MORRISON HERSHFIELD

Site Servicing and Stormwater Management Design Brief

Gladstone Village, Phase 1

933 Gladstone Avenue – Phase 1

Ottawa, Ontario

Presented to:

Diamond Schmitt Architects and KWC Architects in Joint Venture for Ottawa Community Housing

Project: 210101900

Revision 1
March 9th, 2022

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1 Introduction

1.1 Site Description and Proposed Development

This report presents the site servicing and stormwater management design for a proposed residential complex consisting of two high-rise towers with a shared podium. The proposed development will include approximately 335 units as well as various amenity spaces for residents and two commercial ground floor units.

The ground floor of the building will be provided with pedestrian access from all sides as well as from a central courtyard. The courtyard will be accessed from a new Right-of-Way, currently described as ‘Street A’. One level of underground parking will be provided. Vehicles will access the parking from Street A, via a ramp off the courtyard.

The overall building layout is described in greater detail in the *Planning Rationale and Design Brief, Fotenn/Diamond Schmitt/KWC Architects*.

The development will occupy Block 6 within Ottawa Community Housing’s Gladstone Village subdivision. The Plan of Subdivision for Gladstone Village is currently under review by the City (application number D07-16-21-0022).

The existing infrastructure is described in **Section 1.4** below.

The 0.64 ha site was formerly occupied by a federal government warehouse and parking lot. Following demolition in 2015, the area occupied by the warehouse was reinstated with grass. The site is currently graded with a gentle slope (approximately 0.5%) towards the north and east. A drainage swale exits the northeastern edge of the site and is ultimately collected by the storm sewer in Plouffe Park and/or combined sewer on Oak Street.

Proposed grading and servicing for the site is shown on the drawings included in **Appendix A**.

The format of this report matches that of the development servicing study checklist found in Section 4 of the City of Ottawa’s Servicing Study Guidelines for Development Applications. A completed copy of the checklist is provided in **Appendix H**.

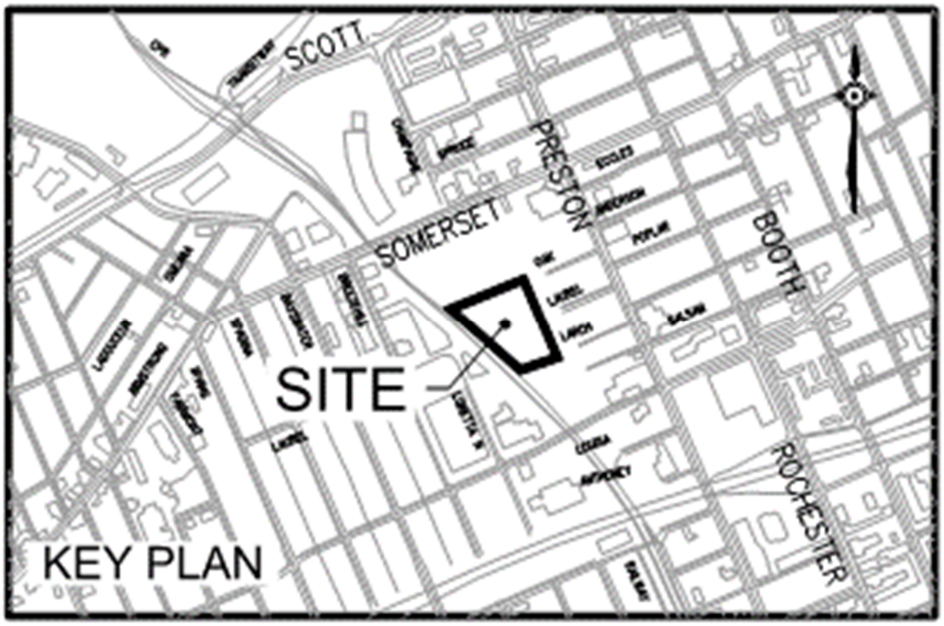
1.1.1 Statement of Objectives and Servicing Criteria

The objective of this Site Servicing and Stormwater Management Design Brief is to demonstrate that the proposed design is consistent with the servicing requirements laid out in the *Functional Servicing Report Gladstone Village, 933 Gladstone Avenue – April 15th, 2021,* prepared by Stantec Consulting Inc., while adhering to the appropriate City of Ottawa design guidelines, and applicable regulatory requirements. Relevant excerpts of the Functional Servicing Report are included in **Appendix E**.

1.1.2 Location Map and Plan

The location of the site is illustrated in **Figure 1**. A detailed site layout is provided within the drawings in **Appendix A**.

Figure 1 Key Plan



The site comprises Block 6 of the Gladstone Village subdivision. This parcel is owned by Ottawa Community Housing Corporation.

1.2 Background Documents

A Topographic Survey has been completed and is included in **Appendix G**.

1.3 Consultation and Permits

1.3.1 Pre-consultation Meeting and Functional Servicing Report

A pre-consultation meeting was held with representatives of the City of Ottawa and the consultant design team on June 29th, 2021. The City provided follow-up notes included site-specific stormwater management design criteria. Key requirements are listed in **Table 1** below.

As described in **Section 1.1.1** a Functional Servicing Report has been prepared for the overall development. It is understood that extensive consultation with the City's Planning Infrastructure & Economic Development Department and Asset Management Branch took place during preparation of the Functional Servicing Report. Site-specific design criteria identified by the Functional Servicing Report are also indicated in **Table 1**. Where these differ from the pre-consultation notes, the table indicates the criteria used and rational for this choice.

Table 1– Selection of Design Criteria

Design Criteria indicated by pre-consultation notes	Design Criteria adopted by Functional Servicing Report	Design Criteria Used	Rationale
Provide on-site storm water detention to limit flow to receiving combined sewer during 100-year event to 2-year pre-development peak flow, less peak sanitary flow.	Provide on-site storm water detention to limit flow to receiving storm sewer during 100-year event to 2-year pre-development peak flow.	Functional Servicing Report	Subdivision will be serviced by separate storm and sanitary sewers.
Runoff coefficient (C) for calculation of release rate to be determined as per existing conditions but in no case more than 0.40	Runoff coefficient (C) for calculation of release rate to be determined as per existing conditions but in no case more than 0.60	Functional Servicing Report	Pre-development Run-off Coefficient of 0.60 is in accordance with the Nepean SWM model.
Time of concentration (TC) to be 20 minutes or calculated. TC not to be less than 10 minutes.	Minimum TC of 10 minutes used for target release rate calculations based on previous development conditions (2014).	Both	Time of Concentration is calculated, to a minimum of 10 minutes
Maximum ponding on the public and private roadways and parking lot surfaces during 1:100 year storm event = 350mm max.	N/A	City of Ottawa	-

All other design requirements are discussed in further detail elsewhere in the report. The complete engineering pre-consultation notes can be found in **Appendix B**.

1.3.2 Adherence to Zoning and Related Requirements

The site is currently zoned Mixed Use Centre Zone, Floor Space Index Maximum 1.5. Rezoning to Mixed Use Centre, Subzone 17 is in process.

1.4 Available Existing Infrastructure

Sewer and watermain mapping collected from the City of Ottawa indicates that the following services exist in and surrounding the subject site:

North

- 400mm diameter watermain (material unknown)

<u>East</u>

- No watermains or sewers immediately east of the site

<u>South</u>

- 1200mm diameter Conc. combined sewer
- 1350mm diameter Conc. storm sewer

<u>West</u>

- No watermains or sewers immediately west of the site

<u>Within the site</u>

- 1200mm diameter Conc. combined sewer (flowing South to North)
- 1350mm diameter Conc. storm sewer (flowing South to North)
- 200mm diameter watermain (material unknown)

Figure 2 illustrates the location of existing infrastructure.

The existing watermains and sewers within the site will be relocated to the north and east of the site under a separate contract (refer to Functional Servicing Report). These relocations will be completed prior to construction of the development that is the subject of the current Site Plan application.

Figure 2 GeoOttawa Infrastructure Excerpt

Existing watermains and sewers (and proposed relocations) are shown in detail in Plan C001 found in **Appendix A.** Proposed relocations for the sewers and watermains are shown included in Plan C001 as well as the Functional Servicing Report (**Appendix E**).

2 Geotechnical Study

A Geotechnical Investigation was undertaken by Golder and is documented in Report No. 21490294 February, 2022.

Six boreholes were drilled to a depths varying between 5m and 14m below the existing ground surface. The subsurface profiles consist primarily of topsoil underlain by a fill layer to approximately 0.9 to 1.4 m depth. The fill is variable in nature and consists of sand with varying amounts of silt and sand. The fill was underlain by approximately 3.6m deposits of silty sand and silty clay underlain by 3.5m of sand. Bedrock depth vary between 6.1m – 9.8m below grade. A similar profile is shown where asphalt is present.

3 Based on available geological mapping, the subject site is located in an area where the bedrock consists of interbedded limestone and shale of the Verulam formation. Groundwater was encountered at depths of 3.5-5.5 m below the existing ground surface, although one borehole showed groundwater only 2m below grade. The geotechnical report provides recommendations for excavation, backfill, pavement structure and pipe bedding and backfill. Water Services

3.1 Design Criteria

The water service has been designed in accordance with the 2010 City of Ottawa Water Design Guidelines (and technical bulletins) as well as MECP Design Guidelines for Drinking Water Systems. The proposed development lies within the City of Ottawa 1W pressure zone as shown by the Pressure Zone map in **Appendix C.**

The Site will be serviced from the relocated 200 mm diameter watermain that passes directly through the site. The main supply will be connected to the following existing water services:

1. A 406mm watermain that runs north south from Somerset Avenue
2. A 200mm watermain that services Oak Street
3. A 200mm watermain that services Gladstone Avenue

The Functional Servicing Report has shown that there is sufficient pressure to meet the pressure requirements at any given parcel within the sub-division. The calculations below use the boundary pressure of the 406mm watermain north of the site while including pressure loss along its length to the proposed servicing location (indicated in **Appendix A**). The pressure at the service location, less the loss to the building, was used to show the systems pressure adequacy under the conditions outlined below.

Table 2 summarizes the parameters used to estimate water demands, assess adequacy of service, and design the proposed watermains:

Table 2– Summary of Water Demand Parameters

Design Parameter	Design Criteria
Water Demand Parameter	
Residential Average Daily Demand	350 l/person/day

Residential Max. Daily Peaking Factor	City of Ottawa Water Design Guidelines Table 4.2 - residential
Residential Max. Hourly Peaking Factor	City of Ottawa Water Design Guidelines Table 4.2 - residential
Fire Flow	Ottawa Design Guidelines (2010 incl. Technical Bulletins) and the Fire Underwriters Survey (1999)
Watermain Design Criteria	
Minimum Depth of Cover	2.4m from top of watermain to finished grade unless insulated
Adequacy of Service Criteria	
Desired pressure range during normal operating conditions	350kPa and 480kPa
Min. pressure during normal operating conditions	275kPa
Max. pressure during normal operating conditions	552kPa
Min. pressure during maximum hourly demand	276kPa
Min. pressure during maximum daily demand + fire flow	140kPa

Table 3 summarizes the water demand/fire flow for the development based on the **Ottawa Design Guidelines (2010 incl. Technical Bulletins)** and the **Fire Underwriters Survey (1999)**:

Table 3– Summary of Water Demand Calculations

Design Parameter	Water Demand
Residential Average Daily Demand	2.3 L/s (200 m³/d)
Residential Max. Daily Demand	5.8 L/s
Residential Max. Hourly Demand	12.8 L/s
Fire Flow	283.3L/s (17,000 L/min)

Domestic and fire flow calculations are provided in **Appendix C**. Supporting correspondence from the Architect is also provided in **Appendix C**.

3.2 Adequacy of Supply for Domestic and Fire Flows

The building will be serviced from the relocated 200 mm diameter watermain. The drop in pressure from the boundary condition location and the service location has been included in the calculations below. The pressure drop in the proposed building service from the 200 mm watermain is also included in the results summarized in the following table.

Table 4– Summarization of Water Servicing Design Parameters/Calculation Results

	Scenario			Source of Data
	Max Day + Fire	**Max Hourly**	**Max Day**	
Flow Demand (L/s)	289.2	5.8	12.8	Calculated
Boundary Condition[1]: Available Pressure under proposed demand (kPa)[2]	454.3	454.3	454.3	Provided by Functional Servicing Report (minimum HGL)
Residual Pressure at Service Tee including losses in 200mm diameter pipe (kPa)	332	454.3	454.3	Calculated
Residual Pressure at Service Entry including pipe losses (200mm diameter pipe) (kPa)	288.2	454.2	454.2	Calculated
Minimum Allowable Pressure (kPa)	140.0	275.0	345.0	City of Ottawa Water Design Guidelines

[1]Boundary conditions per Functional Servicing Report, pressure immediately north of site selected (See **Appendix C**)

[2]The City of Ottawa Boundary Conditions minus finished floor elevation (60.65m) of the proposed building.

Considering the calculated fire flow, and anticipated large fire pump capacity, 200 mmm diameter service connections are proposed to avoid excessive velocities and head losses.

A domestic water pump will be required due to the height of the building.

The following table indicates the minimum number of hydrants within 150m of the building that will be required to satisfy the fire flow (calculated by the FUS method).

Table 5 – Available Fire Flow from Hydrants

Fire Flow Demand (L/min)	**Fire Hydrant(s) within 75m**	**Fire Hydrant(s) within 150m**	**Combined Hydrant Capacity** (L/min.)
17,000	2	2	19,000

Table 5 is based on the minimum number of hydrants expected to be present to meet hydrant spacing standards (i.e. maximum spacing of 90 m).

Morrison Hershfield will coordinate with the sub-division design engineer to ensure that at least one additional hydrant is located within 45m of the proposed fire department connection, which is located immediately adjacent to the main building entrance.

3.3 Check of High Pressures

The site is within Pressure Zone 1W, which operates at a maximum head of 115 m (City of Ottawa Water Master Plan, 2013). This would result in a maximum pressure above the finished floor elevation of approximately 533kPa, which falls under the maximum 552kPa defined in the guidelines.

3.4 Reliability Requirements

Because the average demand exceeds 50 m^3/d, dual service connections will be provided to the building to avoid the creation of a vulnerable service area. An isolation valve will be installed on the 200 mm watermain between the two service connections, to enable supply from either direction.

3.5 Summary and Conclusions

The proposed building will be serviced by dual 200 mm diameter water services connected to the relocated 200mm diameter watermain east of the proposed building.

4 Sanitary Servicing

4.1 Background and Existing Infrastructure

The sanitary service will be designed in accordance with the 2012 Ottawa City Sewer Design Guidelines and technical bulletins. Existing municipal sanitary sewers are described in detail in **Section 1.4**. The site will be serviced by separated storm and sanitary sewers.

4.2 Proposed Servicing and Calculations

The site cannot be serviced directly to Street A because the service connection would conflict with the relocated 1650 mm diameter storm sewer. Sanitary servicing will therefore be to a 20 m length of 200 mm sanitary sewer proposed within Block 5 to the south of the site and included in the subdivision servicing plan. This sanitary sewer connects to the 1500 mm combined sewer in Street A at a proposed maintenance hole, enabling it to cross above the 1650 mm diameter storm sewer.

The development will require a 200 mm diameter PVC sanitary service. This service will extend from the south side of the building to connect to the upstream maintenance hole of the 200 mm diameter sanitary sewer in Block 5.

The sanitary servicing design parameters are summarized in **Table 6**.

Table 6– Summary of Sanitary Servicing Design Parameters

Design Parameter	Value
Occupancy	573 persons
Per capita flow	280 l/c/d
Commercial per GFA flow	28,000 L/ha/d
Commercial Peaking Factor	1.5 if commercial contribution>20%, else 1.0
Infiltration and Inflow Allowance	0.33 L/ha/s
Sanitary Sewer Sizing Based on the Manning's Equation	$Q = \frac{1}{n}\pi A R^{2/3} S^{1/2}$
Manning's Coefficient 'n'	0.013
Minimum Depth of Cover	2.5m from obvert of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
As per Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012 incl. all Tech. Bulletins as of September 2021.	

The site will produce a sanitary flow of **6.9 L/s** as determined in accordance with the City of Ottawa 2012 Sewer Design Guidelines. The proposed 200mm PVC service lateral (at 1% slope) has a maximum capacity of 32.8 L/s. This is sufficient for the calculated sanitary flow.

Full calculations are provided in **Appendix D**.

4.2.1 Sanitary Sewer System & Backflow Prevention

The receiving 200 mm sanitary sewer in Block 5 and 1500 mm combined sewer in Street A have sufficient capacity accommodate this calculated flow (refer to the Functional Servicing Report, **Appendix E**). Based on the evaluation of the combined sewer, recommendations for backflow preventors on all sanitary services is recommended throughout the development. A backflow preventor will be included as part of the mechanical system within the building.

4.3 Summary and Conclusions

The development will be serviced by a 200 mm sanitary connection to a sanitary sewer in Block 5. This arrangement meets all applicable sanitary servicing design criteria.

5 Storm Servicing and Stormwater Management

5.1 Background

The majority of the site presently drains overland to the east into a swale that continues east towards Oak Street. Stormwater then enters catchbasins in this area and drains via the City storm sewer and/or combined sewer network.

The City of Ottawa's Sewer Design Guidelines require the 100-year post-development storm flow to be restricted to the 2-year pre-development run-off. The Functional Servicing Report has determined that the pre-development run-off coefficient should be taken as 0.6 to correspond to the City's previous analysis of the trunk sewer system (Nepean SWM Model).

5.2 Storm Servicing Strategy including analysis of Existing Infrastructure

The 100-year post-development flow is required to be restricted to the 2-year pre-development run-off, with excess run-off from all events greater than the 2-year and up to the 100-year flow to be detained on site. This will significantly reduce flows to the storm sewers during storms exceeding the 2-year event and will also reduce overland flows and associated flooding risks.

Because the underground parking garage will extend to the property lines, no new storm sewers will be installed as part of the development. Other than a narrow strip of landscaping between the podium and property line, all run-off will be collected through roof drains and area drains connected to internal plumbing. The storm lateral will be sized with 5-year capacity in accordance with City requirements.

Quantity control meeting these requirements will be provided through the use of on-site detention and flow control devices. All quantity control requirements are proposed to be met through the use of controlled flow roof drains and a stormwater detention tank.

During design development, opportunities to utilize low impact development technologies were explored. No suitable opportunities were found due to the underground parking garage extending to the property lines. Budget constraints for this community housing development precluded the installation of a green roof.

5.3 Proposed Storm Servicing

Proposed storm servicing is indicated on Drawing C001 in **Appendix A**. The proposed pre-development and post-development catchment areas, runoff coefficients and catchment total areas are indicated on the Drainage Area Plans, also in **Appendix A**.

5.3.1 Design Criteria (Minor and Major Systems)

For the design of stormwater management (SWM), the City of Ottawa's criteria for a Commercial/ Institutional/ Industrial development in an existing area will be applied (Section 8.3.7.3 of the City of Ottawa Sewer Design Guidelines), except where modified as described in the following summary of the SWM design criteria:

- On-site SWM measures required to avoid impact on downstream system (i.e. existing storm sewers).
- Runoff to be controlled to the 2-year pre-development level.
- Pre-development flow to be calculated using the smaller of a runoff coefficient of 0.6 or the actual existing runoff coefficient. Use either a T_c of 20 minutes or calculated the pre-development T_c but not less than 10 minutes.
- All flow depths must be controlled on-site (i.e. no spill to adjacent properties or rights-of-way for flows up to the 100-year event).
- The design should consider the 100-year return period event.

Relevant drainage design requirements from the City of Ottawa Sewer Design Guidelines include:

- For events greater than the 100 year return period, spillage is directed to a public ROW and not to neighbouring private property.
- The site grading ensures that the property being developed is higher than the spill elevation of the adjacent municipal ROW. This is considered especially critical because underground parking is proposed. The grading ensures sufficient positive drainage away from the building, with a minimum slope from the building to the street of 2% and building openings a minimum of 0.3m above the 100-year ponding level.

- The maximum water depth on streets (public, private and parking lots), static or dynamic, is 350 mm.
- Where underground storage is utilized, the design must ensure that backwater from the downstream system does not impact the required storage.

In addition to the City of Ottawa's guidelines, requirements for storm water quality control will be considered. The Rideau Valley Conservation Authority (RVCA) has been contacted and confirmed that on-site stormwater quality control for this site will not be required as the site has less than 3 at grade parking spots draining to the stormwater system. The correspondence is included as part of **Appendix B**.

5.3.2 Stormwater Quantity Control & Runoff Coefficient and Peak Flows

Table 7 indicates the run-off coefficient for the site. The 100-year run-off coefficients include a 25% increase (to a maximum of 1.0) as required by the City of Ottawa Sewer Design Guidelines Section 5.4.5.2.1.

Table 7– Pre-development Run-off Coefficients

	Pre-Development Run-off Coefficients	
Storm Event	**2-Year Storm**	**100-Year Storm**
Site Area (in ha)	0.64	0.64
Run-off Coefficients	0.60	0.75

Intensity (i) is calculated using the formula:

$$i = \frac{A}{(T_d + C)^B}$$

Where A, B and C are all factors of the IDF Return Period, T_d being the time of concentration and A the drainage area (Detailed calculations provided in **Appendix F**).

Time of concentration is determined using the inlet time graph (Appendix 5D Ottawa City Sewer Design Guidelines) which results in a value of 10 minutes. Therefore 10 minutes will be used to calculate peak flows. With the pre- and post-development run-off coefficients and rainfall intensity, the peak flows for each drainage area can be calculated using the Rational Method. The results (using actual run-off coefficients) are summarized in **Table 8**.

Table 8– Pre-Development Peak Flows

	Pre-Development Peak Flows (actual run-off coefficients)	
Storm Event	**2-Year Storm**	**100-Year Storm**
Intensity (mm/hr)	76.8	178.6
Peak Flow (L/s)	82.0	238.3

Considering time of concentration of 10 minutes, site area of 0.64 hectares and a 2-year storm, **the allowable release rate is 82.0 L/s**.

The project will result in an increase in impervious area. The post-development run-off coefficients are indicated in **Table 9**:

Table 9– Overall Post-Development Run-off Coefficients

	Overall Post-Development Run-off Coefficients	
Storm Event	**2-Year Storm**	**100-Year Storm**
Project Area (in ha)	0.64	0.64
Weighted Run-Off Coefficient	**0.85**	**1.00**

5.3.3 Stormwater Management Concept

Uncontrolled Drainage Areas (B1-B3)

It is not feasible to capture run-off from the landscaped strip (including patios) between the property line and podium (Area B1&B2) as well as a green space located northwest of the site (B3). This run-off will be released uncontrolled to the adjacent public ROW/multi-use pathways surrounding the site. These areas will be graded to direct the run-off to appropriate outlets.

Table 10– Post-Development Uncontrolled Release

	Post-Development Uncontrolled Release	
Storm Event	**2-Year Storm**	**100-Year Storm**
Drainage area (ha)	0.14	0.14
Run-off Coefficient	0.65	0.83
Peak Flow (L/s)	20.2	59.6

This leaves a remaining allowable release rate of **22.4 L/s**.

Controlled Drainage Areas A1, A2, A3

The drainage from the roof (A1), as well as the courtyard area on the east side of the site (A2) and the building frontage to the north (A3) will be captured and directed to a stormwater cistern located in the underground parking level. A portion of the unoccupiable roof will be controlled via controlled flow roof drains so as to reduce the peak flow into the cistern. The courtyard will drain via area drains directly into the parking level plumbing and thereafter to the stormwater cistern. The tank will outlet via an Inlet Control Device (ICD). Downstream of the ICD the storm service will outlet to the proposed storm sewer.

As indicated by the proposed storage calculations, the required cistern size is 212.9m³. This will be provided using a rectangular concrete cistern located in the parking level. A detailed drawing for the cistern is provided in in the set of plans in **Appendix A**. The tank will be specified to be watertight with maintenance access that meeting Ontario Building Code requirements for stormwater cisterns.

The base of the tank will be sloped at 2% for drainage. An overflow pipe sized for the 5-year storm will be installed, with the inlet set at the 100-year water level.

Based on the orifice calculation, the outlet will require a Hydrovex 100VHV-1 Vortex ICD, providing a maximum release rate of 11.2 L/s during the 100-year event.

The tank will be designed such that the tank volume is based on the 100-year storm event, and therefore the 100-year HWL is approximately at the top of the tank. The SWM calculations are provided in **Appendix F**.

Summary

Table 11 summarizes the proposed release rates and confirms that the total release rate does not exceed the allowable release rate.

Table 11 – Post-Development Controlled Peak Flows

	Post-Development Controlled Peak Flows (L/s)
Allowable Release Rate	82.0
Release Rate from Uncontrolled Drainage Areas	59.6
Release Rate from Controlled Flow Roof Drainage Areas (controlled downstream)	9.9
Total Release Rate from Controlled Drainage Areas	22.3
Total Release Rate	81.9

Table 12 summarizes the stormwater management measures for the proposed development.

Table 12 – Stormwater Management Summary Table

Area ID	Area (ha)	Release Rates (L/s)		Storage Required		Max Storage Available**		ICD
		2-Yr	100-Yr	2-Yr	100-Yr	2-Yr	100-Yr	Size
Controlled Flow Roof Drainage	0.25	3.97	9.95	11.75	35.47	84	84	Watts Model R1100 Accuflow Single Notch Roof Drains
A1+A2	0.50	8.46	22.30	110.2	212.87	220	220	HYDROVEX 100VHV-1

* This release rate represents the controlled flow that is captured in the cistern to be attenuated and released at the maximum allowable release rate as determined in **Appendix F**
**** Max storage available exceeds values, but remains unused.**

Impact on Existing Stormwater Infrastructure

Overall run-off from the site to the storm sewers will be significantly reduced by the proposed development:

Table 13 – Pre-Development Peak Flows vs. Post-Development Controlled Peak Flows

	Pre-Development Peak Flow (L/s)		Post-Development Peak Flow (L/s)	
Storm Event	**2-Year Storm**	**100-Year Storm**	**2-Year Storm**	**100-Year Storm**
Total run-off (L/s)	82.0	238.3	28.6	81.9

This shows a reduction in total run-off of 65% when compared to the uncontrolled pre-development peak flow.

Sewer Design Calculations and a summary of ICD and SWM results are provided in **Appendix F**.

Area Drain Capture Analysis

Proposed area drains are required to capture the 100-year flow, their inlet capacity is described below:

The highest 100-year flow to an area drain in the courtyard is at AD1 (22.4 L/s L/s). As indicated by Figure A in **Appendix F**, the ponding depth under this flow rate is 25 mm.

This is less than the 350 mm maximum allowable and is significantly less than the FFE which is 200mm higher than any area drain.

5.3.4 Receiving Capacity and Backwater Prevention

The outlet invert will be at 55.85 m, which is higher than the springline of the 1650 mm diameter receiving storm sewer at the connection location (55.53 m). From the correspondence included in the Functional Servicing Report) it is understood that the 1650 mm diameter storm sewer has capacity to receive the (controlled) flows from the site. Confirmation of the 5- and 100-year hydraulic grade lines (HGL) in this sewer will be obtained from Stantec/the City and added to this report. If higher than the cistern outlet, modifications to the cistern will be made as necessary. These could include raising the cistern, adding a backwater valve and enlarging the cistern, or adding a backwater valve and flow-through pump arrangement

5.3.5 Water Quality Control

As indicated in **Section 5.3.1** above, the Rideau Valley Conservation Authority (RVCA) has been contacted and confirmed that on-site stormwater quality control for this site will not be required as the site has less than 5 at grade parking spots draining to the storm water system.

5.3.6 Pre-Consultation with the Ontario Ministry of the Environment and Conservation and Parks, and Conservation Authority

The Ministry of Environment, Conservation and Parks (MECP) has been contacted and it is anticipated that no ECA will be required since the site meets the exemptions set out in O.Reg. 525/98. An ECA for the new and relocated sewers in Street A ad Block 5 will be obtained as part of the subdivision servicing project. Correspondence is provided in **Appendix B**.

5.3.7 Minor and Major Systems

The minor storm sewer system consists of the sewers described above. To the extent possible, the site will be graded to direct run-off from storms in excess of the 100-year event to Street A, from where flow can continue east towards the Oak Street. Further discussion is provided in **Section 5.4** below.

5.3.8 Impacts to Receiving Watercourses

No negative impacts to receiving watercourses are anticipated.

5.3.9 100 Year Flood Levels and Major Flow Routing

The site is not within a 100-year floodplain.

5.4 Grading

The proposed grading plan is shown in Drawing C003 in **Appendix A**. The key objectives of the proposed grading are as follows:

- Provide step-free access to ground floor at all entrances
- Provide a slope away from the building for drainage (minimum 2% to the curb)
- Prevent overland flow on adjacent public ROWs from entering the site
- Direct flows in excess of the 100-year event towards public ROWs, to the extent possible.

The frontage on all sides of the site, less the courtyard, is graded to allow run-off to drain off the site at a minimum of 2% slope towards adjacent properties. This uncontrolled run-off is captured in the stormwater management calculations in section 5.3.3.

5.5 Emergency Overland Flow

The site grading design provides emergency overland flow Street A to the east as well as the multi-use pathway to the west, which are designated as major system flow routes in the Functional Servicing Report **(Appendix E)**.

5.6 Fire Access Routes

Fire access will be provided from Street A up to the principal entrance. The proposed Siamese connection will be located within 15 meters of the principal entrance and will allow the emergency fire vehicle(s) direct access. Since the length of this route is less than 90m (the actual length is approximately 70m), no turnaround is required.

5.7 Erosion and Sediment Control

As described in the servicing guidelines, an erosion and sediment control plan is required for implementation during the construction phase. To minimize the migration of sediments, items such as silt fencing and sediment capture devices for catch-basins downstream of the site and around the building are to be installed to capture and retain sediment. Additionally, all stockpiles are to be covered.

During construction, all erosion control features shall be maintained and repaired as necessary and adjacent roadways kept free of construction debris and sediment this responsibility falls under the prevue of the Contractor.

6 Conclusions

In conclusion the proposed development meets all required servicing constraints and associated design criteria/requirements as well as the additional City of Ottawa/Functional Servicing Report requirements identified in the pre-consultation phase. It is recommended that this report be submitted to the City of Ottawa in support of the application for a Site Plan Agreement.

Sincerely,

Morrison Hershfield Limited

James Fookes, P.Eng., C.Eng.

Senior Municipal Engineer

Daniel Glauser, P.Eng.

Municipal Engineer

7 Appendices

Appendix A Site Servicing, Grading and Erosion and Sediment Control, Catchments Plans and Details
Appendix B MECP, RVCA and City of Ottawa Specific Requirements Correspondence
Appendix C Water Demand and FUS Calculations
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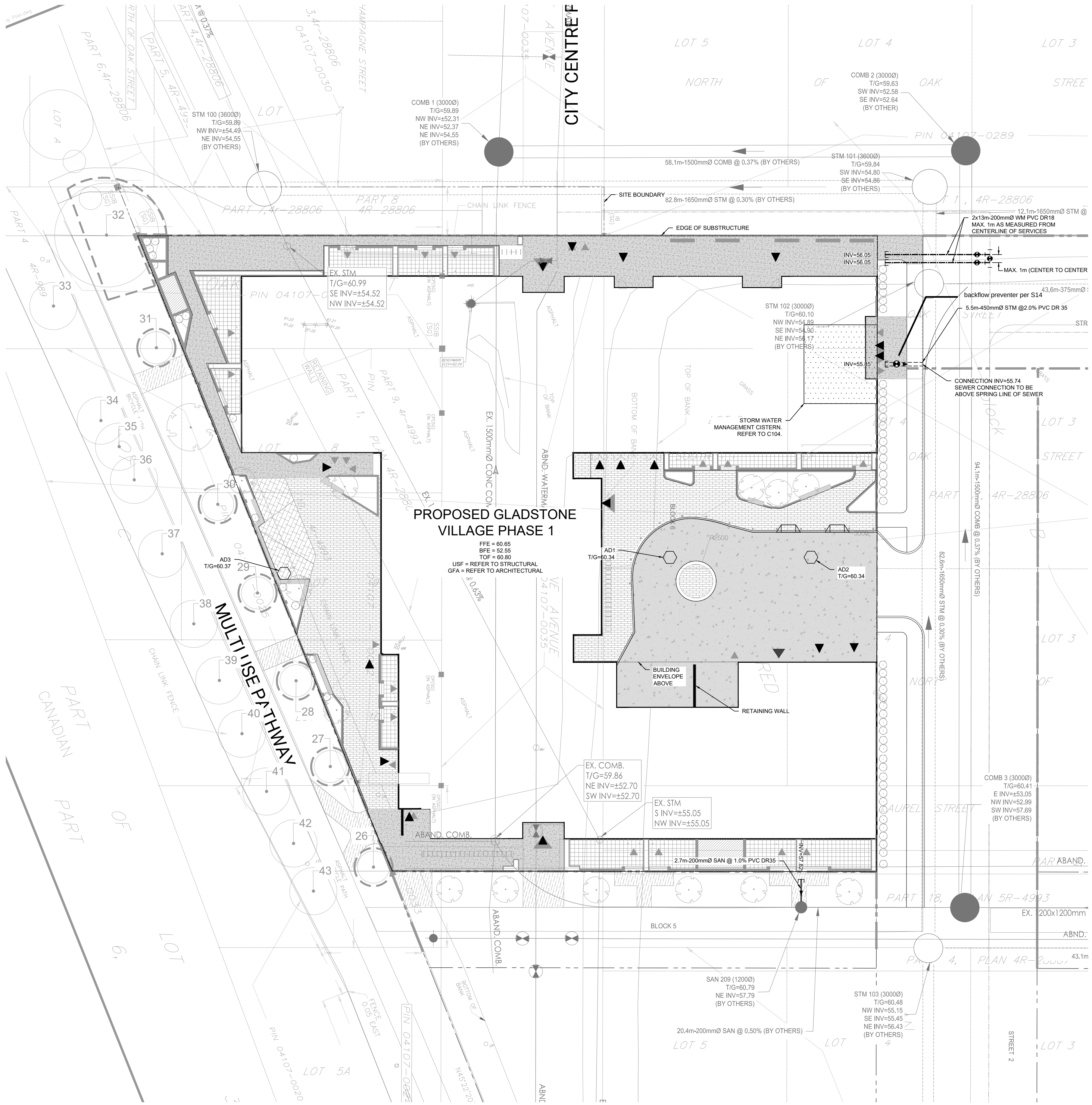
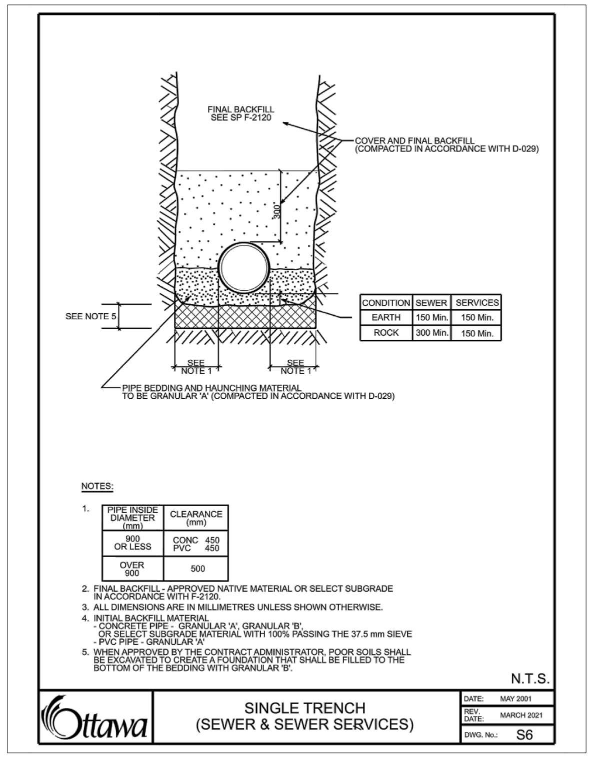
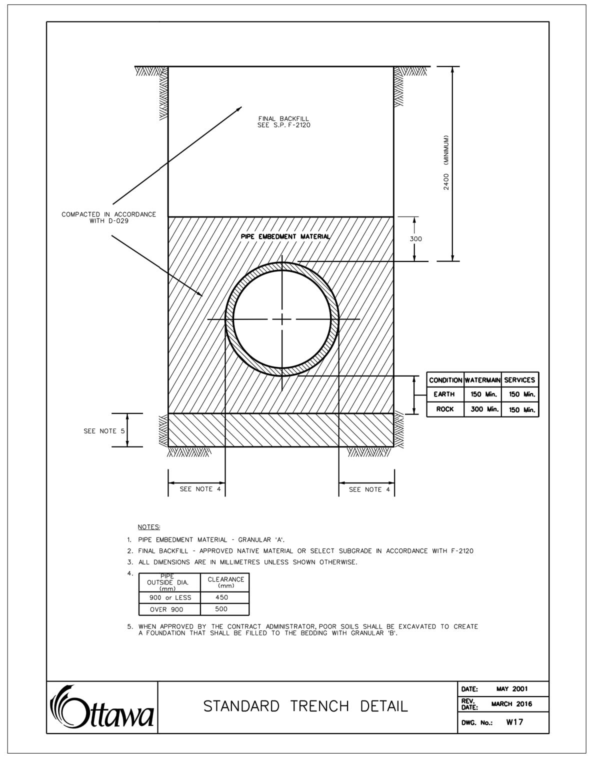
Appendix I Site Servicing Checklist

Appendix A

Site Servicing, Grading and Erosion and Sediment Control, Catchments Plans and Details







NOTES:

GENERAL

1. COORDINATES ARE IN MTM ZONE 9 (76°30' WEST LONGITUDE) NAD-83 (ORIGINAL)
2. SERVICES ARE TO BE CONSTRUCTED TO 1.0m FROM FACE OF BUILDING.
3. CONTRACTOR TO VERIFY ALL EXISTING UTILITY ELEVATIONS AT CONNECTION AND CROSSING LOCATIONS PRIOR TO CONSTRUCTION AND ADVISE THE ENGINEER OF ANY DISCREPANCIES.
4. UNLESS DIRECTED OTHERWISE ANY DAMAGED ASPHALT OR CURB (REGARDLESS OF WHETHER WITHIN OR EXTERNAL TO THE SITE) SHALL BE REINSTATED IN ACCORDANCE WITH CITY STD. DET. R10 AND S1.
5. UNLESS DIRECTED OTHERWISE THE CONTRACTOR SHALL REINSTATE ALL SIGNS, LIGHTING AND OTHER STREET FURNITURE DISTURBED BY THE WORK.
6. THE CONTRACTOR SHALL DEVELOP AND IMPLEMENT TRAFFIC MANAGEMENT PLANS FOR WORK IN RIGHT OF WAY IN ACCORDANCE WITH OTM BOOK 7.
7. CLAY SEALS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD DETAIL S8 AND SHALL BE INSTALLED AT 50m INTERVALS IN ALL PIPE TRENCHES. CLAY SEAL TO EXTEND FULL TRENCH WIDTH AND FROM BOTTOM OF TRENCH EXCAVATION TO UNDERSIDE OF ROAD STRUCTURE, WITH A MINIMUM THICKNESS OF 1m ALONG PIPE.
8. THE CONTRACTOR SHALL PROVIDE ANY TEMPORARY SERVICING NEEDED, AND SHALL ALSO COORDINATE WITH OTHER TRADES AS NECESSARY.
9. TOPOGRAPHICAL SURVEY PREPARED BY STANTEC DATED DEC 21, 2021.
10. MTM ZONE 9, NAD83(CSRS) (2010.0). COORDINATES TO URBAN ACCURACY PER SEC 14(2) OF O.REG. 216/10
    POINT - A (N 5029935.08, E 366271.64)
    POINT - B (N 5029672.68, E 366381.54)

SEWERS

11. ALL STORM SEWERS, SANITARY SEWERS AND CATCH BASINS LEADS SHALL BE PVC DR 35 UNLESS OTHERWISE SPECIFIED.
12. REFER TO DETAIL 1 ON DRAWING C004 FOR SEWER INSTALLATION.
13. CONTRACTOR SHALL MAINTAIN EXISTING SEWER FLOWS DURING ONSTRUCTION IN ACCORDANCE WITH CITY OF OTTAWA SPECIFICATIONS.
14. ALL MAINTENANCE HOLES, CATCHBASINS AND AREA DRAINS SHALL BE ADJUSTED TO POST-CONSTRUCTION GRADE.
15. LEAKAGE TEST (SANITARY SEWER ONLY) AND CCTV INSPECTION SHALL BE COMPLETED AS PER CITY OF OTTAWA SPECIFICATIONS PRIOR TO THE INSTALLATION OF BASE COURSE ASPHALT.
16. BACKWATER VALVES TO BE INSTALLED AS PER CITY OF OTTAWA STANDARD S14 & S14.2.

WATERMAINS

17. REFER TO DETAIL 2 ON DRAWING C003 FOR WATERMAIN INSTALLATION.
18. ALL WATERMAIN MATERIALS AND CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE CITY OF OTTAWA STANDARD SPECIFICATIONS AND STANDARD DRAWINGS. PVC PIPE TO BE CLASS 150 DR18 TO LATEST EDITION OF A.W.W.A. SPECIFICATION C900 AND CSA B137.3 LATEST AMENDMENT WITH GASKETED BELL AND SPIGOT COUPLINGS.
19. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A WATER PERMIT AS REQUIRED FROM THE CITY OF OTTAWA, AND COMPLYING WITH ALL CITY OF OTTAWA REQUIREMENTS. THE CITY MAY REQUIRE THAT CERTAIN ACTIVITIES (E.G. VALVE OPERATION, CONNECTION OF NEW WATER SERVICE TO EXISTING WATERMAIN, DISINFECTION) BE CARRIED OUT ONLY BY CITY FORCES.
20. ALL VALVES 300mm DIAMETER AND SMALLER SHALL INCLUDE A VALVE BOX AS PER W24.
21. THE NEW WATERMAIN IS TO BE INSTALLED WITH A MINIMUM OF 2.4m COVER (INCLUDING HYDRANT LEAD). WHERE 2.4m COVER IS NOT POSSIBLE, PROVIDE INSULATION IN ACCORDANCE WITH CITY OF OTTAWA STANDARD DETAILS W22 & W23.
22. THRUST RESTRAINT SHALL BE PROVIDED BY BOTH RESTRAINING/RETAINING RINGS AND THRUST BLOCKS AT ALL DEAD END CAPS, PLUGS, VALVES, BENDS AND REDUCERS AS PER CITY OF OTTAWA STANDARD DETAILS W25.3, W25.4, W25.5 AND W25.6. ALL TEMPORARY THRUST RESTRAINTS ARE THE RESPONSIBILITY OF THE CONTRACTOR.
23. TRACER WIRE SHALL BE PROVIDED FOR ALL NEW PVC WATERMAINS IN ACCORDANCE WITH THE SPECIFICATIONS AND CITY OF OTTAWA STANDARD DETAIL W36.
24. CATHODIC PROTECTION SHALL BE PROVIDED FOR ALL NEW WATERMAINS IN ACCORDANCE WITH THE SPECIFICATIONS AND CITY OF OTTAWA STANDARD DETAILS W39, W40, W41, W42 AND W47. CATHODIC PROTECTION OF EXISTING WATERMAINS SHALL ALSO BE PROVIDED AT CONNECTIONS BETWEEN EXISTING AND NEW WATERMAINS.
25. ADJUST ALL VALVE CHAMBERS, VALVE BOXES AND HYDRANTS TO FINISHED GRADE.
26. WATERMAIN SHUTDOWNS SHALL BE SCHEDULED A MINIMUM OF 72 HOURS IN ADVANCE

UTILITY NOTE

27. THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND ANDOVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWING,AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM. THE CONTRACTOR WILL BE RESPONSIBLE FOR SUPPORTING AND PROTECTING ANY EXISTING UTILITIES, AS REQUIRED, IN ACCORDANCE WITH THE UTILITY OWNERS' REQUIREMENTS. CONTRACTOR IS REQUIRED TO OBTAIN LOCATES, IN ADVANCE OF EXCAVATION WORK, AND FORWARD COPIES OF THE LOCATES TO THE CONSULTANT AND THE OWNER PRIOR TO EXCAVATION.
28. ALL CROSSING OF EX. UTILITIES TO BE IN ACCORDANCE WITH CITY STD. DET. S10

PIPE CROSSING TABLE		
1	200mmØ WM 0.25m CLEARANCE OVER 1650mmØ STM	WM INV=56.96, STM OBV=56.71
2	200mmØ WM 0.25m CLEARANCE OVER 1650mmØ STM	WM INV=56.96, STM OBV=56.71
3	200mmØ WM 0.25m CLEARANCE OVER 1500mmØ SAN	WM INV=54.61, STM OBV=54.36
4	200mmØ WM 1.26m CLEARANCE OVER 1500mmØ SAN	WM INV=54.61, STM OBV=54.36

LEGEND

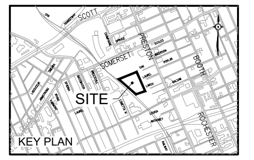
- NEW AREA DRAIN (REFER TO MECHANICAL FOR CONTINUATION)
- NEW STORM SEWER
- NEW SANITARY SEWER
- NEW WATERMAIN
- NEW WATER VALVE AND VALVE BOX (W24)
- EXISTING STORM MANHOLE BY OTHERS
- EXISTING SANITARY MANHOLE BY OTHERS
- EXISTING STORM SEWER BY OTHERS
- EXISTING SANITARY SEWER BY OTHERS
- EXISTING WATERMAIN BY OTHERS
- NEW ENTRANCE
- STORMWATER MANAGEMENT CISTERN
- SITE BOUNDARY
- EDGE OF SUBSTRUCTURE
- ENTRANCE OF PARKING GARAGE ACCESS RAMP

diamond schmitt

KWC

MORRISON HERSHFIELD

200-2932 BASELINE ROAD, OTTAWA, ON K2H 1B1



ISSUED

No.	Date	Description
1	2021 AUG 03	ISSUED FOR 100% SD
2	2021 SEP 08	ISSUED FOR SITE PLAN APPROVAL
3	2021 DEC 14	ISSUED FOR 100% DESIGN DEVELOPMENT
4	2022 FEB 18	ISSUED FOR 30% CD
5	2022 MAR 09	ISSUED FOR SITE PLAN RESUBMISSION

CONTRACTOR MUST CHECK & VERIFY ALL DIMENSIONS ON THE JOB.

DO NOT SCALE DRAWINGS.

