Site Servicing and Stormwater Management Report 1740-1760 St. Laurent Boulevard Development, Ottawa, ON

Client:
11421247 Canada Inc.
768 Boulevard Saint-Joseph,
Gatineau,
Quebec, QC J8Y 4B8

Submitted for:
Rezoning and Site Plan Application

Project Name:
1740-1760 St. Laurent Boulevard Development

Project Number:
OTT-00260579-B0

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Date Submitted:
September 6, 2023

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1740-1760 St. Laurent Blvd, Ottawa, ON
OTT-00260579-A0
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1 Introduction

1.1 Overview

EXP Services Inc. (EXP) was retained by 11421247 Canada Inc. to prepare a Site Servicing and Stormwater Management Report for the proposed redevelopment of 1740 – 1760 St. Laurent Boulevard in support of a Rezoning and Site Plan Application.

The 1.819-hectare site is situated along St. Laurent Boulevard between Innes Road and Bourassa Street, as illustrated in **Figure A1** in **Appendix A**. below. The site is within the City of Ottawa urban boundary and situated in Alta Vista Ward (Ward 18). The description of the subject property is noted below:

- PIN 04262-0210 comprised of:
- Block 14, PIN 04261-0229 (700 Mountaineer Private)
- Block 15, PIN 04261-0230 (1740 St. Laurent Blvd.)
- Plan 4M-1476, PIN 04261-0231 (Mountaineer Private)
- Block 17, PIN 04261-0232 (1754 St. Laurent Blvd.)
- Part 1 Plan 5R – 997, PIN 04261 – 0177 (1760 St. Laurent Blvd.)

The development proposed will consist of four (4) high-rise buildings. Underground parking will also be provided under each building – Towers 1 and 3 will contain three (3) levels of underground parking and Towers 2 and 4 will have two (2) underground parking levels.

The north-east tower (Tower 1) is a 20-storey high-rise comprised of 184 residential units located on the 3rd to 20th floors, with commercial and common areas on the ground floor and 2nd floor common area.

The north-west tower (Tower 2) is a 13-storey tower, with 154 residential units located on the 2nd to 13th floors, with ground floor common areas.

The south-east tower (Tower 3) is a 20-storey high-rise comprised of 200 residential units located on the 2nd to 20th floors, with ground floor commercial area.

The south-west tower (Tower 4) is a 13-storey tower, with 163 residential units located on the 1st to 13th floors and a common area on the ground floor.

This report discusses the required water demands, sewage flows, and stormwater flows to service the proposed development.

2 Existing Conditions

Within the site, there are four (4) existing buildings. The current zoning of the property is Arterial Mainstreet Zone, (AM10) and includes retail and commercial uses. The following summarizes the current building uses within the property.

Existing Building 1 (north)	Gas station, car wash, parking areas.
Existing Building 2 (middle)	Restaurant, parking areas.
Existing Building 3 (south)	Restaurant, commercial, parking areas.
Existing Building 4 (south)	Commercial, parking areas.

The topography of the subject site is gently slopped in a north-east direction towards St. Laurent Boulevard. There is an easement bisecting the property from east to west for a local site access road.

Currently, there are six (6) vehicular access points from the site, all from St. Laurent Boulevard. Inbound (into the site) traffic using any of the six (6) access locations would be south bound from St. Laurent Boulevard only. All outbound traffic would be for south bound traffic on St. Laurent Boulevard, due to a raised concrete median present on St. Laurent Boulevard.

3 Existing Infrastructure

The site includes four (4) buildings that will be removed during the redevelopment of the site. The site is proposed to be developed in two phases - Tower 1 and Tower 2 will be constructed during the first phase while Tower 3 and Tower 4 will be constructed during the second phase.

From review of the sewer and watermain mapping, as-built drawings and Utility Central Registry (UCC) plans, the following summarizes the onsite and adjacent offsite infrastructure:

Within property

- Storm sewers and catch basins, sanitary sewer laterals and manhole, watermain services to the four (4) existing buildings.
- 525mm storm sewer bisecting the proposed Tower 3 & 4 location (will require re-routing).
- Sanitary sewer located below the proposed Tower 1 location (will require re-routing).
- Private 203-305mm watermain connected to St. Laurent Boulevard in Everest Private.

On St. Laurent Boulevard

- 406mm watermains
- 525mm sanitary sewer
- 1050mm storm sewer

4 Pre-Consultation / Permits / Approvals

A pre-consultation meeting was held on May 19, 2020, with the City of Ottawa prior to design commencement. This online Teams meeting outlined the submission requirements and provided information to assist with the development proposal.

The proposed site is located within the Rideau Valley Conservation Authority (RVCA) jurisdiction (Ottawa River East), therefore signoff from the RVCA will be required prior to Site Plan approval. The RVCA will be contacted to confirm the stormwater management quality control requirements.

Generally, an Environmental Compliance Approval (ECA) would need to be obtained from the Ministry of Environment, Conservation and Parks (MECP) for any onsite private Sewage Works. The onsite Sewage Works would generally include the onsite stormwater works such as flow controls, associated stormwater detention, and treatment works. However, an Approval Exemption under Ontario Regulation 525/98 can be applied. Under Section 3 of O'Reg 525/98, Section 53 (1) and (3) do not apply to the alteration, extension, replacement or a change to a stormwater management facility that 1) is designed to service one lot or parcel of land, b) discharges into a storm sewer that is not a combined sewer, c) does not service industrial land or a structure located on industrial land, and finally d) is not located on industrial land. Based on this exemption, if the stormwater management works within the site remain located within one property parcel, then an Approval Exemptions under O'Reg 525/98 would apply and therefore not necessitate an ECA.

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

- Ottawa Design Guidelines – Sewer Design, October 2012 (SGD002), including:
- Technical 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)
- Technical Bulletin ISDTB-2019-02 (08 July 2019)
- 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)
- Technical Bulletin ISTB-2021-03 (08 August 2021)
- 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), 2020.
- Ontario Building Code 2012, Ministry of Municipal Affairs and Housing.
- Servicing and Stormwater Management Brief – Alta Vista Ridge – 355 and 374 Everest Private, Stantec, dated June 02, 2021

5 Water Servicing

5.1 Existing Water Servicing

The subject site is within the City of Ottawa 1E pressure zone. The site is currently serviced by two connections to the watermain on St. Laurent Boulevard, one (1) service and one (1) private watermain connection. From GeoOttawa,

it is shown that a 152mm water service supplies the southern building and a 203mm (increased to 305mm on site) watermain connects through the property to supply buildings on site and to the west of the subject site and ultimately connect back to the watermain in Russel Road. Both noted water services are connected of the existing 406mm watermain in St. Laurent Boulevard. **Figure 5-1** below illustrates the existing water services onsite.



Figure 5-1 – Water Servicing for Existing Buildings

5.2 Water Servicing Proposal

The development proposed will consist of four (4) high-rise buildings. Tower 1 is comprised of 184 residential units and ±872 square metres of commercial space. Tower 2 is comprised of 154 residential units. Tower 3 is comprised of 200 residential units and ±2,144 square metres of office and retail space. Tower 4 is comprised of 163 residential units.

Water supply for the site will be provided by the proposed 300mm diameter watermain that will bisect the site connecting to the existing municipal 406mm diameter watermain on St. Laurent Boulevard and the existing private 305mm diameter watermain along Everest Private. As the towers will be constructed in phases, it is necessary to provide separate services to each tower. As the average day demands for each building exceeds 50 m^3/ da, it is necessary to provide twin water feeds to the site. Each watermain lateral will connect from the private watermain on Everest / Mountaineer Private to each tower's mechanical room within the underground parking level (P1).

A meeting with the City of Ottawa staff was held to confirm water servicing requirements. The City of Ottawa confirmed that a twin watermain will be required within St. Laurent Boulevard right-of-way. The twin 300 mm

diameter watermains will extend to the property line, at which point will join into one 300 mm watermain within the subject site.

Each building will be protected by an automatic sprinkler system. A fire department (siamese) connection will be located within 45 metres of an adjacent fire hydrant. To achieve this, it is proposed that two (2) new hydrants will be installed off the proposed 300 mm diameter watermain on site. Refer to the Site Servicing plan (DWG C100) in **Appendix I** for the water servicing layout.

5.3 Water Servicing Design

The water servicing requirements for the proposed building 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 building, and this was compared to the City's design criteria. Refer to **Appendix G** for the boundary conditions received from the City.

Please refer to **Table B1** in **Appendix B** for detailed calculations of the total water demands.

A review of the estimated watermain pressure at the building connection, based on the boundary conditions provided.

5.4 Water Servicing Design Criteria

Table 5-1 below summarizes the Design Criteria that was used to establish the water demands and the required fire flows, based on the proposed building uses. The design parameters that apply to this project and used for calculations are identified below.

Table 5-1 - 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	3.1 persons/unit	✓
Population Density – Three Bedroom Apartment	3.1 persons/unit	✓
Average Day Demands – Residential (existing units)	350 L/person/day	✓
Average Day Demands – Residential (new units)	280 L/person/day	✓
Average Day Demands – Commercial (based on gross area) Average Day Demands – Commercial (based on floor area)	28,000 L/gross ha/day 5 L/m^2/day	✓
Average Day Demands – Light Industrial / Heavy Industrial	35,000 or 55,000 L/gross ha/day	
Maximum Day Demands – Residential	2.5 x Average Day Demands	✓
Maximum Day Demands – Commercial / Institutional	1.5 x Average Day Demands	✓
Peak Hour Demands – Residential	5.5 x Average Day Demands	✓
Peak Hour Demands – Commercial / Institutional	1.8 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)	✓

5.5 Water Demands

Water demands for the proposed development were based on the on following:

- Tower 1 has 184 residential units and 872 m^2 of commercial space. Estimated residential population of 334.
- Tower 2 has 154 residential units, with an estimated residential population of 272.
- Tower 3 has 200 residential units and 2,144 m^2 of commercial space. Estimated residential population of 272.
- Tower 4 has 163 residential units, resulting in an estimated residential population of 335.

The total combined water demands under average day, maximum day, and peak hour conditions, for Towers 1, 2, 3, and 4 is 10.92 L/sec, 20.30 L/sec, 34.16 L/sec respectively. Water demands estimated for two of the 4 towers included ± 3,016 m2 of commercial space.

As the upstream residential units within Alta Vista Subdivision were included in the water model, water demands were estimated based on the number of units and 350 L/person/day. This higher unit demand was used to match the original Stantec design. The calculated average day, maximum day, and peak hour demands for these units totalled 3.64 L/sec, 9.10 L/sec, and 20.02 L/sec.

The total calculated average day, maximum day, and peak hour demands for both Alta Vista Subdivision and 1740 St. Laurent (subject site) is 14.56 L/sec, 29.40 L/sec, and 54.18 L/sec.

A summary of water demands for the subject property at 1740 St. Laurent Blvd is shown in Table 5-3 below. For a complete breakdown of all water demands please refer to **Table B1** provides a summary of all water demands.

Table 5-2 : Water Demand Summary from Water Demand Design Sheet

Location	Water Demand Conditions		
	Average Day	Max Day	Peak Hour
Tower 1	1.13	2.78	6.03
Tower 2	0.88	2.20	4.84
Tower 3	7.83	12.63	17.35
Tower 4	1.08	2.70	5.94
Subtotal (1760 St. Laurent Blvd)	10.92	20.30	34.16
Alta Vista Subdivision	3.64	9.10	20.02
Total Water Demands (L/sec)	**14.56**	**29.40**	**54.18**

-

5.6 Fire Flow Requirements

Water for fire protection will be available utilizing the proposed fire hydrants located along on St. Laurent Boulevard. The required fire flows for the proposed buildings were calculated based on typical values as established by the Fire Underwriters Survey 2020 (FUS).

The following equation from the Fire Underwriters document “Water Supply for Public Fire Protection”, 2020, 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 Required Fire Flows 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 buildings:

Type of Construction	Non-combustible
Occupancy	Limited combustible
Sprinkler Protection	Fully Supervised Automatic Sprinkler

The estimated required fire flows, based on the FUS methods are: 100 L/sec for Tower 1, 133 L/sec for Tower 2, 100 L/sec for Tower 3, and 117 L/sec for Tower 4. Refer to **Tables B3, B4, B5,** and **B6** in **Appendix B** for detailed calculations.

5.7 Review of Hydrant Spacing

A review of the hydrant spacing was completed to ensure compliance with Appendix I of Technical Bulletin ISTB-2018-02. As per Section 3 of Appendix I all hydrants within 150 metres were reviewed to assess the total possible available flow from these contributing hydrants.

For each hydrant, the distance to the proposed building was determined to arrive at the contribution of fire flow from each. All hydrants are expected to be of Class AA as per Section 5.1 of **Appendix I**. For each, hydrant the straight-line distance, which is the distance measured along a fire route or roadway, regardless of being in an accessible location and its contribution to the required fire flow was assessed. It was determined that two (2) existing hydrants, one along St. Laurent Boulevard and one along Everest Private, and two (2) proposed hydrants on the frontage of Towers 1 and 4 along Everest Private are required to provide adequate fire flow for the proposed buildings. Refer to the Site Servicing plan (DWG C100) in **Appendix I** for the fire hydrants locations. A summary table of the total fire flows available versus the required fire flows (RFFs) is presented in **Table 5-3** below. Refer to **Table B-7** in Appendix B for a detailed summary of available fire flows based on hydrant spacing.

Table 5-3 –Fire Flows Based on Hydrant Spacing

Building	Required Fire Flow (L/min)	Available Fire Flow Based on Hydrant Spacing as per ISTB-2018-02 (L/min)
Tower 1	6,000 (or 100L/sec)	32,300 (or 538L/sec)
Tower 2	8,000 (or 133 L/sec)	24,700 (or 412 L/sec)
Tower 3	6,000 (or 100 L/sec)	34,200 (or 570 L/sec)
Tower 4	7,000 (or 117 L/sec)	20,900 (or 348 L/sec)

Without the addition of two (2) new hydrants the available fire flow available for each tower would be approximately 20,900 L/min, 13,300 L/min, 22,800 L/min, and 9,500 L/min for Towers 1, 2, 3 and 4 respectively. The available flows from the hydrants exceed each tower's fire flow requirements as identified in Appendix I of Technical Bulletin ISTB-2018-02 and is based on two (2) new hydrants being installed.

5.8 Water Modelling

WaterGEMS by Bentley Systems is a hydraulic modeling application that was used to analyze the water distribution system between the Alta Vista Ridge site and the St Laurent Blvd. site.

Bentley WaterGEMS was used to model the average day demands, maximum day plus fire flow demands, and peak hour demands. The following sections describe the results produced from the WaterGEMS analysis. Boundary conditions given by the city of Ottawa were modeled as Connection 1, located on St Laurent Boulevard; Connection 2, located on Russell Road; and Connection 1 and 2

5.8.1 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 of Ottawa is provided in **Appendix G**.

The following hydraulic grade line (HGL) boundary conditions were provided for the connections at either St. Laurent Boulevard or Russell Road:

Minimum HGL	= 108.5 m
Maximum HGL	= 118.3 m
Max Day + Fire Flow (100 L/s)	= 110.7 m
Max Day + Fire Flow (117 L/s)	= 110.0 m
Max Day + Fire Flow (133 L/s)	= 109.1 m

The provided HGL ranges were used to estimate pressures at each proposed building. For average day demands the higher 118.3 m value was used at each boundary connection. For maximum day plus fire flow conditions, the lowest HGL value of 109.10 m was used, and for peak hour condition the minimum value of 108.5 was used at each boundary connection.

5.9 Modelling Scenarios

A total of nine (9) scenarios were modeled using Bentley WaterGEMS. This includes three (3) scenarios for each: Average Day, Maximum Day Plus Fire Flow, and Peak Hour condition.

For each of these primary scenarios, three (3) child scenarios of each condition were completed based on a single connection from St. Laurent Boulevard, a single connection from Russell Road, and a feed from both St. Laurent Boulevard and Russell Road. A summary of the modeled scenarios is below:

Scenario 1 – Average Day Demands

- Scenario 1.1 – Connection to St Laurent Boulevard.
- Scenario 1.2 – Connection to Russell Road.
- Scenario 1.3 – Connection to both St Laurent Boulevard and Russell Road.

Scenario 2 – Maximum Day plus Fire Flow Demands

- Scenario 2.1 – Connection to St Laurent Boulevard
- Scenario 2.2 – Connection to Russell Road
- Scenario 2.3 – Connection to both St Laurent Boulevard and Russell Road

Scenario 3 – Peak Hour Demands

- Scenario 3.1 – Connection to St Laurent Boulevard
- Scenario 3.2 – Connection to Russell Road
- Scenario 3.3 – Connection to both St Laurent Boulevard and Russell Road

5.10 WaterGEMS Results

A summary of results produced using WaterGEMS is below in Table 5-3. Refer to **Appendix E** for the complete results that were produced using WaterGEMS.

5.10.1 Average Day Results

Pressure results under Average Day scenarios ranged between:

Scenario 1.1. 64 psi – 70 psi within subject site, and 58 psi – 62 psi within existing Alta Vista Subdivision.
Scenario 1.2. 64 psi – 69 psi within subject site, and 58 psi – 62 psi within existing Alta Vista Subdivision.
Scenario 1.3. 64 psi – 70 psi within subject site, and 58 psi – 62 psi within existing Alta Vista Subdivision.

Pressures are within the City of Ottawa. With a single connection from either Russell Road or from St. Laurent Boulevard will results in relatively similar pressures under average day conditions.

5.10.2 Maximum Day Plus Fire Flow Results

Under Maximum Day Plus Fire flow conditions the estimated available fire flows within the distribution system are:

Scenario 2.1. >216.6 L/sec within subject site, and greater than 183 L/sec within existing Alta Vista Subdivision.
Scenario 2.2. >257.6 L/sec within subject site, and greater than 183 L/sec within existing Alta Vista Subdivision.
Scenario 2.3. >300 L/sec within subject site, and greater than 183 L/sec within existing Alta Vista Subdivision.

This is based on an upper limit of 300 L/sec used in the fire-flow analysis. Based on this the available fire flows meet the required fire flows (RFFs) of 133 L/sec based on the FUS method. 183 L/sec is the RFF for the Alta Vista Subdivision, as per the Stantec Report.

5.10.3 Peak Hour Results

Under peak hour conditions the calculated pressure ranges between:

Under Scenario 3.1. 50 psi – 55 psi, and 43 psi – 48 psi within existing Alta Vista Subdivision.

Under Scenario 3.2. 49 psi – 54 psi, and 44 psi – 47 psi within existing Alta Vista Subdivision.

Under Scenario 3.3. 50 psi – 55 psi, and 45 psi – 48 psi within existing Alta Vista Subdivision.

Table 5-4 : Water Demand Summary from WaterGEMS

Scenarios	Pressure Ranges (psi)		Fire Flows (L/s)		Meets Required Fire flow (Yes/No)
	Minimum	Maximum	Required (RFF)	Available	
Scenario 1 - Average Day					
Scenario 1.1	64	70			
Scenario 1.2	64	69			
Scenario 1.3	64	70			
Scenario 2 - Max Day + Fire Flow					
Scenario 2.1			133	>133	Yes
Scenario 2.2			133	>133	Yes
Scenario 2.3			133	>133	YEs
Scenario 3 - Peak Hour					
Scenario 3.1	50	55			
Scenario 3.2	49	54			
Scenario 3.3	50	55			

6 Sewage Servicing

6.1 Existing Sewage Conditions

Sewage is currently discharged to the municipal sanitary sewer on St. Laurent Boulevard, which then discharges to the Innes Road collector. The route is as follows:

- East on Everest Private / Mountaineer Private (±153m of 200-300mm pipe) to St. Laurent Boulevard Collector,
- North on St. Laurent Boulevard (±141m of 525mm pipe) to Innes Road Collector,
- East on Innes Road (±2,535m of 900mm, 1650mm pipes) to Stonehenge Crescent
- North on Stonehenge Crescent, north-east through open field, north on Shefford Road and eventually discharging to the Robert O. Pickard Environment Centre.

Sewage flows within the property were estimated in order to compare with developed conditons. **Table 6-1** below summarizes the approximate sewage flows generated from the existing 1.9 hectare property, based on a commerical flow allowance of 28,000 m3/ha/day, commercial peaking factor of 1.5, and infiltration allowance of 0.33 L/sec/gross hectare.

Table 6-1 – Summary of Existing Sewage Flows

Sewage Condition	Sanitary Sewage Flow (L/sec)
Peak Commercial Sewage Flow	0.93
Infiltration Flow (at 0.33 L/ha/sec)	0.62
Total Flow	1.04

6.2 Proposed Sewage Conditions

It is proposed to provide separate sanitary sewer connections from each tower to sanitary sewer on-site, which will then discharge to the sewer on St Laurent Boulevard. For each tower, a monitoring manhole will be installed on the building lateral between the building and the sanitary sewer main.

The sanitary sewer system was designed based on a population flow with an area-based infiltration allowance. A 250mm diameter PVC SDR35 sanitary sewer is proposed for each tower with a minimum 2% slope, having a capacity of 55.7 L/sec based on Manning's Equation under full flow conditions. The Alta Vista Ridge subdivision (355 and 374 Everest Private) is located to the west of the proposed site and has a total sewage flow of 11.17 L/sec as per the Servicing and Stormwater Management brief prepared by Stantec dated June 2, 2021. The estimated peak sanitary flow rate, inclusive of infiltration, from the proposed property is 11.83 L/sec based on City Design Guidelines. Sewage rates in **Table 6-1** below include a total infiltration allowance of 0.33 L/ha/sec based on the total gross site area. Refer to **Tables C-1** in **Appendix C** for detailed calculations. The proposed sanitary sewer will have adequate capacity to convey the effluents from the Alta Vista Ridge Subdivision and the proposed towers.

Table 6-2 – Summary of Anticipated Sewage Rates

Sewage Condition	Sanitary Sewage Flow (L/sec)
Peak Residential (Alta Vista Subdivision)	11.17
Infiltration Flow (Alta Vista Subdivision)	0.66
Peak Residential Flow (1740 – 1760 St Laurent Blvd.)	20.86
Peak Commercial Flow (1740 – 1760 St Laurent Blvd.)	0.18
Infiltration Flow (1740 – 1760 St Laurent Blvd.)	0.61
Peak Design Flow	22.42

The estimated sewage effluent of the subject site and the upstream Alta Vista subdivision is 22.42 L/sec. The estimated sewage effluent (L/s) from all four towers is ± 10.6 L/sec, based on a total accumulated population of 1211 persons. The estimated sewage effluent value includes 3016 m^3 of commercial space and extraneous flows. A 200mm diameter PVC SDR35 lateral with a minimum slope of 2.0% with an estimated capacity of 55.7 L/sec will be installed for each building. The proposed laterals will have adequate capacity to convey the effluents from each building.

7 Storm Servicing & Stormwater Management

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.

7.1 Minor System Design Criteria

The storm sewer was sized based on the Rational Method and Manning's Equation under free flow conditions for the 5-year storm using a starting 15-minute inlet time. The 15-minute time of concentration was used to be consistent with upstream drainage areas within the Alta Vista Subdivision. Reference to the storm design sheet for the Alta Vista Subdivision (Stantec) can be found in **Appendix H**.

- The allowable discharge from the 1.819-hectare site was established using the peak flows derived based on a 5-year return period storm, a maximum runoff coefficient of 0.50 and a standard time of concentration of 10 minutes as per Section 8.3.7.3 of the SDG002.
- On-site storage shall be provided up to the 100-year event based on the controlled allowable discharge as noted above.
- Minimum sewer slopes to be based on minimum velocities for storm sewers of 0.80 m/sec.

Additional requirements from the pre-consultation meeting are noted below:

- *Demonstrate that the approved Stormwater Management design for the Alta Vista Ridge Subdivision will not impact negatively. The Alta Vista Ridge subdivision flows were obtained from the Servicing and Stormwater Management brief prepared by Stantec dated June 2, 2021. Refer to Storm Drainage plan drawing no. SD-1 prepared by Stantec dated 28 May 2021 in* ***Appendix I****.*

7.2 Major System Design Criteria

- As per Technical Bulletin PIEDTB-2016-01 section 8.3.11.1 (p.12 of 14) there shall be no surface ponding on private parking areas during the 2-year storm rainfall event..
- The major system has been designed to accommodate on-site detention with sufficient capacity to attenuate the 100-year design storm. On-site storage is calculated based on the 100-year design storm with on-site detention storage provided on the roof and within the underground parking structures (stormwater cisterns).
- Overland flow routes are provided.
- The vertical distance from the spill elevation on the street and the ground elevation at the buildings is at least 150mm.
- The emergency overflow spill elevation is at least 300mm below the lowest building opening.

7.3 Runoff Coefficients

Runoff coefficients used were based on actual areas taken from CAD. Runoff coefficients for impervious surfaces (roofs, asphalt, and concrete) were taken as 0.90, whereas those for pervious surfaces (grass/landscaping) were taken as 0.20. Average runoff coefficients were calculated for catchments (or drainage areas) using area weighting method.

The average runoff coefficients (C_{AVG}) for estimating both the allowable peak discharge rate and the post development peak flows is illustrated in **Table D6** and **Table D7** in **Appendix D.** The following summarizes the runoff coefficients used:

- For Alta Vista Subdivision, runoff coefficients were taken from the Stantec Report. This included the runoff coefficient used in sizing of the storm sewer, and from the overall storm drainage area plan (SD-1, Revision 11), which is included in **Appendix H.**
- For Russell Heights Subdivision a runoff coefficient of 0.60 was taken from the Stantec Report. This is also taken from the overall storm drainage area plan (SD-1, Revision 11), which is included in **Appendix H.**
- For 1740-1760 St. Laurent Boulevard, the pre-development runoff coefficient was noted used in the estimation of the allowable release rate from the site. As per City guidelines, the allowable release rate is based on a runoff coefficient of 0.50 and controlled to the 5-year rate as noted in the pre-consultation meeting. Sizing of onsite storm sewers were based on capture of the 5-year peak flow and a time of concentration of 15-minutes, consistent with the Stantec design of the upstream Alta Vista Subdivision. Under post-development conditions, runoff coefficients were based on area weighting for a subcatchments. The runoff coefficient ranges from 0.20 to 0.90. **Table D7** summarizes all coefficients used under post-development conditions.

7.4 Allowable Peak Flows

Rather than meeting pre-development release rates, the City of Ottawa imposed a more restrictive stormwater release rate, as noted in Section 8.3.7.3 of the SDG002. The allowable discharge release rate from the site was established using the peak flows based on a 5-year return period storm, and a maximum runoff coefficient of 0.50 and a standard time of concentration of 10 minutes. **Table 7-4** provides a summary of the estimated allowable peak flows. The allowable release rate of 1170 L/sec from the proposed site will be based on a 5-year storm event. **Table D8** in **Appendix D** provides detailed calculations on the total allowable peak flow.

Table 7-1 – Summary of Allowable Peak Flows

Location	Area (ha)	Pre-Dev Runoff Coeff (See note 1)	Allowable Runoff Coeff.	Allowable Peak Flow in 5-yr (L/sec)	Allowable Peak Flow in 100-yr (L/sec)
Alta Vista Ridge Subdivision	2.375	±0.80	0.50 (See note 3)	344.3	344.3
Russell Heights (EXT 1)	4.030	±0.60	0.60 (See note 4)	562.1	1200.7
1740 - 1760 St Laurent Blvd.	1.819	±0.75	0.50 (See note 2)	263.6	263.6
				1170.0	1808.6

Notes

1) Pre-development Runoff Coefficients are estimates only, and not used for establishing allowable discharge rates

2) Allowable Discharge Rate Based on 5-yr storm with C=0.50 for 1760 St. Laurent & Alta Vista Subdivision. Storm Sewers sized for 5-yr event, with runoff above this, and up to the 100-yr event controlled onsite.

3) Strom Sewers for Alta Vista Subdivision were sized based on the 5-year event, with onsite retention of stormwater up to the 100-yr event onsite with a dry pond.

4) For the existing Russell Height Subdivision, a Runoff Coefficient of 0.60 was used for sizing of new downstream storm sewers, based on Stantec Report for the Alta Vista Subdivision. On onsite retention of stormwater for the 100-yr event was allocated.

7.5 Proposed Stormwater System

Stormwater runoff from the proposed site will drain from a combination of controlled and uncontrolled areas. The overall site release rate will meet or be less than the allowable release rate via design control measures and on-site storage. The Post-Development Catchments plan drawing no. C-400 is included in **Appendix I**. A total of 18 subcatchments (or drainage areas) within the development site are shown on this drawing with the average runoff coefficients calculated for each drainage area. The detailed calculations of the post-development average runoff coefficients for each drainage area are provided in **Table D7** in **Appendix D**. As the entire site property contains underground parking structures, the stormwater works shall consist of the following elements:

- Flow-control roof drains for Towers 1, 2, 3 and 4. Each building to have a separate storm lateral connection, which will discharge to an onsite storm manhole, which will then convey the stormwater to the municipal system on St. Laurent Boulevard.
- Runoff from surface areas will be collected by area drains and catchbasins and discharge to two underground storage units (stormwater cisterns) located in the underground parking structures on both sides of Everest Private. There will be one cistern for Towers 1 and 2 and one cistern for Towers 3 and 4. The cisterns will be located opposite the roadway sag location in Everest Private and adjacent to St. Laurent Boulevard. Flows above the controlled rate into the storm sewer system will be diverted to the underground cistern in the parking garage of Towers 1 and 2. The stored runoff from the two underground cisterns will be pumped to storm sewer within Everest Private. The catchbasins within Everest Private will contain inlet control devices restricting the flow into the storm sewer system.

To achieve the quantity control requirements and meet the allowable discharge rates, roof drains on all four (4) Towers will require flow-controlled weirs. The number of roof drains are indicated on the Architectural Roof plan drawing no. P204 in **Appendix I**. WATTS ACCUTROL weirs were used to determine the total discharge rates from the roof areas based on the number of drains. In addition, the total cumulative prism volumes on the roofs were calculated at a maximum permitted depth of 150mm. Refer to **Tables D1**, **D2**, **D3**, **D4**, and **D5** for the detailed roof release rates and available storage for each tower.

Table 7-2 below provides a summary of the stormwater peak flows under post-development conditions.

Table 7-2 – Summary of Post- Development Peak Flows

Site Location	Max 100-yr Allowable Peak Flow (L/sec)	[1]Total Uncontrolled Peak Flow in L/sec			[2]Total Controlled (or Captured) Flow in L/sec		
		2-year	5-year	100-year	2-year	5-year	100-year
Existing Alta Vista	344.3	275.7	347.0	741.3	41.6	83.8	101.4
Existing Russell Height	1200.7	415.2	561.7	1200.7	415.2	561.7	1200.7
1740-1760 St. Laurent Blvd	263.6	222.4	300.8	615.0	178.1	209.6	278.5
	1808.6	913.3	1209.5	2556.9	634.9	855.1	1580.6

Notes:
1) Total Uncontrolled peak flows represent the peak flows that would result if no flow control used and based on T_C of 15 mins.
2) Total Controlled Flow represents the captured flow rates during each storm event using flow control devices. This includes a dry pond within Alta Vista Subdivision, and the use of flow-controlled roof drains and two stormwater cisterns for 1740 St. Laurent Blvd.

Since flow control is being utilized onsite, it is necessary to provide appropriate flow attenuation (storage). Additional information on the estimated 100-year volumes is provided in **Section 7.6** below.

7.6 Flow Attenuation & Storage

The attenuation of stormwater will be achieved by utilizing roof storage and stormwater storage in the underground parking structure (cisterns). Using the allowable release rates, the Modified Rational Method was used to determine the 2-year, 5-year, and 100-year volumes that will occur for corresponding release rates.

Refer to **Table D8 and Table D9 i**n **Appendix D** for the detailed calculations for the storage volumes required in the underground parking structure to attenuate the controlled release rates. **Table 7-3** below summarizes the storage requirements for each drainage area and provided the volume provided for each. **Table 7-4** summarizes the flow controls proposed for subcatchment.

Table 7-3 – Summary of Onsite Storage

Area No	Release Rate (L/sec)			Storage Required MRM (m^3)			Storage Provided (m^3)			Total Storage (m3)
	2-yr	5-yr	100-yr	2-yr	5-yr	100-yr	Roof	Cistern	Ponding	
S05	9.6	13.0	13.0	11.9	27.4	124.4		125.2		125.2
S06	1.8	2.4	2.4							
S11	10.0	13.6	13.6							
S14	21.8	29.4	29.4							
S01	(13.8)	(18.7)	(40.0)							
S02										
S03										
S09										

S08	(20.7)	(28.1)	(60.0)	10.1	22.0	93.0		93.6		93.6
S10										
S15										
S16										
S12 (T1)	(18.9)	(18.9)	(18.9)				43.7			43.7
S04 (T2)	(22.7)	(22.7)	(22.7)				50.9			50.9
S13 (T3)	(20.8)	(20.8)	(20.8)				59.5			59.5
S07 (T4)	(26.5)	(26.5)	(26.5)				54.1			54.1
S17	(1.6)	(2.2)	(4.2)							
S18	(4.1)	(5.6)	(10.6)							
Totals	172.5	201.9	262.2	22.1	49.4	217.4	208.2	218.8		427.0

Table 7-4 – Summary of Flow Control Methods

Drainage Area No	Description	Control Type and Location
S05	Controlled to 5yr	IPEX LMF-75. 5.92L/s @ 1.40m. CB302 & CB303
S06	Controlled to 5yr	IPEX LMF-50. 2.5 L/s @ 1.20m. CB 309
S11	Controlled to 5yr	IPEX LMF-80. 6.82L/s @ 1.40m. CB304 & CB305
S14	Controlled to 5yr	IPEX Type A. 16.2L/s @ 0.80m. CB300 & CB301
S01	Cistern 1 (north). 4.5m x 10.7m x 2.6m = 125.2m3	Maximum Pump Rate of 40 L/sec
S02		
S03		
S09		
S08	Cistern 2 (south). 4.0m x 9.0m x 2.6m = 93.6m3	Maximum Pump Rate of 60 L/sec
S10		
S15		
S16		
S12 (T1)	Flow Control Drains	ACUTROL Drain. 10 Drains @ 30 gpm/drains
S04 (T2)	Flow Control Drains	ACUTROL Drain. 12 Drains @ 30 gpm/drains
S13 (T3)	Flow Control Drains	ACUTROL Drain. 11 Drains @ 30 gpm/drains
S07 (T4)	Flow Control Drains	ACUTROL Drain. 14 Drains @ 30 gpm/drains

8 Erosion & Sediment Control

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

- Filter bag 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 Erosion and Sediment Control plan drawing no. C-300.
- A mud mat will be installed at the construction entrance to help avoid mud from being transported to off-site 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

The 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

- As the average day demands for each building exceeds 50 m^3/ day, it is necessary to provide twin water feeds to the site. A twin 300 mm diameter watermains will be provided within the St. Laurent Blvd. right-of-way and extend to the property line, at which point will join into one 300 mm watermain within the site. Each watermain lateral will connect from the private watermain on Everest / Mountaineer Private to each tower's mechanical room within the underground parking garage levels.
- The Required Fire Flows (RFFs) were estimated at **6,000 L/min** (100 L/sec) for Tower 1, **8,000 L/min** (133 L/sec) for Tower 2, **6,000 L/min** (100 L/sec) for Tower 3, and **7,000 L/min** (117 L/sec) for Tower 4. The total minimum available flows for firefighting purposes, based on the contribution from hydrants, was estimated at **20,900 L/min** (±350 L/s) for all towers. The available flows are based on existing fire hydrants on St. Laurent and Everest Private, and the installation of two (2) new fire hydrants on Everest Private.

Sewage

- The total estimated peak sewage flow for Towers 1 – Towers 4 is 13.34 L/sec, based on a total population of 1,210.8 persons, 3,016 m2 of commercial space and includes extraneous flow allowance. Each building will have a 200mm PVC lateral at minimum 2.0% having a capacity of **46 L/sec.**
- A new 250mm diameter PVC sanitary sewer at 4.0% & 0.83% will be installed within Everest Private. Including upstream Units on Everest Private (Alta Vista Subdivision) the total estimated peak sewage flow is **22.42 L/sec**. The sanitary sewers will have capacities of **121 L/sec** (at 4%) and **59 L/sec** (at 0.83%). The selected diameter and slope are adequate to convey the anticipated sewage flow.

Stormwater

- For the stormwater system, the allowable capture rate from the entire site was calculated based on a 5-year return period storm, a maximum runoff coefficient of 0.50 and a standard time of concentration of 10 minutes as per Section 8.3.7.3 of the SDG002.
- The maximum 100-yr allowable release rate for the subject property was calculated to be **263.6 L/sec**, based on the 5-year storm and runoff coefficient of 0.50. Runoff exceeding will be detained onsite for up to the 100-year storm.
- To meet the allowable release rate, a total retention volume of **319.6 m^3** is required.
- Runoff on the building roofs will be controlled using flow-controlled roof drains. For each roof-drain will be equipped with a WATTS ACCUTROL weir. Based on the number of roof drains, it was determined that the maximum 100-year discharge rates for Towers 1, 2, 3, and 4 are 18.9 L/sec, 22.7 L/sec, 20.8 L/sec, and 26.5 L/sec, respectively.
- The 100-year storage volume requirements on the roofs for Towers 1, 2, 3, and 4 were estimated as 21.3 m3, 22.4 m3, 35.4 m3, and 23.1 m3 for a total of 102.2 m3 based on the above release rates using the Modified Rational Method. Based on the roof areas and the number of drains, it's estimated that a total of 208 m3 of storage is available for ponding .

- Runoff from the surface areas above the parking structure will be collected and detained in underground stormwater chambers (cisterns) located in the parking structures. Runoff from the catchment areas between the buildings will be directed to one of the cisterns.
- Cistern 1 (north), which is located within Tower 1 parking structure was set at a maximum discharge pump rate of 40 L/sec. Based on the tributary area to this cistern and the 40 L/sec pump rate, a 100-year detention volume of 124.4 m3 is required. A cistern with the approximate size of 48.2 m2 x 2.6m depth and having a volume of 125.2 m3 is proposed.
- Cistern 2 (south), which is located within Tower 3 parking structure was set at a maximum discharge pump rate of 60 L/sec. Based on the tributary area to this cistern and the 60 L/sec pump rate, a 100-year detention volume of 93.6 m3 is required. A cistern with the approximate size of 36 m2 x 2.6m depth an having a volume of 93.6 m3 is proposed.
- Seven (7) catchbasins within the site will contain flow control devices (ICDs) for limit runoff into the storm sewer to the 5-year event.

10 Legal Notification

This report was prepared by EXP Services Inc. for the account of 11421247 Canada Inc.

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 A1 – Site Location Plan

Figure A2 – Water Distribution Plan

Figure A3 – Demand Allocation Plan

Figure A4 – Hydrant Location Plan

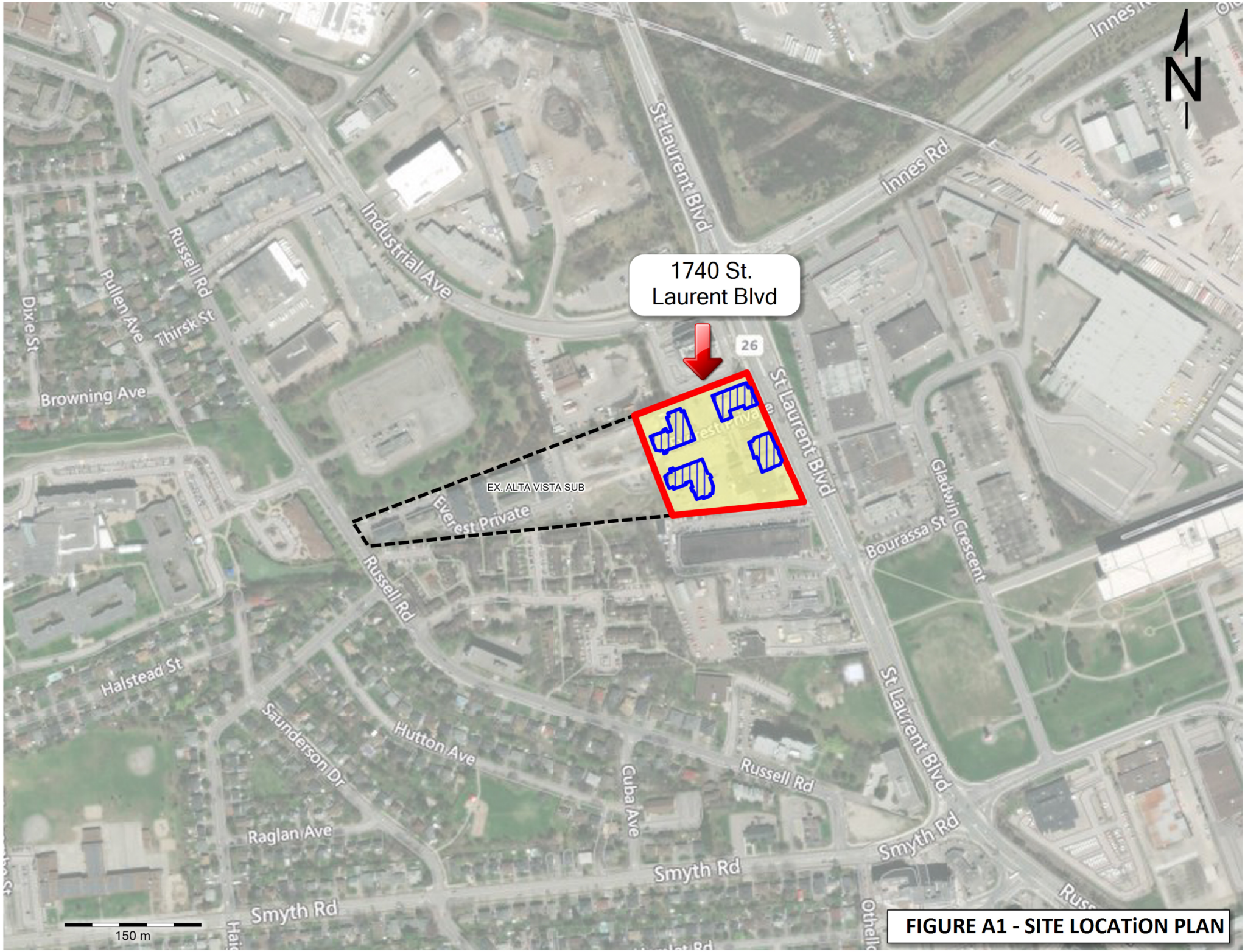


FIGURE A1 - SITE LOCATiON PLAN



exp Services Inc. 100, 2650 Queensview Drive Ottawa, ON K2B 8H6 **www.exp.com**		DESIGN JLF DRAWN SAB DATE JULY 2023 FILE NO 260579	1760 ST. LAURENT BLVD WATER DISTRIBUTION PLAN	SCALE 1:1500 FIGURE NO FIG A2



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

DESIGN	JLF
DRAWN	SAB
DATE	JULY 2023
FILE NO	260579

1760 ST. LAURENT BLVD

WATER DEMAND ALLOCATION PLAN

SCALE	1:1500
FIGURE NO	FIG A3

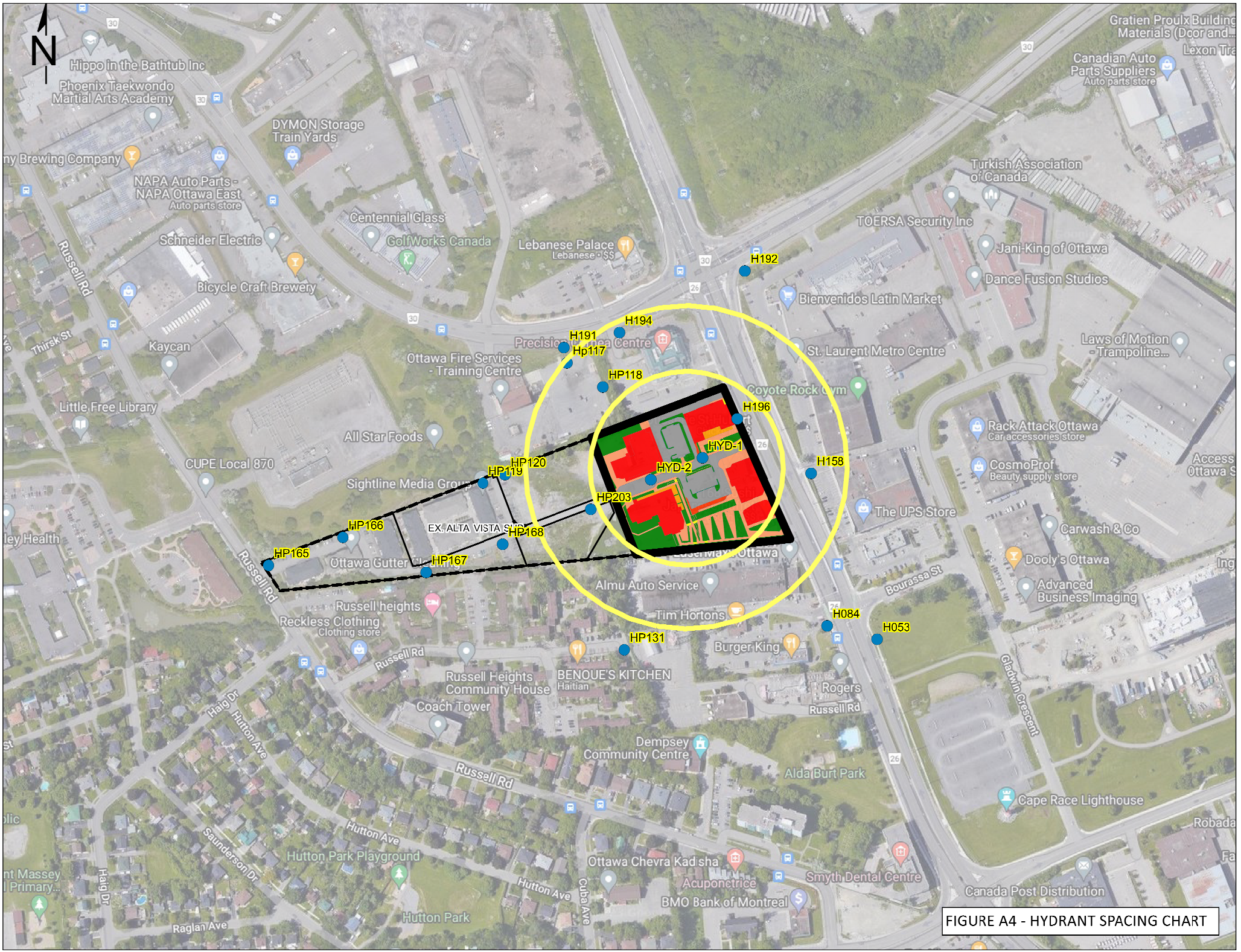


FIGURE A4 - HYDRANT SPACING CHART

Appendix B – Water Servicing Design Sheets

Table B1 – Water Demand Chart

Table B2 – FUS Summary Sheet

Table B3 – Tower 1 FUS Calculations

Table B4 – Tower 2 FUS Calculations

Table B5 – Tower 3 FUS Calculations

Table B6 – Tower 4 FUS Calculations

Table B7 – Hydrant Spacing Table

TABLE B1

WATER DEMAND CHART

Location: 1740 - 1760 St Laurent
Project No: OTT-00260579-B0
Designed by: J. Fitzpatrick
Checked By: B.Thomas
Date Revised: August 2023

Water Consumption

Residential (2012) = 350 L/cap/day (Alta Vista)
Residential (2021) = 280 L/cap/day (174-1760 St. Laurent)
Commercial = 5.0 L/m^2/day

Population Densities

Singles	3.4	person/unit
Semi-Detached	2.7	person/unit
Townhomes	2.7	person/unit
Bachelor Apt	1.4	person/unit
1-bed Apt	1.4	person/unit
Avg Apt (1-bed+den)	1.8	person/unit
2-bed Apt	2.1	person/unit
2-bed + den (same as 3-bed)	3.1	person/unit
3-bed Apt	3.1	person/unit
4-bed Apt. Unit	3.8	person/unit

Junction ID	DESCRIPTION	No. of Residential Units											Residential								Commercial							Total Demands (L/sec)		
		Singles/Semis/Towns				Apartment Units									Avg. Day Demand		Peaking Factors (x Avg Day)					Avg Demand		Peaking Factors (x Avg Day)							
		Single Family	Semi-Detached	Duplex	Townhome	1 Bedroom	1 Bedroom + Den	Bach. (CMHC)	2 Bedroom	2 Bedroom + Den	3 Bedroom	4 Bedroom	Total Persons (pop)	Unit Rate (L/cap/day)	L/day	L/sec	Max Day	Peak Hour	Max Day Demand L/sec	Peak Hour Demand L/sec	Area (m^2)	L/day	L/sec	Max Day	Peak Hour	Max Day Demand L/sec	Peak Hour Demand L/sec	Avg Day (L/s)	Max Day (L/s)	Max Hour (L/s)
1740 - 1760 St Laurent Bvd.																														
J-101	**Tower 4**					55	33	19	67	8	2		334.7	280	93,716	1.08	2.50	5.50	2.70	5.94								1.08	2.70	5.94
J-100	**Tower 2**					50	34	16	56	0	0		271.2	280	75,936	0.88	2.50	5.50	2.20	4.84								0.88	2.20	4.84
J-102	**Tower 1**					52	28	23	79	1	3		333.7	280	93,436	1.08	2.50	5.50	2.70	5.94	872.0	4,360	0.05	1.50	1.80	0.075	0.09	1.13	2.78	6.03
J-103	**Tower 3**					50	34	16	56	0	0		271.2	280	75,936	0.88	2.50	5.50	2.20	4.84	2,144	600,320	6.95	1.50	1.80	10.425	12.51	7.83	12.63	17.35
Subtotal						207	129	74	258	9	5		1210.8		339,024	3.92			9.80	21.56	3016.0							10.920	20.300	34.160
Alta Vista Subdivision																														
Ex.J-6	*12 Units of BLOCK 3*				*12*								*33.0*	*350*	*11,550*	*0.13*	*2.50*	*5.50*	*0.33*	*0.72*								*0.13*	*0.33*	*0.72*
Ex.J-8	*14 Units of BLOCK 3*				*14*								*38.0*	*350*	*13,300*	*0.15*	*2.50*	*5.50*	*0.38*	*0.83*								*0.15*	*0.38*	*0.83*
Ex.J-12	*BLOCK 12*						*100*						*180.0*	*350*	*63,000*	*0.73*	*2.50*	*5.50*	*1.83*	*4.02*								*0.73*	*1.83*	*4.02*
Ex.J-20	*14 Units of BLOCK 2 16 Units of BLOCK 1*				*30*								*81.0*	*350*	*28,350*	*0.33*	*2.50*	*5.50*	*0.83*	*1.82*								*0.33*	*0.83*	*1.82*
Ex.J-21	*BLOCKS 4,5,6,7 BLOCKS 8,9,10,11*				*82*		*193*						*569.0*	*350*	*199,150*	*2.30*	*2.50*	*5.50*	*5.75*	*12.65*								*2.30*	*5.75*	*12.65*
Subtotal					*138*	*0*	*293*	*0*	*0*	*0*	*0*	*0*	*901*		**315,350**	**3.64**				**20.02**	*0*	*0*		*0*	*0*	*0*		*3.64*	*9.10*	*20.02*
Totals =					**138**	**207**	**422**	**74**	**258**	**9**	**5**	**0**	**2,112**		**654,374**	**7.56**				**41.58**	**3,016**	**0**						**14.56**	**29.40**	**54.18**

TABLE B2
SUMMARY OF REQUIRED FIREFLOWS (RFFs)

Building #	Description	[1]No of Storeys	Fire Flow, F (L/min)	[2]Type of Constr. Coeff, C	[3]Reduction Due to Occupancy (%)	[4]Reduction Due to Sprinklers (%)	[5]Total Increase due to Exposures (%)	[6]Required Fire Flow in	
								(L/min)	(L/sec)
Tower 1	high-rise condo	20	14,000	0.8	-15%	-50%	0%	6,000	100
Tower 2	high-rise condo	12	15,000	0.8	-15%	-50%	12%	8,000	133
Tower 3	high-rise condo	20	14,000	0.8	-15%	-50%	0%	6,000	100
Tower 4	high-rise condo	12	15,000	0.8	-15%	-50%	5%	7,000	117

Notes
1 - If basements are included (<50% below grade) then denoted as +.
2 -Types of constructions: 0.8 for non-combustible, 1.0 for ordinary construction,1.5 for wood frame construction.
3 - Reductions due to Occupancy are -25% for non-combustible or -15% for limited combustible.
4 - Reductions due to Sprinkler Systems
5 – Increase due to exposures were calculated based on FUS 2020.
6 – Required Fire Flows are rounded to nearest 1,000 L/min.

