STREET NAMES	LOCATION FROM (Up)		LOCATION TO (Down)		RESIDENTIAL INDIVIDUAL AREA (ha.)	RESIDENTIAL INDIVIDUAL POP.	RESIDENTIAL CUMULATIVE AREA (ha.)	RESIDENTIAL CUMULATIVE POP.	RESIDENTIAL PEAKING FACTOR M	RESIDENTIAL FLOW Q(p) (L/S)	COMMERCIAL , INSTITUTIONAL INDIVIDUAL AREA (ha.)	COMMERCIAL , INSTITUTIONAL INDIVIDUAL POP.	COMMERCIAL , INSTITUTIONAL CUMULATIVE AREA (ha.)	COMMERCIAL , INSTITUTIONAL CUMULATIVE POP.	COMMERCIAL , INSTITUTIONAL PEAKING FACTOR M	COMMERCIAL , INSTITUTIONAL FLOW Q(p) (L/S)	PEAKING FACTOR M	FLOW Q(p) (L/S)	PEAK EXT.FLOW Q(i) (L/S)	PEAK DES. Q(d) (L/S)	SEWER DATA TYPE PIPE	DIA. (N0M) (mm)	DIA. (ACT) (MM)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	UpStream Obv. (M)	UpStream Inv. (M)	DwnStream Obv. (M)	DwnStream Inv. (M)
Eaglehead Crescent	MH	150	MH	151	0.56	41.0	0.56	41	4.00	0.66									0.16	0.82	PVC	200	201.2	0.85	72.5	30.71	97%	0.97	115.06	114.86	114.44	114.24
Eaglehead Crescent	MH	151	MH	152	0.21	7.0	0.77	48	4.00	0.78									0.22	0.99	PVC	200	201.2	0.85	11.0	30.71	97%	0.97	114.41	114.21	114.32	114.12
Eaglehead Crescent	MH	152	MH	154	0.80	38.0	1.57	86	4.00	1.39									0.44	1.83	PVC	200	201.2	0.85	108.5	30.71	94%	0.97	114.14	113.94	113.22	113.02
Park 2	MH	153	MH	154	0.37		0.37												0.10	0.10	PVC	200	201.2	1.00	11.0	33.31	100%	1.05	114.13	113.93	114.02	113.82
Eaglehead Crescent	MH	154	MH	155	0.16	7.0	2.10	93	4.00	1.51									0.59	2.09	PVC	200	201.2	0.85	36.0	30.71	93%	0.97	113.22	113.02	112.91	112.71
Eaglehead Crescent	MH	155	MH	156	0.30	14.0	2.40	107	4.00	1.73									0.67	2.41	PVC	200	201.2	0.50	39.5	23.55	90%	0.74	112.88	112.68	112.68	112.48
Eaglehead Crescent	MH	156	MH	157			2.40	107	4.00	1.73									0.67	2.41	PVC	200	201.2	0.50	11.0	23.55	90%	0.74	112.65	112.45	112.59	112.39
Eaglehead Crescent	MH	157	MH	165	0.38	17.0	2.78	124	4.00	2.01									0.78	2.79	PVC	200	201.2	1.24	73.5	37.09	92%	1.17	112.56	112.36	111.65	111.45
Bandelier Way	MH	160	MH	162	0.17	14.0	0.17	14	4.00	0.23									0.05	0.27	PVC	200	201.2	0.65	40.0	26.86	99%	0.84	114.18	113.98	113.92	113.72
Geranium Walk	MH	161	MH	162	0.40	34.0	0.40	34	4.00	0.55									0.11	0.66	PVC	200	201.2	0.65	63.0	26.86	98%	0.84	114.28	114.08	113.87	113.67
Geranium Walk	MH	162	MH	163	0.23	17.0	0.80	65	4.00	1.05									0.22	1.28	PVC	200	201.2	0.50	45.5	23.55	95%	0.74	113.32	113.12	113.09	112.89
Geranium Walk	MH	163	MH	165	0.18	11.0	0.98	76	4.00	1.23									0.27	1.51	PVC	200	201.2	0.50	37.5	23.55	94%	0.74	113.06	112.86	112.87	112.67