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

GLADSTONE VILLAGE PHASE 1

933 Gladstone Avenue - Phase 1

211006

SITE SERVICING PLAN

Scale: 1:200

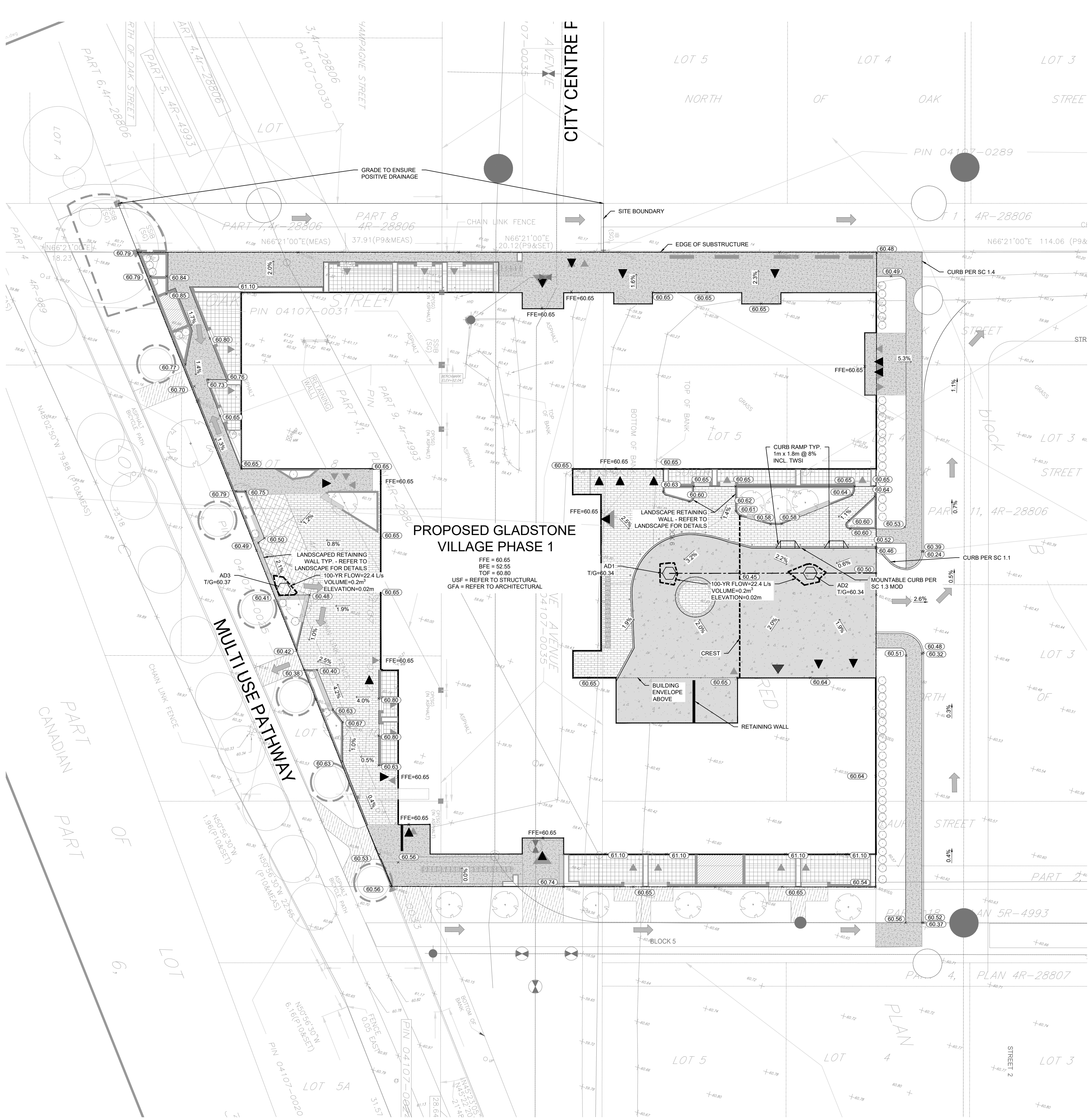
Project No: 210101900

Date: 09/03/22

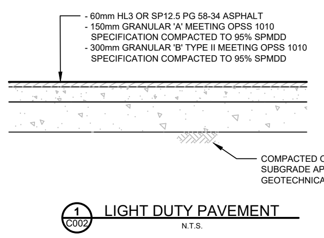
C001

D07-12-21-0149

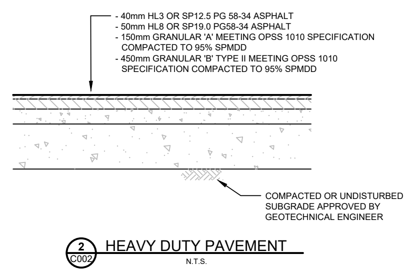
#18593



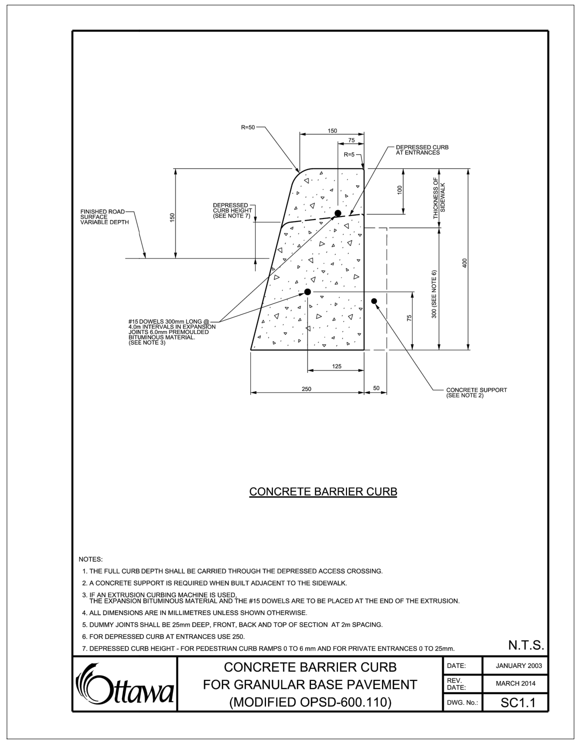
GRADING PLAN SPECIFIC DETAILS

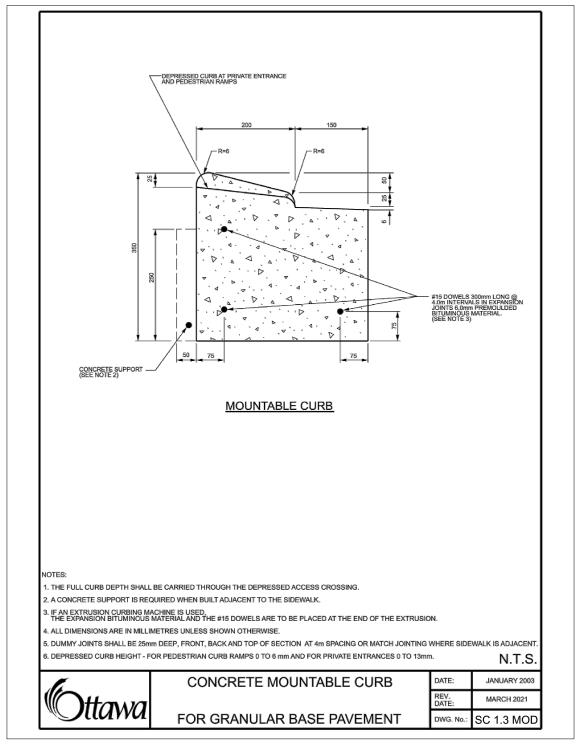


1 C002 LIGHT DUTY PAVEMENT
N.T.S.



2 C002 HEAVY DUTY PAVEMENT
N.T.S.





LEGEND

- NEW AREA DRAIN
- PROPOSED MANHOLE (SEPARATE CONTRACT)
- PROPOSED ELEVATION
- EXTRAPOLATED EXISTING ELEVATION
- PROPOSED SLOPE DIRECTION
- PROPOSED SLOPE DIRECTION (SUB-DIVISION)
- MAJOR OVERLAND FLOW PATH
- PAVERS - REFER TO LANDSCAPE
- LANDSCAPED ISLAND - REFER TO LANDSCAPE
- LIGHT DUTY CONCRETE - REFER TO LANDSCAPE
- HEAVY DUTY CONCRETE - REFER TO LANDSCAPE
- EXISTING ELEVATION
- EXISTING MANHOLE
- SPILL LINE

NOTES:
GRADING

1. ALL ELEVATIONS ARE GEODETIC AND IN METERS UNLESS OTHERWISE NOTED.
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS.
3. REFER TO ARCHITECTURAL AND LANDSCAPE DRAWINGS FOR LAYOUT,DIMENSIONS AND SURFACE FINISHES.
4. ALL ELEVATIONS BY CURBS ARE EDGE OF PAVEMENT UNLESS OTHERWISE INDICATED
5. REINSTATE ALL DISTURBED/DAMAGED AREAS TO THEIR ORIGINAL CONDITION OR BETTER.
6. PROVIDE POSITIVE DRAINAGE, MATCHING EXISTING OVERALL DRAINAGE PATTERN INDICATED.
7. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA AND/OR ONTARIO PROVINCIAL STANDARDS.
8. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED PAVED AREAS AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
9. SUBGRADE FOR THE PAVED AREAS SHALL BE PROOF ROLLED WITH A LARGE (10 TONNE MINIMUM) STEEL DRUM ROLLER UNDER DRY CONDITIONS. ANY SOFT AREAS EXPOSED FROM THE PROOF ROLLING SHOULD BE SUBEXCAVATED TO A DEPTH OF 500mm AND REPLACED WITH COMPACTED SUBGRADE FILL.
10. ALL AREAS SHALL DRAIN AT A MINIMUM OF 1%. ANY DISCREPANCIES PREVENTING THIS SHALL BE REPORTED TO THE ENGINEER PRIOR TO CONTINUING WORK.
11. BLEND NEW EARTHWORK INTO EXISTING, PROVIDING VERTICAL CURVES OR ROUNDING AT ALL TOP AND BOTTOM OF SLOPES.
12. CONCRETE SIDEWALKS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD DRAWING SC1.4 AND SC4.
13. CONCRETE BARRIER CURBS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD DRAWING SC1.1.
14. SAW CUT AND KEY GRIND ASPHALT AT ALL TIE-INS PER CITY OF OTTAWA STANDARD R10.
15. REINSTATE LINE PAINTING.
16. REFER TO GEOTECHNICAL INVESTIGATION REPORT PREPARED BY XXXX FOR SUBSURFACE CONDITONS, CONSTRUCTION RECOMMENDATIONS AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT SHALL REVIEW EXCAVATIONS PRIOR TO THE PLACEMENT OF GRANULAR MATERIAL.
17. THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWING, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM. THE CONTRACTOR WILL BE RESPONSIBLE FOR SUPPORTING AND PROTECTING ANY EXISTING UTILITIES, AS REQUIRED, IN ACCORDANCE WITH THE UTILITY OWNERS' REQUIREMENTS. CONTRACTOR IS REQUIRED TO OBTAIN LOCATES, IN ADVANCE OF EXCAVATION WORK, AND FORWARD COPIES OF THE LOCATES TO THE CONSULTANT AND THE OWNER PRIOR TO EXCAVATION. HAND EXCAVATION IS REQUIRED PER UTILITY OWNERS REQUIREMENTS.
18. CONTRACTOR IS RESPONSIBLE TO KEEP THE ROADS FREE AND CLEAN FROM THE MUD OR DEBRIS.
19. SWALES MUST HAVE MINIMUM 1.5% LONGITUDINAL AND SIDE SLOPE AND MAX 3H:1V SIDE SLOPE (S29).

BENCHMARK NOTE:

20. ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM THE CITY OF OTTAWA VERTICAL CONTROL MONUMENTS No.'S 2011-0106 (ELEV.=62.968 M) AND 2011-0107 (ELEV=55.863).

1:200 HORIZONTAL

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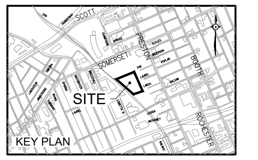
MORRISON HERSHFIELD
200-2932 BASELINE ROAD, OTTAWA, ON K2H 1B1



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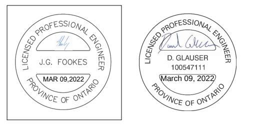


GLADSTONE VILLAGE PHASE 1

933 Gladstone Avenue - Phase 1
211006

GRADING PLAN

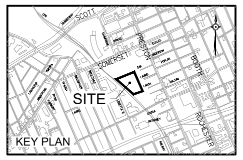
Scale: 1:200
Project No: 210101900
Date: 09/03/22

C002
#18593

D07-12-21-0149

diamond schmitt

MORRISON HERSHFIELD
200-2932 BASELINE ROAD, OTTAWA, ON K2H 1B1



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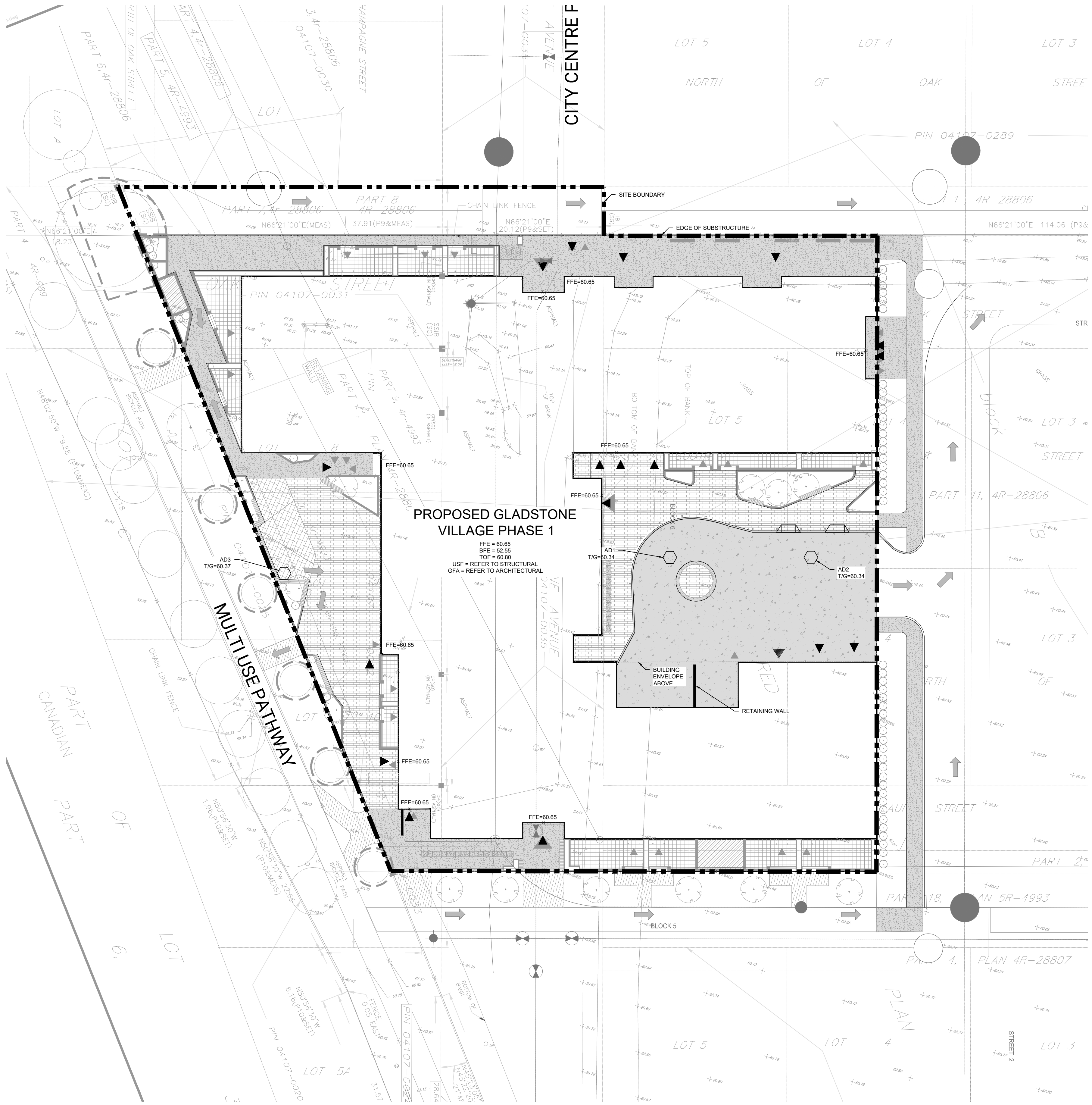
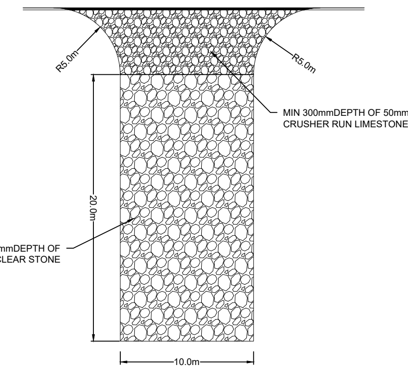


EROSION AND SEDIMENT CONTROL

1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OFTHE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES.THIS INCLUDES LIMITING THE AMOUNT OF EXPOSED SOIL, USING CATCH BASIN SEDIMENT PROTECTION AND INSTALLING SILT FENCES AND OTHER EFFECTIVE SEDIMENT TRAPS. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
2. EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE IMPLEMENTED PRIOR TO CONSTRUCTION AND REMAIN IN PLACE UNTIL VEGETATION IS ESTABLISHED.
3. REGULAR INSPECTION AND MAINTENANCE OF THE EROSION AND SEDIMENT MEASURES SHALL BE UNDERTAKEN. THE IMPLEMENTATION AND ADJUSTMENT AND/OR CORRECTIVE MAINTENANCE OF THE EROSION AND SEDIMENT MEASURES IS AN INTEGRAL PART OF THE PLAN AND MUST BE PERFORMED.
4. CONTRACTOR IS RESPONSIBLE TO KEEP THE ROADS FREE AND CLEAN FROM MUD AND DEBRIS. AS A MINIMUM THIS SHALL INCLUDE SWEEPING LIBRARY ROAD DAILY DURING EXCAVATION WORK.
5. THE SEDIMENT AND EROSION CONTROL MEASURES MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE CITY OF OTTAWA SITE INSPECTOR OR CONSERVATION AUTHORITY.

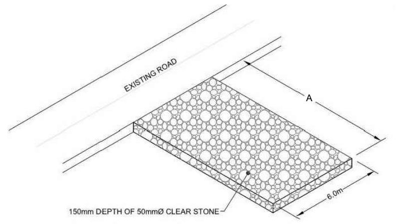
TEMP. ASPHALT RAMP OR CURB CUT



NOTES:
1. INSTALL AT ALL SITE ACCESS LOCATIONS.
2. TEMPORARY CONSTRUCTION ACCESS SHALL BE REMOVED ON COMPLETION OF THE WORK AND ALL DISTURBED AREAS SHALL BE RESTORED TO ORIGINAL OR BETTER CONDITION.

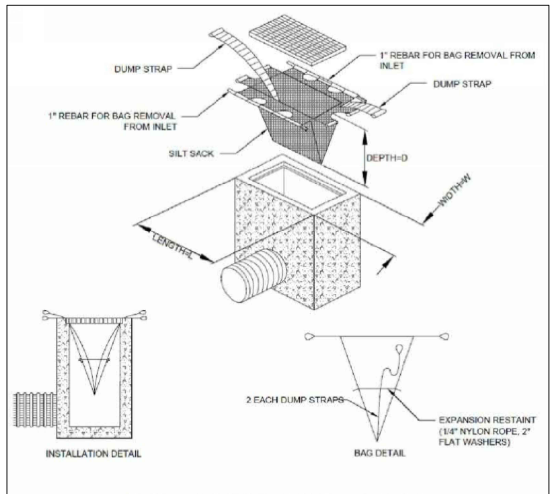
LEGEND

LIGHT DUTY SILT FENCE BARRIER (PER OPSD 219.110)

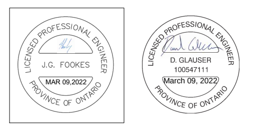


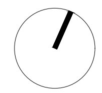
A - TO BE DETERMINED ON SITE IN CONJUNCTION WITH CONSTRUCTION MANAGER

MUD MAT - CONSTRUCTION ACCESS
NTS



INLET SEDIMENT CONTROL DEVICE
NTS





GLADSTONE VILLAGE PHASE 1
933 Gladstone Avenue - Phase 1
211006

EROSION AND SEDIMENT CONTROL PLAN

1:200 HORIZONTAL
0m 4 8

Scale: 1:200
Project No: 210101900
Date: 09/03/22

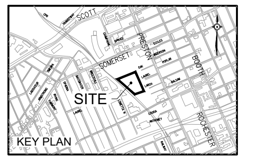
C003
#18593

D07-12-21-0149

diamond schmitt

MORRISON HERSHFIELD

200-2932 BASELINE ROAD, OTTAWA, ON K2H 1B1



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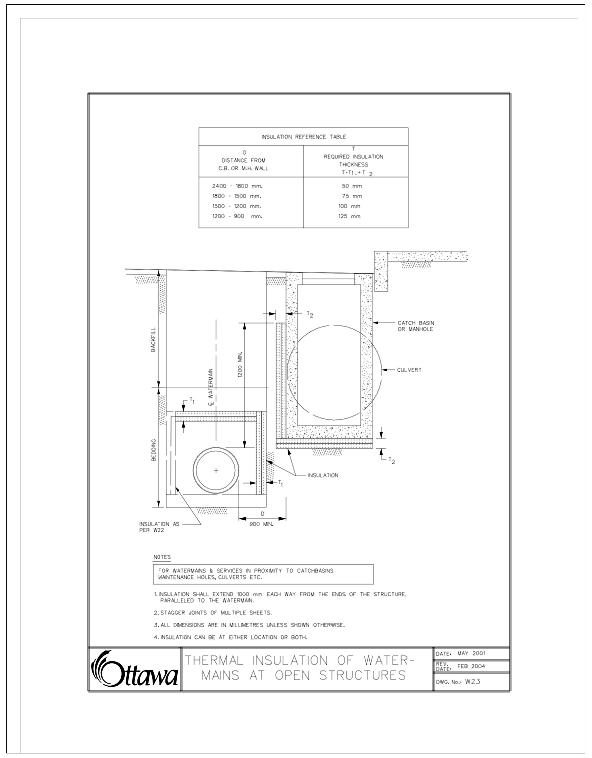
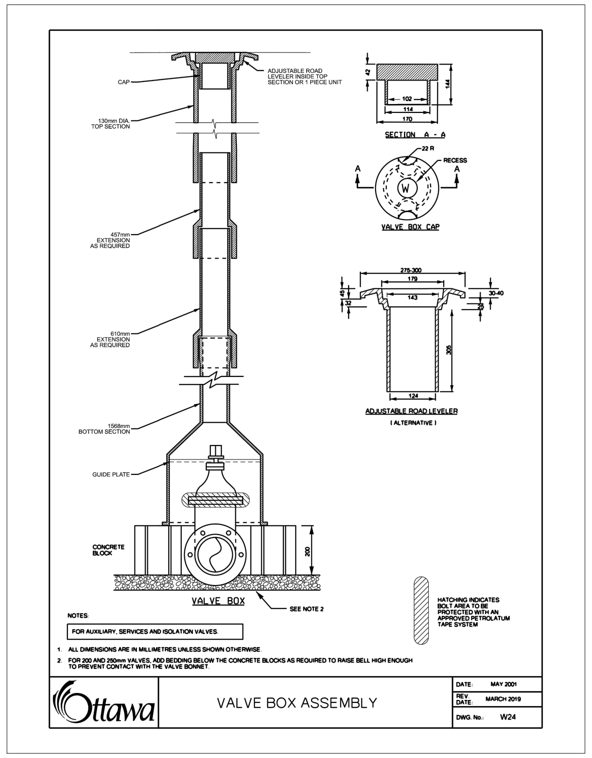
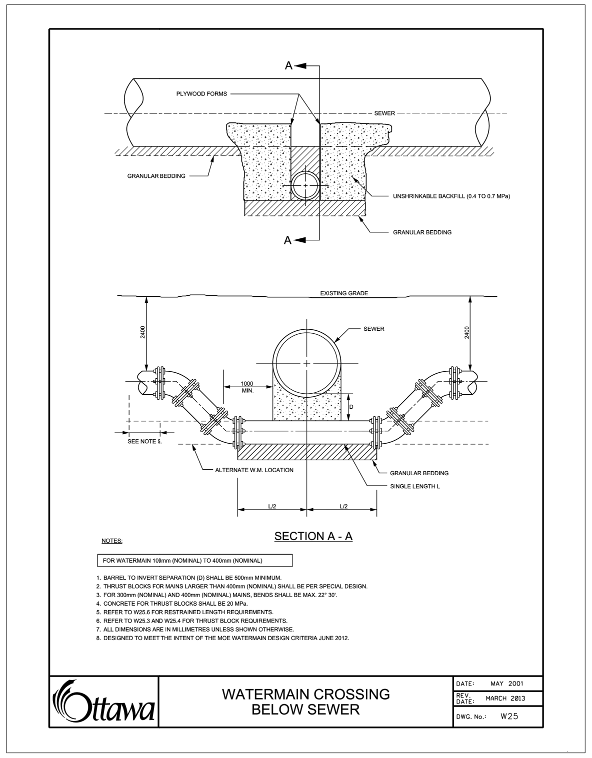
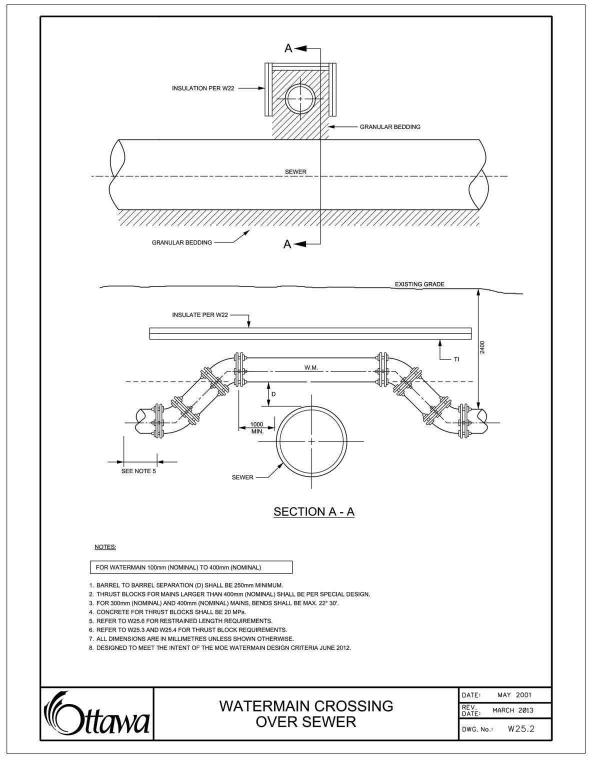
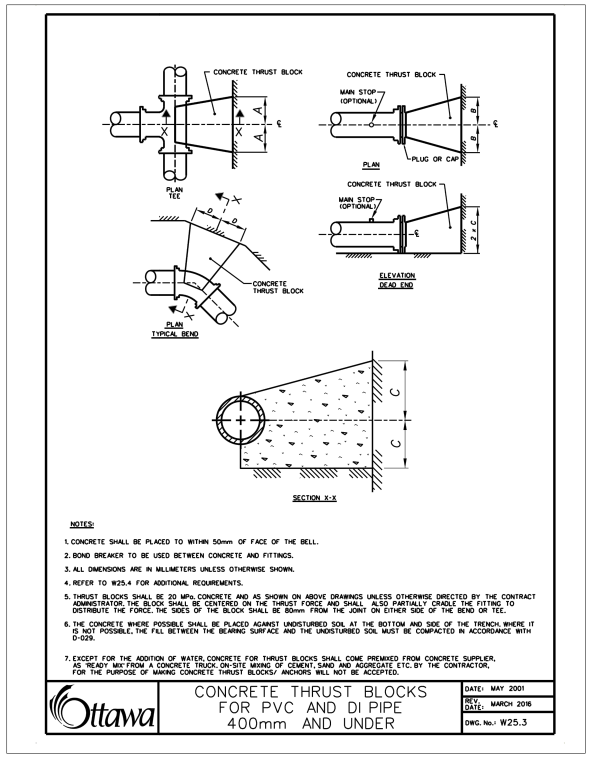










1. SOIL DESCRIPTION: VERY FINE SANDS, SANDY CLAYS, CLAYS.
SOILS WITH TYPICAL BEARING STRENGTH OF 100 TO 199 KPa

PIPE DIAMETER	DIMENSION NOTED ON W25.3			
	A	B	C	D
102	250	250	200	200
152	400	400	250	300
203	550	550	300	450
254	650	650	400	500
305	800	800	450	650
406	1050	1050	600	850

2. SOIL DESCRIPTION: SILTY SAND GRAVELS OR CLAYEY SAND GRAVEL MIXTURES, MODERATE AMOUNT OF FINES.
SOILS WITH TYPICAL BEARING STRENGTH OF 200 TO 299 KPa

PIPE DIAMETER	DIMENSION NOTED ON W25.3			
	A	B	C	D
102	200	200	150	150
152	250	250	200	200
203	350	350	250	270
254	450	450	300	350
305	500	500	350	400
406	750	750	400	600

3. SOIL DESCRIPTION: SANDS, GRAVELS AND GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.
SOILS WITH TYPICAL BEARING STRENGTH OF 300 KPa AND OVER

PIPE DIAMETER	DIMENSION NOTED ON W25.3			
	A	B	C	D
102	150	150	150	150
152	200	200	200	200
203	300	300	200	230
254	400	400	250	270
305	450	450	300	300
406	650	650	350	450

NOTES:

1. THE ABOVE THRUST BLOCK DIMENSIONS MEET OR EXCEED THE WATERMAIN DESIGN CRITERIA FOR FUTURE ALTERATIONS AUTHORIZED UNDER A DRINKING WATER WORKS PERMIT.
2. THE ASSUMPTIONS MADE FOR THE ABOVE CALCULATIONS ARE AS FOLLOWS:
   a) MAXIMUM OPERATING PRESSURE OF 100 psi.
   b) MAXIMUM SURGE PRESSURE WITH A FLOW VELOCITY CHANGE OF 0.6 m/s OF 115 psi (115 psi FOR CLASS 52 DI AND FOR PVC MAX. SURGE IS 35 psi)
3. THE TABLES APPLY TO BOTH DUCTILE IRON AND PVC. WHERE ONE LENGTH EXCEEDED THE OTHER THE LONGER LENGTH WAS USED.
4. DIMENSIONS MAY BE ADJUSTED SO LONG AS THE BEARING SURFACE AREA OF THE THRUST BLOCK IS NOT REDUCED.
4. TO BE USED IN CONJUNCTION WITH W25.3.

Ottawa | THRUST BLOCK DIMENSION TABLES FOR PVC AND DI PIPE 400mm AND UNDER | DATE: MAY 2001 | REV. DATE: MARCH 2011 | DWG. No.: W25.4

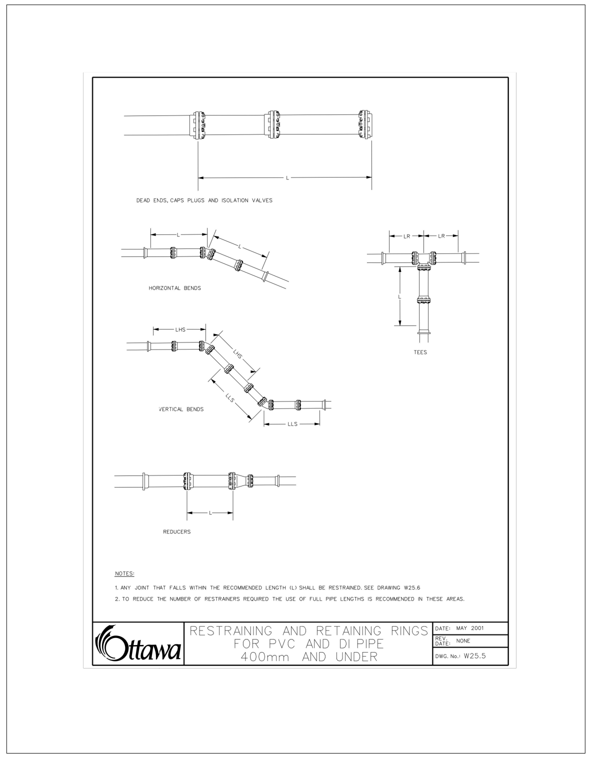


TABLE OF RESTRAINED LENGTHS FOR DI AND PVC WATERMAIN PIPE IN STANDARD GRANULAR 'A' EMBEDMENT IN SOILS OF BEARING CAPACITY OF 100 KPa AND OVER

REDUCERS — LARGER DIAMETER SIDE (TO BE RESTRAINED)

SMALLER DIAMETER (UNRESTRAINED)	100mm	150mm	200mm	250mm	300mm	400mm
100mm	N/A	3	6	8	10	14
150mm	N/A	N/A	4	6	9	13
200mm	N/A	N/A	N/A	3	6	11
250mm	N/A	N/A	N/A	N/A	4	9
300mm	N/A	N/A	N/A	N/A	N/A	7
400mm	N/A	N/A	N/A	N/A	N/A	N/A

PIPE DIAMETER

	100mm	150mm	200mm	250mm	300mm	400mm
DEAD ENDS, CAPS, PLUGS, VALVES						
BEFORE CAPS AND EITHER SIDE OF VALVES - L	5	6	9	10	12	16
VERTICAL BENDS						
LENGTH HIGH SIDE - LHS	3	4	5	6	7	9
LENGTH LOW SIDE - LLS	1.5	2	2.5	3	3.5	4.5
TEES						
LENGTH ALONG THE BRANCH - L	1	1	1	1	1	1
LENGTH ALONG THE RUN - Lr	3	3	3	3	3	3
HORIZONTAL BENDS						
11.25, 22.5, AND 45 DEGREE BENDS	1	1.5	1.5	2	2	2.5

NOTES:

1. THE ABOVE RESTRAINED LENGTHS MEET OR EXCEED THE WATERMAIN DESIGN CRITERIA FOR FUTURE ALTERATIONS AUTHORIZED UNDER A DRINKING WATER WORKS PERMIT.
2. THE ASSUMPTIONS MADE FOR THE ABOVE CALCULATIONS ARE AS FOLLOWS:
   a) MAXIMUM OPERATING PRESSURE OF 100 psi.
   b) MAXIMUM SURGE PRESSURE WITH A FLOW VELOCITY CHANGE OF 0.6 m/s OF 115 psi (115 psi FOR CLASS 52 DI AND FOR PVC MAX. SURGE IS 35 psi)
3. FOR SOFTWARE CALCULATIONS A TEST PRESSURE OF 150 psi AND A SAFETY FACTOR OF 1.5 WAS USED WHICH RESULTS IN 225 psi MAXIMUM PRESSURE.
4. TYPE 5 TRENCH BEDDING.
5. DEPTH TO BURY 2.4 METRES EXCEPT FOR VERTICAL BENDS WHERE THE HIGH SIDE IS AT 1.8 METRES.
6. EMBEDMENT MATERIAL GRANULAR 'A' WITH CHARACTERISTICS OF ASTM D2487 GP.
7. GP SOILS ARE DESCRIBED AS POORLY GRADED GRAVEL AND SAND-GRAVEL MIXES WITH LITTLE OR NO FINES.
8. (Lr) MUST BE OF SOLID PIPE WITHOUT JOINTS, FITTINGS, ETC.
9. THE TABLES APPLY TO BOTH DUCTILE IRON AND PVC. WHERE ONE LENGTH EXCEEDED THE OTHER THE LONGER LENGTH WAS USED.
10. RESTRAINED LENGTHS ARE IN METRES.

Ottawa | TABLES OF RESTRAINED LENGTHS FOR PVC AND DI PIPE 400mm AND UNDER | DATE: MAY 2001 | REV. DATE: MARCH 2011 | DWG. No.: W25.6

GLADSTONE VILLAGE PHASE 1

933 Gladstone Avenue - Phase 1

211006

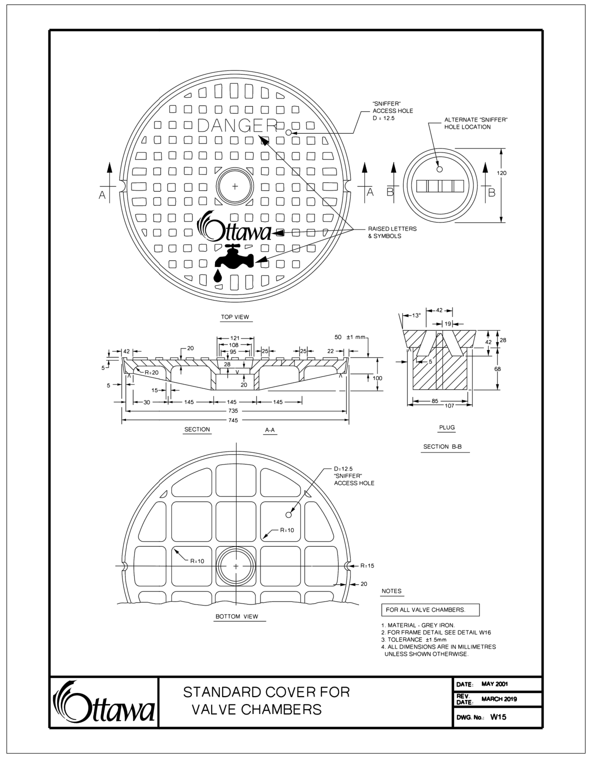
DETAILS 1

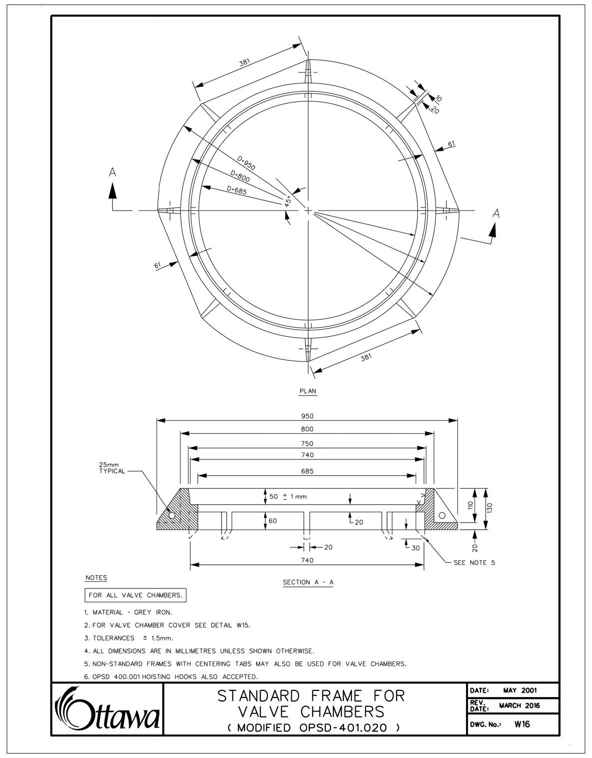
Scale: N/A
Project No: 210101900
Date: 09/03/22

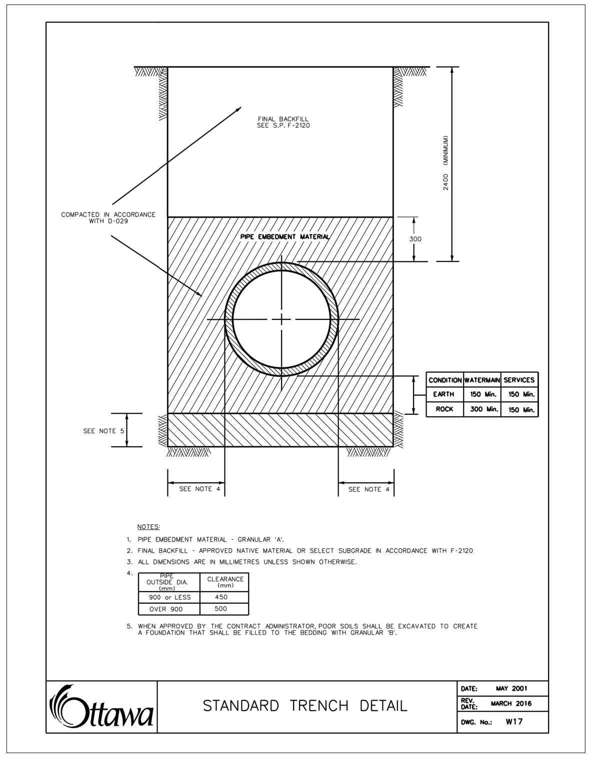
C101

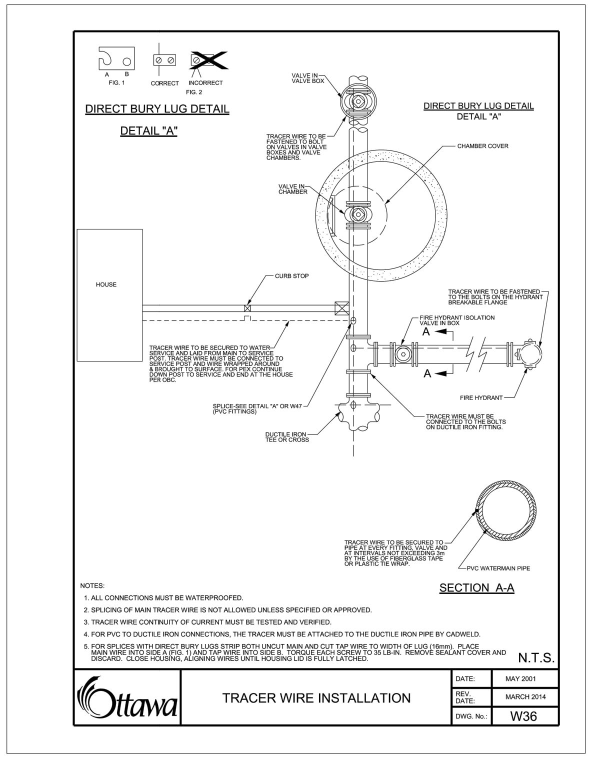
#18593

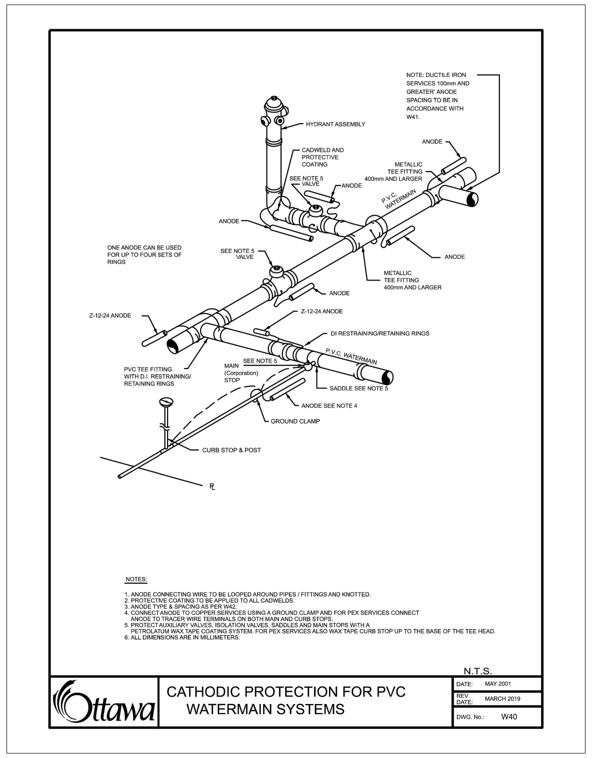
D07-12-21-0149

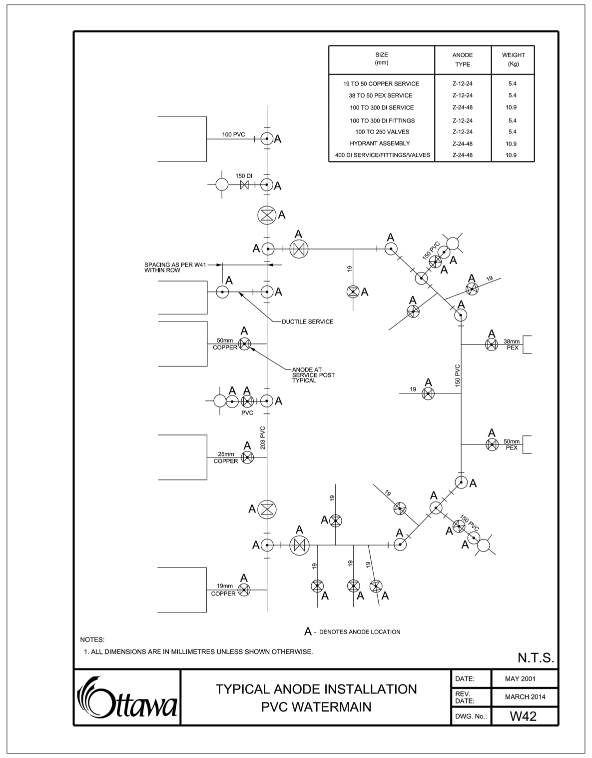


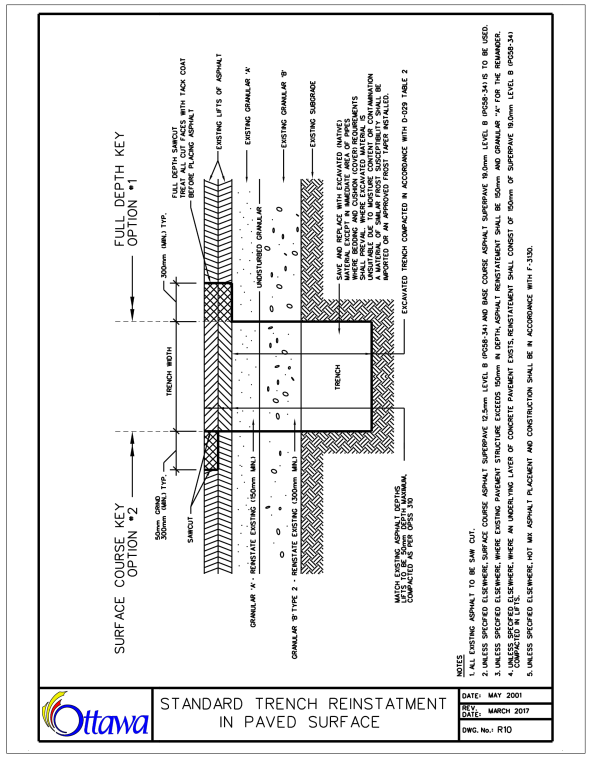


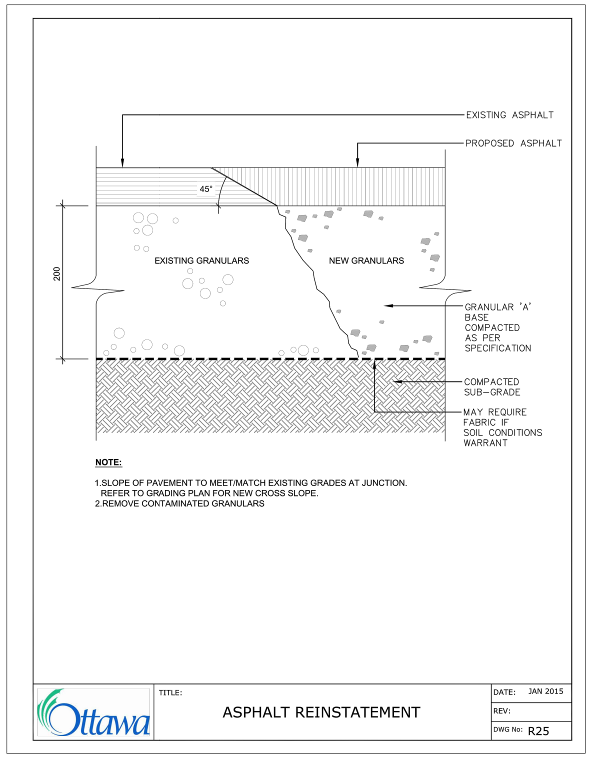










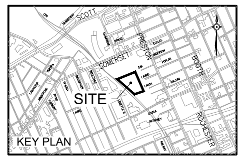


diamond schmitt

KWC

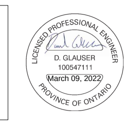
MORRISON HERSHFIELD

200-2932 BASELINE ROAD, OTTAWA, ON K2H 1B1



ISSUED

No.	Date	Description
1	2021 SEP 08	ISSUED FOR SITE PLAN APPROVAL
2	2021 DEC 14	ISSUED FOR 100% DESIGN DEVELOPMENT
3	2022 FEB 18	ISSUED FOR 30% CD
4	2022 MAR 09	ISSUED FOR SITE PLAN RESUBMISSION



GLADSTONE VILLAGE PHASE 1

933 Gladstone Avenue - Phase 1

211006

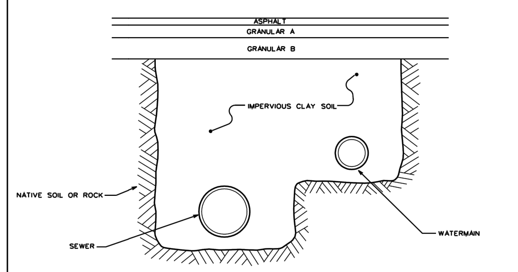
DETAILS 2

Scale: N/A
Project No: 210101900
Date: 09/03/22

C102

D07-12-21-0149

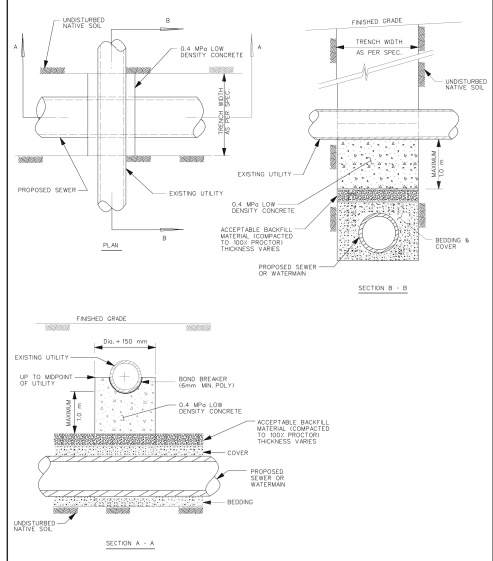
#18593



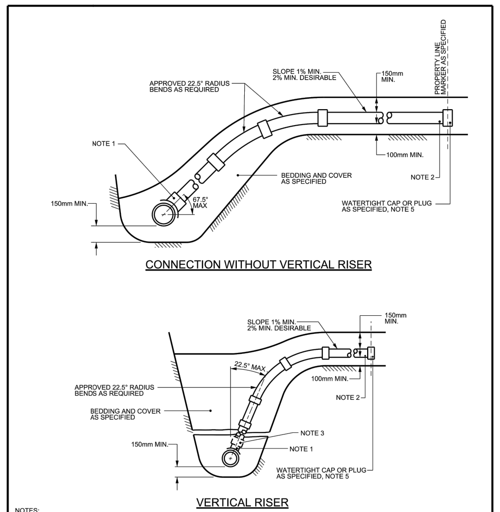
NOTES:

1. CLAY SEAL TO EXTEND FROM BOTTOM OF TRENCH EXCAVATION TO UNDERSIDE OF ROAD STRUCTURE.
2. CLAY SEAL TO EXTEND FULL TRENCH WIDTH TO EXISTING NATIVE SOILS WITH A MINIMUM THICKNESS OF 1.0m ALONG PIPES.
3. CLAY SEAL TO BE LOCATED SO THAT NO PIPE JOINTS ARE WITHIN THE CLAY SEAL MATERIAL.