TABLE B3
FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020
PROJECT: 1740-1760 BOUL ST-LAURENT
Building No: Tower 1

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	Comment	6123.0 m²	
	Floor 11 to 20		1007.0	0%	0.0	Two largest adjoining floors + 50% of floors above (up to eight)		
	Floor 10		1007.0	50%	503.5			
	Floor 9		1007.0	50%	503.5			
	Floor 8		1007.0	50%	503.5			
	Floor 7		1007.0	50%	503.5			
	Floor 6		1007.0	50%	503.5			
	Floor 5		1007.0	50%	503.5			
	Floor 4		963.0	50%	481.5			
	Floor 3		963.0	50%	481.5			
	Floor 2		1066.0	100%	1066.0			
	Floor 1		1073.0	100%	1073.0			
	Basement (At least 50% below grade, not included)			0%	0.0			
Fire Flow (F)	F = 220 * C * SQRT(A)							13,772
Fire Flow (F)	Rounded to nearest 1,000							**14,000**

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%	-2,100	11,900
	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%	-3,570	8,330
	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%	-1,190	7,140
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,190	5,950
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	west face	34.7	5	30.1 to 45	Type II-I (U)	29.2	12	350.4	6	0%	0%	0	5,950
	east face	46	5	30.1 to 45	Type IV-III (U)	29.2	20	584	6	0%			
	north face	32	5	30.1 to 45	Type II-I (U)	28	10	280	6	0%			
	south face	30.2	5	30.1 to 45	Type II-I (U)	20.5	20	410	6	0%			
Obtain Required Fire Flow										Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =			**6,000**
										Total Required Fire Flow, L/s =			**100**

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

Type V	Wood Frame
Type IV-III (U)	Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P)	Mass Timber or Ordinary with Protected Openings
Type II-I (U)	Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P)	Noncombustible or Fire Resistive with Protected Openings

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	5

TABLE B4
FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020
PROJECT: 1740-1760 BOUL ST-LAURENT
Building No: Tower 2

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	Comment	7680.5 m²	
	Floor 11 to 12		861.0	0	0.0	Two largest adjoining floors + 50% of floors above (up to eight)		
	Floor 10		865.0	50%	432.5			
	Floor 9		1328.0	50%	664.0			
	Floor 8		1328.0	50%	664.0			
	Floor 7		1328.0	50%	664.0			
	Floor 6		1328.0	50%	664.0			
	Floor 5		1328.0	50%	664.0			
	Floor 4		1328.0	50%	664.0			
	Floor 3		1328.0	50%	664.0			
	Floor 2		1328.0	100%	1328.0			
	Floor 1 (Main Level)		1272.0	100%	1272.0			
	Basement (At least 50% below grade, not included)			0%	0.0			
Fire Flow (F)	F = 220 * C * SQRT(A)							15,424
Fire Flow (F)	Rounded to nearest 1,000							**15,000**

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%	-2,250	12,750
	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%	-3,825	8,925
	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%	-1,275	7,650
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,275	6,375
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	west face	17.8	3	10.1 to 20	Type II-I (U)	14.61	8	116.88	3F	8%	12%	1,530	7,905
	east face	34.7	5	30.1 to 45	Type II-I (U)	29.23	12	350.76	6	0%			
	north face	46	5	30.1 to 45	Type II-I (U)	20.08	10	200.8	6	0%			
	south face	20.6	4	20.1 to 30	Type II-I (U)	10.19	12	122.28	4F	4%			
Obtain Required Fire Flow										Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =			**8,000**
										Total Required Fire Flow, L/s =			**133**

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

Type V	Wood Frame
Type IV-III (U)	Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P)	Mass Timber or Ordinary with Protected Openings
Type II-I (U)	Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P)	Noncombustible or Fire Resistive with Protected Openings

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	5

TABLE B5
FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020
PROJECT: 1740-1760 BOUL ST-LAURENT
Building No: Tower 3

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	Comment	6765.5 m²	
	Floor 11 to 20		957.0	0	0.0	Two largest adjoining floors + 50% of floors above (up to eight)		
	Floor 10		957.0	50%	478.5			
	Floor 9		1138.0	50%	569.0			
	Floor 8		1138.0	50%	569.0			
	Floor 7		1138.0	50%	569.0			
	Floor 6		1138.0	50%	569.0			
	Floor 5		1138.0	50%	569.0			
	Floor 4		1138.0	50%	569.0			
	Floor 3		1138.0	50%	569.0			
	Floor 2		816.0	100%	816.0			
	Floor 1 (Main Level)		1488.0	100%	1488.0			
	Basement (At least 50% below grade, not included)			0%	0.0			
Fire Flow (F)	F = 220 * C * SQRT(A)							14,476
Fire Flow (F)	Rounded to nearest 1,000							**14,000**

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%	-2,100	11,900
	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%	-3,570	8,330
	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%	-1,190	7,140
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,190	5,950
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	north face	30.2	5	30.1 to 45	Type II-I (U)	15	20	300	6	0%	0%	0	5,950
	south face	46	5	30.1 to 45	Type II-I (U)	27.9	20	558	6	0%			
	west face	51.6	5	30.1 to 45	Type II-I (U)	16.2	12	194.4	6	0%			
	east face	46	5	30.1 to 45	Type II-I (U)	57.6	2	115.2	6	0%			
Obtain Required Fire Flow	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =												**6,000**
	Total Required Fire Flow, L/s =												**100**

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

Type V	Wood Frame
Type IV-III (U)	Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P)	Mass Timber or Ordinary with Protected Openings
Type II-I (U)	Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P)	Noncombustible or Fire Resistive with Protected Openings

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	5

TABLE B6

FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 2020
PROJECT: 1740-1760 BOUL ST-LAURENT
Building No: Tower 4

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/Unrated Mass Timber	1.5	Non-combustible Construction/Encapsulated Mass Timber	0.8	
	Ordinary Construction/Ordinary Mass Timber	1			
	Rated Mass Timber	0.9			
	Non-combustible Construction/Encapsulated Mass Timber	0.8			
	Fire Resistive Construction	0.6			

Input Building Floor Areas (A)	Area	% Used	Area Used	Comment	Value Used	Fire Flow Total (L/min)
Floor 11 to 12	0.0	0	0.0	Two largest adjoining floors + 50% of floors above (up to eight)	7680.5 m²	
Floor 10	865.0	50%	432.5			
Floor 9	1328.0	50%	664.0			
Floor 8	1328.0	50%	664.0			
Floor 7	1328.0	50%	664.0			
Floor 6	1328.0	50%	664.0			
Floor 5	1328.0	50%	664.0			
Floor 4	1328.0	50%	664.0			
Floor 3	1328.0	50%	664.0			
Floor 2	1328.0	100%	1328.0			
Floor 1 (Main Level)	1272.0	100%	1272.0			
Basement (At least 50% below grade, not included)		0%	0.0			
Fire Flow (F)	F = 220 * C * SQRT(A)					15,424
Fire Flow (F)	Rounded to nearest 1,000					**15,000**

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%	-2,250	12,750
	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%	-3,825	8,925
	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%	-1,275	7,650
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Fully Supervised Sprinkler System	-10%	-1,275	6,375
	Not Fully Supervised or N/A	0%				

Choose Structure Exposure Distance	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Length-Height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
	west face	32.5	5	30.1 to 45	Type IV-III (U)	19.3	8	154.4	6	0%	5%	638	7,013
	east face	51.7	5	30.1 to 45	Type IV-III (U)	16.2	12	194.4	6	0%			
	north face	20.6	4	20.1 to 30	Type IV-III (U)	10.2	12	122.4	4F	5%			
	south face	37.1	5	30.1 to 45	Type IV-III (U)	13.7	2	27.4	6	0%			
Obtain Required Fire Flow											Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =		**7,000**
											Total Required Fire Flow, L/s =		**117**

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

Type V	Wood Frame
Type IV-III (U)	Mass Timber or Ordinary with Unprotected Openings
Type IV-III (P)	Mass Timber or Ordinary with Protected Openings
Type II-I (U)	Noncombustible or Fire Resistive with Unprotected Openings
Type II-I (P)	Noncombustible or Fire Resistive with Protected Openings

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	5

TABLE B-7
AVAILABLE FIRE FLOWS BASED ON HYDRANT SPACING

Hydrant #	Location	City / Private	Accessible (yes/no)	Tower 1		Tower 2		Tower 3		Tower 4		Comment
				[1]Distance (m)	[2]Fire Flow Contribution (L/min)	[1]Distance (m)	[2]Fire Flow Contribution (L/min)	[1]Distance (m)	[2]Fire Flow Contribution (L/min)	[1]Distance (m)	[2]Fire Flow Contribution (L/min)	
HP165	Alta Vista	Private	Yes	>150		>150		>150		>150		
HP192	Industrial Ave.	Private	No	123		>150		>150		>150		
HP166	Alta Vista	Private	Yes	>150		>150		>150		>150		
HP203	Alta Vista	Private	Yes	115	3,800	38	5,700	132	3,800	35	5,700	
HP119	Alta Vista	Private	Yes	>150		>150		>150		>150		
HP120	Alta Vista	Private	Yes	>150		>150		>150		>150		
HP167	Alta Vista	Private	Yes	>150		>150		>150		>150		
HP168	Alta Vista	Private	Yes	>150		>150		>150		>150		
H084	St Laurent Blvd	City	Yes	>150		>150		>150		161		
H158	St Laurent Blvd	City	No	84		>150		48		>150		
H196	St Laurent Blvd	City	Yes	45	5,700	100	3,800	40	5,700	97	3,800	
HP118	Industrial Ave.	Private	No	>150		>150		>150		>150		
H194	Industrial Ave.	City	Yes	>150		>150		>150		>150		
HP117	Industrial Ave.	Private	No	>150		>150		>150		>150		
H191	Industrial Ave.	City	No	>150		>150		>150		>150		
H053	St Laurent Blvd	City	No	>150		>150		>150		>150		
HP131	Russell Rd.	Private	No	>150		>150		>150		>150		
HYD-1	1740 -1760 St Laurent Blvd	Private	Yes	14	5,700	40	5,700	30	5,700	44	5,700	New Hydrant
HYD-2	1740 - 1760 St Laurent Blvd	Private	Yes	52	5,700	9	5,700	70	5,700	16	5,700	New Hydrant
Total (L/min)					20,900		20,900		20,900		20,900	
FUS RFF in L/min or (L/sec)					6,000 (100)		8,000 (133)		6,000 (100)		8,000 (133)	
Meets Requreiment (Yes/No)					Yes		Yes		Yes		Yes	

Notes:

[1]Distance is measured along a road or fire route.

[2]Fire Flow Contribution for Class AA Hydrant from Table 1 of Appendix I, ISTB-2018-02

Appendix C – Sanitary Servicing Design Sheet

Table C1 – Sanitary Sewer Design Sheet

TABLE C1

SANITARY SEWER CALCULATION SHEET

LOCATION				RESEDENTIAL AREAS AND POPULAITONS															COMMERCIAL					INFILTRATION					SEWER DATA						
					NUMBER OF UNITS									POPULATION					AREA (m2)					AREA (ha)											
Street	U/S MH	D/S MH	Desc	Area (ha)	Singles	Semis	Towns	Bach. Apt	1-Bed Apt.	Avg. Apt.	2-Bed Apt.	2-Bed + Den Apt.	3-Bed Apt.	4-Bed Apt.	INDIV	ACCU	Correction Factor, K	Peak Factor	Peak Flow (L/sec)	INDIV	ACCU	% of total	Comm Peak Factor	Peak Flow (L/sec)	INDIV	ACCU	INFILT ALLOW-ANCE	INFILT FLOW (L/s)	TOTAL FLOW (L/s)	Nom Dia (mm)	Actual Dia (mm)	Slope (%)	Length (m)	Capacity (L/sec)	Q/Q_{CAP} (%)	Full Velocity (m/s)
Everest Private	Alta Vista Ridge Subdivision[1]	MHSA64453															1.00	4.00																	
	MHSA64453	SAMH201	Tower 2	0.54				16	50	34	56				271.2	271.2	0.80	4.00	3.52						0.5371	0.5371	0.33	0.18	3.69							
			Tower 4	0.27				16	50	34	56				271.2	542.4	0.80	3.36	5.91						0.6330	1.1701	0.33	0.39	6.29	250	251.46	4.02	89.10	121.1	5%	2.43
	SAMH201	SAMH200	Tower 1	0.41				19	55	33	67	8	2		334.7	877.1	0.80	3.27	9.29	872	872	7%	1.00	0.050	0.2675	1.4376	0.33	0.47	9.82							
			Tower 3	0.63				23	52	28	79	1	3		333.7	1210.8	0.80	3.20	12.56	2144	3016	16%	1.00	0.175	0.4056	1.8432	0.33	0.61	13.34	250	251.46	0.85	58.86	55.7	24%	1.12
				1.850				74	207	129	258	9	5		1210.8					3016					1.84			1.65					147.96			

										Unti Type	Persons/Unit
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				Singles	3.0
Commercial Avg. Daily Flow (L/gross ha/day) =	28,000		1.0	(when area <20%)	Peak Extraneous Flow, (L/sec) =	I*Ac				Semi-Detached	2.7
or L/gross ha/sec =	0.324				Residential Peaking Factor, M =	1 + (14/(4+P^0.5)) * K				Townhomes	2.7
Commercial Avg. Daily Flow (L/day/m2) =	5.0	Institutional Peak Factor =	1.5	(when area >20%)	A_c = Cumulative Area (hectares)					Bachelor Apt	1.4
Institutianal Avg. Daily Flow (L/s/ha) =	28,000		1.0	(when area <20%)	P = Population (thousands)					1-bed Apt	1.4
or L/gross ha/sec =	0.324									Avg Apt (1-bed+den)	1.8
Light Industrial Flow (L/gross ha/day) =	35,000	Residential Correction Factor, K =	0.80	(as per TB-2018-01)	Sewer Capacity, Qcap (L/sec) =	$1/N \; S^{1/2} \; R^{2/3} \; A_c$				2-bed Apt	2.1
or L/gross ha/sec =	0.4051	Manning N =	0.013		(Manning's Equation)					2-bed + den (same as 3-bed)	3.1
Light Industrial Flow (L/gross ha/day) =	55,000	Peak extraneous flow, I (L/s/ha) =	0.28	(Wet Weather I/I.)						3-bed Apt	3.1
or L/gross ha/sec =	0.637	Peak extraneous flow, I (L/s/ha) =	0.33	(Total I/I. As per TB-2018-01)						4-bed Apt. Unit	3.8

Designed:	Project:
J. Fitzpatrick	**1740 - 1760 St. Laurent Boulevard Development**
Checked:	Location:
B. Thomas	**1740 - 1760 St. Laurent Boulevard, Ottawa, Ontario**
File Reference:	Page No:
OTT-00260579 Sanitary - Sewer Design Sheet, August 2023 AC.xlsx	1 of 1

Notes:

1) Information for Alta Vista Ridge Subdivision taken from: "Servicing and Stormwater Management Brief – Alta Vista Ridge – 355 and 374 Everest Private" Stantec, dated June 2, 2021

2) Tower 1 has around 876m2 on the ground floor. Tower 3 has around 1262 m2 on the ground floor and 266m2 on the second floor.

Appendix D – Storm Servicing Design Sheet

Table D1 – Summary of Roof Storage and Outflow

Table D2 – Estimation of Roof Storage and Outflow - Tower 1

Table D3 – Estimation of Roof Storage and Outflow - Tower 2

Table D4 – Estimation of Roof Storage and Outflow - Tower 3

Table D5 – Estimation of Roof Storage and Outflow - Tower 4

Table D6 – Estimation of Pre-Development Peak Flows

Table D7 – Average Runoff Coefficients for Post-Development

Table D8 – Summary of Post-Development Peak Flows (Uncontrolled and Controlled)

Table D9 – Summary of Storage

Table D10 – Cistern 1 Storage Design

Table D11 – Cistern 2 Storage Design

Table D12 – Storage Volume Requirements for 2-year, 5-year, 100-year Storms Based on MRM (Tower 1)

Table D13 – Storage Volume Requirements for 2-year, 5-year, 100-year Storms Based on MRM (Tower 2)

Table D14 – Storage Volume Requirements for 2-year, 5-year, 100-year Storms Based on MRM (Tower 3)

Table D15 – Storage Volume Requirements for 2-year, 5-year, 100-year Storms Based on MRM (Tower 4)

Table D16 – Storage Volume Requirements for 2-year, 5-year, 100-year Storms Based on MRM (Alta Vista Sub)

Table D17 – Storm Sewer Design Sheet

Table D1

SUMMARY OF ROOF STORAGE AND OUTFLOW

	TOWER 1	TOWER 2	TOWER 3	TOWER 4
Reference Table	**D2 - Tower 1**	**D3 - Tower 2**	**D4 - Tower 3**	**D5 - Tower 4**
Total Roof Area (m^2)	1093	1272	1488	1352
Total Roof Effictive Area Percentage	80%	80%	80%	80%
Effective Roof Area (m2)	874.496	1017.664	1190.544	1081.736
Actual Number of Drains Used	10	12	11	14
Flow Controled (Yes /No)	Yes	Yes	Yes	Yes
Weir Position	6-Full Open	6-Full Open	6-Full Open	6-Full Open
Max Roof Drian Release Rate (usgpm)	**30**	**30**	**30**	**30**
Max Roof Drian Release Rate (L/sec)	1.893	1.893	1.893	1.893
Total Roof Release Rate (All drians)	18.9	22.7	20.8	26.5
Total Ponding Area (m3)	43.7	50.9	59.5	54.1

D2 - Tower 1
ESTIMATION OF ROOF STORAGE AND OUTFLOW - TOWER 1

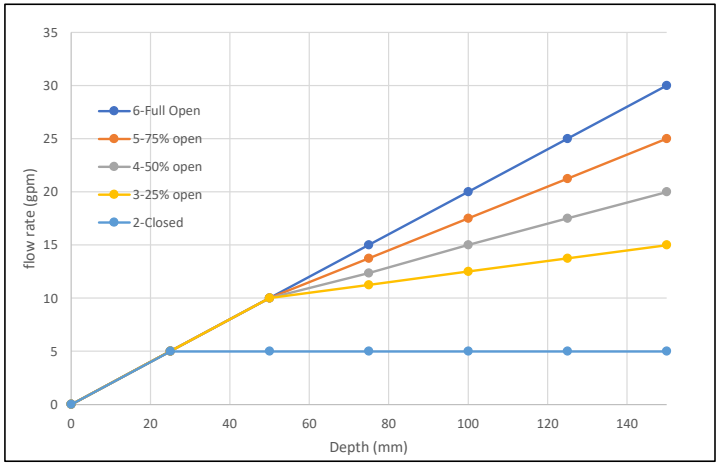
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1-None	2-Closed	3-25% open	4-50% open	5-75% open	6-Full Open
	Max Flow Rate per wier @150mm in gpm					
0	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.05	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.1	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.15	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1-None	0	0	0	0	0	0	0	0
2-Closed	0	5	5	5	5	5	5	0.315
3-25% open	0	5	10	11.25	12.5	13.75	15	0.946
4-50% open	0	5	10	12.35	15	17.5	20	1.262
5-75% open	0	5	10	13.75	17.5	21.25	25	1.577
6-Full Open	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION

Buidling Number	**TOWER 1**	
Total Roof Area (m2)	**1093**	
Minimum Number of Drains Required	1.2	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	25,142	
Max Permitted Load from All Drains (L/sec)	27.9	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	73.2736	
Estimated Distance from roof edge to drains (m)	**4.28**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated No. of Drains Requried	15	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	10	*Use if known*
Effecive Roof Percentage (%)	**80%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	874	
Area per Drain (m2)	87.4	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	54.7	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**30**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release Rate from Roof (L/sec)	18.9	*Based on Maximum Depth of Ponding of 150mm*
Equiv Runoff C for 100-yr Storm	0.35	*Based on 100-yr storm Intensity of 178.6 mm/hr, where I =1735.688 / (Tc + 6.014)^0.820, with Tc=10min)*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH			Total Ponding Volume - All Drains (m3)
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (m2)	Ponding Volume Per Drain (m3)	
0	0	0.00	0.00000	0	0.0	0.0	0.0
0.025	5	0.32	0.00315	0.025	2.4	0.0	0.2
0.05	10	0.63	0.00631	0.05	9.7	0.2	1.6
0.075	15	0.95	0.00946	0.075	21.9	0.5	5.5
0.1	20	1.26	0.01262	0.1	38.9	1.3	13.0
0.125	25	1.58	0.01577	0.125	60.7	2.5	25.3
0.15	30	1.89	0.01893	0.15	87.4	4.4	43.7
Weir Position = **6-Full Open**							

RATING CURVE FOR MODELLING OUTLET

Head or Ponding Depth (m)	Outlfow (L/sec)
0	0.0000
0.025	3.1545
0.05	6.3090
0.075	9.4635
0.1	12.6180
0.125	15.7726
0.15	18.9271

RATING CURVE FOR MODELLING ROOF STORAGE

Head or Ponding Depth (m)	Ponding Area (m2)
0	0.0
0.025	2.4
0.05	9.7
0.075	21.9
0.1	38.9
0.125	60.7
0.15	87.4

D3 - Tower 2
ESTIMATION OF ROOF STORAGE AND OUTFLOW - TOWER 2

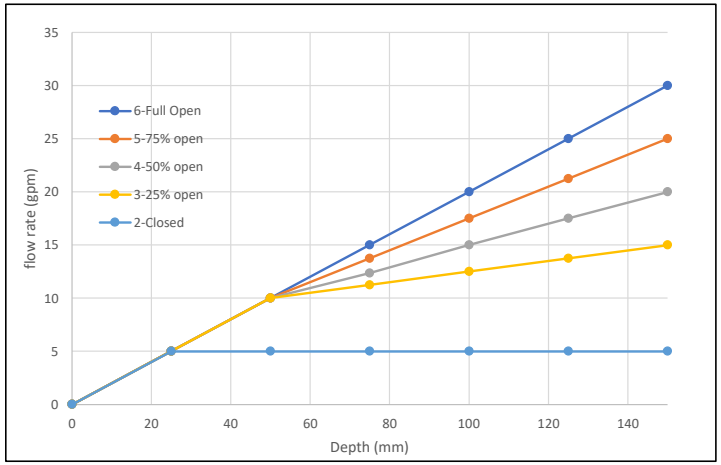
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1-None	2-Closed	3-25% open	4-50% open	5-75% open	6-Full Open
	Max Flow Rate per wier @150mm in gpm					
0	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.05	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.1	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.15	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1-None	0	0	0	0	0	0	0	0
2-Closed	0	5	5	5	5	5	5	0.315
3-25% open	0	5	10	11.25	12.5	13.75	15	0.946
4-50% open	0	5	10	12.35	15	17.5	20	1.262
5-75% open	0	5	10	13.75	17.5	21.25	25	1.577
6-Full Open	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION

Buidling Number	**TOWER 2**	
Total Roof Area (m2)	**1272**	
Minimum Number of Drains Required	1.4	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	29,258	
Max Permitted Load from All Drains (L/sec)	32.5	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	64	
Estimated Distance from roof edge to drains (m)	**4**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated No. of Drains Requried	20	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	12	*Use if known*
Effecive Roof Percentage (%)	**80%**	*Allowance for Mechanical units on roof*
Effecive Total Roof Area (m2)	1018	
Area per Drain (m2)	84.8	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	63.6	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**30**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release Rate from Roof (L/sec)	22.7	*Based on Maximum Depth of Ponding of 150mm*
Equiv Runoff C for 100-yr Storm	0.36	*Based on 100-yr storm Intensity of 178.6 mm/hr, where I =1735.688 / (Tc + 6.014)^0.820, with Tc=10min)*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH			Total Ponding Volume - All Drains (m3)
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (m2)	Ponding Volume Per Drain (m3)	
0	0	0.00	0.00000	0	0.0	0.0	0.0
0.025	5	0.32	0.00379	0.025	2.4	0.0	0.2
0.05	10	0.63	0.00757	0.05	9.4	0.2	1.9
0.075	15	0.95	0.01136	0.075	21.2	0.5	6.4
0.1	20	1.26	0.01514	0.1	37.7	1.3	15.1
0.125	25	1.58	0.01893	0.125	58.9	2.5	29.4
0.15	30	1.89	0.02271	0.15	84.8	4.2	50.9
Weir Position =	**6-Full Open**						

RATING CURVE FOR MODELLING OUTLET

Head or Ponding Depth (m)	Outlfow (L/sec)
0	0.0000
0.025	3.7854
0.05	7.5708
0.075	11.3562
0.1	15.1416
0.125	18.9271
0.15	22.7125

RATING CURVE FOR MODELLING ROOF STORAGE

Head or Ponding Depth (m)	Ponding Area (m2)
0	0.0
0.025	2.4
0.05	9.4
0.075	21.2
0.1	37.7
0.125	58.9
0.15	84.8

D4 - Tower 3
ESTIMATION OF ROOF STORAGE AND OUTFLOW - TOWER 3

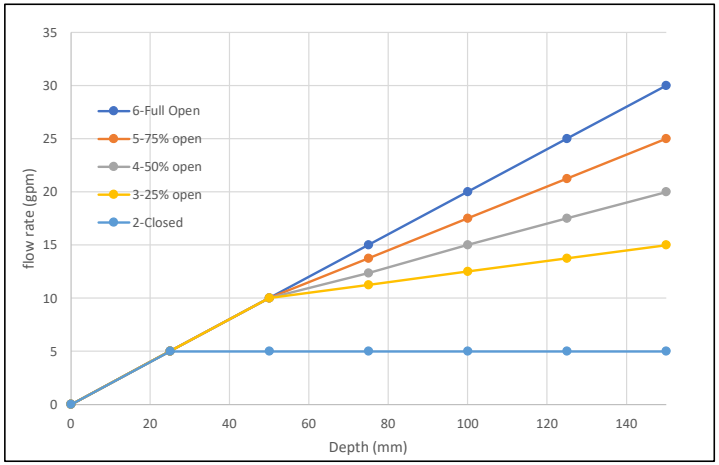
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1-None	2-Closed	3-25% open	4-50% open	5-75% open	6-Full Open
	Max Flow Rate per wier @150mm in gpm					
0	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.05	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.1	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.15	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1-None	0	0	0	0	0	0	0	0
2-Closed	0	5	5	5	5	5	5	0.315
3-25% open	0	5	10	11.25	12.5	13.75	15	0.946
4-50% open	0	5	10	12.35	15	17.5	20	1.262
5-75% open	0	5	10	13.75	17.5	21.25	25	1.577
6-Full Open	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION

Buidling Number	**TOWER 3**	
Total Roof Area (m2)	**1488**	
Minimum Number of Drains Required	1.7	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	34,228	
Max Permitted Load from All Drains (L/sec)	38.0	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	144	
Estimated Distance from roof edge to drains (m)	**6**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated No. of Drains Requried	11	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	11	*Use if known*
Effecive Roof Percentage (%)	**80%**	*N0 Allowance for Mechanical units on this roof*
Effecive Total Roof Area (m2)	1191	
Area per Drain (m2)	108	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	74.4	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**30**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release Rate from Roof (L/sec)	20.8	*Based on Maximum Depth of Ponding of 150mm*
Equiv Runoff C for 100-yr Storm	0.28	*Based on 100-yr storm Intensity of 178.6 mm/hr, where I =1735.688 / (Tc + 6.014)^0.820, with Tc=10min)*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH			Total Ponding Volume - All Drains (m3)
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (m2)	Ponding Volume Per Drain (m3)	
0	0	0.00	0.00000	0	0.0	0.0	0.0
0.025	5	0.32	0.00347	0.025	3.0	0.0	0.3
0.05	10	0.63	0.00694	0.05	12.0	0.2	2.2
0.075	15	0.95	0.01041	0.075	27.1	0.7	7.4
0.1	20	1.26	0.01388	0.1	48.1	1.6	17.6
0.125	25	1.58	0.01735	0.125	75.2	3.1	34.4
0.15	30	1.89	0.02082	0.15	108.2	5.4	59.5
Weir Position =	**6-Full Open**						

RATING CURVE FOR MODELLING OUTLET

Head or Ponding Depth (m)	Outlfow (L/sec)
0	0.0000
0.025	3.4700
0.05	6.9399
0.075	10.4099
0.1	13.8798
0.125	17.3498
0.15	20.8198

RATING CURVE FOR MODELLING ROOF STORAGE

Head or Ponding Depth (m)	Ponding Area (m2)
0	0.0
0.025	3.0
0.05	12.0
0.075	27.1
0.1	48.1
0.125	75.2
0.15	108.2

D5 - Tower 4
ESTIMATION OF ROOF STORAGE AND OUTFLOW - TOWER 4

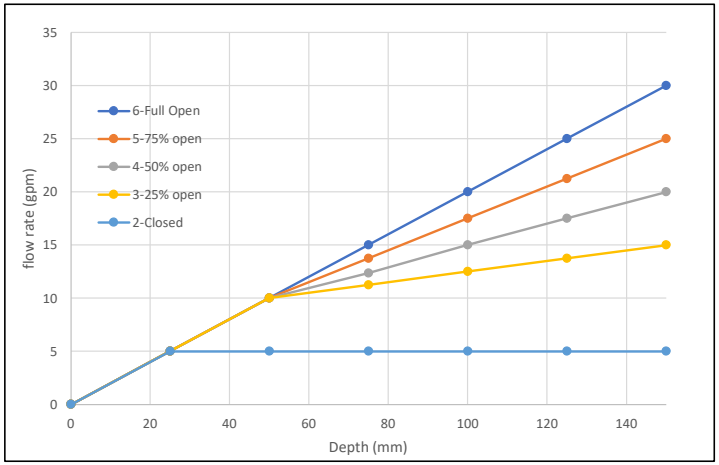
WATTS ADJ ACCUTROL WEIR FLOW RATES (Flow Rates at Various Depths)

Depth	Weir Position					
	1-None	2-Closed	3-25% open	4-50% open	5-75% open	6-Full Open
	Max Flow Rate per wier @150mm in gpm					
0	0	0	0	0	0	0
0.025	0	5	5	5	5	5
0.05	0	5	10	10	10	10
0.075	0	5	11.25	12.35	13.75	15
0.1	0	5	12.5	15	17.5	20
0.125	0	5	13.75	17.5	21.25	25
0.15	0	5	15	20	25	30

WATTS ADJ ACCUTROL WEIR FLOW RATES (Data From Manufacturer's Catalog)

Weir Position	Flow (gpm) per depth							Max Flow Rate per Weir @150mm
	0	25	50	75	100	125	150	
	0	0.025	0.05	0.075	0.1	0.125	0.15	
1-None	0	0	0	0	0	0	0	0
2-Closed	0	5	5	5	5	5	5	0.315
3-25% open	0	5	10	11.25	12.5	13.75	15	0.946
4-50% open	0	5	10	12.35	15	17.5	20	1.262
5-75% open	0	5	10	13.75	17.5	21.25	25	1.577
6-Full Open	0	5	10	15	20	25	30	1.893

GRAPH OF FLOW RATE VERSUS DEPTH FOR VARIOUS WEIR POSITIONS



BUILDING ROOF INFORMATION

Buidling Number	**TOWER 4**	
Total Roof Area (m2)	**1352**	
Minimum Number of Drains Required	1.5	*Minimium of 1 drain every 900 sqaure metres (OBC 7.4.10.4)*
15-min Rainfall Factor for Ottawa (mm)	**23**	*(OBC Supp SB-1)*
Max Permitted Load from All Drains (Litres)	31,100	
Max Permitted Load from All Drains (L/sec)	34.6	*Hydraulic Load expressed in L/sec (OBC Section 7.4.10.3)*
Estimated area per drain (m2)	100	
Estimated Distance from roof edge to drains (m)	**5**	*Not more than 15m from Edge of Roof and 30m to Adjacent Dains (OBC Section 7.4.10.3)*
Estimated No. of Drains Requried	14	*Based on Total Roof Area / Area per Drain*
Actual No. of Drains Used	14	*Use if known*
Effecive Roof Percentage (%)	**80%**	*N0 Allowance for Mechanical units on this roof*
Effecive Total Roof Area (m2)	1082	
Area per Drain (m2)	77	*Based on Effectiive Roof Area / Actual Number of Drains Used*
Max Depth of Ponding at Drains (mm)	**150**	
Estimated Total Volume for Ponding on Roof (m3)	67.6	*Prisim formula, V = 1/3*A*d*
Maximium release rate per drain at 150mm (usgpm)	**30**	*Based on 1 Wier Per Drain and Fully Open Position*
Max Release Rate from Roof (L/sec)	26.5	*Based on Maximum Depth of Ponding of 150mm*
Equiv Runoff C for 100-yr Storm	0.39	*Based on 100-yr storm Intensity of 178.6 mm/hr, where I =1735.688 / (Tc + 6.014)^0.820, with Tc=10min)*

RATING CURVE FOR ROOF

DISCHARGE VERSUS DEPTH				AREA VERSUS DEPTH			Total Ponding Volume - All Drains (m3)
Ponding Depth (m)	Discharge Rate Per Drain (gpm)	Discharge Rate Per Drain (m3/sec)	Total Discharge All Drains (m3/sec)	Ponding Depth (m)	Ponding Area (m2)	Ponding Volume Per Drain (m3)	
0	0	0.00	0.00000	0	0.0	0.0	0.0
0.025	5	0.32	0.00442	0.025	2.1	0.0	0.3
0.05	10	0.63	0.00883	0.05	8.6	0.1	2.0
0.075	15	0.95	0.01325	0.075	19.3	0.5	6.8
0.1	20	1.26	0.01767	0.1	34.3	1.1	16.0
0.125	25	1.58	0.02208	0.125	53.7	2.2	31.3
0.15	30	1.89	0.02650	0.15	77.3	3.9	54.1
Weir Position =	**6-Full Open**						

RATING CURVE FOR MODELLING OUTLET

Head or Ponding Depth (m)	Outlfow (L/sec)
0	0.0000
0.025	4.4163
0.05	8.8326
0.075	13.2489
0.1	17.6653
0.125	22.0816
0.15	26.4979

RATING CURVE FOR MODELLING ROOF STORAGE

Head or Ponding Depth (m)	Ponding Area (m2)
0	0.0
0.025	2.1
0.05	8.6
0.075	19.3
0.1	34.3
0.125	53.7
0.15	77.3

Table D6.1

ESTIMATION OF PRE-DEVEOPMETN PEAK FLOWS (FOR INFORMAION ONLY)

Catchment No.	Area (ha)	Time of Conc, Tc (min)	Storm = 2 yr			Storm = 5 yr			Storm = 100 yr		
			I_2 (mm/hr)	Cavg	Q_2 (L/sec)	I_5 (mm/hr)	Cavg	Q_5 (L/sec)	I_{100} (mm/hr)	Cavg	Q_{100} (L/sec)
Alta Vista Ridge	*2.375*	*10.0*	*76.81*	*0.80*	*405.7*	*104.29*	*0.80*	*550.9*	*178.56*	*0.99*	*550.9*
Russell Heights	*4.03*	*15.0*	*61.77*	*0.60*	*415.2*	*83.62*	*0.60*	*562.1*	*142.89*	*0.74*	*1191.1*
1740 - 1760 St Laurent Bvd.	**1.8187**	**10.0**	**76.81**	**0.75**	**291.2**	**104.29**	**0.75**	**395.5**	*178.56*	*0.93*	**395.5**
Totals	8.22				1112.1			1508.4			2137.4

Notes

1) Intensity, I = 732.951/(Tc+6.199)$^{0.810}$ (2-year, City of 0ttawa)

2) Intensity, I = 998.071/(Tc+6.035)$^{0.814}$ (5-year, City of 0ttawa)

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

4) Cavg for 100-year is increased by 25% to a maximum of 1.0

Table D6.2

ESTIMATION OF ALLOWABLE PEAK FLOWS

Catchment No.	Area (ha)	Outlet Location	Time of Conc, Tc (min)	Storm = 2 yr			Storm = 5 yr			Storm = 100 yr		
				I_2 (mm/hr)	Cavg	Q_2 (L/sec)	I_5 (mm/hr)	Cavg	Q_5 (L/sec)	I_{100} (mm/hr)	Cavg	Q_{100} (L/sec)
Alta Vista Ridge [5]	*2.375*	*St. Laurent Blvd*	*10.0*	*76.81*	*0.50*	*253.6*	*104.29*	*0.50*	*344.3*			*344.3*
Russell Heights (EXT 1)	*4.03*	*St. Laurent Blvd*	*15.0*	*61.77*	*0.60*	*415.2*	*83.62*	*0.60*	*562.1*	*142.89*	*0.75*	*1200.7*
1740 - 1760 St Laurent Bvd.	**1.8187**	*St. Laurent Blvd*	**10.0**	**76.81**	**0.50**	**194.2**	**104.29**	**0.50**	**263.6**			**263.6**
Totals	8.22					862.9			**1170.0**			1808.6

Allowable Discharge (based on 5-yr storm)

Notes

1) Intensity, I = 732.951/(Tc+6.199)$^{0.810}$ (2-year, City of 0ttawa)

2) Intensity, I = 998.071/(Tc+6.035)$^{0.814}$ (5-year, City of 0ttawa)

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

4) Cavg for 100-year is increased by 25% to a maximum of 1.0

5) Total Alta Vista Subdivison area is 2.375 ha

6) Allowable Rate from Original Alta Vista Report (2012) was based on A=2.67 ha, C=0.50, and Tc=10.4 min to establish 5-year Peak Rate of Q=379 L/sec

Table D7

AVERAGE RUNOFF COEFFICIENTS FOR 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	Total Area (m^2)	C_{AVG} (see note)	Comment
S01								1315	0.51	
S02								281	0.45	
S03								566	0.54	
S04 (T2)								1192	0.90	Tower 2
S05								674	0.83	
S06								369	0.28	
S07 (T4)								1299	0.90	Tower 4
S08								1025	0.35	
S09								1498	0.77	
S10								3595	0.70	
S11								759	0.77	
S12 (T1)								1071	0.90	Tower 1
S13 (T3)								1506	0.90	Tower 3
S14								1625	0.78	
S15								497	0.59	
S16								567	0.20	
S17								106	0.90	
S18								267	0.90	
Totals								18,212		

Notes

1) Cavg derived using area-weighting

Table D8

SUMMARY OF POST-DEVELOPMENT PEAK FLOWS (Uncontrolled and Controlled)