Kimpton Drive	MH	165	MH	166	0.07		16.43	1020	3.79	15.68									4.60	20.28	PVC	375	366.4	0.20	41.0	73.72	72%	0.70	111.58	111.21	111.50	111.13
Kimpton Drive	MH	166	CAP	Kimpt. Dr	0.13	4.0	16.56	1024	3.79	15.74									4.64	20.37	CONC	375	381.0	0.20	21.0	81.80	75%	0.72	109.04	108.67	109.00	108.63
Kimpton Drive	CAP	Kimpt. Dr	EX	8 A			16.56	1024	3.79	15.74									4.64	20.37	CONC	375	381.0	0.20	43.0	81.80	75%	0.72	109.00	108.63	108.91	108.54
Bandelier Way	MH	160	MH	170	0.26	19.0	0.26	19	4.00	0.31									0.07	0.38	PVC	200	201.2	0.75	44.5	28.85	99%	0.91	114.05	113.85	113.72	113.52
Bandelier Way	MH	170	MH	171	0.12	6.0	0.38	25	4.00	0.41									0.11	0.51	PVC	200	201.2	0.75	10.0	28.85	98%	0.91	113.69	113.49	113.61	113.41
Bandelier Way	MH	171	MH	172	0.61	57.0	0.99	82	4.00	1.33									0.28	1.61	PVC	200	201.2	0.75	71.0	28.85	94%	0.91	113.58	113.38	113.05	112.85
Bandelier Way	MH	172	MH	173	0.40	36.0	1.39	118	4.00	1.91									0.39	2.30	PVC	200	201.2	0.65	54.0	26.86	91%	0.84	113.05	112.85	112.70	112.50
Bandelier Way	MH	173	MH	175			1.39	118	4.00	1.91									0.39	2.30	PVC	200	201.2	0.65	3.0	26.86	91%	0.84	112.67	112.47	112.65	112.45
Commercial (by others)	STUB	101	MH	174	1.17	70.0	1.17	70	4.00	1.13	9.02	1292.0	9.02	1292	1.50	7.85			2.85	11.84	PVC	300	299.2	0.23	7.5	46.05	74%	0.65	111.32	111.02	111.30	111.00
Commercial (by Minto)	STUB	102	MH	174							1.85	265.0	1.85	265	1.50	1.61			0.52	2.13	PVC	200	201.2	0.35	6.0	19.71	89%	0.62	111.29	111.09	111.27	111.07
Easement	MH	174	MH	175			1.17	70	4.00	1.13			10.87	1557	1.50	9.46			3.37	13.97	PVC	300	299.2	0.23	55.5	46.05	70%	0.65	111.27	110.97	111.14	110.84
Bandelier Way	MH	175	MH	176	0.13	6.0	2.69	194	4.00	3.14			10.87	1557	1.50	9.46			3.80	16.40	PVC	300	299.2	0.23	8.5	46.05	64%	0.65	111.08	110.78	111.06	110.76
Bandelier Way	MH	176	MH	177	0.52	52.0	3.21	246	4.00	3.99			10.87	1557	1.50	9.46			3.94	17.39	PVC	300	299.2	0.23	68.5	46.05	62%	0.65	111.03	110.73	110.87	110.57
Geranium Walk	MH	161	MH	177	0.72	68.0	0.72	68	4.00	1.10									0.20	1.30	PVC	200	201.2	1.50	113.5	40.80	97%	1.28	114.14	113.94	112.44	112.24
Bandelier Way	MH	177	CAP	Bandelier Way	0.17	14.0	4.10	328	4.00	5.31			10.87	1557	1.50	9.46			4.19	18.97	CONC	300	304.8	0.20	38.0	44.55	57%	0.61	110.87	110.57	110.80	110.50
Street No.2	CAP	Bandelier Way	EX	14 A			4.10	328	4.00	5.31			10.87	1557	1.50	9.46			4.19	18.97	CONC	300	304.8	0.20	43.0	45.12	58%	0.62	110.80	110.50	110.71	110.41