Ottawa — CLAY SEAL FOR PIPE TRENCHES — DATE: MAY 2001 — REV. DATE: MARCH 2006 — DWG. No.: S8



Ottawa — SUPPORT DETAIL FOR EXISTING UTILITY CROSSING SEWER OR WATERMAIN TRENCH — DATE: MAY 2001 — REV. DATE: NONE — DWG. No.: S10

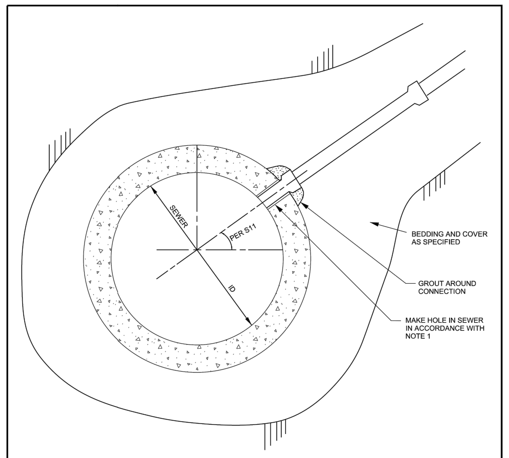


NOTES:

1. ALL DIAMETERES OF SERVICE CONNECTIONS THAT HAVE NOMINAL DIAMETERS NO GREATER THAN 50% OF THE NOMINAL DIAMETER OF THE RIGID SEWER PIPE SHALL BE MADE USING A BELL END INSERT AS PER S11.2 OR AN APPROVED RUBBER GASKETED INSERT, INSTALLED ABOVE THE SPRING LINE.
2. SANITARY SERVICES TO BE 135mm AND STORM SERVICES TO BE 100mm FOR NEW RESIDENCES UNLESS SPECIFIED OTHERWISE. SERVICE PIPE AND RADIUS BENDS TO BE APPROVED CSA B182.2, SDR28 PRODUCTS UNLESS SPECIFIED OTHERWISE.
3. APPROVED CONTROLLED SETTLEMENT JOINTS OPTIONAL FOR SERVICE CONNECTIONS TO MAIN SEWERS UP TO 5m DEEP. WHERE APPROVED, CONNECTIONS TO SEWERS OVER 5m DEEP REQUIRE APPROVED CONTROLLED SETTLEMENT JOINTS.
4. VERTICAL RISER SHALL BE SAME AS SERVICE PIPE UNLESS OTHERWISE SPECIFIED.
5. CAP OR PLUG AT THE PROPERTY LINE SHALL BE ADEQUATELY BRACED TO WITHSTAND TESTING PRESSURE.
6. FOR NEW CONSTRUCTION, INSERTS MUST BE INSTALLED ON THE MAIN PIPE BEFORE THAT PIPE IS LAID. FOR SERVICES/BRANCHES 375mm DIA. OR LESS, APPROVED "CORED TEES" MAY BE USED.
7. APPROVED CUT-IN TOOL MUST BE USED FOR FIELD MADE CONNECTIONS.
8. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.

N.T.S.

Ottawa — SEWER SERVICE CONNECTIONS FOR RIGID MAIN SEWER PIPE (MODIFIED OPSD-1006.010) — DATE: MARCH 2006 — REV. DATE: MARCH 2014 — DWG. No.: S11

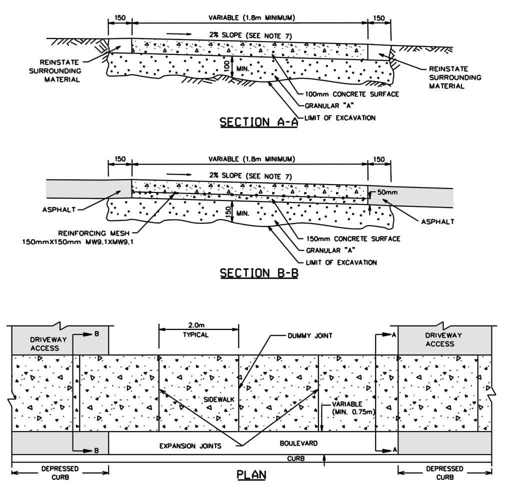


NOTES:

1. OPENING IN PIPE SHALL BE A ROUND MACHINE CUT HOLE.
2. INSERT TO CONSIST OF THE BELL END OF AN APPROVED SERVICE PIPE. LENGTH TO BE LIMITED SUCH THAT NO PART OF THE INSERT PROTRUDES INTO THE OPENING OF THE PIPE.
3. WRAP APPROVED WATER-TIGHT SEALANT AROUND THE SPIGOT PORTION OF THE BELL END PRIOR TO INSERTING. USE ENOUGH SEALANT TO ENSURE A TIGHT WATER-TIGHT CONNECTION THAT WILL HOLD THE BELL IN POSITION.
4. GROUT AROUND THE BELL END TO PROTECT THE SEALANT AND SUPPORT THE BELL.
5. ALL OTHER NOTES OF S11 APPLY.
6. SEE MS-22.15 FOR APPROVED SEALANT PRODUCTS.

N.T.S.

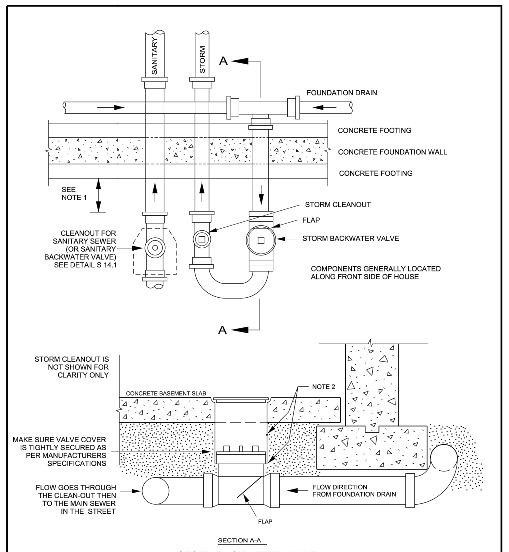
Ottawa — SEWER SERVICE CONNECTIONS FOR RIGID MAIN SEWER PIPE USING BELL END INSERT METHOD — DATE: MARCH 2011 — REV. DATE: — DWG. No.: S11.2



NOTES:

1. CONCRETE AND GRANULAR "A" IS TO BE INCREASED TO 150mm AT THE ENTRANCE AND 150x150mm MW9.1 x MW9.1 REINFORCING MESH IS TO BE PLACED MID DEPTH WITHIN DRIVEWAY ACCESS.
2. TRANSVERSE EXPANSION JOINTS ARE REQUIRED AT THE ENDS, THE MIDPOINT, AT INTERVALS OF 4m MAXIMUM, AND ALSO TO ISOLATE OBSTRUCTIONS FROM SIDEWALK, HYDRANTS, POLES, BUILDINGS, ETC.
3. WHEN THE OVERALL SIDEWALK WIDTH EXCEEDS 2.5m, A LONGITUDINAL CONSTRUCTION JOINT SHALL BE CREATED AT ITS MIDPOINT.
4. EDGES AND JOINTS ARE TO BE FINISHED WITH A 75mm EDGING TOOL.
5. ALL CONCRETE SIDEWALKS ARE TO HAVE A BROOM FINISH UNLESS OTHERWISE SPECIFIED.
6. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
7. THE MAXIMUM SLOPE IS NOT TO EXCEED 2%.
8. INSTALL DUMMY TRANSVERSE JOINTS AS REQUIRED SO THERE IS A MAXIMUM SPACING OF 2m BETWEEN ALL JOINTS.
9. SIDEWALK NOT TO BE DEPRESSED ACROSS DRIVEWAY ACCESSES.
10. EXPANSION AND DUMMY JOINTS AS PER SC5

Ottawa — TYPICAL CONCRETE SIDEWALK IN BOULEVARD — DATE: MAY 2001 — REV. DATE: MARCH 2016 — DWG. No.: SC4

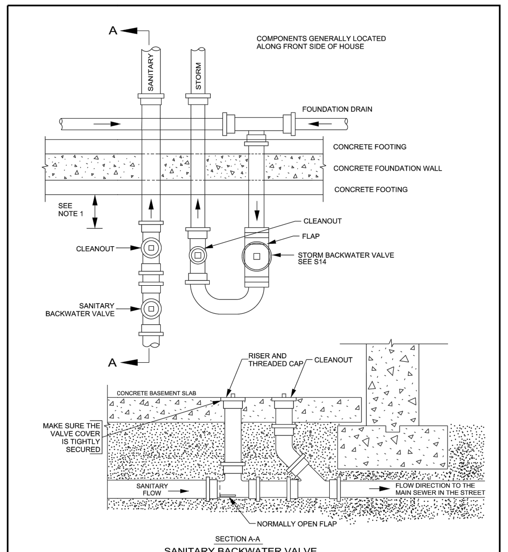


NOTES:

1. BACKWATER VALVE, CLEAN-OUTS AND ANY OTHER FITTINGS MUST BE INSTALLED A MINIMUM OF 300mm INSIDE OF THE BASEMENT FOOTING. THIS IS TO ENSURE THERE IS SUFFICIENT ROOM TO REPLACE THESE COMPONENTS IN THE FUTURE WITHOUT HAVING TO DAMAGE THE FOOTING/WALL DURING THE PROCESS
2. JOINTS BETWEEN THE SLEEVE AND THE BACKWATER VALVE AND THE FLOOR SHALL BE WATERTIGHT.

N.T.S.

Ottawa — FOUNDATION DRAIN BACKWATER VALVE INSTALLATION — DATE: DEC. 2002 — REV. DATE: MARCH 2011 — DWG. No.: S14

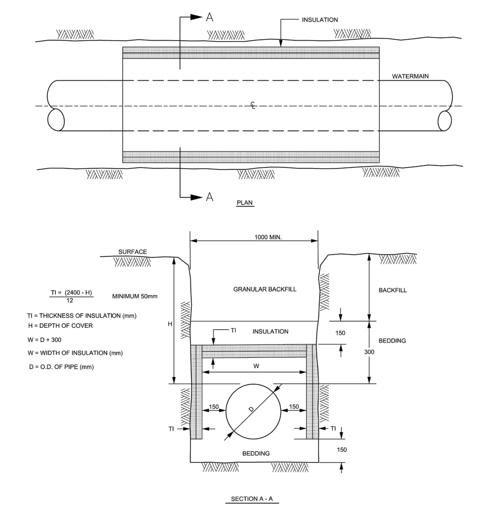


NOTES:

1. BACKWATER VALVE, CLEANOUTS AND ANY OTHER FITTINGS MUST BE INSTALLED A MINIMUM OF 300mm INSIDE OF THE BASEMENT FOOTING. THIS IS TO ENSURE THERE IS SUFFICIENT ROOM TO REPLACE THESE COMPONENTS IN THE FUTURE WITHOUT HAVING TO DAMAGE THE FOOTING/WALL DURING THE PROCESS
2. JOINTS BETWEEN CLEANOUT AND THE BACKWATER VALVE AND THE FLOOR SLAB SHALL BE SEALED.

N.T.S.

Ottawa — SANITARY BACKWATER VALVE INSTALLATION TYPE 2 — DATE: MARCH 2011 — REV. DATE: — DWG. No.: S14.2



NOTES

FOR 150 - 400mm (NOMINAL DIAMETER) WATERMAINS, WHERE THE DEPTH OF COVER IS LESS THAN 2400mm

1. INCREMENTS OF THICKNESS SHALL BE ADJUSTABLE TO 25mm.
2. IN PROXIMITY OF MAINTENANCE HOLES, CULVERTS, CATCHBASINS, ETC., INSULATION SHALL BE PLACED PER DETAIL W23
3. DEPTH OF COVER LESS THAN 1200mm REQUIRES SPECIAL DESIGN
4. STAGGER JOINTS OF MULTIPLE SHEETS.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.

Ottawa — THERMAL INSULATION FOR WATERMAINS IN SHALLOW TRENCHES — DATE: MAY 2001 — REV. DATE: MARCH 2013 — DWG. No.: W22

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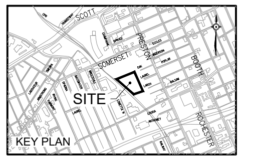
MORRISON HERSHFIELD
200-2932 BASELINE ROAD, OTTAWA, ON K2H 1B1



ISSUED

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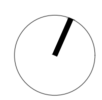


CONTRACTOR MUST CHECK & VERIFY ALL DIMENSIONS ON THE JOB.

DO NOT SCALE DRAWINGS.

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

GLADSTONE VILLAGE
PHASE 1
933 Gladstone Avenue - Phase 1
211006

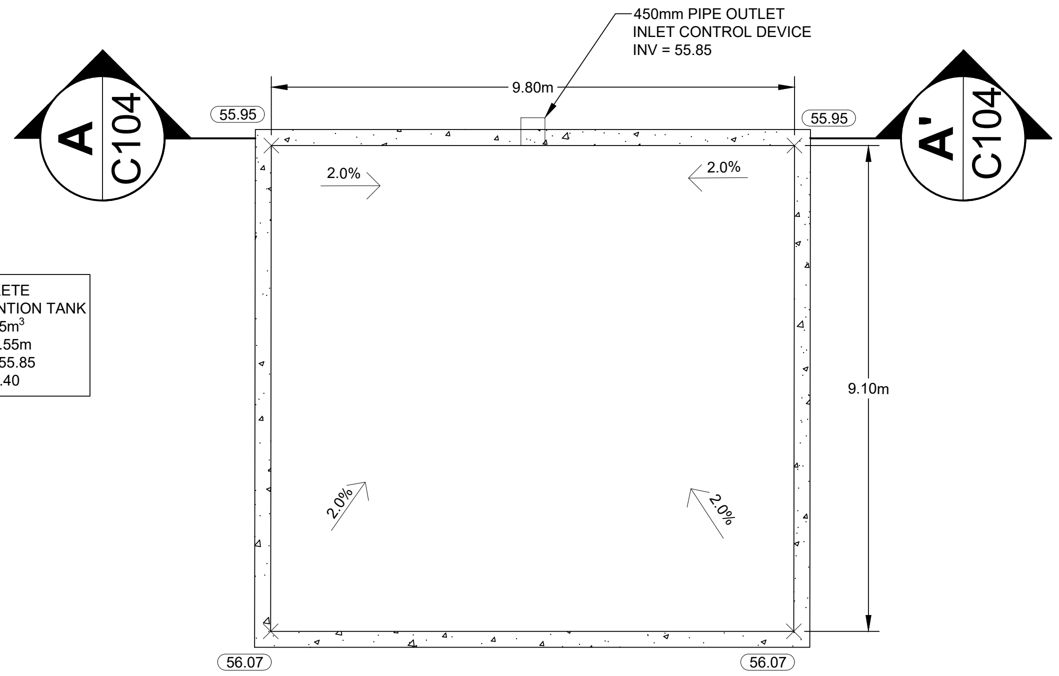
DETAILS 3

Scale: N/A
Project No: 210101900
Date: 09/03/22

C103
#18593

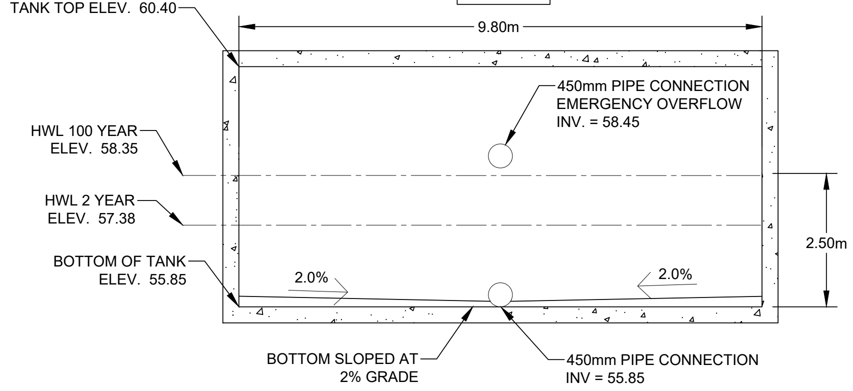
D07-12-21-0149

DETAILS OF STORMWATER DETENTION TANK



REINFORCED CONCRETE
STORMWATER DETENTION TANK
GROSS VOLUME = 405m^3
OVERALL HEIGHT = 4.55m
TANK BOTTOM INV = 55.85
TANK TOP ELEV. = 60.40

PLAN VIEW



SECTION A-A'

NOTES:

1. REFER TO STRUCTURAL/MECHANICAL FOR CONCRETE AND REINFORCING DESIGN, ACCESS LOCATIONS, PIPE INLET LOCATIONS, VENT LOCATIONS
2. REFER TO ICD TABLE BELOW FOR ALL CONTROLLED FLOW REQUIREMENTS

LEGEND

- PIPE OUTLET
- 56.00 PROPOSED ELEVATION
- 2.0% PROPOSED SLOPE DIRECTION
- CONCRETE WALL

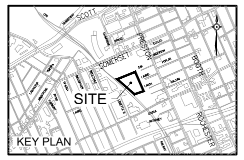
INLET CONTROL DEVICE DATA TABLE - 450mm PIPE OUTLET

DESIGN EVENT	ICD TYPE	DIAMETER OF OUTLET PIPE (mm)	DESIGN FLOW (L/s)	WATER ELEVATION (m)	REQUIRED VOLUME (m³)	TOTAL VOLUME PROVIDED (m³)
1:2 YR	HYDROVEX 100VHV-1	450mmØ	8.8	57.38	110.2	220
1:100 YR	HYDROVEX 100VHV-1	450mmØ	11.2	58.35	213.0	220

1:50
HORIZONTAL
0m 1 2

diamond schmitt KWC

MORRISON HERSHFIELD
200-2932 BASELINE ROAD, OTTAWA, ON K2H 1B1



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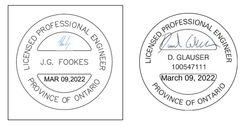
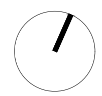




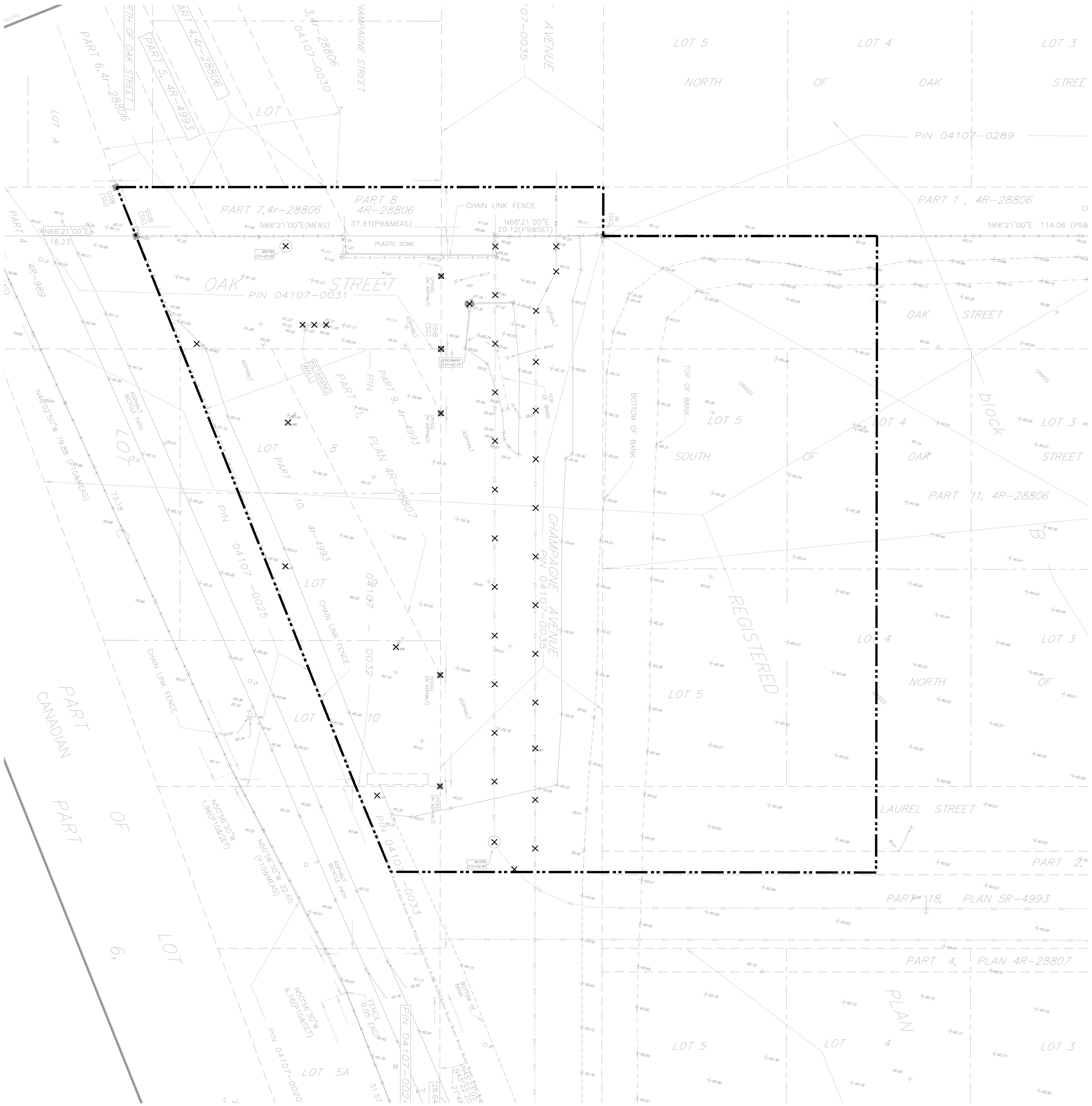
GLADSTONE VILLAGE
PHASE 1
933 Gladstone Avenue - Phase 1
211006

DETAILS 4

Scale: 1:50
Project No: 210101900
Date: 09/03/22

C104
#18593

D07-12-21-0149



REMOVALS

1. COMPLETE ALL REMOVALS IN ACCORDANCE WITH OPSS MUN. 510

LEGEND

SITE BOUNDARY

EXISTING WATERMAIN OR SEWER, VALVE CHAMBER, MAINTENANCE HOLE OR CATCH BASIN TO BE REMOVED OR ABANDONED (REMOVE IF WITH EXCAVATION LIMITS).

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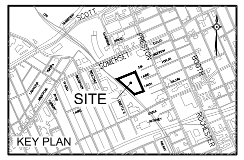
MORRISON HERSHFIELD

200-2932 BASELINE ROAD, OTTAWA, ON K2H 1B1



ISSUED

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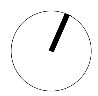


GLADSTONE VILLAGE
PHASE 1

933 Gladstone Avenue - Phase 1

211006

1:200
HORIZONTAL
0m 4 8

REMOVALS PLAN

Scale: 1:200
Project No: 210101900
Date: 09/03/22

C700

#18593

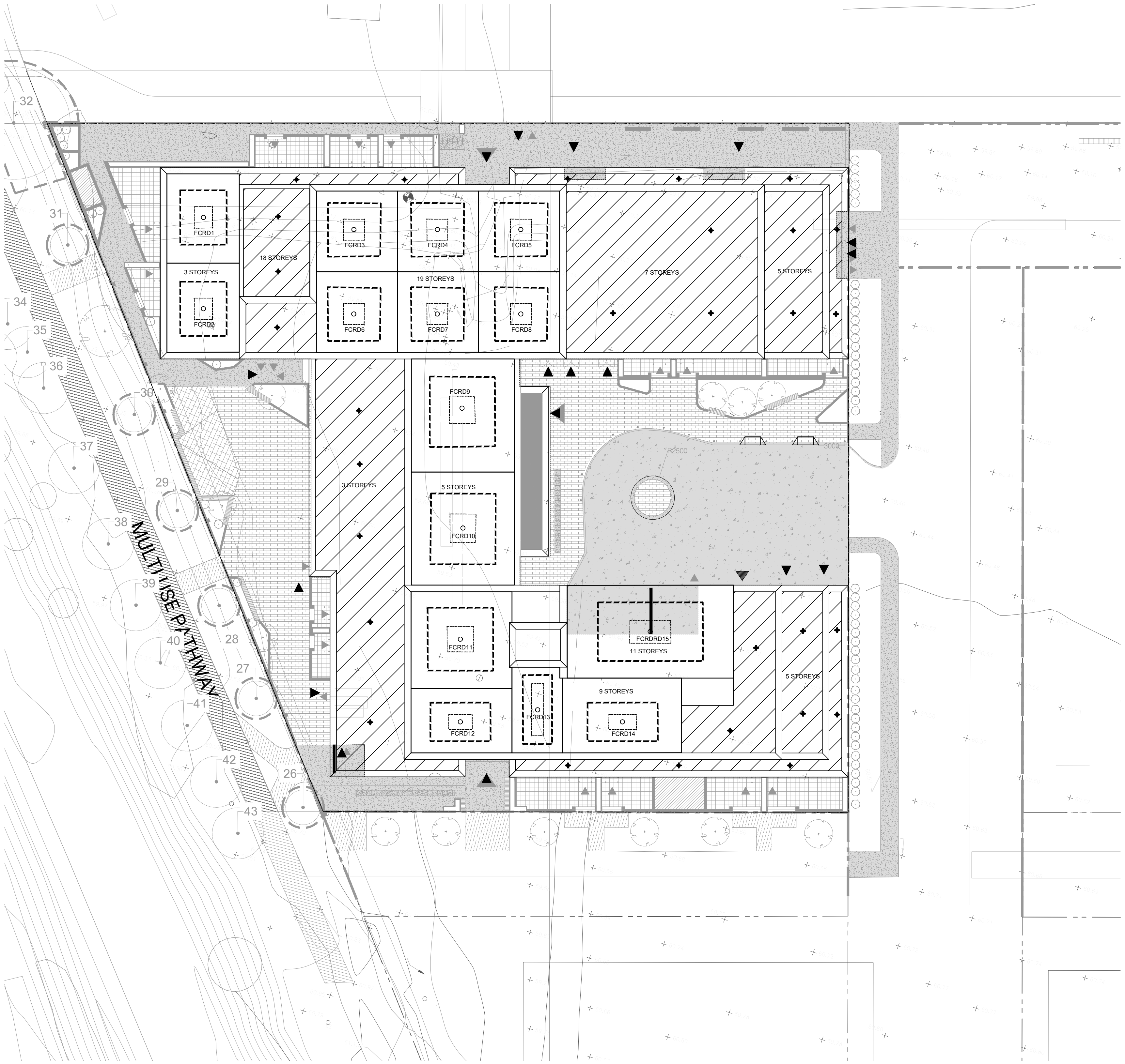
D07-12-21-0149

diamond schmitt

KWC

MORRISON HERSHFIELD

200-2932 BASELINE ROAD, OTTAWA, ON K2H 1B1



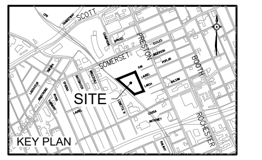
LEGEND

- FLOW CONTROLLED ROOF DRAIN
- UNCONTROLLED FLOW ROOF DRAIN
- AMENITY ROOF/OCCUPIABLE - NO FLOW CONTROL
- UNOCCUPIABLE ROOF - NO FLOW CONTROL
- AREA WITH UNCONTROLLED FLOW
- 2 YR=25mm DEPTH
- 100 YR=63mm DEPTH

PRODUCT HEAD vs. FLOW					
PONDING DEPTH (m)	FLOW (L/s)				
	OPEN	3/4	1/2	1/4	CLOSED
0.025	0.315	0.315	0.315	0.315	0.315
0.05	0.631	0.631	0.631	0.631	0.315
0.075	0.946	0.867	0.789	0.710	0.315
0.1	1.262	1.104	0.946	0.789	0.315
0.125	1.577	1.341	1.104	0.867	0.315
0.15	1.893	1.577	1.262	0.946	0.315

NOTES:

1. PRODUCT - ADJUSTABLE ACCUTROL WEIR
   WEIR SETTING - 3/4
   FLOW RATE APPROX. 0.8L/s IN 100-YR EVENT
2. FOR SCUPPER / EMERGENCY OVERFLOW LOCATIONS / ELEVATION REFER TO ARCHITECTURAL



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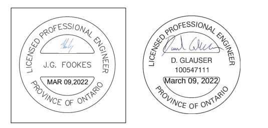
1	2021 SEP 08	ISSUED FOR SITE PLAN APPROVAL
2	2021 DEC 14	ISSUED FOR 100% DESIGN DEVELOPMENT
3	2022 MAR 09	ISSUED FOR SITE PLAN RESUBMISSION



GLADSTONE VILLAGE
PHASE 1

933 Gladstone Avenue - Phase 1

211006

1:200 HORIZONTAL

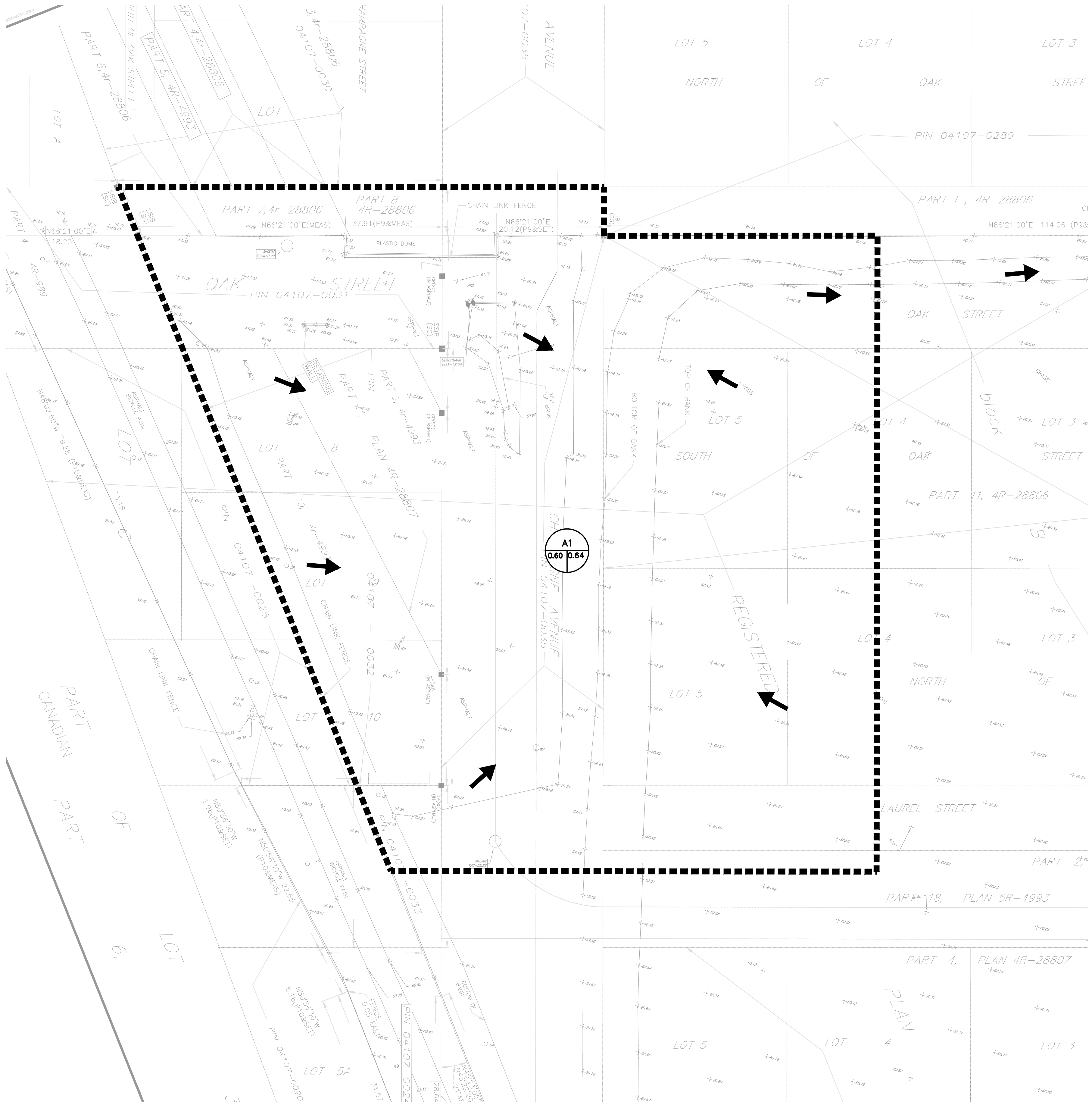
ROOF DRAIN LAYOUT & PONDING

Scale: 1:200
Project No: 210101900
Date: 09/03/22

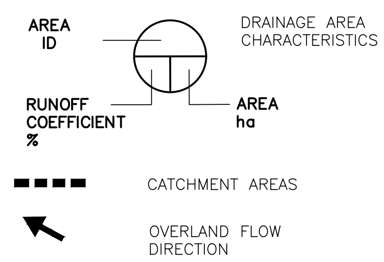
C701

#18593

D07-12-21-0149

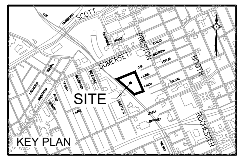


LEGEND



diamond schmitt

MORRISON HERSHFIELD
200-2932 BASELINE ROAD, OTTAWA, ON K2H 1B1



ISSUED

No.	Date	Description
1	2021 SEP 08	ISSUED FOR SITE PLAN APPROVAL
2	2021 DEC 14	ISSUED FOR 100% DESIGN DEVELOPMENT
3	2022 FEB 18	ISSUED FOR 30% CD
4	2022 MAR 09	ISSUED FOR SITE PLAN RESUBMISSION

J.G. FOOKES MAR 09,2022 LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

D. GLAUSER 100047111 March 09, 2022 LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO

CONTRACTOR MUST CHECK & VERIFY ALL DIMENSIONS ON THE JOB.

DO NOT SCALE DRAWINGS.

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

GLADSTONE VILLAGE PHASE 1

933 Gladstone Avenue - Phase 1
211006

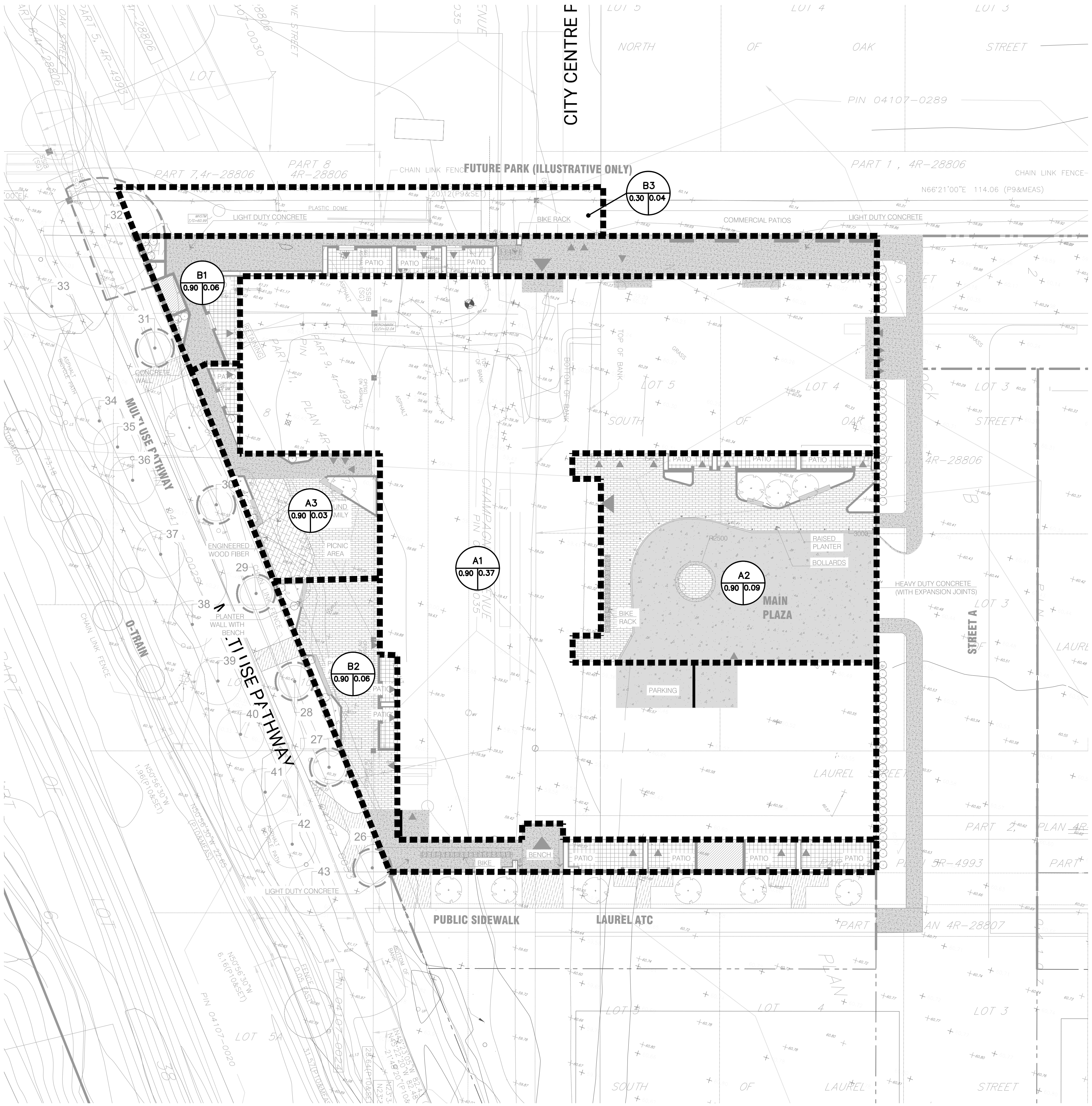
EXISTING SITE CATCHMENTS

1:200 HORIZONTAL

Scale: 1:200
Project No: 210101900
Date: 09/03/22

C800
#18593

D07-12-21-0149



NOTES
1. A1 & A2 ARE PROPOSED CONTROLLED CATCHMENTS.
B1 IS A PROPOSED UNCONTROLLED CATCHMENT.

LEGEND

AREA ID

DRAINAGE AREA CHARACTERISTICS

RUNOFF COEFFICIENT %

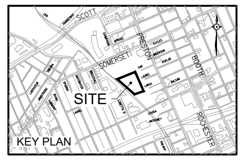
AREA ha

CATCHMENT AREAS

diamond schmitt

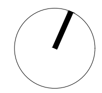
KWC

MORRISON HERSHFIELD
200-2932 BASELINE ROAD, OTTAWA, ON K2H 1B1



ISSUED

No.	Date	Description
1	2021 SEP 08	ISSUED FOR SITE PLAN APPROVAL
2	2021 DEC 14	ISSUED FOR 100% DESIGN DEVELOPMENT
3	2022 FEB 18	ISSUED FOR 30% CD
4	2022 MAR 09	ISSUED FOR SITE PLAN RESUBMISSION



GLADSTONE VILLAGE
PHASE 1
933 Gladstone Avenue - Phase 1
211006

PROPOSED SITE CATCHMENTS

1:200 HORIZONTAL

Scale: 1:200
Project No: 210101900
Date: 09/03/22

C801
#18593

D07-12-21-0149

Appendix B

MECP, RVCA and City of Ottawa Specific Requirements Correspondence

Pre-Consul Meeting Notes to the File Lead - Ann O'Connor April 23, 2020
Re: Gladstone Village @ 933 Gladstone Avenue
Ward 14 - Somerset

Infrastructure:

A 305 mm dia. PVC Watermain (c. 1997) is available on Gladstone Ave., which ties into a 406mm dia. UCI WM runs approximately central through the property in a North-South direction

A 375 mm dia. PVC Combined Sewer (c. 1997) is available on Somewhere Ave., which drains to Somewhere Ave. Trunk/Collector and Interceptor Sewer.

A 1800 mm dia. Conc. Combined Trunk Sewer runs approximately central through the property in a North-South direction.

A 1650 mm dia. Conc. (c. 1962) Storm Trunk (The Nepean Bay Storm) runs through the West side of the property in a North-South angular direction.

The following apply to this site and any development within a <u>combined sewer</u> area:

- **<u>Total</u>** (San & Stm) allowable release rate will be 2-year pre-development rate.
- Coefficient (C) of runoff will need to be determined **as per existing conditions** but in no case more than 0.4
- TC = 20 minutes or can be calculated
  TC should be not be less than 10 minutes, since IDF curves become unrealistic at less than 10 min.
- Any storm events greater than 2 year, up to 100 year, and including 100-year storm event must be detained on site.
- Two separate sewer laterals (one for sanitary and other for storm) will be required.

This proposal, in terms of infrastructure, is similar to Plan of Condominium / Subdivision with private roads and private infrastructure, connecting to the City ROW. Please be sure City Guidelines are adhered to in this regard.

An MECP ECA will be required.

Please have applicant provide one copy of the following for our review:

MECP ECA Application Form - Direct Submission tied to SPC
Fees – Contact Ministry for payment arrangements due to process changes in relation to COVID19 crisis. Payment to Minister of Finance.
Proof of Applicant's Identification (<u>if no Certificate of Incorporation</u>), Identify authority signatory.
Certificate of Incorporation (if Applicable)
NAICS Code (If Applicable)
Plan & Profile
Grading and Servicing Plans
Survey Plan
Pipe Data Form
Draft ECA (City of Ottawa Expanded Works Form)
Source Protection Policy Screening & Significant Threat Report
Sewer Drainage Area Plan
SWM Report
Services Report
Geotechnical Report & any other supportive documentation
Correspondence: City of Ottawa including ROW, Water Resources Dept., ISD etc., MNR, Conservation Authority & MECP.

Please note that once the review has been completed and the Sr. Engineer is satisfied and ready to sign off on the application, after the PM recommendations 3 final bound copies including 3 CD Rom disks will be required to accompany the applications with MECP and for City of Ottawa records. Footer of ECA Application should have reference #: 8551E (2019/05).

Please also note:

Foundation drains are to be independently connected to sewermain (separated or combined) unless being pumped with appropriate back up power, sufficient sized pump and back flow prevention.

Roof drains are to be connected downstream of any incorporated ICD within the SWM system.

Site is adjacent Trillium Rail Line. Please refer to Official Plan Amendments and published guidelines for Setback requirements. Discuss with City Planner (File Lead) if needed. https://ottawa.ca/en/city-hall/public-engagement/projects/official-plan-amendment-setbacks-railway-corridors

We await City - Water Distribution Dept. comments for this proposal and will forward to File Lead when received.

Other:

Environmental Noise Study is required due to site being on Gladstone Ave., adjacent to Trillium Rail Line and within 500 m of Hwy #417.

Stationary Noise Study – consultant to speak to this in their report as per City NCG and NPC 300 Guidelines. May be required after Mechanical Design completed and prior to building permit issuance.

If greater than 9 metres in height Wind Study is required for this proposal.

No Capital Projects listed in the area on GeoOttawa or Envista.

Water Supply Redundancy – Fire Flow:

> Applicant to ensure that a second service with an inline valve chamber be provided where the average daily demand exceeds 50 m^3 / day (0.5787 l/s per day)
> FUS Fire Flow Criteria to be used unless a low-rise building, where OBC requirements may be applicable.

If applicable, existing buildings require a CCTV inspection and report to ensure existing services to be re-used are in good working order and meet current minimum size requirements. Located services to be placed on site servicing plans.

CCTV Scan Guideline.pdf

Source Protection Policy Screening:

1. The address lies within the Mississippi-Rideau Source Protection Region and is subject to the policies of the Mississippi-Rideau Source Protection Plan.

2. The entire property lies within the Surface Water Intake Protection Zone for the Ottawa River (Lemieux) Intake, IPZ-2 (vulnerability score of 8.1) where significant threat policies apply. Policies are only applicable for specific significant drinking water threat activities.

    - The *Clean Water Act* Tables of Circumstances identify circumstances under which certain activities would be considered a significant threat to drinking water, and the Mississippi-Rideau Source Protection Plan contains policies related to significant drinking water threat activities to protect the drinking water supply.
    - Activities that may be considered a significant drinking water threat within the IPZ-2 (score 8.1) include the following:
        - Untreated stormwater from a stormwater retention pond
        - Sewage treatment plant effluent discharges
        - Combined sewer discharge from a stormwater outlet
        - Sewage treatment plant bypass discharge
        - Industrial effluent discharge
        - Waste disposal site
        - Agricultural activities (application or storage of manure or chemical fertilizers or pesticides, or use of land for livestock grazing)
    - If any of the above activities are proposed within the IPZ-2, then please follow up with me to determine if the activity meets the circumstance to be a significant drinking water threat.
    - If none of the activities listed above are proposed within the IPZ-2, then there are no applicable Source Protection policies related to the IPZ-2.

3. The area is <u>not</u> within a Wellhead Protection Area (WHPA).

4. The area located within a Highly Vulnerable Aquifer (HVA). Note that there are no legally binding policies under the Mississippi-Rideau Source Protection Plan for activities within Highly Vulnerable Aquifers.

5. The area is <u>not</u> within a Significant Groundwater Recharge Area.

Please follow up with confirmation if the above highlighted activities are proposed within the IPZ-2.

Rideau Valley Conservation Authority (RVCA) to be contacted by applicant to ensure there are no restrictions due to quality control requirements and if so, to comply accordingly. Please provide all correspondence with RVCA.

Refer to recommendations from City TAC Committee, discuss with File Lead as needed.

SWM - Where underground storage (UG) and surface ponding are being considered:

Show all ponding for 5- and 100-year events

Above and below ground storage is permitted although uses ½ Peak Flow Rate or is modeled. Please confirm that this has been accounted for and/or revise.

Rationale:

The Modified Rational Method for storage computation in the Sewer Design Guidelines was originally intended to be used for above ground storage (i.e. parking lot) where the change in head over the orifice varied from 1.5 m to 1.2 m (assuming a 1.2 m deep CB and a max ponding depth of 0.3 m). This change in head was small and hence the release rate fluctuated little, therefore there was no need to use an average release rate.

When underground storage is used, the release rate fluctuates from a maximum peak flow based on maximum head down to a release rate of zero. This difference is large and has a significant impact on storage requirements. We therefore require that an average release rate be used to estimate the required volume. Alternatively, the consultant may choose to use a submersible pump in the design to ensure a constant release rate.

In the event that there is a disagreement from the designer regarding the required storage, The City will require that the designer demonstrate their rationale utilizing dynamic modelling, that will then be reviewed by City modellers in the Water Resources Group.

Note that the above will added to upcoming revised Sewer Design Guidelines to account for underground storage, which is now widely used.

Further to above, what will be the actual underground storage provided during the major (100 year) and minor (2 year) storm events?

Please provide information on UG storage pipe. Provide required cover over pipe and details, chart of storage values, capacity etc. How will this pipe be cleaned of sediment and debris?

Note - There must be at least 15cm of vertical clearance between the spill elevation and the ground elevation at the building envelope that is in proximity of the flow route or ponding area. The exception in this case would be at reverse sloped loading dock locations. At these locations, a minimum of 15cm of vertical clearance must be provided below loading dock openings. Ensure to provide discussion in report and ensure grading plan matches if applicable.

Provide information on type of underground storage system including product name and model, number of chambers, chamber configuration, confirm invert of chamber system, top of chamber system, required cover over system and details, interior bottom slope (for self-cleansing), chart of storage values, length, width and height, capacity, entry ports (maintenance) etc.

Provide a cross section of underground chamber system showing invert and obvert/top, major and minor HWLs, top of ground, system volume provided during major and minor events. UG storage to provide actual 2- and 100-year event storage requirements.

In regard to all proposed UG storage, ground water levels (and in particular HGW levels) will need to be reviewed to ensure that the proposed system does not become surcharged and thereby ineffective.

Modeling can be provided to ensure capacity for both storm and sanitary sewers for the proposed development by City's Water Distribution Dept. – Modeling Group, through PM and upon request.

For proposed depressed driveways or developments with private lanes, parking areas or with entrances etc. lower than roadway…

S18.pdf S18.1.pdf

Provided Info:
Please be advised that it is the responsibility of the applicant and their representatives/consultants to verify information provided by the City of Ottawa.
Please contact City View and Release Info Centre at Ext. 44455

Environmental Source Information:

Due to more sensitive use, a Record of Site Condition (RSC) is required. Ensure Phase I, and if applicable, Phase II ESA's speak to required RSC.

City of Ottawa - Historical Land Use Inventory (HLUI) - Required

Rationale:
The HLUI database is currently undergoing an update. The updated HLUI will include additional sources beyond those included in the current database, making the inclusion of this record search even more important.
Although a municipal historic land use database is not specifically listed as required environmental record in O. Reg 153/04, Schedule D, Part II states the following:

The following are the specific objectives of a records review:

1. To obtain and review records that relate to the Phase I (One) property and to the current and past uses of and activities at or affecting the Phase I (One) property in order to determine if an area of potential environmental concern exists and to interpret any area of potential environmental concern.

2. To obtain and review records that relate to properties in the Phase I (One) study area other than the Phase I (One) property, in order to determine if an area of potential environmental concern exists and to interpret any area of potential environmental concern.

It is therefore reasonable to request that the HLUI search be included in the Phase I ESA to meet the above objectives.
Please submit.

All existing reports and plans will need to be revised if older than 2 years and must reflect current City Standards, Guidelines, By-laws and Policies.

Please refer to City of Ottawa website portal **for "Guide to preparing Studies and Plans"** at https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans.

Please ensure you are using the current guidelines, bylaws and standards including materials of construction, disinfection and all relevant reference to OPSS/D and AWWA guidelines - all current and as amended, such as:

City of Ottawa Sewer Design Guidelines (**CoOSDG**) complete with ISTDB 2012-01, 2014-01, 2016-0, 2018-01 & 2019-02 technical bulletin updates as well as current Sewer, Landscape & Road Standard Detail Drawings as well as Material Specifications (MS Docs).
Sewer Connection (2003-513) & Sewer Use (2003-514) By-Laws.