Area No	Area (ha)	Time of Conc, Tc (min)	Storm = 2 yr				Storm = 5 yr				Storm = 100 yr				Comments
			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)	
Alta Vista Subdivison															
ALTA VISTA	2.0173	15	0.74	61.77	256.33	**(29.4)**	0.74	83.62	347.00	**(67.3)**	0.93	142.89	741.26	**(84.9)**	Area to Dry Pond Inlet
POND	0.0644	15	0.65	61.77	7.19		0.65	83.62	9.73		0.81	142.89	20.79		Area Around Pond
FRT2	0.124	15	0.33	61.77	7.03	7.03	0.33	83.62	9.51	**(9.5)**	0.41	142.89	20.32	**(9.5)**	Controlled to 5-yr
103B	0.054	15	0.56	61.77	5.19	5.19	0.56	83.62	7.03	**(7.0)**	0.70	142.89	15.02	**(7.0)**	Controlled to 5-yr
Subtotal =	2.260				275.7	41.6			347.0	83.8			741.3	101.4	
Russell Heights															
EXT1	4.030	15	0.60	61.77	415.2	415.2	0.60	83.56	561.7	561.7	0.75	142.89	1200.7	1200.7	.
Subtotal =	4.030				415.2	415.2			561.7	561.7			1200.7	**1200.7**	
1740 - 1760 St Laurent Bvd.															
S05	0.067	15	0.83	61.77	9.6	9.6	0.83	83.56	13.0	13.0	1.00	142.89	26.8	**(13.0)**	Controlled to 5yr (ICD)
S06	0.037	15	0.28	61.77	1.8	1.8	0.28	83.56	2.4	2.4	0.35	142.89	5.1	**(2.4)**	Controlled to 5yr (ICD)
S11	0.076	15	0.77	61.77	10.0	10.0	0.77	83.56	13.6	13.6	0.96	142.89	29.0	**(13.6)**	Controlled to 5yr (ICD)
S14	0.163	15	0.78	61.77	21.8	21.8	0.78	83.56	29.4	29.4	0.98	142.89	62.9	**(29.4)**	Controlled to 5yr (ICD)
S01	0.132	15	0.51	61.77	11.5	**(13.8)**	0.51	83.56	15.6	**(18.7)**	0.64	142.89	33.3	**(40.0)**	PARKING STRUCTURE DECK TO CISTERN 1
S02	0.028	15	0.45	61.77	2.2		0.45	83.56	2.9		0.56	142.89	6.3		
S03	0.057	15	0.54	61.77	5.2		0.54	83.56	7.1		0.68	142.89	15.2		
S09	0.150	15	0.77	61.77	19.8		0.77	83.56	26.8		0.96	142.89	57.3		
S08	0.103	15	0.35	61.77	6.2	**(20.7)**	0.35	83.56	8.3	**(28.1)**	0.44	142.89	17.8	**(60.0)**	PARKING STRUCTURE DECK TO CISTERN 2
S10	0.360	15	0.70	61.77	43.2		0.70	83.56	58.5		0.88	142.89	125.0		
S15	0.050	15	0.59	61.77	5.0		0.59	83.56	6.8		0.74	142.89	14.6		
S16	0.057	15	0.20	61.77	1.9		0.20	83.56	2.6		0.25	142.89	5.6		
S12 (T1)	0.107	15	0.90	61.77	16.6	**(18.9)**	0.90	83.56	22.4	**(18.9)**	1.00	142.89	42.5	**(18.9)**	TOWER 1 Roof Drains
S04 (T2)	0.119	15	0.90	61.77	18.4	**(22.7)**	0.90	83.56	24.9	**(22.7)**	1.00	142.89	47.4	**(22.7)**	TOWER 2 Roof Drains
S13 (T3)	0.151	15	0.90	61.77	23.3	**(20.8)**	0.90	83.56	31.5	**(20.8)**	1.00	142.89	59.8	**(20.8)**	TOWER 3 Roof Drains
S07 (T4)	0.130	15	0.90	61.77	20.1	**(26.5)**	0.90	83.56	27.2	**(26.5)**	1.00	142.89	51.6	**(26.5)**	TOWER 4 Roof Drains
S17	0.011	15	0.90	61.77	1.6	1.64	0.90	83.56	2.2	2.2	1.00	142.89	4.2	4.2	Uncontrolled Offsite
S18	0.027	15	0.90	61.77	4.1	4.13	0.90	83.56	5.6	5.6	1.00	142.89	10.6	10.6	Uncontrolled Offsite
Subtotal	1.8212				222.4	172.5			300.8	201.9			615.0	262.2	
Totals	**3.6424**				**913.3**	**629.3**			**1209.5**	**847.5**			**2556.9**	**1564.3**	
Allowable Rates (from table above)						*862.9*				*1170.0*				*1808.6*	

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***

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

Table D9

SUMMARY OF STORAGE REQUIREMENTS

Area No	Required Release Rate (L/s)			Storage Required (m^3) (MRM)			Storage Provided (m^3)			Total Storage (m3)	Description	Control Type and Location
	2-yr	5-yr	100-yr	2-yr	5-yr	100-yr	Roof	Cistern	Ponding			
Alta Vista Subdivison												
ALTA VISTA	**(29.4)**	**(67.3)**	**(84.9)**				162.8			162.8	Area to Dry Pond Inlet	Roof 1 has 108.8 m3, and roof 2 has 54 m3
POND									640.0	640.0		Dry pond has 155mm orifce and 640 m3
FRT2	7.0	**(9.5)**	**(9.5)**								Controlled to 5-yr	
103B	5.2	**(7.0)**	**(7.0)**								Controlled to 5-yr	
Subtotal (Alta Vista)=	41.6	83.8	101.4			817.8	162.8		640.0	802.8		
Russell Heights												
EXT1	415.2	561.7	1200.7									
Subtotal (Russell Heights)=	415.2	561.7	1200.7									
1740 - 1760 St Laurent Bvd.												
S05	9.6	13.0	**(13.0)**	11.9	27.4	124.4		**125.2**		125.2	Controlled to 5yr	IPEX LMF-75. 5.92L/s @ 1.40m. CB302 & CB303
S06	1.8	2.4	**(2.4)**								Controlled to 5yr	IPEX LMF-50. 2.5 L/s @ 1.20m. CB 309
S11	10.0	13.6	**(13.6)**								Controlled to 5yr	IPEX LMF-80. 6.82L/s @ 1.40m. CB304 & CB305
S14	21.8	29.4	**(29.4)**								Controlled to 5yr	IPEX Type A. 16.2L/s @ 0.80m. CB300 & CB301
S01	**(13.8)**	**(18.7)**	**(40.0)**								Cistern 1 (north). 4.5m x 10.7m x 2.6m = 125.2m3	Maximum Pump Rate of 40 L/sec
S02												
S03												
S09												
S08	**(20.7)**	**(28.1)**	**(60.0)**	10.1	22.0	93.0		**93.6**		93.6	Cistern 2 (south). 4.0m x 9.0m x 2.6m = 93.6m3	Maximium Pump Rate of 60 L/sec
S10												
S15												
S16												
S12 (T1)	**(18.9)**	**(18.9)**	**(18.9)**			21.3	43.7			43.7	Flow Control Drains	ACUTROL Drain. 10 Drains @ 30 gpm/drains
S04 (T2)	**(22.7)**	**(22.7)**	**(22.7)**			22.4	50.9			50.9	Flow Control Drains	ACUTROL Drain. 12 Drains @ 30 gpm/drains
S13 (T3)	**(20.8)**	**(20.8)**	**(20.8)**			35.4	59.5			59.5	Flow Control Drains	ACUTROL Drain. 11 Drains @ 30 gpm/drains
S07 (T4)	**(26.5)**	**(26.5)**	**(26.5)**			23.1	54.1			54.1	Flow Control Drains	ACUTROL Drain. 14 Drains @ 30 gpm/drains
S17	1.6	2.2	4.2									No control or storage of stormwater
S18	4.1	5.6	10.6									No control or storage of stormwater
Subtotal (1740 St. Laurent)=	172.5	201.9	262.2	22.1	49.4	319.6	208.2	218.8		427.0		
Totals (all)=	**629.3**	**847.5**	**1564.3**	**22.1**	**49.4**	**1137.4**	**371.0**	**218.8**	**640.0**	**1229.8**		

TABLE D10 - CISTERN 1

Storage Volumes for 2-year, 5-Year and 100-Year Storms Based on MRM

Area No: **S01, S02, S03, S05 S06, S09, S011, S014**

C_{AVG} = 0.67 (2-yr)

C_{AVG} = 0.67 (5-yr)

C_{AVG} = 0.84 (100-yr, Max 1.0)

Time Interval = 2.00 (mins)

Drainage Area = 0.7087 (hectares)

100-yr Release Rate from ICDs in CBs (L/sec) = 58.4

Pumped Rate from U/G Cistern (L/sec) = 40.0

Total 100-yr Release Rate (L/sec) = 98.4

Percentage of Actual Rate (City of Ottawa requirement) = 100% (Pumped at 100% or 98.4 L/sec)

Release Rate Used for Estimation of 100-year Storage (L/sec) = 98.4

Duration (min)	Release Rate = 98.4 (L/sec), Return Period = 2 (years), IDF Parameters, A = 732.951, B = 0.810, C = 6.199, (I = A/(T_c+C)^B					Release Rate = 98.4 (L/sec), Return Period = 5 (years), IDF Parameters, A = 998.071, B = 0.814, C = 6.053, (I = A/(T_c+C)^B					Release Rate = 98.4 (L/sec), Return Period = 100 (years), IDF Parameters, A = 1735.688, B = 0.820, C = 6.014, (I = A/(T_c+C)^B				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
0	167.2	221.8	98.41	123.4	0.00	230.5	305.7	98.413	207.3	0.00	398.6	660.9	98.413	562.4	0.00
2	133.3	176.8	98.41	78.4	9.41	182.7	242.3	98.413	143.9	17.27	315.0	522.2	98.413	423.8	50.86
4	111.7	148.2	98.41	49.8	11.94	152.5	202.3	98.413	103.9	24.93	262.4	435.0	98.413	336.6	80.79
6	96.6	128.2	98.41	29.8	10.71	131.6	174.5	98.413	76.1	27.39	226.0	374.7	98.413	276.3	99.46
8	85.5	113.3	98.41	14.9	7.17	116.1	154.0	98.413	55.6	26.68	199.2	330.3	98.413	231.8	111.28
10	76.8	101.9	98.41	3.5	2.07	104.2	138.2	98.413	39.8	23.87	178.6	296.0	98.413	197.6	118.57
12	69.9	92.7	98.41	-5.7	-4.11	94.7	125.6	98.413	27.2	19.57	162.1	268.8	98.413	170.4	122.68
14	64.2	85.2	98.41	-13.2	-11.11	86.9	115.3	98.413	16.9	14.19	148.7	246.6	98.413	148.2	124.45
16	59.5	78.9	98.41	-19.5	-18.71	80.5	106.7	98.413	8.3	7.97	137.5	228.0	98.413	129.6	124.44
18	55.5	73.6	98.41	-24.8	-26.80	75.0	99.4	98.413	1.0	1.10	128.1	212.3	98.413	113.9	123.05
20	52.0	69.0	98.41	-29.4	-35.28	70.3	93.2	98.413	-5.2	-6.29	120.0	198.9	98.413	100.5	120.54
22	49.0	65.0	98.41	-33.4	-44.08	66.1	87.7	98.413	-10.7	-14.10	112.9	187.1	98.413	88.7	117.13
24	46.4	61.5	98.41	-36.9	-53.14	62.5	82.9	98.413	-15.5	-22.27	106.7	176.9	98.413	78.4	112.96
26	44.0	58.4	98.41	-40.0	-62.43	59.3	78.7	98.413	-19.7	-30.74	101.2	167.7	98.413	69.3	108.16
28	41.9	55.6	98.41	-42.8	-71.91	56.5	74.9	98.413	-23.5	-39.46	96.3	159.6	98.413	61.2	102.81
30	40.0	53.1	98.41	-45.3	-81.55	53.9	71.5	98.413	-26.9	-48.40	91.9	152.3	98.413	53.9	97.01
32	38.3	50.8	98.41	-47.6	-91.33	51.6	68.4	98.413	-30.0	-57.53	87.9	145.7	98.413	47.3	90.80
34	36.8	48.8	98.41	-49.6	-101.24	49.5	65.7	98.413	-32.8	-66.83	84.3	139.7	98.413	41.3	84.23
36	35.4	46.9	98.41	-51.5	-111.26	47.6	63.1	98.413	-35.3	-76.27	81.0	134.2	98.413	35.8	77.36
38	34.1	45.2	98.41	-53.2	-121.37	45.8	60.8	98.413	-37.7	-85.85	77.9	129.2	98.413	30.8	70.21
40	32.9	43.6	98.41	-54.8	-131.58	44.2	58.6	98.413	-39.8	-95.55	75.1	124.6	98.413	26.2	62.80
Max =					**11.94**					**27.39**					**124.45**

Notes

1) Peak flow is equal to the product of 2.78 x C x I x A

2) Rainfall Intensity, I = A/(Tc+C)^B

3) Release Rate = Min (Release Rate, Peak Flow)

4) Storage Rate = Peak Flow - Release Rate

5) Storage = Duration x Storage Rate

6) Maximium Storage = Max Storage Over Duration

7) Parameters a,b,c are for City of Ottawa

TABLE D11 - CISTERN 2

Storage Volumes for 2-year, 5-Year and 100-Year Storms Based on MRM

Area No: **S08, S10, S15, S16**

C_{AVG} = 0.58 (2-yr)

C_{AVG} = 0.58 (5-yr)

C_{AVG} = 0.72 (100-yr, Max 1.0)

Time Interval = 2.00 (mins)

Drainage Area = 0.5684 (hectares)

Pumped Rate from U/G Cistern (L/sec) = 60.0

Total 100-yr Release Rate (L/sec) = 60.0

Percentage of Actual Rate (City of Ottawa requirement) = 100% (Pumped at 100% or 98.4 L/sec)

Release Rate Used for Estimation of 100-year Storage (L/sec) = 60.0

Duration (min)	Release Rate = 60.0 (L/sec), Return Period = 2 (years), IDF Parameters, A = 732.951, B = 0.810, (I = A/(T_c+C)), C = 6.199					Release Rate = 60.0 (L/sec), Return Period = 5 (years), IDF Parameters, A = 998.071, 0.814, (I = A/(T_c+C)), C = 6.053					Release Rate = 60.0 (L/sec), Return Period = 100 (years), IDF Parameters, A = 1735.688, 0.820, (I = A/(T_c+C)), C = 6.014				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
0	167.2	152.6	60.00	92.6	0.00	230.5	210.3	60.000	150.3	0.00	398.6	454.6	60.000	394.6	0.00
2	133.3	121.6	60.00	61.6	7.40	182.7	166.7	60.000	106.7	12.80	315.0	359.2	60.000	299.2	35.91
4	111.7	101.9	60.00	41.9	10.06	152.5	139.1	60.000	79.1	18.99	262.4	299.3	60.000	239.3	57.42
6	96.6	88.2	60.00	28.2	10.14	131.6	120.0	60.000	60.0	21.61	226.0	257.8	60.000	197.8	71.19
8	85.5	78.0	60.00	18.0	8.62	116.1	105.9	60.000	45.9	22.05	199.2	227.2	60.000	167.2	80.25
10	76.8	70.1	60.00	10.1	6.04	104.2	95.1	60.000	35.1	21.04	178.6	203.6	60.000	143.6	86.18
12	69.9	63.8	60.00	3.8	2.71	94.7	86.4	60.000	26.4	19.01	162.1	184.9	60.000	124.9	89.93
14	64.2	58.6	60.00	-1.4	-1.17	86.9	79.3	60.000	19.3	16.22	148.7	169.6	60.000	109.6	92.07
16	59.5	54.3	60.00	-5.7	-5.48	80.5	73.4	60.000	13.4	12.87	137.5	156.9	60.000	96.9	92.99
18	55.5	50.6	60.00	-9.4	-10.12	75.0	68.4	60.000	8.4	9.07	128.1	146.1	60.000	86.1	92.96
20	52.0	47.5	60.00	-12.5	-15.03	70.3	64.1	60.000	4.1	4.91	120.0	136.8	60.000	76.8	92.16
22	49.0	44.7	60.00	-15.3	-20.16	66.1	60.3	60.000	0.3	0.46	112.9	128.7	60.000	68.7	90.73
24	46.4	42.3	60.00	-17.7	-25.47	62.5	57.1	60.000	-2.9	-4.23	106.7	121.7	60.000	61.7	88.79
26	44.0	40.2	60.00	-19.8	-30.94	59.3	54.1	60.000	-5.9	-9.14	101.2	115.4	60.000	55.4	86.41
28	41.9	38.3	60.00	-21.7	-36.53	56.5	51.5	60.000	-8.5	-14.21	96.3	109.8	60.000	49.8	83.66
30	40.0	36.5	60.00	-23.5	-42.24	53.9	49.2	60.000	-10.8	-19.44	91.9	104.8	60.000	44.8	80.59
32	38.3	35.0	60.00	-25.0	-48.04	51.6	47.1	60.000	-12.9	-24.79	87.9	100.2	60.000	40.2	77.24
34	36.8	33.6	60.00	-26.4	-53.94	49.5	45.2	60.000	-14.8	-30.27	84.3	96.1	60.000	36.1	73.65
36	35.4	32.3	60.00	-27.7	-59.91	47.6	43.4	60.000	-16.6	-35.84	81.0	92.3	60.000	32.3	69.84
38	34.1	31.1	60.00	-28.9	-65.94	45.8	41.8	60.000	-18.2	-41.51	77.9	88.9	60.000	28.9	65.85
40	32.9	30.0	60.00	-30.0	-72.04	44.2	40.3	60.000	-19.7	-47.25	75.1	85.7	60.000	25.7	61.68
Max =					**10.14**					**22.05**					**92.99**

Notes

1) Peak flow is equal to the product of 2.78 x C x I x A

2) Rainfall Intensity, $I = A/(Tc+C)^B$

3) Release Rate = Min (Release Rate, Peak Flow)

4) Storage Rate = Peak Flow - Release Rate

5) Storage = Duration x Storage Rate

6) Maximium Storage = Max Storage Over Duration

7) Parameters a,b,c are for City of Ottawa

TABLE D12

Storage Volumes for 2-year, 5-Year and 100-Year Storms Based on MRM

Area No: S12(Tower 1)

C_{AVG} = 0.90 (2-yr)

C_{AVG} = 0.90 (5-yr)

C_{AVG} = 1.00 (100-yr, Max 1.0)

Time Interval = 1.00 (mins)

Drainage Area = 0.1071 (hectares)

Duration (min)	Release Rate = 18.9 (L/sec); Return Period = 2 (years); IDF Parameters, A = 732.951, B = 0.810, C = 6.199 (I = A/(T_c+C)					Release Rate = 18.9 (L/sec); Return Period = 5 (years); IDF Parameters, A = 998.071, B = 0.814, C = 6.053 (I = A/(T_c+C)					Release Rate = 18.93 (L/sec); Return Period = 100 (years); IDF Parameters, A = 1735.688, B = 0.820, C = 6.014 (I = A/(T_c+C)				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
0	167.2	44.8	18.93	25.9	0.00	230.5	61.8	18.927	42.8	0.00	398.6	118.7	18.9	99.8	0.00
1	148.1	39.7	18.93	20.8	1.25	203.5	54.5	18.927	35.6	2.14	351.4	104.6	18.9	85.7	5.14
2	133.3	35.7	18.93	16.8	2.02	182.7	49.0	18.927	30.0	3.60	315.0	93.8	18.9	74.9	8.98
3	121.5	32.5	18.93	13.6	2.45	166.1	44.5	18.927	25.6	4.60	286.0	85.2	18.9	66.2	11.92
4	111.7	29.9	18.93	11.0	2.64	152.5	40.9	18.927	21.9	5.27	262.4	78.1	18.9	59.2	14.21
5	103.6	27.8	18.93	8.8	2.65	141.2	37.8	18.927	18.9	5.67	242.7	72.3	18.9	53.3	16.00
6	96.6	25.9	18.93	7.0	2.51	131.6	35.3	18.927	16.3	5.88	226.0	67.3	18.9	48.4	17.41
7	90.7	24.3	18.93	5.4	2.25	123.3	33.0	18.927	14.1	5.93	211.7	63.0	18.9	44.1	18.52
8	85.5	22.9	18.93	4.0	1.91	116.1	31.1	18.927	12.2	5.85	199.2	59.3	18.9	40.4	19.38
9	80.9	21.7	18.93	2.7	1.48	109.8	29.4	18.927	10.5	5.67	188.3	56.1	18.9	37.1	20.05
10	76.8	20.6	18.93	1.7	0.99	104.2	27.9	18.927	9.0	5.40	178.6	53.2	18.9	34.2	20.54
11	73.2	19.6	18.93	0.7	0.45	99.2	26.6	18.927	7.7	5.05	169.9	50.6	18.9	31.7	20.90
12	69.9	18.7	18.93	-0.2	-0.14	94.7	25.4	18.927	6.4	4.64	162.1	48.3	18.9	29.3	21.13
13	66.9	17.9	18.93	-1.0	-0.77	90.6	24.3	18.927	5.4	4.18	155.1	46.2	18.9	27.3	21.26
14	64.2	17.2	18.93	-1.7	-1.44	86.9	23.3	18.927	4.4	3.67	148.7	44.3	18.9	25.4	21.30
15	61.8	16.6	18.93	-2.4	-2.14	83.6	22.4	18.927	3.5	3.12	142.9	42.5	18.9	23.6	21.26
16	59.5	15.9	18.93	-3.0	-2.86	80.5	21.6	18.927	2.6	2.53	137.5	41.0	18.9	22.0	21.15
17	57.4	15.4	18.93	-3.5	-3.61	77.6	20.8	18.927	1.9	1.91	132.6	39.5	18.9	20.6	20.97
18	55.5	14.9	18.93	-4.1	-4.38	75.0	20.1	18.927	1.2	1.26	128.1	38.1	18.9	19.2	20.74
19	53.7	14.4	18.93	-4.5	-5.17	72.5	19.4	18.927	0.5	0.58	123.9	36.9	18.9	18.0	20.47
20	52.0	13.9	18.93	-5.0	-5.98	70.3	18.8	18.927	-0.1	-0.12	120.0	35.7	18.9	16.8	20.14
Max =					**2.65**					**5.93**					**21.30**

Notes

1) Peak flow is equal to the product of 2.78 x C x I x A

2) Rainfall Intensity, $I = A/(Tc+C)^B$

3) Release Rate = Min (Release Rate, Peak Flow)

4) Storage Rate = Peak Flow - Release Rate

5) Storage = Duration x Storage Rate

6) Maximium Storage = Max Storage Over Duration

7) Parameters a,b,c are for City of Ottawa

TABLE D13

Storage Volumes for 2-year, 5-Year and 100-Year Storms Based on MRM

Area No: **S04 (Tower 2)**

C_{AVG} = 0.90 (2-yr)

C_{AVG} = 0.90 (5-yr)

C_{AVG} = 1.00 (100-yr, Max 1.0)

Time Interval = 1.00 (mins)

Drainage Area = 0.1192 (hectares)

Duration (min)	Release Rate = 22.7 (L/sec); Return Period = 2 (years); IDF Parameters, A = 732.951, B = 0.810, C = 6.199 (I = A/(T_c+C)					Release Rate = 22.7 (L/sec); Return Period = 5 (years); IDF Parameters, A = 998.071, B = 0.814, C = 6.053 (I = A/(T_c+C)					Release Rate = 22.7 (L/sec); Return Period = 100 (years); IDF Parameters, A = 1735.688, B = 0.820, C = 6.014 (I = A/(T_c+C)				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
0	167.2	49.9	22.71	27.2	0.00	230.5	68.7	22.712	46.0	0.00	398.6	132.1	22.712	109.4	0.00
1	148.1	44.2	22.71	21.5	1.29	203.5	60.7	22.712	38.0	2.28	351.4	116.4	22.712	93.7	5.62
2	133.3	39.8	22.71	17.1	2.05	182.7	54.5	22.712	31.8	3.81	315.0	104.4	22.712	81.7	9.80
3	121.5	36.2	22.71	13.5	2.43	166.1	49.5	22.712	26.8	4.83	286.0	94.8	22.712	72.1	12.97
4	111.7	33.3	22.71	10.6	2.55	152.5	45.5	22.712	22.8	5.47	262.4	87.0	22.712	64.2	15.42
5	103.6	30.9	22.71	8.2	2.45	141.2	42.1	22.712	19.4	5.82	242.7	80.4	22.712	57.7	17.31
6	96.6	28.8	22.71	6.1	2.20	131.6	39.2	22.712	16.5	5.95	226.0	74.9	22.712	52.2	18.79
7	90.7	27.0	22.71	4.3	1.82	123.3	36.8	22.712	14.1	5.91	211.7	70.1	22.712	47.4	19.92
8	85.5	25.5	22.71	2.8	1.33	116.1	34.6	22.712	11.9	5.72	199.2	66.0	22.712	43.3	20.78
9	80.9	24.1	22.71	1.4	0.76	109.8	32.7	22.712	10.0	5.42	188.3	62.4	22.712	39.7	21.42
10	76.8	22.9	22.71	0.2	0.12	104.2	31.1	22.712	8.4	5.02	178.6	59.2	22.712	36.5	21.87
11	73.2	21.8	22.71	-0.9	-0.59	99.2	29.6	22.712	6.9	4.53	169.9	56.3	22.712	33.6	22.17
12	69.9	20.8	22.71	-1.9	-1.34	94.7	28.2	22.712	5.5	3.98	162.1	53.7	22.712	31.0	22.33
13	66.9	20.0	22.71	-2.8	-2.15	90.6	27.0	22.712	4.3	3.37	155.1	51.4	22.712	28.7	22.38
14	64.2	19.2	22.71	-3.6	-2.99	86.9	25.9	22.712	3.2	2.70	148.7	49.3	22.712	26.6	22.32
15	61.8	18.4	22.71	-4.3	-3.86	83.6	24.9	22.712	2.2	1.99	142.9	47.4	22.712	24.6	22.18
16	59.5	17.7	22.71	-5.0	-4.77	80.5	24.0	22.712	1.3	1.23	137.5	45.6	22.712	22.9	21.95
17	57.4	17.1	22.71	-5.6	-5.70	77.6	23.1	22.712	0.4	0.44	132.6	44.0	22.712	21.2	21.66
18	55.5	16.5	22.71	-6.2	-6.66	75.0	22.4	22.712	-0.4	-0.38	128.1	42.4	22.712	19.7	21.31
19	53.7	16.0	22.71	-6.7	-7.64	72.5	21.6	22.712	-1.1	-1.23	123.9	41.0	22.712	18.3	20.90
20	52.0	15.5	22.71	-7.2	-8.63	70.3	21.0	22.712	-1.8	-2.11	120.0	39.7	22.712	17.0	20.44
Max =					**2.55**					**5.95**					**22.38**

Notes

1) Peak flow is equal to the product of 2.78 x C x I x A

2) Rainfall Intensity, $I = A/(Tc+C)^B$

3) Release Rate = Min (Release Rate, Peak Flow)

4) Storage Rate = Peak Flow - Release Rate

5) Storage = Duration x Storage Rate

6) Maximium Storage = Max Storage Over Duration

7) Parameters a,b,c are for City of Ottawa

TABLE D14

Storage Volumes for 2-year, 5-Year and 100-Year Storms Based on MRM

Area No: **S13 (Tower 3)**

C_{AVG} = 0.90 (2-yr)

C_{AVG} = 0.90 (5-yr)

C_{AVG} = 1.00 (100-yr, Max 1.0)

Time Interval = 1.00 (mins)

Drainage Area = 0.1506 (hectares)

Duration (min)	Release Rate = 20.8 (L/sec); Return Period = 2 (years); IDF Parameters, A = 732.951, B = 0.810, C = 6.199 (I = A/(T_c+C)					Release Rate = 20.8 (L/sec); Return Period = 5 (years); IDF Parameters, A = 998.071, B = 0.814, C = 6.053 (I = A/(T_c+C)					Release Rate = 20.82 (L/sec); Return Period = 100 (years); IDF Parameters, A = 1735.688, B = 0.820, C = 6.014 (I = A/(T_c+C)				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
0	167.2	63.0	20.82	42.2	0.00	230.5	86.8	20.820	66.0	0.00	398.6	166.9	20.8	146.1	0.00
1	148.1	55.8	20.82	35.0	2.10	203.5	76.7	20.820	55.9	3.35	351.4	147.1	20.8	126.3	7.58
2	133.3	50.2	20.82	29.4	3.53	182.7	68.8	20.820	48.0	5.76	315.0	131.9	20.8	111.1	13.33
3	121.5	45.8	20.82	24.9	4.49	166.1	62.6	20.820	41.8	7.52	286.0	119.8	20.8	98.9	17.81
4	111.7	42.1	20.82	21.3	5.11	152.5	57.5	20.820	36.6	8.79	262.4	109.9	20.8	89.0	21.37
5	103.6	39.0	20.82	18.2	5.46	141.2	53.2	20.820	32.4	9.71	242.7	101.6	20.8	80.8	24.24
6	96.6	36.4	20.82	15.6	5.61	131.6	49.6	20.820	28.8	10.35	226.0	94.6	20.8	73.8	26.57
7	90.7	34.2	20.82	13.3	5.60	123.3	46.5	20.820	25.6	10.77	211.7	88.6	20.8	67.8	28.48
8	85.5	32.2	20.82	11.4	5.46	116.1	43.8	20.820	22.9	11.01	199.2	83.4	20.8	62.6	30.04
9	80.9	30.5	20.82	9.7	5.21	109.8	41.4	20.820	20.6	11.10	188.3	78.8	20.8	58.0	31.32
10	76.8	28.9	20.82	8.1	4.87	104.2	39.3	20.820	18.4	11.06	178.6	74.8	20.8	53.9	32.36
11	73.2	27.6	20.82	6.7	4.45	99.2	37.4	20.820	16.6	10.93	169.9	71.1	20.8	50.3	33.21
12	69.9	26.3	20.82	5.5	3.97	94.7	35.7	20.820	14.9	10.70	162.1	67.9	20.8	47.1	33.88
13	66.9	25.2	20.82	4.4	3.43	90.6	34.1	20.820	13.3	10.40	155.1	64.9	20.8	44.1	34.41
14	64.2	24.2	20.82	3.4	2.84	86.9	32.8	20.820	11.9	10.03	148.7	62.3	20.8	41.4	34.81
15	61.8	23.3	20.82	2.5	2.21	83.6	31.5	20.820	10.7	9.60	142.9	59.8	20.8	39.0	35.10
16	59.5	22.4	20.82	1.6	1.54	80.5	30.3	20.820	9.5	9.12	137.5	57.6	20.8	36.8	35.30
17	57.4	21.6	20.82	0.8	0.83	77.6	29.2	20.820	8.4	8.59	132.6	55.5	20.8	34.7	35.40
18	55.5	20.9	20.82	0.1	0.10	75.0	28.2	20.820	7.4	8.02	128.1	53.6	20.8	32.8	35.43
19	53.7	20.2	20.82	-0.6	-0.67	72.5	27.3	20.820	6.5	7.42	123.9	51.9	20.8	31.0	35.39
20	52.0	19.6	20.82	-1.2	-1.46	70.3	26.5	20.820	5.7	6.78	120.0	50.2	20.8	29.4	35.28
Max =					**5.61**					**11.10**					**35.43**

Notes

1) Peak flow is equal to the product of 2.78 x C x I x A

2) Rainfall Intensity, $I = A/(Tc+C)^B$

3) Release Rate = Min (Release Rate, Peak Flow)

4) Storage Rate = Peak Flow - Release Rate

5) Storage = Duration x Storage Rate

6) Maximium Storage = Max Storage Over Duration

7) Parameters a,b,c are for City of Ottawa

TABLE D15

Storage Volumes for 2-year, 5-Year and 100-Year Storms Based on MRM

Area No: **S07 (Tower 4)**

C_{AVG} = 0.90 (2-yr)

C_{AVG} = 0.90 (5-yr)

C_{AVG} = 1.00 (100-yr, Max 1.0)

Time Interval = 1.00 (mins)

Drainage Area = 0.1299 (hectares)

Duration (min)	Release Rate = 26.5 (L/sec); Return Period = 2 (years); IDF Parameters, A = 732.951, B = 0.810, C = 6.199 (I = A/(T_c+C)					Release Rate = 26.5 (L/sec); Return Period = 5 (years); IDF Parameters, A = 998.071, B = 0.814, C = 6.053 (I = A/(T_c+C)					Release Rate = 26.5 (L/sec); Return Period = 100 (years); IDF Parameters, A = 1735.688, B = 0.820, C = 6.014 (I = A/(T_c+C)				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
0	167.2	54.3	26.50	27.9	0.00	230.5	74.9	26.498	48.4	0.00	398.6	143.9	26.498	117.5	0.00
1	148.1	48.1	26.50	21.7	1.30	203.5	66.1	26.498	39.6	2.38	351.4	126.9	26.498	100.4	6.02
2	133.3	43.3	26.50	16.8	2.02	182.7	59.4	26.498	32.9	3.95	315.0	113.8	26.498	87.3	10.47
3	121.5	39.5	26.50	13.0	2.34	166.1	54.0	26.498	27.5	4.95	286.0	103.3	26.498	76.8	13.82
4	111.7	36.3	26.50	9.8	2.36	152.5	49.6	26.498	23.1	5.54	262.4	94.8	26.498	68.3	16.38
5	103.6	33.7	26.50	7.2	2.15	141.2	45.9	26.498	19.4	5.82	242.7	87.6	26.498	61.1	18.34
6	96.6	31.4	26.50	4.9	1.77	131.6	42.8	26.498	16.3	5.85	226.0	81.6	26.498	55.1	19.84
7	90.7	29.5	26.50	3.0	1.25	123.3	40.1	26.498	13.6	5.70	211.7	76.4	26.498	49.9	20.97
8	85.5	27.8	26.50	1.3	0.61	116.1	37.7	26.498	11.2	5.40	199.2	71.9	26.498	45.4	21.81
9	80.9	26.3	26.50	-0.2	-0.12	109.8	35.7	26.498	9.2	4.96	188.3	68.0	26.498	41.5	22.40
10	76.8	25.0	26.50	-1.5	-0.92	104.2	33.9	26.498	7.4	4.42	178.6	64.5	26.498	38.0	22.79
11	73.2	23.8	26.50	-2.7	-1.79	99.2	32.2	26.498	5.7	3.79	169.9	61.4	26.498	34.9	23.01
12	69.9	22.7	26.50	-3.8	-2.72	94.7	30.8	26.498	4.3	3.08	162.1	58.5	26.498	32.1	23.08
13	66.9	21.8	26.50	-4.7	-3.70	90.6	29.5	26.498	3.0	2.31	155.1	56.0	26.498	29.5	23.02
14	64.2	20.9	26.50	-5.6	-4.72	86.9	28.3	26.498	1.8	1.48	148.7	53.7	26.498	27.2	22.86
15	61.8	20.1	26.50	-6.4	-5.78	83.6	27.2	26.498	0.7	0.59	142.9	51.6	26.498	25.1	22.59
16	59.5	19.3	26.50	-7.2	-6.87	80.5	26.2	26.498	-0.3	-0.33	137.5	49.7	26.498	23.2	22.25
17	57.4	18.7	26.50	-7.8	-7.99	77.6	25.2	26.498	-1.3	-1.30	132.6	47.9	26.498	21.4	21.83
18	55.5	18.0	26.50	-8.5	-9.14	75.0	24.4	26.498	-2.1	-2.30	128.1	46.3	26.498	19.8	21.34
19	53.7	17.5	26.50	-9.0	-10.31	72.5	23.6	26.498	-2.9	-3.34	123.9	44.7	26.498	18.2	20.79
20	52.0	16.9	26.50	-9.6	-11.50	70.3	22.8	26.498	-3.7	-4.40	120.0	43.3	26.498	16.8	20.18
Max =					**2.36**					**5.85**					**23.08**

Notes

1) Peak flow is equal to the product of 2.78 x C x I x A

2) Rainfall Intensity, $I = A/(Tc+C)^B$

3) Release Rate = Min (Release Rate, Peak Flow)

4) Storage Rate = Peak Flow - Release Rate

5) Storage = Duration x Storage Rate

6) Maximium Storage = Max Storage Over Duration

7) Parameters a,b,c are for City of Ottawa

TABLE D16

Storage Volumes for 2-year, 5-Year and 100-Year Storms Based on MRM

Area No: **ALTA VISTA**

C_{AVG} = 0.71 (2-yr)

C_{AVG} = 0.71 (5-yr)

C_{AVG} = 0.89 (100-yr, Max 1.0)

Time Interval = 5.00 (mins)

Drainage Area = 2.2597 (hectares)

Duration (min)	Release Rate = 29.4 (L/sec); Return Period = 2 (years); IDF Parameters, A = 732.951, B = 0.810, C = 6.199 (I = A/(T_c+C)					Release Rate = 67.3 (L/sec); Return Period = 5 (years); IDF Parameters, A = 998.071, B = 0.814, C = 6.053 (I = A/(T_c+C)					Release Rate = 84.90 (L/sec); Return Period = 100 (years); IDF Parameters, A = 1735.688, B = 0.820, C = 6.014 (I = A/(T_c+C)				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
0	167.2	746.5	29.36	717.2	0.00	230.5	1028.9	67.300	961.6	0.00	398.6	2224.4	84.9	2139.5	0.00
5	103.6	462.4	29.36	433.0	129.90	141.2	630.2	67.300	562.9	168.88	242.7	1354.3	84.9	1269.4	380.83
10	76.8	342.9	29.36	313.5	188.11	104.2	465.1	67.300	397.8	238.70	178.6	996.4	84.9	911.5	546.90
15	61.8	275.7	29.36	246.4	221.74	83.6	373.0	67.300	305.7	275.14	142.9	797.4	84.9	712.5	641.23
20	52.0	232.3	29.36	202.9	243.50	70.3	313.6	67.300	246.3	295.58	120.0	669.4	84.9	584.5	701.34
25	45.2	201.6	29.36	172.3	258.41	60.9	271.9	67.300	204.6	306.83	103.8	579.5	84.9	494.6	741.89
30	40.0	178.8	29.36	149.4	268.92	53.9	240.7	67.300	173.4	312.20	91.9	512.6	84.9	427.7	769.94
35	36.1	161.0	29.36	131.6	276.39	48.5	216.6	67.300	149.3	313.51	82.6	460.8	84.9	375.9	789.41
40	32.9	146.7	29.36	117.4	281.65	44.2	197.2	67.300	129.9	311.87	75.1	419.3	84.9	334.4	802.63
45	30.2	135.0	29.36	105.6	285.21	40.6	181.4	67.300	114.1	308.00	69.1	385.3	84.9	300.4	811.13
50	28.0	125.2	29.36	95.8	287.46	37.7	168.1	67.300	100.8	302.37	64.0	356.9	84.9	272.0	815.94
55	26.2	116.8	29.36	87.5	288.65	35.1	156.8	67.300	89.5	295.34	59.6	332.7	84.9	247.8	817.79
60	24.6	109.6	29.36	80.3	288.97	32.9	147.1	67.300	79.8	287.16	55.9	311.9	84.9	227.0	817.22
65	23.2	103.4	29.36	74.0	288.57	31.0	138.6	67.300	71.3	278.01	52.6	293.8	84.9	208.9	814.63
70	21.9	97.8	29.36	68.5	287.55	29.4	131.1	67.300	63.8	268.05	49.8	277.8	84.9	192.9	810.34
75	20.8	92.9	29.36	63.6	286.00	27.9	124.5	67.300	57.2	257.40	47.3	263.7	84.9	178.8	804.58
80	19.8	88.5	29.36	59.2	283.99	26.6	118.6	67.300	51.3	246.13	45.0	251.1	84.9	166.2	797.57
85	18.9	84.6	29.36	55.2	281.58	25.4	113.2	67.300	45.9	234.34	43.0	239.7	84.9	154.8	789.44
90	18.1	81.0	29.36	51.6	278.82	24.3	108.4	67.300	41.1	222.09	41.1	229.4	84.9	144.5	780.35
95	17.4	77.7	29.36	48.4	275.75	23.3	104.0	67.300	36.7	209.42	39.4	220.1	84.9	135.2	770.38
100	16.7	74.8	29.36	45.4	272.40	22.4	100.0	67.300	32.7	196.38	37.9	211.5	84.9	126.6	759.65
Max =					**288.97**					**313.51**					**817.79**

Notes

1) Peak flow is equal to the product of 2.78 x C x I x A

2) Rainfall Intensity, $I = A/(Tc+C)^B$

3) Release Rate = Min (Release Rate, Peak Flow)

4) Storage Rate = Peak Flow - Release Rate

5) Storage = Duration x Storage Rate

6) Maximium Storage = Max Storage Over Duration

7) Parameters a,b,c are for City of Ottawa

TABLE D17: 5-YEAR STORM SEWER CALCULATION SHEET

Return Period Storm = 5-year
Default Inlet Time = 10
Manning Coefficient = 0.013

U/S Manhole	D/S Manhole	Street	AREA INFO				PEAK FLOWS (UNRESTRICTED RATES)							Indiv. CAP FLOW (L/s)	CUMUL. CAP FLOW (L/s)	SEWER DATA										
			Area No.	Indiv. Area (ha)	Cumul. Area (ha)	Runoff Coeff, C	Indiv. 2.78*A*C	Accum. 2.78*A*C	Return Period	Tc (mins)	Intensity (mm/hr)	Indiv Peak Flow (L/sec)	Accum. Peak Flow (L/sec)			Dia (mm) Actual	Dia (mm) Nominal	Type	Slope (%)	Length (m)	Capacity, Q_{CAP} (L/sec)	Velocity (m/s)		Time in Pipe, Tt (min)	Hydraulic Ratios		
																						Vf	Va		Q/Q_{CAP}	Q/Q_{CAPT}	Va/Vf
MHST67080	*MHST67081*		*EXT1*	*4.0671*	*4.067*	*0.60*	*6.784*	*6.784*	*5-year*	*15.00*	*83.56*	*566.8*	*566.8*	*566.8*	*566.8*	*533.0*	*525*	*CONC*	*4.18*	*38.05*	*915.45*	*4.06*	*3.70*	*0.17*	*0.62*	*0.62*	*0.91*
MHST67081	**STMH100**		*FTR2*	*0.1248*	*4.192*	*0.33*	*0.114*	*6.898*	*5-year*	*15.17*	*83.01*	*9.5*	*572.6*	*9.5*	*576.3*	*533.0*	*525*	*CONC*	*3.26*	*18.10*	*808.45*	*3.59*	*3.48*	*0.09*	*0.71*	*0.71*	*0.97*
STMH100	**STMH101**		**S06**	**0.0344**	**4.226**	**0.28**	***0.027***	**6.925**	**5-year**	**15.00**	***83.56***	***2.2***	***578.6***	**2.2**	**578.6**												
			UNC3	**0.0338**	**4.260**	**0.20**	***0.019***	**6.944**	**5-year**	**15.00**	***83.56***	***1.6***	***580.2***	***1.6***	**580.2**	**610.0**	**600**	**CONC**	**2.00**	**18.97**	**907.47**	**3.07**	**2.83**	**0.11**	**0.64**	**0.64**	**0.92**
EXMH105	*EX_POND (HW1)*	*ALTA VISTA*	*(see note 1)*	*2.0180*	*2.018*	*0.73*	*4.095*	*4.095*	*5-year*	*20.40*	*69.39*	*284.2*	*284.2*			*533.0*	*525*	*CONC*	*0.30*	*18.10*	*245.25*	*1.09*	*1.13*	*0.27*	*1.16*		*1.04*
EX_POND (HW2)	*EXMH104*		*POND*	*0.0640*	*2.082*	*0.65*	*0.116*	*4.211*	*5-year*	*20.67*	*68.82*	*8.0*	*289.8*	*84.9*	*84.9*	*533.0*	*525*	*CONC*	*0.30*	*20.40*	*245.25*	*1.09*	*1.13*	*0.30*	*1.18*	*0.35*	*1.04*
EXMH104	**STMH101**				*2.082*			*4.211*	*5-year*	*20.97*	*68.20*		*287.2*		*84.9*	*533.0*	*525*	*CONC*	*0.30*	*17.10*	*245.25*	*1.09*	*1.13*	*0.25*	*1.17*	*0.35*	*1.04*
STMH101	**STMH102**	**External - Surface**	**103B**	**0.0524**	**6.395**	**0.56**	***0.082***	**11.237**	**5-year**	**15.00**	***83.56***	***6.8***		**6.8**	**671.9**												
		Surface	**S02**	**0.0281**	**6.423**	**0.45**	***0.035***	**11.272**	**5-year**	**15.00**	***83.56***	***2.9***		**2.9**	**674.8**												
		Cistern 1 (north)	**S03**	**0.0536**	**6.476**	**0.54**	***0.080***	**11.352**	**5-year**	**15.00**	***83.56***	***6.7***			**674.8**												
		Cistern 2 (south)	**S08**	**0.0716**	**6.548**	**0.35**	***0.070***	**11.422**	**5-year**	**15.00**	***83.56***	***5.8***			**674.8**												
		Roof (T2)	**S04**	**0.1193**	**6.667**	**0.90**	***0.298***	**11.720**	**5-year**	**15.00**	***83.56***	***24.9***		**20.0**	**694.8**												
		Roof (T4)	**S07**	**0.1299**	**6.797**	**0.90**	***0.325***	**12.045**	**5-year**	**15.00**	***83.56***	***27.2***		**20.0**	**714.8**												
		Surface	**S05**	**0.0561**	**6.853**	**0.83**	***0.129***	**12.175**	**5-year**	**15.00**	***83.56***	***10.8***			**714.8**												
		Surface	**S11**	**0.0765**	**6.930**	**0.77**	***0.164***	**12.339**	**5-year**	**15.00**	***83.56***	***13.7***			**714.8**												
		Cistern 1 (north)	**S09**	**0.1449**	**7.075**	**0.77**	***0.310***	**12.649**	**5-year**	**15.00**	***83.56***	***25.9***			**714.8**												
		Cistern 2 (south)	**S10**	**0.0765**	**7.151**	**0.70**	***0.149***	**12.798**	**5-year**	**21.22**	***67.68***	***10.1***	***866.2***		**714.8**	**762.0**	**750**	**CONC**	**0.91**	**88.56**	**1107.92**	**2.40**	**2.36**	**0.63**	***0.78***	***0.65***	**0.98**
STMH102	**STMH103**	**Roof (T1)**	**S12**	**0.1071**	**7.258**	**0.90**	***0.268***	**13.066**	**5-year**	**15.00**	***83.56***	***22.4***			**714.8**												
		Roof (T3)	**S13**	**0.1506**	**7.409**	**0.90**	***0.377***	**13.442**	**5-year**	**15.00**	***83.56***	***31.5***			**714.8**												
		Surface	**S14**	**0.1445**	**7.553**	**0.78**	***0.313***	**13.756**	**5-year**	**15.00**	***83.56***	***26.2***			**714.8**												
		Cistern 2 (south)	**S15**	**0.0497**	**7.603**	**0.59**	***0.082***	**13.837**	**5-year**	**15.00**	***83.56***	***6.8***			**714.8**												
		Cistern 1 (north)	**S01**	**0.1346**	**7.738**	**0.51**	***0.191***	**14.028**	**5-year**	**15.00**	***83.56***	***15.9***			**714.8**												
		Surface	**S16**	**0.0874**	**7.825**	**0.20**	**0.049**	**14.077**	**5-year**	**22.00**	***66.15***	***3.2***	***931.1***		**714.8**	**914.0**	**900**	**CONC**	**0.30**	**81.71**	**1033.21**	**1.56**	**1.56**	**0.83**	***0.90***	***0.69***	**1.00**
TOTALS =				**7.825**			**14.0766**																				