Existing Sanitary Sewers

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Feb. 24, 2017
PROVINCE OF ONTARIO

Feedmill Creek
Stormwater Management Criteria Study

Final Report
with Expansion Area 3 and Update
April 30 2018

Submitted to:

City of Ottawa
Planning and Infrastructure

Submitted by:

J.F. Sabourin and Associates Inc.

In association with:

Coldwater Consulting Ltd

JFSA Ref. No.: 1307(01)-17

J.F. Sabourin and Associates Inc.
www.jfsa.com

JFSA Water Resources and Environmental Consultants

5.2 SWM Criteria

The SWM criteria for future developments within the Feedmill Creek subwatershed apply to the approximately 175.10 ha of remaining developable land within the Feedmill Creek subwatershed (refer to Table 1 and Figure 2). The SWM criteria have been developed based on data collected during a field investigation and analysis of hydrologic, hydraulic and geomorphic numerical simulations and calculations. The SWM criteria are setup to resolve both existing and future flood and erosion risk along Feedmill Creek. This study followed a step-by-step process considering four (4) SWM scenarios for the ultimate full build out conditions. The ultimate development conditions SWM control Scenario B has been selected as the 'optimal' scenario and forms the basis for these criteria.

There are four (4) components for SWM criteria, on-site extended detention storage, 100-year on-site storage, on-site LID controls and in-stream works.

The SWM criteria are as follows:

1. Extended Detention Control: Provide sufficient on-site storage volume to control the peak flow from a 15 mm 3-hour Chicago design storm to 0.51 L/s/ha.

2. Flood Control: Provide sufficient on-site storage volume and quantity control structure to control the peak flow from a 100-year 12-hour SCS Type II storm to 8.0 L/s/ha[3].

3. Retention Control: Provide on-site Low Impact Development (LID) controls to retain the entire volume (no runoff) from either a 5 mm or 10 mm rainfall depending on location:

    a. 5 mm for catchments located east of Carp Road (FS206_2, FS204, FS203a, FS203b, FS067_4, FS075_1, FS081_2 and FS107)

    b. 10 mm for catchments located west of Carp Road (FS103_2b and FS104_2b)[4]

4. In-stream works are required in addition to the SWM controls detailed above. A design has been prepared by Coldwater (2017b), refer to Appendix B of this report.

[3] Flood control requirements are listed for the 100-year event only, meeting this 100-year requirement will practically require inherent peak flow controls for more frequent events. The peak flow results from the 15-mm 3-hour Chicago storm and the 2- to 100-year 12-hour SCS Type II storm for near future conditions and ultimate development conditions SWM Scenario B are included in Appendix H for reference. These values should be referenced by detailed designers, in addition to the hydraulic constraints, since the overall goal of post-to-pre control on the subwatershed level applies to all return periods.

[4] The interim, near future and ultimate conditions model results for the Timbermere SWM pond are above the original design report. The proper functioning of that facility must be assessed and resolved before development can occur on the upstream catchments notwithstanding these SWM Criteria.

Appendix I – Checklist

Appendix J – Drawings

Site Plan & Survey Drawings

- Site Plan, SP-00 (08-05-2020)
- Topographic Plan, (file:Z38800, Jan 14, 2020)

Engineering Drawings (included separately)

- SSP1 – Site Servicing Plan – Rev.1
- GPM – Macro Grading Plan – Rev.1
- STMM – Macro Storm Drainage Plan – Rev.1
- SANM – Macro Sanitary Drainage Plan – Rev.1
- ESCM – Macro Erosion and Sediment Control Plan – Rev.1

SITE INFORMATION

ZONING	AM9
MAX BUILDING HEIGHT (WITHIN 20 M. OF RESIDENTIAL)	11.0 M.
MAX BUILDING HEIGHT (ALL OTHER CASES)	15.0 M.
LOT AREA	90,187.6 SQ. M.

6171 HAZELDEAN RD
STITTSVILLE, ONTARIO,
CANADA

SITE SETBACKS	PROVIDED
FRONT YARD (HAZELDEAN)	5.0 M.
CORNER SIDE YARD	N/A
INTERIOR SIDE YARD	7.5 M.
REAR YARD	7.5 M.