City of Ottawa Water Distribution Design Guidelines (**CoOWDDG**) complete with ISTDB 2010-02, 2014-02 & 2018-02 technical bulletin updates as well as current Watermain/ Services Material Specifications (MS Docs) as well as Water and Road Standard Detail Drawings.
FUS Fire Flow standards
Water (2018-167) By-Law

Ensure to include version date and add "(**as amended**)" when referencing all standards, detail drwaings, by-Laws and guidelines.

Contact me at 613-580-2424, Ext. # 33017 or e-mail shawn.wessel@ottawa.ca if you have any questions.

Sincerely,

Shawn Wessel, A.Sc.T., rcji
Project Manager
Development Review, Central Branch

RVCA Correspondence Regarding Stormwater Quality Control Requirements

Daniel Glauser

From:	Eric Lalande <eric.lalande@rvca.ca>
Sent:	Wednesday, September 1, 2021 10:13 AM
To:	Daniel Glauser
Cc:	Glen McDonald
Subject:	RE: Site Plan Control Regulatory Requirements; Gladstone Village - Phase 1

Hi Dan,

As the majority of site is rooftop, which is considered clean, the RVCA has no additional water quality protection requirements for the site. Best management practices are encouraged to be integrated where possible. This comment is based on our understanding of the site plan and no more than 5 above ground parking spaces being provided.

Thank you,

Eric Lalande, MCIP, RPP
Planner, RVCA
613-692-3571 x1137

From: Daniel Glauser <DGlauser@morrisonhershfield.com>
Sent: Wednesday, September 1, 2021 10:03 AM
To: Glen McDonald <glen.mcdonald@rvca.ca>
Cc: Eric Lalande <eric.lalande@rvca.ca>
Subject: Site Plan Control Regulatory Requirements; Gladstone Village - Phase 1

Hi Glen,

We are designing the phase 1 development of Gladstone Village located at 933 Gladstone Avenue in Ottawa (Link to Map location). I have included a plan showing the municipal infrastructure near the site from the cities GIS service - GeoOttawa.

The project objective is to construct the first phase of the Gladstone Village subdivision, which includes a multi-tiered residential building which is illustrated in the renderings and layout drawings attached. I've attached also drawing showing the proposed site servicing, which shows the re-located municipal sewers/watermains. The majority of the overland drainage will be captured and detained on-site to meet the stormwater requirements set out by the City of Ottawa. There is potential for a maximum of 3 above ground parking spaces located between the lower end of the ramp to the parking level and the structure above. This is illustrated in the Preliminary Architectural Rendering Pdf attached. Given these parking spaces are covered, the drainage will be directed towards the sanitary system. There will be no other above ground parking as part of the site.

Please could you confirm whether on-site quality control is required for this site, and if required, what treatment level would be required.

Kind Regards

Daniel Glauser
Municipal Designer - Infrastructure Ottawa
Office: 613 739 2910 Ext. 1022323
DGlauser@morrisonhershfield.com

MECP Correspondence Regarding Regulatory Requirements

Daniel Glauser

From: Daniel Glauser
Sent: Tuesday, August 17, 2021 3:02 PM
To: MOECCOttawaSewage@ontario.ca
Cc: Diamond, Emily (MECP)
Subject: ECA requirements; Gladstone Village Phase 1
Attachments: geoOttawa.pdf; Site Servicing Plan-C001.pdf; Preliminary Arch.Renderings.pdf

To whom it may concern,

We are designing the phase 1 development of Gladstone Village located south of 1010 Somerset in Ottawa (Link to Map location). I have included a plan showing the municipal infrastructure near the site from the cities GIS service - GeoOttawa.

The project objective is to construct the first phase of the Gladstone Village subdivision, which includes a multi-tiered residential building which is illustrated in the renderings and layout drawings attached. I've attached also drawing showing the proposed site servicing, which shows the re-located municipal sewers/watermains. The majority of the overland drainage will be captured and detained on-site to meet the stormwater requirements set out by the City of Ottawa.

As identified by the attached GeoOttawa extract, there are currently a large diameter stormwater and combing sewer that cross the site. These sewers will be relocated as part of the Gladstone Village subdivision construction. These works (and the associated ECA application) will be undertaken under a separate contract and will relocated outside of our site prior to the construction our site. We will simply be connecting our the parcel building services to the relocated sewers/watermains.

We were asked as part of the site plan approval process to confirm that no ECA is required for this work. Could you please confirm that under these conditions an ECA is not required?

Please feel free to contact me if you have any questions.

Kind Regards

Daniel Glauser
Municipal Designer - Infrastructure Ottawa
Office: 613 739 2910 Ext. 1022323
DGlauser@morrisonhershfield.com

2932 Baseline Road | Ottawa, ON K2H 1B1 Canada
Dir: 613 739 2910 x1022323
Did you know? Morrison Hershfield turns 75 this year. Read more about our diamond anniversary milestone here.
Think before you ink. Please consider the environment before printing this email and feel free to send us all project documents electronically.

Appendix C

Water Demand and FUS Calculations

Gladstone Village, Phase 1 - Block 6

Project Name	Gladstone Village, 933 Gladstone Avenue
Project Number	210101900
Site Address	933 Gladstone Avenue
Completed By	DG
Date	10-Mar-22

Per Fire Underwriters Survey, Water Supply for Public Fire Protection, 1999, as modified and amended by the City of Ottawa Design Guidelines, Water Distribution, Appendix H "Protocol to Clarify the Application of the Fire Flow Calculation Method Published by Fire Underwriters Survey (FUS)"

Calculation:

1. Determine Estimated Fire Flow based on Building Floor Area

F= 220 C √A

F= Required flow in litres / minute

A= Total floor area in m^2

C= Coefficient related to Construction
= 1.5 for wood frame construction
= 1.0 for ordinary construction
= 0.8 for non-combustible construction
= 0.6 for fire-resistive construction

C= 0.8

Name	Area m2	Name	Area m2
Level 1	2443	Level 11	691
Level 2	3455	Level 12	691
Level 3	3426	Level 13	691
Level 4	2503	Level 14	691
Level 5	2400	Level 15	691
Level 6	1935	Level 16	691
Level 7	1935	Level 17	691
Level 8	1496	Level 18	691
Level 9	1695	Level 19	590
Level 10	940	**Total**	**28346**

A= 28346 m^2 - Based on Architectural

F= 29631.8 L/min

Round to nearest 1000 L/m, F = 30000.0 L/min

2. Adjust flow based on Fire hazard and contents

A	Non-combustible	-25%
B	Limited Combustible	-15%
C	Combustible	0%
D	Free Burning	15%
E	Rapid Burning	25%

Type of Construction (A,B,C,D)	B	
Adjustment Factor	-15%	
Flow From 1.	30000.0	L/min
Adjusted Flow	25500.0	L/min
Minimum Flow (2000 L/min)	25500.0	L/min
Flow	25500.0	L/min

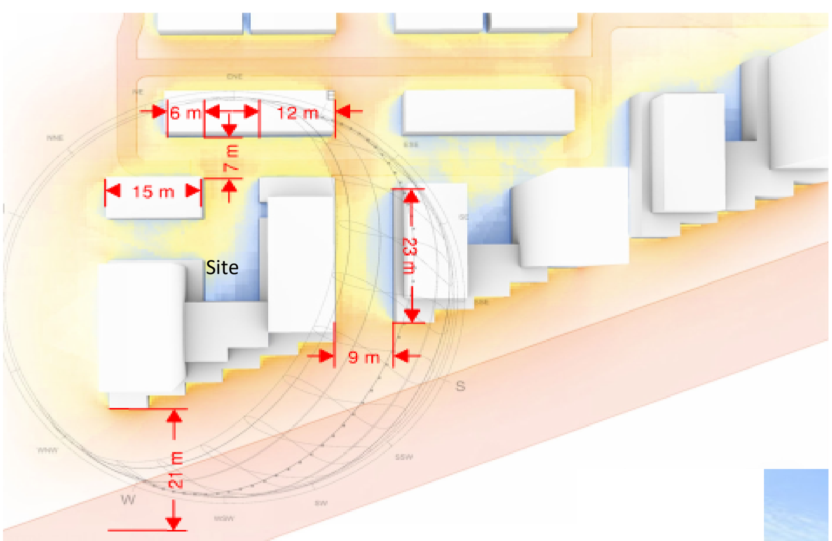
3. Reduce flow from No. 2. based on automatic sprinkler protection

Flow from 2.	25500.0	L/min
Automatic Sprinkler Protection (yes/no)	Yes	
Reduction	30%	(Maximum 30%)
Water supply is standard (yes/no)	Yes	
Additional Reduction	10%	(Maximum 10%)
Sprinkler System is fully supervised (yes/no)	Yes	
Additional Reduction	10%	(Maximum 10%)
Total Reduction	50%	
Flow after Sprinkler Reduction	12750.0	L/min

4. Adjacent Structures / Fire Separation with other buildings

Flow from 3.	12750.0	L/min

Figure 1: Adjacent Buildings



Exposure charge based on Table G5:

Side	Separation Distance (m)	LH Factor	Exposure Charge
North	>45	0	0%
East	7	54	16%
South	9	81	18%
West	>45	0	0%

Cumulative Increase (Max 75%) 34%

Flow Increased for Adjacent Structures	17085.0	L/min
Maximum Permitted Flow (45 000 L/min)	17085.0	L/min
Minimum Permitted Flow (2 000 L/min)	17085.0	L/min
Required Fire Flow (rounded to nearest 1000 L/m)	17000.0	L/min
	283.33	L/s

Required fire flow is available from hydrants within 150m of building (To be provided as part of sub-dvision design):

Hydrant	Distance from building (m)	Class	Contribution to required fire flow (L/m)
1 (proposed)*	38	AA	5700
2 (proposed)	<90	AA	5700
3 (proposed)	>75	AA	3800
4 (relocated)	86	AA	3800
*Hydrant within 45m of Siamese		Available Flow	19000

Required Flow (FUS calc) 17000.0 L/min

Gladstone Village, Phase 1 - Block 6

10-Mar-22

Domestic Water Demands

Project Name	Gladstone Village, 933 Gladstone Avenue
Project Number	210101900
Site Address	933 Gladstone Avenue
Completed By	DG

Building Occupancy 573 people

Building Occupancy Breakdown

Unit type			**persons per unit**	
Bachelor/Studio	59	ea	1.4	82.6
1 Bedroom	180	ea	1.4	252
2 Bedroom	60	ea	2.1	126
3 Bedroom	36	ea	3.1	111.6
			Total	**572.2**

Residential	573 persons	
Per Capita Flow	350 l/per/d	City of Ottawa Water Design Guidelines Table 4.2 - residential
Daily average flow	200550 l/d	>50000 l/d Therefore dual water services are required
Daily average flow	2.321 l/s	

Residential portion

Maximum Daily Demand Peak

Peak Factor	2.50 x average day	City of Ottawa Water Design Guidelines Table 4.2 - residential
Peak Flow	5.80 l/s	
	91.98 GPM	

Maximum Hourly Demand Peak

Peak Factor	2.20 x max day	City of Ottawa Water Design Guidelines Table 4.2 - residential
Peak Flow	12.77 l/s	
	202.35 GPM	

Fire Flow (refer to separate calculation)	283.33 l/s
Max Daily + Fire demand	289.14 l/s

Gladstone Village, Phase 1 - Block 6

10-Mar-22

Water Service Sizing (Pressure Loss from Boundary to Site - Fire Flow Condition)

HGL_{Road}= 107.00 (m)
Building FFE= 60.65 (m)
P_{Road}= 46.35 (m)
P_{Road}= 454.7 (kPa)
P_{Road}= 65.95 (psi)

Length

L= 28 (m)
92 (ft)

Size

d= 200 (mm)
8 (in)

Flow

Q = 0.2891 (m3/s)
4583 (Usg/min)

Velocity

$$V = \frac{1.274Q}{d^2}$$

V= 9.21 (m/s)

Head Loss

$$P_d = \frac{4.52Q^{1.85}}{C^{1.85}d^{4.87}}$$

$$P = 0.434hSG$$

SG= specific gravity of water
= 1
C = 110
P_d= 0.1937 (psi)
h= 0.446 (ft/ft)
41.01 (ft)

Pipe Diameter	C-Factor
150	100
200-250	110
300-600	120
600+	130

Pressure Loss

P_{ROAD}= 66.0 (psi)
P_L= 17.8 (psi)
$P_{AT\ METER}$= 48.2 (psi)
$P_{AT\ METER}$= 332.0 (kPa)
$P_{AT\ METER}$= 94.5 (m)

Gladstone Village, Phase 1 - Block 6

Water Service Sizing (Pressure Loss from Boundary to Site - Domestic Flow Condition)

HGL_{Road}= 107.00 (m)
Building FFE= 60.65 (m)
P_{Road}= 46.35 (m)
P_{Road}= 454.7 (kPa)
P_{Road}= 65.95 (psi)

Length

L= 28 (m)
92 (ft)

Size

d= 200 (mm)
8 (in)

Flow

Q = 0.0128 (m3/s)
202 (Usg/min)

Velocity

$$V = \frac{1.274Q}{d^2}$$

V= 0.41 (m/s)

Head Loss

$$P_d = \frac{4.52Q^{1.85}}{C^{1.85}d^{4.87}}$$

$$P = 0.434hSG$$

SG= specific gravity of water
= 1
C = 110
P_d= 0.0006 (psi)
h= 0.001 (ft/ft)
0.13 (ft)

Pipe Diameter	C-Factor
150	100
200-250	110
300-600	120
600+	130

Pressure Loss

P_{ROAD}= 66.0 (psi)
P_L= 0.1 (psi)
$P_{AT\ METER}$= 65.9 (psi)
$P_{AT\ METER}$= 454.3 (kPa)
$P_{AT\ METER}$= 107.0 (m)

Gladstone Village, Phase 1 - Block 6

10-Mar-22

Water Service Sizing (Max Day + Fire)

HGL_{Road}= 94.49 (m)
Building FFE= 60.65 (m)
P_{Road}= 33.843615 (m)
P_{Road}= 332.0 (kPa)
P_{Road}= 48.15 (psi)

Length

L= 10 (m)
33 (ft)

Size

d= 200 (mm)
8 (in)

Flow

Q = 0.2891 (m3/s)
4583 (Usg/min)

Velocity

$$V = \frac{1.274Q}{d^2}$$

V= 9.21 (m/s)

Head Loss

$$P_d = \frac{4.52Q^{1.85}}{C^{1.85}d^{4.87}}$$

$$P = 0.434hSG$$

SG= specific gravity of water
= 1
C = 110
P_d= 0.1937 (psi)
h= 0.446 (ft/ft)
14.65 (ft)

Pipe Diameter	C-Factor
150	100
200-250	110
300-600	120
600+	130

Pressure Loss

P_{ROAD}= 48.2 (psi)
P_L= 6.4 (psi)
$P_{AT\ METER}$= 41.8 (psi)
$P_{AT\ METER}$= 288.2 (kPa)

Minimum pressure required under Maximum Day + Fire Demand = 140.0 (kpa)

Pressure is satisfactory

Gladstone Village, Phase 1 - Block 6

10-Mar-22

Water Service Sizing (Max Hourly)

HGL_{Road}= 107.0 (m)
Building FFE= 60.65 (m)
P_{Road}= 46.312684 (m)
P_{Road}= 454.3 (kPa)
P_{Road}= 65.89 (psi)

Length

L= 10 (m)
33 (ft)

Size

d= 200 (mm)
8 (in)

Flow

Q = 0.0128 (m3/s)
202 (Usg/min)

Velocity

$$V = \frac{1.274Q}{d^2}$$

V= 0.41 (m/s)

Head Loss

$$P_d = \frac{4.52Q^{1.85}}{C^{1.85}d^{4.87}}$$

$$P = 0.434hSG$$

SG= specific gravity of water
= 1
C = 110
P_d= 0.000603 (psi)
h= 0.001390 (ft/ft)
0.0456 (ft)

Pipe Diameter	C-Factor
150	100
200-250	110
300-600	120
600+	130

Pressure Loss

P_{ROAD}= 65.9 (psi)
P_L= 0.0 (psi)
$P_{AT\ METER}$= 65.9 (psi)
$P_{AT\ METER}$= 454.2 (kpa)

Minimum pressure required under Maximum Hourly Demand = 276.0 (kpa)

Pressure is satisfactory

Requirement for Domestic Water Booster Pump

Roof elevation= 80 (m)
Building height= 19.35 (m)
Max height at which minimum pressure is provided= 18.2 (m) above ground floor

Booster pump is required for all floors >18.2m above ground floor

Gladstone Village, Phase 1 - Block 6

10-Mar-22

Water Service Sizing (Max Day + Fire)

HGL_{Road}=	107.0	(m)
Building FFE=	60.65	(m)
P_{Road}=	46.312684	(m)
P_{Road}=	454.3	(kPa)
P_{Road}=	65.89	(psi)

Length

L=	10	(m)
	33	(ft)

Size

d=	200	(mm)
	8	(in)

Flow

Q =	0.0058	(m3/s)
	92	(Usg/min)

Velocity

$$V = \frac{1.274Q}{d^2}$$

V= 0.18 (m/s)

Head Loss

$$P_d = \frac{4.52Q^{1.85}}{C^{1.85}d^{4.87}}$$

$$P = 0.434hSG$$

SG=	specific gravity of water	
=	1	
C =	110	
P_d=	0.0001	(psi)
h=	0.000	(ft/ft)
	0.01	(ft)

Pipe Diameter	C-Factor
150	100
200-250	110
300-600	120
600+	130

Pressure Loss

P_{ROAD}=	65.9	(psi)
P_L=	0.0	(psi)
$P_{AT\ METER}$=	65.9	(psi)
$P_{AT\ METER}$=	454.3	(kPa)

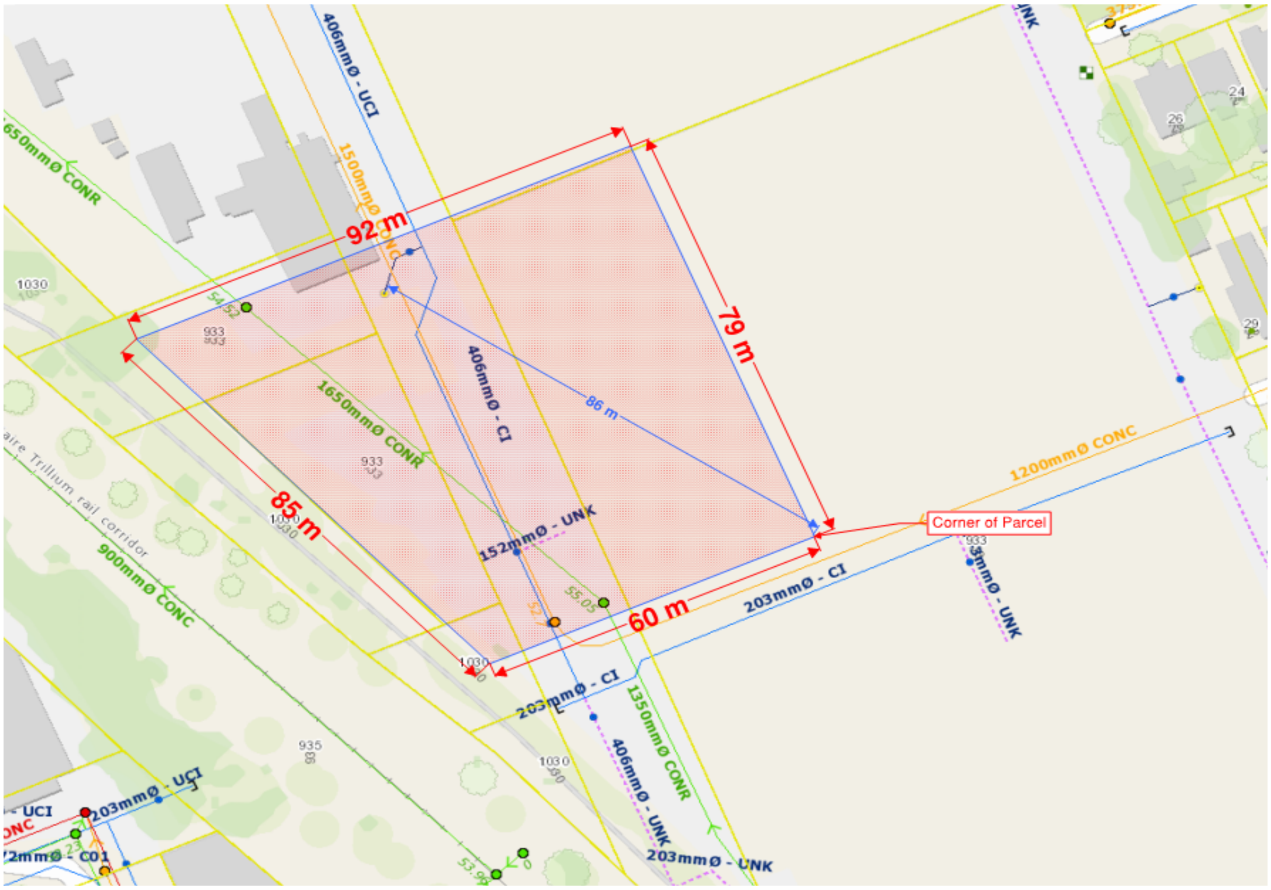
Minimum pressure required under Maximum Day + Fire Demand = 345.0 (kpa)

Pressure is satisfactory

Gladstone Village, Phase 1 - Block 6

10-Mar-22

Key Plan showing surrounding hydrants and distances to surrounding structures



FUS - Supporting Coordination Correspondence

Daniel Glauser

From:	Elaine Guenette <elaine.guenette@smithandandersen.com>
Sent:	Wednesday, July 28, 2021 10:10 PM
To:	Arne Suraga; Daniel Glauser; Maya Orzechowska
Cc:	Ran Zaig; James Fookes; Kyle Alliston; SUDHIR CHHAYANI; Allie Gilks; Nigel Tai
Subject:	RE: OCH-PH1 - Information required for Fire Underwriters Survey Calculation

Hi Arne, Daniel,

The sprinkler system is fully supervised.

Regards,

Smith + Andersen

Elaine Guenette B.A.Sc., P.Eng., LEED AP
Principal
d 613 691 1853 **m** 343 961 2244

From: Arne Suraga <ASuraga@dsai.ca>
Sent: Wednesday, July 28, 2021 7:32 PM
To: Daniel Glauser <dglauser@morrisonhershfield.com>; Maya Orzechowska <MOrzechowska@dsai.ca>; Elaine Guenette <elaine.guenette@smithandandersen.com>
Cc: Ran Zaig <rzaig@kwc-arch.com>; James Fookes <jfookes@morrisonhershfield.com>; Kyle Alliston <KAlliston@morrisonhershfield.com>; SUDHIR CHHAYANI <SCHHAYANI@morrisonhershfield.com>; Allie Gilks <agilks@lmdg.com>; Nigel Tai <ntai@dsai.ca>
Subject: RE: OCH-PH1 - Information required for Fire Underwriters Survey Calculation

CAUTION: EXTERNAL SENDER
Hi Daniel,

To respond to your questions below (and follow up on our phone call earlier):

1. Attached are two area breakdowns: One is of Building Area per floor, the other is a summary of GFA per floor, with a total also provided.
2. Our building is to be of non-combustible construction to meet OBC Part 3 requirements for a high-rise building. While I've haven't used the ISO fire rating classification system previously, it would appear to be an ISO Class 3 building.
3. In terms of this occupancy rating, I've copied in Allie Gilks from LMDG for commentary. As far as the documentation you forwarded, it would appear the most appropriate would be the C-2 limited-combustibility occupancy (since it lists apartments as a C-2 occupancy example).
4. Confirmed.
5. I believe this should be the case, but I will let Elaine confirm.

Also attached is the latest draft Code Report for your information.

Thanks,

Arne

Arne Suraga
Associate

Diamond Schmitt Architects
m: 416 720 8126

From: Daniel Glauser <DGlauser@morrisonhershfield.com>
Sent: July 26, 2021 5:14 PM
To: Arne Suraga <ASuraga@dsai.ca>; Maya Orzechowska <MOrzechowska@dsai.ca>
Cc: Ran Zaig <rzaig@kwc-arch.com>; James Fookes <jfookes@morrisonhershfield.com>; Kyle Alliston <KAlliston@morrisonhershfield.com>; SUDHIR CHHAYANI <SCHHAYANI@morrisonhershfield.com>; Glenn Somerton <GSomerton@morrisonhershfield.com>
Subject: OCH-PH1 - Information required for Fire Underwriters Survey Calculation

Hi Arne, Maya,

For Site Plan Control submission we are required to provide supporting correspondence for our assumptions with respect to the Fire Underwriters Survey fire flow calculations. These calculations are provided as part of the Site Servicing report, and are used by the City to verify that sufficient fire flow is available at hydrants in the vicinity of the building.

Could you please confirm the following.

1. Building Floor Area per floor and total GFA divided into independent fire areas.

2. Type of construction, based on the ISO classes and additional notes as follows. The ISO guide referenced here is attached as a PDF.

A. Determine the type of construction.

- Coefficient *C* in the FUS method is equivalent to coefficient *F* in the ISO method:

Correspondence between FUS and ISO construction coefficients

FUS type of construction	ISO class of construction	Coefficient *C*
Fire-resistive construction	Class 6 (fire resistive)	0.6
	Class 5 (modified fire resistive)	0.6
Non-combustible construction	Class 4 (masonry non-combustible)	0.8
	Class 3 (non-combustible)	0.8
Ordinary construction	Class 2 (joisted masonry)	1.0
Wood frame construction	Class 1 (frame)	1.5

However, the FUS definition of fire-resistive construction is more restrictive than those of ISO construction classes 5 and 6 (modified fire resistive and fire resistive). FUS requires structural members and floors in buildings of fire-resistive construction to have a fire-resistance rating of 3 hours or longer.

- With the exception of fire-resistive construction that is defined differently by FUS and ISO, practitioners can refer to the definitions of the ISO construction classes (and the supporting definitions of the types of materials and assemblies that make up the ISO construction classes) found in the current ISO guide [4] (see Annex i) to help select coefficient *C*.
- To identify the most appropriate type of construction for buildings of mixed construction, the rules included in the current ISO guide [4] can be followed (see Annex i). For a building to be assigned a given classification, the rules require ⅔ (67%) or more of the total wall area and ⅔ (67%) or more of the total floor and roof area of the building to be constructed according to the given construction class or a higher class.

3. Occupancy type based on the following classifications. Definitions are included in the attached PDF.

- The charge for occupancy class in the FUS method corresponds with the occupancy factor *O* in the ISO method (subtracting 1.00 from the ISO *O* factor values and converting to a percentage will yield the FUS charges):

Correspondence between FUS occupancy charges and ISO occupancy factors

FUS occupancy class	ISO occupancy combustibility class	Occupancy charge	Occupancy factor *O*
Non-combustible	C-1 (non-combustible)	−25%	0.75
Limited combustible	C-2 (limited combustibility)	−15%	0.85
Combustible	C-3 (combustible)	No charge	1.00
Free burning	C-4 (free burning)	+15%	1.15
Rapid burning	C-5 (rapid burning or flash burning)	+25%	1.25

4. Confirm that the building will be provided with complete automatic sprinkler protection.

5. Confirm whether the sprinkler system is fully supervised. This requires a supervisory signal and water flow alarm to be transmitted to an approved monitoring location, meeting the NFPA requirements as follows:

- The FUS guide offers an additional credit of up to 10% for sprinkler systems that are considered "fully supervised", but the phrase is not clearly defined. In its *Life Safety Code* [10], the National Fire Protection Association (NFPA) describes "supervision" of sprinkler systems as requiring two types of signals:
  - a distinctive supervisory signal to indicate conditions that could impair the satisfactory operation of the sprinkler system (a fault alarm), which is to sound and be displayed, either at a location within the building that is constantly attended by qualified personnel (such as a security room), or at an approved remotely located receiving facility (such as a monitoring facility of the sprinkler system manufacturer); and
  - a water flow alarm to indicate that the sprinkler system has been activated, which is to be transmitted to an approved, proprietary alarm-receiving facility, a remote station, a central station or the fire department.

Let me know if you have any questions!

Kind Regards

Daniel Glauser
Municipal Designer - Infrastructure Ottawa
Office: 613 739 2910 Ext. 1022323
DGlauser@morrisonhershfield.com

2932 Baseline Road | Ottawa, ON K2H 1B1 Canada
Dir: 613 739 2910 x1022323

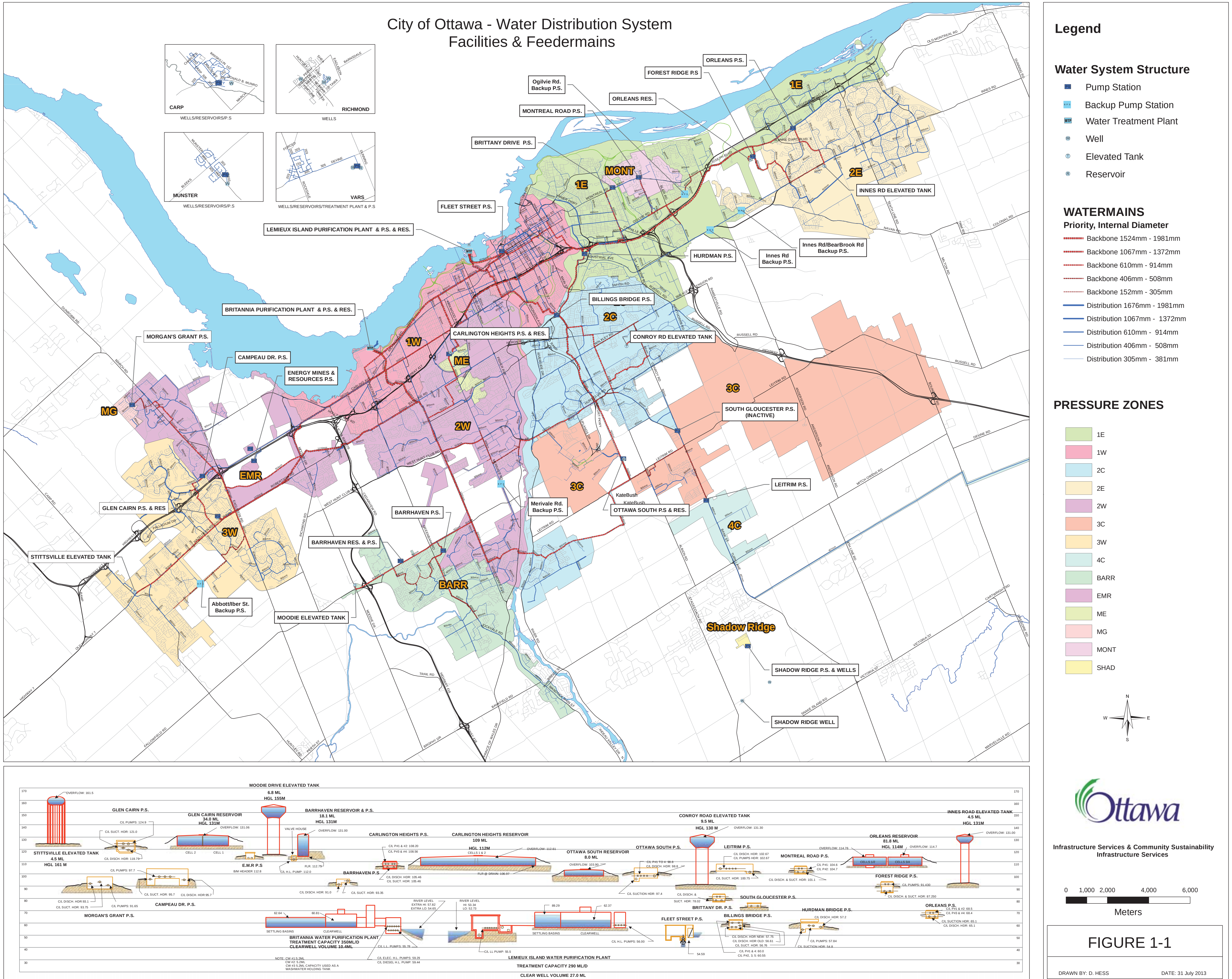

City of Ottawa - Water Distribution System
Facilities & Feedermains
CARP
WELLS/RESERVOIRS/P.S
RICHMOND
WELLS
MUNSTER
WELLS/RESERVOIRS/P.S
VARS
WELLS/RESERVOIRS/TREATMENT PLANT & P.S
ORLEANS P.S.
FOREST RIDGE P.S
Ogilvie Rd. Backup P.S.
ORLEANS RES.
MONTREAL ROAD P.S.
BRITTANY DRIVE P.S.
FLEET STREET P.S.
LEMIEUX ISLAND PURIFICATION PLANT & P.S. & RES.
INNES RD ELEVATED TANK
Innes Rd/BearBrook Rd Backup P.S.
Innes Rd Backup P.S.
HURDMAN P.S.
BILLINGS BRIDGE P.S.
BRITANNIA PURIFICATION PLANT & P.S. & RES.
CARLINGTON HEIGHTS P.S. & RES.
CONROY RD ELEVATED TANK
MORGAN'S GRANT P.S.
CAMPEAU DR. P.S.
ENERGY MINES & RESOURCES P.S.
SOUTH GLOUCESTER P.S. (INACTIVE)
LEITRIM P.S.
GLEN CAIRN P.S. & RES
Merivale Rd. Backup P.S.
OTTAWA SOUTH P.S. & RES.
BARRHAVEN P.S.
BARRHAVEN RES. & P.S.
STITTSVILLE ELEVATED TANK
Abbott/Iber St. Backup P.S.
MOODIE ELEVATED TANK
SHADOW RIDGE P.S. & WELLS
SHADOW RIDGE WELL
1E
MONT
2E
1W
ME
2C
3C
MG
2W
EMR
3W
4C
BARR
Shadow Ridge
Legend
Water System Structure
Pump Station
Backup Pump Station
Water Treatment Plant
Well
Elevated Tank
Reservoir
WATERMAINS
Priority, Internal Diameter
Backbone 1524mm - 1981mm
Backbone 1067mm - 1372mm
Backbone 610mm - 914mm
Backbone 406mm - 508mm
Backbone 152mm - 305mm
Distribution 1676mm - 1981mm
Distribution 1067mm - 1372mm
Distribution 610mm - 914mm
Distribution 406mm - 508mm
Distribution 305mm - 381mm
PRESSURE ZONES
1E
1W
2C
2E
2W
3C
3W
4C
BARR
EMR
ME
MG
MONT
SHAD
MOODIE DRIVE ELEVATED TANK
6.8 ML
HGL 155M
STITTSVILLE ELEVATED TANK
4.5 ML
HGL 161 M
GLEN CAIRN P.S.
GLEN CAIRN RESERVOIR
34.0 ML
HGL 131M
BARRHAVEN RESERVOIR & P.S.
18.1 ML
HGL 131M
E.M.R P.S
CARLINGTON HEIGHTS P.S.
CARLINGTON HEIGHTS RESERVOIR
109 ML
HGL 112M
BARRHAVEN P.S.
MORGAN'S GRANT P.S.
CAMPEAU DR. P.S.
BRITANNIA WATER PURIFICATION PLANT
TREATMENT CAPACITY 350ML/D
CLEARWELL VOLUME 10.4ML
LEMIEUX ISLAND WATER PURIFICATION PLANT
TREATMENT CAPACITY 290 ML/D
CLEAR WELL VOLUME 27.0 ML
OTTAWA SOUTH RESERVOIR
8.0 ML
OTTAWA SOUTH P.S.
CONROY ROAD ELEVATED TANK
9.5 ML
HGL 130 M
LEITRIM P.S.
MONTREAL ROAD P.S.
ORLEANS RESERVOIR
81.8 ML
HGL 114M
INNES ROAD ELEVATED TANK
4.5 ML
HGL 131M
FOREST RIDGE P.S.
SOUTH GLOUCESTER P.S.
BRITTANY DR. P.S.
FLEET STREET P.S.
BILLINGS BRIDGE P.S.
HURDMAN BRIDGE P.S.
ORLEANS P.S.
Infrastructure Services & Community Sustainability
Infrastructure Services
0 1,000 2,000 4,000 6,000
Meters
DRAWN BY: D. HESS
DATE: 31 July 2013

FIGURE 1-1

Boundary Conditions - Functional Servicing Study Excerpt

From:	Wessel, Shawn
To:	Mott, Peter
Cc:	Paerez, Ana
Subject:	Gladstone Village OCH Boundary Conditions Request Draft
Date:	Tuesday, March 23, 2021 2:13:52 PM
Attachments:	Gladstone Village OCH March 2021.pdf

Good afternoon Mr. Mott.

Please find water boundary conditions, as requested:

The following are boundary conditions, HGL, for the hydraulic analysis at Gladstone Village OCH (zone 1W) assumed to be internally looped and connected to the 406 mm on Champagne Avenue, 152 mm on Oak Street and 203 mm on Gladstone Avenue (see attached PDF for location).

All Connections:

Minimum HGL = 107.0 m

Maximum HGL = 114.9 m

Max Day + Fire Flow	Fire Demand (167 L/s)	Fire Demand (233 L/s)	Fire Demand (250 L/s)
Champagne 406mm Connection	109.1 m	108.4 m	108.2 m
Oak 152mm Connection	106.2 m	103.4 m	102.5 m
Gladstone 203mm Connection	106.4 m	103.7 m	102.9 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.

If you require additional information or clarification, please do not hesitate to contact me anytime.

Thank you

Regards,

Shawn Wessel, A.Sc.T.,rcji
Project Manager - Infrastructure Approvals
Gestionnaire de projet – Approbation des demandes d'infrastructures

Development Review Central Branch | Direction de l'examen des projets d'aménagement, Centrale
Planning, Infrastructure and Economic Development Department | Direction générale de la planification de l'infrastructure et du développement économique
City of Ottawa | Ville d'Ottawa
110 Laurier Ave. W. | 110, avenue Laurier Ouest, Ottawa ON K1P 1J1
(613) 580 2424 Ext. | Poste 33017
Int. Mail Code | Code de Courrier Interne 01-14
shawn.wessel@ottawa.ca

*****Please also note that, while my work hours may be affected by the current situation and am working from home, I still have access to email, video conferencing and telephone. Feel free to schedule video conferences and/or telephone calls, as necessary.*****

From: Mott, Peter <Peter.Mott@stantec.com>
Sent: March 17, 2021 11:10 AM
To: Wessel, Shawn <shawn.wessel@ottawa.ca>
Cc: Paerez, Ana <Ana.Paerez@stantec.com>
Subject: RE: Gladstone Village OCH Boundary Conditions Request Draft

Hello Mr. Wessel,

I would like to request the hydraulic boundary conditions for the proposed Gladstone Village OCH Development (933 Gladstone Avenue). Please find attached the concept plan, the key map showing the location of the proposed development, domestic water demand calculations, and fire flow calculations.

A summary of the proposed site is provided below:

We anticipate that three (3) connections to the existing watermain infrastructure will be required to service the site. The following connections are expected for servicing:

➢Connection to existing 152 mm (PVC) watermain on Oak Street;
➢Connection to existing 403 mm (UCI) watermain on the North West corner of property (Champagne Avenue);
➢Connection to existing 203 mm (PVC) watermain on Gladstone Avenue.

*Existing hydrants on Somerset Street West, Laurel, Larch and Balsam Street, and Gladstone Avenue.

For the purpose of the boundary conditions request, may you please provide us with the boundary conditions for the following servicing options:

i. Watermain connections to the existing 152 mm (PVC) watermain on Oak Street, the existing 403 mm (UCI) watermain on the North West corner of property (Champagne Avenue), and to the existing 203 mm (PVC) watermain on Gladstone Avenue; assuming a fire flow requirement of **10,000 L/min** for the site in addition to the domestic water demands provided below.

ii. Watermain connections to the existing 152 mm (PVC) watermain on Oak Street, the existing 403 mm (UCI) watermain on the North West corner of property (Champagne Avenue), and to the existing 203 mm (PVC) watermain on Gladstone Avenue; assuming a fire flow of **14,000 L/min** for the site in addition to the domestic water demands provided below.

- The intended land use is a combination of commercial and residential, per the summary provided in the Domestic Demands spreadsheet. (See attached Concept Plan with project stats)
- Estimated fire flow demand per the FUS methodology: 14000 L/min (250 L/s) for the worst-case scenario (Block B2)
- Domestic water demands for the entire development:
    - **Average day: 681.6 L/min (11.36 L/s)**
    - **Maximum day: 1415.7 L/min (23.59 L/s)**
    - **Peak hour: 2941.5 L/min (49.03 L/s)**

Thank you for your time and please contact me at your earliest convenience if any additional information or clarification is required.

Best regards,

Peter Mott EIT
Engineering Intern, Community Development

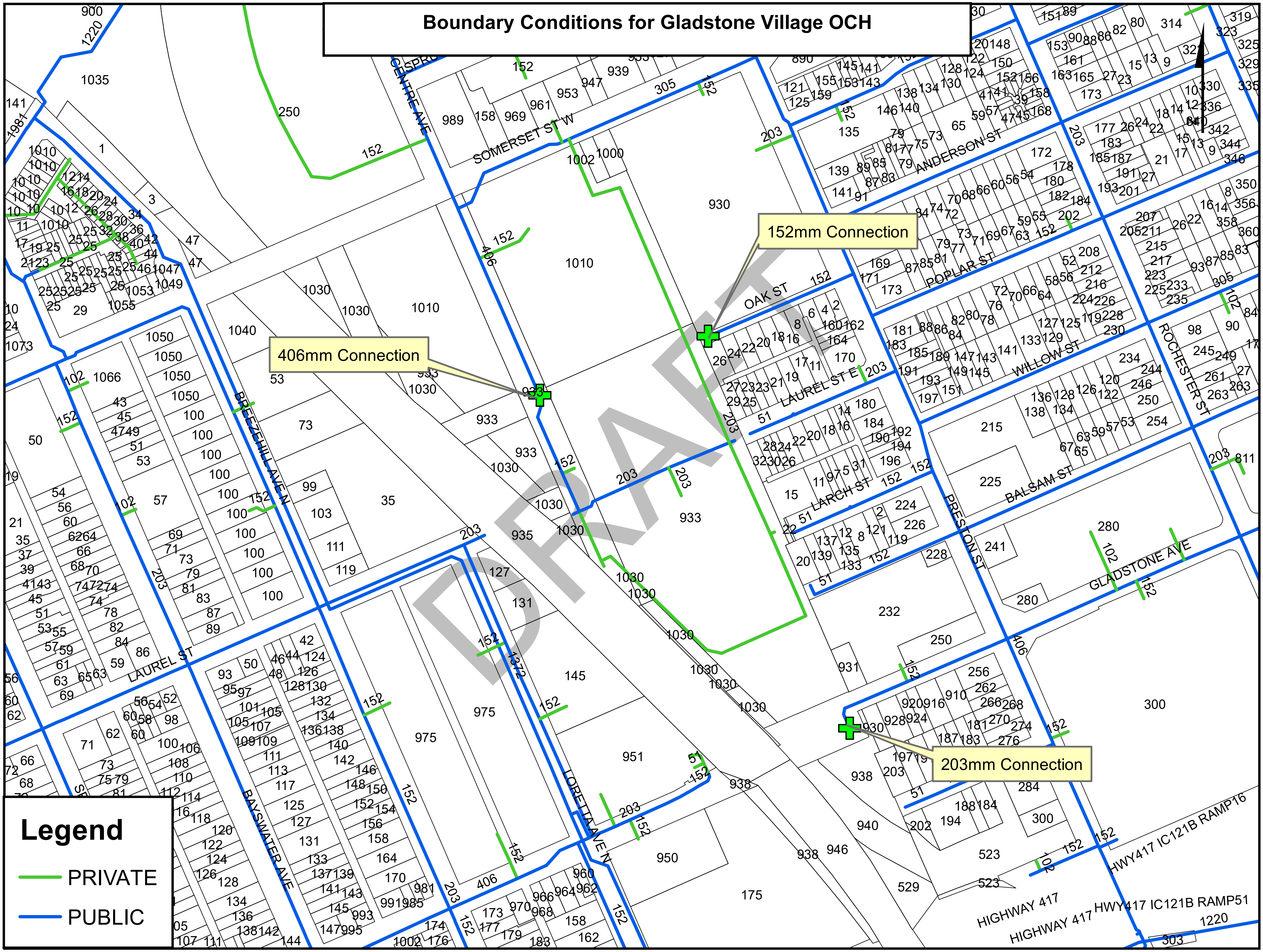
Mobile: 613-897-0445

Peter.Mott@stantec.com
Stantec
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

'

'

Boundary Conditions for Gladstone Village OCH



Appendix D

Sanitary Flow Calculations

Gladstone Village Phase 1 - Sanitary Flow Estimate

Occupancy Based Calculation

Occupancy	573	persons	(per Water Demand Calculations)
Per Capita Flow	280	l/c.d	(Sewer Design Guidelines, Figure 4.3)
Daily average flow	160 440	l/d	
	160.44	m³/d	
Peak Factor	3.61		(Sewer Design Guidelines, Figure 4.3)
Peak Flow	6.7	l/s	
Ground Floor Amenity Space	945.00	m²	
Daily average flow	0.03	L/s	
Peak Factor	1		(Sewer Design Guidelines, Figure 4.3)
Peak Flow	0.03	l/s	
Site Area	0.614	ha	
Infiltration allowance	0.33	l/s.gross ha	(Sewer Design Guidelines, Figure 4.3)
Infiltration flow	0.20262	l/s	
Peak Flow	6.9	l/s	

Mechanical Based Calculation

Peak Flow	340	GPM	(per Mechanical Correspondence)
Peak Flow	21.45	L/s	

Peak flow occurs based on the Mechanical FU estimate, so a peak sanitary flow of 21.45 L/sec will be used for design.

Designed: **D. Glauser**		Project: **Gladstone Village - Phase 1** **Proposed Servicing**	
Checked: **J. Fookes**	Date: **March 9, 2022**	Location: **933 Gladstone Avenue**	
Dwg Reference: **C-001**	File Ref: **210101900**		Sheet No.: **1 of 1**

PROPOSED SANITARY SEWER CALCULATION SHEET

Proposed Development - Gladstone Village Phase 1

LOCATION				RESIDENTIAL AREA AND POPULATION										COMMERCIAL			INSTITUTIONAL		
Area ID	UP	Down	Area	Number of Units				Pop.	Cumulative		Qres	Peak.	Qres	Area	Accu	Qc	Area	Accu	Qins
				By Type					area	pop.	avg.	Fact.				avg.			avg.
			(ha)	Bachelor	1 Bed	2Bed	3Bed	P	(ha)		(L/s)	(-)	(L/s)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)
A1	1	2	0.64	59	180	60	36	572	0.640	572	1.854	3.61	6.700	0.095	0.095	0.031	0.000	0.000	0.000

LOCATION	INDUSTRIAL				IINFILTRATION			TOTAL	EXISTING SEWER										
Area ID	Area	Accu	Qind	QC+I+I	Total	Accu.	Flow	Flow	Length	Size	Area	Grade	Minimum Slope	Full Capacity	Full Velocity	Time of Flow	Reserve Capacity	Qtot/Qfull	Notes
			avg.		Area														
	(ha)	(ha)	(L/s)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(m)	(mm)	(m²)	(%)	(%)	(L/s)	(m/s)	(min)	(L/s)	(-)	
A1	0.000	0.000	0.000	0.000	0.74	0.74	0.243	6.943	10	200	0.031	1.000	1.00	32.8	1.04	0.16	25.9	0.21	Mechanical Flow of 21.45L/s is 70% of the full service capacity

Design Parameters

Avg. Daily Flow Res.	280 L/p/d	Peak Fact. Res.	Harmon's Equation	Infiltration / Inflow	0.33 L/s/ha
Avg. Daily Flow Comm.	28000 L/ha/d	Commercial Contribution	2%	Min. Pipe Velocity	0.06 L/s
Avg. Daily Flow Instit.	28000 L/ha/d	Peak Fact. Comm.	1	Max. Pipe Velocity	3.00 L/s
Avg. Daily Flow Indust	55000 L/ha/d	Institutional Contribution	0%	Mannings Roughness Coeffici	0.013
		Peak Fact. Instit.	1		
		Peak Fact. Indust	per MOE Graph		

Prepared By: Daniel Glauser

Checked by: James Fookes

Date: September 07, 2021

Project No. 210101900

Daniel Glauser

From: Menggu He <Menggu.He@smithandandersen.com>
Sent: Tuesday, March 8, 2022 3:58 PM
To: Daniel Glauser
Subject: RE: GVPH1 - 211006 - Manhole Access to Cistern

Hi Daniel,

I looked at the sanitary calculation by suite counts and the total fixture unit is 2862, total water flow is 340gpm so we actually need 10" sanitary outlet from the building. The previous estimate may not have the one washroom/two washroom per suite taken into account. Hope it's not too late. Thanks.