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	0.810
5-year	998.071	6.053	0.814
100-year	1735.688	6.014	0.820

Designed:	Project:	
J. Fitzpatrick, P.Eng.	1740 St. Laurent Boulevard Development	
Checked:	Location:	
B. Thomas, P.Eng.	1740 St. Laurent Boulevard	
Dwg Reference:	File Ref:	Sheet No:
C100 - Site Servicing Plan	**OTT-00260579 Storm - Sewer Design Sheets, August 31, 2023 AC.xlsx**	1 of 1

Notes

1) Total Area to Dry Pond INLET from Alta Vista Sub = 2.018 ha. Includes subcatchments 105, 107A, 107B, 109, 111, 112A, 112B, 113, 114, 116, 117,C1, C2, EXT-A, EXX-B, FTR-3. Total weighted Cavg = 0.74

2) Total from Dry Pond = 2.082 + 0.064ha = 2.0817 ha. Includes all subcatchments above + POND. Total weighted Cavg = 0.73

Appendix E – WaterGEMS Results

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

1.1 - Average Day Demand Connection 1

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
EX.J-1	76.56	0.00	118.49	60
EX.J-2_HP166	76.95	0.00	118.49	59
EX.J-3	76.91	0.00	118.49	59
EX.J-4	76.82	0.00	118.49	59
EX.J-5	76.86	0.00	118.49	59
EX.J-6	76.93	0.13	118.49	59
EX.J-7	76.63	0.00	118.49	59
EX.J-8	76.26	0.15	118.49	60
EX.J-9_HP168	76.00	0.00	118.49	60
EX.J-12	75.25	0.73	118.49	61
EX.J-13_HP168	75.35	0.00	118.49	61
EX.J-18_HP165	77.70	0.00	118.49	58
EX.J-20	77.65	0.33	118.49	58
EX.J-24_HP167	76.26	0.00	118.49	60
EXJ-21_HYD1_HYD2	75.60	2.30	118.49	61
Ex.J-22	74.69	0.00	118.49	62
ExJ-10	75.32	0.00	118.49	61
J-42	69.53	0.00	118.50	70
J-46_HYD1	69.85	0.00	118.50	69
J-100_TOWER2	73.44	1.08	118.49	64
J-101_TOWER4	73.26	0.88	118.49	64
J-102_HYD2	73.27	0.00	118.49	64
J-102_TOWER1	69.57	1.13	118.50	69
J-103_TOWER3	69.55	5.83	118.50	69
J-104	69.50	0.00	118.50	70

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

1.1 - Average Day Demand Connection 1

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)
P-1	15	EX.J-1	EX.J-18_HP165	297.0	PVC	120.0	0.00	0.00
P-2	46	EX.J-18_HP165	EX.J-20	297.0	PVC	120.0	0.00	0.00
P-3	28	EX.J-20	EX.J-2_HP166	297.0	PVC	120.0	-0.33	0.00
P-4	3	EX.J-2_HP166	EX.J-3	297.0	PVC	120.0	-0.33	0.00
P-5	13	EX.J-3	EX.J-4	297.0	PVC	120.0	-0.33	0.00
P-6	3	EX.J-4	EX.J-5	297.0	PVC	120.0	-0.33	0.00
P-7	19	EX.J-5	EX.J-6	297.0	PVC	120.0	-0.33	0.00
P-8	16	EX.J-6	EX.J-7	297.0	PVC	120.0	-0.46	0.01
P-9	32	EX.J-7	EX.J-8	297.0	PVC	120.0	-0.46	0.01
P-10	10	EX.J-8	EX.J-24_HP167	297.0	PVC	120.0	-0.61	0.01
P-11	76	EX.J-24_HP167	EX.J-9_HP168	297.0	PVC	120.0	-0.61	0.01
P-12	16	EX.J-9_HP168	ExJ-10	297.0	PVC	120.0	-0.61	0.01
P-13	53	ExJ-10	EXJ-21_HYD1_HYD2	297.0	PVC	120.0	2.30	0.03
P-14	55	ExJ-10	EX.J-12	297.0	PVC	120.0	-2.91	0.04
P-15	17	EX.J-12	EX.J-13_HP168	297.0	PVC	120.0	-3.64	0.05
P-16	24	EX.J-13_HP168	Ex.J-22	297.0	PVC	120.0	-3.64	0.05
P-20	20	Ex.J-22	J-100_TOWER2	297.0	PVC	120.0	-3.64	0.05
P-21	3	J-100_TOWER2	J-101_TOWER4	297.0	PVC	120.0	-4.72	0.07
P-22	14	J-101_TOWER4	J-102_HYD2	297.0	PVC	120.0	-5.60	0.08
P-23	54	J-102_HYD2	J-46_HYD1	297.0	PVC	120.0	-5.60	0.08
P-24	34	J-46_HYD1	J-102_TOWER1	297.0	PVC	120.0	-5.60	0.08
P-25	3	J-102_TOWER1	J-103_TOWER3	297.0	PVC	120.0	-6.73	0.10
P-26	6	J-103_TOWER3	J-42	297.0	PVC	120.0	-12.56	0.18
P-27	33	J-42	J-104	297.0	PVC	120.0	-6.11	0.09
P-28	30	J-42	J-104	297.0	PVC	120.0	-6.45	0.09
P-30	17	R-2	EX.J-1	600.0	PVC	120.0	(N/A)	(N/A)
P-31	11	R-1	J-104	600.0	PVC	120.0	12.56	0.04

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

1.1 - Average Day Demand Connection 1

Reservoir Table - Time: 0.00 hours

ID	Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
89	R-1	118.50	<None>	12.56	118.50
90	R-2	118.50	<None>	(N/A)	(N/A)

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

1.2 - Average Day Demand Connection 2

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
EX.J-1	76.56	0.00	118.50	60
EX.J-2_HP166	76.95	0.00	118.49	59
EX.J-3	76.91	0.00	118.48	59
EX.J-4	76.82	0.00	118.48	59
EX.J-5	76.86	0.00	118.48	59
EX.J-6	76.93	0.13	118.48	59
EX.J-7	76.63	0.00	118.48	59
EX.J-8	76.26	0.15	118.47	60
EX.J-9_HP168	76.00	0.00	118.46	60
EX.J-12	75.25	0.73	118.45	61
EX.J-13_HP168	75.35	0.00	118.45	61
EX.J-18_HP165	77.70	0.00	118.50	58
EX.J-20	77.65	0.33	118.49	58
EX.J-24_HP167	76.26	0.00	118.47	60
EXJ-21_HYD1_HYD2	75.60	2.30	118.46	61
Ex.J-22	74.69	0.00	118.45	62
ExJ-10	75.32	0.00	118.46	61
J-42	69.53	0.00	118.44	69
J-46_HYD1	69.85	0.00	118.44	69
J-100_TOWER2	73.44	1.08	118.44	64
J-101_TOWER4	73.26	0.88	118.44	64
J-102_HYD2	73.27	0.00	118.44	64
J-102_TOWER1	69.57	1.13	118.44	69
J-103_TOWER3	69.55	5.83	118.44	69
J-104	69.50	(N/A)	(N/A)	(N/A)

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

1.2 - Average Day Demand Connection 2

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)
P-1	15	EX.J-1	EX.J-18_HP165	297.0	PVC	120.0	12.56	0.18
P-2	46	EX.J-18_HP165	EX.J-20	297.0	PVC	120.0	12.56	0.18
P-3	28	EX.J-20	EX.J-2_HP166	297.0	PVC	120.0	12.23	0.18
P-4	3	EX.J-2_HP166	EX.J-3	297.0	PVC	120.0	12.23	0.18
P-5	13	EX.J-3	EX.J-4	297.0	PVC	120.0	12.23	0.18
P-6	3	EX.J-4	EX.J-5	297.0	PVC	120.0	12.23	0.18
P-7	19	EX.J-5	EX.J-6	297.0	PVC	120.0	12.23	0.18
P-8	16	EX.J-6	EX.J-7	297.0	PVC	120.0	12.10	0.17
P-9	32	EX.J-7	EX.J-8	297.0	PVC	120.0	12.10	0.17
P-10	10	EX.J-8	EX.J-24_HP167	297.0	PVC	120.0	11.95	0.17
P-11	76	EX.J-24_HP167	EX.J-9_HP168	297.0	PVC	120.0	11.95	0.17
P-12	16	EX.J-9_HP168	ExJ-10	297.0	PVC	120.0	11.95	0.17
P-13	53	ExJ-10	EXJ-21_HYD1_HYD2	297.0	PVC	120.0	2.30	0.03
P-14	55	ExJ-10	EX.J-12	297.0	PVC	120.0	9.65	0.14
P-15	17	EX.J-12	EX.J-13_HP168	297.0	PVC	120.0	8.92	0.13
P-16	24	EX.J-13_HP168	Ex.J-22	297.0	PVC	120.0	8.92	0.13
P-20	20	Ex.J-22	J-100_TOWER2	297.0	PVC	120.0	8.92	0.13
P-21	3	J-100_TOWER2	J-101_TOWER4	297.0	PVC	120.0	7.84	0.11
P-22	14	J-101_TOWER4	J-102_HYD2	297.0	PVC	120.0	6.96	0.10
P-23	54	J-102_HYD2	J-46_HYD1	297.0	PVC	120.0	6.96	0.10
P-24	34	J-46_HYD1	J-102_TOWER1	297.0	PVC	120.0	6.96	0.10
P-25	3	J-102_TOWER1	J-103_TOWER3	297.0	PVC	120.0	5.83	0.08
P-26	6	J-103_TOWER3	J-42	297.0	PVC	120.0	0.00	0.00
P-27	33	J-42	J-104	297.0	PVC	120.0	(N/A)	(N/A)
P-28	30	J-42	J-104	297.0	PVC	120.0	(N/A)	(N/A)
P-30	17	R-2	EX.J-1	600.0	PVC	120.0	12.56	0.04
P-31	11	R-1	J-104	600.0	PVC	120.0	(N/A)	(N/A)

Reservoir Table - Time: 0.00 hours

ID	Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
89	R-1	118.50	<None>	(N/A)	(N/A)
90	R-2	118.50	<None>	12.56	118.50

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

1.3 - Average Day Demand Connection 1 and 2

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
EX.J-1	76.56	0.00	118.50	60
EX.J-2_HP166	76.95	0.00	118.50	59
EX.J-3	76.91	0.00	118.50	59
EX.J-4	76.82	0.00	118.50	59
EX.J-5	76.86	0.00	118.50	59
EX.J-6	76.93	0.13	118.50	59
EX.J-7	76.63	0.00	118.50	59
EX.J-8	76.26	0.15	118.50	60
EX.J-9_HP168	76.00	0.00	118.50	60
EX.J-12	75.25	0.73	118.50	61
EX.J-13_HP168	75.35	0.00	118.50	61
EX.J-18_HP165	77.70	0.00	118.50	58
EX.J-20	77.65	0.33	118.50	58
EX.J-24_HP167	76.26	0.00	118.50	60
EXJ-21_HYD1_HYD2	75.60	2.30	118.50	61
Ex.J-22	74.69	0.00	118.50	62
ExJ-10	75.32	0.00	118.50	61
J-42	69.53	0.00	118.50	70
J-46_HYD1	69.85	0.00	118.50	69
J-100_TOWER2	73.44	1.08	118.50	64
J-101_TOWER4	73.26	0.88	118.50	64
J-102_HYD2	73.27	0.00	118.50	64
J-102_TOWER1	69.57	1.13	118.50	69
J-103_TOWER3	69.55	5.83	118.50	69
J-104	69.50	0.00	118.50	70

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

1.3 - Average Day Demand Connection 1 and 2

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)
P-1	15	EX.J-1	EX.J-18_HP165	297.0	PVC	120.0	2.99	0.04
P-2	46	EX.J-18_HP165	EX.J-20	297.0	PVC	120.0	2.99	0.04
P-3	28	EX.J-20	EX.J-2_HP166	297.0	PVC	120.0	2.66	0.04
P-4	3	EX.J-2_HP166	EX.J-3	297.0	PVC	120.0	2.66	0.04
P-5	13	EX.J-3	EX.J-4	297.0	PVC	120.0	2.66	0.04
P-6	3	EX.J-4	EX.J-5	297.0	PVC	120.0	2.66	0.04
P-7	19	EX.J-5	EX.J-6	297.0	PVC	120.0	2.66	0.04
P-8	16	EX.J-6	EX.J-7	297.0	PVC	120.0	2.53	0.04
P-9	32	EX.J-7	EX.J-8	297.0	PVC	120.0	2.53	0.04
P-10	10	EX.J-8	EX.J-24_HP167	297.0	PVC	120.0	2.38	0.03
P-11	76	EX.J-24_HP167	EX.J-9_HP168	297.0	PVC	120.0	2.38	0.03
P-12	16	EX.J-9_HP168	ExJ-10	297.0	PVC	120.0	2.38	0.03
P-13	53	ExJ-10	EXJ-21_HYD1_HYD2	297.0	PVC	120.0	2.30	0.03
P-14	55	ExJ-10	EX.J-12	297.0	PVC	120.0	0.08	0.00
P-15	17	EX.J-12	EX.J-13_HP168	297.0	PVC	120.0	-0.65	0.01
P-16	24	EX.J-13_HP168	Ex.J-22	297.0	PVC	120.0	-0.65	0.01
P-20	20	Ex.J-22	J-100_TOWER2	297.0	PVC	120.0	-0.65	0.01
P-21	3	J-100_TOWER2	J-101_TOWER4	297.0	PVC	120.0	-1.73	0.02
P-22	14	J-101_TOWER4	J-102_HYD2	297.0	PVC	120.0	-2.61	0.04
P-23	54	J-102_HYD2	J-46_HYD1	297.0	PVC	120.0	-2.61	0.04
P-24	34	J-46_HYD1	J-102_TOWER1	297.0	PVC	120.0	-2.61	0.04
P-25	3	J-102_TOWER1	J-103_TOWER3	297.0	PVC	120.0	-3.74	0.05
P-26	6	J-103_TOWER3	J-42	297.0	PVC	120.0	-9.57	0.14
P-27	33	J-42	J-104	297.0	PVC	120.0	-4.66	0.07
P-28	30	J-42	J-104	297.0	PVC	120.0	-4.91	0.07
P-30	17	R-2	EX.J-1	600.0	PVC	120.0	2.99	0.01
P-31	11	R-1	J-104	600.0	PVC	120.0	9.57	0.03

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

1.3 - Average Day Demand Connection 1 and 2

Reservoir Table - Time: 0.00 hours

ID	Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
89	R-1	118.50	<None>	9.57	118.50
90	R-2	118.50	<None>	2.99	118.50

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
EX.J-1	76.56	0.00	109.06	46
EX.J-2_HP166	76.95	0.00	109.06	46
EX.J-3	76.91	0.00	109.06	46
EX.J-4	76.82	0.00	109.06	46
EX.J-5	76.86	0.00	109.06	46
EX.J-6	76.93	0.32	109.06	46
EX.J-7	76.63	0.00	109.06	46
EX.J-8	76.26	0.37	109.06	47
EX.J-9_HP168	76.00	0.00	109.06	47
EX.J-12	75.25	1.82	109.06	48
EX.J-13_HP168	75.35	0.00	109.07	48
EX.J-18_HP165	77.70	0.00	109.06	45
EX.J-20	77.65	0.82	109.06	45
EX.J-24_HP167	76.26	0.00	109.06	47
EXJ-21_HYD1_HYD2	75.60	5.75	109.06	47
Ex.J-22	74.69	0.00	109.07	49
ExJ-10	75.32	0.00	109.06	48
J-42	69.53	0.00	109.09	56
J-46_HYD1	69.85	0.00	109.08	56
J-100_TOWER2	73.44	2.70	109.07	51
J-101_TOWER4	73.26	2.20	109.07	51
J-102_HYD2	73.27	0.00	109.07	51
J-102_TOWER1	69.57	1.69	109.09	56
J-103_TOWER3	69.55	8.75	109.09	56
J-104	69.50	0.00	109.10	56

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

2.1 - Max Day + FF. Connection 1

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)
P-1	15	EX.J-1	EX.J-18_HP165	297.0	PVC	120.0	0.00	0.00
P-2	46	EX.J-18_HP165	EX.J-20	297.0	PVC	120.0	0.00	0.00
P-3	28	EX.J-20	EX.J-2_HP166	297.0	PVC	120.0	-0.83	0.01
P-4	3	EX.J-2_HP166	EX.J-3	297.0	PVC	120.0	-0.83	0.01
P-5	13	EX.J-3	EX.J-4	297.0	PVC	120.0	-0.83	0.01
P-6	3	EX.J-4	EX.J-5	297.0	PVC	120.0	-0.83	0.01
P-7	19	EX.J-5	EX.J-6	297.0	PVC	120.0	-0.83	0.01
P-8	16	EX.J-6	EX.J-7	297.0	PVC	120.0	-1.15	0.02
P-9	32	EX.J-7	EX.J-8	297.0	PVC	120.0	-1.15	0.02
P-10	10	EX.J-8	EX.J-24_HP167	297.0	PVC	120.0	-1.53	0.02
P-11	76	EX.J-24_HP167	EX.J-9_HP168	297.0	PVC	120.0	-1.53	0.02
P-12	16	EX.J-9_HP168	ExJ-10	297.0	PVC	120.0	-1.53	0.02
P-13	53	ExJ-10	EXJ-21_HYD1_HYD2	297.0	PVC	120.0	5.75	0.08
P-14	55	ExJ-10	EX.J-12	297.0	PVC	120.0	-7.28	0.11
P-15	17	EX.J-12	EX.J-13_HP168	297.0	PVC	120.0	-9.10	0.13
P-16	24	EX.J-13_HP168	Ex.J-22	297.0	PVC	120.0	-9.10	0.13
P-20	20	Ex.J-22	J-100_TOWER2	297.0	PVC	120.0	-9.10	0.13
P-21	3	J-100_TOWER2	J-101_TOWER4	297.0	PVC	120.0	-11.80	0.17
P-22	14	J-101_TOWER4	J-102_HYD2	297.0	PVC	120.0	-14.00	0.20
P-23	54	J-102_HYD2	J-46_HYD1	297.0	PVC	120.0	-14.00	0.20
P-24	34	J-46_HYD1	J-102_TOWER1	297.0	PVC	120.0	-14.00	0.20
P-25	3	J-102_TOWER1	J-103_TOWER3	297.0	PVC	120.0	-15.70	0.23
P-26	6	J-103_TOWER3	J-42	297.0	PVC	120.0	-24.44	0.35
P-27	33	J-42	J-104	297.0	PVC	120.0	-11.90	0.17
P-28	30	J-42	J-104	297.0	PVC	120.0	-12.54	0.18
P-30	17	R-2	EX.J-1	600.0	PVC	120.0	(N/A)	(N/A)
P-31	11	R-1	J-104	600.0	PVC	120.0	24.44	0.09

Reservoir Table - Time: 0.00 hours

ID	Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
89	R-1	109.10	<None>	24.44	109.10
90	R-2	109.10	<None>	(N/A)	(N/A)

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

2.1 - Max Day + FF. Connection 1

Fire Flow Results Table - Time: 0.00 hours

Label	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Satisfies Fire Flow Constraints?	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Pressure (Zone Lower Limit) (psi)
EX.J-18_HP165	183.00	216.61	183.00	216.61	True	20	20	20
EX.J-2_HP166	183.00	235.71	183.00	235.71	True	20	21	20
EX.J-24_HP167	183.00	269.73	183.00	269.73	True	20	22	20
EXJ-21_HYD1_HYD2	183.00	300.00	188.75	305.75	True	20	21	20
EX.J-13_HP168	183.00	300.00	183.00	300.00	True	20	32	20
EX.J-9_HP168	183.00	300.00	183.00	300.00	True	20	24	20
J-102_HYD2	0.00	300.00	133.00	300.00	True	0	41	0
J-46_HYD1	0.00	300.00	133.00	300.00	True	0	51	0

Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (System Lower Limit) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanced?
22	EX.J-1	20	22	EX.J-1	True
20	EX.J-18_HP165	20	20	EX.J-18_HP165	True
20	EX.J-18_HP165	20	20	EX.J-18_HP165	True
23	EX.J-18_HP165	20	23	EX.J-18_HP165	True
29	EX.J-18_HP165	20	29	EX.J-18_HP165	True
21	EX.J-18_HP165	20	21	EX.J-18_HP165	True
35	EX.J-18_HP165	0	35	EX.J-18_HP165	True
40	EX.J-18_HP165	0	40	EX.J-18_HP165	True

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
EX.J-1	76.56	0.00	109.10	46
EX.J-2_HP166	76.95	0.00	109.04	46
EX.J-3	76.91	0.00	109.04	46
EX.J-4	76.82	0.00	109.03	46
EX.J-5	76.86	0.00	109.03	46
EX.J-6	76.93	0.33	109.02	46
EX.J-7	76.63	0.00	109.01	46
EX.J-8	76.26	0.38	108.99	46
EX.J-9_HP168	76.00	0.00	108.94	47
EX.J-12	75.25	1.82	108.91	48
EX.J-13_HP168	75.35	0.00	108.90	48
EX.J-18_HP165	77.70	0.00	109.09	45
EX.J-20	77.65	0.82	109.06	45
EX.J-24_HP167	76.26	0.00	108.98	46
EXJ-21_HYD1_HYD2	75.60	5.76	108.93	47
Ex.J-22	74.69	0.00	108.89	49
ExJ-10	75.32	0.00	108.93	48
J-42	69.53	0.00	108.87	56
J-46_HYD1	69.85	0.00	108.88	55
J-100_TOWER2	73.44	2.71	108.89	50
J-101_TOWER4	73.26	2.20	108.89	51
J-102_HYD2	73.27	0.00	108.89	51
J-102_TOWER1	69.57	2.78	108.87	56
J-103_TOWER3	69.55	9.63	108.87	56
J-104	69.50	(N/A)	(N/A)	(N/A)

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

2.2 - Max Day + FF. Connection 2

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)
P-1	15	EX.J-1	EX.J-18_HP165	297.0	PVC	120.0	26.43	0.38
P-2	46	EX.J-18_HP165	EX.J-20	297.0	PVC	120.0	26.43	0.38
P-3	28	EX.J-20	EX.J-2_HP166	297.0	PVC	120.0	25.61	0.37
P-4	3	EX.J-2_HP166	EX.J-3	297.0	PVC	120.0	25.61	0.37
P-5	13	EX.J-3	EX.J-4	297.0	PVC	120.0	25.61	0.37
P-6	3	EX.J-4	EX.J-5	297.0	PVC	120.0	25.61	0.37
P-7	19	EX.J-5	EX.J-6	297.0	PVC	120.0	25.61	0.37
P-8	16	EX.J-6	EX.J-7	297.0	PVC	120.0	25.28	0.36
P-9	32	EX.J-7	EX.J-8	297.0	PVC	120.0	25.28	0.36
P-10	10	EX.J-8	EX.J-24_HP167	297.0	PVC	120.0	24.90	0.36
P-11	76	EX.J-24_HP167	EX.J-9_HP168	297.0	PVC	120.0	24.90	0.36
P-12	16	EX.J-9_HP168	ExJ-10	297.0	PVC	120.0	24.90	0.36
P-13	53	ExJ-10	EXJ-21_HYD1_HYD2	297.0	PVC	120.0	5.76	0.08
P-14	55	ExJ-10	EX.J-12	297.0	PVC	120.0	19.14	0.28
P-15	17	EX.J-12	EX.J-13_HP168	297.0	PVC	120.0	17.32	0.25
P-16	24	EX.J-13_HP168	Ex.J-22	297.0	PVC	120.0	17.32	0.25
P-20	20	Ex.J-22	J-100_TOWER2	297.0	PVC	120.0	17.32	0.25
P-21	3	J-100_TOWER2	J-101_TOWER4	297.0	PVC	120.0	14.61	0.21
P-22	14	J-101_TOWER4	J-102_HYD2	297.0	PVC	120.0	12.41	0.18
P-23	54	J-102_HYD2	J-46_HYD1	297.0	PVC	120.0	12.41	0.18
P-24	34	J-46_HYD1	J-102_TOWER1	297.0	PVC	120.0	12.41	0.18
P-25	3	J-102_TOWER1	J-103_TOWER3	297.0	PVC	120.0	9.63	0.14
P-26	6	J-103_TOWER3	J-42	297.0	PVC	120.0	0.00	0.00
P-27	33	J-42	J-104	297.0	PVC	120.0	(N/A)	(N/A)
P-28	30	J-42	J-104	297.0	PVC	120.0	(N/A)	(N/A)
P-30	17	R-2	EX.J-1	600.0	PVC	120.0	26.43	0.09
P-31	11	R-1	J-104	600.0	PVC	120.0	(N/A)	(N/A)

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

2.2 - Max Day + FF. Connection 2

Fire Flow Results Table - Time: 0.00 hours

Label	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Satisfies Fire Flow Constraints?	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Pressure (Zone Lower Limit) (psi)
EX.J-18_HP165	183.00	300.00	183.00	300.00	True	20	43	20
EX.J-2_HP166	183.00	300.00	183.00	300.00	True	20	37	20
EX.J-24_HP167	183.00	300.00	183.00	300.00	True	20	28	20
EXJ-21_HYD1_HYD2	183.00	274.55	188.76	280.31	True	20	20	20
EX.J-13_HP168	183.00	265.85	183.00	265.85	True	20	20	20
EX.J-9_HP168	183.00	300.00	183.00	300.00	True	20	21	20
J-102_HYD2	0.00	257.56	133.00	257.56	True	0	20	0
J-46_HYD1	0.00	257.56	133.00	257.56	True	0	21	0

Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (System Lower Limit) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanced?
43	EX.J-20	20	43	EX.J-20	True
37	EX.J-6	20	37	EX.J-6	True
29	EX.J-9_HP168	20	29	EX.J-9_HP168	True
24	EX.J-13_HP168	20	24	EX.J-13_HP168	True
21	Ex.J-22	20	21	Ex.J-22	True
22	EXJ-21_HYD1_HYD2	20	22	EXJ-21_HYD1_HYD2	True
21	Ex.J-22	0	21	Ex.J-22	True
20	J-102_HYD2	0	20	J-102_HYD2	True

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

2.3 - Max Day + FF. Connection 1 and 2

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
EX.J-1	76.56	0.00	109.10	46
EX.J-2_HP166	76.95	0.00	109.10	46
EX.J-3	76.91	0.00	109.10	46
EX.J-4	76.82	0.00	109.09	46
EX.J-5	76.86	0.00	109.09	46
EX.J-6	76.93	0.33	109.09	46
EX.J-7	76.63	0.00	109.09	46
EX.J-8	76.26	0.38	109.09	47
EX.J-9_HP168	76.00	0.00	109.09	47
EX.J-12	75.25	1.82	109.09	48
EX.J-13_HP168	75.35	0.00	109.09	48
EX.J-18_HP165	77.70	0.00	109.10	45
EX.J-20	77.65	0.82	109.10	45
EX.J-24_HP167	76.26	0.00	109.09	47
EXJ-21_HYD1_HYD2	75.60	5.76	109.09	48
Ex.J-22	74.69	0.00	109.09	49
ExJ-10	75.32	0.00	109.09	48
J-42	69.53	0.00	109.10	56
J-46_HYD1	69.85	0.00	109.09	56
J-100_TOWER2	73.44	2.71	109.09	51
J-101_TOWER4	73.26	2.20	109.09	51
J-102_HYD2	73.27	0.00	109.09	51
J-102_TOWER1	69.57	2.78	109.09	56
J-103_TOWER3	69.55	9.63	109.09	56
J-104	69.50	0.00	109.10	56

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

2.3 - Max Day + FF. Connection 1 and 2

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)
P-1	15	EX.J-1	EX.J-18_HP165	297.0	PVC	120.0	7.02	0.10
P-2	46	EX.J-18_HP165	EX.J-20	297.0	PVC	120.0	7.02	0.10
P-3	28	EX.J-20	EX.J-2_HP166	297.0	PVC	120.0	6.20	0.09
P-4	3	EX.J-2_HP166	EX.J-3	297.0	PVC	120.0	6.20	0.09
P-5	13	EX.J-3	EX.J-4	297.0	PVC	120.0	6.20	0.09
P-6	3	EX.J-4	EX.J-5	297.0	PVC	120.0	6.20	0.09
P-7	19	EX.J-5	EX.J-6	297.0	PVC	120.0	6.20	0.09
P-8	16	EX.J-6	EX.J-7	297.0	PVC	120.0	5.87	0.08
P-9	32	EX.J-7	EX.J-8	297.0	PVC	120.0	5.87	0.08
P-10	10	EX.J-8	EX.J-24_HP167	297.0	PVC	120.0	5.49	0.08
P-11	76	EX.J-24_HP167	EX.J-9_HP168	297.0	PVC	120.0	5.49	0.08
P-12	16	EX.J-9_HP168	ExJ-10	297.0	PVC	120.0	5.49	0.08
P-13	53	ExJ-10	EXJ-21_HYD1_HYD2	297.0	PVC	120.0	5.76	0.08
P-14	55	ExJ-10	EX.J-12	297.0	PVC	120.0	-0.27	0.00
P-15	17	EX.J-12	EX.J-13_HP168	297.0	PVC	120.0	-2.09	0.03
P-16	24	EX.J-13_HP168	Ex.J-22	297.0	PVC	120.0	-2.09	0.03
P-20	20	Ex.J-22	J-100_TOWER2	297.0	PVC	120.0	-2.09	0.03
P-21	3	J-100_TOWER2	J-101_TOWER4	297.0	PVC	120.0	-4.80	0.07
P-22	14	J-101_TOWER4	J-102_HYD2	297.0	PVC	120.0	-7.00	0.10
P-23	54	J-102_HYD2	J-46_HYD1	297.0	PVC	120.0	-7.00	0.10
P-24	34	J-46_HYD1	J-102_TOWER1	297.0	PVC	120.0	-7.00	0.10
P-25	3	J-102_TOWER1	J-103_TOWER3	297.0	PVC	120.0	-9.78	0.14
P-26	6	J-103_TOWER3	J-42	297.0	PVC	120.0	-19.41	0.28
P-27	33	J-42	J-104	297.0	PVC	120.0	-9.45	0.14
P-28	30	J-42	J-104	297.0	PVC	120.0	-9.96	0.14
P-30	17	R-2	EX.J-1	600.0	PVC	120.0	7.02	0.02
P-31	11	R-1	J-104	600.0	PVC	120.0	19.41	0.07

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

2.3 - Max Day + FF. Connection 1 and 2

Fire Flow Results Table - Time: 0.00 hours

Label	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Satisfies Fire Flow Constraints?	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Pressure (Zone Lower Limit) (psi)
EX.J-18_HP165	183.00	300.00	183.00	300.00	True	20	43	20
EX.J-2_HP166	183.00	300.00	183.00	300.00	True	20	42	20
EX.J-24_HP167	183.00	300.00	183.00	300.00	True	20	41	20
EXJ-21_HYD1_HYD2	183.00	300.00	188.76	305.76	True	20	36	20
EX.J-13_HP168	183.00	300.00	183.00	300.00	True	20	42	20
EX.J-9_HP168	183.00	300.00	183.00	300.00	True	20	40	20
J-102_HYD2	0.00	300.00	133.00	300.00	True	0	46	0
J-46_HYD1	0.00	300.00	133.00	300.00	True	0	53	0

Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (System Lower Limit) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanced?
44	EX.J-20	20	44	EX.J-20	True
42	EX.J-3	20	42	EX.J-3	True
41	EX.J-8	20	41	EX.J-8	True
41	EX.J-9_HP168	20	41	EX.J-9_HP168	True
42	EX.J-12	20	42	EX.J-12	True
41	EXJ-21_HYD1_HYD2	20	41	EXJ-21_HYD1_HYD2	True
44	EX.J-13_HP168	0	44	EX.J-13_HP168	True
44	EX.J-20	0	44	EX.J-20	True

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
EX.J-1	76.56	0.00	108.34	45
EX.J-2_HP166	76.95	0.00	108.34	45
EX.J-3	76.91	0.00	108.34	45
EX.J-4	76.82	0.00	108.34	45
EX.J-5	76.86	0.00	108.34	45
EX.J-6	76.93	0.71	108.34	45
EX.J-7	76.63	0.00	108.34	45
EX.J-8	76.26	0.82	108.34	46
EX.J-9_HP168	76.00	0.00	108.34	46
EX.J-12	75.25	4.02	108.36	47
EX.J-13_HP168	75.35	0.00	108.36	47
EX.J-18_HP165	77.70	0.00	108.34	43
EX.J-20	77.65	1.82	108.34	44
EX.J-24_HP167	76.26	0.00	108.34	46
EXJ-21_HYD1_HYD2	75.60	12.65	108.33	46
Ex.J-22	74.69	0.00	108.37	48
ExJ-10	75.32	0.00	108.34	47
J-42	69.53	0.00	108.48	55
J-46_HYD1	69.85	0.00	108.44	55
J-100_TOWER2	73.44	5.94	108.38	50
J-101_TOWER4	73.26	4.84	108.38	50
J-102_HYD2	73.27	0.00	108.39	50
J-102_TOWER1	69.57	2.03	108.47	55
J-103_TOWER3	69.55	10.49	108.48	55
J-104	69.50	0.00	108.50	55

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

3.1 - Peak Hr. Connection 1

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)
P-1	15	EX.J-1	EX.J-18_HP165	297.0	PVC	120.0	0.00	0.00
P-2	46	EX.J-18_HP165	EX.J-20	297.0	PVC	120.0	0.00	0.00
P-3	28	EX.J-20	EX.J-2_HP166	297.0	PVC	120.0	-1.82	0.03
P-4	3	EX.J-2_HP166	EX.J-3	297.0	PVC	120.0	-1.82	0.03
P-5	13	EX.J-3	EX.J-4	297.0	PVC	120.0	-1.82	0.03
P-6	3	EX.J-4	EX.J-5	297.0	PVC	120.0	-1.82	0.03
P-7	19	EX.J-5	EX.J-6	297.0	PVC	120.0	-1.82	0.03
P-8	16	EX.J-6	EX.J-7	297.0	PVC	120.0	-2.53	0.04
P-9	32	EX.J-7	EX.J-8	297.0	PVC	120.0	-2.53	0.04
P-10	10	EX.J-8	EX.J-24_HP167	297.0	PVC	120.0	-3.36	0.05
P-11	76	EX.J-24_HP167	EX.J-9_HP168	297.0	PVC	120.0	-3.36	0.05
P-12	16	EX.J-9_HP168	ExJ-10	297.0	PVC	120.0	-3.36	0.05
P-13	53	ExJ-10	EXJ-21_HYD1_HYD2	297.0	PVC	120.0	12.65	0.18
P-14	55	ExJ-10	EX.J-12	297.0	PVC	120.0	-16.01	0.23
P-15	17	EX.J-12	EX.J-13_HP168	297.0	PVC	120.0	-20.02	0.29
P-16	24	EX.J-13_HP168	Ex.J-22	297.0	PVC	120.0	-20.02	0.29
P-20	20	Ex.J-22	J-100_TOWER2	297.0	PVC	120.0	-20.02	0.29
P-21	3	J-100_TOWER2	J-101_TOWER4	297.0	PVC	120.0	-25.96	0.37
P-22	14	J-101_TOWER4	J-102_HYD2	297.0	PVC	120.0	-30.80	0.44
P-23	54	J-102_HYD2	J-46_HYD1	297.0	PVC	120.0	-30.80	0.44
P-24	34	J-46_HYD1	J-102_TOWER1	297.0	PVC	120.0	-30.80	0.44
P-25	3	J-102_TOWER1	J-103_TOWER3	297.0	PVC	120.0	-32.83	0.47
P-26	6	J-103_TOWER3	J-42	297.0	PVC	120.0	-43.33	0.63
P-27	33	J-42	J-104	297.0	PVC	120.0	-21.09	0.30
P-28	30	J-42	J-104	297.0	PVC	120.0	-22.24	0.32
P-30	17	R-2	EX.J-1	600.0	PVC	120.0	(N/A)	(N/A)
P-31	11	R-1	J-104	600.0	PVC	120.0	43.33	0.15

Reservoir Table - Time: 0.00 hours

ID	Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
89	R-1	108.50	<None>	43.33	108.50
90	R-2	108.50	<None>	(N/A)	(N/A)

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

3.2 - Peak Hr. Connection 2

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (psi)
EX.J-1	76.56	0.00	108.50	45
EX.J-2_HP166	76.95	0.00	108.30	45
EX.J-3	76.91	0.00	108.30	45
EX.J-4	76.82	0.00	108.27	45
EX.J-5	76.86	0.00	108.26	45
EX.J-6	76.93	0.74	108.22	44
EX.J-7	76.63	0.00	108.19	45
EX.J-8	76.26	0.85	108.13	45
EX.J-9_HP168	76.00	0.00	107.96	45
EX.J-12	75.25	4.01	107.87	46
EX.J-13_HP168	75.35	0.00	107.85	46
EX.J-18_HP165	77.70	0.00	108.46	44
EX.J-20	77.65	1.80	108.36	44
EX.J-24_HP167	76.26	0.00	108.11	45
EXJ-21_HYD1_HYD2	75.60	12.68	107.92	46
Ex.J-22	74.69	0.00	107.83	47
ExJ-10	75.32	0.00	107.93	46
J-42	69.53	0.00	107.77	54
J-46_HYD1	69.85	0.00	107.79	54
J-100_TOWER2	73.44	5.97	107.82	49
J-101_TOWER4	73.26	4.83	107.81	49
J-102_HYD2	73.27	0.00	107.81	49
J-102_TOWER1	69.57	6.04	107.77	54
J-103_TOWER3	69.55	13.75	107.77	54
J-104	69.50	(N/A)	(N/A)	(N/A)

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)
P-1	15	EX.J-1	EX.J-18_HP165	297.0	PVC	120.0	50.67	0.73
P-2	46	EX.J-18_HP165	EX.J-20	297.0	PVC	120.0	50.67	0.73
P-3	28	EX.J-20	EX.J-2_HP166	297.0	PVC	120.0	48.87	0.71
P-4	3	EX.J-2_HP166	EX.J-3	297.0	PVC	120.0	48.87	0.71
P-5	13	EX.J-3	EX.J-4	297.0	PVC	120.0	48.87	0.71
P-6	3	EX.J-4	EX.J-5	297.0	PVC	120.0	48.87	0.71
P-7	19	EX.J-5	EX.J-6	297.0	PVC	120.0	48.87	0.71
P-8	16	EX.J-6	EX.J-7	297.0	PVC	120.0	48.13	0.69
P-9	32	EX.J-7	EX.J-8	297.0	PVC	120.0	48.13	0.69
P-10	10	EX.J-8	EX.J-24_HP167	297.0	PVC	120.0	47.28	0.68
P-11	76	EX.J-24_HP167	EX.J-9_HP168	297.0	PVC	120.0	47.28	0.68
P-12	16	EX.J-9_HP168	ExJ-10	297.0	PVC	120.0	47.28	0.68
P-13	53	ExJ-10	EXJ-21_HYD1_HYD2	297.0	PVC	120.0	12.68	0.18
P-14	55	ExJ-10	EX.J-12	297.0	PVC	120.0	34.60	0.50
P-15	17	EX.J-12	EX.J-13_HP168	297.0	PVC	120.0	30.59	0.44
P-16	24	EX.J-13_HP168	Ex.J-22	297.0	PVC	120.0	30.59	0.44
P-20	20	Ex.J-22	J-100_TOWER2	297.0	PVC	120.0	30.59	0.44
P-21	3	J-100_TOWER2	J-101_TOWER4	297.0	PVC	120.0	24.62	0.36
P-22	14	J-101_TOWER4	J-102_HYD2	297.0	PVC	120.0	19.79	0.29
P-23	54	J-102_HYD2	J-46_HYD1	297.0	PVC	120.0	19.79	0.29
P-24	34	J-46_HYD1	J-102_TOWER1	297.0	PVC	120.0	19.79	0.29
P-25	3	J-102_TOWER1	J-103_TOWER3	297.0	PVC	120.0	13.75	0.20
P-26	6	J-103_TOWER3	J-42	297.0	PVC	120.0	0.00	0.00
P-27	33	J-42	J-104	297.0	PVC	120.0	(N/A)	(N/A)
P-28	30	J-42	J-104	297.0	PVC	120.0	(N/A)	(N/A)
P-30	17	R-2	EX.J-1	600.0	PVC	120.0	50.67	0.18
P-31	11	R-1	J-104	600.0	PVC	120.0	(N/A)	(N/A)

1740 - 1760 St Laurent Bvd WaterGEMS Analysis

3.2 - Peak Hr. Connection 2

Reservoir Table - Time: 0.00 hours

ID	Label	Elevation (m)	Zone	Flow (Out net) (L/s)	Hydraulic Grade (m)
89	R-1	108.50	<None>	(N/A)	(N/A)
90	R-2	108.50	<None>	50.67	108.50

Appendix F – Manufacturer Information

WATTS Adjustable Accutrol Weir

WATTS®	Adjustable Accutrol Weir Tag: _____	Adjustable Flow Control for Roof Drains

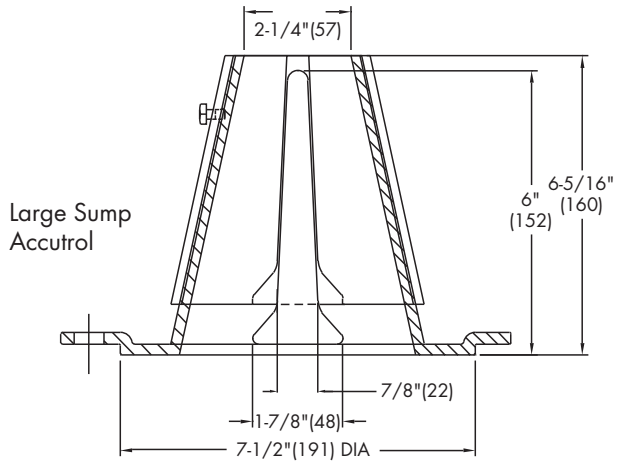
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

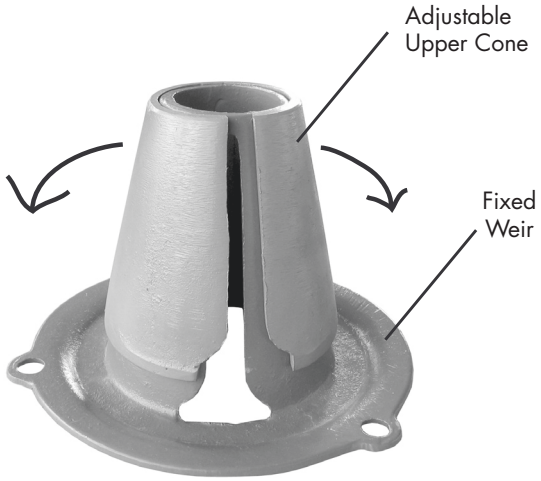
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2"of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3"of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm (per inch of head) x 2 inches of head] + 2-1/2 gpm (for the third inch of head) = 12-1/2 gpm.





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

Engineer _____ Representative _____

Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Watts Technical Service. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.