RESIDENTIAL UNITS	
DETACHED HOMES:	20
TOWNHOUSES:	154
CONDOMINIUM UNITS:	180
APARTMENT UNITS:	175
TOTAL UNITS:	529

PARKING	REQUIRED
DETACHED & TOWNHOUSE	
RESIDENTIAL:	1.2 PER DWELLING
VISITOR:	0.2 PER DWELLING
CONDOMINIUM & APARTMENT	
RESIDENTIAL:	1.0 PER DWELLING
VISITOR:	0.2 PER DWELLING

DEVELOPMENT STATISTICS

PARKING	REQUIRED	PROVIDED
DETACHED HOUSES		
RESIDENTIAL:	20	20
VISITOR:	4	20
TRADITIONAL TOWNS		
RESIDENTIAL:	154	154
VISITOR:	31	154
CONDOMINIUM UNITS		
RESIDENTIAL:	216	216
VISITOR:	36	36
BICYCLE:	90	**90
APARTMENT UNITS		
RESIDENTIAL:	210	**210
VISITOR:	35	**35
COMMERCIAL SPACE:	58	**58
BICYCLE	88	**88
DEDICATED PARKLAND		
STREET PARKING:	0	21
TOTAL		
CAR SPACES:	764	**924
BICYCLE SPACES:	178	**178

DETACHED HOUSES	BLD.	FOOTPRINT AREA	UNITS	NET UNIT AREA
MODEL 1	-	**1,309 SQFT	5	**2,309 SQFT
MODEL 2	-	**1,309 SQFT	5	**2,309 SQFT
MODEL 3	-	**1,309 SQFT	5	**2,309 SQFT
MODEL 4	-	**1,309 SQFT	5	**2,309 SQFT
TOTAL	-	**26,180 SQFT (**2,432.2 SQM)	20	**46,180 SQFT (** 4,290.3 SQM)

TOWNHOUSES	BLD.	FOOTPRINT AREA	UNITS	NET UNIT AREA
BLOCK 1	-	6,056 SQFT	6	13,948 SQFT
BLOCK 2	-	8,000 SQFT	8	18,450 SQFT
BLOCK 2	-	6,627 SQFT	8	17,420 SQFT
BLOCK 4	-	8,000 SQFT	8	18,450 SQFT
BLOCK 5	-	4,201 SQFT	5	10,962 SQFT
BLOCK 6	-	4,201 SQFT	5	10,962 SQFT
BLOCK 7	-	6,627 SQFT	8	17,420 SQFT
BLOCK 8	-	6,627 SQFT	8	17,420 SQFT
BLOCK 9	-	6,627 SQFT	8	17,420 SQFT
BLOCK 10	-	1,767 SQFT	8	4,504 SQFT
BLOCK 11	-	6,627 SQFT	8	17,420 SQFT
BLOCK 12	-	6,627 SQFT	8	17,420 SQFT
BLOCK 13	-	6,627 SQFT	8	17,420 SQFT
BLOCK 14	-	6,056 SQFT	6	13,948 SQFT
BLOCK 15	-	6,056 SQFT	6	13,948 SQFT
BLOCK 16	-	6,056 SQFT	6	13,948 SQFT
BLOCK 17	-	6,056 SQFT	6	13,948 SQFT
BLOCK 18	-	6,627 SQFT	8	17,420 SQFT
BLOCK 19	-	6,056 SQFT	6	13,948 SQFT
BLOCK 20	-	6,056 SQFT	6	13,948 SQFT
BLOCK 21	-	6,056 SQFT	6	13,948 SQFT
BLOCK 22	-	6,056 SQFT	6	13,948 SQFT
BLOCK 23	-	6,627 SQFT	8	17,420 SQFT
TOTAL	-	140,316 SQFT (13,035.8 SQM)	154	345,622 SQFT (32,109.3 SQM)