Smith + Andersen

Menggu He B.Eng., M.A.Sc., P.Eng., LEED Green Associate
Project Manager - Mechanical
t 613 230 1186 ext 3121
Menggu.He@smithandandersen.com

From: Daniel Glauser <DGlauser@morrisonhershfield.com>
Sent: March 7, 2022 10:02 AM
To: Arne Suraga <ASuraga@dsai.ca>
Cc: Alison Modl <AModl@dsai.ca>; Sarah Elliott <SElliott@dsai.ca>; Menggu He <Menggu.He@smithandandersen.com>
Subject: RE: GVPH1 - 211006 - Manhole Access to Cistern

CAUTION: EXTERNAL SENDER
Hi Arne,

The cover is 750mm and the frame required is just over 1000mm. I'm envisaging a janitors closet of sorts in terms of room size, but I'm not sure if there are any OBC requirements for maintenance accesses so I've CC'd Menggu in case he is aware of any.

Kind Regards

Daniel Glauser, P. Eng
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Subject: GVPH1 - 211006 - Manhole Access to Cistern

Appendix E

Functional Servicing Study Excerpts

Gladstone Village, 933 Gladstone Avenue – Functional Servicing Report

Stantec Project No. 160401614

April 15, 2021

Prepared for:

Ottawa Community Housing Corporation

Prepared by:

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Revision	Description	Author		Review		Review	
1	1st Submission	2021-04-09	PM	2021-04-12	AMP	2021-04-14	KS

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1.0 INTRODUCTION

The Ottawa Community Housing Corporation (OCHC) has commissioned Stantec Consulting Ltd. to prepare the following Functional Servicing Report for the Gladstone Village development. The subject property is located at 933 Gladstone Avenue within the City of Ottawa, bounded by Gladstone Avenue to the south, the O-Train Trillium Rail Corridor to the west, Oak Street, Laurel Street East, Larch Street, and Balsam Street to the east and City of Ottawa lands fronting Somerset Street West to the north.

The proposed development site is presently undeveloped but was previously occupied by a large federal government warehouse prior to 2015. The area is designated as a Mixed-Use Centre Zone and **Figure 1** illustrates the location of the proposed Gladstone Village Development. The proposed development land comprises approximately 3.21 ha and is anticipated to be subdivided into thirteen (13) blocks and a public right-of-way (ROW) that bisects the site. Eight (8) blocks will contain a mixture of townhomes, stacked back-to-back townhomes, mid-rise mixed-use buildings, high-rise mixed-use buildings, underground parking, and semi-underground parking. The remainder of the blocks will be designated as parking areas, multi-use pathways and servicing corridors. The proposed draft plan is provided in Error! Reference source not found.**.1**.

Figure 1: Location of Gladstone Village OCH Site

1.1 OBJECTIVE

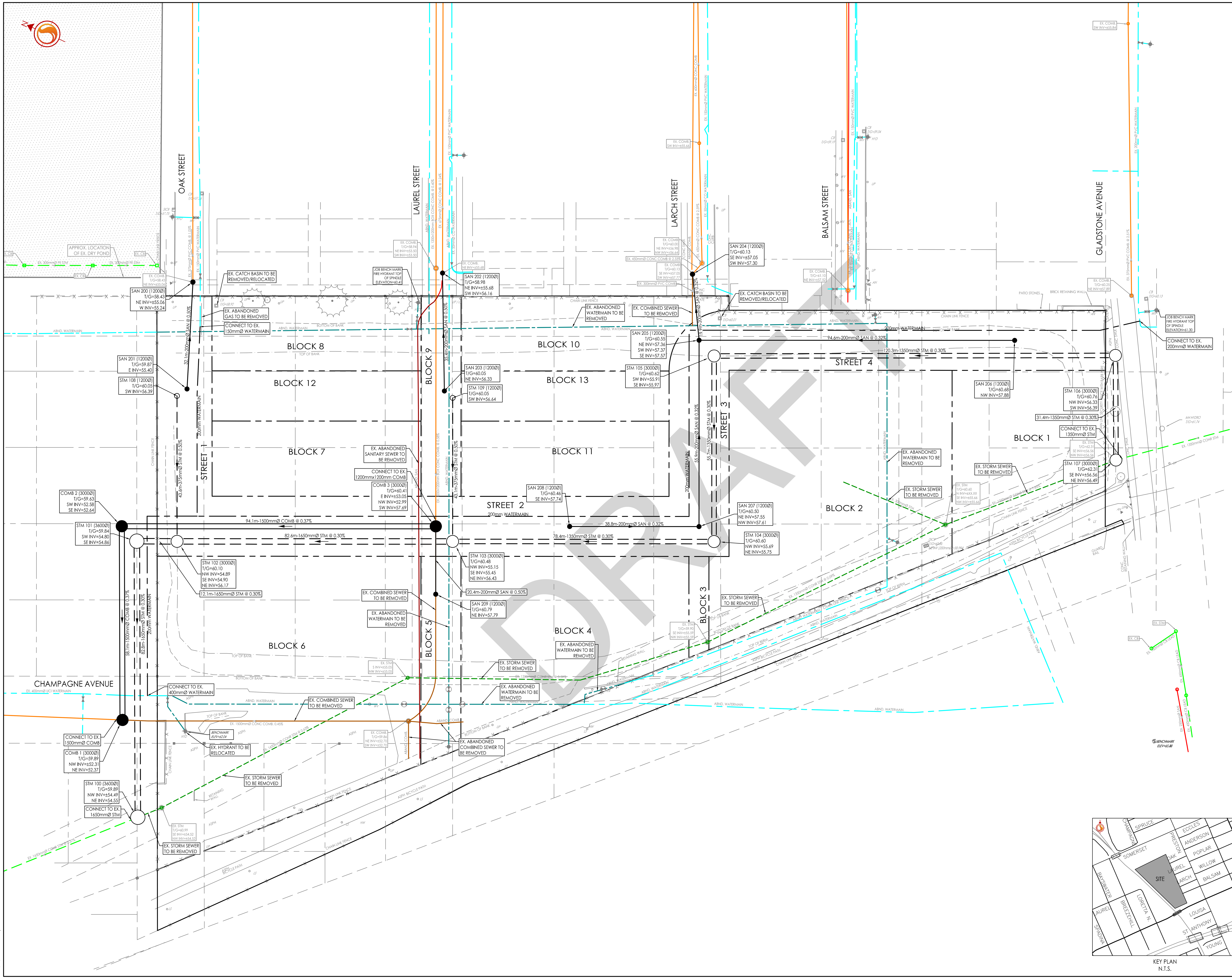
The intent of this report is to develop a functional servicing strategy specific to the subject property that uses the existing infrastructure surrounding the site and meets the design criteria obtained from the City included in **Appendix D.3**. The report will establish criteria for future detailed design of the development in accordance with the associated servicing criteria, City of Ottawa Guidelines, and all other relevant regulations.

Criteria and constraints provided by the City of Ottawa and background studies have been used as a basis for the adequacy of services for the proposed development.

- **Water Servicing**
  - Estimate water demands to characterize the proposed water services for the 933 Gladstone Avenue development which will be serviced from the existing 203mm diameter PVC watermain along Gladstone Avenue, the existing 406 mm diameter unlined cast iron watermain along Champagne Avenue, and the existing 152 mm diameter PVC watermain on Oak Street.
  - Watermain servicing for the development is to provide average day, maximum day, and peak hour demands (i.e., non-emergency conditions) at pressures within the acceptable range of 40 to 80 psi (275 to 552 kPa).
  - Under fire flow (emergency) conditions, the water distribution system is to maintain a minimum pressure greater than 20 psi (138 kPa).
- **Wastewater Servicing**
  - Estimate wastewater generation based on the proposed concept and direct flows to the local combined sewer system on the neighbouring streets.
- **Storm Sewer Servicing**
  - Define major and minor conveyance systems in conjunction with the conceptual grading plan.
  - Determine the conceptual stormwater management storage requirements to meet the allowable release rate for the site.
  - Provide quantity and quality control meeting the criteria specified in **Section 5.0**.
- **Grading and Drainage**
  - Prepare a functional grading plan in accordance with the proposed development plan and grading constraints.

The Overall Servicing and Removals Plan shown in Figure 2 illustrates the proposed block layout within the site, the existing infrastructure within and surrounding the subject property, and the infrastructure proposed to service the site.

Figure 2: Overall Servicing and Removals Plan



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Legend

- PROPOSED WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- EXISTING WATERMAIN
- EXISTING VALVE AND VALVE BOX
- EXISTING VALVE CHAMBER
- EXISTING FIRE HYDRANT
- EXISTING SANITARY SEWER
- EXISTING COMBINED SEWER
- EXISTING STORM SEWER
- EXISTING CATCHBASIN
- EXISTING SANITARY SEWER TO BE REMOVED
- EXISTING COMBINED SEWER TO BE REMOVED
- EXISTING STORM SEWER TO BE REMOVED
- EXISTING WATERMAIN TO BE REMOVED

Revision	By	Appd.	YY.MM.DD
1 ISSUED FOR REVIEW	WAJ	AMP	21.04.15

File Name: 160401614-DB	Dwn.	Chkd.	Dsgn.	YY.MM.DD
	WAJ	AMP	WAJ	21.03.02

Permit-Seal

Client/Project

OTTAWA COMMUNITY HOUSING CORPORATION

GLADSTONE VILLAGE
933 GLADSTONE AVENUE
OTTAWA, ON

Title

FIGURE 2 OVERALL SERVICING AND REMOVALS PLAN

Project No. 160401614

Scale 1:500 (0, 5, 15, 25m)

Drawing No. FIG-2

Sheet 1 of 1

Revision 1

ORIGINAL SHEET - ARCH D

2.0 BACKGROUND

The following documents were referenced in the preparation of this report:

- Final Report ON – *Phase One Environmental Site Assessment, 933 Gladstone Avenue, Ottawa, Ontario*, Golder Associates Ltd., December 2016.
- Report ON – *Phase Two Environmental Site Assessment, 933 Gladstone Avenue, Ottawa, ON,* Golder Associates Ltd., March 2017.
- Preliminary Geotechnical Investigation – *Proposed Development, Gladstone Village, 933 Gladstone Avenue, Ottawa, Ontario*, Golder Associates Ltd., June 2018.
- *Preston Street Rehabilitation Albert Street to Carling Avenue Design Brief – Sewers,* Stantec Consulting Ltd., November 2007.
- *Plouffe Park Stormwater Storage Facility Design Brief – Sewers,* Stantec Consulting Ltd., January 2008.
- Technical Bulletin ISTB-2018-01 Revision to Ottawa Design Guidelines – Sewer, City of Ottawa, March 2018
- Technical Bulletin ISTB-2018-02 Revision to Ottawa Design Guidelines – Water Distribution, City of Ottawa, March 2018
- Technical Bulletin PIEDTB-2016-01 Revisions to Ottawa Design Guidelines – Sewer, City of Ottawa, September 2016
- Technical Bulletin ISTB-2014-02 Revision to Ottawa Design Guidelines – Water, City of Ottawa, May 2014
- City of Ottawa Sewer Design Guidelines, 2nd Ed., City of Ottawa, October 2012
- City of Ottawa Design Guidelines – Water Distribution, Infrastructure Services Department, City of Ottawa, First Edition, July 2010

3.0 WATER SERVICING

The 933 Gladstone Avenue site is located within the City of Ottawa's 1W pressure zone. The existing watermains available to service the proposed development include a 203 mm diameter watermain within Gladstone Avenue, a 152 mm diameter watermain within Oak Street, and a 403 mm diameter watermain within future Champagne Avenue providing multiple feeds and looping opportunities for the subdivision development as shown on **Drawing OSSP-1**. Fire hydrants will be installed along the public ROW to service the proposed development. Locations will be determined at the detailed design stage based on the results of a hydraulic analysis.

3.1 WATER DEMANDS

3.1.1 Domestic Water Demands

Water demands for the future developments were estimated based on the unit mix of the preferred development concept plan provided by Hobin Architecture as shown in **Appendix A.2**. The site will consist of approximately 1,087 residential units, noting that additional units have been accounted for based on correspondence with the client and assumptions made for expected future densities. As a result, the expected future densities of the development deviate slightly from the proposed concept plan and the site statistics provided in **Appendix A.3**. **Table 1** indicates the unit mix of the preferred development concept.

Table 1 - Proposed Unit Mix 933 Gladstone Ave. Development

Building ID	Commercial Area (m²)	Residential Area GFA (m²)	Total Area GFA (m²)	No. Residential Units	Population
Townhomes					
Block A1 (Block 8)	-	1987	1987	12	32
Block A2 (Block 10)	-	1987	1987	12	32
Stacked Townhomes					
Block B1 (Block 7)	-	3237	3237	36	97
Block B2 (Block 11)	-	3237	3237	36	97
Block B3 (Block 6)	-	1799	1799	20	54
Mixed Use - Block C (Block 6)					
C1 Podium Residential	-	4612	4612	40	108
C1 Podium Retail/Commercial/Institutional	2323	-	2323	-	-
C2 Midrise	-	5520	5520	67	121
C3 Highrise	-	12800	12800	156	281
Mixed Use - Block D (Block 4)					
D1 Podium Residential	-	1666	1666	18	49

Building ID	Commercial Area (m²)	Residential Area GFA (m²)	Total Area GFA (m²)	No. Residential Units	Population
D1 Podium Retail/Commercial/Institutional	2323	-	2323	-	-
D2 Midrise	-	4320	4320	53	95
D3 Highrise	-	10714	10714	131	236
Mixed Use - Block E (Block 2)					
E1 Podium Residential	-	2911	2911	32	86
E1 Podium Retail/Commercial/Institutional	2323	-	2323	-	-
E2 Midrise	-	4320	4320	53	95
E3 Highrise	-	15840	15840	193	347
Mixed Use - Block F (Block 1)					
F1 Podium Residential [1]	-	1553	1553	18	49
F1 Podium Retail/Commercial	2323	-	2323	-	-
F2 Highrise, Residential/Office	-	15480	15480	189	340
Block C1, C2, C3, and B3 Build-out [2]	-	-	-	21	38
Total	**9,290**	**91,982**	**101,273**	**1,087**	**2,158**

1. Unit count not provided in site statistics for Block F1 residential area (1553m²). Unit count taken from Block D1 podium residential area with comparable footprint.
2. Intended future revision/expansion to Block C1, C2, C3, and Block B3 unit counts. Total of 21 additional units to be added to blocks for ultimate build-out as per the client's direction, resulting in deviation from the provided architectural statistics.

The City of Ottawa's *Water Distribution Guidelines* (2010) were used to estimate the domestic water demand for the proposed development. An average daily rate of 350 L/c/d for residential units and 28,000 L/ha/d for commercial space were applied to the proposed unit mix provided by Hobin Architecture.

Per the City of Ottawa's Water Distribution Guidelines, peaking factors of 1.5 and 2.5 were applied to the average day demands to calculate maximum day demands for commercial and residential areas, respectively. Peaking factors of 1.8 and 2.2 were applied to the maximum day demands to calculate the peak hour demands for commercial and residential areas, respectively. Based on a total 0.93 ha of commercial space and 1,087 residential units, assuming an average population of 1.8 persons per unit for apartment units and 2.7 persons per unit for townhome units as specified by City of Ottawa guidelines, the average day demand (AVDY) for the entire site was determined to be 11.75 L/s, with a maximum daily demand (MXDY) of 24.58 L/s and a peak hour demand (PKHR) of 52.27 L/s. Refer to **Appendix B.1** for detailed domestic water demand estimates.

3.1.2 Fire Flow Demands

Fire flow requirements were estimated using the Fire Underwriters Survey (FUS) methodology, based on the measured floor areas of proposed buildings, to determine the highest fire flow requirement from the proposed concept plans. The FUS fire flow calculation spreadsheet for the governing fire flow demand scenario, provided in **Appendix B.2**, was produced to calculate the expected fire flow demands from the proposed site.

Using the townhome block with the largest number of stacked units (18 units) as a worst-case scenario, fire flow calculations were performed for Block B2 (Block 11) and the required fire flow was estimated to be 333 L/s. Given that the total ground floor area of Block B2 (Block 11) exceeds the maximum allowable area of 600 m^2, as per the Ontario Building Code, it is anticipated that fire separation will be required for the stacked back-to-back townhome blocks to meet OBC requirements. As a result, fire flow calculations were completed assuming fire separation within Block B2 (Block 11) resulting in 8-unit and 10-unit clusters. Based on the above fire separation assumptions for the 10-unit cluster, with a single unit ground floor area of 49 m^2, the required fire flow was determined to be 250.0 L/s as shown in **Appendix B.2**.

3.1.3 Boundary Conditions

The boundary conditions provided by the City of Ottawa are shown in **Table 2.**

Table 2 - Water Distribution Boundary Conditions (2021)

Location	Oak Street - 152mm Connection (Elev. 59.0 m)	Gladstone - 203mm Connection (Elev. 60.3 m)	Champagne - 406mm Connection (Elev. 60.4 m)
Minimum HGL	107.0 m (68.25 psi)	107.0 m (66.41 psi)	107.0 m (66.26 psi)
Maximum HGL	114.9 m (79.49 psi)	114.9 m (77.64 psi)	114.9 m (77.50 psi)
Max Day + Fire Demand (167 L/s)	106.2 m (67.12 psi)	106.4 m (65.55 psi)	109.1 m (69.25 psi)
Max Day + Fire Demand (233 L/s)	103.4 m (63.14 psi)	103.7 m (61.71 psi)	108.4 m (68.25 psi)
Max Day +Fire Demand (250 L/s)	102.5 m (61.86 psi)	102.9 m (60.58 psi)	108.2 m (67.97 psi)

As shown on **Drawing OGP-1**, the ground elevation at the connections on Oak Street, Gladstone Avenue, and Champagne Avenue are 59.0 m, 60.3 m and 60.4 m, respectively. A residual pressure of **62 psi**, **61 psi**, and **68 psi** at the Oak Street, Gladstone Avenue, and Champagne Avenue connections will be available under the maximum day plus fire flow requirement (250 L/s) which are well above the required minimum pressure of 20 psi.

On-site pressures are expected to range from **66 psi** to **80 psi** under normal operating conditions. These values are within the normal operating pressure range as defined by City of Ottawa design guidelines (desired 50 to 80 psi and not less than 40 psi). Booster pumps internal to the buildings will be required to provide adequate pressures for upper storeys. These pumps are to be designed by the buildings' mechanical engineer.

It is anticipated that there is sufficient supply and pressure in the proposed water distribution system to meet the demands expected from the new development concept. A detailed hydraulic model will be provided at the detailed design stage to ensure pressures in the water distribution network meet the applicable City of Ottawa design guidelines.

4.0 WASTEWATER SERVICING

The subject site at 933 Gladstone Avenue is located within a combined sewer area. There are existing combined sewers along Oak Street (375 mm diameter), Laurel Street (675 mm diameter), Larch Street (450 mm diameter), Balsam Street (375 mm diameter), and Gladstone Avenue (375 mm diameter) that connect to the Preston Street Combined Trunk Sewer (PSCTS), as well as a combined sewer known as the Booth Street Sewer (BSS) that runs west along Laurel Street (1200 x 1200 concrete box) and continues through the subject site (1500 mm diameter) and then runs north along Champagne Avenue (1500 mm diameter) to Spruce Street and ultimately runs west to Booth Street (see **Drawing OSSP-1** and **Figure 2,** as well as background report excerpts in **Appendix C.2**).

The proposed private blocks 1, 2 and 4 will be serviced through a 200 mm diameter sanitary sewer along the proposed public ROW that will connect to the existing 450 mm diameter combined sewer on Larch Street. The proposed private blocks 10 and 11 will be serviced through a 200 mm diameter sanitary sewer along Block 9 that will connect to the existing 675 mm diameter combined sewer on Laurel Street to the PSCTS. Similarly, the proposed private blocks 7 and 8 will be serviced through a 200 mm diameter sanitary sewer along Street 1 that will connect to the existing 375 mm diameter combined sewer on Oak Street. Due to crossing conflicts with the proposed infrastructure along Street 2, private block 6 cannot be serviced through the existing combined sewers connected to the PSCTS and as such, it is proposed to service this block through a 200 mm diameter sanitary sewer along Block 5 connected to the proposed relocated 1500 mm diameter combined sewer along Street 2 that will connect to the existing combined sewer on Champagne Avenue and ultimately to the BSS.

4.1 DESIGN CRITERIA

As outlined in the City of Ottawa's *Sewer Design Guidelines*, the following criteria were used to calculate estimated wastewater flow rates based on the preferred development concept:

- Average wastewater generation – 280 L/cap/day
- Peaking factor - 4.0 (Harmon's residential)
- Peaking factor - 1.5 (Harmon's commercial)
- Harmon Correction Factor = 0.8
- Extraneous flow allowance - 0.33 L/s/ha
- Population density for 1-bedroom apartments - 1.4 persons per unit
- Population density for Townhome - 2.7 persons per unit
- Population for 'average apartment' - 1.8 persons per unit
- Average wastewater generation (commercial) - 28,000 L/ha/day of building space

4.2 ESTIMATED WASTEWATER PEAK FLOWS

Private sanitary sewers within the private blocks are anticipated to collect all sanitary wastewater from the proposed buildings via separate building services. Connections to the existing combined sewers on Oak

Street, Laurel Street, and Larch Street will convey sanitary flows from Blocks 1, 2, 4, 7, 8, 10 and 11 to the combined trunk sewer on Preston Street (PSCTS). Given the offsets and elevations required of the large diameter sewers that will be located within the northern segment of Street 2, the local sanitary sewer system cannot be extended to service Block 6. Block 6 will be serviced by a connection to the existing combined collector sewer to be relocated within Street 2 as shown on **Drawing OSA-1**.

Based on available background reports for the Preston Street Sewer Rehabilitation (Stantec, November 2007) and the Plouffe Park Stormwater Storage Facility (Stantec, January 2008) which are included in **Appendix C.2,** the existing 1500 mm diameter combined sewer (BSS), which will be relocated along the proposed public ROW, serviced the previous building within the subject site and also serves as a storm relief sewer to drain the Preston Street profile sag. As shown in Figure 3-1 of the Plouffe Park Design Brief included in **Appendix C.2,** the existing combined sewer crossing the site is used mostly for storm underground storage and is equipped with a flow control at the Somerset Street crossing that restricts peak flows to 300 L/s, which is well above the expected sanitary peak flows from the proposed private Block 6 (6.9 L/s).

A functional sanitary sewer design sheet was prepared and is included in **Appendix C.1.** The estimated wastewater flows expected to be generated are based on the preferred development concept of the site which includes 224 stacked townhome units and 863 residential apartment units with an estimated population of 2,158 persons and 0.93 ha of commercial space. The anticipated wastewater peak flow generated from the proposed development is summarized in the following table:

Table 3 - Estimated Total Wastewater Peak Flow

Outlet Location	Residential Units				Commercial Areas			Inf. Flow (L/s)	Total Peak Flow (L/s)
	Number of Units	Population	Peak Factor	Peak Flow (L/s)	Area (ha)	Peak Factor	Peak Flow (L/s)		
Oak St. Connection	48	130	3.57	1.5	0.00	1.50	0.00	0.20	1.7
Laurel St. Connection	48	130	3.57	1.5	0.00	1.50	0.00	0.10	1.6
Larch St. Connection	687	1,298	3.18	13.4	0.70	1.50	0.30	0.50	14.2
Total Estimated Wastewater Peak Flow (L/s) to the PSCTS						**17.5**			
Champagne Ave. Connection	304	601	3.35	6.5	0.23	1.50	0.10	0.30	6.9
Total Estimated Wastewater Peak Flow (L/s) to BSS						**6.9**			

1. Intended future revision/expansion to Block 6-unit counts. Total of 21 additional units added to this block.
2. Unit count not provided for Block 1 residential area (1553m²). Unit count adapted from Block D1 podium residential area with comparable footprint.
3. Design residential flow based on 280 L/p/day and design commercial flow based on 28,000L/ha/day.
4. Peak factor for residential units calculated using Harmon's formula and taken as 1.50 for commercial areas.
5. Average apartment population assumed to be 1.8 persons/unit.
6. Townhome population assumed to be 2.7 persons/unit.
7. Infiltration design flow equals 0.33 L/s/ha.

The peak wastewater design flows generated from the proposed development will be conveyed east to the existing combined trunk sewer within Preston Street (PSCTS), and north to the existing combined trunk sewer within Champagne Avenue (BSS). Confirmation from the City of Ottawa regarding conveyance capacity of the connecting sewers will be included in the next submission. Full port backflow preventers should be specified for each building service to protect from flooding in the event the combined sewer network surcharges

5.0 STORMWATER MANAGEMENT AND SERVICING

The proposed 3.21 ha mixed-use development consists of thirteen (13) development blocks, where blocks 1, 2, 4 and 6 will consist of mixed residential and commercial use with underground parking, blocks 7 and 11 will consist of stacked back-to-back townhomes with semi-underground parking, and blocks 8 and 10 will consist of standard townhomes with garage and basements. The remaining five (5) blocks will be used as multi-use pathways, above ground parking areas and servicing corridors. Access to the development will be provided via a public roadway from Oak Street to Gladstone Avenue. The property is currently zoned as Mixed-Use and will contain four (4) high-rise mixed-use buildings, three (3) mid-rise mixed-use buildings, and a combination of traditional townhomes and stacked townhomes (see concept plan in **Appendix A.3**).

The proposed development is within a combined sewer area. There are existing combined sewers within and adjacent to the site along Oak Street, Laurel Street, Larch Street, Balsam Street, and Gladstone Avenue, as outlined in **Drawing OSSP-1**. However, as established through correspondence with City of Ottawa (see **Appendix D.3**), stormwater flows from the proposed site have been included in the stormwater model for the Nepean storm trunk sewer that runs north along the western property line as shown on **Drawing OSD-1**. As part of the proposed development, the existing storm trunk sewer running north along the western property line will be removed and relocated along the proposed public ROW and will connect the existing manhole on Gladstone Avenue to the existing 1650 mm diameter storm sewer west of Champagne Avenue. Based on correspondence with City of Ottawa staff (see **Appendix D.3**), there is approximately a 20-ha drainage tributary to this trunk sewer system (starting at highway 417) with a peak flow of about 2 m^3/s. **Appendix** Error! Reference source not found. contains the functional storm sewer design sheet.

Emergency overland flow from the proposed private blocks will be directed to adjacent streets, while major system peak flows from the proposed public ROW will be directed to Oak Street and ultimately to the Preston Street storm relief system.

5.1 STORMWATER MANAGEMENT CRITERIA

The criteria used to design the stormwater management (SWM) component will ensure that post-development stormwater peak flows from the site do not exceed the allowable target release rate set forth by the stormwater management criteria. The SWM criteria for the proposed development have been determined through consultation with City of Ottawa staff and the review of background information. **Appendix D.3** contains correspondence with City of Ottawa staff confirming the stormwater management criteria to be used. The stormwater management (SWM) criteria are summarized as follows:

- Restrict inflows to the receiving storm sewer to the 2-year peak flow based on a maximum runoff coefficient (C) of 0.60.
- Stormwater runoff in excess of the target release rate to be stored on-site up to and including the 100-year event for all private blocks.

- Minimum time of concentration of 10 minutes used for target release rate calculations based on previous development conditions (2014).
- Major system peak flows from public ROWs to be directed east towards Oak Street and ultimately to the Preston Street storm relief system.
- Enhanced Level of quality control (i.e., 80% TSS removal) to be provided for all above ground parking areas within the proposed private blocks.

5.2 WATER QUANTITY CONTROL

The Modified Rational Method (MRM) has been used to assess the rate and volume of runoff expected to be generated during post-development and pre-development conditions.

5.2.1 Target Release Rate

The target release rate for the site area has been determined using the 2-year storm event IDF curves as provided within the City of Ottawa's *Sewer Design Guidelines*. Prior to 2015, the site was occupied by a Federal Government Warehouse which encompassed most of the property parcel as illustrated on **Drawing EXSD-1**. However, as confirmed through correspondence with City of Ottawa, the Nepean Bay SWM model assumed an imperviousness equivalent to a runoff coefficient (C) of 0.60. Therefore, the runoff coefficient value of 0.60 was used to determine the target peak outflow for the site as per the criteria established during pre-consultation. A time of concentration of 10 minutes for the pre-development area was assigned based on the previously existing building that occupied most of the site which provided little to no pervious area.

An overall target release rate of **411.2 L/s** from the entire site was obtained based on the rational method equation shown below.

$$\boldsymbol{Q} = \mathbf{2.78}\,(\boldsymbol{C})(\boldsymbol{I})(\boldsymbol{A})$$

Where:

$\boldsymbol{Q} = peak\ flow\ rate, L/s$

$\boldsymbol{C} = site\ runoff\ coefficient$

$\boldsymbol{I} = rainfall\ intensity, mm/hr\ (per\ City\ of\ Ottawa\ 2 - year\ IDF\ curves)$

$\boldsymbol{A} = drainage\ area, ha$

$$Intensity\ (mm/hr) = \frac{732.951}{(10 + 6.199)^{0.81}} = \mathbf{76.81\ mm/hr}$$

$$Q = 2.78(0.6)(76.81 mm/hr)(3.21\ ha) = \mathbf{411.2\ L/s}$$

The overall site target release rate was divided by the total site area to determine the target release rate per hectare (**128.1 L/s/ha**). Target release rates for the site are summarized in

Table 4 below:

Table 4 - Site Target Release Rates

Development Parcel	Subcatchment Area (ha)	Target Flow Rate to Storm Sewer (L/s)[1]	Pre-Development Target (L/s/ha)
Blocks			
Block 1	0.21	26.90	
Block 2	0.47	60.21	
Block 3	0.02	2.56	
Block 4	0.30	38.43	
Block 5	0.07	8.97	
Block 6	0.62	79.43	
Block 7	0.14	17.94	
Block 8	0.14	17.94	
Block 9	0.07	8.97	
Block 10	0.15	19.22	**128.1**
Block 11	0.14	17.94	
Block 12	0.09	11.53	
Block 13	0.09	11.53	
Public Right-of-Way			
Street 1	0.11	14.09	
Street 2	0.15	19.22	
Street 2	0.13	16.65	
Street 3	0.11	14.09	
Street 4	0.20	25.62	
Total	**3.21**	**411.2**	

1. Target flow rate (L/s) from each block/street is the product of the allowable pre-development target rate (L/s/ha) and the subcatchment area (ha)

5.2.2 Storage Requirements

A runoff coefficient (C value) between 0.65 to 0.85 was assumed for the proposed catchments based on the expected land use, which resulted in an overall runoff coefficient of 0.79 for the entire site. Post-development peak flows up to the 100-year storm from the proposed private blocks will be restricted to the allowable release rates using a combination of rooftop storage and/or underground cisterns and pipe storage, while post-development peak flows from the proposed ROW and public Block catchments will be restricted to the target release rates using inlet control devices (ICDs) and major system overflows will be directed overland to Oak Street and eventually to the Preston Street storm relief system.

Rooftop storage is expected to be provided on Blocks 1, 2, 4, and 6, not exceeding 150 mm depth of storage with conservative assumptions adopted for the usable roof area and number of drains. Stormwater will first be detained on the roofs via roof drains, then it is assumed to be controlled by underground storage tanks/cisterns before discharging to the downstream sewer. **Appendices** Error! Reference source not found. and Error! Reference source not found. contain the functional storm sewer design sheet and the preliminary modified rational method calculations.

Roof storage calculations assume the roofs will be equipped with standard Watts Model R1100 Accuflow Single Notch Roof Drains (50%-75% open) and that 80% of the roof areas are usable. **Table 5** summarizes the conceptual 100-year roof release rates and storage requirements.

Table 5 - 100-Year Summary of Roof Controls

Block ID	Area ID	Usable Roof Area (m^2)	Discharge (L/s)	Storage Volume (m^3)	Maximum Depth (m)
Block 1	L106B	1,518	10.7	69.5	145.0
Block 2 [1]	L105B	1,409	10.6	62.8	143.6
Block 4 [1]	L104B	1,204	7.5	57.8	147.7
Block 6 [1]	L103B	1,729	12.2	79.0	144.9
Total Roof Storage Used (m^3):				**269**	

1. Block 2, 4 & 6 building roof areas assume podium roof area is available for storage.

Additional storage is required within most private blocks to restrict post-development peak flows up to the 100-year storm to the target release rates. It is assumed that uncontrolled surface areas within the proposed private blocks will be equipped with catchbasins/drains that will either direct runoff to underground parking cisterns or to oversized pipes for storage. **Table 6** demonstrates that the target release rates can be achieved for the proposed site and shows the resultant minimum stormwater storage requirements for each block.

Table 6 - 100-Year Storage Requirements and Release Rates

Block ID	Area ID	Area (ha)	100-Year Volume Requirements (m^3)		100-Year Release Rate (L/s)	Target Release Rate (L/s)	Underground Storage Req. (m^3/ha)
			Cistern	Underground Storage			
Block 1	L106B	0.21	0.0	-	14.50	26.90	0.0
Block 2	L105B	0.47	57.8	-	60.21	60.21	122.9
Block 3	L104C	0.02	-	-	2.56	2.56	-
Block 4	L104B	0.30	22.4	-	38.43	38.43	74.6
Block 5	L103C	0.07	-	-	8.97	8.97	-
Block 6	L103B	0.62	80.6	-	79.43	79.43	129.9
Block 7	L108D	0.14	34.5	-	17.94	17.94	246.4
Block 8	L108B	0.14	-	-	To Block 12	17.94	-
Block 9	L109A	0.07	-	-	8.97	8.97	-
Block 10	L109B	0.15	-	-	To Block 13	19.22	-
Block 11	L109D	0.14	34.5	-	17.94	17.94	246.4
Block 12 [1]	L108C	0.09	-	46.2	29.47	11.53	200.8
Block 13 [2]	L109C	0.09	-	47.9	30.75	11.53	199.5
Street 1	L108A	0.11	-	-	14.09	14.09	-

Block ID	Area ID	Area (ha)	100-Year Volume Requirements (m^3)		100-Year Release Rate (L/s)	Target Release Rate (L/s)	Underground Storage Req. (m^3/ha)
			Cistern	Underground Storage			
Street 2	L103A	0.15	-	-	19.22	19.22	-
Street 2	L104A	0.13	-	-	16.65	16.65	-
Street 3	L105A	0.11	-	-	14.09	14.09	-
Street 4	L106A	0.20	-	-	25.62	25.62	-
	Totals:	**3.21**	**229.8**	**94.1**	**398.83**	**411.24**	**-**

1. Block 8 100-year release rate allocated to underground storage within Block 12.
2. Block 10 100-year release rate allocated to underground storage within Block 13.

A detailed hydraulic analysis will be completed at the detailed design stage to ensure the minimum 0.3 m clearance between the 100-year HGL and the underside of footing (USF) for the townhome units within Blocks 8 and 10 can be achieved.

5.3 WATER QUALITY CONTROL

Enhanced level of quality control equivalent to 80% total suspended solids (TSS) removal will be provided within each private site to treat runoff from all above-ground parking areas through oil/grit separators that will be sized at the detailed design stage.

6.0 BACKGROUND STUDIES

6.1 GEOTECHNICAL INVESTIGATION

A preliminary geotechnical investigation report was prepared by Golder Associates Ltd. in June 2018 (**Appendix E**) to assess the subsurface conditions found at borehole locations. Five (5) boreholes numbered 18-01 to 18-05, were advanced to auger refusal to depths ranging from about 3.0 to 7.5 metres below the existing ground surface. The information obtained from the field investigation will guide the detailed design of the site and identify development constraints.

Based on the field investigation for the proposed development area, the subsurface conditions at the site are characterized primarily by a surficial layer of topsoil and fill, over sand or silty clay, glacial till, and shallow bedrock consisting of interbedded limestone and shale. The field work for this investigation was carried out on April 27 to May 1, 2018. The geotechnical investigation report details the methodology adopted, analysis of subsurface conditions, and a chemical analysis of the groundwater to examine the corrosion potential of the subsurface soils. Borehole 18-01 was advanced through the existing pavement structure which consisted of approximately 80 millimetres of asphaltic concrete with gravelly sand base and gravel fill material underneath. Additionally, a layer of fill was encountered below the topsoil at boreholes 18-02 to 18-05 that ranges in depth from approximately 0.4 to 1.8 metres below the existing ground surface. The fill primarily consists of clayey silt with some gravel to sand with detectable amounts concrete fragments, brick, mortar, cinders, ash, organics, fibre insulation, and construction waste.

Upon auger refusal in boreholes 18-01 to 18-05, the boreholes were subsequently advanced into the bedrock via diamond coring techniques for an additional 2.0 metres while retrieving NQ sized core samples. The results of the rock core sampling at boreholes 18-01 to 18-05 indicate that the bedrock material encountered consisted of fresh, medium to thick bedded, grey limestone with shale interbeds. The bedrock quality, based on the measured RQD values, indicated excellent rock quality. Bedrock removal, via drilling and blasting procedures, will be required for basement and foundation construction within designated blocks. Due to the shallow depth of the bedrock underlying the site, no grade raise restrictions are recommended.

Groundwater levels were measured from monitoring wells within boreholes from the previous Phase II ESA on February 6th and 7th, 2017 and on April 30th, 2018. The groundwater level was encountered at depths ranging from approximately 1.0 to 4.9 metres below the existing ground surface, however, groundwater levels are subject seasonal fluctuations with higher groundwater levels anticipated during wet seasonal periods. One soil sample from borehole 18-03 was analyzed by an accredited laboratory institute for basic chemical analysis where it was determined that there is an elevated potential for the corrosion of exposed ferrous metal. The results also indicate that concrete made with Type GU Portland cement should be acceptable for substructures within the proposed development lands.

6.2 ENVIRONMENTAL SITE ASSESSMENTS (PHASE I & II ESA)

A Phase I and Phase II Environmental Site Assessment (ESA) were completed for the site by Golder Associates in 2016 and 2017, respectively. The Phase I & II ESA, attached in Error! Reference source not found., identified 15 areas of potential environmental concern (APECs) within the proposed development location. Through soil and groundwater sampling, the reported concentrations of contaminants posing possible concern were below the applicable site conditions standards as of February 7, 2017 (Certification Date). Elevated levels of Vanadium were found in soil samples, however, based on Golder's analysis it was determined that the exceedance was attributed to the presence of Ottawa marine clays and not a result of the APEC associated with the site. Accordingly, the exceedance of the applicable site condition standard was not considered a contaminant of possible concern.

The site does not require the completion of a risk assessment or remediation. The Record of Site Condition (RSC) has been filed in the Environmental Site Registry.

7.0 SITE GRADING AND DRAINAGE

The proposed development site measures approximately 3.21 ha in area and was previously occupied by a Federal Government Ordnance Depot prior to 2015. The subject site is currently vacant land with a relatively flat topography that gradually slopes downward from the southern property limit near Gladstone Avenue to the northern property limit toward Somerset Street West and gradually slopes downward from the western property limits towards the residential properties along Oak, Laurel, Larch and Balsam Street with marginally higher elevations within the middle of the site. Based on a topographic survey completed by Stantec Geomatics, the grade difference from the south limit to the north limit of the site is approximately 1 meter, with an elevation of approximately 60.99 meters at the southeast corner of the site and slightly lower elevations at the northwest corner of the site (approx. 59.84 m).

Please refer to **Drawing OGP-1** in **Appendix F** for the conceptual site grading plan, which maintains the general drainage pattern of the existing condition site and matches all perimeter grades.

The proposed site layout may limit the ability to achieve a significant volume of storage on the surface of the site, therefore, underground storage options have been considered for the private development blocks.

8.0 UTILITIES

Enbridge gas, Bell services, and Hydro Ottawa utilities exist within the vicinity of the proposed site. The site is expected to be serviced through connections to these existing services.

According to the City of Ottawa-provided UCC plans there is an existing 200mm gas main along Gladstone Avenue fronting the site, a 200mm gas main along Preston Street, and a 100mm gas main along Somerset Street West. Additionally, local streets adjacent to the proposed development contain existing 35mm gas mains within Balsam Street and Laurel Street, and existing 50mm gas mains within Larch and Oak Street.

Bell utilities exist near the subject site along Gladstone Avenue, Preston Street, and Somerset West. It is anticipated that the future development will be serviced by Bell fibre optic cables which will be extended to the site.

Hydro Ottawa utilities exist in proximity to the site along Gladstone Avenue, Preston Street, and Somerset Street West. Future correspondence will determine whether the existing service has available capacity, or if the installation of a new 13.2kV 3-phase circuit will be required to service the future development.

Detailed design of the required utility services will be completed by the respective utility companies as part of the future development of the lands.

9.0 EROSION CONTROL DURING CONSTRUCTION

In order to protect downstream water quality and prevent sediment build up in catch basins and storm sewers, erosion and sediment control measures must be implemented during construction. The following recommendations will be included in the contract documents and communicated to the Contractor.

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit the extent of the exposed soils at any given time.
3. Re-vegetate exposed areas as soon as possible.
4. Minimize the area to be cleared and grubbed.
5. Protect exposed slopes with geotextiles, geogrid, or synthetic mulches.
6. Provide sediment traps and basins during dewatering works.
7. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
8. Schedule the construction works at times which avoid flooding due to seasonal rains.

The Contractor will also be required to complete inspections and guarantee the proper performance of their erosion and sediment control measures at least after every rainfall. The inspections are to include:

- Verification that water is not flowing under silt barriers.
- Cleaning and changing the sediment traps placed on catch basins.

The proposed location of silt fences, straw bales, and other erosion control measures are to be provided at the detailed design stage.

10.0 APPROVALS

The proposed subdivision development will be serviced by an existing municipal combined sewer network. As such, the site will require approval through the Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Application (ECA) process under direct submission.

Based on groundwater levels outlined in the geotechnical report for the site, ground or surface water volumes may require to be pumped during the construction phase. A Permit to Take Water (PTTW) through the MECP would be required for dewatering in excess of 400,000 L/day. Alternatively, an Environmental Activity and Sector Registry (EASR) is required for dewatering in excess of 50,000 L/day.

11.0 CONCLUSIONS

11.1 WATER SERVICING

The proposed watermain design will achieve the level of service required by the City of Ottawa. The following conclusions related to the potable water servicing for the Gladstone Village site were made:

- The proposed development will be serviced through connections to the existing 203mm diameter watermain within Gladstone Avenue, the 152mm diameter watermain within Oak Street, and the existing 406mm diameter watermain within the future Champagne Avenue.
- The boundary conditions provided by the City of Ottawa demonstrate that the existing municipal watermain can provide sufficient domestic flow to meet the requirements of the development. On-site pressures are expected to range from **66 psi** to **80 psi** under normal operating conditions which is within the targets outlined in City of Ottawa Water Distribution Guidelines.
- The boundary conditions provided by the City of Ottawa demonstrate that the existing municipal watermain can provide sufficient fire flow to meet the requirements of the development while maintaining minimum residual pressures of 20 psi. A residual pressure of **62 psi**, **61 psi**, and **68 psi** will be available during fire flow conditions (250 L/s) at the Oak Street, Gladstone Avenue, and future Champagne Avenue connections, respectively.

11.2 WASTEWATER SERVICING

The subject site at 933 Gladstone Avenue is located within a combined sewer area with proposed connections that convey wastewater flows to the Preston Street Combined Trunk Sewer (PSCTS), as well as the combined sewer known as the Booth Street Sewer (BSS). The following conclusions related to the wastewater servicing for the Gladstone Village site were made:

- The estimated wastewater flows expected to be generated are based on the preferred development concept of the site which includes 224 stacked townhome units and 863 residential apartment units with an estimated population of 2,158 persons and 0.93 ha of commercial space.
- Private blocks 1, 2 and 4 will be serviced through a 200 mm diameter sanitary sewer along the proposed public ROW that will connect to the existing 450 mm diameter combined sewer on Larch Street to the PSCTS.
- Private block 6 will be serviced through a 200 mm diameter sanitary sewer along Block 5 connected to the proposed relocated 1500 mm diameter combined sewer along Street 2 that will connect to the existing combined sewer on Champagne Avenue and ultimately to the BSS.

- Private blocks 7 and 8 will be serviced through a 200 mm diameter sanitary sewer along Street 1 that will connect to the existing 375 mm diameter combined sewer on Oak Street to the PSCTS.
- Private blocks 10 and 11 will be serviced through a 200 mm diameter sanitary sewer along Block 9 that will connect to the existing 675 mm diameter combined sewer on Laurel Street to the PSCTS.
- Estimated wastewater peak flow to the PSCTS are 17.5 L/s.
- Estimated wastewater peak flow to the BSS are 6.9 L/s.
- Private sanitary sewers within the subject site are anticipated to collect all sanitary wastewater from the proposed buildings via individual building services.

Confirmation from the City of Ottawa regarding conveyance capacity of the connecting sewers will be included in the next submission, however, it is anticipated that the functional wastewater servicing strategy will achieve the level of service required by the City of Ottawa.

11.3 STORMWATER SERVICING AND MANAGEMENT

The proposed stormwater management plan complies with the requirements outlined in the background documents, the City of Ottawa Sewer Design Guidelines, and through correspondence with the City. The following conclusions associated with the stormwater management for the subject site were made:

- A target release rate of 411.2 L/s for the development area was determined using the 2-year storm event IDF curves, a C of 0.60, and a time of concentration of 10 minutes for the 3.21 ha site area.
- A runoff coefficient (C value) between 0.65 to 0.85 was assumed for the proposed catchments based on the expected land use, resulting in an overall runoff coefficient of 0.79 for the entire site.
- Enhanced level of quality control equivalent to 80% total suspended solids (TSS) removal will be provided within each private site to treat runoff from all above-ground parking areas through oil/grit separators that will be sized at the detailed design stage.
- Stormwater flows to be directed to the proposed storm sewer along the proposed public ROW that will direct flow to the existing 1650 mm diameter storm sewer along the western property line.
- Emergency overflow from private blocks will be directed to adjacent streets, while major system peak flows within the public ROW will be directed to Oak Street and conveyed to Preston Street.
- Post-development peak flows up to the 100-year storm from the proposed private blocks will be restricted to the allowable release rates using a combination of rooftop storage and/or underground cisterns and pipe storage, while post-development peak flows from the proposed ROW and public block catchments will be restricted to the target release rates using inlet control devices (ICDs).

- Based on the concept plan for the development, it is estimated that a total of 269 m^3 of storage can provided on the four (4) building roofs within Block 1, 2, 4, and 6; assuming podium roof areas are available to provide storage.
- Stormwater captured on the roofs will be detained via roof drains and released at a controlled release rate to the provided underground storage before discharging to the downstream sewer. The discharge rate from the site's stormwater storage was set to match the maximum allowable target release rate.

With on-site storage and a controlled release rate as detailed in **Section 5.0**, the stormwater servicing design for the site can meet the discharge criteria established for the downstream storm sewer system.

11.4 GEOTECHNICAL CONSIDERATIONS

A preliminary geotechnical investigation was conducted by Golder Associates Ltd. to identify the general subsurface conditions at the site by means of boreholes (five (5) boreholes, numbered 18-01 to 18-05 to depths ranging from about 3.0 to 7.5 metres below ground surface until auger refusal).

11.5 GRADING

The subject site is currently vacant land with a relatively flat topography that gradually slopes downward from the southern property limit near Gladstone Avenue to the northern property limit toward Somerset Street West and gradually slopes downward from the western property limits towards the residential properties along Oak, Laurel, Larch and Balsam Street with marginally higher elevations within the middle of the site.

The conceptual site grading plan maintains the general drainage pattern of the existing condition site and matches all perimeter grades. Additionally, the proposed site layout may limit the ability to achieve a significant volume of storage on the surface of the site, therefore, underground storage options have been considered.