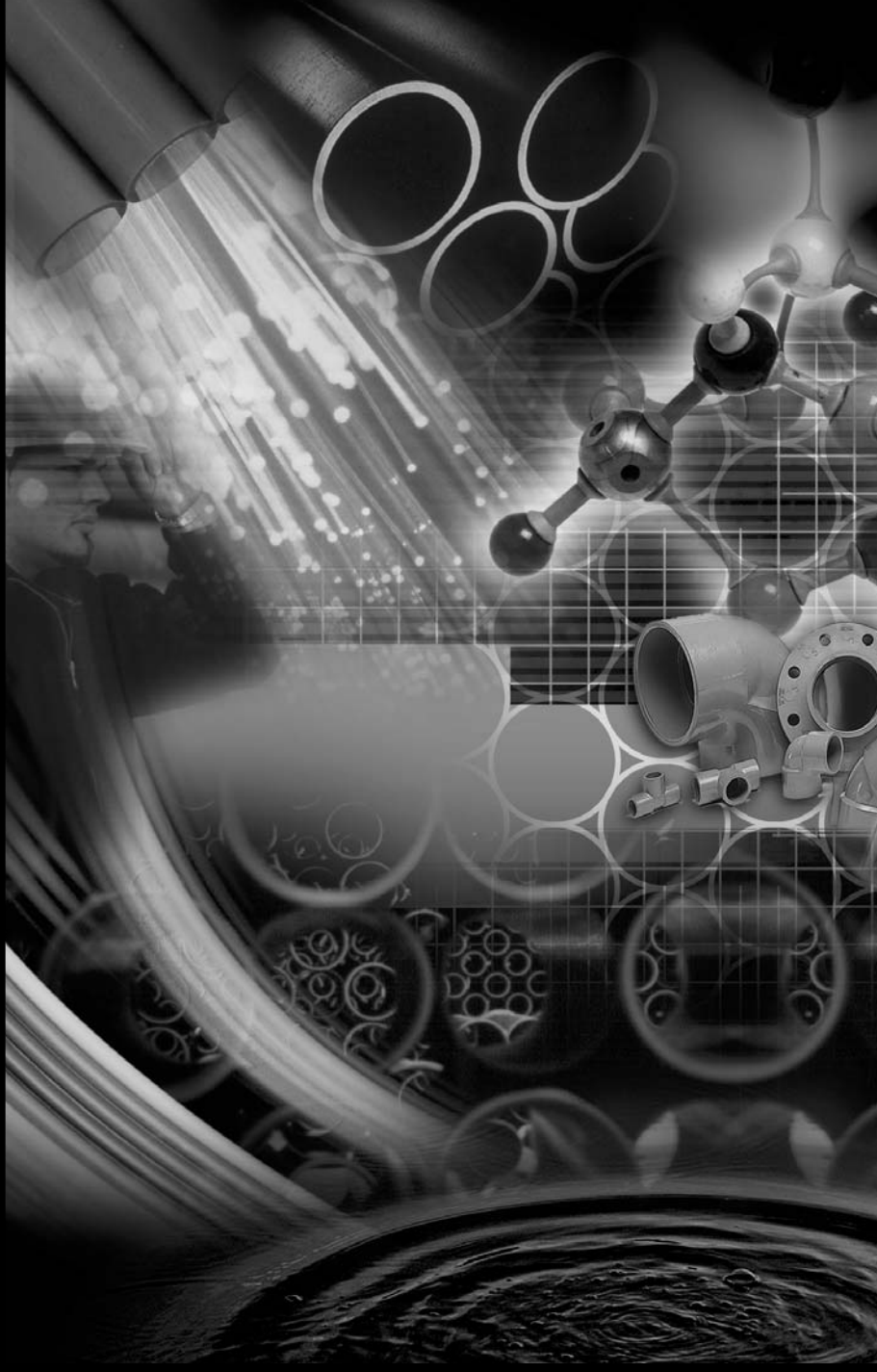
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Volume III: TEMPEST™ INLET CONTROL DEVICES

Municipal Technical Manual Series



SECOND EDITION

LMF (Low to Medium Flow) ICD

HF (High Flow) ICD

MHF (Medium to High Flow) ICD

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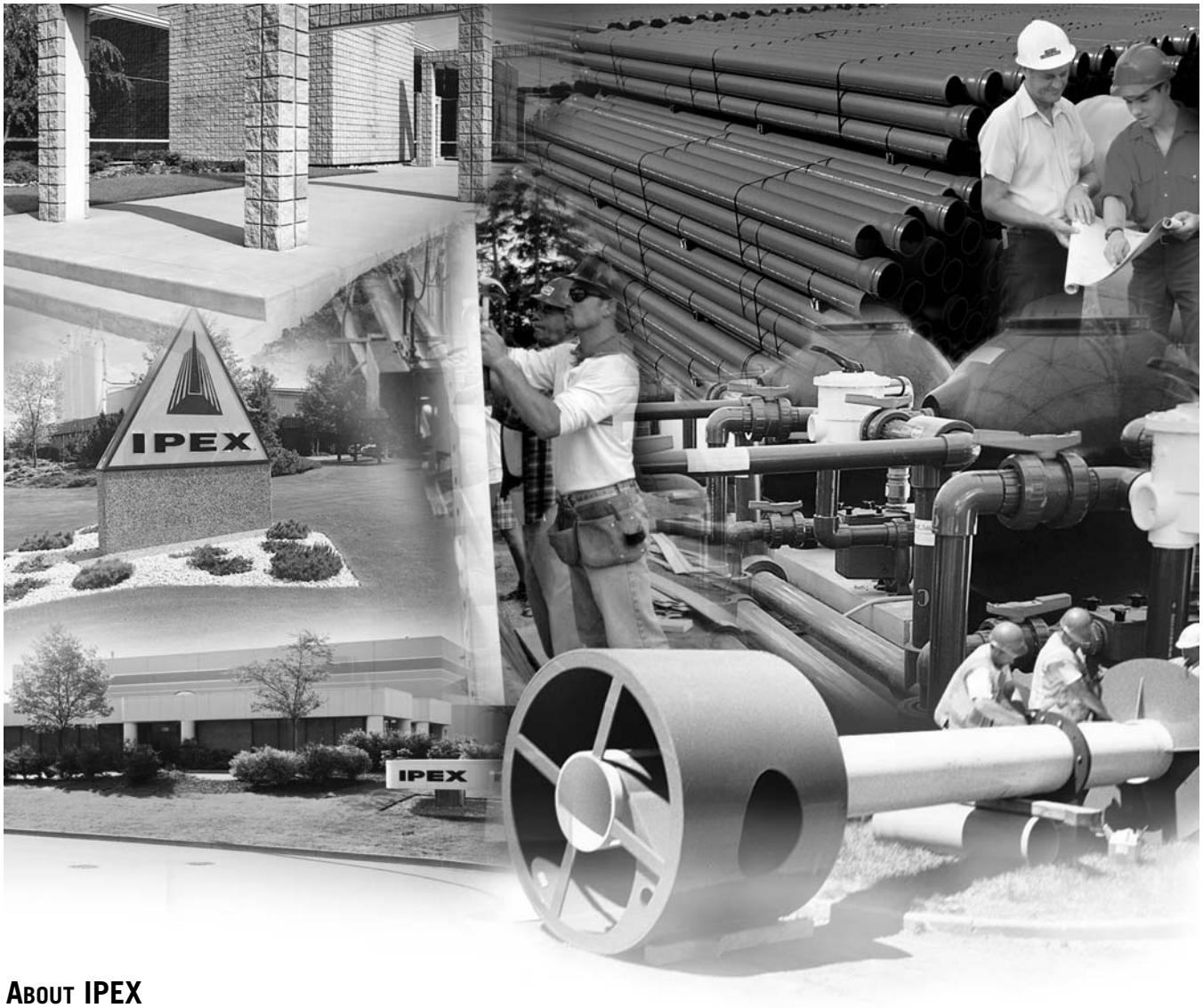
IPEX Tempest™ Inlet Control Devices

Municipal Technical Manual Series

Vol. I, 2nd Edition

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About IPEX

At IPEX, we have been manufacturing non-metallic pipe and fittings since 1951. We formulate our own compounds and maintain strict quality control during production. Our products are made available for customers thanks to a network of regional stocking locations throughout North America. We offer a wide variety of systems including complete lines of piping, fittings, valves and custom-fabricated items.

More importantly, we are committed to meeting our customers' needs. As a leader in the plastic piping industry, IPEX continually develops new products, modernizes manufacturing facilities and acquires innovative process technology. In addition, our staff take pride in their work, making available to customers their extensive thermoplastic knowledge and field experience. IPEX personnel are committed to improving the safety, reliability and performance of thermoplastic materials. We are involved in several standards committees and are members of and/or comply with the organizations listed on this page.

For specific details about any IPEX product, contact our customer service department.

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NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

PRODUCT INFORMATION: TEMPEST LOW, MEDIUM FLOW (LMF) ICD

Purpose

To control the amount of storm water runoff entering a sewer system by allowing a specified flow volume out of a catch basin or manhole at a specified head. This approach conserves pipe capacity so that catch basins downstream do not become uncontrollably surcharged, which can lead to basement floods, flash floods and combined sewer overflows.

Product Description

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

Available in 14 preset flow curves, the LMF ICD has the ability to provide flow rates: 2lps – 17lps (31gpm – 270gpm)

Product Function

The LMF ICD vortex flow action allows the LMF ICD to provide a narrower flow curve using a larger orifice than a conventional orifice plate ICD, making it less likely to clog. When comparing flows at the same head level, the LMF ICD has the ability to restrict more flow than a conventional ICD during a rain event, preserving greater sewer capacity.

Product Construction

Constructed from durable PVC, the LMF ICD is light weight 8.9 Kg (19.7 lbs).

Product Applications

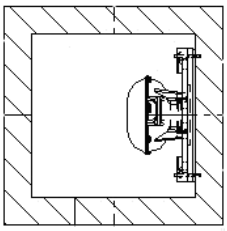
Will accommodate both square and round applications:



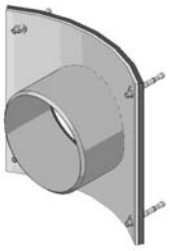
Square Application



Universal Mounting Plate



Round Application



+

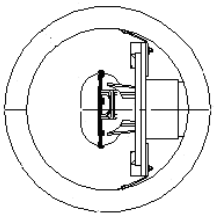


Spigot CB Wall Plate

=



Universal Mounting Plate Hub Adapter



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

Chart 1: LMF 14 Preset Flow Curves

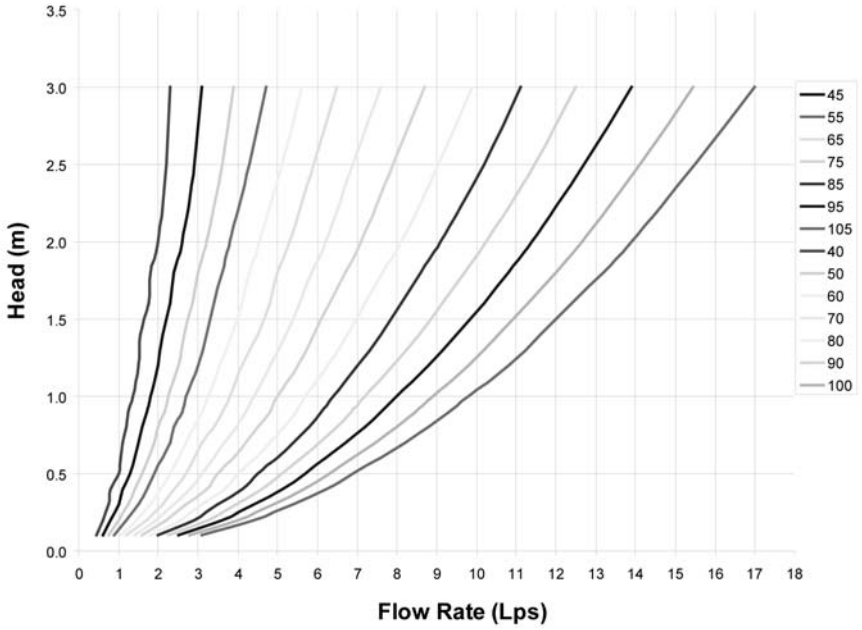
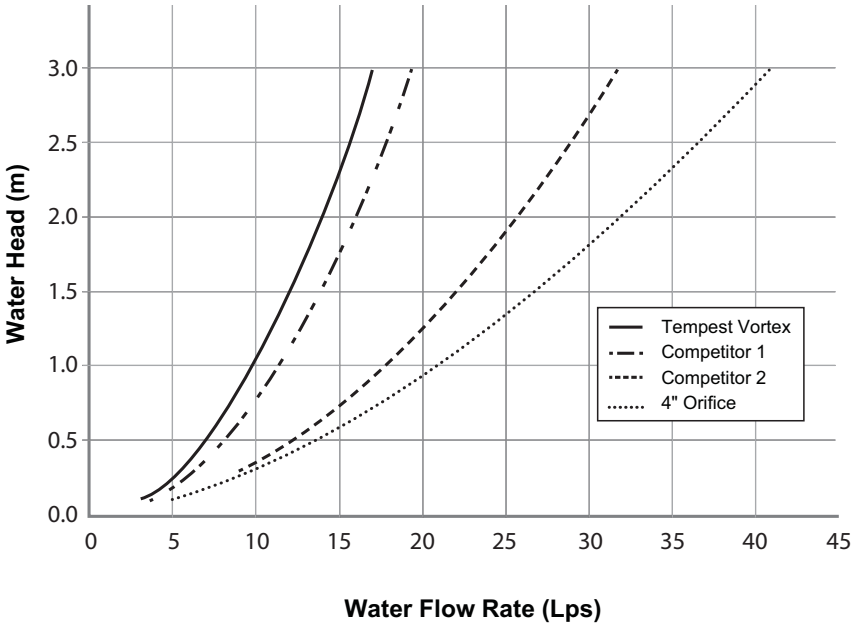


Chart 2: LMF Flow vs. ICD Alternatives



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

PRODUCT INSTALLATION

Instructions to assemble a TEMPEST LMF ICD into a Square Catch Basin:

STEPS:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers, (4) nuts, universal mounting plate, ICD device.
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a minimum of 1-1/2" depth up to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the universal mounting plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From the ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the universal mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- Call your IPEX representative for more information or if you have any questions about our products.

Instructions to assemble a TEMPEST LMF ICD into a Round Catch Basin:

STEPS:

1. Materials and tooling verification.
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers and (4) nuts, spigot CB wall plate, universal mounting plate hub adapter, ICD device.
2. Use the spigot catch basin wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a depth between 1-1/2" to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the CB spigot wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the spigot wall plate and the catch basin wall.
6. Apply solvent cement on the hub of the universal mounting plate, hub adapter and the spigot of the CB wall plate, then slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the universal mounting plate hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut back the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.
- Call your IPEX representative for more information or if you have any questions about our products.

NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

PRODUCT TECHNICAL SPECIFICATION

General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook will be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above must not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices will consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's shall have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

PRODUCT INFORMATION: TEMPEST HF & MHF ICD

Product Description

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

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

Product Function



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



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



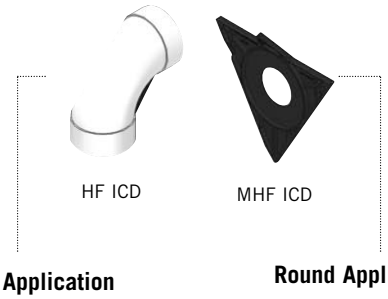
TEMPEST MHF (Medium to High Flow):
The MHF plate or plug is designed to control flow rates 9 L/s (143 gpm) or greater. It is not designed to prevent the propagation of odour and floatables.

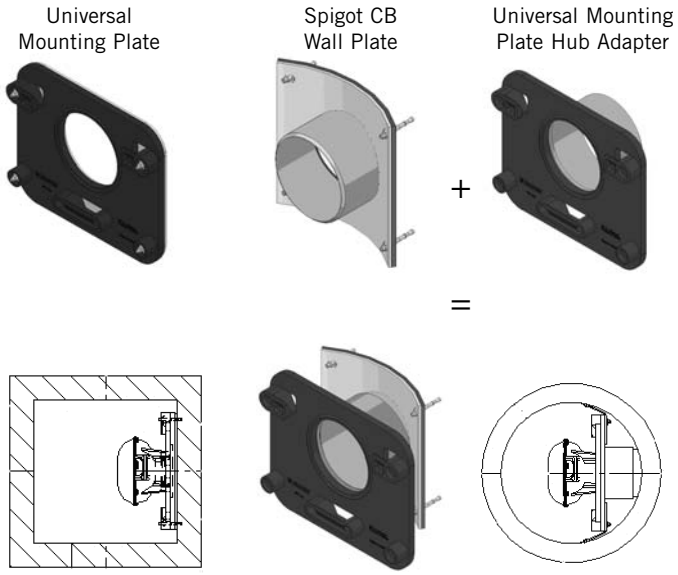
Product Construction

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

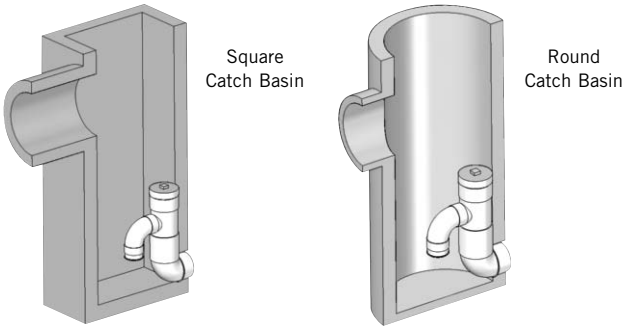
Product Applications

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



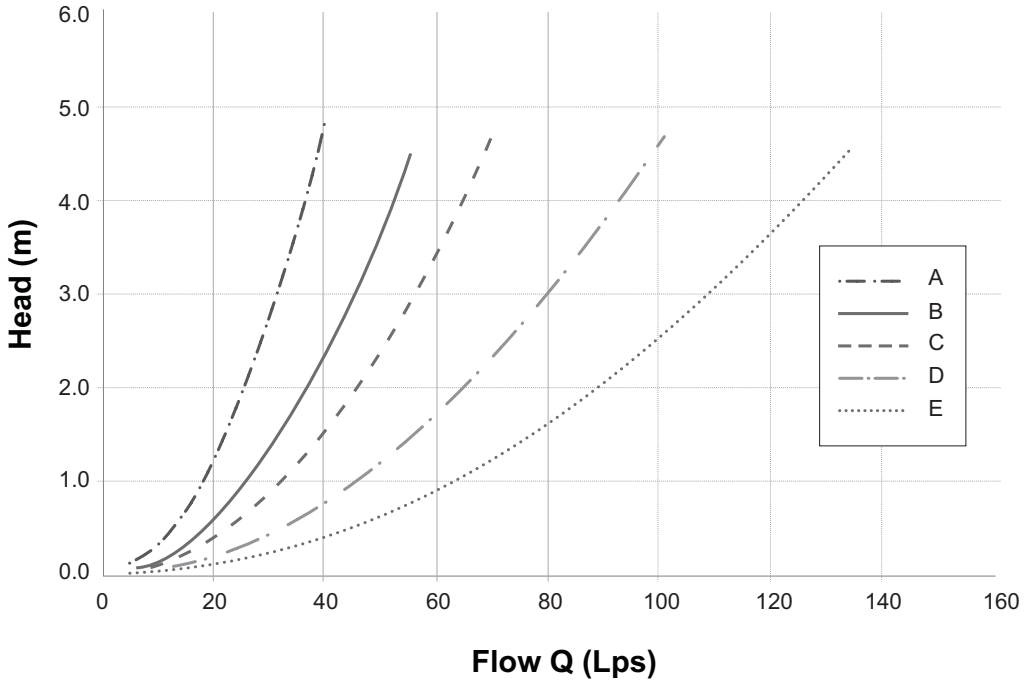


The HF Sump is available to accommodate low to no sump applications in both square and round catch basins:



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

Chart 3: HF & MHF Preset Flow Curves



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

PRODUCT INSTALLATION

Instructions to assemble a TEMPEST HF or MHF ICD into a Square Catch Basin:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers, (4) nuts, universal mounting plate, ICD device
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a minimum of 1-1/2" depth up to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the universal wall mounting plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From the ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the universal wall mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- Call your IPEX representative for more information or if you have any questions about our products.

Instructions to assemble a TEMPEST HF or MHF ICD into a Round Catch Basin:

STEPS:

1. Materials and tooling verification.
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers and (4) nuts, spigot CB wall plate, universal mounting plate hub adapter, ICD device.
2. Use the round catch basin spigot adaptor to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a depth between 1-1/2" to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the spigot CB wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the spigot CB wall plate and the catch basin wall.
6. Put solvent cement on the hub of the universal mounting plate, hub adapter and the spigot of the CB wall plate, then slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the wall mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.
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Instructions to assemble a TEMPEST HF Sump into a Square or Round Catch Basin:

STEPS:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, mastic tape and metal strapping
   - Material: (2) concrete anchor 3/8 x 3-1/2, (2) washers, (2) nuts, HF Sump pieces (2).
2. Apply solvent cement to the spigot end of the top half of the sump. Apply solvent cement to the hub of the bottom half of the sump. Insert the spigot of the top half of the sump into the hub of the bottom half of the sump.
3. Install the 8" spigot of the device into the outlet pipe. Use the mastic tape to seal the device spigot into the outlet pipe. You should use a level to be sure that the fitting is standing at the vertical.
4. Use an impact drill with a 3/8" concrete bit to make a series of 2 holes along each side of the body throat. The depth of the hole should be between 1-1/2" to 2-1/2". Clean the concrete dust from the 2 holes.
5. Install the anchors (2) in the holes by using a hammer. Put the nuts on the top of the anchors to protect the threads when you hit the anchors. Remove the nuts from the ends of the anchors.
6. Cut the metal strapping to length and connect each end of the strapping to the anchors. Screw the nuts in place with a maximum torque of 40 N.m (30 lbf-ft). The device should be completely flush with the catch basin wall.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.
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PRODUCT TECHNICAL SPECIFICATION

General

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All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook shall be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above shall not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices shall consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's shall have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

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www.ipexinc.com

U.S. Customers call IPEX USA LLC

Toll free: (800) 463-9572

www.ipexamerica.com

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As leading suppliers of thermoplastic piping systems, the IPEX Group of Companies provides our customers with some of the largest and most comprehensive product lines. All IPEX products are backed by more than 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, we have established a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX group products are:

- Electrical systems
- Telecommunications and utility piping systems
- PVC, CPVC, PP, ABS, PEX, FR-PVDF and PE pipe and fittings (1/4" to 48")
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- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- PE Electrofusion systems for gas and water
- Industrial, plumbing and electrical cements
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A policy of ongoing product improvement is maintained. This may result in modifications of features and/or specifications without notice.

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IPEX

Appendix G – Correspondence

Pre-consultation Meeting Summary Notes with the City of Ottawa

Boundary Conditions – City of Ottawa

Correspondence with RVCA regarding water quality

1740 St. Laurent Blvd

Meeting Summary Notes
May 19, 2020, Online Teams Meeting

Attendees:

- Carmine Zayoun, Groupe Heafey
- Etienne Boudreault-Savageau, Groupe Heafey
- Christian Rheault, Groupe Heafey
- Raad Akrawi, Groupe Heafey
- Jaime Posen, Fotenn Consultants
- Nick Sutherland, Fotenn Consultants
- Wally Dubyk (Transportation Project Manager, City of Ottawa)
- Sharif Sharif (Project Manager, City of Ottawa)
- Christopher Moise (Urban Designer, Architect, City of Ottawa)
- Tracey Scaramozzino (File Lead, Planner, City of Ottawa)

Issue of Discussion:

- Rezoning and Site Plan for 2 15-storey mixed-used buildings with 115 units and 260 units; and 2 12-storey residential buildings with 89 units and 181 units.
- Buildings will be rental; owned and operated by Groupe Heafey
- St. Hubert will remain a tenant in the new building and will include a drive-through; the carpet and sushi stores may also remain
- The gas station will not remain.



Official Plan: designated “Arterial Mainstreet”.

1. The high-rise buildings being proposed are permitted subject to a zoning amendment since the location is within 400 metres walking distance of a Rapid Transit Station on Schedule D of this Plan;



2. The development MUST provide a community amenity and provide adequate transition to adjacent low-rise.

3. As per Policy 4

   “…the site should be planned in a coordinated fashion that will facilitate:

   a. *multi-modal (pedestrian, cycling, transit and vehicular) access between the site and the public street(s),*
   b. *multi-modal (pedestrian, cycling, transit and vehicular) access between the site and the public street(s),*
   c. *attractive, safe and usable pedestrian and cycle connections between the site and adjacent communities,*
   d. *an enhanced interconnected pedestrian environment that links individual uses on the site, transit stops and continuous public sidewalks on the adjoining streets, and which is generally distinct from internal vehicle routes,*
   e. *measures of sufficient size and quality to relieve the visual impact of surface parking areas,*
   f. *the provision of adequate landscaped areas, particularly trees, along the perimeter of the site and street frontages,*
   g. *the provision of coordinated signage.*

4. New gas bars, service stations, automobile sales, and drive-through facilities are permitted on Arterial Mainstreets and will be evaluated on the basis of the Design Objectives and Principles in Section 2.5.1, any applicable Council-approved design guidelines, and the Compatibility policies set out in Section 4.11.

5. Building formats must enclose and define the street edge with active frontages that provide direct pedestrian access to the sidewalk.

Zoning Information – Arterial Mainstreet, Subzone 10, exception 1658 (AM 10 [1658])

Infrastructure/Servicing (Golam Sharif):

Please note the following information regarding the engineering design submission for the above noted site:

1. The Servicing Study Guidelines for Development Applications are available at the following address: https://ottawa.ca/en/city-hall/planning-and-development/how-develop-property/development-application-review-process-2/guide-preparing-studies-and-plans
2. Servicing and site works shall be in accordance with the following documents:
   - ð Ottawa Sewer Design Guidelines (October 2012) and all the Technical Bulletins including, Technical Bulletin PIEDTB-2016-01 and ISTB-2018-01
   - ð Ottawa Design Guidelines – Water Distribution (2010) and Technical Bulletins ISD-2010-2, ISDTB-2014-02 and ISTB-2018-02
   - ð Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
   - ð City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
   - ð City of Ottawa Environmental Noise Control Guidelines (January, 2016)
   - ð City of Ottawa Park and Pathway Development Manual (2012)
   - ð City of Ottawa Accessibility Design Standards (2012)
   - ð Ottawa Standard Tender Documents (latest version)
   - ð Ontario Provincial Standards for Roads & Public Works (2013)

3. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455).
4. The Stormwater Management Criteria, for the subject site, is to be based on the following:
   i. Demonstrate that the approved Stormwater Management design for the Alta Vista Ridge Subdivision will not impact negatively.
5. Deep Services (Storm, Sanitary & Water Supply)



i. A plan view of the approximate services may be seen above. Services should ideally be grouped in a common trench to minimize the number of road cuts. The sizing of available future services is:
   a. Everest Private:
      i. Sanitary – 200 mm (private).
      ii. Storm – 450 mm/ 525 mm (private).
      iii. Water – 200 mm/ 300 mm (private).

ii. Provide all the servicing demand (water, sanitary and storm) are as per the approved subdivision. If the demand changes, demonstrate the capacity is available.

6. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:
   i. Location of service

ii. Type of development and the amount of fire flow required (as per FUS, 1999).
iii. Average daily demand: ___ l/s.
iv. Maximum daily demand: ___l/s.
v. Maximum hourly daily demand: ___ l/s.
vi. Hydrant location and spacing to meet City's Water Design guidelines.

7. General comments –
   i. Stormwater Management criteria must be followed from the Alta Vista Ridge Subdivision.
   ii. Site-specific Geotechnical brief is required apart from the Subdivision report.
   iii. Site-specific Noise study/brief is required apart from the Subdivision report.

Should you have any questions or require additional information, please contact me directly at (613) 580-2424, x 20763 or by email at sharif.sharif@ottawa.ca.

Initial Planning (Tracey Scaramozzino):

1. Ensure all OP policies are achieved and clearly demonstrated.
2. Ensure there is enough amenity/ green space.
3. We want active frontage along St Laurent – it appears as though there are functioning front doors
4. It should only be visitor and retail parking on surface – remaining should be u/g
5. Show bike parking – try to exceed requirement
6. Provide for car sharing and e-cars
7. In other parts of the city near transit – City is asking for the property owner to provide each unit with a prepaid presto transit pass to encourage transit ridership....
8. Cil required to a max 10% value of land
9. Speak to councillor and community groups –
10. Ensure a coordinated approach with design and development at 355 Everest.
11. Ensure compliance with Design Guidelines for the proposed drive-through.
12. Consider informal meeting with UDRP panel to obtain guidance.
13. Consider using Green/Sustainable Technology and features where possible.
14. Ensure there is a plan for where construction workers will park, to ensure no spillover onto local streets
15. Ensure safewings.ca are consulted to reduce the buildings' impacts on bird safety.

Initial Design Comments (Christopher Moise):

1. This proposal runs along one of the City's Design Priority Areas and must attend the City's UDRP. We recommend the proposal attend an Informal visit (prior to a full submission and is not a public meeting), with the City's UDRP to further discuss and evaluate various scenarios of development for the whole site;

2. We recommend a fulsome analysis of the City's Urban Design Guidelines for High-rise Buildings be provided, paying particular attention to tower floorplate maximums and transitioning to the surrounding context;
3. It appears that the two southern high-rise buildings are designed as mid-rise buildings and fall short of what the City would support;
4. Please see the Design Brief Terms of Reference provided and consult the City's website for details regarding the UDRP schedule (if applicable).
5. This is an exciting project in an area full of potential. We look forward to helping you achieve its goals with the highest level of design resolution. We are happy to assist and answer any questions regarding the above. Good luck.

Landscape Plan/Tree Conservation Report (Mark Richardson):

1. A permit is required prior to any tree removal on site. Please contact the Planning Forester, Mark Richardson (mark.richardson@ottawa.ca) for information on obtaining the tree permit.

Transportation (Wally Dubyk):

1. This section of St Laurent Blvd had a major road modifications work. I believe that the portion of the ROW protection limits that extended into private property had been conveyed to the City. The proponent's surveyor should confirm the ROW limits.
2. St. Laurent Blvd is designated as an Arterial road within the City's Official Plan with a ROW protection of 44.50 metres. The ROW limits are to be shown on all the drawings and the offset distance (22.25 metres) to be dimensioned from the existing centerline of pavement.
3. ROW interpretation – Land for a road widening will be taken equally from both sides of a road, measured from the centreline in existence at the time of the widening if required by the City. The centreline is a line running down the middle of a road surface, equidistant from both edges of the pavement. In determining the centreline, paved shoulders, bus lay-bys, auxiliary lanes, turning lanes and other special circumstances are not included in the road surface.
4. The TIA (Transportation Impact Assessment) Guidelines (2017) were approved by Transportation Committee and City Council on June 14, 2017. The new version of the TIA Guidelines (2017) that are posted on the web are now to be used for the TIA Submission for development applications.
5. The following list highlights the significant changes to the 2006 TIA Guidelines

    (a) A Screening Test (Step 1) quickly determines if a transportation study is required. Consultants should fill in the form in Appendix B.

    (b) Should the development generate 60 peak hour person trips, the TIA guidelines Step 2 – Scoping report would be required.

(c) Study Scope (Step 2) is site specifically tailored; there are no longer three defined types of TIA reports. Scoping report is required and needs to be signed off by TPM before the consultant moves on to Forecasting volumes.

(d) Sign off from City Transportation Project Manager is required at key points in the review process prior to TIA Submission (Step 5). See Figure 1 on page 9 for a good flow chart of the process.

(e) Multi Modal Level of Service (MMLOS) and Complete Street analysis is required to assess the impact of all modes of travel rather than just vehicle traffic.

(f) There is no longer a requirement for consultant pre-approval. Consultants must now sign and submit the Credentials Form included in the Appendix A with each TIA report.

(g) The TIA Submission (report, drawings and/or monitoring plan) is required with the development application.

Click on the website: https://ottawa.ca/en/transportation-impact-assessment-guidelines

6. The proposed traffic signals will require the delegated authority approval from the Manager of Development Review, Transportation Engineering Services - RMA report is required.
7. A construction Traffic Management Plan is to be provided for approval by the Senior Engineer, Traffic Management, Transportation Services Dept.
8. Further comments relating to Site Plan Application will be provided.

Waste Collection

1. Please see City's Waste Management Guidelines for multi-unit residential: http://ottawa.ca/calendar/ottawa/citycouncil/pec/2012/11-13/Solid%20Waste%20Collection%20Guidelines%20-%20Doc%201.pdf

Process/Required Applications

1. Zoning By-law Amendment and Site Plan Control – Public Consultation
2. Please name electronic files in the following format:
    1. June XX, Street Address, Landscape
    2. June XX, Street Address, SWM

    Etc Etc

General Information

1. Please ensure the zoning table on the site plan is in the following format. Ensure that all zoning provisions and rates are shown and differentiate those that require a re-zoning or variance.

ZONING INFORMATION: MC16		
PROPOSED 8 STOREY BUILDING (MID-RISE APARTMENT)		
	REQUIRED	PROPOSED
MINIMUM LOT WIDTH	NO MINIMUM	27.824m
MINIMUM LOT AREA	NO MINIMUM	881.37m²
MINIMUM BUILDING HEIGHT	6.7	27m
MAXIMUM BUILDING HEIGHT	27m	27m
MINIMUM FRONT YARD SETBACK	NO MINIMUM	2m
MINIMUM CORNER SIDE YARD SETBACK	N/A	N/A
MINIMUM REAR YARD SETBACK	3m & 7.5 ABOVE 3RD FLOOR	3m & 7.5 ABOVE 3RD FLOOR
MINIMUM INTERIOR SIDE YARD SETBACK	NO MINIMUM	0.6m & 2.44m
Parking Rate		
Motor Vehicle	NO	14 spaces
Bicycle Parking (0.5/unit)	26 spaces	27 spaces

2. Ensure that all plans and studies are prepared as per City guidelines – as available online…

   https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans

Key Policy Objectives for the City of Ottawa – as of December 2019

The approved preliminary policy directions address six key themes:

- **Growth management –** policies would encourage more growth through intensification than through expansion into new or undeveloped areas, promote growth around transit, encourage sustainable village expansion and consider housing and transportation affordability.

- **Energy and climate mitigation –** policies would ensure climate change and energy conservation considerations are integrated into city planning guidelines, promote local energy generation, set new energy standards for buildings and reduce emissions through transportation and infrastructure.

- **Climate resiliency –** policies would align with the Climate Change Master Plan to reduce the urban heat island effect, further reduce the risk and impact of flooding and encourage more resilient homes, buildings, communities and infrastructure.

- **Transportation and mobility –** policies would aim to see more than half of all trips made by sustainable transportation. The City would pursue related policies as part of the coming Transportation Master Plan update.

- **Neighbourhood context –** policies would establish a framework of six areas, including the downtown core, inner urban area, outer urban area, suburban area, rural area and Greenbelt, and policies would be tailored to each so that growth can better address neighbourhood context.

- **Economic development –** policies would direct major employment to established hubs and corridors, support economic development in rural and village areas and establish a new economic zone centred on the airport.

Jason Fitzpatrick

From: Unrau, Derek <derek.unrau@ottawa.ca>
Sent: Tuesday, May 2, 2023 10:51 AM
To: Jason Fitzpatrick
Cc: Bruce Thomas; Sevigny, John
Subject: RE: 1740 - 1760 St Laurent Bvd Boundary Conditions

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Jason,

See below the boundary conditions information as requested.

The following are boundary conditions, HGL, for hydraulic analysis at 1740-1760 St-Laurent Boulevard (zone 1E) assumed to be privately connected to the 203 mm watermain off St-Laurent Boulevard and the 305 mm on Russell Road (see attached PDF for location).

Both Connections:

Min HGL: 108.5 m

Max HGL: 118.3 m

Max Day + Fire Flow (100 L/s): 110.7 m

Max Day + Fire Flow (117 L/s): 110.0 m

Max Day + Fire Flow (133 L/s): 109.1 m

These are for current conditions and are based on computer model simulation.

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

Please let me know if you have any questions.

Regards,

Derek Unrau, C.E.T.
Project Manager
Planning, Real Estate and Economic Development Department
Development Review - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 27670, Derek.Unrau@ottawa.ca

From: Jason Fitzpatrick <jason.fitzpatrick@exp.com>
Sent: April 03, 2023 1:38 PM
To: Unrau, Derek <derek.unrau@ottawa.ca>
Cc: Bruce Thomas <Bruce.Thomas@exp.com>
Subject: FW: 1740 - 1760 St Laurent Bvd Boundary Conditions

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Hi Derek

We are providing the required background information that is necessary in order for the City to provide hydraulic boundary conditions on the water system, that we can use for our design.

Please find attached the following information:

· Estimated Required Fire Flows (RFF) for each building based on FUS Method (updated March 2023)
· Water demands for each building and total.
· Concept Site Plan.
· Site Location Plan

Based on calculations, the following summarizes the domestic and fire flow demands:

· Average Day Demands = 6.8 L/sec
· Maximum Day Demands = 16.8 L/sec
· Peak Hour Demands = 36.9 L/sec
· Required Fire Flow (RFF) = 100 L/sec, 133 L/sec, 100 L/sec, 117 L/sec (Towers 1, 2, 3, 4, respectively)

Please note that the above demands include the four proposed buildings (Tower 1-4) and the existing and proposed buildings on Everest Private.

If you have any questions, let me know.

Thanks

Alexandria Cushing, EIT
EXP | Engineering Designer
t : +1.613.688.1899, 63352 | e : alexandria.cushing@exp.com
2650 Queensview Drive
Suite 100
Ottawa, ON K2B 8H6
CANADA

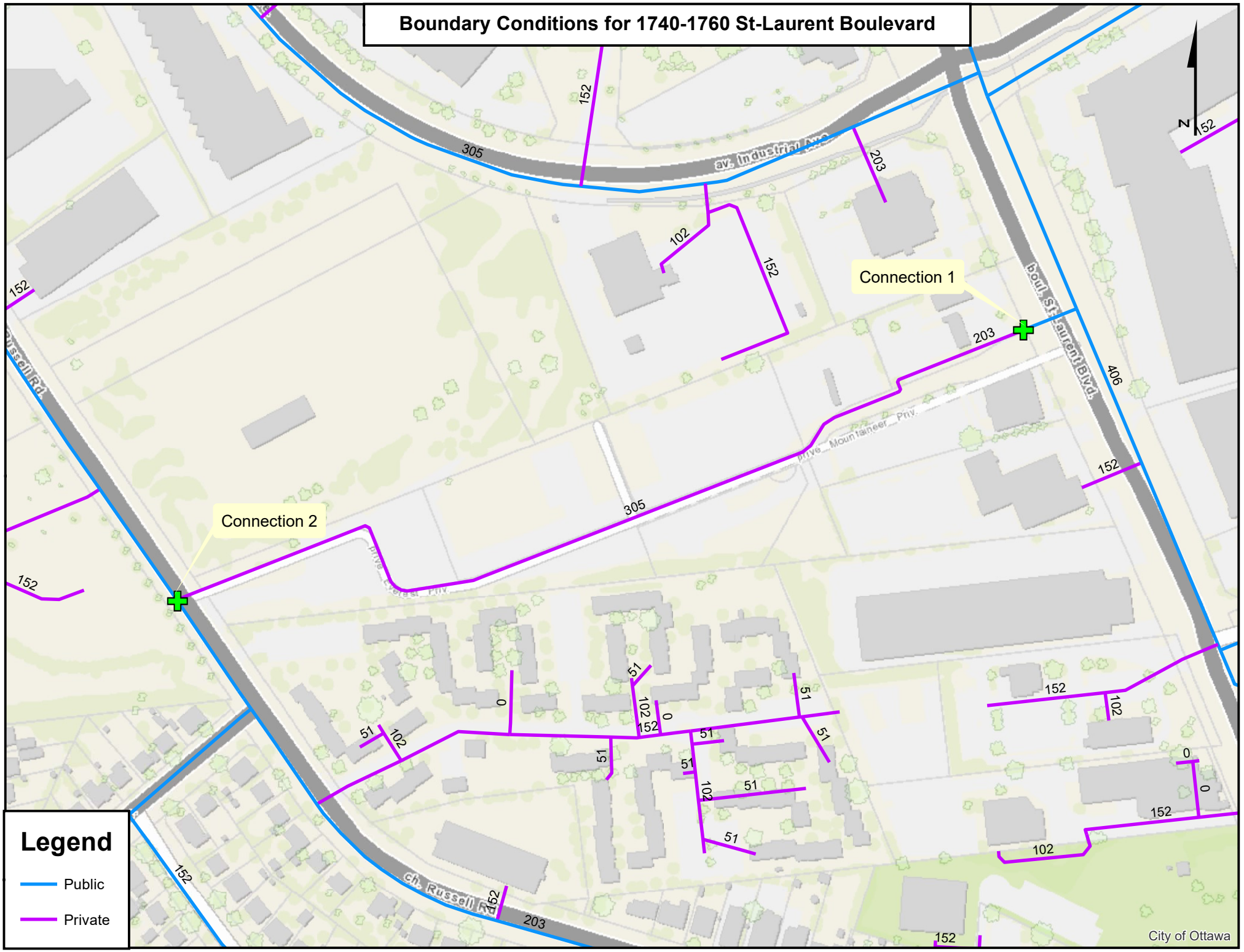
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'

Boundary Conditions for 1740-1760 St-Laurent Boulevard



From: Eric Lalande <eric.lalande@rvca.ca>
Sent: August 15, 2023 12:19 PM
To: Alexandria Cushing
Cc: Bruce Thomas; Jason Fitzpatrick
Subject: RE: 1740 - 1760 St Laurent Blvd development stormwater quality requirements

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Alexandria,

Sorry for the delay, unfortunately, the RVCA no longer provides water quality control requirement review on behalf of the City of Ottawa for pending Planning Act applications. As per Bill 23, the Conservation authority directs you to the City of Ottawa to obtain this information (typically through pre-consultation process). That being said, previously, if the Site was serviced by a SWM facility downstream, the RVCA would not have required additional on-site facilities.

Thanks,

Eric Lalande, MCIP, RPP
Planner, Rideau Valley Conservation Authority
613-692-3571 x1137

From: Alexandria Cushing <Alexandria.Cushing@exp.com>
Sent: Wednesday, August 02, 2023 11:30 AM
To: Eric Lalande <eric.lalande@rvca.ca>
Cc: Bruce Thomas <bruce.thomas@exp.com>; Jason Fitzpatrick <jason.fitzpatrick@exp.com>; Alexandria Cushing <Alexandria.Cushing@exp.com>
Subject: 1740 - 1760 St Laurent Blvd development stormwater quality requirements

Good morning Eric:

EXP Inc. is preparing a site servicing and stormwater report for a client who is proposing to construct four (4) high rise buildings at 1740 – 1760 St Laurent Blvd. (see attached site plan).

Tower 1 is a 20-storey high-rise comprised of 184 residential units located on the 3rd to 20th floors, with commercial and common areas on the ground floor and 2nd floor common area. Tower 2 is a 13-storey tower, with 154 residential units located on the 2nd to 13th floors, with ground floor common areas. Tower 3 is a 20-storey high-rise comprised of 200 residential units located on the 2nd to 20th floors, with ground floor commercial area. Tower 4 is a 13-storey tower, with 163 residential units located on the 1st to 13th floors and a common area on the ground floor.

Underground parking will also be provided under each building – three (3) levels will be available under Tower 1, four (4) levels will be available under Tower 2, two (2) levels will be available under Tower 3, and three (3) levels will be available under Tower 4.

A new storm sewer will be provided within the private street (Everest Private) discharging to the 1050 diameter storm sewer within St. Laurent Boulevard. From our review of the downstream storm sewer system, there appears to be a downstream SWM facility on the South Cryville Drains.

We are requesting RVCA to comment on any stormwater quality requirements from the proposed development.

Please let me know if you have any questions.

Alexandria

Alexandria Cushing, M.Eng., EIT
EXP | Engineering Designer
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Appendix H – Background Information

Stantec Servicing and Stormwater Management Brief – Alta Vista Ridge – 355 and 374 Everest Private, June 2021 (15 Pages)

Alta Vista Ridge – 1740 St Laurent Boulevard, Ottawa, ON, Le Groupe Heafey – Stormwater Management Report, February 2012 (3 Pages)

Servicing and Stormwater Management Brief – Alta Vista Ridge – 355 and 374 Everest Private

Stantec Project No. 160401493

Prepared for:
Le Groupe Heafey

Prepared by:
Stantec Consulting Ltd.

June 2, 2021

Table 3 – Stormwater Drainage Comparison Based on AC Values

		Area (ha)	Runoff Coefficient (C value)	AC Value (Area x C)
Area Tributary to the Dry Pond[1]	**Original Site Plan (2012)**	1.844	0.67	1.243
	Revised Site Plan (2021)	1.863	0.65	1.215
Entire Alta Vista Ridge Site[1]	**Original Site Plan (2012)**	7.737[2]	0.66	5.091
	Revised Site Plan (2021)	7.688[2]	0.65	5.004

1. Roof areas for 355 and 374 Everest Private have been excluded from the A x C calculations for both the 2012 analysis and the revised site plan (2021).
2. Difference in total area between 2012 and 2021 analysis due to rounding errors for individual subcatchments as well as difference in roof sizes for 355 and 374 Everest Private between the 2012 and 2021 site plans.

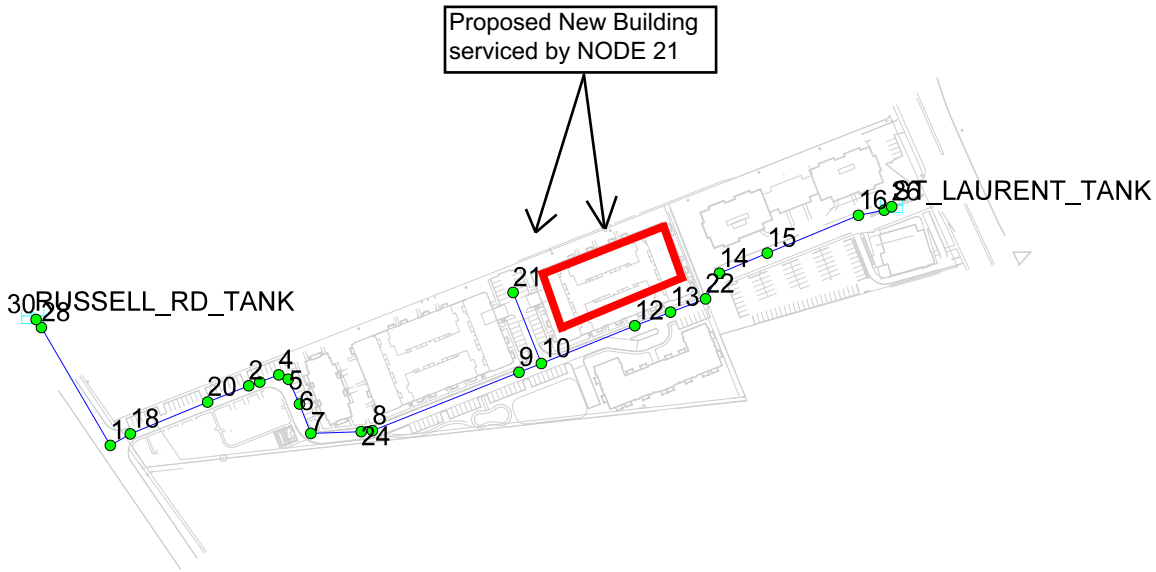
Based on the results shown in **Table 3** the total weighted A x C value for the area tributary to the stormwater management dry pond decreased from 1.243 (2012 stormwater management analysis) to 1.215 (2021 revised site plan). The weighted A x C value for the entire Alta Vista Ridge site decreased from 5.091 to 5.004. This demonstrates that the proposed site plan changes result in a decrease in impervious area and stormwater runoff.