TYP. CONDO BLD. (x5)	GROSS FLOOR AREA	UNITS	NET UNIT AREA
PARKING LEVEL	- 10,440 SQFT	-	N/A
Ground FLOOR	- 10,171 SQFT	12	8,530 SQFT
2nd FLOOR	- 10,171 SQFT	12	8,971 SQFT
3rd FLOOR	- 10,171 SQFT	12	8,971 SQFT
TOTAL	- 40,953 SQFT (3,804.7 SQM)	36	26,472 SQFT (2,459.3 SQM)
ALL BLD. TOTAL	- 204,765 SQFT (19,023.3 SQM)	180	132,360 SQFT (12,296.5 SQM)

APARTMENT BLD.	GROSS FLOOR AREA	UNITS	NET UNIT AREA
PARKING LEVEL	- 0,000 SQFT	-	N/A
GROUND FLOOR (RES.)	- 19,834 SQFT	11	7,755 SQFT
GROUND FLOOR (COM.)	- N/A	3	6,190 SQFT
TYPICAL FLOOR (2-7)	- 19,360 SQFT x6 =116,160 SQFT	22 x6 =132	17,358 SQFT x6 =104,148 SQFT
8th FLOOR	- 14,154 SQFT	16	12,318 SQFT
9th FLOOR	- 14,154 SQFT	16	12,318 SQFT
TOTAL	- 164,302 SQFT (15,264.2 SQM)	178	142,730 SQFT (13,260.1 SQM)

AMENITY SPACE	REQUIRED	PROVIDED
CONDOMINIUM UNITS		
INTERIOR - PRIVATE:	N/A	12,240 SQFT
INTERIOR - COMMUNAL:	N/A	0,000 SQFT
EXTERIOR - COMMUNAL:	MIN. 6,975 SQFT	7,787 SQFT
TOTAL:	11,625 SQFT (1,080.0 SQM)	20,027 SQFT (1,860.6 SQM)
APARTMENT UNITS		
INTERIOR - PRIVATE:	N/A	15,700 SQFT
INTERIOR - COMMUNAL:	MIN. 6,781 SQFT	3,036 SQFT
EXTERIOR - COMMUNAL:		7,601 SQFT
TOTAL:	11,302 SQFT (1,050.0 SQM)	26,337 SQFT (2,446.8 SQM)
DEDICATED PARKLAND		
TOTAL:	78,150 SQFT (7,260.3 SQM)	78,151 SQFT (7,260.5 SQM)

SITE COVERAGE

SPACE		AREA
BUILDING FOOTPRINT	-	**22,038.0 SQM
PARKING LOT	-	4,812.9 SQM
SIDEWALKS	-	3,443.3 SQM
DRIVEWAYS (TOWNHOUSE)	-	4,247. SQM
DRIVEWAYS (DETACHED HOUSE)	-	**480.0 SQM
CITY STREETS	-	10,711.4 SQM
LOT AREA		
6171 HAZELDEAN RD.	-	90,187.6 SQM
LANDSCAPE SPACE	-	52,625.3 SQM
TOTAL LANDSCAPE SPACE (%)	-	58.4%

QUALIFICATIONS

** TARGET VALUE

IT IS THE RESPONSIBILITY OF THE APPROPRIATE CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE AND TO REPORT ALL ERRORS AND/OR OMISSIONS TO THE ARCHITECT.

ALL CONTRACTORS MUST COMPLY WITH ALL PERTINENT CODES AND BY-LAWS.

THIS DRAWING MAY NOT BE USED FOR CONSTRUCTION UNTIL SIGNED BY THE ARCHITECT.

DO NOT SCALE DRAWINGS.

NOTATION SYMBOLS:

- (00) INDICATES DRAWING NOTES, LISTED ON EACH SHEET.
- ◇00 INDICATES ASSEMBLIE TYPE; REFER TO TYPICAL ASSEMBLIES SCHEDUAL.
- ⬡00 INDICATES WINDOW TYPE; REFER TO WINDOW ELEVATIONS AND DETAILS ON A900 SERIES.
- 000 INDICATES DOOR TYPE; REFER TO DOOR SCHEDULE AND DETAILS ON A900 SERIES.
- 00 DETAIL NUMBER
- 00 TITLE (A900/00) SCALE
- DETAIL REFERENCE PAGE
- DETAIL CROSS REFERENCE PAGE