11.6 UTILITIES

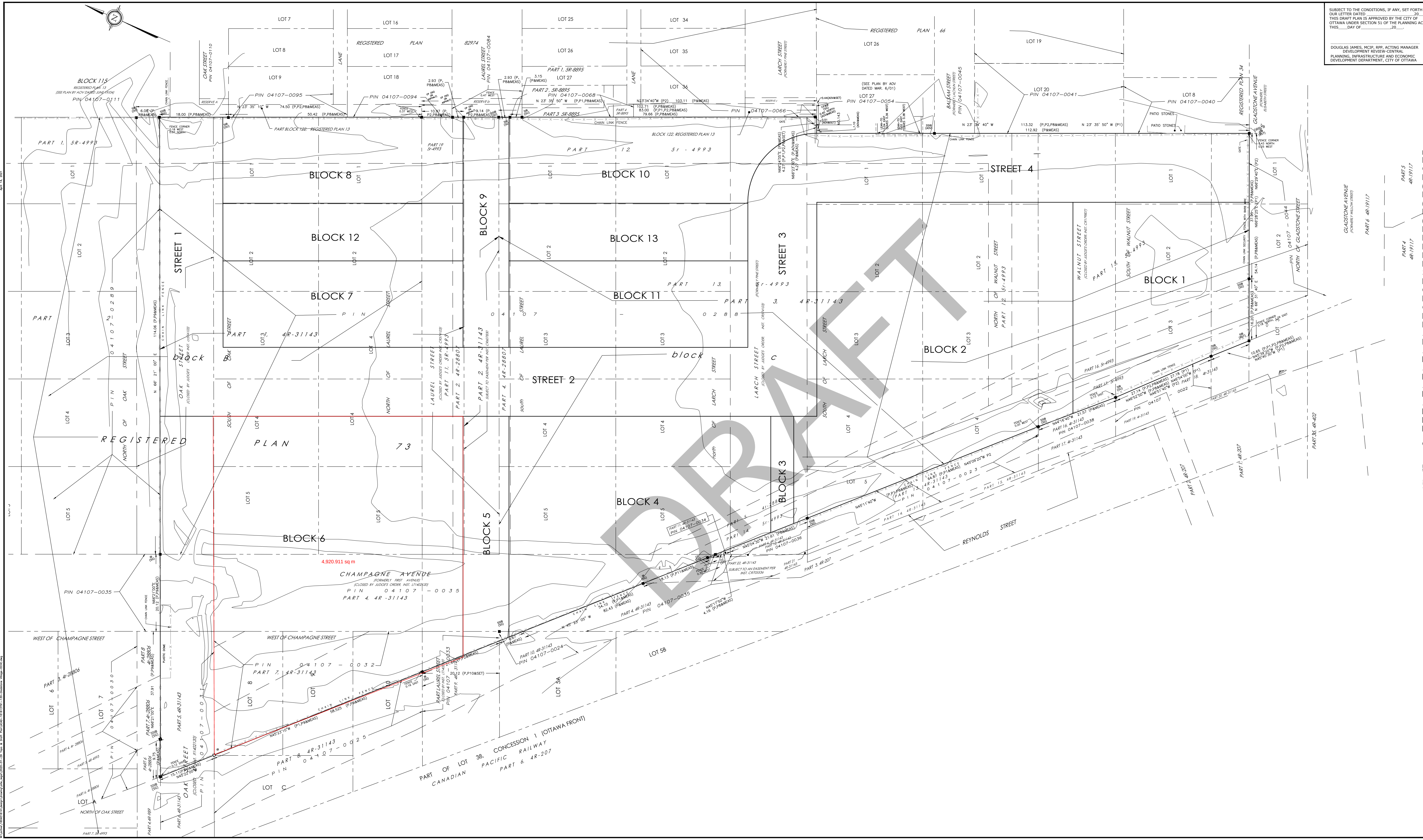
Enbridge Gas, Bell and Hydro Ottawa services all exist within the vicinity of the proposed site. The site is anticipated to be serviced through connections to these existing services.

Detailed design of the required utility services will be completed by the respective utility companies at the detailed design stage.

APPENDICES

Appendix A PROPOSED DRAFT PLAN

A.1 PROPOSED DRAFT PLAN



SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED ____ 20__ THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER SECTION 51 OF THE PLANNING ACT. THIS____DAY OF__________,20___.

DOUGLAS JAMES, MCIP, RPP, ACTING MANAGER
DEVELOPMENT REVIEW-CENTRAL
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

KEY PLAN *(NOT TO SCALE)*

DRAFT PLAN OF SUBDIVISION OF

LOTS 1, 2 & PART OF LOT 3 BLOCK C(SOUTH WALNUT STREET)
LOTS 1, 2, 3 & PART OF LOT 4 BLOCK C (NORTH WALNUT STREET)
LOTS 1, 2, 3, 4 & PART OF LOT 5 BLOCK C (SOUTH LARCH STREET)
LOTS 1, 2, 3, 4 & PART OF LOT 5 BLOCK C (NORTH LARCH STREET)
LOTS 1, 2, 3, 4 & 5 BLOCK C (SOUTH LAUREL STREET)
LOTS 1, 2, 3, 4 & 5 BLOCK B (NORTH LAUREL STREET)
LOTS 1, 2, 3, 4 & 5 BLOCK B (SOUTH OAK STREET)
PART OF LOTS 8, 9 & 10 (WEST CHAMPAGNE AVENUE)
PART OF LOTS 1, 2 & 3 BLOCK C (NORTH GLADSTONE AVENUE)
PART OF LOT 5A
PART OF OAK STREET (CLOSED BY JUDGE'S ORDER INST. NO. OC574103)
PART OF LAUREL STREET (CLOSED BY JUDGE'S ORDER INST. NO. CR574103)
PART OF LAUREL STREET (CLOSED BY JUDGE'S ORDER INST. NO. LT1402120)
PART OF LARCH STREET (CLOSED BY JUDGE'S ORDER INST. NO. OC574103)
PART OF WALNUT STREET (CLOSED BY JUDGE'S ORDER INST. NO. CR179807)
PART OF CHAMPAGNE AVENUE (CLOSED BY JUDGE'S ORDER INST. NO. LT1402120)
REGISTERED PLAN NO.73

CITY OF OTTAWA

Scale 1:300
5 0 5 10 15 20 METRES

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

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 OF THE PLANNING ACT.

(A)-AS SHOWN ON DRAFT PLAN
(B)-AS SHOWN ON DRAFT PLAN
(C)-AS SHOWN ON DRAFT AND KEY PLANS
(D)-
(E)-AS SHOWN ON DRAFT PLAN
(F)-AS SHOWN ON DRAFT PLAN
(G)-AS SHOWN ON DRAFT PLAN
(H)-
(I)-
(J)-AS SHOWN ON DRAFT PLAN
(K)-
(L)-AS SHOWN ON DRAFT PLAN

OWNER'S CERTIFICATE
I HEREBY AUTHORIZE STANTEC GEOMATICS LTD. TO SUBMIT THIS DRAFT PLAN OF SUBDIVISION ON MY BEHALF

DATE

*,PRESIDENT
####### ONTARIO LIMITED
I HAVE THE AUTHORITY TO BIND THE CORPORATION

SURVEYOR'S CERTIFICATE
I HEREBY CERTIFY THAT THE BOUNDARIES OF THE SUBJECT LANDS AND THEIR RELATIONSHIP TO ADJOINING LANDS HAVE BEEN ACCURATELY AND CORRECTLY SHOWN.

DATE

BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

Stantec Geomatics Ltd.
CANADA LANDS SURVEYORS
ONTARIO LAND SURVEYORS
1331 CLYDE AVENUE, SUITE 400
OTTAWA, ONTARIO, K2C 3G4
TEL. 613.722.4420 FAX. 613.722.2799
stantec.com

DRAWN: *	CHECKED: *	DATE: *	PROJECT No.: 161600000

A.3 SITE STATISTICS

GLADSTONE VILLAGE - DEVELOPMENT STATS

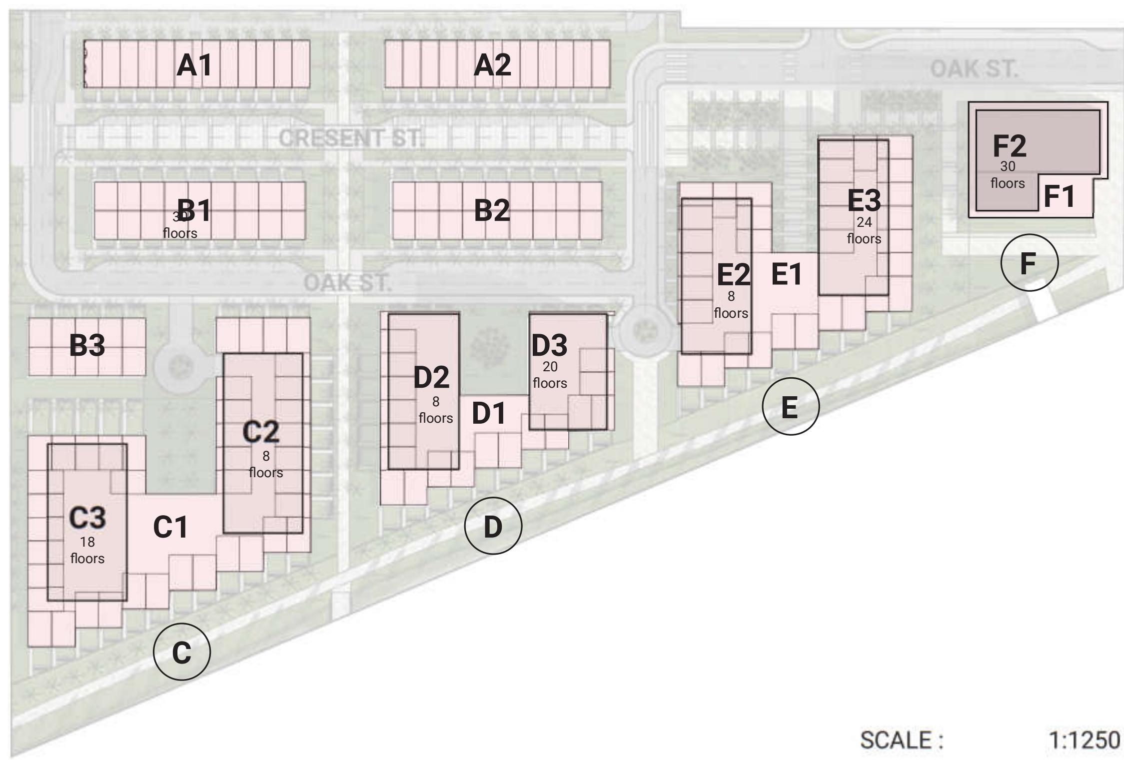
CURRENT OPTION

	GFA		UNITS +/-
BLOCK A1 - TOWNHOMES			
TOTAL	21,384	SQ.FT.	12
BLOCK A2 - TOWNHOMES			
TOTAL	21,384	SQ.FT.	12
BLOCK B1 - STACKED TOWNHOMES			
TOTAL	34,848	SQ.FT.	36
BLOCK B2 - STACKED TOWNHOMES			
TOTAL	34,848	SQ.FT.	36
BLOCK B3 - STACKED TOWNHOMES			
TOTAL	19,360	SQ.FT.	20
BLOCK C - MIXED USE			
C1 PODIUM RES	49,640	SQ.FT.	40
C1 PODIUM RETAIL / COMMERCIAL / INSTITUTIONAL	25,000	SQ.FT.	
C2 MID-RISE	59,412	SQ.FT.	67
C3 HIGH RISE	137,776	SQ.FT.	156
TOTAL	271,828	SQ.FT.	263
BLOCK D - MIXED USE			
D1 PODIUM RES	17,938	SQ.FT.	18
D1 PODIUM RETAIL / COMMERCIAL / INSTITUTIONAL	25,000	SQ.FT.	
D2 MID-RISE	46,500	SQ.FT.	53
D3 HIGH RISE	115,326	SQ.FT.	131
TOTAL	204,764	SQ.FT.	201
BLOCK E - MIXED USE			
E1 PODIUM RES	31,330	SQ.FT.	32
E1 PODIUM RETAIL / COMMERCIAL / INSTITUTIONAL	25,000	SQ.FT.	
E2 MID-RISE	46,500	SQ.FT.	53
E3 HIGH RISE	170,500	SQ.FT.	193
TOTAL	273,330	SQ.FT.	278
BLOCK F - MIXED USE			
F1 PODUIM RES	16,714	SQ.FT.	-
F1 PODIUM RETAIL / COMMERCIAL	25,000	SQ.FT.	
F2 HIGH RISE, RES / OFFICE	166,629	SQ.FT.	189
TOTAL GROSS	208,343	SQ.FT.	189

TOTALS	GFA	UNITS
	1,090,089	1048

OVERALL UNIT TYPOLOGY BREAKDOWN

TRADITIONAL TOWNHOMES :	24	UNITS
BACK TO BACK STACKED TOWNHOMES :	92	UNITS
TOWNHOMES AT PODIUM BASE :	90	UNITS
MID-RISE APARTMENT/CONDO UNITS :	173	UNITS
HIGH-RISE APARTMENT/CONDO UNITS :	669	UNITS
	1048	**UNITS**



SCALE : 1:1250

Appendix B POTABLE WATER SERVICING

B.1 DOMESTIC WATER DEMAND CALCULATIONS

Gladstone Village (933 Gladstone Ave.) OCH Development - Domestic Water Demand Estimates

Based on conceptual development plans by Hobin Architecture (2021-03-15)
Last updated on March 16, 2021

Densities as per City Guidelines:		
Townhomes	2.7	ppu
Apartments	1.8	ppu

Development Block/Area ID	Commercial Area (m^2)	Number of Residential Units	Population	Daily Demand Rate (L/cap/day or L/ha/d)	Avg. Day Demand [1,2]		Max. Day Demand [1, 2]		Peak Hour Demand [1, 2]	
					(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)
Townhomes										
Block A1 (Block 8)	-	12	32	350	7.9	0.13	19.7	0.33	43.3	0.72
Block A2 (Block 10)	-	12	32	350	7.9	0.13	19.7	0.33	43.3	0.72
Stacked Townhomes										
Block B1 (Block 7)	-	36	97	350	23.6	0.39	59.1	0.98	129.9	2.17
Block B2 (Block 11)	-	36	97	350	23.6	0.39	59.1	0.98	129.9	2.17
Block B3 (Block 6)	-	20	54	350	13.1	0.22	32.8	0.55	72.2	1.20
Mixed Use - Block C (Block 6)										
C1 Podium Residential	-	40	108	350	26.3	0.44	65.6	1.09	144.4	2.41
C1 Podium Retail/Commercial/Institutional	2323	-	-	28000	45.2	0.8	67.7	1.1	121.9	2.03
C2 Midrise	-	67	121	350	29.3	0.49	73.3	1.22	161.2	2.69
C3 Highrise	-	156	281	350	68.3	1.14	170.6	2.84	375.4	6.26
Mixed Use - Block D (Block 4)										
D1 Podium Residential	-	18	49	350	11.8	0.20	29.5	0.49	65.0	1.08
D1 Podium Retail/Commercial/Institutional	2323	-	-	28000	45.2	0.8	67.7	1.1	121.9	2.03
D2 Midrise	-	53	95	350	23.2	0.4	58.0	1.0	127.5	2.13
D3 Highrise	-	131	236	350	57.3	1.0	143.3	2.4	315.2	5.25
Mixed Use - Block E (Block 2)										
E1 Podium Residential	-	32	86	350	21.0	0.35	52.5	0.88	115.5	1.93
E1 Podium Retail/Commercial/Institutional	2323	-	-	28000	45.2	0.8	67.7	1.1	121.9	2.03
E2 Midrise	-	53	95	350	23.2	0.4	34.8	0.6	76.5	1.28
E3 Highrise	-	193	347	350	84.4	1.41	126.7	2.1	278.6	4.64
Mixed Use - Block F (Block 1)										
F1 Podium Residential [4]	-	18	49	350	11.8	0.20	29.5	0.5	65.0	1.08
F1 Podium Retail/Commercial	2323	-	-	28000	45.2	0.8	67.7	1.1	121.9	2.03
F2 Highrise, Residential/Office	-	189	340	350	82.7	1.4	206.7	3.4	454.8	7.58
Block C1, C2, C3, and B3 Build-out [5]		21	38	350	9.2	0.2	23.0	0.4	50.5	0.84
Total Site :	**9290**	**1087**	**2158**	**-**	**705.2**	**11.75**	**1474.7**	**24.58**	**3136.1**	**52.27**

1 Water demand criteria used to estimate peak demand rates for residential areas are as follows:
maximum daily demand rate = 2.5 x average day demand rate
peak hour demand rate = 2.2 x maximum day demand rate

2 Water demand criteria used to estimate peak demand rates for commercial/amenity/lobby areas are as follows:
maximum daily demand rate = 1.5 x average day demand rate
peak hour demand rate = 1.8 x maximum day demand rate

3 Population density for all residential units based on an 'average apartment' population density from Table 4.1 of the City of Ottawa Water Distribution Design Guidelines (2010).

4 Unit count not provided for Block F1 residential area (1553m²). Unit count taken from Block D1 podium residential area with comparable footprint.

5 Intended future revision/expansion to Block C1, C2, C3, and Block B3 unit counts. Total of 21 additional units to be added to these blocks .

B.2 FIRE FLOW DEMAND CALCULATIONS PER FUS GUIDELINES

Stantec

FUS Fire Flow Calculation Sheet

Stantec Project #: 160401614
Project Name: Gladstone Village OCH Development
Date: 2021-04-08
Fire Flow Calculation #: 1
Description: Residential Stacked Towns, Block B2

Notes: Stacked residential townhomes assuming 3-storeys above grade. Building information from Conceptual Architectural Drawings by Hobin Arcitecture. No fire seperation provided between adjacent units.

Step	Task	Notes						Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Wood Frame						1.5	-
2	Determine Ground Floor Area of One Unit (m2)	Approx. area of a single storey of a single unit						49	-
	Determine Number of Adjoining Units	Includes adjacent wood frame structures separated by 3m or less						18	-
3	Determine Height in Storeys	Does not include floors >50% below grade or open attic space						3	-
4	Determine Required Fire Flow	(F = 220 x C x $A^{1/2}$). Round to nearest 1000 L/min						-	17000
5	Determine Occupancy Charge	Limited Combustible						-15%	14450
6	Determine Sprinkler Reduction	None						0%	0
		Non-Standard Water Supply or N/A						0%	
		Not Fully Supervised or N/A						0%	
		% Coverage of Sprinkler System						100%	
7	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	-	-
		North	20.1 to 30	15	3	31-60	Wood Frame or Non-Combustible	8%	5925
		East	20.1 to 30	52	3	> 120	Wood Frame or Non-Combustible	10%	
		South	20.1 to 30	15	3	31-60	Wood Frame or Non-Combustible	8%	
		West	10.1 to 20	52	3	> 120	Wood Frame or Non-Combustible	15%	
8	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min							20000
		Total Required Fire Flow in L/s							333.3
		Required Duration of Fire Flow (hrs)							4.50
		Required Volume of Fire Flow (m^3)							5400

FUS Fire Flow Calculation Sheet

Stantec Project #: 160401614
Project Name: Gladstone Village OCH Development
Date: 2021-04-08
Fire Flow Calculation #: 2
Description: Residential Stacked Towns, Block B2

Notes: Stacked residential townhomes assuming 3-storeys above grade. Building information from Conceptual Architectural Drawings by Hobin Arcitecture. Fire seperation provided seperating Block B2 into clusters of 8 units and 10 Units. Fire separation to reduce building footprint below 600m² as per building code requirements.

Step	Task	Notes						Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Wood Frame						1.5	-
2	Determine Ground Floor Area of One Unit (m2)	Approx. area of a single storey of a single unit						49	-
	Determine Number of Adjoining Units	Includes adjacent wood frame structures separated by 3m or less						10	-
3	Determine Height in Storeys	Does not include floors >50% below grade or open attic space						3	-
4	Determine Required Fire Flow	(F = 220 x C x $A^{1/2}$). Round to nearest 1000 L/min						-	13000
5	Determine Occupancy Charge	Limited Combustible						-15%	11050
6	Determine Sprinkler Reduction	None						0%	0
		Non-Standard Water Supply or N/A						0%	
		Not Fully Supervised or N/A						0%	
		% Coverage of Sprinkler System						100%	
7	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	-	-
		North	0 to 3	15	3	31-60	Ordinary or Fire Resistive (Blank Wall)	0%	3647
		East	20.1 to 30	52	3	> 120	Wood Frame or Non-Combustible	10%	
		South	20.1 to 30	15	3	31-60	Wood Frame or Non-Combustible	8%	
		West	10.1 to 20	52	3	> 120	Wood Frame or Non-Combustible	15%	
8	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min							15000
		Total Required Fire Flow in L/s							250.0
		Required Duration of Fire Flow (hrs)							3.00
		Required Volume of Fire Flow (m^3)							2700

B.3 BOUNDARY CONDITIONS (MARCH 2021)

From:	Wessel, Shawn
To:	Mott, Peter
Cc:	Paerez, Ana
Subject:	Gladstone Village OCH Boundary Conditions Request Draft
Date:	Tuesday, March 23, 2021 2:13:52 PM
Attachments:	Gladstone Village OCH March 2021.pdf

Good afternoon Mr. Mott.

Please find water boundary conditions, as requested:

The following are boundary conditions, HGL, for the hydraulic analysis at Gladstone Village OCH (zone 1W) assumed to be internally looped and connected to the 406 mm on Champagne Avenue, 152 mm on Oak Street and 203 mm on Gladstone Avenue (see attached PDF for location).

All Connections:

Minimum HGL = 107.0 m

Maximum HGL = 114.9 m

Max Day + Fire Flow	Fire Demand (167 L/s)	Fire Demand (233 L/s)	Fire Demand (250 L/s)
Champagne 406mm Connection	109.1 m	108.4 m	108.2 m
Oak 152mm Connection	106.2 m	103.4 m	102.5 m
Gladstone 203mm Connection	106.4 m	103.7 m	102.9 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.

If you require additional information or clarification, please do not hesitate to contact me anytime.

Thank you

Regards,

Shawn Wessel, A.Sc.T.,rcji

Project Manager - Infrastructure Approvals
Gestionnaire de projet – Approbation des demandes d'infrastructures

Development Review Central Branch | Direction de l'examen des projets d'aménagement, Centrale
Planning, Infrastructure and Economic Development Department | Direction générale de la planification de l'infrastructure et du développement économique
City of Ottawa | Ville d'Ottawa
110 Laurier Ave. W. | 110, avenue Laurier Ouest, Ottawa ON K1P 1J1
(613) 580 2424 Ext. | Poste 33017
Int. Mail Code | Code de Courrier Interne 01-14
shawn.wessel@ottawa.ca

*****Please also note that, while my work hours may be affected by the current situation and am working from home, I still have access to email, video conferencing and telephone. Feel free to schedule video conferences and/or telephone calls, as necessary.*****

From: Mott, Peter <Peter.Mott@stantec.com>
Sent: March 17, 2021 11:10 AM
To: Wessel, Shawn <shawn.wessel@ottawa.ca>
Cc: Paerez, Ana <Ana.Paerez@stantec.com>
Subject: RE: Gladstone Village OCH Boundary Conditions Request Draft

Hello Mr. Wessel,

I would like to request the hydraulic boundary conditions for the proposed Gladstone Village OCH Development (933 Gladstone Avenue). Please find attached the concept plan, the key map showing the location of the proposed development, domestic water demand calculations, and fire flow calculations.

A summary of the proposed site is provided below:

We anticipate that three (3) connections to the existing watermain infrastructure will be required to service the site. The following connections are expected for servicing:

➢Connection to existing 152 mm (PVC) watermain on Oak Street;
➢Connection to existing 403 mm (UCI) watermain on the North West corner of property (Champagne Avenue);
➢Connection to existing 203 mm (PVC) watermain on Gladstone Avenue.

*Existing hydrants on Somerset Street West, Laurel, Larch and Balsam Street, and Gladstone Avenue.

For the purpose of the boundary conditions request, may you please provide us with the boundary conditions for the following servicing options:

i. Watermain connections to the existing 152 mm (PVC) watermain on Oak Street, the existing 403 mm (UCI) watermain on the North West corner of property (Champagne Avenue), and to the existing 203 mm (PVC) watermain on Gladstone Avenue; assuming a fire flow requirement of **10,000 L/min** for the site in addition to the domestic water demands provided below.

ii. Watermain connections to the existing 152 mm (PVC) watermain on Oak Street, the existing 403 mm (UCI) watermain on the North West corner of property (Champagne Avenue), and to the existing 203 mm (PVC) watermain on Gladstone Avenue; assuming a fire flow of **14,000 L/min** for the site in addition to the domestic water demands provided below.

- The intended land use is a combination of commercial and residential, per the summary provided in the Domestic Demands spreadsheet. (See attached Concept Plan with project stats)
- Estimated fire flow demand per the FUS methodology: 14000 L/min (250 L/s) for the worst-case scenario (Block B2)
- Domestic water demands for the entire development:
    - **Average day: 681.6 L/min (11.36 L/s)**
    - **Maximum day: 1415.7 L/min (23.59 L/s)**
    - **Peak hour: 2941.5 L/min (49.03 L/s)**

Thank you for your time and please contact me at your earliest convenience if any additional information or clarification is required.

Best regards,

Peter Mott EIT
Engineering Intern, Community Development

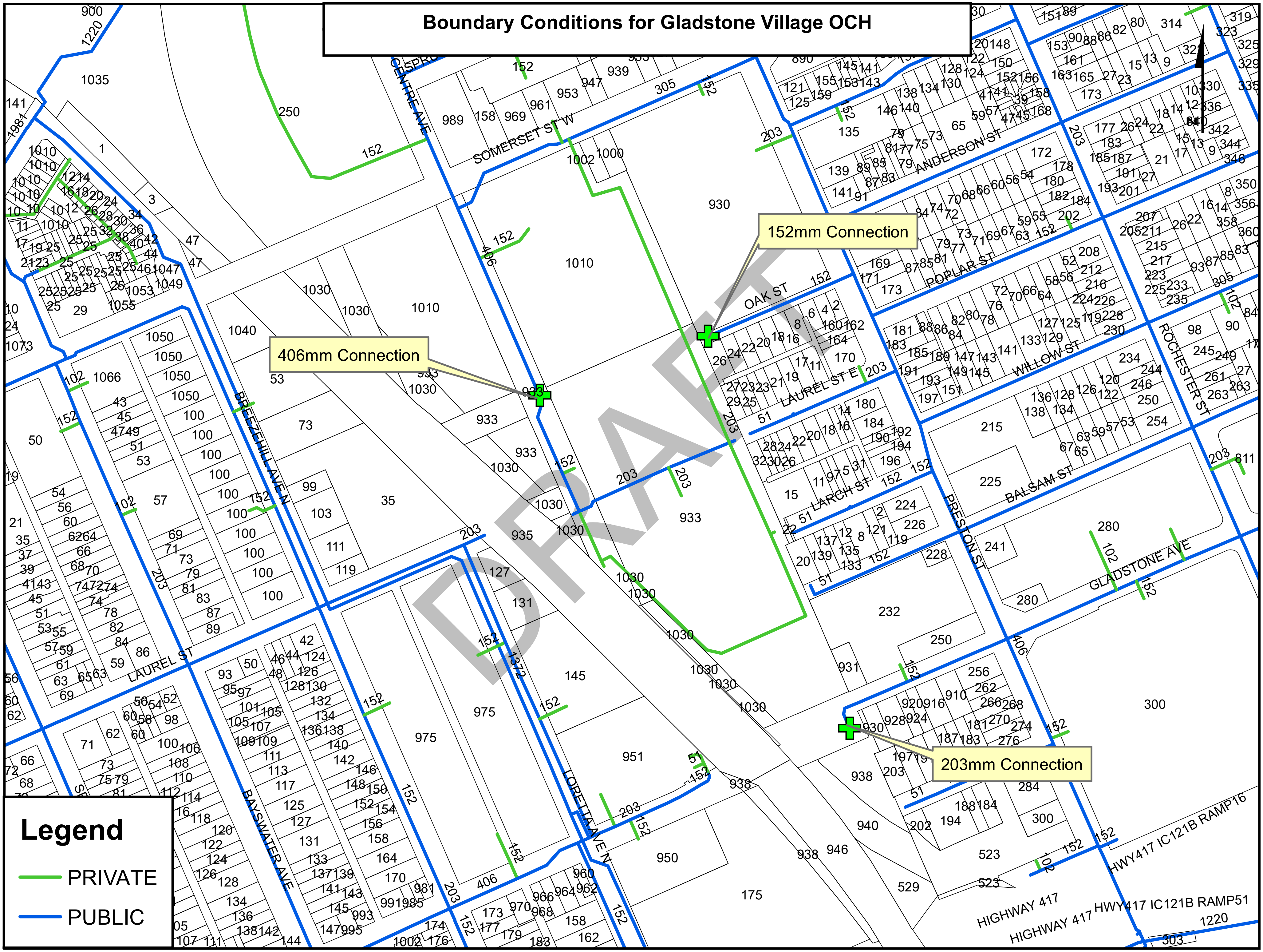
Mobile: 613-897-0445

Peter.Mott@stantec.com
Stantec
400 - 1331 Clyde Avenue
Ottawa ON K2C 3G4

'

'

Boundary Conditions for Gladstone Village OCH



Appendix C WASTEWATER SERVICING

C.1 FUNCTIONAL SANITARY SEWER DESIGN SHEET

Stantec	SUBDIVISION: Gladstone Village - 933 Gladstone Avenue	SANITARY SEWER DESIGN SHEET (City of Ottawa)
	DATE: 4/14/2021	
	REVISION: 2	
	DESIGNED BY: WAJ	**FILE NUMBER:** 160401614
	CHECKED BY: AMP	**Functional Sewer Design for Draft Plan Submission**

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	280 L/p/day	MINIMUM VELOCITY	0.60 m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	28,000 L/ha/day	MAXIMUM VELOCITY	3.00 m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 L/ha/day	MANNINGS n	0.013
PEAKING FACTOR (ICI >20%):	1.5	INDUSTRIAL (LIGHT)	35,000 L/ha/day	BEDDING CLASS	B
PERSONS / SINGLE	3.4	INSTITUTIONAL	28,000 L/ha/day	MINIMUM COVER	2.50 m
PERSONS / TOWNHOME	2.7	INFILTRATION	0.33 L/s/ha	HARMON CORRECTION FACTOR	0.8
PERSONS / APARTMENT	1.8				

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / STREET		C+I+I	INFILTRATION			TOTAL	PIPE								
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (ha)	SINGLE	UNITS TOWN	APT	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (L/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (L/s)	FLOW (L/s)	LENGTH (m)	DIA (mm)	MATERIAL	CLASS	SLOPE (%)	CAP. (FULL) (L/s)	CAP. V PEAK FLOW (%)	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
Larch Street Connection																																			
R206A (Street 4), C206B (Block 1)**	206	205	0.00	0	18	189	388.8	0.00	389	3.42	4.3	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.1	0.43	0.43	0.1	4.6	94.6	200	PVC	SDR 35	0.32	18.9	**24.15%**	0.60	0.41
R208C (Walkway), C208B (Block 4), R208A (Street 2)	208	207	0.07	0	18	184	379.8	0.07	380	3.43	4.2	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.15	0.1	0.45	0.45	0.1	4.5	38.8	200	PVC	SDR 35	0.32	18.9	**23.68%**	0.60	0.40
C207B (Block 2), R207A (Street 3)	207	205	0.24	0	32	246	529.2	0.31	909	3.26	9.6	0.23	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.26	0.2	0.58	1.03	0.3	10.2	55.9	200	PVC	SDR 35	0.32	18.9	**53.78%**	0.60	0.52
	205	204	0.00	0	0	0	0.0	0.31	1298	3.18	13.4	0.00	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.3	0.00	1.46	0.5	14.2	19.9	200	PVC	SDR 35	0.32	18.9	**75.04%**	0.60	0.58
Champagne Avenue Connection																												450							
R209B (Walkway), R209A* (Block 6)	209	3	0.39	0	60	244	601.2	0.39	601	3.35	6.5	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.1	0.69	0.69	0.2	6.9	20.4	200	PVC	SDR 35	0.50	23.6	**29.01%**	0.74	0.54
R3A (Street 2)	3	2	0.00	0	0	0	0.0	0.39	601	3.35	6.5	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.22	0.1	0.15	0.84	0.3	6.9	94.1	1500	CONCRETE	100-D	0.37	4533.5	**0.15%**	2.49	0.40
	2	1	0.00	0	0	0	0.0	0.39	601	3.35	6.5	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.1	0.00	0.84	0.3	6.9	58.1	1500	CONCRETE	100-D	0.37	4533.5	**0.15%**	2.49	0.40
Laurel Street Connection																												1500							
R203D (Blk11), R203C (Road), R203A(Walkway), R203B (Blk10)	203	202	0.29	0	48	0	129.6	0.29	130	3.57	1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.16	0.0	0.45	0.45	0.1	1.6	35.4	200	PVC	SDR 35	0.50	23.6	**6.97%**	0.74	0.36
Oak Street Connection																												675							
R201B (Blk8), R201C (Road), R201A (Street 1), R201D (Blk7)	201	200	0.28	0	48	0	129.6	0.28	130	3.57	1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.0	0.48	0.48	0.2	1.7	32.1	200	PVC	SDR 35	0.50	23.6	**7.01%**	0.74	0.36
					224	**863**	**2158**																**3.23**					375							

*Intended future revision/expansion to Block 6 unit counts. Total of 21 additional units to be added to this block .

**Unit count not provided for Block 1 residential area (1553m²). Unit count taken from Block D1 podium residential area with comparable footprint.

C.2 CORRESPONDENCE AND BACKGROUND

1 INTRODUCTION

The City of Ottawa has retained Stantec Consulting to prepare a detailed design for the rehabilitation of Preston Street, Albert St. to Carling Ave. The project involves the complete road reconstruction and replacement of old watermains and sewers. This design brief has been prepared as supporting documentation for the Ministry of Environment Certificate of Approval for Sewage. Covered in this design brief and application are the trunk sewers scheduled for replacement as part of the Preston Street Rehabilitation project. The installation of catchbasin inlet control devices outside of the Preston St right of way will be covered in a separate application.

The project is scheduled for construction in six parts over the years 2008-2010. Because of the stormwater management component and the large scale of the project the planning and design of the whole project proceeded in accordance with the requirements of a Municipal Class Environmental Assessment and more specifically according to the Schedule B Class EA process. A Technical Advisory Committee and Public Advisory Group have been formed to provide guidance during the design and construction process.

1.1 Background

1.1.1 Previous Studies

Preston Street Drainage Flooding Remediation, Environmental Assessment Summary Report (Stantec, March 2004)

Stantec undertook this project to complete the 2003 study and advance both the Class EA process and the Canadian Environmental Assessment Act (CEAA) process. The report outlines the existing conditions, the problem identification, the evaluation of alternatives, the selection of the preferred alternative, the environmental impacts and the required monitoring and mitigation measures. The report also included agency, stakeholder and public consultation information.

At the time, the evaluation of alternatives concluded that the combined trunk sewer upgrade alternatives do not provide adequate or cost-effective improvements to the existing level of service.

The preferred alternative identified in the EA document included:

- Installation of inlet control devices in catch-basins to restrict flows into the minor system;
- Minor street re-grading and curb modifications to ensure that private property is protected from overland flow;
- Local high-level relief sewers to drain excess storm runoff from low-lying areas to Brown's Inlet;
- Diversion of flow to the Booth Street system at Laurel Street to improve the hydraulic conditions in the Preston Street Sewer; and,

- Improvements to the existing Spruce Street diversion structure to improve local hydraulics in the Preston Street Sewer.

Preston Street Drainage Area Flooding Remediation, Preliminary Design Report (Stantec, August 2004)

This report outlines the preliminary design for the preferred alternatives outlined in the Preston Street Drainage Flooding Remediation EA Summary Report (Stantec, March 2004).

Specifically detailed in the report are the following flood control measures:

- Installation of inlet control devices in catch-basins throughout most of the Preston Street Drainage Area;
- High-level sewers in Brown's Inlet area to convey excess surface runoff;
- Major Drainage Improvements in Brown's Inlet area;
- Reinstatement of the Laurel Street diversion to relieve the PSCTS during periods of surcharge; and,
- Modifications to the Spruce Street flow control chamber to divert all of the PSCTS flows to the Booth Street sewer.

Storage of excess surface runoff in the portion North of Carling Ave was not addressed as part of the original EA or Pre-design study, given that the measures proposed in the EA did not lead to a worsening of existing ponding.

Preston Street Drainage Area Flooding Remediation Environmental Assessment Summary Report Addendum (November 2007)

This addendum has recently been completed and is within a 30 day review period. The addendum addresses the mitigation of existing and future surface flooding risks near the Preston Street sag (near Anderson Street). The recommended solution is to lower Plouffe Park (located to the north west of the Preston and Oak Street intersection) to provide storage of excess surface runoff. The proposed works would provide flooding relief for runoff events between the 1:10 and 1:50-yr return period. It is the City's intention to initiate the design of the recommended works in 2008.

1.1.2 In Summary

The capacity of the existing combined trunk sewer along Preston St. between Carling Ave. and Albert St. is deficient and there have been numerous reports of basement flooding along Preston St. and a few of the side streets. Since the filing of the original Environmental Assessment (EA) in 2004, the City has reconsidered the combined sewer upgrade alternatives for the segment between Carling Ave. and Albert St. in combination with implementation of the inlet control devices to limit sewer inflows to the 1:5-year level. Assessments undertaken by the City Water Resources Group indicated that such a combination would result in a higher level of service than each alternative implemented separately.

It is the intention of the City of Ottawa that the portion of the PSCTS drainage area north of Somerset Street will be, to the extent possible, separated (Combined Sewer Area Pollution

Control Planning Study, City of Ottawa/MOE, 1993). This separation process has already started and is progressing as part of infrastructure rehabilitation projects.

2 EXISTING CONDITIONS

The tributary area to the Preston Street Combined Trunk Sewer (PSCTS) within the proposed project limits is bounded by Cambridge St. to the east, Albert St. to the north, the O-Train corridor to the west and Brown's Inlet/Dow's Lake to the south (**refer to Figure 1**). The land use within the project limits can be described primarily as a mix of residential and commercial.

The existing PSCTS, which was constructed in 1899, is of brick construction between 1200 and 1500 mm in diameter and, with the exception of the section to the north of Somerset St., is installed with approximately 2m of cover. A sewer condition assessment (GA Clark, 2006) of the existing trunk sewer south of Somerset St. revealed that this section is in poor condition.

The majority of the sewers along the side streets have been replaced in conjunction with previous infrastructure renewal projects and are relatively new. Some exceptions are Larch St., Laurel St., Norfolk St., Young St. and Sidney St. which will be rehabilitated as part of the Preston Street Rehabilitation project. Note separate C of A applications will be submitted for the side streets.

There is an existing 1500 mm dia. combined sewer within the Laurel R-O-W that received the combined flows from the Willow St. catchment and also serves as an overflow for the Preston Combined sewer. This sewer, known as the Booth St. Sewer (BSS), runs west along Laurel Street; then under federally owned lands (Public Works Canada partially vacant warehouses); then runs north along Champagne to Spruce Street; then runs east along Spruce St. to Booth St. To our knowledge, there are currently only a few sanitary connections to the BBS from the federally owned lands. This land is poised for redevelopment and will ultimately be serviced by new outlets toward Larch, Laurel Streets.

PSCTS wet weather flows are diverted to the BSS at Spruce Street through the use of a bulkhead in the PSCTS and an overflow weir to the BSS. Under extreme runoff events, the PSCTS and BSS currently operate under surcharge conditions due to capacity constraints of both the PSCTS and the BSS (1800 diameter sewer d/s of Preston St.). As confirmed by the recent CCTV inspections, the BSS is in good structural condition.

3 DESCRIPTION OF PROPOSED WORKS

The proposed sewerage works included as part of this application are:

- the upgrade of the PSCTS, Carling Ave to Spruce St.;
- the lowering of the PSCTS between Young and Spruce Streets;
- the conversion of the existing PSCTS from Spruce St to Albert St. to a storm sewer;
- the provision of a new sanitary sewer from Somerset St. to Albert St.;

- the provision of a new high-level storm relief sewer between Laurel and Spruce Streets including an in-line flow control device at its outlet at Spruce St.; and,
- the provision of an in-line flow control device in the Booth St. sewer near its intersection with Somerset St.

These works are described in more detail below.

3.1 Preston Street Combined Trunk Sewer Upgrade

The PSCTS section between Carling Ave and Spruce Street will be upgraded and lowered to provide an enhanced level of service reducing the health and safety risks associated with basement flooding.

The PSCTS will be replaced with:

- a 1500 mm diameter combined sewer between Carling Ave. and Aberdeen St.;
- a 1650 mm diameter combined sewer between Aberdeen St. and Young St. Note that presence of a large diameter watermain at Young St. forces us to match inverts at Aberdeen St.;
- a deeper 1,800 mm diameter combined sewer between Young St. and Willow St.;
- a deeper 2100 mm diameter sewer between Willow St. and Spruce St. with all flows from Willow St. sewer directed to the PSCTS; and,
- removal of the interconnection (overflow) between the PSCTS and the Booth St. sewer at Laurel St.

The combination of storm inflow restriction into the combined sewers along with an upgraded trunk sewer down to the Booth St. sewer (slightly larger and deeper trunk) provides a significant reduction in hydraulic grade line and risk of basement flooding during infrequent events. Furthermore, the proposed PSCTS upgrade between Willow and Spruce Streets eliminates the reliance on the existing overflow to the Booth St. sewer at Laurel St.

The catchbasins along Preston St., with the exception of the catchbasins in the sag area near Anderson St., will be fitted with 20L/sec inlet control devices to control the flows into the PSCTS (Refer to **Section 4.1.1**).

3.2 Preston Street Sewer Separation - North of Somerset

The area north of Somerset St. will be serviced by separated sewers. The existing combined trunk sewer will be converted to a storm sewer while a new sanitary sewer will be provided between Somerset and Albert Streets. Note that the flows from the newly converted storm sewer and from the new sanitary sewer will be temporarily recombined immediately south of Albert Street and will continue to flow to the Cave Creek Collector until such time that a new storm sewer outlet is provided from Albert St.

Note that the Somerset St. and Spruce St. combined sewers west of Preston Streets are too deep to be serviced by the proposed separated storm and sanitary sewers. The Somerset St. combined sewer west of Preston St. will drain to the upgraded PSCTS whereas the Spruce St. combined sewer west of Preston St. will continue to drain to the Booth St. sewer.

Details of the storm and sanitary sewers are provided below.

3.2.1 Sanitary Sewer

A new sanitary sewer will be provided on Preston St. between Somerset and Albert Streets. The new sewer will range in size from 375mm diameter at Somerset St. to a 525 mm diameter sewer near Albert St. This sewer will collect sanitary sewage from the side streets which have already been separated. Sanitary sub-headers (250 mm diameter) are proposed between Spruce St. and a point 36 m north of Primrose Ave. These are provided to collect the sewage from the properties fronting onto Preston St. and to facilitate future connections of sanitary laterals thereby avoiding excessively deep excavations (up to 7m deep). These high-level sub-headers flow in a north to south direction to the nearest manhole junction with the new sanitary sewer.

3.2.2 Storm Sewer

The existing 1500 mm diameter PSCTS between Spruce and Albert Streets will be converted to a storm sewer which will service the side streets which are for the most part separated.

A new high-level storm relief sewer will be provided between Spruce and Laurel Streets as the existing PSCTS has been found to be in poor condition south of Spruce St. where the overburden thickness decreases and the upgrade of the PSCTS south of Spruce St. requires the removal of the old trunk sewer. This new 1050 mm diameter high-level storm sewer will serve as an extension of the converted storm sewer past Spruce St. The high-level sewer will be located to the west of the upgraded PSCTS alignment and will collect the future storm drainage from Somerset St. east of Preston St. when it is separated. The main purpose of the high-level sewer past Somerset St. is to provide flooding relief from excess surface runoff which tends to accumulate at the Preston St. sag near its intersection with Anderson St. Roadway drainage along Preston Street, between Spruce and Laurel Streets, will be directed to the new high-level sewer.

Details of the proposed high-level sewer and related appurtenances include:

- a 1050 mm diameter high-level storm sewer extending between Spruce and Laurel Streets. The new sewer would have a high point at Oak Street and storm flows would be split between the Preston St. brick storm sewer immediately north of Spruce Street and the Booth Street sewer at Laurel St. Note that the high-level sewer is oversized to provide up to 160 m^3 of in-line storage ;
- the discharge from the high-level sewer to the Preston St. storm sewer north of Spruce St. must be controlled to the existing allowable peak discharge in an effort to prevent increased combined sewer overflows from the Cave Creek collector and to prevent surcharging of the sewer downstream of Spruce St. It is therefore necessary to provide a bulkhead at Spruce Street to allow a maximum discharge of approximately 700 L/sec when the high-level sewer is under surcharge conditions;
- the interconnection of the high-level storm sewer to the existing Booth Street sewer at Laurel St. provides for approximately 800 m^3 of pipe storage. The discharge from the Booth Street sewer must be controlled to prevent surcharging of the Booth St. sewer and ultimately the Preston St. Trunk sewer. A discharge rate of approximately

300 L/sec can be accommodated within the Booth St. sewer downstream of Somerset St. without adversely impacting downstream hydraulic grade lines. Since this interconnection will link the combined system (BSS) with a storm sewer system, it could offer the remote possibility of combined sewage backing up into the storm sewer system. To prevent this, a check valve will be provided along with the orifice in the Booth Street sewer at Somerset Street, upstream of the 900 mm diameter sewer entering from the west on Somerset St.; and,

- the catchbasins located within the large sag area (i.e. Preston St. between Laurel and Somerset Streets, Anderson St. immediately east of Preston Street and Oak St. immediately west of Preston St.) will be connected to the high-level storm relief sewer without inlet control devices.

4 DESIGN BASIS

4.1 Hydrologic and Hydraulic Modeling

4.1.1 Major System Drainage Assessment

A dual drainage hydrologic and hydraulic model was developed (DDSWMM release 2.1) for the sewershed as part of the Preston Street Drainage Area Study (Stantec, 2003). This model was updated as part of the Preston Street Drainage Area Flooding Remediation, Preliminary Design Report (Stantec, August 2004) and further refined as part of the ongoing Preston Street Rehabilitation Project between Carling Avenue and Albert Street. This refinement was undertaken in an effort to reflect recent and proposed road reconstruction activity within the study area and to better characterize street level flow during high intensity storm events. The intent of the proposed stormwater management plan is to limit sewer inflows throughout the sewershed to approximately the 5-year level in order to prevent surcharging of the Preston St. Combined Trunk Sewer and reduce the associated risk of basement and surface flooding. Model input and output files are provided in **Attachment A**.

The criteria used for the DDSWMM model included selected catchbasin capture rates to achieve an average 1:5-year capture rate equivalent to the existing 1:5-year minor system capture rate of 102 L/s/ha for the area north of Carling Ave. and south of Spruce St. The inlet control rates were selected among preset control rates (6, 10, 15 and 20 L/sec) based on City accepted standard designs, rates lower than 15 L/sec are a vortex type ICD. The capture rates selected for catchbasins located along major arterials including Preston St. were set to 20 L/sec to ensure a high level of service. Prescribed inlet restriction rates are illustrated in **Attachment A**.

The resultant future conditions for the 1:5-year and 1:100-year capture rates are estimated at 97 and 134 L/s/ha respectively. The dual drainage model indicates that the implementation of inlet control devices is not expected to result in significant increases in runoff flow depths on the streets for the frequent runoff events up to and including the 1:5-year event.

With the exception of the main profile sag on Preston St. (between Anderson St. and Oak St.) most roadway sag areas are located on side streets where minor inconveniences are expected during major runoff events. A high-level relief storm sewer is proposed between

Laurel and Spruce Streets to help mitigate surface flooding at the Preston St. sag. This high-level sewer will provide an outlet, independent of the PSCTS/Booth St. sewer system, for the Preston St. sag. In-line storage will be provided within the high-level sewer and a section of the Booth St. sewer. Catchbasins located within this sag will drain to the high-level sewer and will not be fitted with ICD.

4.1.2 Hydraulic Analysis

As described in the previous sub-section, a dual drainage model was used to determine the allocation of flows between the sewer system (minor) and roadway system (major). The hydraulic behaviour of the flows within the trunk sewer network was modeled by the City with the use of the XPSWMM model. The sewer system inflows were imported from the dual drainage model (DDSWMM) into the City hydraulic model.

The hydraulic model was set up to assess the hydraulic performance of a few alternative trunk profiles and arrangements. With the lowering of the trunk sewer profile downstream of Young St, the upstream section becomes hydraulically independent due to the significant drop at Young St. The governing factor for the sewer profile upstream of Young St. is the presence of a 1200 mm diameter watermain that cannot be lowered. Hence, the new trunk would have to match the existing invert at this location.

The results of the hydraulic modeling indicate that the use of a 1500 mm diameter sewer at a 0.2% gradient between Carling Ave. and Aberdeen St. and a 1650 mm diameter sewer at a 0.2% gradient between Aberdeen St. and Young St, (while matching inverts at Aberdeen) provides the most efficient use of the infrastructure while reducing the hydraulic grade line during the 1:100-year event. **Figure 2** illustrates the proposed combined trunk sewer profile and estimated hydraulic grade line. The resulting hydraulic grade line is below the surveyed basement elevations and therefore basement flooding risks from sewer surcharge should be eliminated during the 1:100-year event.

For the trunk section downstream of Young St. it was determined that a lowered 1800 mm diameter sewer between Young St. and Willow St. and a 2100 mm diameter sewer between Willow St. and Spruce St. provides the best hydraulic performance. Furthermore, this configuration eliminates the reliance on the overflow to the BSS at Laurel St.

4.2 Sewer Sizing

The new sanitary sewers north of Somerset St. - were sized based on the current City of Ottawa Sewer Design Guidelines (2004). Sewer design spreadsheet and associated drainage plans are attached (**Attachment B**).

The PSCTS being converted to a storm sewer between Spruce and Albert Streets - this segment of 1500 mm diameter sewer currently services 25 ha of area to the north of Somerset St. (which will ultimately be separated) while accepting a maximum combined flow from upstream of Spruce St. of approximately 700 L/sec. Therefore, the conversion of this sewer to a storm sewer while maintaining the flow control at Spruce St. will essentially maintain peak discharges at existing levels. The peak flow capacity of this sewer is approximately 3.3 m^3/sec (1500 @ 0.2% gradient).

The upgraded PSCTS between Carling Ave and Spruce St. - was sized through the use of the XPSWMM hydrodynamic model (refer to **Section 4.1.2**).

The high-level storm relief sewer between Spruce and Laurel Streets - has been oversized in order to provide some in-line storage capacity. The flow past Spruce St. in the existing PSCTS is currently controlled by an orifice (bulkhead) within the PSCTS immediately downstream of its interconnection with the Booth St. sewer. It is estimated that the current bulkhead which restricts flows to the lower 230 mm of the 1500 mm diameter circular section controls the outflow to approximately 700 L/sec when the hydraulic grade line is at the obvert of the sewer. It is proposed to maintain such a flow control device at the outlet of the high-level storm relief sewer into the newly converted storm sewer in order to prevent excessive flows from reaching the Cave Creek Collector resulting in an increase in combined sewer overflow occurrences. The need for this flow control may be re-evaluated by the City in the future when a new storm outlet is provided at Albert Street.