The detailed A x C calculations for both the proposed site (2021 site plan) and previous analysis (2012 site plan, modified to exclude the roofs of 355 and 374 Everest Private) are included in **Appendix C**.

The proposed building at 374 Everest Private will have rooftop storage controlled to below the previously approved allowable release rate of 16 L/s for a 100-year storm. The roof storage has been designed to completely capture the 100-year storm with a release rate of 14 L/s meeting the required criteria with twenty-two (22) Watts Accutrol (or equivalent) roof drains, half of which will be 25% open and half of which will be closed. The storage depth will be to a maximum of 0.147 m in the 100-year event, which falls under the maximum acceptable depth of 0.15 m. Furthermore, the maximum available rooftop storage for the proposed building is 108.8 m^3 which is greater than the storage capacity available with the original site plan, 78 m^3.

A catchbasin on the east side of 374 Everest Private will pick up stormwater drainage from the ramp (drainage area BLDG1). The 100-year release rate from this area is 14.4 L/s as per the MRM sheet for 374 Everest Private in **Appendix C**. Given that this drainage area has no gravity outlet, it will be directed to the building plumbing and pumped to the storm outlet. Plumbing design by the Mechanical Consultant and governed by the Ontario Building Code.

2012-02-08



JUNCTION (MOTYPE)
- Active
- Domain

TANK (MOTYPE)
- Active Tank
- Domain Tank
- Active Reservoir
- Domain Reservoir

PIPE (MOTYPE)
- Active Pipe
- Domain Pipe
- Active Check Valve
- Domain Check Valve

PUMP (MOTYPE)
- Active
- Domain

VALVE (MOTYPE)
- Active
- Domain

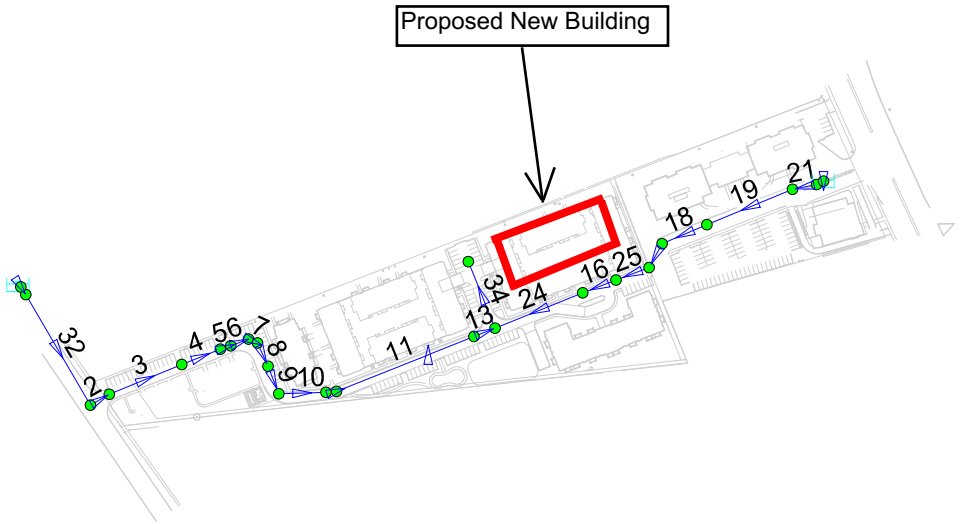
ACAD-water analysis backgrou

ACAD-water analysis backgrou

Prepared By:

Date: 6/7/2019 1:52:38 PM

2019-06-07 **PIPE IDs**



JUNCTION (MOTYPE)
- Active
- Domain

TANK (MOTYPE)
- Active Tank
- Domain Tank
- Active Reservoir
- Domain Reservoir

PIPE (MOTYPE)
- Active Pipe
- Domain Pipe
- Active Check Valve
- Domain Check Valve

PUMP (MOTYPE)
- Active
- Domain

VALVE (MOTYPE)
- Active
- Domain

ACAD-water analysis backgrou

ACAD-water analysis backgrou

Prepared By:

Date: 6/7/2019 2:39:17 PM

1751 Russell Road **Watermain Hydraulic Analysis Results**

Average Daily Demand

Nodes

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (psi)	Pressure (kPa)
1	0	76.56	121.5	44.94	63.8	440.0
2	0	76.95	121.5	44.55	63.3	436.2
3	0.03	76.91	121.5	44.59	63.3	436.6
4	0	76.82	121.5	44.68	63.4	437.4
5	0	76.86	121.5	44.64	63.4	437.1
6	0.18	76.93	121.5	44.57	63.3	436.4
7	0	76.63	121.5	44.87	63.7	439.3
8	0.15	76.26	121.5	45.24	64.2	442.9
9	0	76	121.5	45.5	64.6	445.5
10	0	75.32	121.5	46.18	65.6	452.1
12	0.7	75.25	121.5	46.25	65.7	452.8
13	0	75.35	121.5	46.15	65.5	451.8
14	0	72.94	121.5	48.56	69.0	475.4
15	1.3	70.72	121.5	50.78	72.1	497.2
16	0	69.56	121.5	51.94	73.8	508.5
18	0	77.7	121.5	43.8	62.2	428.8
20	0.35	77.65	121.5	43.85	62.3	429.3
17	0	69.3	121.5	52.2	74.1	511.1
21	1.8	75.6	121.5	45.9	65.2	449.4
22	0	74.69	121.5	46.81	66.5	458.3
24	0	76.23	121.5	45.27	64.3	443.2
26	0	69.3	121.5	52.2	74.1	511.1
28	0	77.1	121.5	44.4	63.0	434.7
30	0	77.1	121.5	44.4	63.0	434.7

Links

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/km)	Status	Flow Reversal Count
2	1	18	17.2	297	120	1.66	0.02	0	0	Open	0
3	18	20	39	297	120	1.66	0.02	0	0	Open	0
5	2	3	3.3	297	120	1.31	0.02	0	0	Open	0
6	3	4	16.9	297	120	1.28	0.02	0	0	Open	0
7	4	5	2.1	297	120	1.28	0.02	0	0	Open	0
8	5	6	12.9	297	120	1.28	0.02	0	0	Open	0
9	6	7	18	297	120	1.1	0.02	0	0	Open	0
10	7	24	27.8	297	120	1.1	0.02	0	0	Open	0
11	8	9	84.4	297	120	0.95	0.01	0	0	Open	0
13	9	10	15	297	120	0.95	0.01	0	0	Open	0
16	12	13	21.06	297	120	-1.55	0.02	0	0	Open	0
18	14	15	28.68	297	120	-1.55	0.02	0	0	Open	0
19	15	16	54.46	297	120	-2.85	0.04	0	0.01	Open	0
4	20	2	22.2	297	120	1.31	0.02	0	0	Open	0
21	16	17	14.51	297	120	-2.85	0.04	0	0.01	Open	0
23	RUSSELL_RD_TANK	30	0.5	297	120	1.66	0.02	0	0	Open	0
24	10	12	55.59	297	120	-0.85	0.01	0	0	Open	0
25	13	22	20.74	297	120	-1.55	0.02	0	0	Open	0
26	22	14	16.04	297	120	-1.55	0.02	0	0	Open	0
28	24	8	6.29	297	120	1.1	0.02	0	0	Open	0
30	ST_LAURENT_TANK	26	0.88	297	120	2.85	0.04	0	0.01	Open	0
32	28	1	127.3	297	120	1.66	0.02	0	0	Open	0
34	10	21	46.3	297	120	1.8	0.03	0	0	Open	0

Maximum Daily Demand + Fire Flow

Nodes

ID	Static Demand (L/s)	Static Pressure (m)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (m)	Pressure (psi)	Pressure (kPa)	Available Flow at Hydrant (L/s)	Available Flow Pressure (m)
1	0	17.39	93.95	0	17.39	24.7	170.3	284	14.28
10	0	19.81	95.13	0	19.81	28.1	194.0	288	14.28
12	1.8	20.15	95.4	0	20.15	28.6	197.3	283	14.28
13	0	20.15	95.5	183	17.93	25.5	175.5	278	14.28
14	0	22.75	95.69	0	22.75	32.3	222.7	304	14.28
15	1.9	25.11	95.83	183	22.65	32.2	221.8	324	14.28
16	0	26.56	96.12	0	26.56	37.7	260.0	326	14.28
17	0	26.9	96.2	0	26.9	38.2	263.4	326	14.28
18	0	16.33	94.03	183	14.85	21.1	145.4	218	14.28
2	0	17.34	94.29	183	15.48	22.0	151.6	242	14.28
20	0.7	16.55	94.2	0	16.55	23.5	162.0	213	14.28
21	2.8	19.53	95.13	0	19.53	27.7	191.2	240	14.28
22	0	20.92	95.61	0	20.92	29.7	204.8	285	14.28
28	0	16.3	93.4	0	16.3	23.1	159.6	281	14.28
3	0.05	17.4	94.31	0	17.4	24.7	170.4	243	14.28
4	0	17.56	94.38	0	17.56	24.9	171.9	245	14.28
5	0	17.53	94.39	0	17.53	24.9	171.6	243	14.28
6	0.4	17.52	94.45	0	17.52	24.9	171.5	240	14.28
7	0	17.9	94.53	0	17.9	25.4	175.3	251	14.28
8	0.35	18.42	94.68	183	16.21	23.0	158.7	266	14.28
9	0	19.06	95.06	183	16.73	23.8	163.8	278	14.28

1751 Russell Road **Watermain Hydraulic Analysis Results**

Peak Hour Demand

Nodes

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (psi)	Pressure (kPa)
1	0	76.56	108.84	32.28	45.8	316.0
2	0.8	76.95	108.87	31.92	45.3	312.5
3	0.13	76.91	108.87	31.96	45.4	312.9
4	0	76.82	108.88	32.06	45.5	313.9
5	0	76.86	108.88	32.02	45.5	313.5
6	0.83	76.93	108.89	31.96	45.4	312.9
7	0	76.63	108.89	32.26	45.8	315.8
8	0.55	76.26	108.91	32.65	46.4	319.7
9	0	76	108.95	32.95	46.8	322.6
10	0	75.32	108.96	33.64	47.8	329.4
12	4	75.25	109.01	33.76	47.9	330.5
13	0	75.35	109.04	33.69	47.8	329.8
14	0	72.94	109.08	36.14	51.3	353.8
15	0.3	70.72	109.12	38.4	54.5	376.0
16	0	69.56	109.18	39.62	56.3	387.9
18	0	77.7	108.85	31.15	44.2	305.0
20	1.75	77.65	108.86	31.21	44.3	305.6
17	0	69.3	109.2	39.9	56.7	390.6
21	9.8	75.6	108.95	33.35	47.4	326.5
22	0	74.69	109.06	34.37	48.8	336.5
24	0	76.23	108.91	32.68	46.4	320.0
26	0	69.3	109.2	39.9	56.7	390.6
28	0	77.1	108.8	31.7	45.0	310.4
30	0	77.1	108.8	31.7	45.0	310.4

Links

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/km)	Status	Flow Reversal Count
2	1	18	17.2	297	120	-18.32	0.26	0.01	0.34	Open	0
3	18	20	39	297	120	-18.32	0.26	0.01	0.34	Open	0
5	2	3	3.3	297	120	-20.87	0.3	0	0.43	Open	0
6	3	4	16.9	297	120	-21	0.3	0.01	0.43	Open	0
7	4	5	2.1	297	120	-21	0.3	0	0.43	Open	0
8	5	6	12.9	297	120	-21	0.3	0.01	0.43	Open	0
9	6	7	18	297	120	-21.83	0.32	0.01	0.47	Open	0
10	7	24	27.8	297	120	-21.83	0.32	0.01	0.47	Open	0
11	8	9	84.4	297	120	-22.38	0.32	0.04	0.49	Open	0
13	9	10	15	297	120	-22.38	0.32	0.01	0.49	Open	0
16	12	13	21.06	297	120	-36.18	0.52	0.03	1.19	Open	0
18	14	15	28.68	297	120	-36.18	0.52	0.03	1.19	Open	0
19	15	16	54.46	297	120	-36.48	0.53	0.07	1.21	Open	0
4	20	2	22.2	297	120	-20.07	0.29	0.01	0.4	Open	0
21	16	17	14.51	297	120	-36.48	0.53	0.02	1.21	Open	0
23	RUSSELL_RD_TANK	30	0.5	297	120	-18.32	0.26	0	0.33	Open	0
24	10	12	55.59	297	120	-32.18	0.46	0.05	0.96	Open	0
25	13	22	20.74	297	120	-36.18	0.52	0.02	1.19	Open	0
26	22	14	16.04	297	120	-36.18	0.52	0.02	1.19	Open	0
28	24	8	6.29	297	120	-21.83	0.32	0	0.47	Open	0
30	ST_LAURENT_TANK	26	0.88	297	120	36.48	0.53	0	1.22	Open	0
32	28	1	127.3	297	120	-18.32	0.26	0.04	0.34	Open	0
34	10	21	46.3	297	120	9.8	0.14	0	0.11	Open	0

Stantec

PROJECT NAME		STORM SEWER DESIGN SHEET (City of Ottawa)	DESIGN PARAMETERS				
DATE:	24-Aug-2011		I = a / (t+b)^c			(As per City of Ottawa Guidelines, 2004)	
REVISION DATE:	14-Feb-2012			1:5 yr	1:10 yr		
DESIGNED BY:	aml	FILE NUMBER: 1604-00898	a =	998.07	1174.184	MANNING'S n =	0.013
CHECKED BY:	npc		b =	6.053	6.014	MINIMUM COVER:	2.00 m
			c =	0.814	0.816	TIME OF ENTRY	15 min

BEDDING CLASS = C

GO

XML Conversion

LOCATION			DRAINAGE AREA																	PIPE SELECTION								
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (ROOF) (ha)	C (-)	ACCUM. AREA (5YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	ACCUM. AREA (10YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	T of C (min)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	Q_{ROOF} (NOTE 1) (L/s)	ACCUM. Q_{ROOF} (L/s)	Q_{ACT} (CIA/360) (L/s)	Q_{CD} (NOTE 2) (L/s)	ACCUM. Q_{CD} (L/s)	LENGTH (m)	PIPE SIZE (mm)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	$\frac{Q_{ACT}}{Q_{CAP}}$ (-)	VEL. (FULL) (m/s)	VEL. (ACT) (m/s)	TIME OF FLOW (min)
116, C1, C2	116	106	0.383	0.00	0.446	0.76	0.383	0.291	0.291	0.000	0.000	0.000	15.00	83.56	97.85	32.4	32.4	67.6	0.0	0.0	51.9	375	PVC	SDR-35	0.50	116.6	0.58	1.11	1.14	0.76
													15.76																	
113	113	112	0.023	0.00	0.000	0.34	0.023	0.008	0.008	0.000	0.000	0.000	15.00	83.56	97.85	0.0	0.0	1.8	0.0	0.0	17.0	200	PVC	SDR-35	0.50	23.6	0.08	0.74	0.39	0.74
112A, 112B	112	111A	0.229	0.00	0.000	0.78	0.252	0.179	0.186	0.000	0.000	0.000	15.74	81.25	95.14	0.0	0.0	42.1	0.0	0.0	38.5	375	PVC	65-D	0.50	116.6	0.36	1.11	1.01	0.64
													16.37																	
114	115	114	0.117	0.00	0.000	0.57	0.117	0.067	0.067	0.000	0.000	0.000	15.00	83.56	97.85	0.0	0.0	15.5	0.0	0.0	19.3	200	PVC	SDR-35	0.65	26.9	0.58	0.84	0.87	0.37
	114	111A	0.000	0.00	0.000	0.00	0.117	0.000	0.067	0.000	0.000	0.000	15.37	82.38	96.47	0.0	0.0	15.3	0.0	0.0	21.6	250	PVC	SDR-35	0.45	40.5	0.38	0.82	0.74	0.49
													15.86																	
	111A	111	0.000	0.00	0.000	0.00	0.369	0.000	0.253	0.000	0.000	0.000	16.37	79.37	92.93	0.0	0.0	55.8	0.0	0.0	41.0	375	PVC	65-D	0.50	116.6	0.48	1.11	1.08	0.63
111, EXT-A	111	110	0.168	0.00	0.000	0.56	0.537	0.094	0.347	0.000	0.000	0.000	17.00	77.60	90.84	0.0	0.0	74.8	0.0	0.0	32.4	375	PVC	65-D	0.50	116.6	0.64	1.11	1.18	0.46
	110	109	0.000	0.00	0.000	0.00	0.537	0.000	0.347	0.000	0.000	0.000	17.46	76.37	89.40	0.0	0.0	73.7	0.0	0.0	8.6	375	PVC	65-D	0.50	116.6	0.63	1.11	1.17	0.12
109	109	108	0.140	0.00	0.000	0.63	0.677	0.088	0.435	0.000	0.000	0.000	17.58	76.05	89.02	0.0	0.0	92.0	0.0	0.0	29.3	375	PVC	65-D	1.00	164.8	0.56	1.56	1.59	0.31
													17.89																	
117, EXT-B	118	117	0.137	0.00	0.000	0.51	0.137	0.070	0.070	0.000	0.000	0.000	15.00	83.56	97.85	0.0	0.0	16.2	0.0	0.0	3.3	200	PVC	SDR-35	1.00	33.3	0.49	1.05	1.04	0.05
	117	108	0.000	0.00	0.000	0.00	0.137	0.000	0.070	0.000	0.000	0.000	15.05	83.39	97.65	0.0	0.0	16.2	0.0	0.0	48.3	250	PVC	SDR-35	0.35	35.7	0.45	0.72	0.69	1.16
													16.21																	
	108	107	0.000	0.00	0.000	0.00	0.814	0.000	0.505	0.000	0.000	0.000	17.89	75.25	88.09	0.0	0.0	105.6	0.0	0.0	8.5	450	CONCRETE	65-D	0.50	210.3	0.50	1.28	1.28	0.11
107A, 107B	107	106	0.171	0.00	0.000	0.60	0.985	0.103	0.608	0.000	0.000	0.000	18.00	74.97	87.76	0.0	0.0	126.6	0.0	0.0	91.1	450	CONCRETE	65-D	0.41	190.5	0.66	1.16	1.25	1.22
													19.22																	
FTR-3	106	105	0.000	0.00	0.129	0.90	1.368	0.000	0.899	0.000	0.000	0.000	19.22	72.02	84.28	8.0	40.4	179.8	0.0	0.0	79.7	525	CONCRETE	65-D	0.25	224.3	0.80	1.00	1.12	1.18
105	105	HEADWALL 1	0.138	0.00	0.000	0.83	1.506	0.115	1.014	0.000	0.000	0.000	20.40	69.39	81.20	0.0	40.4	195.3	0.0	0.0	33.9	525	CONCRETE	65-D	0.30	245.7	0.79	1.10	1.23	0.46
													20.86									525								
FTR2, POND	HEADWALL 2	104	0.000	0.00	0.000	0.44	0.000	0.000	0.000	0.000	0.000	0.000	15.00	83.56	97.85	0.0	0.0	0.0	84.9	84.9	20.4	600	CONCRETE	65-D	0.30	350.9	0.24	1.20	0.00	0.00
	104	103	0.000	0.00	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	15.00	83.56	97.85	0.0	0.0	0.0	0.0	84.9	34.5	600	CONCRETE	100-D	0.25	320.3	0.27	1.10	0.00	0.00
103A, 103B, FTR1, EX1	103	102	0.430	0.00	0.000	0.33	0.430	0.142	0.142	0.000	0.000	0.000	15.00	83.56	97.85	0.0	0.0	32.9	0.0	84.9	53.3	675	CONCRETE	65-D	0.20	392.2	0.30	1.06	0.62	1.44
EX2, EX3, EX4, EX5	102	101	0.626	0.00	0.000	0.82	1.056	0.513	0.655	0.000	0.000	0.000	16.44	79.17	92.69	0.0	0.0	144.1	0.0	84.9	61.4	525	CONCRETE	65-D	0.30	491.5	0.47	1.10	0.93	1.09
EX6	101	100	0.054	0.00	0.000	0.80	1.110	0.043	0.698	0.000	0.000	0.000	17.54	76.17	89.16	0.0	0.0	147.8	0.0	84.9	31.6	675	CONCRETE	65-D	0.30	480.3	0.48	1.30	1.13	0.46
													18.00									675								
	check		2.616				2.616	1.712	1.712																					

Note: Q_{CD} from the SWM pond is the 100 year interim release rate since it is higher than the ultimate pond release rate

Stantec

SUBDIVISION:

SUBDIVISION:

DATE: September 6, 2011
REVISION: January 30, 2012
DESIGNED BY: DT
CHECKED BY: TJW

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 1604-00898

XML Conversion

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	350	l/p/day	MINIMUM VELOCITY	0.60	m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	0.60	l/s/Ha	MAXIMUM VELOCITY	3.00	m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL	0.40	l/s/Ha	MANNINGS n	0.013	
PEAKING FACTOR (COMM., INST.):	1.5	INSTITUTIONAL	0.60	l/s/Ha	BEDDING CLASS	C	
PERSONS / SINGLE UNIT	3.4	INFILTRATION	0.28	l/s/Ha	MINIMUM COVER	2.50	m
PERSONS / TOWNHOME	2.8						
PERSONS / APARTMENT	1.8						

LOCATION			RESIDENTIAL AREA AND POPULATION									COMM		INDUST		INSTIT		GREEN / UNUSED		C+I+I	INFILTRATION				PIPE								
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	SINGLE	UNITS TOWN	APT.	POP.	CUMULATIVE AREA	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	TOTAL FLOW	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)	VEL. (ACT.)
			(ha)					(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)			(%)	(l/s)	(%)	(m/s)	(m/s)
	12	11	0.04	0	2	0	6	0.04	6	4.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.01	0.11	18.7	200	PVC	SDR-35	1.01	33.47	0.32	1.05	0.93
	11	15	0.12	0	12	0	34	0.16	40	4.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.16	0.04	0.69	40.3	200	PVC	SDR-35	0.50	23.55	2.94	0.74	0.84
	16	15	0.07	0	4	0	12	0.07	12	4.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.02	0.21	21.3	200	PVC	SDR-35	0.65	26.85	0.80	0.84	0.94
	15	10	0.11	0	12	0	34	0.34	86	4.00	1.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.34	0.10	1.49	42.2	200	PVC	SDR-35	0.50	23.55	6.32	0.74	0.84
	10	9	0.13	0	14	0	40	0.47	126	4.00	2.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.47	0.13	2.17	31.9	200	PVC	SDR-35	0.50	23.55	9.23	0.74	0.84
	9	8	0.01	0	0	0	0	0.48	126	4.00	2.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.48	0.13	2.18	9.0	200	PVC	SDR-35	0.50	23.55	9.24	0.74	0.84
	8	7	0.03	0	0	0	0	0.51	126	4.00	2.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.51	0.14	2.18	29.4	200	PVC	SDR-35	0.50	23.55	9.27	0.74	0.84
	14	7	0.10	0	12	0	34	0.10	34	4.00	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.03	0.58	45.7	200	PVC	SDR-35	0.50	23.55	2.46	0.74	0.84
	7	6	0.01	0	0	0	0	0.62	160	4.00	2.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.62	0.17	2.77	8.6	200	PVC	SDR-35	0.50	23.55	11.74	0.74	0.84
	6	5	0.25	0	0	0	0	0.87	160	4.00	2.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.87	0.24	2.84	91.1	200	PVC	SDR-35	1.14	35.56	7.98	1.12	1.28
	13	5	0.95	0	164	0	460	0.95	460	3.99	7.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	0.95	0.27	7.71	51.9	200	PVC	SDR-35	0.50	23.55	32.72	0.74	0.84
	5	4	0.52	0	0	100	180	2.34	800	3.86	12.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	2.34	0.66	13.17	99.5	200	PVC	SDR-35	1.73	43.81	30.05	1.38	1.57
	4	3	0.01	0	0	0	0	2.35	800	3.86	12.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	2.35	0.66	13.17	19.7	200	PVC	SDR-35	2.10	48.27	27.28	1.52	1.73
	3	2	0.34	0	0	100	180	2.69	980	3.81	15.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	2.69	0.75	15.86	40.1	200	PVC	SDR-35	2.50	52.66	30.12	1.66	1.89
	2	1	0.79	0	0	0	0	3.48	980	3.81	15.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79	3.48	0.97	16.08	12.7	200	PVC	SDR-35	2.00	47.10	34.14	1.48	1.69
																										200							
	check		3.48				980	3.48	980																								

WATERMAIN 'A' – (100mm DIAMETER)			
STATION	PROPOSED GRADE	TOP OF WATERMAIN	DESCRIPTION
0+000	77.69	75.29	TEE CONNECTION 300mmø x 100mmø
0+02.20	77.66	76.16	
0+05.20	77.72	76.16	
0+010	77.99	75.59	
0+021.9	77.66	75.26	50mmø TVS FOR SERVICE
0+022.4	77.66	75.26	100mm VALVE AND BOX
0+022.9	77.66	75.26	50mmø TVS FOR SERVICE
0+023.9	77.61	75.21	100mmø CAP AND THRUST BLOCK

WATERMAIN 'B' – (100mm DIAMETER)			
STATION	PROPOSED GRADE	TOP OF WATERMAIN	DESCRIPTION
0+000	76.38	74.98	300mmø x 100mmø TEE
0+002.6	76.51	74.11	100mmø VALVE AND BOX
0+004.7	76.58	74.18	22.5° BEND
0+010	76.67	74.27	
0+020	76.67	74.27	
0+030	76.56	74.16	
0+040	76.34	73.94	
0+042.6	76.24	73.84	45° BEND
0+044.6	76.19	73.79	45° BEND
0+048.7	76.43	74.03	100mmø VALVE AND BOX
0+050.0	76.66	74.26	100mm CAP AND THRUST BLOCK

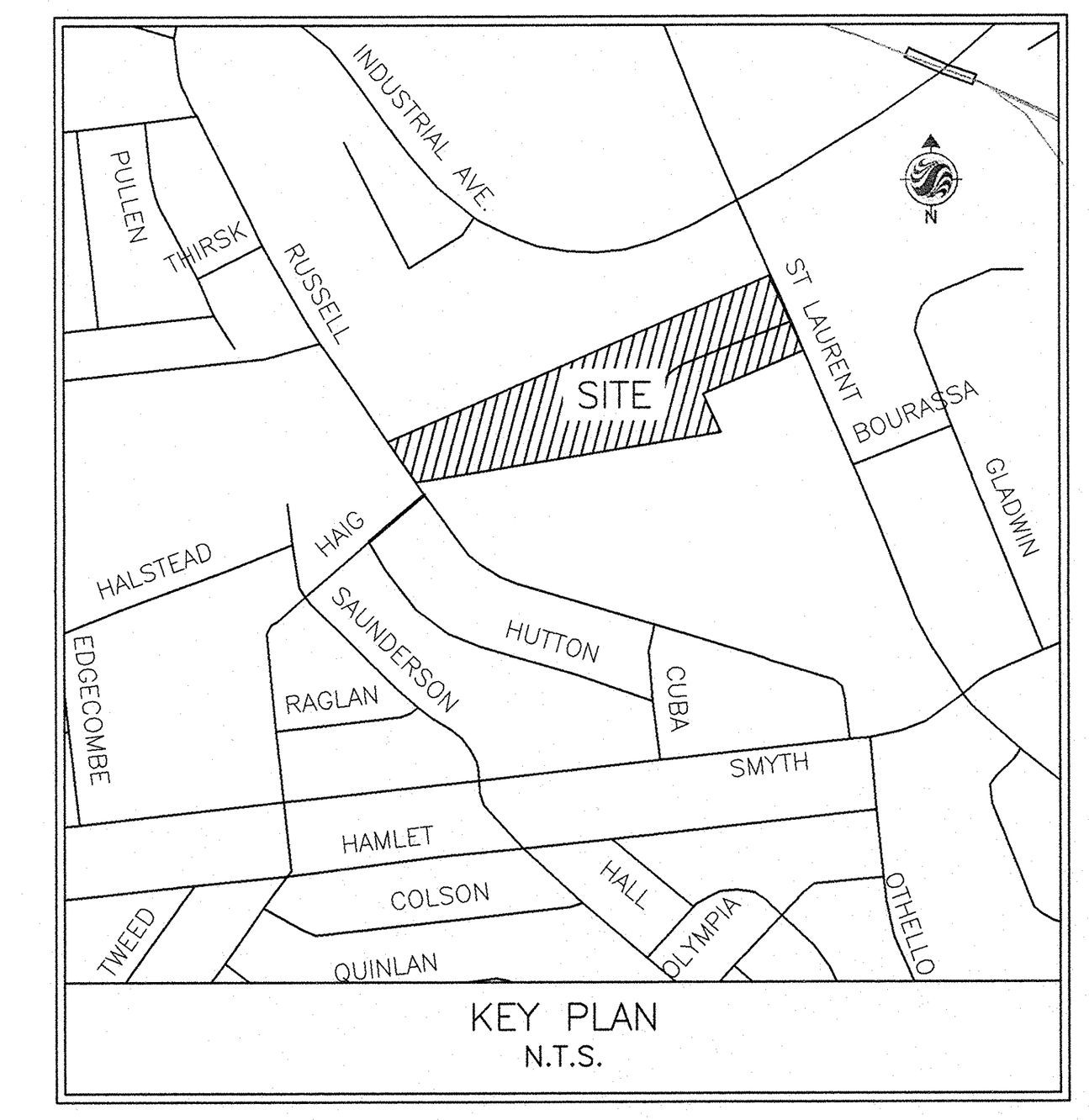
WATERMAIN 'C' – (300mm DIAMETER)			
STATION	PROPOSED GRADE	TOP OF WATERMAIN	DESCRIPTION
0+000	75.26	72.40	300mmø x 300mmø TEE
0+002.0	75.27	72.87	300mmø VALVE AND BOX
0+010	75.11	72.71	
0+020	75.31	72.91	
0+030	75.33	72.93	
0+040	75.19	72.79	
0+044.0	75.58	73.18	BUILDING SERVICE
0+046.2	75.53	73.13	BUILDING SERVICE
0+047.8	75.48	73.08	300mø CAP AND THRUST BLOCK

Summary of ICD Sizes and Location

Area ID	MH/CB ID	Invert (m)	ICD Type	Max. Release Rate (L/s)
101	CB124	76.00	IPEX 'A'	22.0
102A	CB120	75.09	IPEX 'A'	22.0
103	CB128	74.45	75 mm dia. orifice	17.0
102B	CB122	74.38	IPEX 'B'	32.0
104	CB146	74.43	IPEX 'A'	22.0
107	CB131	74.43	IPEX 'A'	22.0
106	CB129	74.43	IPEX 'A'	22.0
108A	CB132	74.11	IPEX 'A'	22.0
C1	Internal Plumbing System	N/A	Zurn Roof Drains	16.0
108B	CB134	73.31	IPEX 'A'	22.0
111	CB141	73.82	IPEX 'A'	22.0
110A	CB154	73.29	IPEX 'A'	22.0
110B	CB152	73.52	IPEX 'A'	22.0
C2	Internal Plumbing System	N/A	Zurn Roof Drains	16.0
112A	CB144	72.77	IPEX 'A'	22.0
FTR2	N/A	N/A	100 year	40.0
FTR3	N/A	N/A	Zurn Roof Drains	8.0
FTR1	N/A	N/A	N/A	63.0
113A	Existing Relocated CB	69.43	IPEX 'A'	22.0
POND	Headwall 2	71.90	250 mm dia. orifice	145.1

SUMMARY OF POND OUTLET HEADWALL ICDs

Event	ICD Location	Maximum Ponding Depth (m)	Maximum Storage Volume (m^3)	Inlet-Control Device			Peak Flow Rate (L/s)
				Invert (m)	Size (mm)	Drawdown (hrs)	
5-year	Pond Outlet Headwall	1.26	284	71.9	150	6.25	50.4
100-year	Pond Outlet Headwall	1.9	573	71.9	150	8	63



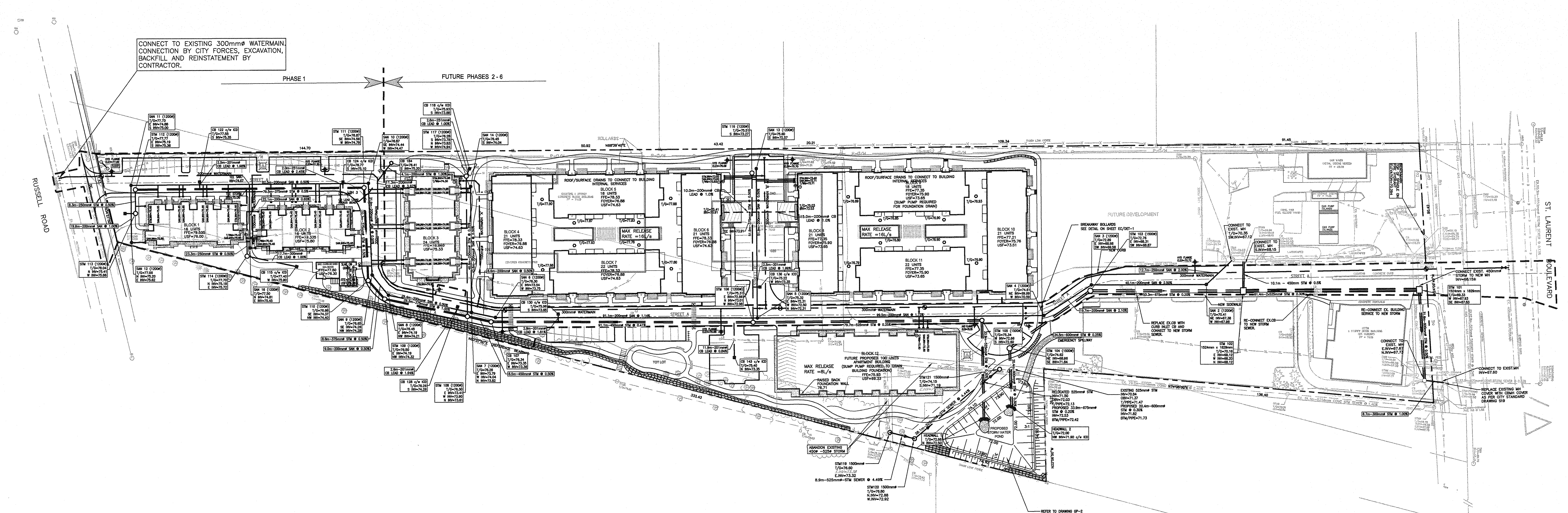
KEY PLAN
N.T.S.

SITE PLAN
PREPARED BY: RODERICK LAHEY ARCHITECTS
REVISION: 2

SITE SURVEY BY
PREPARED BY: FAIRHALL MOFFATT AND WOODLAND LTD. OLS.

SITE BENCHMARK
PROVIDED BY: FAIRHALL MOFFATT AND WOODLAND LTD. OLS, JANUARY 2011
LOCATION / DESCRIPTION: FIRE HYDRANT TOP OF SPINDLE, NORTH WEST CORNER OF ST. LAURENT AND PRIVATE ROAD. ELEV = 70.294

GEOTECHNICAL REPORT
PREPARED BY: EXP GROUP, AUGUST 2011.



V:\01-604\active\160400898_St. Laurent_Russell\design\drawing\160400898_OSP.dwg
9/12/2012 10:41:15 AM BY: ALYNCH

ORIGINAL SHEET: OCE B1-700 700X1000 MM

Stantec

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Ottawa ON Canada
K1Z 7T1
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Fax. 613.722.2799
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Legend

- PROPOSED WATERMAIN
- PROPOSED VALVE BOX
- PROPOSED VALVE CHAMBER
- PROPOSED FIRE HYDRANT
- PROPOSED WATER METER
- PROPOSED REMOTE METER
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING WATERMAIN
- EXISTING CATCHBASIN
- CATCHBASINS TO BE INTERCONNECTED
- CATCHBASINS TO BE INSTALLED WITH IPEX TYPE A OR EQUIVALENT 22.0L/S.
- CB'T' PROPOSED REAR YARD POT DRAIN
- D.C PROPOSED DEPRESSED CURB LOCATIONS

SERVICING BLOCKS 1 AND 2
- 200mm STORM SERVICE PVC SDR 28 @ 1% MIN
- 150mm SANITARY SERVICE PVC SDR 28 @ 1% MIN
- 50mm TYPE K SOFT COPPER WATER SERVICE C/W CURB STOP AND SERVICE POST

SERVICING BLOCKS 3
- 200mm STORM SERVICE PVC SDR 28 @ 1% MIN
- 150mm SANITARY SERVICE PVC SDR 28 @ 1% MIN
- 100mm PVC DR18 WATER SERVICE C/W VALVE AND BOX

SERVICING BLOCKS 4 TO 12
- 200mm STORM SERVICE PVC SDR 28 @ 1% MIN
- 150mm SANITARY SERVICE PVC SDR 28 @ 1% MIN
- 150mm PVC DR18 WATER SERVICE C/W VALVE AND BOX

NOTE: FINAL BUILDING SERVICES LOCATION AND SIZES TO BE CONFIRMED BY MECHANICAL CONSULTANT.

- PHASE LIMIT

Notes

1 ALL MATERIALS AND CONSTRUCTION METHODS TO BE IN ACCORDANCE WITH OPS AND CITY OF OTTAWA STANDARD SPECIFICATIONS AND DRAWINGS AND OPSD SUPPLEMENT. ONTARIO PROVINCIAL STANDARDS WILL APPLY WHERE NO CITY STANDARDS ARE AVAILABLE.

2 THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AND BEAR COST OF SAME INCLUDING WATER PERMIT AND ASSOCIATED COSTS.

3 SERVICE AND UTILITY LOCATIONS ARE APPROXIMATE, CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING SERVICES AND UTILITIES PRIOR TO ANY CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING LOCATES FROM ALL UTILITY COMPANIES TO LOCATE EXISTING UTILITIES PRIOR TO EXCAVATION. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTION AND REINSTATEMENT.

4 ALL DISTURBED AREAS SHALL BE REINSTATED TO EQUAL OR BETTER CONDITION TO THE SATISFACTION OF THE ENGINEER & THE CITY. PAVEMENT REINSTATEMENT FOR SERVICE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH OPSD 509.010 AND OPSS 310.

5 SANITARY SEWERS TO BE PVC SDR35 INSTALLED AS PER CITY OF OTTAWA STANDARD S6 AND S7, UNLESS OTHERWISE NOTED.

6 STORM SEWERS 375mm DIA. OR SMALLER SHALL BE PVC SDR 35. STORM SEWERS LARGER THAN 375mm DIA. SHALL BE CONCRETE CSA A 257 CLASS 65D AS PER OPSD 807.010 CLASS B BEDDING, UNLESS OTHERWISE NOTED.

7 THE CONTRACTOR SHALL CONSTRUCT WATERMAIN,WATER SERVICES,CONNECTIONS & APPURTENANCES AS PER CITY OF OTTAWA SPECIFICATIONS & SHALL CO-ORDINATE AND PAY ALL RELATED COSTS INCLUDING THE COST OF CONNECTION,INSPECTION & DISINFECTION BY CITY PERSONNEL.SERVICE CONNECTIONS SHALL BE INSTALLED A MINIMUM OF 2400mm FROM ANY CATCHBASIN, MANHOLE, OR OBJECT THAT MAY CONTRIBUTE TO FREEZING. THERMAL INSULATION SHALL BE INSTALLED ON ALL PROPOSED CB'S ON THE W/M STREET SIDE WHERE 2400mm SEPARATION CANNOT BE ACHIEVED.(AS PER CITY OF OTTAWA W22 & W23)(CATHODIC PROTECTION AS PER CITY OF OTTAWA W40 AND W42). WATERMAIN PIPE MATERIAL SHALL BE PVC CL.150 DR18. DEFLECTION OF WATERMAIN PIPE IS NOT TO EXCEED 1/2 OF THAT SPECIFIED BY THE MANUFACTURER.

8 STREET LIGHTING TO CITY OF OTTAWA STANDARDS.

9 STORM AND SANITARY MANHOLES SHALL BE 1200mm DIAMETER IN ACCORDANCE WITH OPSD-701.01 (UNLESS OTHERWISE NOTED) c/w FRAME AND COVER AS PER CITY OF OTTAWA S24 AND S25. ALL STORM MANHOLES WITH SEWERS 900mm DIA SEWERS AND OVER IN SIZE SHALL BE BENCHED. ALL OTHERS SHALL BE COMPLETED WITH 300mm SUMPS AS PER CITY STANDARDS.

10 CATCH BASINS SHALL BE IN ACCORDANCE WITH CITY STANDARDS c/w FRAME AND GRATE AS PER S20 AND S21 FOR REAR YARDS AND S3 FOR STREET CB'S. PROVIDE 150mm ADJUSTED SPACERS. ALL CATCH BASINS SHALL HAVE SUMPS (600mm DEEP). CATCH BASIN

11 LEADS SHALL BE 200mm DIA.(MIN) PVC SDR 35 AT 1.0% GR. ALL STREET CB'S WILL BE INSTALLED WITH 'IPEX' INLET CONTROL DEVICE (ICD)
EXCESS EXCAVATED MATERIAL SHALL BE REMOVED FROM THE SITE.

12 THE CONTRACTOR SHALL SUBMIT AN EROSION AND SEDIMENTATION CONTROL PLAN WHICH WILL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE PROTECTION FOR RECEIVING STORM SEWERS OR DRAINAGE DURING CONSTRUCTION ACTIVITIES. THIS PLAN SHALL INCLUDE BUT NOT LIMITED TO FILTER CLOTH ON CATCH BASINS, STRAW BALE CHECK DAMS AND SEDIMENT CONTROLS AROUND ALL DISTURBED AREAS. DEWATERING SHALL BE PUMPED INTO SEDIMENT TRAPS.

13 GRANULAR "A" SHALL BE PLACED TO A MINIMUM THICKNESS OF 300 mm AROUND ALL STRUCTURES WITHIN PAVEMENT AREA

14 SEWER TRENCH SHALL CONSIST OF A CLASS "B" BEDDING AS PER CITY OF OTTAWA STANDARDS S6 AND S7. COMPACTION SHALL BE A MINIMUM OF 98% STANDARD PROCTOR DENSITY.

15 ALL GRANULAR FOR ROADS SHALL BE COMPACTED TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY.

16 ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR. REVIEW WITH ARCHITECT AND THE CITY OF OTTAWA PRIOR TO TREE CUTTING.

17 CONTRACTOR SHALL PERFORM LEAKAGE TESTING, IN THE PRESENCE OF THE CONSULTANT, FOR SANITARY SEWERS IN ACCORDANCE WITH OPSS 410 AND OPSS 407. CONTRACTOR SHALL PERFORM VIDEO INSPECTION OF ALL STORM AND SANITARY SEWERS. A COPY OF THE VIDEO AND INSPECTION REPORT SHALL BE SUBMITTED TO THE CONSULTANT FOR REVIEW.

18 ASPHALT WEAR COURSE SHALL NOT BE PLACED UNTIL THE VIDEO INSPECTION OF SEWERS & NECESSARY REPAIRS HAVE BEEN CARRIED OUT TO THE SATISFACTION OF THE CONSULTANT.

19 SUB-EXCAVATE SOFT AREAS & FILL WITH GRANULAR 'B' COMPACTED IN 0.15m LAYERS.

20 FOR ALL LANDSCAPING FEATURES (ie. TREES, WALKWAYS, PARK DETAILS, NOISE BARRIERS, FENCES etc.) REFER TO LANDSCAPE ARCHITECT PLAN

21 CONCRETE CURBS SHALL BE CONSTRUCTED AS PER CITY STANDARD SC1.1 BARRIER CURB

22 ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.