DRAWING NOTES

1. SWITCHGEAR
2. TRANSFORMER
3. NEW CONCRETE SIDEWALK BUILT TO CITY OF OTTAWA STANDARDS
4. CITY OWNED BOULEVARD PARKING
5. EXISTING WOOD FENCE
6. SITE APPROACH
7. --
8. 350mm WIDE MOUNTABLE CURB
9. DEPRESSED AND CONTINUOUS SIDEWALK
10. NEW FIRE HYDRANT (EXACT LOCATION TO BE CONFIRMED BY CIVIL ENGINEER)
11. PROVIDE TWSI AND DEPRESSED AND CONTINUOUS SIDEWALK
12. PROVIDE DEPRESSED CURB AND CROSSWALK
13. SHORT TERM PARKING
14. PICK UP AND PROP OFF LOCATION
15. PROVIDE CONCRETE PAD FOR GARBAGE PICK-UP STAGING AREA
16. --
17. NEW "BICYCLE RACK" AND OR "BICYCLE PARKING" (STRUCTURE TO BE DESIGNED)
18. --
19. --
20. --

GENERAL NOTES:

- (A) REFER TO TYPICAL ASSEMBLIES SHEET FOR WALL, PARTITION, ROOF CEILING & FLOOR TYPES.
- (B) FOR DOOR TYPES AND HARDWARE REQUIREMENTS REFER TO DOOR SCHEDULE ON A900 SERIES.
- (C) ALL INTERIOR DIMENSIONS ARE TAKEN FROM THE FACE OF STUD
- (D) ALL EXTERIOR DIMENSIONS ARE TAKEN FROM THE FACE OF STUD
- (E) ALL EXTERIOR WALLS ARE TO BE TYPE 'W1' UNLESS NOTED OTHER WISE.
- (F) ALL INTERIOR PARTITIONS ARE TO BE TYPE 'P1' UNLESS NOTED OTHER WISE.
- (G) ALL REINFORCED CONCRETE SUSPENDED SLABS, COLUMNS & BEAMS HAVE A MIN. FIR OF 1.5 HRS (AS DETERMINED BY OBC SB-2) UNLESS OTHERWISE STATED.

LEGEND

- ORGANICS BIN (O)
- 3 YRD. GARBAGE BIN (G3)
- 4 YRD. GARBAGE BIN (G4)
- 3 YRD. FIBROUS RECYCLING BIN (R3)
- 2 YRD. GLASS AND PLASTIC RECYCLING BIN (R2)
- TYPICAL PARKING SPACE 2600 x 5200
- SMALL PARKING SPACE 2400 x 4600
- SMALL PARKING SPACE 2600 x 5200
- UNIT ENTRY POINT
- TRAFFIC FLOW
- FIRE HYDRANT
- NEW LIGHT STANDARD
- EXISTING LIGHT STANDARD
- VISITOR PARKING V#
- RESIDENT PARKING R#
- GEODETIC ELEVATION MARKER 123.45
- BICYCLE PARKING 1800 x 600
- PROPERTY LINE
- SETBACK LINE
- FIRE TRUCK AND GARBAGE PICK UP ROUTE
- SUBDIVISION LINE
- LOT LINE
- PROPOSED BUILDING OUTLINE
- NEW PRIVATE DRIVEWAY
- NEW SIDEWALKS

DRAFT

No.	DESCRIPTION	DATE
1	ISSUED FOR COORDINATION	08-05-2020

REVISIONS:

ARCHITECT SEAL:

NORTH ARROW:

CLIENT: LATITUDE Homes

ARCHITECT:
rla/architecture
roderick lahey architect inc.
56 beech street, ottawa, ontario K1S 3J6
t. 613.724.9932 f. 613.724.1209 rlaarchitecture.ca

PROJECT TITLE:

6171 HAZELDEAN ROAD

OTTAWA ONTARIO

SHEET TITLE:

SITE PLAN

DRAWN:	CHECKED:
L.M.	R.V.
SCALE: 1:750	SHEET No. SP-00
PROJECT No. 1831	

PLOT DATE: Tuesday, June 30, 2020 F:\2019\1961 - 6171 Hazeldean Road - GNCR\00_Site Plan\1961_6171 Hazeldean Road_Site Plan DRAFT_30-06-2020.dwg PEN STYLE: 0_RLA Master.ctb PLOT SCALE: 1:0.943 PLOT SIZE: ARCH D