4.3 Design Issues

All sanitary and storm services will be replaced to the property line along Preston St. Catchbasins and catchbasin leads will be also replaced and fitted for the most part with 20 L/sec inlet control devices complete with odour traps (**Attachment A**).

4.3.1 Temporary sewer arrangements

As mentioned previously, the flows from the newly converted storm sewer and from the new sanitary sewer north of Somerset St. will be temporarily recombined immediately south of Albert St. and will continue to flow to the Cave Creek Collector until such time that a new storm sewer outlet is provided at Albert St.

Since Somerset St. east of Preston St. is not yet separated, it will continue to drain to the PSCTS until it is separated. Once separated, the sanitary sewer will discharge to the new sanitary sewer north of Somerset St. This sewer connection will be built as part of this project and a temporary bulkhead will direct to the flow to the PSCTS.

4.3.2 Somerset St. Storm Servicing

Upon the future sewer separation, the storm flows from Somerset St. east of Preston St. will be split between the new high-level storm relief sewer on Preston St. and the PSCTS. By using a flap gate at the outlet of the Somerset St. storm sewer to the high-level sewer, low flows would be allowed to continue through to the storm system on Preston St. For large events when the high-level storm sewer on Preston St. fills up and surcharges due to the 700 L/s restriction, the flap would close and storm flows would be diverted to the PSCTS.

The proposed setup has the advantage of not taking away from combined sewage capacity at the Booth regulator during frequent events and making use of the combined sewage capture capacity at the Lloyd-Preston Regulator on the Cave Creek Collector. Note that the infrastructure necessary to split the future storm flows from Somerset St. will be constructed as part of this project to avoid the future need to dig up Preston St.

5 MITIGATION MEASURES DURING CONSTRUCTION

The contract documents will stipulate that sediment and erosion control will be the responsibility of the Contractor. The Contractor, prior to carrying out the proposed works, shall implement erosion control measures. The Contractor will be required to submit to the Contract Administrator for review a detailed staging and sediment control plan indicating how he intends to control site runoff and secure the site against erosion. The submission will also ensure that the contractor has a complete understanding of the contract requirements. Contract specifications will indicate that exposed grading shall be protected against erosion.

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2007-05-25 11:14AM By: ecalberry

Dec., 2006
1636_00597

ORIGINAL SHEET - ISO A4

Stantec Consulting Ltd.
1505 Laperriere Avenue
Ottawa ON Canada
K1Z 7T1
Tel. 613.722.4420
Fax. 613.722.2799
www.stantec.com

Stantec

Client/Project
CITY OF OTTAWA
PRESTON STREET
RECONSTRUCTION

Figure No.

Title
PRESTON ST. SANITARY
CONTRIBUTING AREAS

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2007-05-25 11:14AM By: ecalberry

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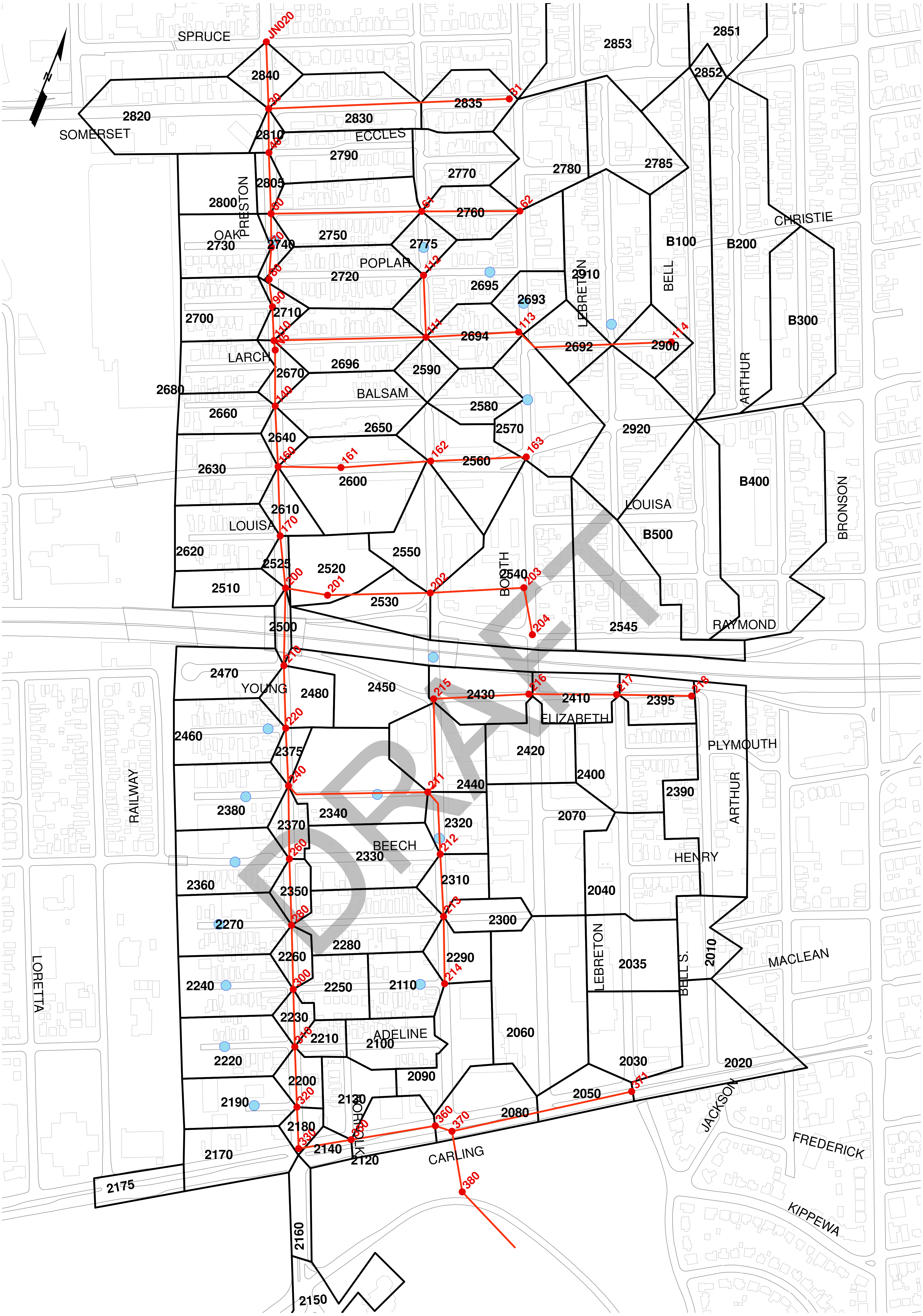
Client/Project
CITY OF OTTAWA
PRESTON STREET
RECONSTRUCTION

Figure No.

Title
PRESTON ST.
FLAT ROOF STORM
CONTRIBUTING AREAS



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Legend

- Maintenance Hole (Modeled)
- Sewer (Modeled)
- DDSWMM Ponding Area
- DDSWMM Subarea

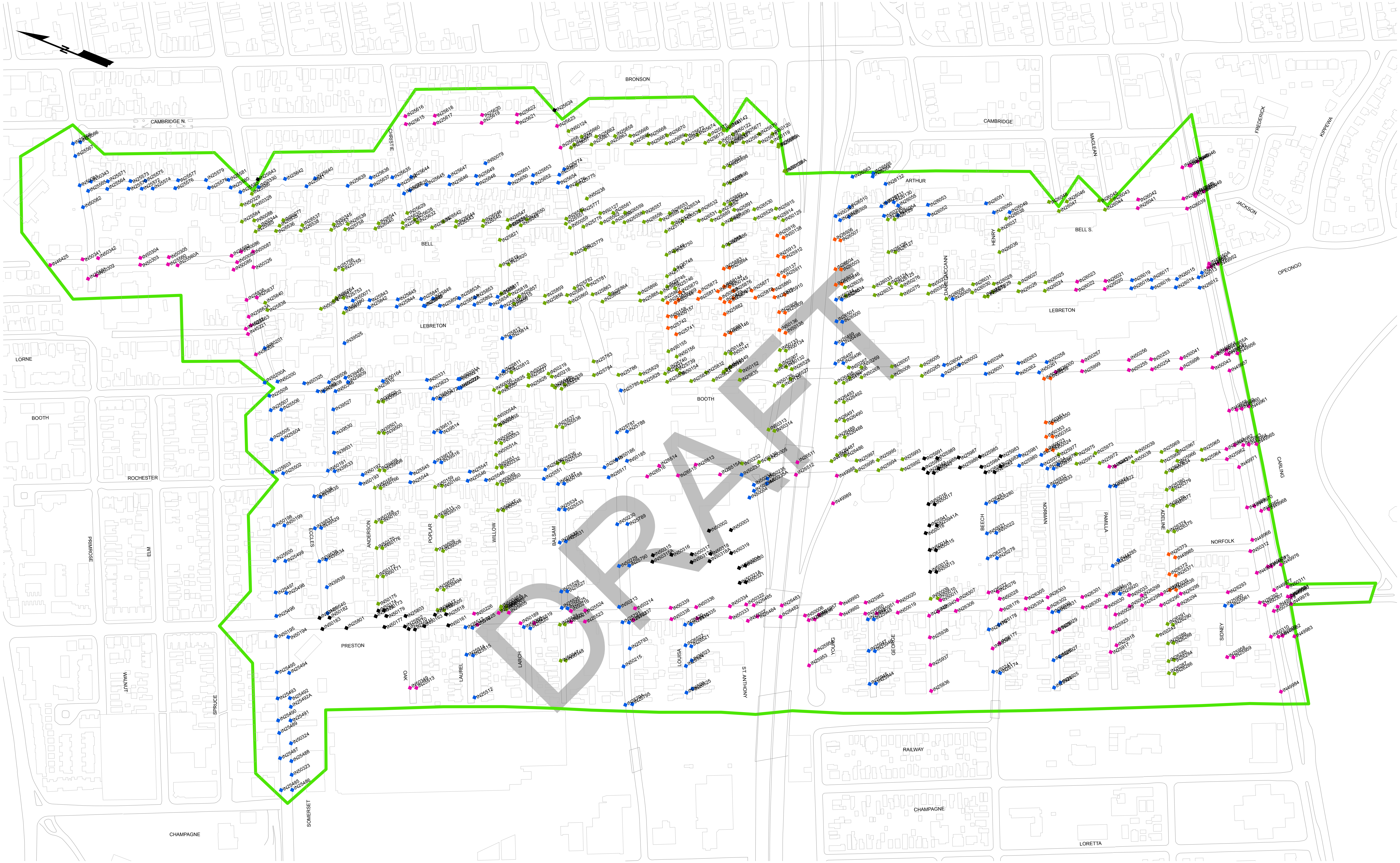
Stantec

Client/Project
CITY OF OTTAWA
PRESTON STREET REHABILITATION
PRELIMINARY DESIGN REPORT

Figure No.
1

Title
Revised DDSWMM System

May 2007
1636-00597



W:\active\1636_00597_Preston_St_Sewer_WM\preliminary\drawing\ArcGIS\design brief fig A-1.mxd

Legend

Prescribed Control

- 6 L/sec
- 10 L/sec
- 15 L/sec
- 20 L/sec
- No ICD
- ICD implementation Area (this project)

Stantec

Client/Project

CITY OF OTTAWA
PRESTON STREET REHABILITATION
DESIGN BRIEF

Figure No.

A-1

Title

Prescribed Catchbasin Control

November 2007
1636-00597

1 INTRODUCTION

The City of Ottawa has retained Stantec Consulting to prepare a detailed design for the Preston Street Rehabilitation Project which involves the complete road reconstruction including replacement of old watermains and sewers. A stormwater storage facility has been recommended as part of the larger Preston Street Rehabilitation Project to protect private and public property from excessive surface flooding. This design brief has been prepared as supporting documentation for the Ministry of Environment Certificate of Approval for Sewage Works for the stormwater storage facility component of the Preston Street Rehabilitation project. Certificate of Approval applications for the proposed sewer works and installation of catchbasin inlet control devices for the Preston Street Rehabilitation Project have already been submitted under separate cover.

The project is scheduled for construction in 2008. Because of the stormwater management component and the large scale of the overall project, the planning and design of the whole project proceeded in accordance with the requirements of a Municipal Class Environmental Assessment and more specifically according to the Schedule B Class EA process. A Technical Advisory Committee and Public Advisory Group have been formed to provide guidance during the design and construction process. A notice of filing of an Addendum to the original approved Schedule “B” Class EA was issued on November 9, 2007.

2 BACKGROUND

2.1 Previous Studies

Preston Street Drainage Flooding Remediation, Environmental Assessment Summary Report (Stantec, March 2004)

Stantec undertook this project to complete the 2003 study and advance both the Class EA process and the Canadian Environmental Assessment Act (CEAA) process. The recommended alternatives identified, among other things, the installation of inlet control devices in catch-basins within the entire sewershed to restrict flows into the minor system. The other recommendations focused primarily on surface drainage improvements in the Brown’s Inlet area and on hydraulic improvements to the sewer system.

Preston Street Drainage Area Flooding Remediation, Preliminary Design Report (Stantec, August 2004)

This report presents the preliminary design of the recommended alternatives outlined in the Preston Street Drainage Flooding Remediation EA Summary Report (Stantec, March 2004). The majority of those measures deal with surface flooding in the area south of Carling Avenue or improvement of the minor system hydraulics. Specifically detailed in the report is the installation of inlet control devices in catch-basins throughout most of the Preston Street Drainage Area.

While the need for management of excess surface runoff in the portion North of Carling Ave was identified, no specific mitigation measures were presented.

Preston Street Drainage Area Flooding Remediation Environmental Assessment Summary Report Addendum (November 2007)

This recent addendum issued on November 9 , 2007 addresses the mitigation of existing and future surface flooding risks near the Preston Street sag (near Anderson Street). The recommended solution, and the subject of this application, is to lower Plouffe Park (located to the north west of the Preston and Oak Street intersection) to provide storage of excess surface runoff. The proposed works would provide flooding relief for runoff events between the 1:10 and 1:50-yr return period.

2.2 Existing Conditions

The capacity of the existing minor and major drainage system along Preston Street (Carling Ave. to Albert St.) is deficient and there have been numerous reports of basement and surface flooding along Preston Street and a few of the side streets. The catchment area for the major surface drainage on Preston Street is approximately 70 ha and is roughly bounded by the railroad cut to the west, Bell Avenue to the east, Somerset Street to the north and Norman Street to the south (refer to **Figure 2-1**). The low-point north of Norman Street along Preston Street where excess surface runoff accumulates is located between Anderson and Oak Streets adjacent to the City owned Plouffe Park. An estimate of the current flooding extents along Preston Street for a 1:100-yr event is illustrated in **Figure 2-2**. The land use adjacent to the Preston Street profile sag can be described primarily as a mix of residential, commercial and parkland.

2.3 Preston Street Rehabilitation

In order to alleviate basement flooding, the City is upgrading the combined sewer for the segment between Carling Avenue and Spruce Street in combination with the implementation of inlet control devices in the catchbasins to limit sewer inflows to the 1:5-year level. Dual drainage and hydraulic assessments undertaken by the City indicate that such a combination would result in a higher minor system level of service than if these mitigation measures were implemented separately. While the implementation of inlet control devices do not lead to a worsening of the extent of surface flooding, they will not improve the existing situation.

In order to alleviate the extent and duration of surface flooding to some degree, the City intends to provide a high-level storm relief sewer which will drain the Preston Street profile sag, located in the vicinity of Anderson St., to a storm sewer and provide some in-line storage as well. This high-level storm relief sewer will increase the level of service to approximately the 1:10-yr event i.e. major surface drainage will be contained within the roadway right-of-way up to the 1:10-yr event. An estimate of the flooding extents along Preston Street with the implementation of the high-level sewer alone is illustrated in **Figure 2-3**. Current and future surface flooding extents do not meet current City of Ottawa design guidelines.

Note that the proposed infrastructure upgrades within the roadway right-of-ways, including the combined sewer upgrade, the high-level sewer and the inlet control devices, are currently under MOE review for Certificates of Approval for Sewage Works.

3 DESCRIPTION OF PROPOSED WORKS

In an effort to increase the level of service of the surface drainage beyond the 1:10-yr level being offered by the proposed high-level storm relief sewer, the City is proposing to lower the Plouffe Park playing fields in order to temporarily store excess surface runoff in an effort to prevent excessive flood levels within the Preston Street right-of-way and reduce the risk of flooding of private properties (refer to **Figure 3-1**).

The proposed works are presented on **Drawing No. SWM1** and include:

- Lowering of the Plouffe Park;
- Provision of an underdrain system for the fields; and,
- Provision of an outflow control device.

These works are described in more detail below.

As illustrated on the attached design **Drawing No. SWM1**, the surface runoff storage area will be provided by lowering the playing fields by an average depth of 0.7 m with the low points along the east and west edges having an elevation of 56.70m. Further lowering of the fields is not possible without compromising the size of the soccer fields or necessitating an extensive length of retaining walls. The field surfaces will be sloped at 0.5% toward the east and west with a ridge running in a north-south direction in the center of the area. The majority of the field edges will be sloped at 3H:1V slopes with portions of the south, east and west edges being provided with terraced retaining walls to provide seating area and to act as grade control.

An underdrain system in the form of "French drains" will be provided below the playing fields to ensure adequate drainage. 300 mm diameter perforated drains will collect the drainage from the "French drains" and from catchbasins located along the low edges of the fields and convey the flow to the high-level storm relief sewer running north along Preston Street. An orifice plate is proposed to control the outflow from the storage area to the high-level storm relief sewer.

4 DESIGN BASIS

4.1 Hydrologic and Hydraulic Modeling

4.1.1 Major System Drainage Assessment

A dual drainage hydrologic and hydraulic model was developed (DDSWMM release 2.1) for the sewershed as part of the Preston Street Drainage Area Study (Stantec, 2003). This model was updated as part of the Preston Street Drainage Area Flooding Remediation, Preliminary Design Report (Stantec, August 2004) and further refined as part of the ongoing Preston Street Rehabilitation Project between Carling Avenue and Albert Street. This refinement was undertaken in an effort to reflect recent and proposed road reconstruction activity within the study area and to better characterize street level flow during high intensity storm events. The intent of the proposed stormwater management plan is to limit sewer inflows throughout the sewershed to approximately the 5-year level in order to prevent surcharging of the Preston St. Combined Trunk Sewer and reduce the associated risk of basement and surface flooding. Model input and output files are provided in **Attachment A**.

The criteria used for the DDSWMM model included selected catchbasin capture rates to achieve an average 1:5-year capture rate equivalent to the existing 1:5-year minor system capture rate of 102 L/s/ha for the area north of Carling Ave. and south of Spruce St. The inlet control rates were selected among preset control rates (6, 10, 15 and 20 L/sec) based on City accepted standard designs, rates lower than 15 L/sec are a vortex type ICD. The capture rates selected for catchbasins located along major arterials including Preston St. were set to 20 L/sec to ensure a high level of service. Prescribed inlet restriction rates are illustrated in **Attachment A**.

The dual drainage model indicates that the implementation of inlet control devices is not expected to result in significant increases in runoff flow depths on the streets for the frequent runoff events up to and including the 1:5-year event. It is estimated that approximately 5,400 and 7,400 m^3 of surface runoff (major drainage) reaches the Preston Street profile sag area when the catchment is subject to the 1:50 and the 1:100-yr rainfall events, respectively. These volumes are comparable to previous flooding estimates prepared for the City (Stantec, August 2004) where approximately half of the water in the sag originated from combined sewer breakout. Hence, the implementation of inlet control devices combined with the proposed Preston Street combined sewer upgrade is expected to provide for a net improvement in surface floodwater quality (i.e. no combined sewer breakout) and it is **not** expected to increase the volume of surface flooding at the sag area.

4.1.2 Hydraulic Analysis

In order to estimate the level of surface flooding to be expected, the major system hydrographs from the DDSWMM model and routed through the sag/high-level storm relief sewer and Plouffe Park storage facility using the HydroCAD software. Stage-area relationships for the roadway right-of-way and stage discharge curves for the flow from the roadway to the park were entered into the model along with the flow controls from the high-level sewer and park storage facility. This routing indicated that excess runoff is only expected to spill into the park storage facility for events with a recurrence interval greater than the 1:10-yr and that 1:50-yr events may be accommodated with reasonable amounts of surface flooding on Preston Street. **Attachment B** provides the 1:50-yr HydroCAD output which indicate that a peak discharge of 5.25m^3/sec reaches the street sags resulting in a flood elevation of approximately 57.30 m within the right-of-way. Refer to **Figure 4-1** for the estimated extent of flooding under future conditions. Approximately 1.0m^3/sec is evacuated from the sag by the high-level sewer via the Preston Street storm sewer (0.7m^3/sec) and the Booth St. sewer (0.3m^3/sec). Excess runoff spills to the Plouffe Park storage facility at a peak discharge of approximately 4.1m^3/sec. The maximum level reached in the storage facility is approximately 57.24 m for a peak storage volume of 2,425 m^3. The drawdown time is expected to be in the order of 8 hours for the 50-yr event.

The 1:100-yr event is expected to lead to flooding elevations in the sag area of approximately 57.45 m which may impact private property. Hence, the proposed storage facility will provide a 50-yr level of service against surface flooding. The drawdown time for the storage facility is expected to be in the order of 13 hours for the 1:100-yr event. Refer to **Figure 4-2** for the estimated extent of flooding under these conditions.

4.2 Collection System and Flow Control Orifice Sizing

The collection system proposed for the park field is designed to provide good drainage of the field during the spring snowmelt and for frequent rainfall events. The system is composed of a series of parallel “French drains” (300mm x 300 mm cross section at 8m spacing) and a perforated collection pipe around the west, north and east edge of the field. The collection piping discharges to the high-level storm relief sewer running along Preston Street. Catchbasins are provided along the perforated collection piping at the low edges of the field to evacuate surface runoff during rainfall and storage events. Each branch of the collection piping can convey approximately 60 L/s (300 mm diameter @ 0.35%) for a total flow of 120 L/sec into the manhole containing the outflow control orifice.

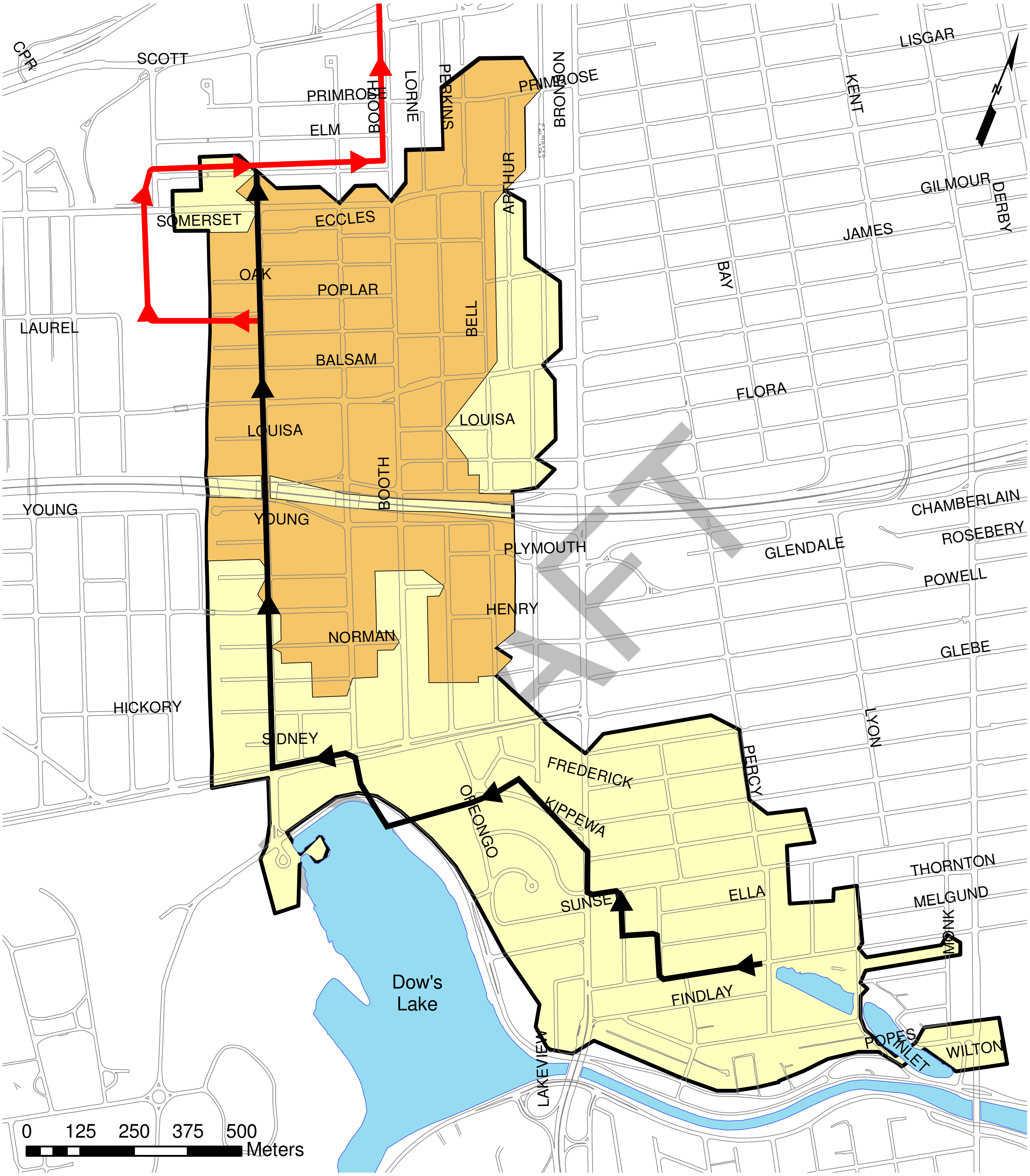
A 155 mm x 155 mm diamond shape orifice plate is proposed to control the outflow from the storage area to the high-level storm relief sewer. This orifice is sized to allow a relatively small outflow rate from the storage facility (approximately 100 L/sec under the design event) while providing reasonable dewatering times. **Attachment C** provides the rating curve for the outlet orifice. As mentioned previously, the estimated dewatering time for the 1:50-yr design event is 8 hours. It is also worth noting that a backflow valve has been specified at the outlet of the collection system at its interconnection with a new high-level storm relief sewer along Preston Street.

4.3 Design Issues

Due to the fact that large maintenance vehicles may access the playing field from time to time, French drains were selected for the underdrain system as opposed to the traditional perforated pipe systems. The French drains were sized to provide an equivalent void end area to that of a 100 mm diameter pipe.

5 MITIGATION MEASURES DURING CONSTRUCTION

The contract documents will stipulate that sediment and erosion control will be the responsibility of the Contractor. The Contractor, prior to carrying out the proposed works, shall implement erosion control measures. The Contractor will be required to submit to the Contract Administrator for review a detailed staging and sediment control plan indicating how he intends to control site runoff and secure the site against erosion. The submission will also ensure that the contractor has a complete understanding of the contract requirements. Contract specifications will indicate that exposed grading shall be protected against erosion.



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Legend

- Preston St Combined Sewer
- Booth St Combined Sewer
- Major Drainage Area to Preston Street Sag
- Preston St Sewer Drainage Area

Stantec

Client/Project
CITY OF OTTAWA
PLOUFFE PARK
STORMWATER STORAGE FACILITY

Figure No.
2-1

Title
Drainage Area Plan

January 2008
1636-00597

Figure 2-2: Current and Future (do nothing) estimated flooding extents along Preston St. for 1:100-yr event

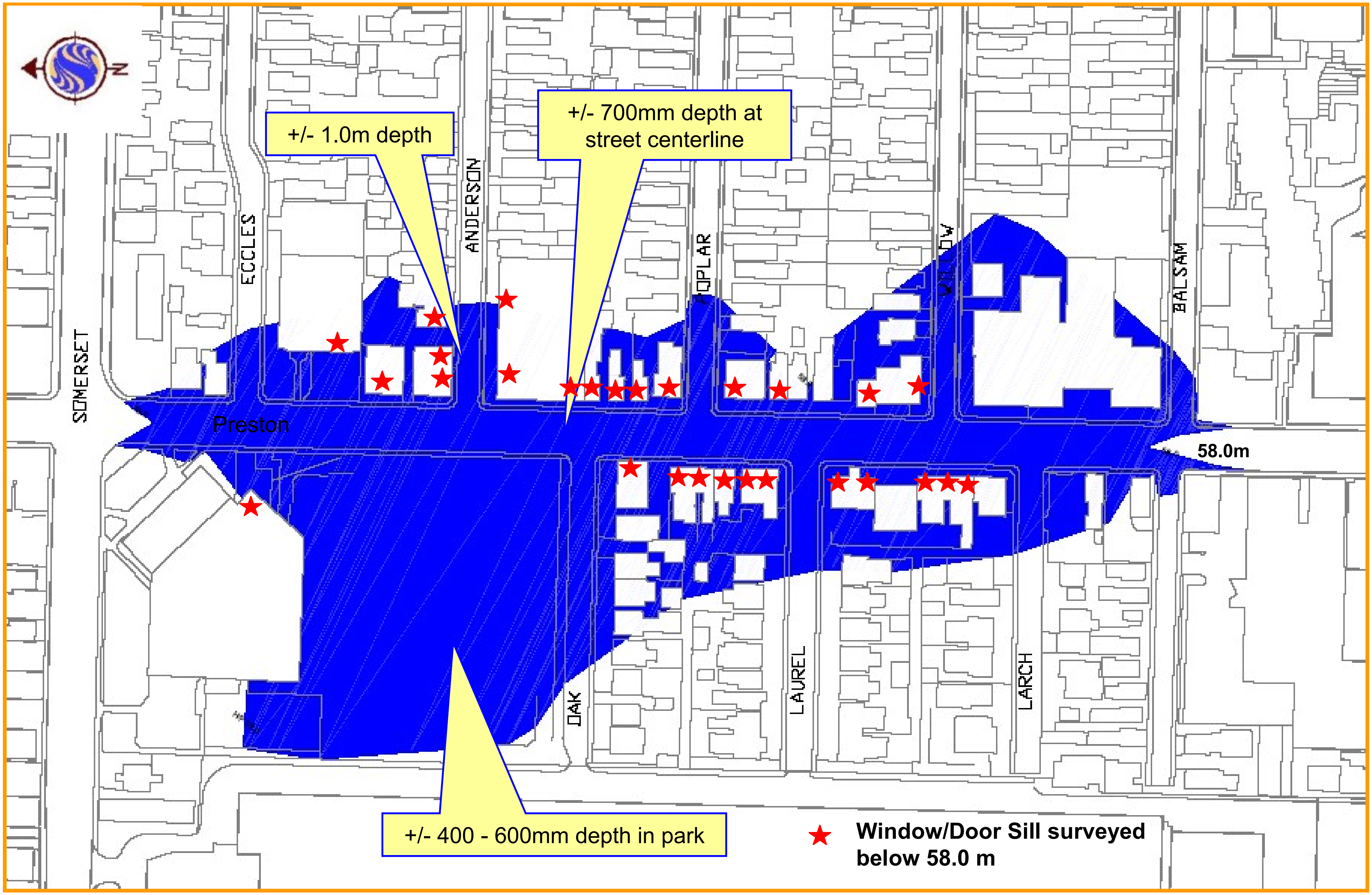


Figure 2-3: Future estimated flooding extents along Preston St. for 1:100-yr event with high-level storm relief sewer to Preston and Booth St. sewers and no surface storage facility

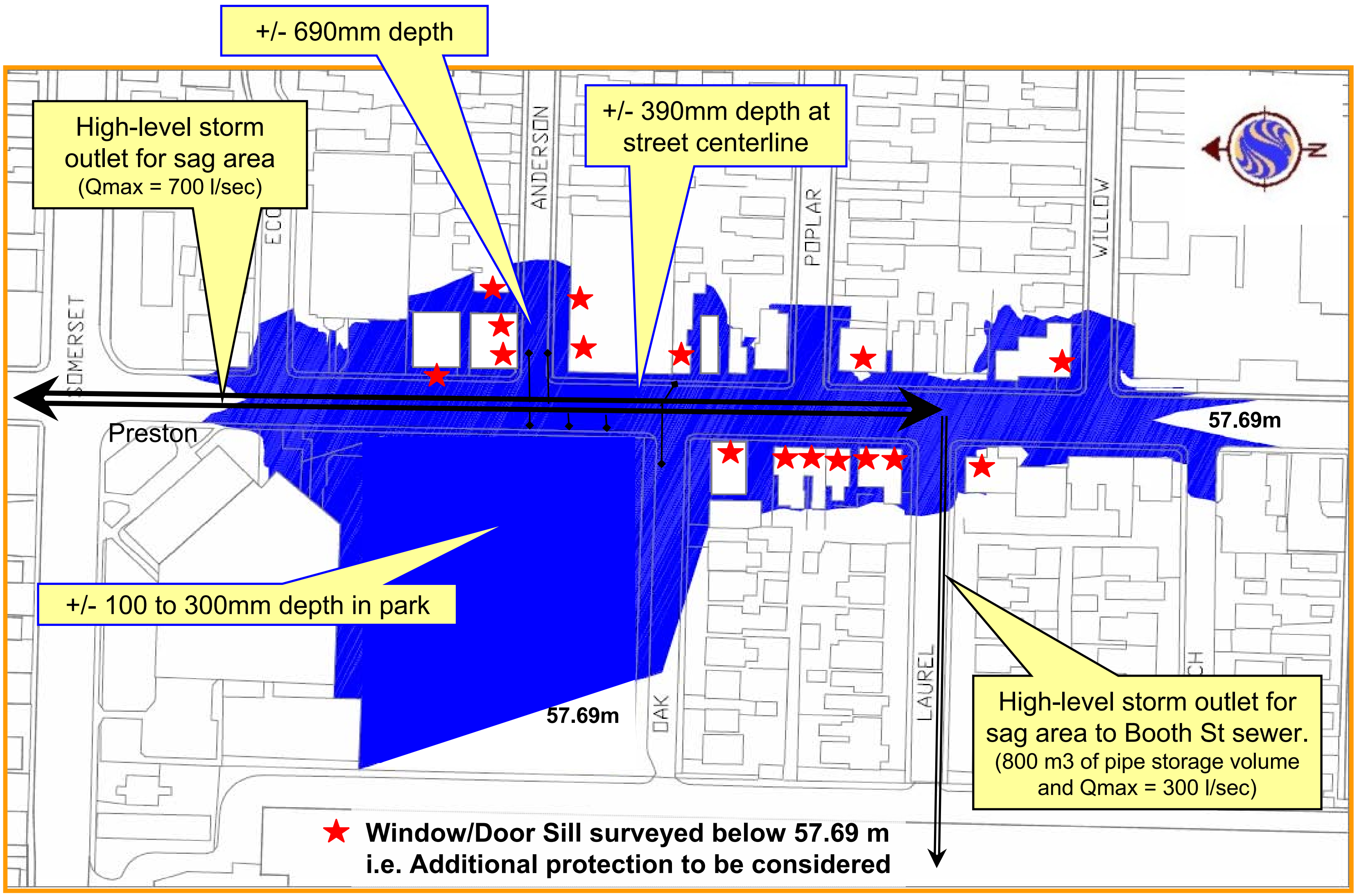


Figure 3-1: Proposed Stormwater Storage Facility

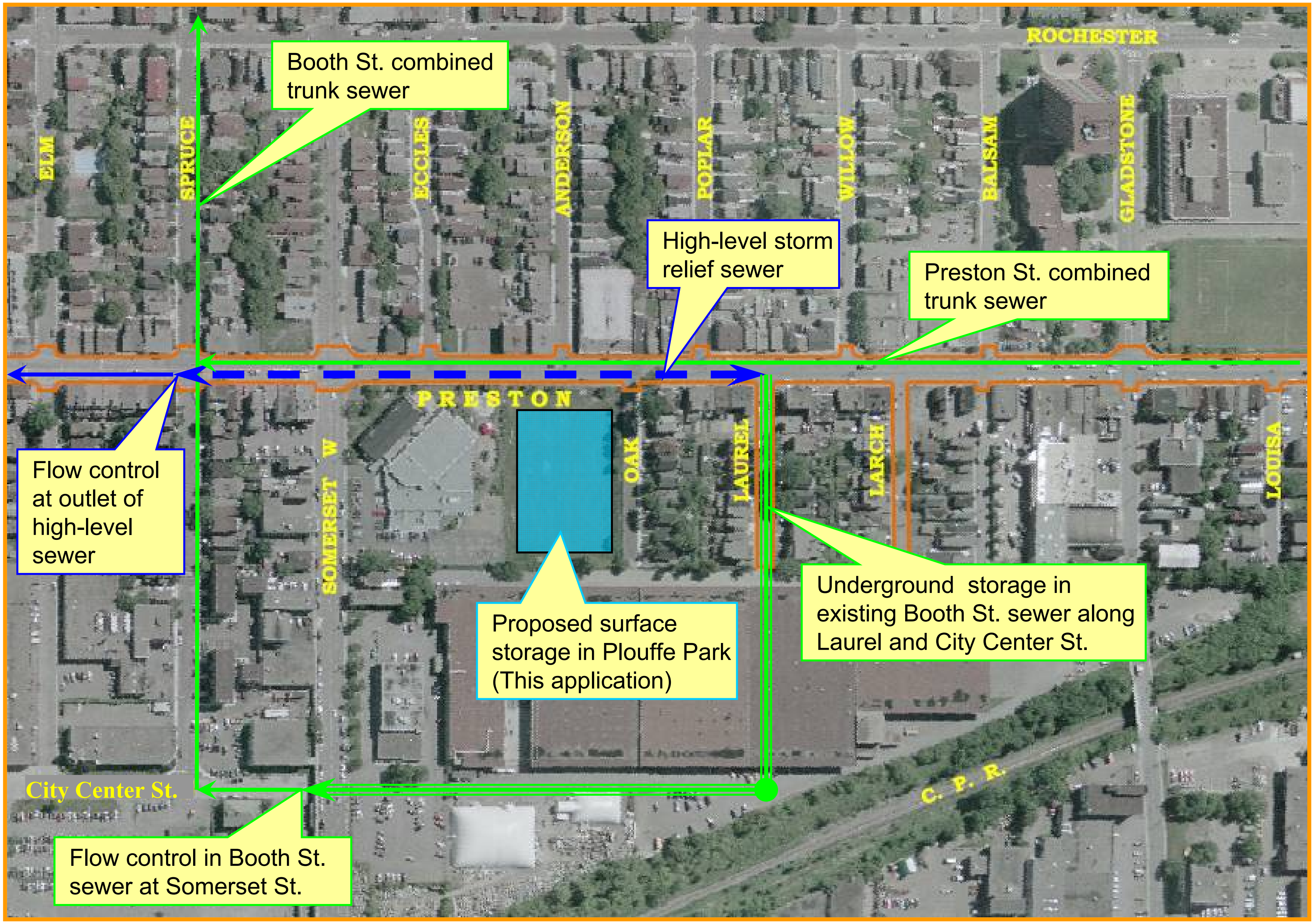


Figure 4-1: Future estimated flooding extents along Preston St. for 1:50-yr event with high-level sewer to Preston and Booth St. sewers and surface storage in park

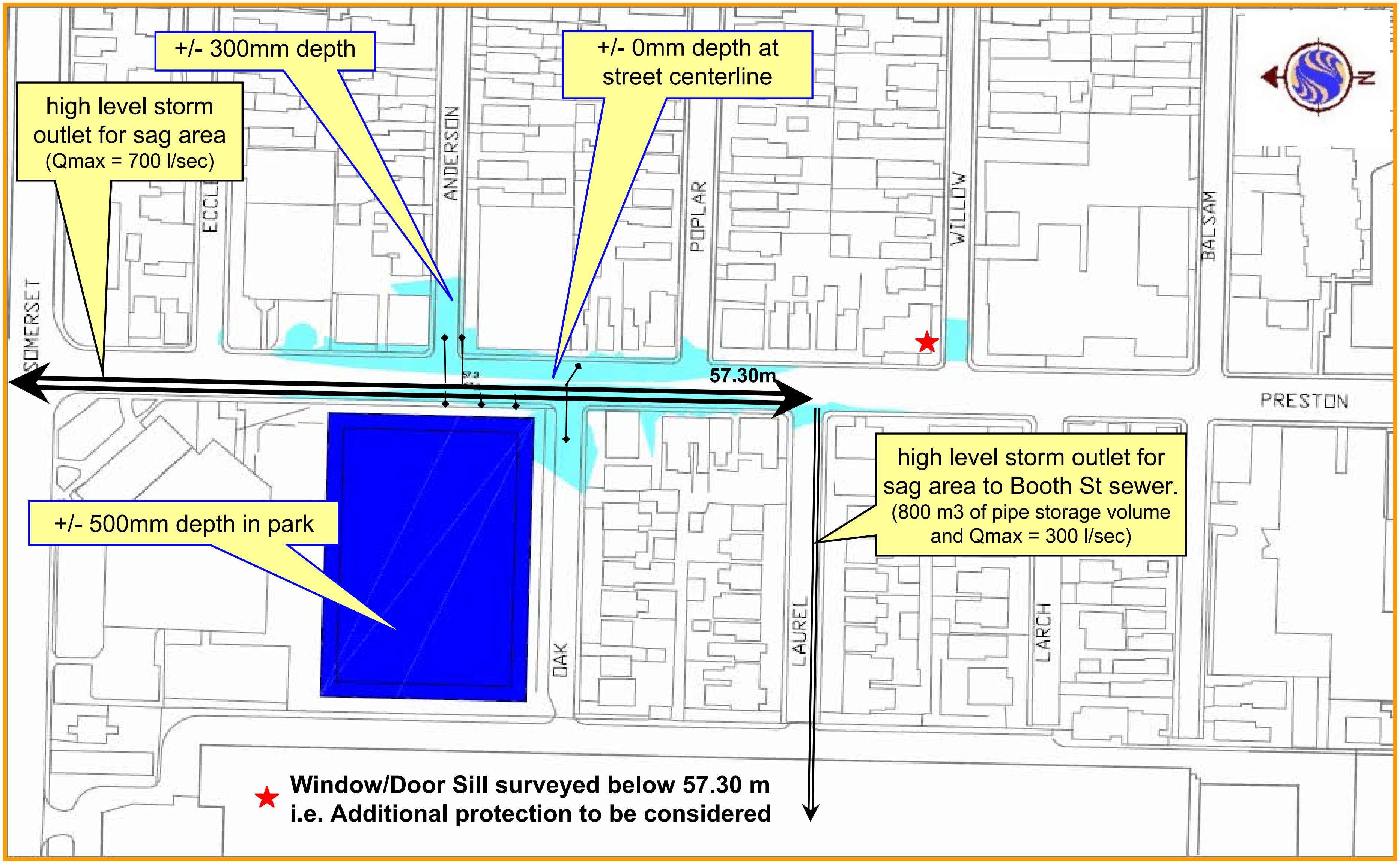
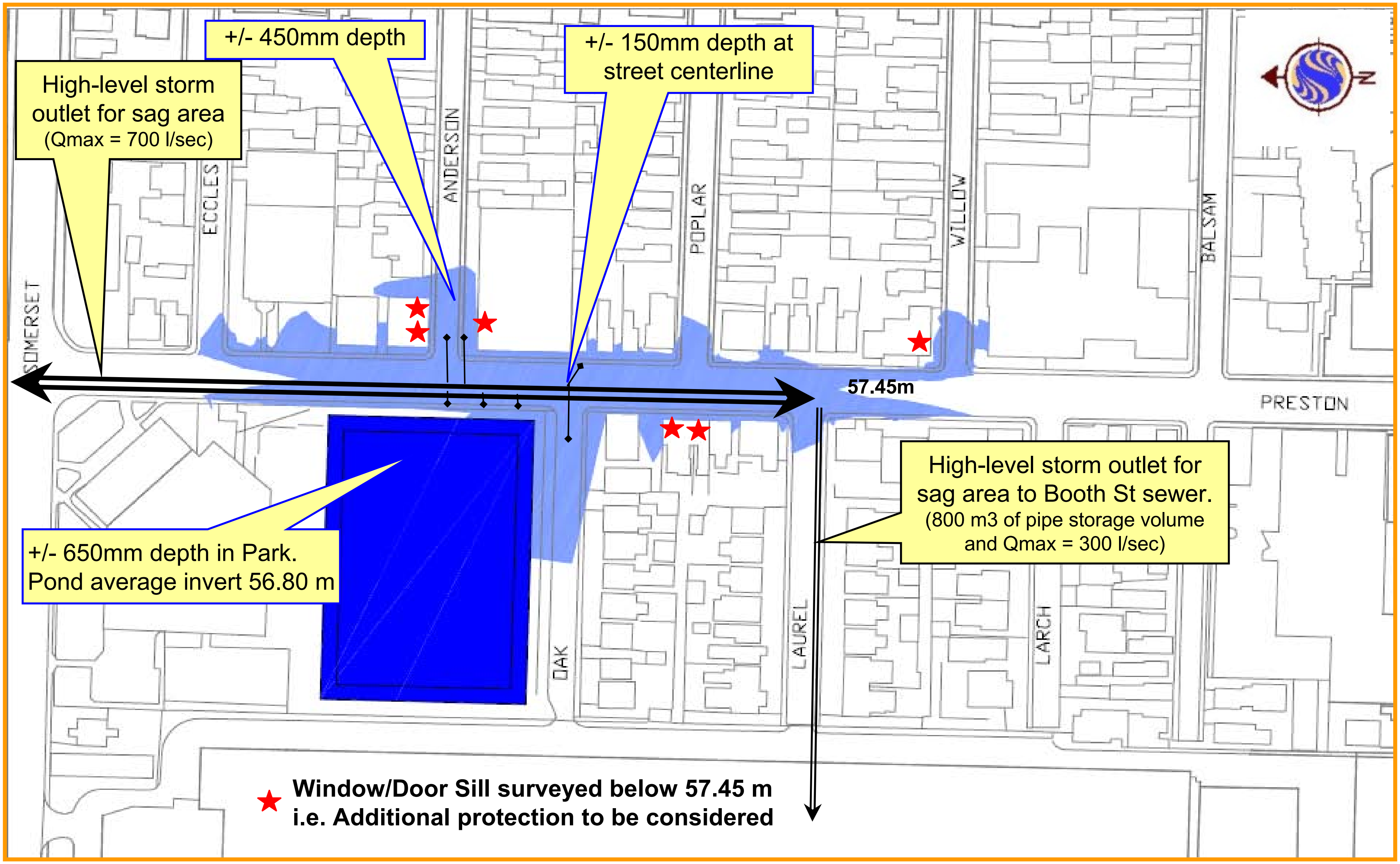
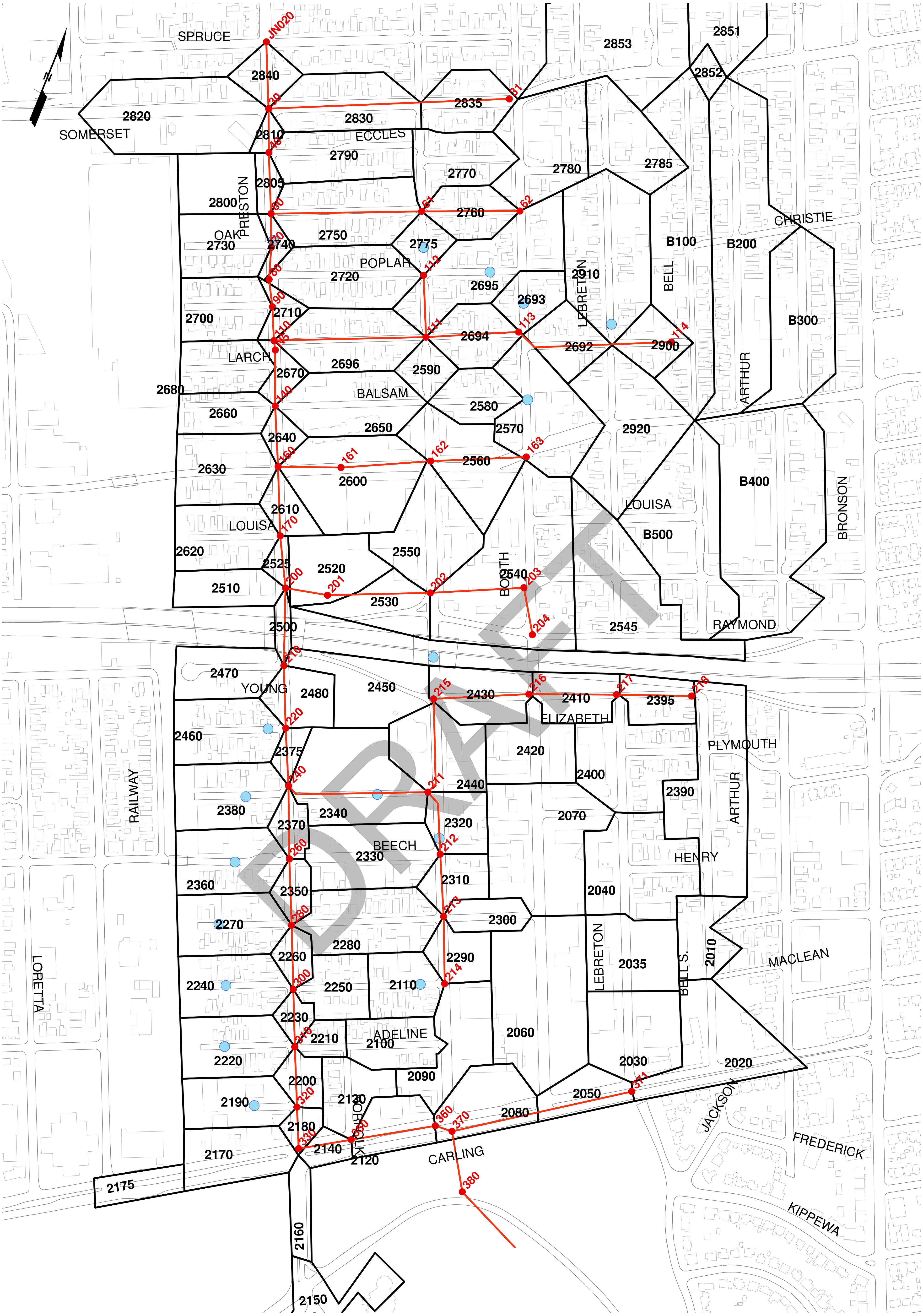


Figure 4-2: Future estimated flooding extents along Preston St. for 1:100-yr event with high-level sewer to Preston and Booth St. sewers and surface storage in park





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Legend

- Maintenance Hole (Modeled)
- Sewer (Modeled)
- DDSWMM Ponding Area
- DDSWMM Subarea

Stantec

Client/Project

CITY OF OTTAWA
PRESTON STREET REHABILITATION
PRELIMINARY DESIGN REPORT

Figure No.