Revision	By	Appd.	YY.MM.DD
4 ISSUED FOR TENDER/ADDED 2 HYD'S ON END OF STR B	GBU	TJW	12.09.12
3 REVISED AS PER NEW SITE PLAN AND SERVICE LATERAL LOCATIONS BLK 1,2, AND 3	MJS	TJW	12.06.26
2 REVISED AS PER CITY COMMENTS	AML	NPC	12.04.16
1 REVISED AS PER CITY COMMENTS	GBU	TJW	12.02.21
0 ISSUED TO CITY FOR REVIEW	MJS	TJW	11.09.06

File Name: 160400898_OSP	Dwn.	Chkd.	Dsgn.	YY.MM.DD
	MJS	TJW	MJS	11.08.25

Permit-Seal

LICENSED PROFESSIONAL ENGINEER
P. MOROZ
Sept 12, 2012
PROVINCE OF ONTARIO

Client/Project

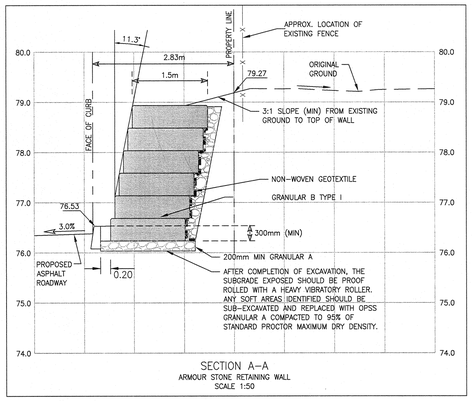
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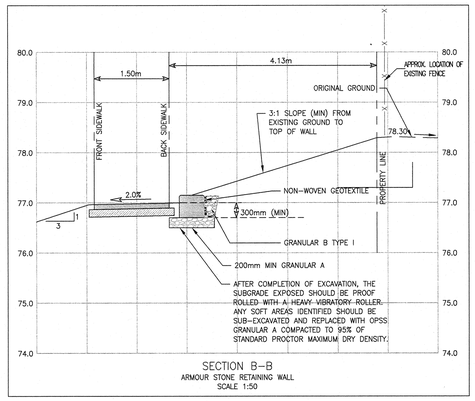
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OVERALL SITE SERVICING PLAN

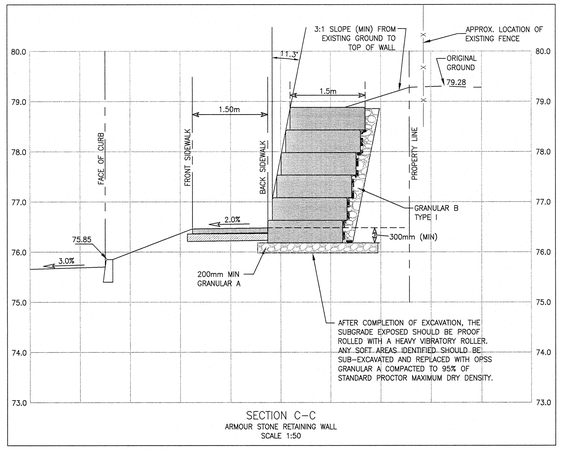
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Drawing No.	**Sheet**	**Revision**
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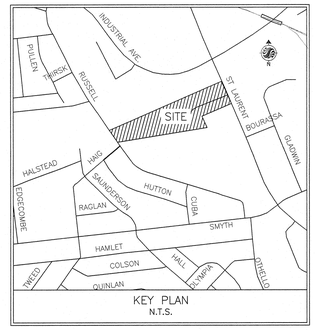
SECTION A–A
ARMOUR STONE RETAINING WALL
SCALE 1:50

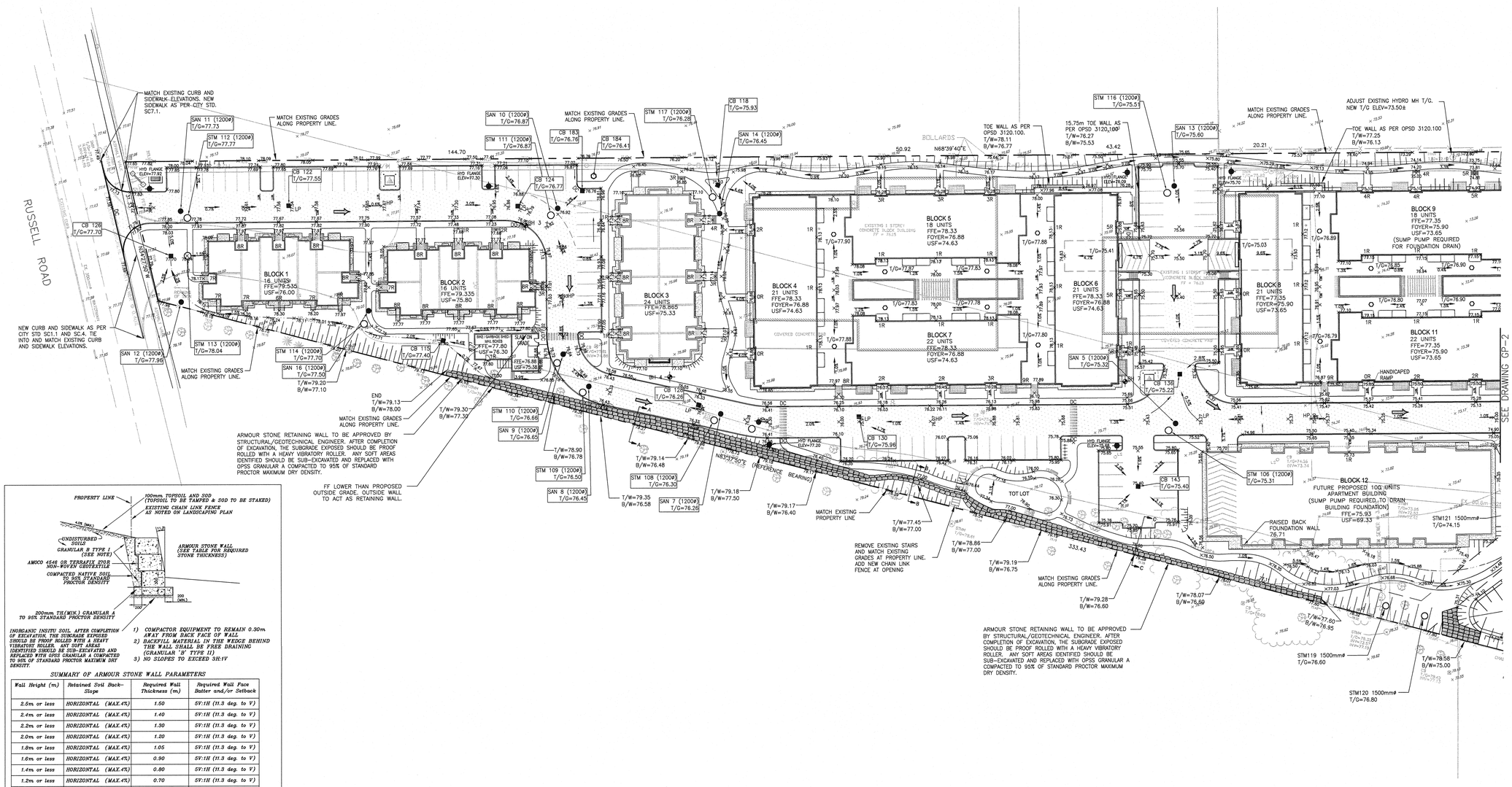


SECTION B–B
ARMOUR STONE RETAINING WALL
SCALE 1:50



SECTION C–C
ARMOUR STONE RETAINING WALL
SCALE 1:50





INORGANIC INSITU SOIL AFTER COMPLETION OF EXCAVATION. THE SUBGRADE EXPOSED SHOULD BE PROOF ROLLED WITH A HEAVY VIBRATORY ROLLER. ANY SOFT AREAS IDENTIFIED SHOULD BE SUB-EXCAVATED AND REPLACED WITH OPSS GRANULAR A COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY.

1) COMPACTOR EQUIPMENT TO REMAIN 0.30m AWAY FROM BACK FACE OF WALL
2) BACKFILL MATERIAL IN THE WEDGE BEHIND THE WALL SHALL BE FREE DRAINING (GRANULAR 'B' TYPE II)
3) NO SLOPES TO EXCEED 3H:1V

SUMMARY OF ARMOUR STONE WALL PARAMETERS

Wall Height (m)	Retained Soil Back-Slope	Required Wall Thickness (m)	Required Wall Face Batter and/or Setback
2.5m or less	HORIZONTAL (MAX.4%)	1.50	5V:1H (11.3 deg. to V)
2.4m or less	HORIZONTAL (MAX.4%)	1.40	5V:1H (11.3 deg. to V)
2.2m or less	HORIZONTAL (MAX.4%)	1.30	5V:1H (11.3 deg. to V)
2.0m or less	HORIZONTAL (MAX.4%)	1.20	5V:1H (11.3 deg. to V)
1.8m or less	HORIZONTAL (MAX.4%)	1.05	5V:1H (11.3 deg. to V)
1.6m or less	HORIZONTAL (MAX.4%)	0.90	5V:1H (11.3 deg. to V)
1.4m or less	HORIZONTAL (MAX.4%)	0.80	5V:1H (11.3 deg. to V)
1.2m or less	HORIZONTAL (MAX.4%)	0.70	5V:1H (11.3 deg. to V)
1.0m maximum	HORIZONTAL (MAX.4%)	0.60	5V:1H (11.3 deg. to V)

TYPICAL ARMOUR STONE WALL DETAIL
N.T.S.

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ORIGINAL SHEET: OCE B1-700 700X1000 MM

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Stantec

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Legend

×69.41	ORIGINAL GROUND
80.59 × 2.0%	PROPOSED ELEVATION / DIRECTION & PERCENT FLOW
90.20 × 89.50	PROPOSED LOT CORNER ELEVATION / EXISTING ELEVATION AT LOT CORNER
FF=91.35 USF=88.51	FINISHED FIRST FLOOR ELEVATION / UNDER SIDE OF FOOTING
3R	NUMBER OF RISERS
3 :1	TERRACING 3:1 SLOPE MINIMUM (UNLESS OTHERWISE SHOWN)
	PROPOSED SWALE AND DIRECTION
	PROPOSED SANITARY SEWER MANHOLES
	PROPOSED STORM SEWER MANHOLES
	PROPOSED FIRE HYDRANT
	PROPOSED VALVE BOX
	PROPOSED VALVE CHAMBER
	PROPOSED CATCH BASIN
	PROPOSED SUB DRAIN CATCH BASIN AS PER CITY OF OTTAWA STANDARD DETAIL DRAWINGS L10 AND L11.
	DIRECTION OF OVERLAND FLOW
■Ⓐ	CATCHBASINS TO BE INSTALLED WITH IPEX TYPE A OR EQUIVALENT 22.0L/S.
D.C	PROPOSED DEPRESSED CURB LOCATIONS
SOG	SLAB ON GRADE UNIT
	HEAVY DUTY ASPHALT
T/W=79.28 B/W=75.60	TOP OF WALL / BOTTOM OF WALL

Notes

SITE GRADING

1. ALL GRANULAR SNGE & SUB BASE COURSE MATERIALS SHALL BE COMPACTED TO 100% STANDARD PROCTOR MAX. DRY DENSITY.
2. ALL DISTURBED GRASSED AREAS SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER, WITH 100 mm MIN. 100mm TOPSOIL. THE RELOCATION OF TREES AND SHRUBS SHALL BE SUBJECT TO APPROVAL BY THE PROJECT LANDSCAPE ARCHITECT OR ENGINEER.
3. PAVEMENT CONSTRUCTION AS PER exp. REPORT DATED AUGUST 4, 2011, PROJECT No. OTT-00201533-A0
   PROPOSED PRELIMINARY ACCESS ROUTE PAVEMENT STRUCTURE:
   40mm HL3 or OPS SS-3A) ASPHALTIC CONCRETE WEAR COURSE
   50mm HL8 or OPS SS-30) ASPHALTIC CONCRETE BASE COURSE
   150mm BASE COURSE OPSS GRAN."A"
   400mm SUB BASE OPSS GRAN."B" TYPE II
   PROPOSED LOT PAVEMENT STRUCTURE:
   50mm HL3 or OPS SS-3A) ASPHALTIC CONCRETE WEAR COURSE
   150mm BASE COURSE OPSS GRAN."A"
   300mm SUB BASE OPSS GRAN."B" TYPE II
4. ALL BARRIER CURBS, CONCRETE SLAKES AND SIDEWALKS SHOWN ON THIS DRAWING ARE TO BE PIECED IN THE STOCKPILED PORTION OF THE CONTRACT ALL BARRIER CURBS ARE TO BE CONSTRUCTED PER CITY OF OTTAWA STANDARD DRAWING SC1 AND SC6.
5. INSPECTIONS ALL WORK ON THE MUNICIPAL RIGHT OF WAY AND EASEMENTS TO BE INSPECTED BY THE MUNICIPALITY PRIOR TO BACKFILLING. ALL WORK RELATING TO WATERMAINS AND SEWERS TO BE INSPECTED BY THE MUNICIPALITY WHEN REQUIRED.
6. REFER TO ARCHITECTURAL SITE PLAN FOR DIMENSIONS AND SITE DETAILS.
7. STEP JOINTS ARE TO BE USED WHERE PROPOSED ASPHALT MEETS EXISTING ASPHALT AS PER DETAIL OS-12. ALL JOINTS MUST BE SEALED AS PER DETAIL.
8. CONTRACTOR TO OBTAIN A ROAD OCCUPANCY PERMIT 48 HOURS PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL ROAD ALLOWANCE IF REQUIRED BY THE MUNICIPALITY.
9. PARKING AREA PONDING DEPTH TO BE 0.30m (MINIMUM).
10. EMBANKMENTS TO BE SLOPED AT MIN. 3:1, UNLESS OTHERWISE SPECIFIED.
11. REFER TO DRAWING GP-2 FOR EROSION AND SEDIMENT CONTROL.
12. ALL PAVEMENT MARKING, LINE PAINTING, DIRECTIONAL LATS/LANDMARK ETC. SHALL BE PLACED IN ACCORDANCE WITH THE ILLUSTRATIONAL SIGN PLAN OF THE ONTARIO TRAFFIC CONTROLLING CONSULTANT'S DRAWINGS. LINE PAINTING AND DIRECTIONAL SYMBOLS ARE TO BE APPLIED WITH A MINIMUM OF TWO COATS OF ORGANIC SOLVENT BASED PAINT.
13. THE CONTRACTOR SHALL PROVIDE TO THE ENGINEER 1 (ONE) SET OF AS CONSTRUCTED SITE SERVICING, GRADING, AND SITE ELECTRICAL DWGS.
14. SITE SIGNAGE TO BE INSTALLED AS PER ARCHITECTURAL SITE PLAN.
15. SIDEWALKS TO BE 5mm BELOW THE FINISH FLOOR SLAB ELEVATION AT ENTRANCES.
16. ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR. REVIEW WITH ARCHITECT AND THE CITY OF OTTAWA PRIOR TO TREE CUTTING.
17. SUB-EXCAVATE SOFT AREAS & FILL WITH GRANULAR 'B' COMPACTED IN 0.15m LAYERS.
18. FOR ALL LANDSCAPING FEATURES (ie. TREES, WALKWAYS, PARK DETAILS, NOISE BARRIERS, FENCES etc.) REFER TO LANDSCAPE ARCHITECT PLAN.
19. ROUGH GRADING FOR LANDSCAPED ISLANDS TO BE LOT 150mm BELOW CURB AND COMPACTED TO 95%.
20. WHERE APPLICABLE THE CONTRACTOR IS TO SUBMIT SHOP DRAWINGS FOR RETAINING WALLS (INCLUDE RAILINGS IF APPLICABLE) TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION. SHOP DRAWINGS MUST BE SITE SPECIFIC AND SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF ONTARIO. THE DESIGN, STRUCTURAL AND GEOTECHNICAL CERTIFICATION OF THE AS-CONSTRUCTED RETAINING WALL TO THE ENGINEER PRIOR TO FINAL ACCEPTANCE.

GENERAL NOTES

1. ALL WORK SHALL BE CARRIED OUT IN COMPLIANCE WITH THE ONTARIO OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2. ALL WORK AND MATERIALS TO CONFORM WITH CURRENT MINISTRY OF THE ENVIRONMENT & ENERGY OF ONTARIO, CITY OF OTTAWA AND OTHERWISE STATED. STANDARD AND SPECIFICATIONS. LOCAL UTILITY STANDARDS AND MINISTRY OF TRANSPORTATION STANDARDS WILL APPLY WHERE REQUIRED.
3. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING DURING THE PERIOD OF THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE HIS CONSTRUCTION ACTIVITIES AND COOPERATION WITH ALL OTHER CONTRACTORS AND PREVENT OBSTRUCTION CONFLICTS.
4. THE INFORMATION SHOWN FOR EXISTING UTILITIES WAS PROVIDED BY OTHERS. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL UTILITIES DURING CONSTRUCTION. ALL EXISTING UTILITIES MUST BE LOCATED AND VERIFIED BY EACH UTILITY PRIOR TO COMMENCEMENT OF WORK. ANY VARIANCE IS TO BE IMMEDIATELY REPORTED TO THE ENGINEER. THE LOCATION OF ALL UTILITIES SHALL BE CONFIRMED BY THE CONTRACTOR AND NOTIFY THE ENGINEER OF POSSIBLE CONFLICTS PRIOR TO CONSTRUCTION WILL BE AT THE CONTRACTORS EXPENSE.
5. ALL CONSTRUCTION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE RECOMMENDATIONS MADE IN THE GEOTECHNICAL REPORT.
6. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AND TO BEAR THE COST OF SAME INCLUDING WATER PERMIT AND ASSOCIATED COSTS.
7. ALL DISTURBED AREAS SHALL BE REINSTATED TO EQUAL OR BETTER CONDITION TO THE SATISFACTION THE ENGINEER AND THE CITY. PAVEMENT REINSTATEMENT FOR SERVICE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH OPSD 500.010 AND OPSD 216.
8. FOR DETAILS RELATING TO STORMWATER MANAGEMENT AND ROOF DRAINAGE, SEE THE STORMWATER MANAGEMENT REPORT PREPARED BY STANTEC CONSULTING LTD. RAIN GUARANTEE TO BE PROVIDED VIA RESTRICTED ROOFING, ROOF DRAINS AS DETAILED IN THE REPORT.
9. BENCHMARKS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THAT THE SITE BENCHMARK(S) HAS NOT BEEN ALTERED OR DISTURBED AND THAT ITS RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION SHOWN ON DRAWING GP-1.
10. THE CONTRACTOR SHALL PROVIDE TO THE ENGINEER 1 (ONE) SET OF AS CONSTRUCTED SITE SERVICING, GRADING, AND SITE ELECTRICAL DWGS.

Revision	By	Appd.	YY.MM.DD
4 ISSUED FOR TENDER/ADDED 2 HYD'S ON END OF STR B	GBU	TJW	12.09.12
3 REVISED AS PER NEW SITE PLAN AND SERVICE	MJS	TJW	12.06.26
LATERAL LOCATIONS BLK 1,2, AND 3			
2 REVISED AS PER CITY COMMENTS	AML	NPC	12.04.16
1 REVISED AS PER CITY COMMENTS	GBU	TJW	12.02.21
0 ISSUED TO CITY FOR REVIEW	MJS	TJW	11.09.06
File Name: 160400898_GP	Dwn. MJS	Chkd. TJW	Dsgn. MJS	YY.MM.DD 11.08.25

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LICENSED PROFESSIONAL ENGINEER P. MOROZ Sept 12, 2012 PROVINCE OF ONTARIO

Client/Project

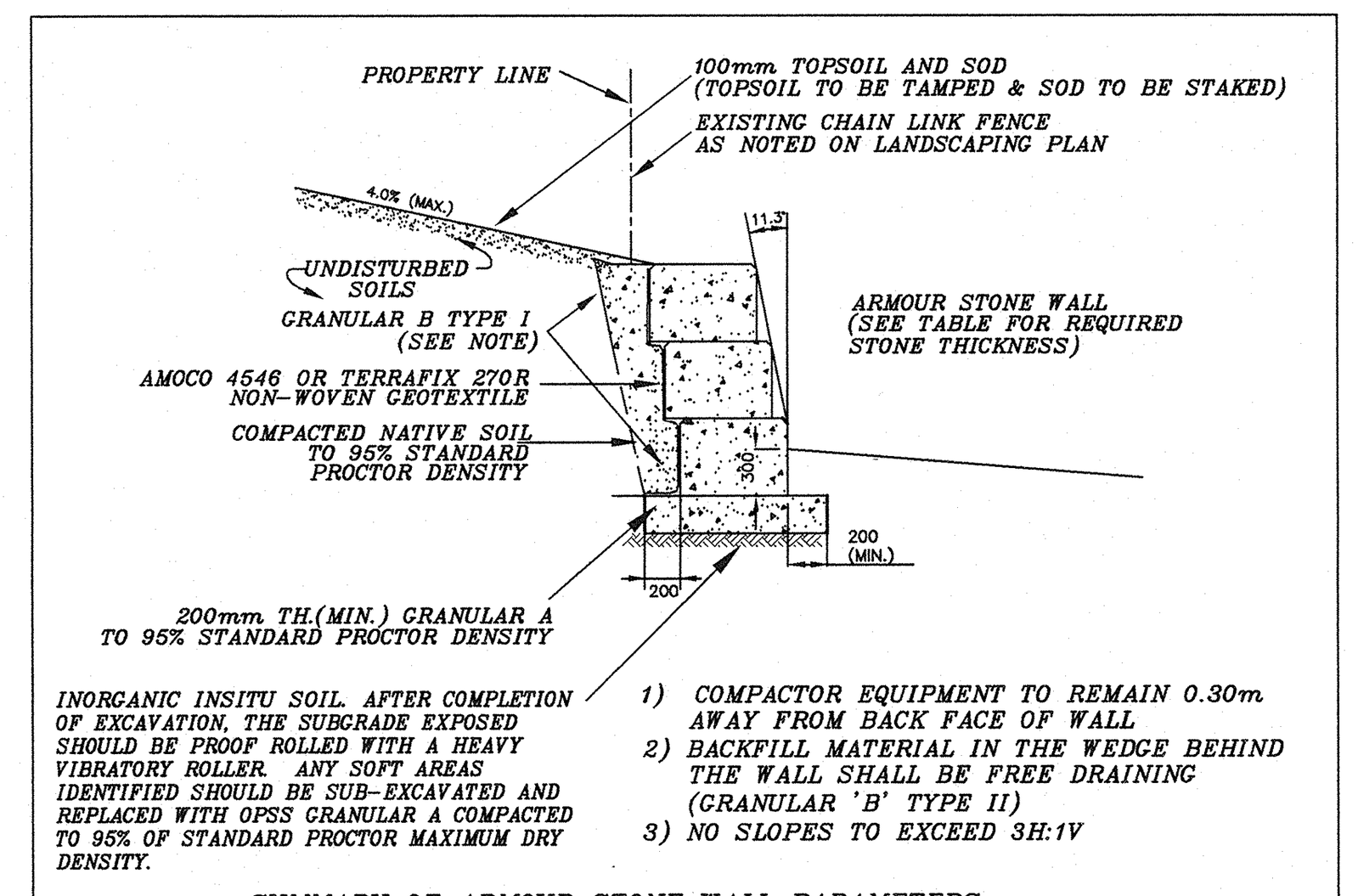
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Ottawa ON Canada

Title

GRADING PLAN

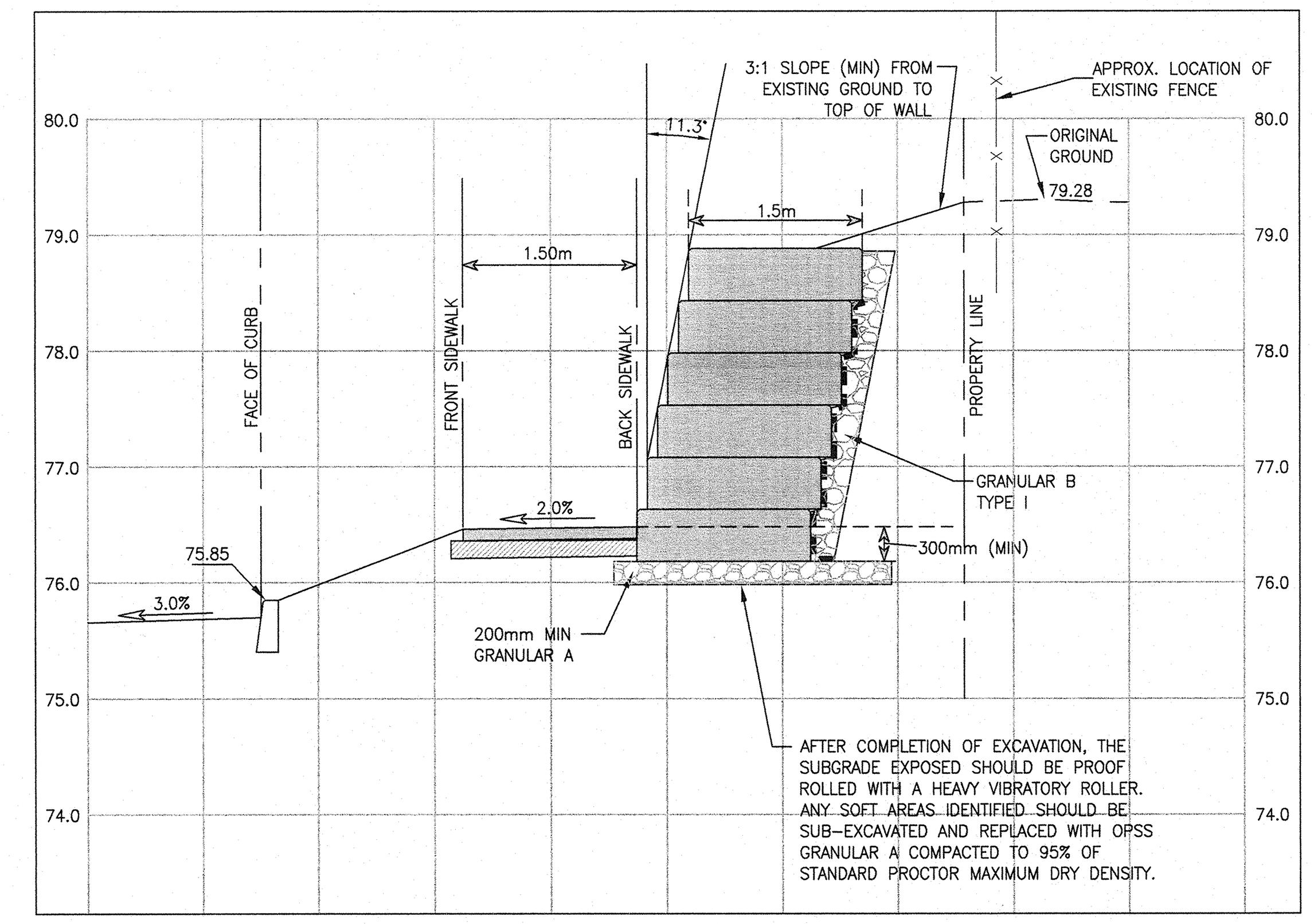
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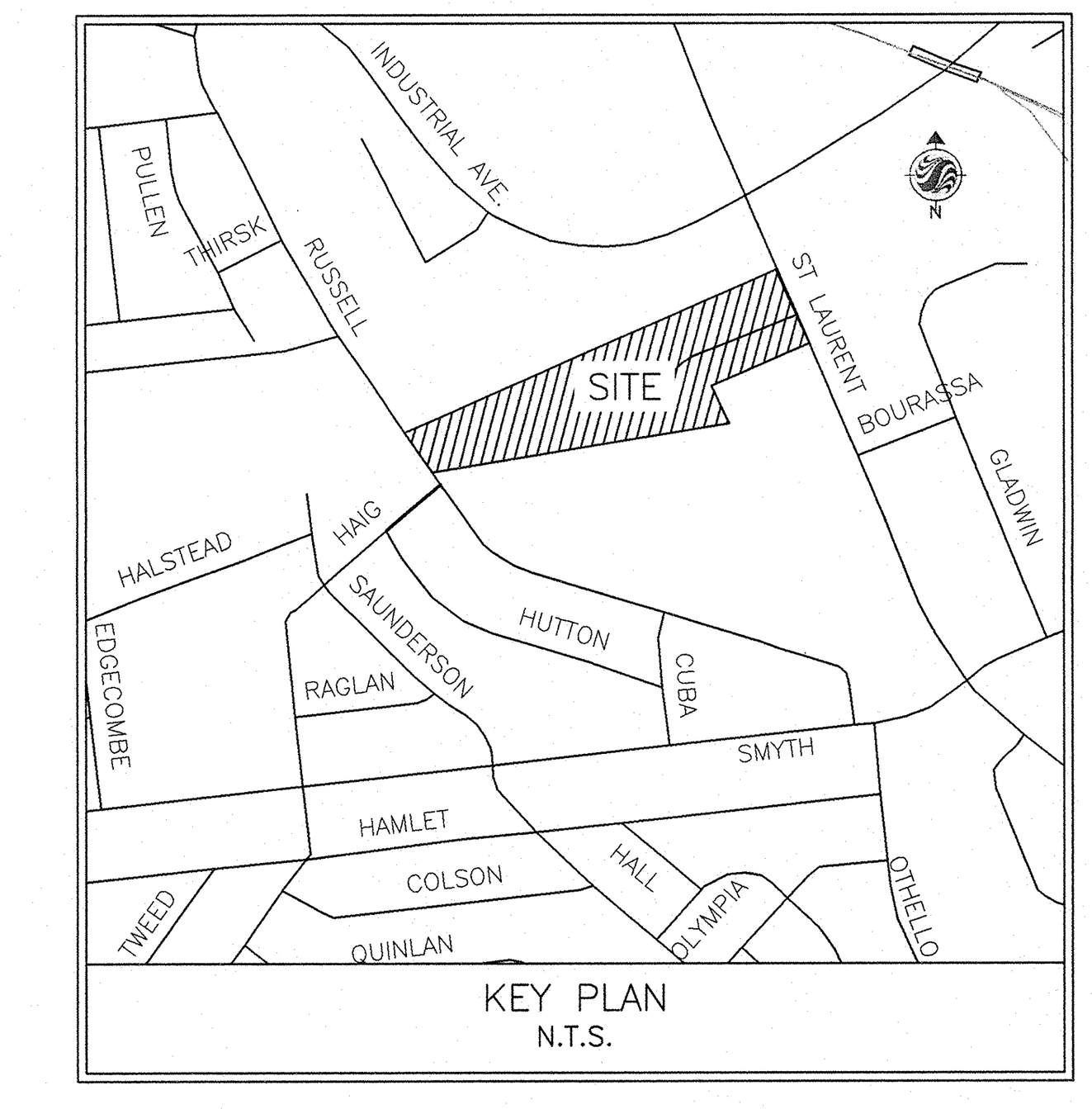


SUMMARY OF ARMOUR STONE WALL PARAMETERS

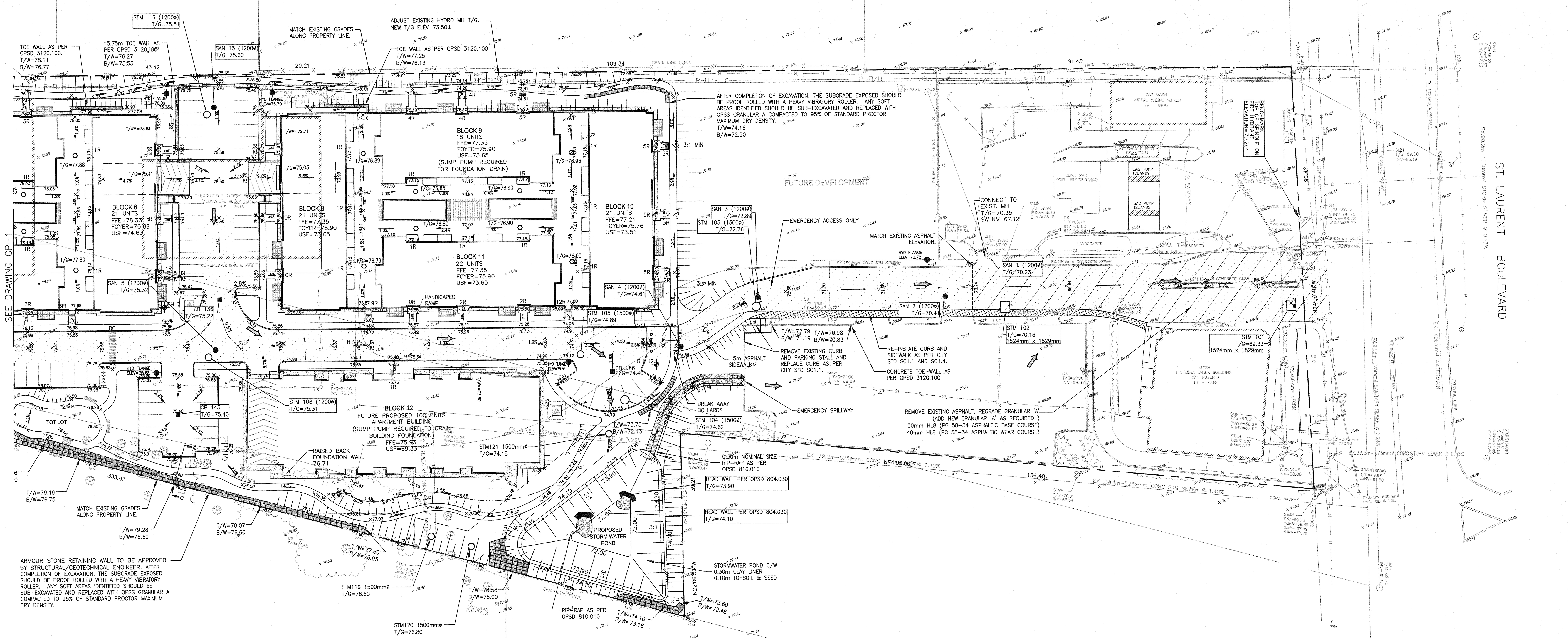
Wall Height (m)	Retained Soil Back-Slope	Required Wall Thickness (m)	Required Wall Face Batter and/or Setback
2.5m or less	HORIZONTAL (MAX.4%)	1.50	5V:1H (11.3 deg. to V)
2.4m or less	HORIZONTAL (MAX.4%)	1.40	5V:1H (11.3 deg. to V)
2.2m or less	HORIZONTAL (MAX.4%)	1.30	5V:1H (11.3 deg. to V)
2.0m or less	HORIZONTAL (MAX.4%)	1.20	5V:1H (11.3 deg. to V)
1.8m or less	HORIZONTAL (MAX.4%)	1.05	5V:1H (11.3 deg. to V)
1.6m or less	HORIZONTAL (MAX.4%)	0.90	5V:1H (11.3 deg. to V)
1.4m or less	HORIZONTAL (MAX.4%)	0.80	5V:1H (11.3 deg. to V)
1.2m or less	HORIZONTAL (MAX.4%)	0.70	5V:1H (11.3 deg. to V)
1.0m maximum	HORIZONTAL (MAX.4%)	0.60	5V:1H (11.3 deg. to V)

TYPICAL ARMOUR STONE WALL DETAIL
N.T.S.





KEY PLAN
N.T.S.



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Stantec

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Legend

Symbol	Description
×89.41	ORIGINAL GROUND
80.59 ×	PROPOSED ELEVATION
2.0% →	DIRECTION & PERCENT FLOW
90.20 × / 89.50	PROPOSED LOT CORNER ELEVATION / EXISTING ELEVATION AT LOT CORNER
FF=91.35 / USF=88.51	FINISHED FIRST FLOOR ELEVATION / UNDER SIDE OF FOOTING
3R	NUMBER OF RISERS
3:1	TERRACING 3:1 SLOPE MINIMUM (UNLESS OTHERWISE SHOWN)
—··—··—	PROPOSED SWALE AND DIRECTION
●	PROPOSED SANITARY SEWER MANHOLES
○	PROPOSED STORM SEWER MANHOLES
	PROPOSED FIRE HYDRANT
	PROPOSED VALVE BOX
	PROPOSED VALVE CHAMBER
■	PROPOSED CATCH BASIN
	PROPOSED SUB DRAIN CATCH BASIN AS PER CITY OF OTTAWA STANDARD DETAIL DRAWINGS L10 AND L11.
⇨	DIRECTION OF OVERLAND FLOW
■Ⓐ	CATCHBASINS TO BE INSTALLED WITH IPEX TYPE A OR EQUIVALENT 22.0L/S.
D.C	PROPOSED DEPRESSED CURB LOCATIONS
SOG	SLAB ON GRADE UNIT
	HEAVY DUTY ASPHALT
T/W=79.28 / B/W=75.60	TOP OF WALL / BOTTOM OF WALL

Notes

SITE GRADING

1 ALL GRANULAR BASE & SUB BASE COURSE MATERIALS SHALL BE COMPACTED TO 100% STANDARD PROCTOR MAX. DRY DENSITY.

2 ALL DISTURBED GRASSED AREAS SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER, WITH SOD ON MIN. 100mm TOPSOIL. THE RELOCATION OF TREES AND SHRUBS SHALL BE SUBJECT TO APPROVAL BY THE PROJECT LANDSCAPE ARCHITECT OR ENGINEER.

3 PAVEMENT CONSTRUCTION AS PER exp. REPORT DATED AUGUST 4, 2011, PROJECT No. OTT-00201533-A0
PROPOSED FIRE/TRUCK ACCESS ROUTE PAVEMENT STRUCTURE
40mm HL3 or (PG 58-34) ASPHALTIC CONCRETE WEAR COURSE
50mm HL8 or (PG 58-34) ASPHALTIC CONCRETE BASE COURSE
150mm BASE COURSE OPSS GRAN."A"
450mm SUB BASE OPSS GRAN."B" TYPE II
PROPOSED PARKING LOT PAVEMENT STRUCTURE
75mm HL3 or (PG 58-34) ASPHALTIC CONCRETE WEAR COURSE
150mm BASE COURSE OPSS GRAN."A"
300mm SUB BASE OPSS GRAN."B" TYPE II

4 ALL BARRIER CURBS, CONCRETE ISLANDS AND SIDEWALKS SHOWN ON THIS DRAWING ARE TO BE PRICED IN THE SITEWORKS PORTION OF THE CONTRACT. ALL BARRIER CURBS AND SIDEWALKS TO BE CONSTRUCTED PER CITY OF OTTAWA STANDARD DRAWING SC1 AND SC8.

5 INSPECTIONS: ALL WORK ON THE MUNICIPAL RIGHT OF WAY AND EASEMENTS TO BE INSPECTED BY THE MUNICIPALITY PRIOR TO BACKFILLING. ALL WORK RELATING TO WATERMAINS AND SEWERS TO BE INSPECTED BY THE MUNICIPALITY WHEN REQUIRED.

6 REFER TO ARCHITECTURAL SITE PLAN FOR DIMENSIONS AND SITE DETAILS.

7 STEP JOINTS ARE TO BE USED WHERE PROPOSED ASPHALT MEETS EXISTING ASPHALT AS PER DETAIL DS-2. ALL JOINTS MUST BE SEALED AS PER DETAIL.

8 CONTRACTOR TO OBTAIN A ROAD OCCUPANCY PERMIT 48 HOURS PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL ROAD ALLOWANCE IF REQUIRED BY THE MUNICIPALITY.

9 PARKING AREA PONDING DEPTH TO BE 0.30m (MAXIMUM).

10 EMBANKMENTS TO BE SLOPED AT MIN. 3:1, UNLESS OTHERWISE SPECIFIED.

11 REFER TO DRAWING D1/EC FOR EROSION AND SEDIMENT CONTROL.

12 ALL PAVEMENT MARKING, LINE PAINTING, DIRECTIONAL LINES/ARROWS ETC. SHALL BE PLACED IN ACCORDANCE WITH THE ARCHITECTURAL SITE PLAN OR THE OWNER'S TRAFFIC ENGINEERING CONSULTANT'S DRAWINGS. LINE PAINTING AND DIRECTIONAL SYMBOLS SHALL BE APPLIED WITH A MINIMUM OF TWO COATS OF ORGANIC SOLVENT BASED PAINT.

13 THE CONTRACTOR SHALL PROVIDE TO THE ENGINEER 1 (ONE) SET OF AS CONSTRUCTED SITE SERVICING, GRADING, AND SITE ELECTRICAL DWGS.

14 SITE SIGNAGE TO BE INSTALLED AS PER ARCHITECTURAL SITE PLAN.

15 SIDEWALKS TO BE 5mm BELOW THE FINISH FLOOR SLAB ELEVATION AT ENTRANCES.

16 ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR. REVIEW WITH ARCHITECT AND THE CITY OF OTTAWA PRIOR TO TREE CUTTING.

17 SUB-EXCAVATE SOFT AREAS & FILL WITH GRANULAR 'B' COMPACTED IN 0.15m LAYERS.

18 FOR ALL LANDSCAPING FEATURES (ie. TREES, WALKWAYS, PARK DETAILS, NOISE BARRIERS, FENCES etc.) REFER TO LANDSCAPE ARCHITECT PLAN.

19 ROUGH GRADING FOR LANDSCAPED ISLANDS TO BE LEFT 150mm BELOW CURB AND COMPACTED TO 95%.

20 WHERE APPLICABLE THE CONTRACTOR IS TO SUBMIT SHOP DRAWINGS FOR RETAINING WALLS (INCLUDE RAILINGS IF APPLICABLE) TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION. SHOP DRAWINGS MUST BE SITE SPECIFIC, SIGNED AND SEALED BY A LICENSED STRUCTURAL ENGINEER. THE CONTRACTOR WILL ALSO BE REQUIRED TO SUPPLY STRUCTURAL AND GEOTECHNICAL CERTIFICATION OF THE AS-CONSTRUCTED RETAINING WALL TO THE ENGINEER PRIOR TO FINAL ACCEPTANCE.

GENERAL NOTES

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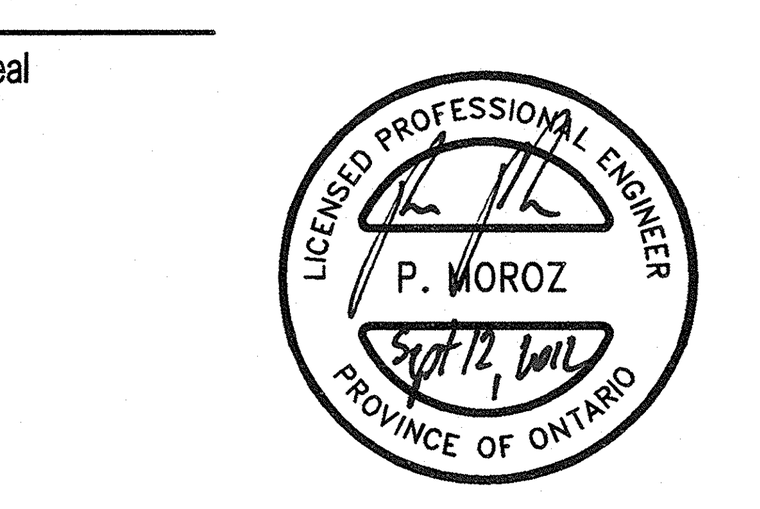
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Revision	By	Appd.	YY.MM.DD
4 ISSUED FOR TENDER/ADDED 2 HYD'S ON END OF STR B	GBU	TJW	12.09.12
3 REVISED AS PER NEW SITE PLAN AND SERVICE LATERAL LOCATIONS BLK 1,2, AND 3	MJS	TJW	12.06.26
2 REVISED AS PER CITY COMMENTS	AML	NPC	12.04.16
1 REVISED AS PER CITY COMMENTS	GBU	TJW	12.02.21
0 ISSUED TO CITY FOR REVIEW	MJS	TJW	11.09.06

File Name: 160400898_GP	MJS	TJW	MJS	11.08.25
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

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Client/Project

6553061 CANADA INC.

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1740 ST. LAURENT BOULEVARD
Ottawa ON Canada

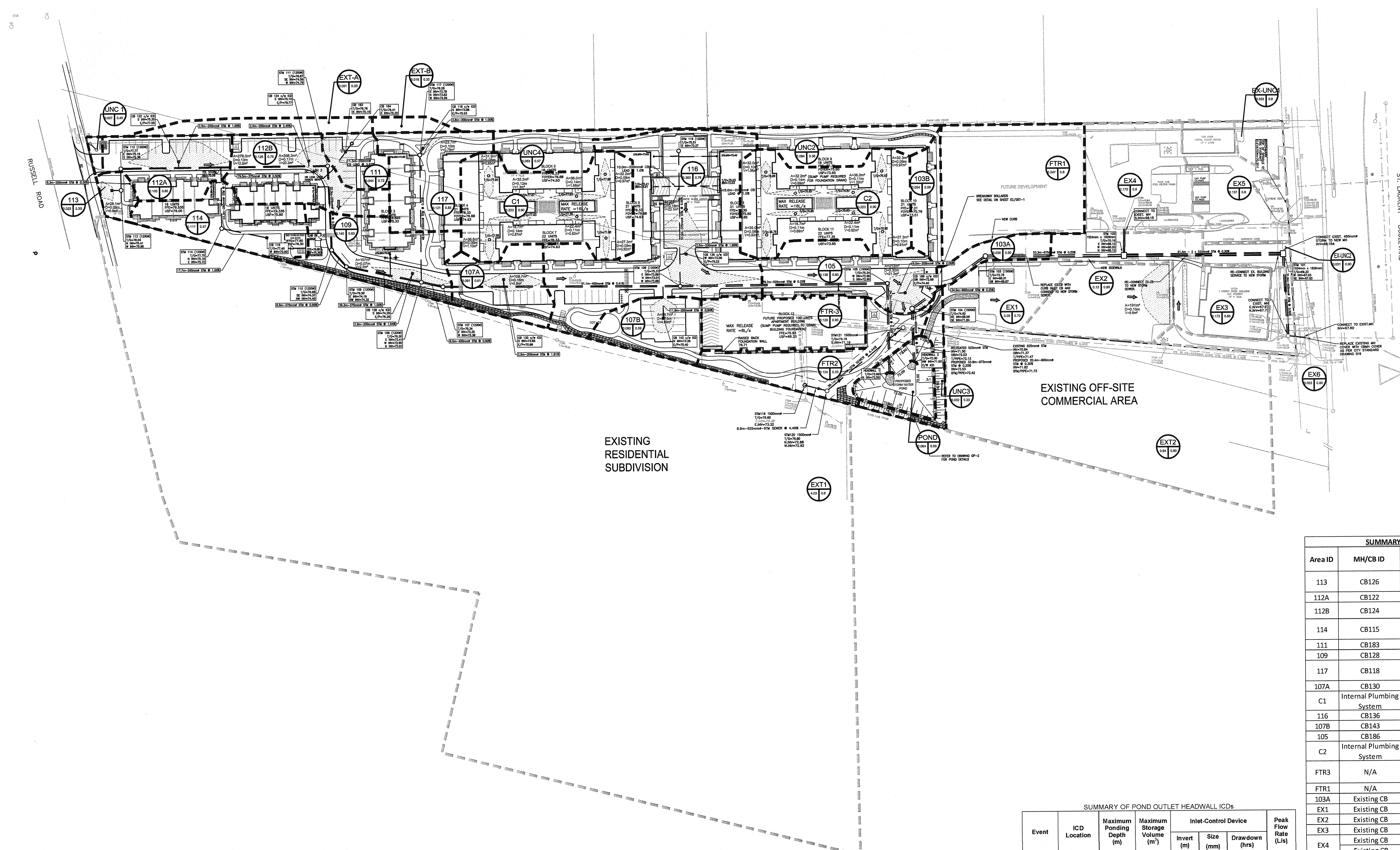
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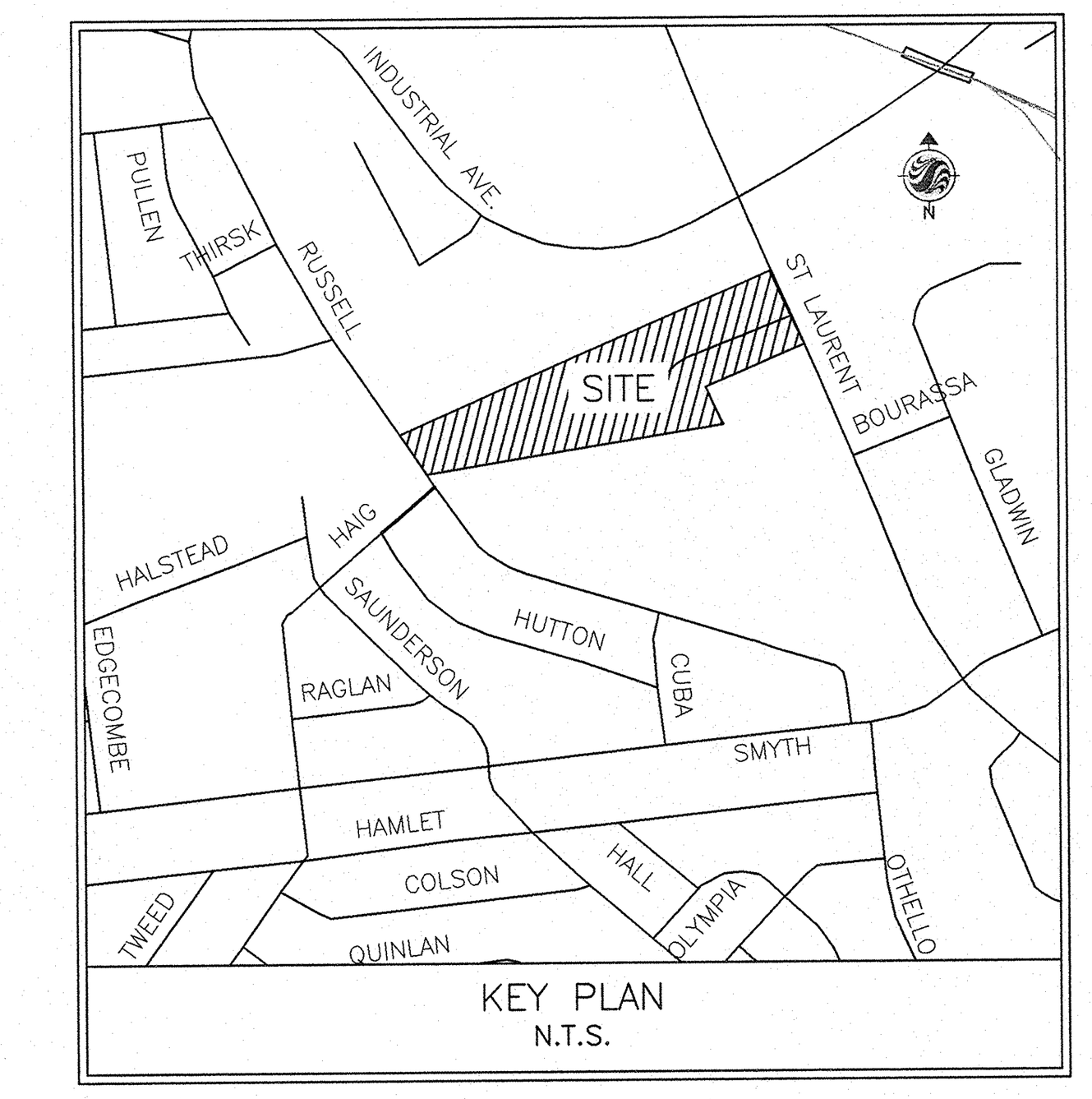
GRADING PLAN

Project No.	Scale	
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Drawing No.	**Sheet**	**Revision**
GP-2	8 of 13	4

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KEY PLAN
N.T.S.