PROJECT DEVELOPER
LATITUDE HOMES
190 LISGAR STREET
OTTAWA, ONTARIO
K2P 0C4
carmine.zayoun@gmail.com
PHONE: 1 305 607 8749

PLANNER
FOTENN PLANNING + DESIGN
396 COOPER STREET, SUITE 300
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LANDSCAPE ARCHITECT
JAMES B. LENNOX AND ASSOCIATES INC
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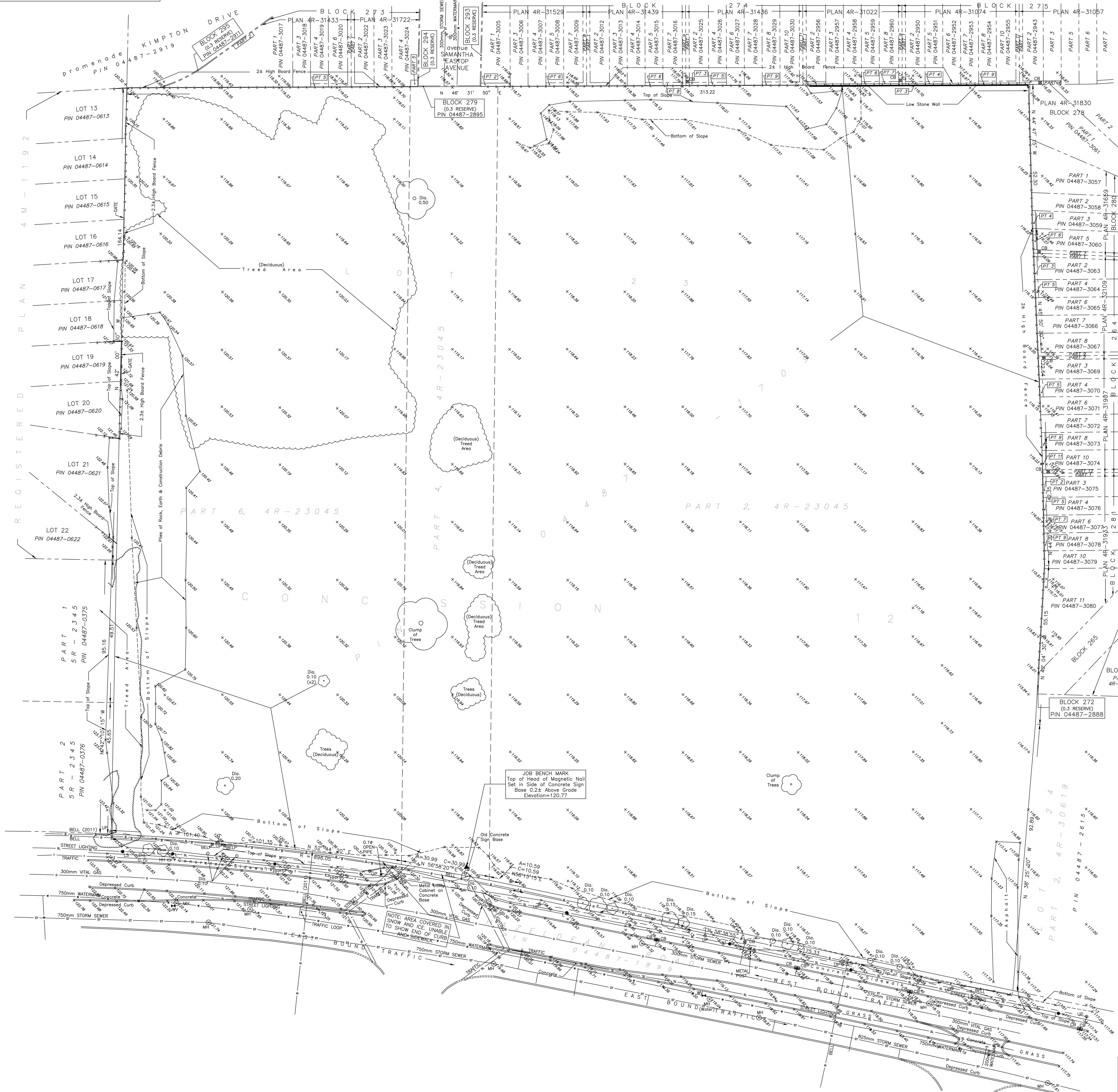
SURVEYOR
FAIRHALL MOFFATT & WOODLAND LTD.
600 TERRY FOX DR. UNIT 100
KANATA, ONTARIO, CANADA
K2L 4B6
john@fmw.on.ca
PHONE: 613 722 5168
FAX: 1 866 343 3942

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



TOPOGRAPHIC PLAN OF
PART OF LOT 23
CONCESSION 12
GEOGRAPHIC TOWNSHIP OF GOULBOURN
CITY OF OTTAWA

SCALE 1 : 500
0 10 20 50 metres

FAIRHALL, MOFFATT & WOODLAND LIMITED
ONTARIO LAND SURVEYORS

ELEVATION NOTES

1. ELEVATIONS ARE REFERRED TO GEODETIC DATUM (CGVD28).
2. ELEVATIONS FOR MANHOLE COVERS AND CATCH BASINS HAVE TO BE INDEPENDENTLY CONFIRMED BEFORE THEY CAN BE ACCEPTED FOR FINAL DESIGN OR CONSTRUCTION PURPOSES.
3. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE JOB BENCH MARK HAS NOT BEEN ALTERED OR DISTURBED AND THAT THE RELATIVE ELEVATION AND DESCRIPTION AGREE WITH THE INFORMATION SHOWN ON THIS DRAWING.

UTILITY NOTES

1. UNDERGROUND UTILITY INFORMATION HAS BEEN COMPILED FROM PLANS P-Q-18, P-P-13 AND RECORD DRAWING No. 131003-P10 PROVIDED BY THE CITY OF OTTAWA AND CONFIRMED IN THE FIELD WHERE POSSIBLE.
2. THIS DRAWING CANNOT BE ACCEPTED AS ACKNOWLEDGING ALL OF THE UNDERGROUND UTILITIES AND IT WILL BE THE RESPONSIBILITY OF THE USER TO CONTACT THE RESPECTIVE UTILITY AUTHORITIES FOR CONFIRMATION OR LOCATION.
3. BEFORE ANY WORK INVOLVING PROBING, EXCAVATING, ETC., A FIELD LOCATION OF UNDERGROUND PLANT BY THE PERTINENT UTILITY AUTHORITY IS MANDATORY.

NOTES

1. BOUNDARY DIMENSIONS HAVE BEEN TAKEN FROM PLAN 4R-23045.
2. THIS SURVEY WAS CARRIED OUT UNDER WINTER CONDITIONS.
3. THE CAD FILE IS REFERENCED TO THE MTM GRID SYSTEM, ZONE 9, NAD83 (ORIGINAL).
4. DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR 0.99991.

LEGEND

DIA.	– DIAMETER
ø	– DIAMETER
PIN	– PROPERTY IDENTIFIER NUMBER
PT	– PART
CB	– CATCH BASIN
MH	– MANHOLE
WV	– WATER VALVE
LS	– LAMP STANDARD
L	– LAMP
UP	– UTILITY POLE
HH	– HAND HOLE
BELP	– BELL PEDESTAL
	– GUY WIRE AND ANCHOR
	– SIGN
	– DECIDUOUS TREE
— · —	– OVERHEAD UTILITY WIRES
═══	– CURB (ELEVATIONS AT BOTTOM OF CURB, CURBS 0.15± HIGH)
======	– CURB (UNABLE TO LOCATE – ASSUMED)
—ST—	– STORM SEWER
—W—	– WATERMAIN
—G—	– GAS LINE
—B—	– BELL
—T—	– TRAFFIC
—SL—	– STREET LIGHTING

DATE OF SURVEY: JANUARY 14, 2020.

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JOB No. Z38800

REFERENCE No.
415(a) – 12 GOULBOURN

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