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Fax. 613.722.2799
www.stantec.com

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- PROPOSED CATCH BASIN
- PROPOSED SUB DRAIN CATCH BASIN AS PER CITY OF OTTAWA STANDARD DETAIL DRAWINGS L10 AND L11.

Notes

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STORMWATER MANAGEMENT NOTES

1 THE STORMSEWER SYSTEM DOWNSTREAM OF STM102 HAS BEEN SIZED TO ACCOMODATE UNCONTROLLED 5-YEAR RUNOFF FROM THE EXISTING DEVELOPMENTS AND ACCESS ROAD (208 L/s FROM AREA 'EXIST'). HOWEVER, AREA 'EXIST' HAS NOT BEEN INCLUDED IN THE SWM DESIGN OF THE SITE AND AS SUCH, THESE DEVELOPMENTS MUST PROVIDE ON-SITE SWM MEASURES.

2 FUTURE SITE AREAS (FTR) HAVE BEEN INCLUDED IN THE SWM DESIGN OF THE SITE AS FOLLOWS:
- FTR-1 TO CONTAIN 100YR STORM ON-SITE AND RESTRICT RELEASE RATE TO THE SEWER TO 30L/S.
- AREA FTR2 IS ASSUMED TO SHEET DRAIN TO THE SWM POND AND BUILDING FTR3 HAS BEEN ASSUMED TO HAVE NO BASEMENTS AND TO PROVIDE ROOF STORAGE TO LIMIT THE 100 YEAR RELEASE RATE TO THE STORM SEWER TO 8L/s.

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4 ALL UNDERGROUND PARKING LOTS ON THE SITE ARE TO BE DRAINED THROUGH THE INTERNAL PLUMBING SYSTEM OF THE BUILDINGS. BLOCKS 8-11 AND FUTURE BLOCK 12 WILL REQUIRE PUMPING AT THE UNDERGROUND PARKING LEVEL.

5 REFER TO ICD SCHEDULE FOR SUMMARY OF ICD REQUIREMENTS AND LOCATIONS.

6 STORMWATER POND TO BE GRASSED AND UNDERLAID WITH 100mm TOPSOIL.

SUMMARY OF POND OUTLET HEADWALL ICDs

Event	ICD Location	Maximum Ponding Depth (m)	Maximum Storage Volume (m^3)	Inlet-Control Device			Peak Flow Rate (L/s)
				Invert (m)	Size (mm)	Drawdown (hrs)	
5-year	Pond Outlet Headwall	1.26	284	71.9	150	6.25	50.4
100-year	Pond Outlet Headwall	1.9	573	71.9	150	8	63

SUMMARY OF ICD SIZES AND LOCATION

Area ID	MH/CB ID	Invert (m)	ICD Type	Max. Release Rate (L/s)
113	CB126	75.6	75 mm dia. orifice	17
112A	CB122	75.35	IPEX 'A'	22
112B	CB124	75.10	IPEX 'B'	32
114	CB115	75.42	75 mm dia. orifice	17
111	CB183	74.76	IPEX 'A'	22
109	CB128	74.26	IPEX 'A'	22
117	CB118	73.86	75 mm dia. orifice	17
107A	CB130	73.65	IPEX 'A'	22
C1	Internal Plumbing System	N/A	Zurn Roof Drains	16
116	CB136	73.06	IPEX 'A'	22
107B	CB143	73.35	IPEX 'A'	22
105	CB186	72.69	IPEX 'A'	22
C2	Internal Plumbing System	N/A	Zurn Roof Drains	16
FTR3	N/A	N/A	Zurn Roof Drains	8
FTR1	N/A	N/A	N/A	30
103A	Existing CB	69.43	IPEX 'A'	22
EX1	Existing CB	69.69	IPEX 'C'	40
EX2	Existing CB	68.52	IPEX 'A'	22
EX3	Existing CB	68.23	IPEX 'C'	40
EX4	Existing CB	68.54	IPEX 'C'	40
	Existing CB	68.48	IPEX'C'	40
EX5	Existing CB	68.2	IPEX'D'	60
EX6	Existing CB	68.08	IPEX'B'	32
POND	HEADWALL 2	71.9	152 mm dia. orifice	64

Contractor to install ICDs as outlined above or approved equivalent.

Revision				
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File Name: 160400898_SD	MJS	AMP	AML	11.09.01
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

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LICENSED PROFESSIONAL ENGINEER
P. MOROZ
Sept 17, 2012
PROVINCE OF ONTARIO

Client/Project

6553061 CANADA INC.

ALTA VISTA RIDGE
1740 ST. LAURENT BOULEVARD
Ottawa ON Canada

Title

OVERALL STORM DRAINAGE PLAN

Project No. 160400898

Scale 1:750 0 7.5 22.5 37.5m

Drawing No. OSD-1

Sheet 9 of 13

Revision 4

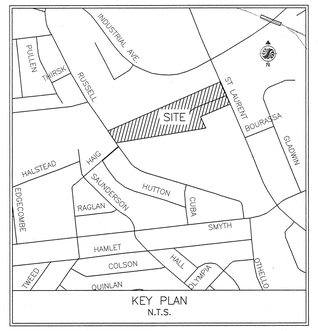
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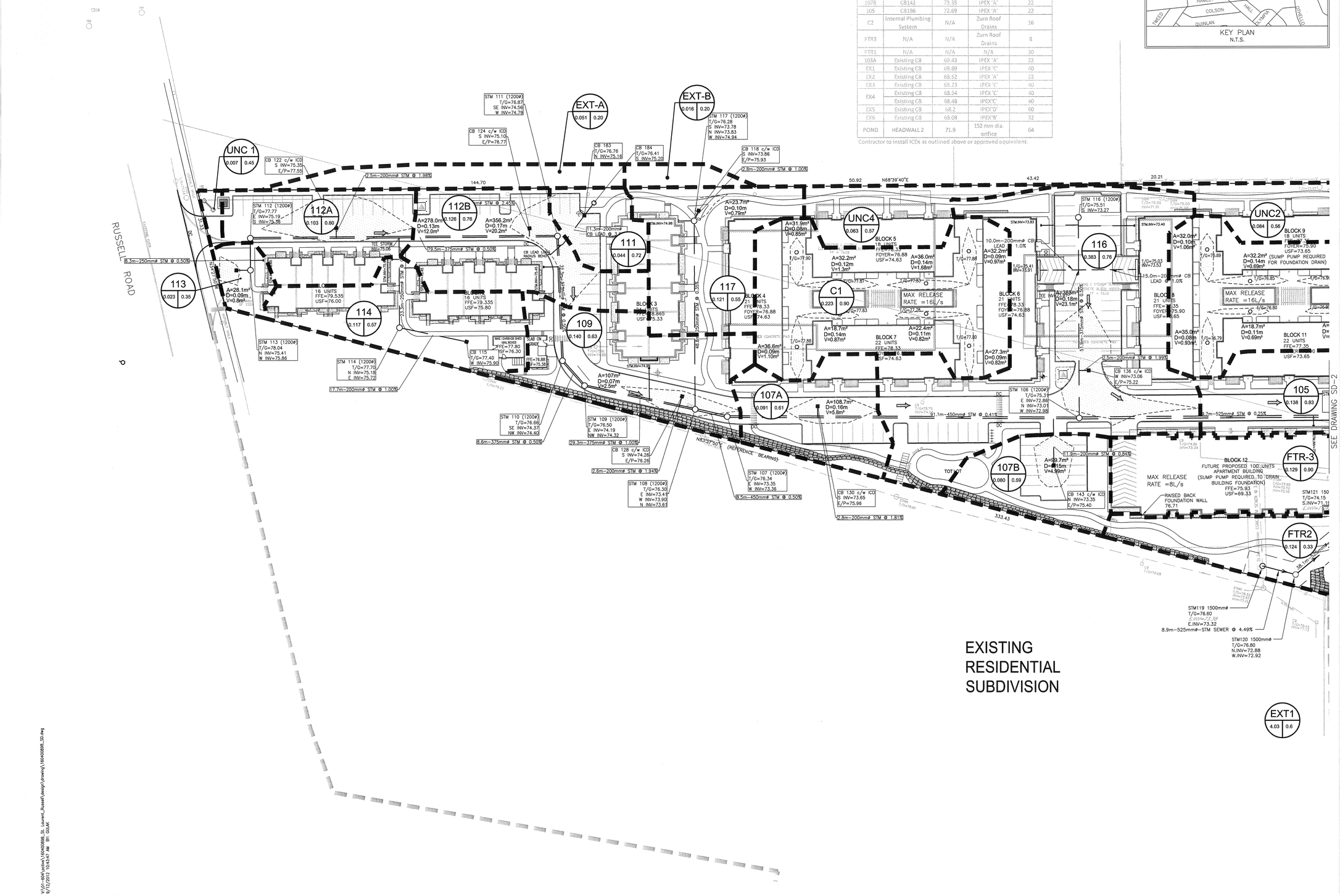
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KEY PLAN
N.T.S.



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DATE
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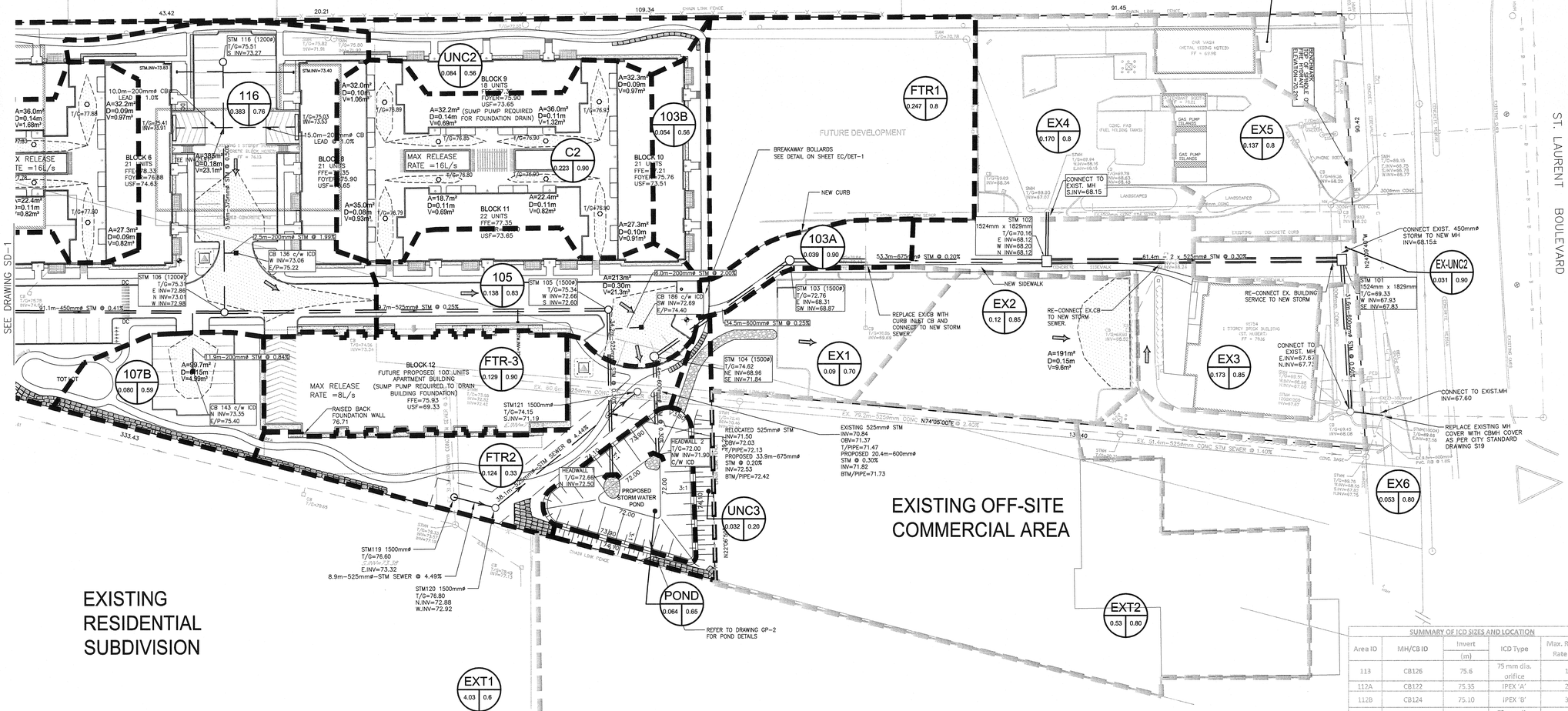
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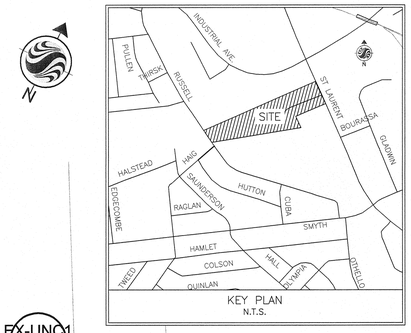
Title
STORM DRAINAGE PLAN

Project No.	Scale	
160400898	1:400	0 4.0 12.0 20.0m
Drawing No.	Sheet	Revision
SD-1	10 of 13	4

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Legend

- PROPOSED STORM SEWER
- AREA ID
- RUNOFF COEFFICIENT
- STORM DRAINAGE AREA ha.
- STORM DRAINAGE BOUNDARY
- EXISTING STORM DRAINAGE BOUNDARY
- TYPICAL SERVICE LATERAL LOCATION
- MAXIMUM PONDING LIMITS
- EXISTING STORM SEWER
- DIRECTION OF OVERLAND FLOW
- PROPOSED CATCH BASIN
- PROPOSED SUB DRAIN CATCH BASIN AS PER CITY OF OTTAWA STANDARD DETAIL DRAWINGS L10 AND L11.

Notes

GENERAL NOTES

1 ALL WORK SHALL BE CARRIED OUT IN COMPLIANCE WITH THE ONTARIO OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
2 ALL WORK AND MATERIALS TO CONFORM WITH CURRENT MINISTRY OF THE ENVIRONMENT & ENERGY OF ONTARIO, CITY OF OTTAWA AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS. LOCAL UTILITY STANDARDS AND MINISTRY OF TRANSPORTATION STANDARDS WILL APPLY WHERE REQUIRED.
3 THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING DURING THE PERIOD OF THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES AND COOPERATION WITH ALL OTHER CONTRACTORS AND PRESENT CONSTRUCTION CONCURRENTLY.
4 THE INFORMATION SHOWN FOR EXISTING UTILITIES WAS PROVIDED BY OTHERS. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING THE LOCATION OF ALL UTILITIES AND STRUCTURES WHETHER SHOWN ON THE DRAWINGS OR NOT. ANY DISCREPANCIES NOTED BY EACH UTILITY PRIOR TO COMMENCEMENT OF WORK, ANY DAMAGE IS TO BE IMMEDIATELY REPORTED TO THE ENGINEER. COST TIME DUE TO FAILURE OF THE CONTRACTOR TO CONFIRM UTILITY LOCATIONS AND NOTIFY THE ENGINEER OF POSSIBLE CONFLICTS PRIOR TO CONSTRUCTION WILL BE AT THE CONTRACTORS EXPENSE.
5 ALL CONSTRUCTION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE RECOMMENDATIONS MADE IN THE GEOTECHNICAL REPORT.
6 THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AND TO BEAR THE COST OF SAME INCLUDING WATER POINT AND ASSOCIATED COSTS.
7 ALL DISTURBED AREAS SHALL BE REINSTATED TO EQUAL OR BETTER CONDITION TO THE SATISFACTION THE ENGINEER AND THE CITY. PAVEMENT REINSTATEMENT FOR SEWAGE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH OPSD 306.010 AND OPSD 310.
8 FOR DETAILS RELATING TO STORMWATER MANAGEMENT AND ROOF DRAINAGE, SEE THE STORMWATER MANAGEMENT REPORT PREPARED BY STANTEC CONSULTING LTD. ROOF DRAINAGE TO BE PROVIDED VIA RESTRICTED RELEASE ROOF DRAINS AS DETAILED IN THE REPORT.
9 BENCHMARKS: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THAT THE SITE BENCHMARKS HAS NOT BEEN ALTERED OR DISTURBED AND THAT ITS RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION SHOWN ON DRAWING GP-1.
10 THE CONTRACTOR SHALL PROVIDE TO THE ENGINEER 1 (ONE) SET OF AS CONSTRUCTED SITE SERVICING, GRADING, AND SITE ELECTRICAL DWGS.

STORMWATER MANAGEMENT NOTES

1 THE STORMSEWER SYSTEM DOWNSTREAM OF STM102 HAS BEEN SIZED TO ACCOMODATE UNCONTROLLED 5-YEAR RUNOFF FROM THE EXISTING DEVELOPMENTS AND ACCESS ROAD (208 L/s FROM AREA 'EXIST'). HOWEVER, AREA 'EXIST' HAS NOT BEEN INCLUDED IN THE SWM DESIGN OF THE SITE AND AS SUCH, THESE DEVELOPMENTS MUST PROVIDE ON-SITE SWM MEASURES.
2 FUTURE SITE AREAS (FTR) HAVE BEEN INCLUDED IN THE SWM DESIGN OF THE SITE AS FOLLOWS:
   - FTR=1 TO CONTAIN 100YR STORM ON-SITE AND RESTRICT RELEASE RATE TO THE SEWER TO 30L/S.
   - AREA FTR2 IS ASSUMED TO SHEET DRAIN TO THE SWM POND AND BUILDING FTR3 HAS BEEN ASSUMED TO HAVE NO BASEMENTS AND TO PROVIDE ROOF STORAGE TO LIMIT THE 100 YEAR RELEASE RATE TO THE STORM SEWER TO 8L/s.
3 AN EMERGENCY SPILLWAY IS TO BE PROPOSED TO SAFELY CONVEY OVERFLOW FROM THE STORMWATER POND.
4 ALL UNDERGROUND PARKING LOTS ON THE SITE ARE TO BE DRAINED THROUGH THE INTERNAL PLUMBING SYSTEM OF THE BUILDINGS. BLOCKS 8–11 AND FUTURE BLOCK 12 WILL REQUIRE PUMPING AT THE UNDERGROUND PARKING LEVEL.
5 REFER TO ICD SCHEDULE FOR SUMMARY OF ICD REQUIREMENTS AND LOCATIONS.
6 STORMWATER POND TO BE GRASSED AND UNDERLAID WITH 100mm TOPSOIL.

SUMMARY OF ICD SIZES AND LOCATION

Area ID	MH/CB ID	Invert (m)	ICD Type	Max. Release Rate (L/s)
113	CB126	75.6	75 mm dia. orifice	17
112A	CB122	75.35	IPEX 'A'	22
112B	CB124	75.10	IPEX 'B'	32
114	CB115	75.42	75 mm dia. orifice	17
111	CB183	74.76	IPEX 'A'	22
109	CB128	74.26	IPEX 'A'	22
117	CB118	73.86	75 mm dia. orifice	17
107A	CB130	73.65	IPEX 'A'	22
C1	Internal Plumbing System	N/A	Zurn Roof Drains	16
116	CB136	73.06	IPEX 'A'	22
107B	CB143	73.35	IPEX 'A'	22
105	CB186	72.69	IPEX 'A'	22
C2	Internal Plumbing System	N/A	Zurn Roof Drains	16
FTR3	N/A	N/A	Zurn Roof Drains	8
FTR1	N/A	N/A	N/A	30
103A	Existing CB	69.43	IPEX 'A'	22
EX1	Existing CB	69.69	IPEX 'C'	40
EX2	Existing CB	68.52	IPEX 'A'	22
EX3	Existing CB	68.23	IPEX 'C'	40
EX4	Existing CB	68.54	IPEX 'C'	40
	Existing CB	68.48	IPEX'C'	40
EX5	Existing CB	68.2	IPEX'D'	60
EX6	Existing CB	68.08	IPEX'B'	32
POND	HEADWALL 2	71.9	152 mm dia. orifice	64

Contractor to install ICDs as outlined above or approved equivalent.

Revision	By	Appd.	YY.MM.DD
4 ISSUED FOR TENDER/ADDED 2 HYD'S ON END OF STR B	GBU	TJW	12.09.12
3 REVISED AS PER NEW SITE PLAN AND SERVICE LATERAL LOCATIONS BLK 1,2, AND 3	MJS	TJW	12.06.26
2 REVISED AS PER CITY COMMENTS	AML	NPC	12.04.16
1 REVISED AS PER CITY COMMENTS	GBU	TJW	12.02.21
0 ISSUED TO CITY FOR REVIEW	MJS	TJW	11.09.06
File Name: 160400898_SD	MJS Dwn.	AMP Chkd.	AML Dsgn.	11.09.01 YY.MM.DD

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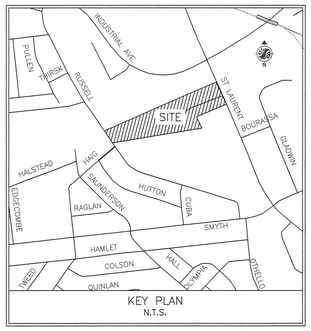
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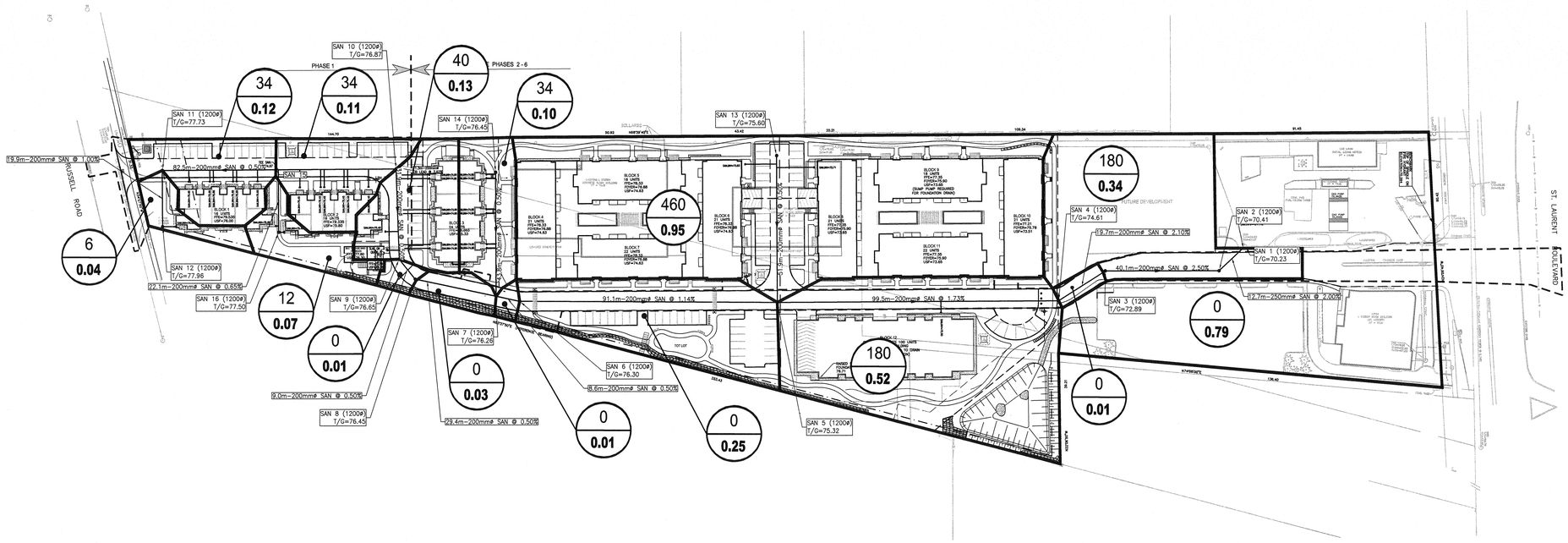
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STORM DRAINAGE PLAN

Project No. 160400898
Scale 1:400 (0, 4.0, 12.0, 20.0m)
Drawing No. SD-2
Sheet 11 of 13
Revision 4

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Legend

PROPOSED SANITARY SEWER

73 / 1.20 — POPULATION / SANITARY DRAINAGE AREA ha.

SANITARY DRAINAGE AREA ha.

Notes

Revision	By	Appd.	YY.MM.DD
4 ISSUED FOR TENDER/ADDED 2 HYD'S ON END OF STR B	GBU	TJW	12.09.12
3 REVISED AS PER NEW SITE PLAN AND SERVICE LATERAL LOCATIONS BLK 1,2, AND 3	MJS	TJW	12.06.26
2 REVISED AS PER CITY COMMENTS	AML	NPC	12.04.16
1 REVISED AS PER CITY COMMENTS	GBU	TJW	12.02.21
0 ISSUED TO CITY FOR REVIEW	MJS	TJW	11.09.06
File Name: 160400898_SAN	MJS Dwn.	TJW Chkd.	MJS Dsgn.	11.08.25 YY.MM.DD

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P. MOROZ
PROVINCE OF ONTARIO

Client/Project

6553061 CANADA INC.

ALTA VISTA RIDGE
1740 ST. LAURENT BOULEVARD
Ottawa ON Canada

Title

SANITARY DRAINAGE PLAN

Project No. 160400898

Scale 1:750 (0, 7.5, 22.5, 37.5m)

Drawing No. SAN-1

Sheet 12 of 13

Revision 4

Alta Vista Ridge - 1740 St-Laurent Boulevard, Ottawa, ON, Le Groupe Heafey - Stormwater Management Report

Stantec Consulting Ltd.
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Submission Dates
2nd Submission – February 24, 2012
1st Submission – September 7, 2011

1604-00898/83

Table 7: Summary of Results

Storm Event	Q_{target} (L/s)	Q_{Uncon} (L/s)	$Q_{Controlled}$ (L/s)[1]	Q_{Total} (L/s)	Pond $V_{required}$ (m^3)	Max. Pond $V_{available}$ (m^3)[2]	Maximum Pond Water Level (m)[3]
5 year	379.0	24	81.4	105.4	286	640	73.21
100 year		70	93.9	163.9	617		73.85

1. Controlled runoff includes SWM dry pond outflow (from XP-SWMM) and controlled release rates from FTR1 and 113B (from SWMHYMO)
2. Surface storage available in the SWM dry pond
3. Maximum possible water level in the dry pond is 73.90 m

3.3.2 Interim Conditions – Proposed Development Site

The ultimate conditions design included assumptions about storage for future Block 12 and future area FTR1. In the interim condition no controls will be in place for either of these areas, as such flows from Block 12 will sheet drain uncontrolled to the pond and area FTR1 will also flow uncontrolled to the existing catchbasin within the road. As a result, flows into the stormwater pond are higher in the interim condition than the ultimate condition. It is therefore proposed that the 152mm pond outlet orifice for the ultimate condition be replaced with a 178mm orifice in the interim condition to prevent the pond from spilling during the 100-year event. **Tables 8 and 9** provide a summary of the 5 and 100 year SWM pond storage requirements for the site during interim conditions.

Table 8: 5 Year Summary of Interim Condition SWM Dry Pond Storage and Outlet Characteristics[1]

ICD Location	Maximum Ponding Depth (m)	Maximum Storage Volume (m^3)[2]	Inlet-Control Device			Peak Flow Rate (L/s)
			Invert (m)	Size (mm)	Drawdown (hrs)	
Pond Outlet	1.23	263	71.90	178	6.0	67.3

4. See **Appendix A** and **Appendix B** for detailed calculations
5. Obtained through interpolating pond water depth from XP-SWMM model in pond rating curve
6. Emergency spillway at the dry pond was set at 73.90 m

Table 9: 100 Year Summary of Interim Condition SWM Dry Pond Storage and Outlet Characteristics[1]

ICD Location	Maximum Ponding Depth (m)	Maximum Storage Volume (m^3)[2]	Inlet-Control Device			Peak Flow Rate (L/s)
			Invert (m)	Size (mm)	Drawdown (hrs)	
Pond Outlet	1.87	580	71.90	178	6.6	84.9

4. See **Appendix A** and **Appendix B** for detailed calculations
5. Obtained through interpolating pond water depth from XP-SWMM model in pond rating curve
6. Emergency spillway at the dry pond was set at 73.90 m

Table 10 demonstrates that under interim conditions, the proposed SWM dry pond, in combination with surface grading, roof drain restrictions, and local ICDs, provide adequate attenuation storage to compensate for uncontrolled areas and meet the 379 L/s target peak outflow for all storms up to and including the 100 year storm

Table 10: Summary of Results

Storm Event	Q_{target} (L/s)	Q_{Uncon} (L/s)	$Q_{Controlled}$ (L/s)[1]	Q_{Total} (L/s)	Pond $V_{required}$ (m^3)	Max. Pond $V_{available}$ (m^3)[2]	Maximum Pond Water Level (m)[3]
5 year	379.0	95	81.4	176.4	286	640	73.21
100 year		199	93.9	292.9	617		73.85

1. Controlled runoff includes SWM dry pond outflow (from XP-SWMM)
2. Uncontrolled runoff includes uncontrolled release rates from areas UNC1 to UNC4, Major flow from area 117, area FTR1 and 103B (from SWMHYMO)
3. Surface storage available in the SWM dry pond
4. Maximum possible water level in the dry pond is 73.90 m

3.3.3 Proposed Sewer Connection and Existing Commercial Site

Minor flows from site areas downstream of the proposed SWM dry pond will be controlled only at the catchbasin inlets. The 5 year runoff from the existing commercial sites on the eastern portion of the site (area EX1 to EX6 as shown on **Drawing SD-2**) was included in the sizing of the storm sewer outlet downstream of the SWM dry pond. It has been assumed that no control measures currently exist to restrict flows generated within the existing area, however, the proposed design includes the addition of ICDs to protect the downstream sewers and make use of available surface storage. The proposed ICD sizes and configuration for the existing commercial area are shown in **Table 11**, below

Table 11: Summary of ICD Sizes and Location for the Areas Downstream of the SWM Pond

Area ID	MH/CB ID	Invert (m)	ICD Type	Max. Release Rate (L/s)
FTR1	N/A	N/A	N/A	30
103A	Existing CB	69.43	IPEX 'A'	22
EX1	Existing CB	69.69	IPEX 'C'	40
EX2	Existing CB	68.52	IPEX 'A'	22
EX3	Existing CB	68.23	IPEX 'C'	40
EX4	Existing CB	68.54	IPEX 'C'	40

Appendix I – Drawings

Architectural Floor Plan – Level Rooftop DWG No. P205

Alta Vista Ridge Storm Drainage Plan DWG No. SD-1

Notes and Legend Sheet DWG No. C001 (Provided Separately)

Existing Conditions and Removals Plan DWG No. C002 (Provided Separately)

Site Servicing Plan DWG No. C100 (Provided Separately)

Everest Private Plan and Profile No. C101 (Provided Separately)

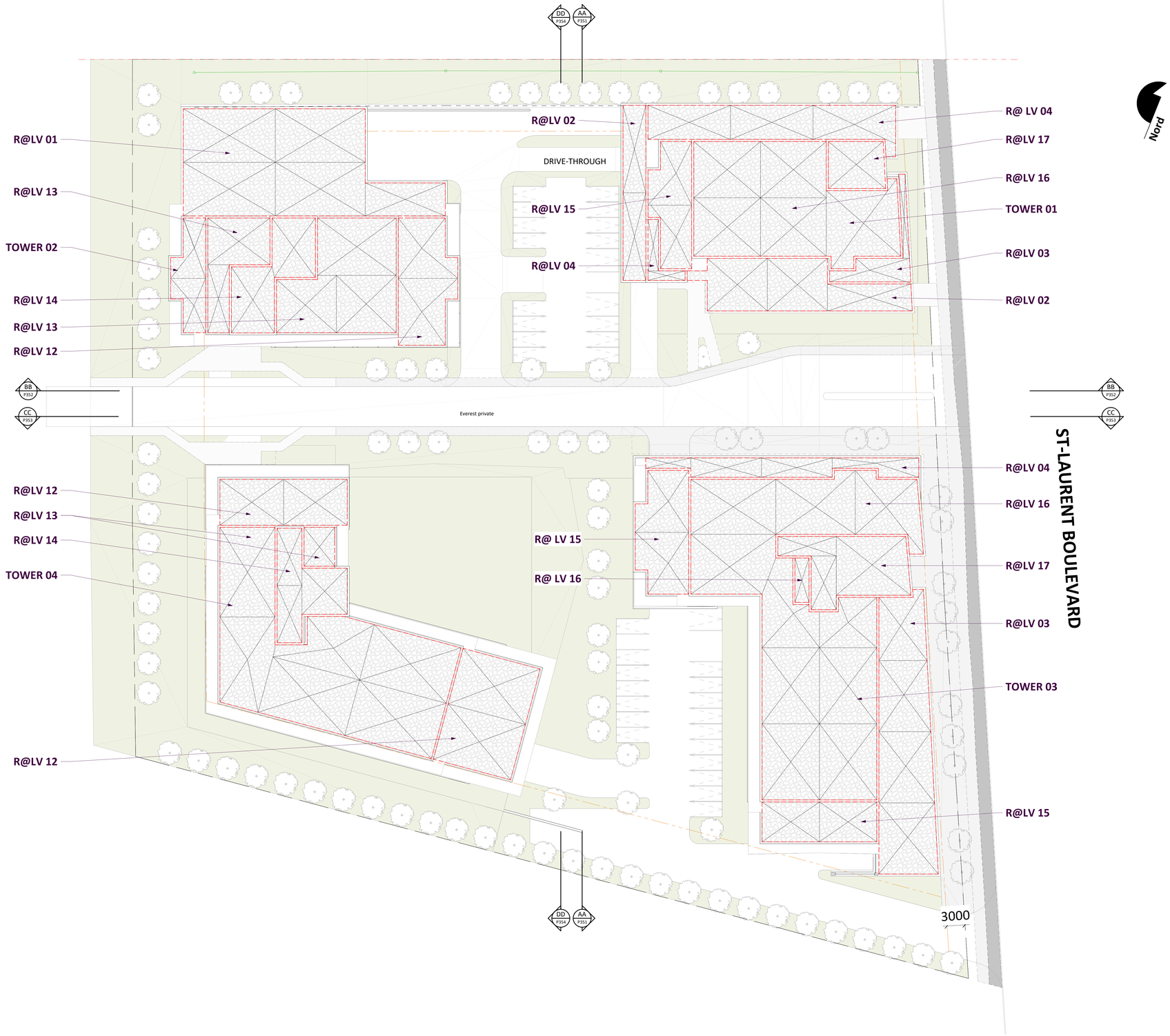
Site Grading Plan DWG No. C200 (Provided Separately)

Erosion and Sediment Control Plan DWG N0. C300 (Provided Separately)

Post-Development Storm Drainage Area Plan DWG No. C400 (Provided Separately)

Sanitary Drainage Area Plan DWG No. C500 (Provided Separately)

Standard Details Sheet No. C600 (Provided Separately)



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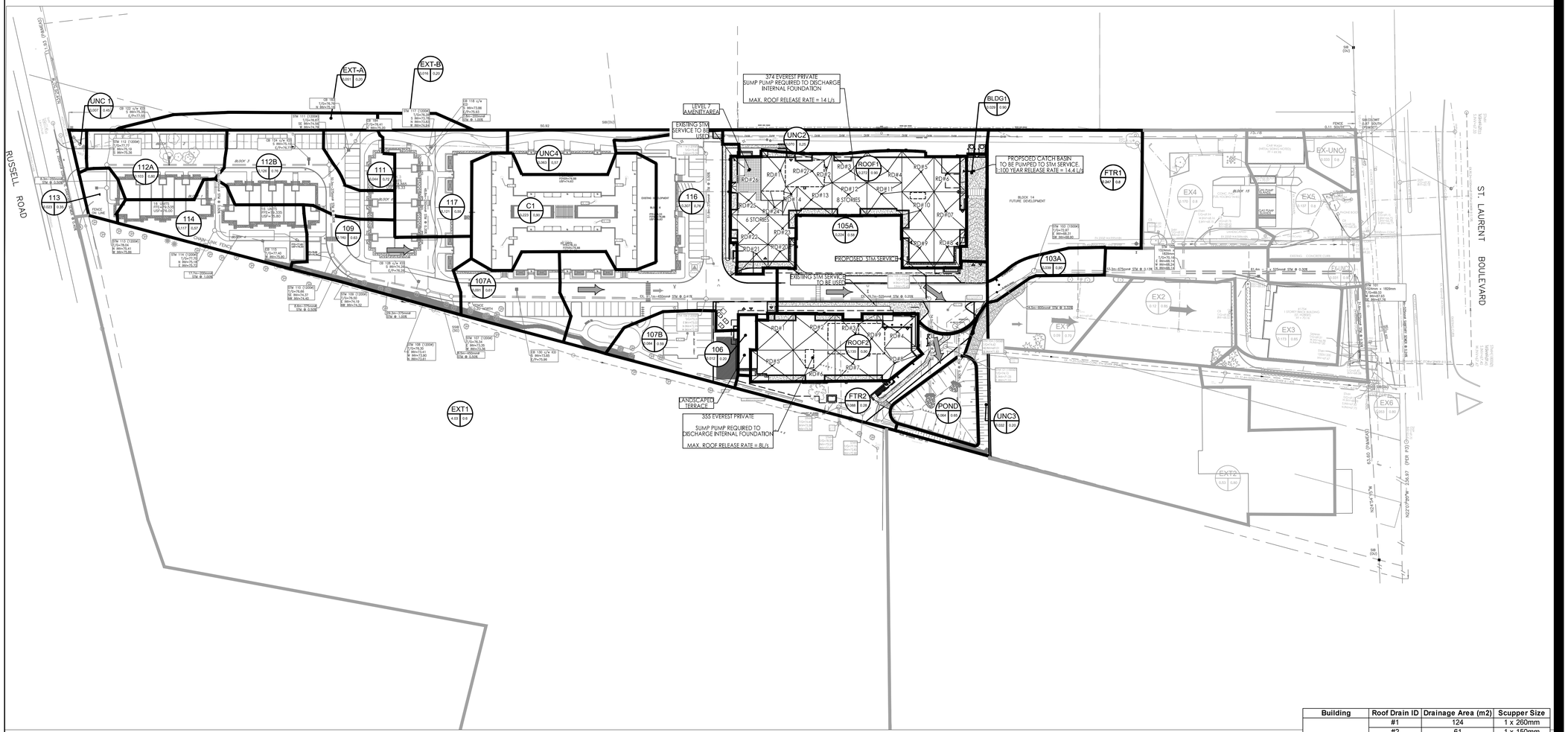
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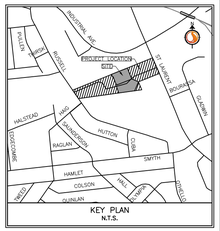
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1 : 250	2021-06-18	FLOOR PLAN - LEVEL ROOFTOP	P205





Building	Roof Drain ID	Drainage Area (m2)	Scupper Size
374 Everest Private	#1	124	1 x 260mm
	#2	61	1 x 150mm
	#3	130	1 x 318mm
	#4	139	1 x 342mm
	#5	160	1 x 391mm
	#6	147	1 x 352mm
	#7	159	1 x 386mm
	#8	142	1 x 342mm
	#9	155	1 x 376mm
	#10	154	1 x 338mm
	#11	145	1 x 357mm
	#12	143	1 x 357mm
	#13	130	1 x 564mm
	#14	49	-
	#20	81	1 x 198mm
	#21	113	1 x 270mm
	#22	142	1 x 342mm
	#23	104	1 x 352mm
	#24	54	-
	#25	126	1 x 304mm
	#26	113	1 x 323mm
	#27	132	1 x 256mm

Building	Roof Drain ID	Drainage Area (m2)	Scupper Size
355 Everest Private	#1	151	1 x 386mm
	#2	193	1 x 477mm
	#3	117	1 x 289mm
	#4	158	1 x 386mm
	#5	174	1 x 415mm
	#6	171	1 x 376mm
	#7	162	1 x 395mm
	#8	129	1 x 309mm
	#9	101	1 x 231mm

SCHEDULE OF ROOF RELEASE RATES

BUILDING	DRAIN TYPE	# DRAINS	100YR Head (m)	100YR RELEASE RATE (L/s)	DRAWDOWN TIME (hrs)	AVAILABLE STORAGE (m3)
355 EVEREST PRIVATE	WATTS ACCUTROL (25% OPEN)	9	0.143	8	1.7	54.0
374 EVEREST PRIVATE	WATTS ACCUTROL (11 DRAINS 25% OPEN, 11 DRAINS CLOSED)	22	0.147	14	2.2	108.8

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Legend

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- AREA ID
- RUNOFF COEFFICIENT
- STORM DRAINAGE AREA ha.
- STORM DRAINAGE BOUNDARY
- MAXIMUM PONDING LIMITS
- DIRECTION OF OVERLAND FLOW
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED DITCH INLET CATCHBASIN
- PROPOSED DOUBLE CATCH BASIN
- PROPOSED SUB DRAIN CATCH BASIN AS PER CITY OF OTTAWA STANDARD DETAIL DRAWINGS L10 AND L11.
- PROPOSED PERFORATED SUBDRAIN
- EXISTING STORM SEWER
- EXISTING CATCHBASIN MANHOLE
- EXISTING CATCHBASIN
- EXISTING SUBDRAIN CATCHBASIN
- EXISTING SWALE
- ROOF DRAINAGE AREA

8	ISSUED FOR CITY REVIEW	JP	KS	21.05.28
7	ISSUED FOR REVIEW	JP	KS	21.04.09
6	ISSUED FOR COORDINATION	JP	KS	21.03.04
5	ISSUED FOR COORDINATION	JP	KS	20.11.25
4	REVISED AS PER CITY COMMENTS	JP	SG	20.05.28
3	REVISED AS PER CITY COMMENTS	JP	SG	20.04.24
2	REVISED AS PER CITY COMMENTS	JP	SG	20.01.30
1	ISSUED TO CITY FOR SPA	JP	SG	19.07.18
Revision		By	Appd.	YY.MM.DD
File Name: 160401493-DB		JP Dwn.	SG Chkd.	JP 19.05.05 Dsgn. YY.MM.DD

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Brian Thomas

Client/Project
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768, BOUL. ST-JOSEPH, SUITE 100, GATINEAU (QUEBEC) CANADA, J8Y 4B8

355 & 374 EVEREST PRIVATE

OTTAWA, ON

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Drawing No. SD-1

Sheet 7 of 8

Revision 8

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