1

Title

Revised DDSWMM System

May 2007
1636-00597

Appendix D STORMWATER MANAGEMENT

D.1 FUNCTIONAL STORM SEWER DESIGN SHEET

Stantec	Gladstone Village - 933 Gladstone Avenue	STORM SEWER DESIGN SHEET (City of Ottawa)
	DATE: 2021-04-13	
	REVISION: 2	
	DESIGNED BY: WAJ	FILE NUMBER: **160401614**
	CHECKED BY: AMP	**Functional Storm Sewer Design for Draft Plan**

DESIGN PARAMETERS

$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:5 yr	1:10 yr	1:100 yr			
a =	732.951	998.071	1174.184	1735.688	MANNING'S n =	0.013	BEDDING CLASS = B
b =	6.199	6.053	6.014	6.014	MINIMUM COVER:	2.00	m
c =	0.810	0.814	0.816	0.820	TIME OF ENTRY	10	min

LOCATION / DRAINAGE AREA

AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)
	107	106	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
L106B, L106A	106	105	0.41	0.00	0.00	0.00	0.00	0.78	0.00	0.00	0.00	0.321	0.321	0.000	0.000	0.000	0.000	0.000	0.000
L105B, L105A	105	104	0.58	0.00	0.00	0.00	0.00	0.82	0.00	0.00	0.00	0.478	0.799	0.000	0.000	0.000	0.000	0.000	0.000
L104C, L104A, L104B	104	103	0.45	0.00	0.00	0.00	0.00	0.81	0.00	0.00	0.00	0.360	1.160	0.000	0.000	0.000	0.000	0.000	0.000
L109B, L109A, L109C, L109D	109	103	0.46	0.00	0.00	0.00	0.00	0.77	0.00	0.00	0.00	0.354	0.354	0.000	0.000	0.000	0.000	0.000	0.000
L103A, L103C, L103B	103	102	0.84	0.00	0.00	0.00	0.00	0.82	0.00	0.00	0.00	0.691	2.205	0.000	0.000	0.000	0.000	0.000	0.000
L108B, L108A, L108C, L108D	108	102	0.49	0.00	0.00	0.00	0.00	0.74	0.00	0.00	0.00	0.364	0.364	0.000	0.000	0.000	0.000	0.000	0.000
	102	101	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	2.570	0.000	0.000	0.000	0.000	0.000	0.000
	101	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	2.570	0.000	0.000	0.000	0.000	0.000	0.000

DRAINAGE AREA (cont.) / PIPE SELECTION

AREA ID NUMBER	FROM M.H.	TO M.H.	T of C (min)	I_{2-YEAR} (mm/h)	I_{5-YEAR} (mm/h)	$I_{10-YEAR}$ (mm/h)	$I_{100-YEAR}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETE (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)	VEL. (ACT) (m/s)	TIME OF FLOW (min)
	107	106	10.00	76.81	104.19	122.14	178.56	2000.0	2000.0	2000.0	31.4	1350	1350	CIRCULAR	CONCRETE	100-D	0.30	3049.8	**65.58%**	2.06	1.92	0.27
L106B, L106A	106	105	10.27	75.77	102.77	120.47	176.10	0.0	2000.0	2067.6	120.3	1350	1350	CIRCULAR	CONCRETE	100-D	0.30	3049.8	**67.80%**	2.06	1.93	1.04
L105B, L105A	105	104	11.31	72.11	97.74	114.55	167.40	0.0	2000.0	2160.2	55.7	1350	1350	CIRCULAR	CONCRETE	100-D	0.30	3049.8	**70.83%**	2.06	1.96	0.47
L104C, L104A, L104B	104	103	11.78	70.57	95.63	112.05	163.74	0.0	2000.0	2227.4	78.4	1350	1350	CIRCULAR	CONCRETE	100-D	0.30	3049.8	**73.03%**	2.06	1.99	0.66
			12.44																			
L109B, L109A, L109C, L109D	109	103	10.00	76.81	104.19	122.14	178.56	0.0	0.0	75.6	43.1	375	375	CIRCULAR	PVC	SDR 35	0.50	116.6	**64.84%**	1.11	1.02	0.70
			10.70																			
L103A, L103C, L103B	103	102	12.44	68.55	92.85	108.78	158.94	0.0	2000.0	2419.9	82.6	1650	1650	CIRCULAR	CONCRETE	100-D	0.30	5208.0	**46.46%**	2.36	1.98	0.70
			13.14																			
L108B, L108A, L108C, L108D	108	102	10.00	76.81	104.19	122.14	178.56	0.0	0.0	77.8	43.6	375	375	CIRCULAR	PVC	SDR 35	0.50	116.6	**66.71%**	1.11	1.03	0.70
			10.70																			
	102	101	13.14	66.54	90.10	105.55	154.19	0.0	2000.0	2475.0	12.1	1650	1650	CIRCULAR	CONCRETE	100-D	0.30	5208.0	**47.52%**	2.36	1.98	0.10
	101	100	13.24	66.26	89.71	105.09	153.52	0.0	2000.0	2473.0	82.8	1650	1650	CIRCULAR	CONCRETE	100-D	0.30	5208.0	**47.48%**	2.36	1.98	0.70
			13.94									1650	1650									

Note:
1. Based on correspondence with City of Ottawa staff, a constant upstream peak flow of 2 cms from the Nepean storm sewer has been included to assess the conveyance capacity of the proposed trunk storm sewer.

D.2 MODIFIED RATIONAL METHOD CALCULATIONS

Stormwater Management Calculations

File No: **160401614**
Project: **933 Gladstone Avenue - Gladstone Village OCH**
Date: **15-Apr-21**

SWM Approach:
Restrict 100-year peak flows from entire site to 411.2 L/s/ (128.1 L/s/ha)

Post-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table

Sub-catchment Area Catchment Type	ID / Description		Area (ha) "A"		Runoff Coefficient "C"		"A x C"	Overall Runoff Coefficient
Tributary to Cistern Block 1	L106B - UNC	Hard	0.005		0.9	0.00		
Block 1		Soft	0.015		0.2	0.00		
		Subtotal		0.02			0.01	0.38
Controlled Roof	L106B -Roof	Hard	0.190		0.9	0.17		
Block 1		Soft	0.000		0.2	0.00		
		Subtotal		0.19			0.17	0.90
Tributary to Cistern Block 2	L105B - UNC	Hard	0.260		0.9	0.23		
Block 2		Soft	0.034		0.2	0.01		
		Subtotal		0.29			0.24	0.82
Controlled Roof	L105B - Roof	Hard	0.176		0.9	0.16		
Block 2		Soft	0.000		0.2	0.00		
		Subtotal		0.18			0.16	0.90
Tributary to Preston Street	L104C - UNC	Hard	0.019		0.9	0.02		
Block 3		Soft	0.001		0.2	0.00		
		Subtotal		0.02			0.017	0.85
Tributary to Cistern Block 4	L104B - UNC	Hard	0.128		0.9	0.12		
Block 4		Soft	0.021		0.2	0.00		
		Subtotal		0.15			0.12	0.80
Controlled Roof	L104B - Roof	Hard	0.151		0.9	0.14		
Block 4		Soft	0.000		0.2	0.00		
		Subtotal		0.15			0.14	0.90
Tributary to Preston Street	L103C - UNC	Hard	0.065		0.9	0.06		
Block 5		Soft	0.005		0.2	0.00		
		Subtotal		0.07			0.06	0.85
Tributary to Cistern Block 6	L103B - UNC	Hard	0.360		0.9	0.32		
Block 6		Soft	0.044		0.2	0.01		
		Subtotal		0.40			0.33	0.82
Controlled Roof	L103B - Roof	Hard	0.216		0.9	0.19		
Block 6		Soft	0.000		0.2	0.00		
		Subtotal		0.22			0.19	0.90
Tributary to Cistern Block 7	L108D - UNC	Hard	0.120		0.9	0.11		
Block 7		Soft	0.020		0.2	0.00		
		Subtotal		0.14			0.11	0.80
Tributary to Underground Storage	L108B - UNC	Hard	0.090		0.9	0.08		
Block 8 (To Block 12)		Soft	0.050		0.2	0.01		
		Subtotal		0.14			0.091	0.65
Tributary to Prestion Street	L109A - UNC	Hard	0.065		0.9	0.06		
Block 9		Soft	0.005		0.2	0.00		
		Subtotal		0.07			0.06	0.85
Tributary to Underground Storage	L109B - UNC	Hard	0.096		0.9	0.09		
Block 10 (To Block 13)		Soft	0.054		0.2	0.01		
		Subtotal		0.15			0.10	0.65
Tributary to Cistern Block 11	L109D - UNC	Hard	0.120		0.9	0.11		
Block 11		Soft	0.020		0.2	0.00		
		Subtotal		0.14			0.11	0.80
Tributary to Underground Storage	L108C - UNC	Hard	0.084		0.9	0.08		
Block 12		Soft	0.006		0.2	0.00		
		Subtotal		0.09			0.08	0.85
Tributary to Underground Stroage	L109C - UNC	Hard	0.084		0.9	0.08		
Block 13		Soft	0.006		0.2	0.00		
		Subtotal		0.09			0.08	0.85
Tributary to Preston Street	L106A - UNC	Hard	0.143		0.9	0.13		
Street 4		Soft	0.057		0.2	0.01		
		Subtotal		0.20			0.14	0.70
Tributary to Preston Street	L105A - UNC	Hard	0.079		0.9	0.07		
Street 3		Soft	0.031		0.2	0.01		
		Subtotal		0.11			0.08	0.70
Tributary to Preston Street	L104A - UNC	Hard	0.093		0.9	0.08		
Street 2		Soft	0.037		0.2	0.01		
		Subtotal		0.13			0.09	0.70
Tributary to Preston Street	L103A - UNC	Hard	0.107		0.9	0.10		
Street 2		Soft	0.043		0.2	0.01		
		Subtotal		0.15			0.11	0.70
Tributary to Preston Street	L108A - UNC	Hard	0.079		0.9	0.07		
Street 1		Soft	0.031		0.2	0.01		
		Subtotal		0.11			0.08	0.70
Total				**3.210**			**2.552**	
Overall Runoff Coefficient= C:								**0.79**

Total Block 1 (Roof Storage & Cistern)	0.21	**ha**
Total Block 2 (Roof Storage & Cistern)	0.47	**ha**
Total Block 3 (Underground Storage)	0.02	**ha**
Total Block 4 (Roof Storage & Cistern)	0.30	**ha**
Total Block 5 (Underground Storage)	0.07	**ha**
Total Block 6 (Roof Storage & Cistern)	0.62	**ha**
Total Block 7 (Cistern)	0.14	**ha**
Total Block 8 (Cistern)	0.14	**ha**
Total Block 9 (Underground Storage)	0.07	**ha**
Total Block 10 (Cistern)	0.15	**ha**
Total Block 11 (Cistern)	0.14	**ha**
Total Block 12 (Cistern)	0.09	**ha**
Total Block 13 (Cistern)	0.09	**ha**
Street 1	0.11	**ha**
Street 2 (L103A)	0.15	**ha**
Street 2 (L104A)	0.13	**ha**
Street 3	0.11	**ha**
Street 4	0.20	**ha**
Total Site	**3.210**	**ha**

Stormwater Management Calculations

Project #160401614, 933 Gladstone Avenue - Gladstone Village OCH
Modified Rational Method Calculatons for Storage

2 yr Intensity | $I = a/(t + b)^c$
City of Ottawa

a =	732.951
b =	6.199
c =	0.81

t (min)	I (mm/hr)
10	76.81
20	52.03
30	40.04
40	32.86
50	28.04
60	24.56
70	21.91
80	19.83
90	18.14
100	16.75
110	15.57
120	14.56

2 YEAR Predevelopment Target Release from Portion of Site

Restrict Sanitary Peak Flows and 100-year peak flows from entire site to 2-year pre-development with C of 0.60

Area (ha): 3.2100
C: 0.60

tc (min)	I (2 yr) (mm/hr)	Q2-yr (L/s)	Qall (L/s)
10	76.81	411.2	**411.2**

128.1 L/s/ha

2 YEAR Modified Rational Method for Entire Site

Subdrainage Area: **L106B - UNC** — Block 1, Tributary to Cistern Block 1
Area (ha): **0.02**
C: **0.38**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	1.64	1.64		
20	52.03	1.11	1.11		
30	40.04	0.85	0.85		
40	32.86	0.70	0.70		
50	28.04	0.60	0.60		
60	24.56	0.52	0.52		
70	21.91	0.47	0.47		
80	19.83	0.42	0.42		
90	18.14	0.39	0.39		
100	16.75	0.36	0.36		
110	15.57	0.33	0.33		
120	14.56	0.31	0.31		

Subdrainage Area: **L106B -Roof** — Controlled Roof
Area (ha): **0.19** — Maximum Storage Depth: 150 mm
C: **0.90**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	36.5	7.1	29.4	17.6	90.6	0.00
20	52.03	24.7	7.5	17.2	20.7	96.5	0.00
30	40.04	19.0	7.5	11.5	20.7	**96.6**	0.00
40	32.86	15.6	7.4	8.2	19.7	94.7	0.00
50	28.04	13.3	7.2	6.1	18.3	92.0	0.00
60	24.56	11.7	7.0	4.7	16.8	89.0	0.00
70	21.91	10.4	6.8	3.6	15.2	85.9	0.00
80	19.83	9.4	6.6	2.8	13.6	82.8	0.00
90	18.14	8.6	6.4	2.2	12.0	79.8	0.00
100	16.75	8.0	6.2	1.8	10.5	77.0	0.00
110	15.57	7.4	6.0	1.4	9.2	73.9	0.00
120	14.56	6.9	5.8	1.1	8.3	70.4	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	96.6	0.10	7.5	20.7	75.9	0.0

Subdrainage Area: Block 1 Tributary to Internal Cistern (L106B)
Area (ha): **0.210** — **Allowable Release Rate:** **26.90** **L/s**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	76.81	8.75	**8.75**	0.00	0.00	0 m^3/ha
20	52.03	8.61	8.61	0.00	0.00	
30	40.04	8.36	8.36	0.00	0.00	
40	32.86	8.08	8.08	0.00	0.00	
50	28.04	7.80	7.80	0.00	0.00	
60	24.56	7.53	7.53	0.00	0.00	
70	21.91	7.26	7.26	0.00	0.00	
80	19.83	7.01	7.01	0.00	0.00	
90	18.14	6.78	6.78	0.00	0.00	
100	16.75	6.56	6.56	0.00	0.00	
110	15.57	6.33	6.33	0.00	0.00	
120	14.56	6.08	6.08	0.00	0.00	

Subdrainage Area: **L105B - UNC** — Block 2, Tributary to Cistern Block 2
Area (ha): **0.29**
C: **0.82**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	51.5	51.5		
20	52.03	34.9	34.9		
30	40.04	26.8	26.8		
40	32.86	22.0	22.0		
50	28.04	18.8	18.8		
60	24.56	16.5	16.5		
70	21.91	14.7	14.7		
80	19.83	13.3	13.3		
90	18.14	12.2	12.2		
100	16.75	11.2	11.2		
110	15.57	10.4	10.4		
120	14.56	9.8	9.8		

Subdrainage Area: **L105B - Roof** — Controlled Roof
Area (ha): **0.18** — Maximum Storage Depth: 150 mm
C: **0.90**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	33.84	7.07	26.77	16.06	90.0	0.00
20	52.03	22.93	7.42	15.51	18.61	**95.3**	0.00
30	40.04	17.64	7.40	10.25	18.45	95.0	0.00
40	32.86	14.48	7.25	7.23	17.36	92.7	0.00
50	28.04	12.35	7.05	5.31	15.92	89.7	0.00
60	24.56	10.82	6.83	3.99	14.35	86.5	0.00
70	21.91	9.65	6.62	3.04	12.76	83.2	0.00
80	19.83	8.74	6.40	2.33	11.21	80.0	0.00
90	18.14	7.99	6.20	1.80	9.71	76.9	0.00
100	16.75	7.38	5.97	1.41	8.43	73.5	0.00
110	15.57	6.86	5.72	1.14	7.50	69.7	0.00
120	14.56	6.42	5.49	0.92	6.64	66.3	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	95.3	0.10	7.4	18.6	70.4	0.0

Project #160401614, 933 Gladstone Avenue - Gladstone Village OCH
Modified Rational Method Calculatons for Storage

100 yr Intensity | $I = a/(t + b)^c$
City of Ottawa

a =	1735.688
b =	6.014
c =	0.820

t (min)	I (mm/hr)
10	178.56
20	119.95
30	91.87
40	75.15
50	63.95
60	55.89
70	49.79
80	44.99
90	41.11
100	37.90
110	35.20
120	32.89

100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: **L106B - UNC** — Block 1, Tributary to Cistern Block 1
Area (ha): **0.02**
C: **0.48**

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	4.77	4.77		
20	119.95	3.20	3.20		
30	91.87	2.45	2.45		
40	75.15	2.01	2.01		
50	63.95	1.71	1.71		
60	55.89	1.49	1.49		
70	49.79	1.33	1.33		
80	44.99	1.20	1.20		
90	41.11	1.10	1.10		
100	37.90	1.01	1.01		
110	35.20	0.94	0.94		
120	32.89	0.88	0.88		

Subdrainage Area: **L106B -Roof** — Controlled Roof
Area (ha): **0.19** — Maximum Storage Depth: 150 mm
C: **1.00**

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	94.2	9.7	84.5	50.7	130.3	0.00
20	119.95	63.3	10.4	52.9	63.5	140.3	0.00
30	91.87	48.5	10.6	37.8	68.1	143.9	0.00
40	75.15	39.6	10.7	28.9	69.5	**145.0**	0.00
50	63.95	33.7	10.7	23.1	69.2	144.7	0.00
60	55.89	29.5	10.6	18.9	67.9	143.7	0.00
70	49.79	26.3	10.5	15.7	66.1	142.3	0.00
80	44.99	23.7	10.4	13.3	63.9	140.6	0.00
90	41.11	21.7	10.3	11.4	61.5	138.8	0.00
100	37.90	20.0	10.2	9.8	59.0	136.8	0.00
110	35.20	18.6	10.0	8.5	56.4	134.7	0.00
120	32.89	17.4	9.9	7.5	53.7	132.7	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	145.0	0.14	10.7	69.5	75.9	0.0

Subdrainage Area: Block 1 Tributary to Internal Cistern (L106B)
Area (ha): **0.210**

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	178.56	14.50	**14.50**	0.00	0.00	0 m^3/ha
20	119.95	13.60	13.60	0.00	0.00	
30	91.87	13.09	13.09	0.00	0.00	
40	75.15	12.71	12.71	0.00	0.00	
50	63.95	12.40	12.40	0.00	0.00	
60	55.89	12.12	12.12	0.00	0.00	
70	49.79	11.86	11.86	0.00	0.00	
80	44.99	11.62	11.62	0.00	0.00	
90	41.11	11.39	11.39	0.00	0.00	
100	37.90	11.18	11.18	0.00	0.00	
110	35.20	10.97	10.97	0.00	0.00	
120	32.89	10.77	10.77	0.00	0.00	

Subdrainage Area: **L105B - UNC** — Block 2, Tributary to Cistern Block 2
Area (ha): **0.29**
C: **1.00**

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	145.9	145.9		
20	119.95	98.0	98.0		
30	91.87	75.1	75.1		
40	75.15	61.4	61.4		
50	63.95	52.3	52.3		
60	55.89	45.7	45.7		
70	49.79	40.7	40.7		
80	44.99	36.8	36.8		
90	41.11	33.6	33.6		
100	37.90	31.0	31.0		
110	35.20	28.8	28.8		
120	32.89	26.9	26.9		

Subdrainage Area: **L105B - Roof** — Controlled Roof
Area (ha): **0.18** — Maximum Storage Depth: 150 mm
C: **1.00**

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	87.4	9.7	77.7	46.6	129.9	0.00
20	119.95	58.7	10.3	48.4	58.0	139.6	0.00
30	91.87	45.0	10.6	34.4	61.9	142.8	0.00
40	75.15	36.8	10.6	26.2	62.8	**143.6**	0.00
50	63.95	31.3	10.6	20.7	62.2	143.0	0.00
60	55.89	27.4	10.5	16.9	60.7	141.8	0.00
70	49.79	24.4	10.4	14.0	58.7	140.1	0.00
80	44.99	22.0	10.3	11.8	56.5	138.2	0.00
90	41.11	20.1	10.1	10.0	54.0	136.2	0.00
100	37.90	18.6	10.0	8.6	51.4	134.0	0.00
110	35.20	17.2	9.8	7.4	48.8	131.8	0.00
120	32.89	16.1	9.7	6.4	46.2	129.6	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	143.6	0.14	10.6	62.8	70.4	0.0

Stormwater Management Calculations

Project #160401614, 933 Gladstone Avenue - Gladstone Village OCH
Modified Rational Method Calculatons for Storage

Subdrainage Area: Block 2 Tributary to Internal Cistern (L105B)
Area (ha): 0.470 **Allowable Release Rate: 60.21 L/s**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	76.81	58.53	**58.53**	0.00	**0.00**	0 m^3/ha
20	52.03	42.28	42.28	0.00	0.00	
30	40.04	34.23	34.23	0.00	0.00	
40	32.86	29.27	29.27	0.00	0.00	
50	28.04	25.84	25.84	0.00	0.00	
60	24.56	23.29	23.29	0.00	0.00	
70	21.91	21.30	21.30	0.00	0.00	
80	19.83	19.69	19.69	0.00	0.00	
90	18.14	18.35	18.35	0.00	0.00	
100	16.75	17.19	17.19	0.00	0.00	
110	15.57	16.15	16.15	0.00	0.00	
120	14.56	15.25	15.25	0.00	0.00	

Subdrainage Area: L104C - UNC Block 3
Area (ha): 0.02 Tributary to Preston Street
C: 0.85 **Allowable Release Rate: 2.56 L/s**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)
10	76.81	3.63	**2.56**
20	52.03	2.46	2.46
30	40.04	1.89	1.89
40	32.86	1.55	1.55
50	28.04	1.33	1.33
60	24.56	1.16	1.16
70	21.91	1.04	1.04
80	19.83	0.94	0.94
90	18.14	0.86	0.86
100	16.75	0.79	0.79
110	15.57	0.74	0.74
120	14.56	0.69	0.69

Subdrainage Area: L104B - UNC Block 4
Area (ha): 0.15 Tributary to Cistern Block 4
C: 0.80

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	25.5	25.5		
20	52.03	17.3	17.3		
30	40.04	13.3	13.3		
40	32.86	10.9	10.9		
50	28.04	9.3	9.3		
60	24.56	8.2	8.2		
70	21.91	7.3	7.3		
80	19.83	6.6	6.6		
90	18.14	6.0	6.0		
100	16.75	5.6	5.6		
110	15.57	5.2	5.2		
120	14.56	4.8	4.8		

Subdrainage Area: L104B - Roof Controlled Roof
Area (ha): 0.15 Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	28.9	5.3	23.6	14.1	91.1	0.00
20	52.03	19.6	5.6	14.0	16.8	97.5	0.00
30	40.04	15.1	5.6	9.5	17.1	**98.1**	0.00
40	32.86	12.4	5.5	6.8	16.4	96.5	0.00
50	28.04	10.6	5.4	5.1	15.3	93.9	0.00
60	24.56	9.2	5.3	3.9	14.1	90.9	0.00
70	21.91	8.3	5.2	3.0	12.8	87.7	0.00
80	19.83	7.5	5.1	2.4	11.4	84.4	0.00
90	18.14	6.8	5.0	1.9	10.1	81.2	0.00
100	16.75	6.3	4.8	1.5	8.8	78.0	0.00
110	15.57	5.9	4.7	1.1	7.5	74.9	0.00
120	14.56	5.5	4.6	0.9	6.6	70.6	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	98.1	0.10	5.6	17.1	60.2	0.0

Subdrainage Area: Block 4 Tributary to Internal Cistern (L104B)
Area (ha): 0.300 **Allowable Release Rate: 38.43 L/s**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	76.81	30.87	**30.87**	0.00	**0.00**	0 m^3/ha
20	52.03	22.88	22.88	0.00	0.00	
30	40.04	18.91	18.91	0.00	0.00	
40	32.86	16.47	16.47	0.00	0.00	
50	28.04	14.77	14.77	0.00	0.00	
60	24.56	13.50	13.50	0.00	0.00	
70	21.91	12.50	12.50	0.00	0.00	
80	19.83	11.68	11.68	0.00	0.00	
90	18.14	11.00	11.00	0.00	0.00	
100	16.75	10.41	10.41	0.00	0.00	
110	15.57	9.90	9.90	0.00	0.00	
120	14.56	9.41	9.41	0.00	0.00	

Subdrainage Area: L103C - UNC Block 5
Area (ha): 0.07 Tributary to Preston Street
C: 0.85 **Allowable Release Rate: 8.97 L/s**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)
10	76.81	12.70	**8.97**
20	52.03	8.61	8.61
30	40.04	6.62	6.62
40	32.86	5.44	5.44
50	28.04	4.64	4.64
60	24.56	4.06	4.06
70	21.91	3.62	3.62
80	19.83	3.28	3.28
90	18.14	3.00	3.00
100	16.75	2.77	2.77
110	15.57	2.58	2.58
120	14.56	2.41	2.41

Project #160401614, 933 Gladstone Avenue - Gladstone Village OCH
Modified Rational Method Calculatons for Storage

Subdrainage Area: Block 2 Tributary to Internal Cistern (L105B)
Area (ha): 0.470

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	178.56	155.60	60.21	95.39	57.23	
20	119.95	108.35	**60.21**	48.14	**57.77**	123 m^3/ha
30	91.87	85.63	60.21	25.41	45.75	
40	75.15	72.01	60.21	11.80	28.32	
50	63.95	62.83	60.21	2.62	7.86	
60	55.89	56.17	56.17	0.00	0.00	
70	49.79	51.07	51.07	0.00	0.00	
80	44.99	47.02	47.02	0.00	0.00	
90	41.11	43.71	43.71	0.00	0.00	
100	37.90	40.95	40.95	0.00	0.00	
110	35.20	38.60	38.60	0.00	0.00	
120	32.89	36.56	36.56	0.00	0.00	

Subdrainage Area: L104C - UNC Block 3
Area (ha): 0.02 Tributary to Preston Street
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)
10	178.56	9.93	**2.56**
20	119.95	6.67	2.56
30	91.87	5.11	2.56
40	75.15	4.18	2.56
50	63.95	3.56	2.56
60	55.89	3.11	2.56
70	49.79	2.77	2.56
80	44.99	2.50	2.50
90	41.11	2.29	2.29
100	37.90	2.11	2.11
110	35.20	1.96	1.96
120	32.89	1.83	1.83

Subdrainage Area: L104B - UNC Block 4
Area (ha): 0.15 Tributary to Cistern Block 4
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	74.2	74.2		
20	119.95	49.8	49.8		
30	91.87	38.2	38.2		
40	75.15	31.2	31.2		
50	63.95	26.6	26.6		
60	55.89	23.2	23.2		
70	49.79	20.7	20.7		
80	44.99	18.7	18.7		
90	41.11	17.1	17.1		
100	37.90	15.7	15.7		
110	35.20	14.6	14.6		
120	32.89	13.7	13.7		

Subdrainage Area: L104B - Roof Controlled Roof
Area (ha): 0.15 Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	74.7	6.8	67.9	40.7	130.8	0.00
20	119.95	50.2	7.2	42.9	51.5	141.5	0.00
30	91.87	38.4	7.4	31.0	55.9	145.7	0.00
40	75.15	31.4	7.5	24.0	57.5	147.4	0.00
50	63.95	26.8	7.5	19.3	57.8	**147.7**	0.00
60	55.89	23.4	7.5	15.9	57.3	147.2	0.00
70	49.79	20.8	7.4	13.4	56.3	146.2	0.00
80	44.99	18.8	7.4	11.4	55.0	144.8	0.00
90	41.11	17.2	7.3	9.9	53.4	143.3	0.00
100	37.90	15.9	7.3	8.6	51.6	141.6	0.00
110	35.20	14.7	7.2	7.5	49.8	139.7	0.00
120	32.89	13.8	7.1	6.7	47.9	137.9	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	147.7	0.15	7.5	57.8	60.2	0.0

Subdrainage Area: Block 4 Tributary to Internal Cistern (L104B)
Area (ha): 0.300

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	178.56	81.02	38.43	42.59	25.55	
20	119.95	57.08	**38.43**	18.65	**22.37**	75 m^3/ha
30	91.87	45.57	38.43	7.14	12.85	
40	75.15	38.69	38.43	0.26	0.61	
50	63.95	34.05	34.05	0.00	0.00	
60	55.89	30.68	30.68	0.00	0.00	
70	49.79	28.11	28.11	0.00	0.00	
80	44.99	26.07	26.07	0.00	0.00	
90	41.11	24.40	24.40	0.00	0.00	
100	37.90	23.00	23.00	0.00	0.00	
110	35.20	21.81	21.81	0.00	0.00	
120	32.89	20.78	20.78	0.00	0.00	

Subdrainage Area: L103C - UNC Block 5
Area (ha): 0.07 Tributary to Preston Street
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)
10	178.56	34.75	8.97
20	119.95	23.34	**8.97**
30	91.87	17.88	8.97
40	75.15	14.62	8.97
50	63.95	12.45	8.97
60	55.89	10.88	8.97
70	49.79	9.69	8.97
80	44.99	8.76	8.76
90	41.11	8.00	8.00
100	37.90	7.38	7.38
110	35.20	6.85	6.85
120	32.89	6.40	6.40

Stormwater Management Calculations

Project #160401614, 933 Gladstone Avenue - Gladstone Village OCH
Modified Rational Method Calculatons for Storage

Subdrainage Area: L103B - UNC — Block 6, Tributary to Cistern Block 6
Area (ha): 0.40
C: 0.82

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	71.0	71.0		
20	52.03	48.1	48.1		
30	40.04	37.0	37.0		
40	32.86	30.4	30.4		
50	28.04	25.9	25.9		
60	24.56	22.7	22.7		
70	21.91	20.3	20.3		
80	19.83	18.3	18.3		
90	18.14	16.8	16.8		
100	16.75	15.5	15.5		
110	15.57	14.4	14.4		
120	14.56	13.5	13.5		

Subdrainage Area: L103B - Roof — Controlled Roof
Area (ha): 0.22 — Maximum Storage Depth: 150 mm
C: 0.90

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	76.81	41.5	8.1	33.4	20.0	90.6	0.00
20	52.03	28.1	8.6	19.6	23.5	96.4	0.00
30	40.04	21.7	8.6	13.1	**23.5**	96.5	0.00
40	32.86	17.8	8.4	9.3	22.4	94.6	0.00
50	28.04	15.2	8.2	6.9	20.8	91.9	0.00
60	24.56	13.3	8.0	5.3	19.0	88.9	0.00
70	21.91	11.8	7.8	4.1	17.2	85.8	0.00
80	19.83	10.7	7.5	3.2	15.4	82.7	0.00
90	18.14	9.8	7.3	2.5	13.6	79.7	0.00
100	16.75	9.1	7.1	2.0	11.9	76.8	0.00
110	15.57	8.4	6.8	1.6	10.4	73.7	0.00
120	14.56	7.9	6.6	1.3	9.3	70.2	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
2-year Water Level	96.5	0.10	8.6	23.5	86.4	0.0

Subdrainage Area: Block 6 Tributary to Internal Cistern (L103B)
Area (ha): 0.620 — **Allowable Release Rate: 79.43 L/s**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	76.81	79.12	**79.43**	0.00	**0.00**	0 m³/ha
20	52.03	56.66	56.66	0.00	0.00	
30	40.04	45.58	45.58	0.00	0.00	
40	32.86	38.80	38.80	0.00	0.00	
50	28.04	34.14	34.14	0.00	0.00	
60	24.56	30.69	30.69	0.00	0.00	
70	21.91	28.01	28.01	0.00	0.00	
80	19.83	25.85	25.85	0.00	0.00	
90	18.14	24.07	24.07	0.00	0.00	
100	16.75	22.56	22.56	0.00	0.00	
110	15.57	21.23	21.23	0.00	0.00	
120	14.56	20.04	20.04	0.00	0.00	

Subdrainage Area: L108D - UNC — Block 7, Tributary to Cistern Block 7
Area (ha): 0.14
C: 0.80 — **Allowable Release Rate: 17.94 L/s**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	76.81	23.9	**17.94**	5.98	**3.59**	26 m³/ha
20	52.03	16.2	16.20	0.00	0.00	
30	40.04	12.5	12.47	0.00	0.00	
40	32.86	10.2	10.23	0.00	0.00	
50	28.04	8.7	8.73	0.00	0.00	
60	24.56	7.6	7.65	0.00	0.00	
70	21.91	6.8	6.82	0.00	0.00	
80	19.83	6.2	6.17	0.00	0.00	
90	18.14	5.6	5.65	0.00	0.00	
100	16.75	5.2	5.21	0.00	0.00	
110	15.57	4.8	4.85	0.00	0.00	
120	14.56	4.5	4.53	0.00	0.00	

Subdrainage Area: L108B - UNC — Block 8 (To Block 12), Tributary to Underground Storage
Area (ha): 0.14
C: 0.65 — **Allowable Release Rate: 17.94 L/s**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	19.4	19.4		
20	52.03	13.2	13.2		
30	40.04	10.1	10.1		
40	32.86	8.3	8.3		
50	28.04	7.1	7.1		
60	24.56	6.2	6.2		
70	21.91	5.5	5.5		
80	19.83	5.0	5.0		
90	18.14	4.6	4.6		
100	16.75	4.2	4.2		
110	15.57	3.9	3.9		
120	14.56	3.7	3.7		

Subdrainage Area: L108C - UNC — Block 12, Tributary to Underground Storage
Area (ha): 0.09
C: 0.85 — **Allowable Release Rate: 11.53 L/s**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	16.3	16.3		
20	52.03	11.1	11.1		
30	40.04	8.5	8.5		
40	32.86	7.0	7.0		
50	28.04	6.0	6.0		
60	24.56	5.2	5.2		
70	21.91	4.7	4.7		
80	19.83	4.2	4.2		
90	18.14	3.9	3.9		
100	16.75	3.6	3.6		
110	15.57	3.3	3.3		
120	14.56	3.1	3.1		

Project #160401614, 933 Gladstone Avenue - Gladstone Village OCH
Modified Rational Method Calculatons for Storage

Subdrainage Area: L103B - UNC — Block 6, Tributary to Cistern Block 6
Area (ha): 0.40
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	200.5	200.5		
20	119.95	134.7	134.7		
30	91.87	103.2	103.2		
40	75.15	84.4	84.4		
50	63.95	71.8	71.8		
60	55.89	62.8	62.8		
70	49.79	55.9	55.9		
80	44.99	50.5	50.5		
90	41.11	46.2	46.2		
100	37.90	42.6	42.6		
110	35.20	39.5	39.5		
120	32.89	36.9	36.9		

Subdrainage Area: L103B - Roof — Controlled Roof
Area (ha): 0.22 — Maximum Storage Depth: 150 mm
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	Depth (mm)	
10	178.56	107.3	11.1	96.1	57.7	130.3	0.00
20	119.95	72.1	11.9	60.2	72.2	140.2	0.00
30	91.87	55.2	12.2	43.0	77.5	143.8	0.00
40	75.15	45.1	12.2	32.9	79.0	**144.9**	0.00
50	63.95	38.4	12.2	26.2	78.6	144.6	0.00
60	55.89	33.6	12.1	21.4	77.2	143.7	0.00
70	49.79	29.9	12.0	17.9	75.1	142.2	0.00
80	44.99	27.0	11.9	15.1	72.6	140.5	0.00
90	41.11	24.7	11.8	12.9	69.9	138.6	0.00
100	37.90	22.8	11.6	11.2	67.0	136.6	0.00
110	35.20	21.1	11.5	9.7	64.0	134.6	0.00
120	32.89	19.8	11.3	8.5	61.0	132.5	0.00

Storage: Roof Storage

	Depth (mm)	Head (m)	Discharge (L/s)	Vreq (cu. m)	Vavail (cu. m)	Discharge Check
100-year Water Level	144.9	0.14	12.2	79.0	86.4	0.0

Subdrainage Area: Block 6 Tributary to Internal Cistern (L103B)
Area (ha): 0.620

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	178.56	211.62	79.43	132.19	79.31	
20	119.95	146.56	**79.43**	67.14	**80.56**	130 m³/ha
30	91.87	115.31	79.43	35.88	64.58	
40	75.15	96.61	79.43	17.18	41.23	
50	63.95	84.02	79.43	4.59	13.78	
60	55.89	74.90	74.90	0.00	0.00	
70	49.79	67.93	67.93	0.00	0.00	
80	44.99	62.42	62.42	0.00	0.00	
90	41.11	57.92	57.92	0.00	0.00	
100	37.90	54.17	54.17	0.00	0.00	
110	35.20	50.98	50.98	0.00	0.00	
120	32.89	48.23	48.23	0.00	0.00	

Subdrainage Area: L108D - UNC — Block 7, Tributary to Cistern Block 7
Area (ha): 0.14
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	178.56	69.5	17.94	51.56	30.94	
20	119.95	46.7	**17.94**	28.75	**34.50**	246 m³/ha
30	91.87	35.8	17.94	17.82	32.08	
40	75.15	29.2	17.94	11.31	27.15	
50	63.95	24.9	17.94	6.96	20.87	
60	55.89	21.8	17.94	3.82	13.75	
70	49.79	19.4	17.94	1.44	6.06	
80	44.99	17.5	17.51	0.00	0.00	
90	41.11	16.0	16.00	0.00	0.00	
100	37.90	14.8	14.75	0.00	0.00	
110	35.20	13.7	13.70	0.00	0.00	
120	32.89	12.8	12.80	0.00	0.00	

Subdrainage Area: L108B - UNC — Block 8 (To Block 12), Tributary to Underground Storage
Area (ha): 0.14
C: 0.81

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	56.5	56.5		
20	119.95	37.9	37.9		
30	91.87	29.1	29.1		
40	75.15	23.8	23.8		
50	63.95	20.2	20.2		
60	55.89	17.7	17.7		
70	49.79	15.7	15.7		
80	44.99	14.2	14.2		
90	41.11	13.0	13.0		
100	37.90	12.0	12.0		
110	35.20	11.1	11.1		
120	32.89	10.4	10.4		

Subdrainage Area: L108C - UNC — Block 12, Tributary to Underground Storage
Area (ha): 0.090
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	44.7	44.7		
20	119.95	30.0	30.0		
30	91.87	23.0	23.0		
40	75.15	18.8	18.8		
50	63.95	16.0	16.0		
60	55.89	14.0	14.0		
70	49.79	12.5	12.5		
80	44.99	11.3	11.3		
90	41.11	10.3	10.3		
100	37.90	9.5	9.5		
110	35.20	8.8	8.8		
120	32.89	8.2	8.2		

Stormwater Management Calculations

Project #160401614, 933 Gladstone Avenue - Gladstone Village OCH
Modified Rational Method Calculatons for Storage

Subdrainage Area: Block 8 & 12 Tributary to Underground Storage (L108B & L108C)
Area (ha): 0.23 **Allowable Release Rate: 29.47 L/s**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	76.81	35.76	**29.47**	6.30	**3.78**	16 m^3/ha
20	52.03	24.23	24.23	0.00	0.00	
30	40.04	18.65	18.65	0.00	0.00	
40	32.86	15.30	15.30	0.00	0.00	
50	28.04	13.06	13.06	0.00	0.00	
60	24.56	11.44	11.44	0.00	0.00	
70	21.91	10.20	10.20	0.00	0.00	
80	19.83	9.23	9.23	0.00	0.00	
90	18.14	8.45	8.45	0.00	0.00	
100	16.75	7.80	7.80	0.00	0.00	
110	15.57	7.25	7.25	0.00	0.00	
120	14.56	6.78	6.78	0.00	0.00	

Subdrainage Area: L109D - UNC Block 11
Area (ha): 0.14 Tributary to Cistern Block 11
C: 0.80 **Allowable Release Rate: 17.94 L/s**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	23.9	**17.9**	6.0	**3.6**
20	52.03	16.2	16.2	0.0	0.0
30	40.04	12.5	12.5	0.0	0.0
40	32.86	10.2	10.2	0.0	0.0
50	28.04	8.7	8.7	0.0	0.0
60	24.56	7.6	7.6	0.0	0.0
70	21.91	6.8	6.8	0.0	0.0
80	19.83	6.2	6.2	0.0	0.0
90	18.14	5.6	5.6	0.0	0.0
100	16.75	5.2	5.2	0.0	0.0
110	15.57	4.8	4.8	0.0	0.0
120	14.56	4.5	4.5	0.0	0.0

Subdrainage Area: L109B - UNC Block 10 (To Block 13)
Area (ha): 0.15 Tributary to Underground Storage
C: 0.65 **Allowable Release Rate: 19.22 L/s**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	20.8	20.8		
20	52.03	14.1	14.1		
30	40.04	10.9	10.9		
40	32.86	8.9	8.9		
50	28.04	7.6	7.6		
60	24.56	6.7	6.7		
70	21.91	5.9	5.9		
80	19.83	5.4	5.4		
90	18.14	4.9	4.9		
100	16.75	4.5	4.5		
110	15.57	4.2	4.2		
120	14.56	3.9	3.9		

Subdrainage Area: L109C - UNC Block 13
Area (ha): 0.090 Tributary to Underground Stroage
C: 0.85 **Allowable Release Rate: 11.53 L/s**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	76.81	16.3	16.3		
20	52.03	11.1	11.1		
30	40.04	8.5	8.5		
40	32.86	7.0	7.0		
50	28.04	6.0	6.0		
60	24.56	5.2	5.2		
70	21.91	4.7	4.7		
80	19.83	4.2	4.2		
90	18.14	3.9	3.9		
100	16.75	3.6	3.6		
110	15.57	3.3	3.3		
120	14.56	3.1	3.1		

Subdrainage Area: Block 10 & 13 Tributary to Underground Storage (L109B & L109C)
Area (ha): 0.24 **Allowable Release Rate: 30.75 L/s**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	76.81	37.15	**30.75**	6.41	**3.84**	16 m^3/ha
20	52.03	25.17	25.17	0.00	0.00	
30	40.04	19.37	19.37	0.00	0.00	
40	32.86	15.90	15.90	0.00	0.00	
50	28.04	13.56	13.56	0.00	0.00	
60	24.56	11.88	11.88	0.00	0.00	
70	21.91	10.60	10.60	0.00	0.00	
80	19.83	9.59	9.59	0.00	0.00	
90	18.14	8.78	8.78	0.00	0.00	
100	16.75	8.10	8.10	0.00	0.00	
110	15.57	7.53	7.53	0.00	0.00	
120	14.56	7.04	7.04	0.00	0.00	

Subdrainage Area: L109A - UNC Block 9
Area (ha): 0.07 Tributary to Prestion Street
C: 0.85 **Allowable Release Rate: 8.97 L/s**

tc (min)	I (2 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)
10	76.81	12.70	**8.97**
20	52.03	8.61	8.61
30	40.04	6.62	6.62
40	32.86	5.44	5.44
50	28.04	4.64	4.64
60	24.56	4.06	4.06
70	21.91	3.62	3.62
80	19.83	3.28	3.28
90	18.14	3.00	3.00
100	16.75	2.77	2.77
110	15.57	2.58	2.58
120	14.56	2.41	2.41

Project #160401614, 933 Gladstone Avenue - Gladstone Village OCH
Modified Rational Method Calculatons for Storage

Subdrainage Area: Block 8 & 12 Tributary to Underground Storage (L108B & L108C)
Area (ha): 0.23

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	178.56	101.14	29.47	71.67	43.00	
20	119.95	67.94	**29.47**	38.48	**46.17**	201 m^3/ha
30	91.87	52.04	29.47	22.57	40.63	
40	75.15	42.56	29.47	13.10	31.44	
50	63.95	36.23	29.47	6.76	20.28	
60	55.89	31.66	29.47	2.19	7.90	
70	49.79	28.20	28.20	0.00	0.00	
80	44.99	25.48	25.48	0.00	0.00	
90	41.11	23.29	23.29	0.00	0.00	
100	37.90	21.47	21.47	0.00	0.00	
110	35.20	19.94	19.94	0.00	0.00	
120	32.89	18.63	18.63	0.00	0.00	

Subdrainage Area: L109D - UNC Block 11
Area (ha): 0.14 Tributary to Cistern Block 11
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	69.5	17.9	51.6	30.9
20	119.95	46.7	**17.9**	28.7	**34.5**
30	91.87	35.8	17.9	17.8	32.1
40	75.15	29.2	17.9	11.3	27.1
50	63.95	24.9	17.9	7.0	20.9
60	55.89	21.8	17.9	3.8	13.7
70	49.79	19.4	17.9	1.4	6.1
80	44.99	17.5	17.5	0.0	0.0
90	41.11	16.0	16.0	0.0	0.0
100	37.90	14.8	14.8	0.0	0.0
110	35.20	13.7	13.7	0.0	0.0
120	32.89	12.8	12.8	0.0	0.0

Subdrainage Area: L109B - UNC Block 10 (To Block 13)
Area (ha): 0.15 Tributary to Underground Storage
C: 0.81

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	60.5	60.5		
20	119.95	40.6	40.6		
30	91.87	31.1	31.1		
40	75.15	25.5	25.5		
50	63.95	21.7	21.7		
60	55.89	18.9	18.9		
70	49.79	16.9	16.9		
80	44.99	15.2	15.2		
90	41.11	13.9	13.9		
100	37.90	12.8	12.8		
110	35.20	11.9	11.9		
120	32.89	11.1	11.1		

Subdrainage Area: L109C - UNC Block 13
Area (ha): 0.090 Tributary to Underground Stroage
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.56	44.7	44.7		
20	119.95	30.0	30.0		
30	91.87	23.0	23.0		
40	75.15	18.8	18.8		
50	63.95	16.0	16.0		
60	55.89	14.0	14.0		
70	49.79	12.5	12.5		
80	44.99	11.3	11.3		
90	41.11	10.3	10.3		
100	37.90	9.5	9.5		
110	35.20	8.8	8.8		
120	32.89	8.2	8.2		

Subdrainage Area: Block 10 & 13 Tributary to Underground Storage (L109B & L109C)
Area (ha): 0.24

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)	
10	178.56	105.17	30.75	74.43	44.66	
20	119.95	70.65	**30.75**	39.91	**47.89**	200 m^3/ha
30	91.87	54.11	30.75	23.36	42.06	
40	75.15	44.26	30.75	13.51	32.44	
50	63.95	37.67	30.75	6.92	20.77	
60	55.89	32.92	30.75	2.18	7.83	
70	49.79	29.33	29.33	0.00	0.00	
80	44.99	26.50	26.50	0.00	0.00	
90	41.11	24.21	24.21	0.00	0.00	
100	37.90	22.33	22.33	0.00	0.00	
110	35.20	20.73	20.73	0.00	0.00	
120	32.89	19.38	19.38	0.00	0.00	

Subdrainage Area: L109A - UNC Block 9
Area (ha): 0.07 Tributary to Prestion Street
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)
10	178.56	34.75	**8.97**
20	119.95	23.34	8.97
30	91.87	17.88	8.97
40	75.15	14.62	8.97
50	63.95	12.45	8.97
60	55.89	10.88	8.97
70	49.79	9.69	8.97
80	44.99	8.76	8.76
90	41.11	8.00	8.00
100	37.90	7.38	7.38
110	35.20	6.85	6.85
120	32.89	6.40	6.40

Project #160401614, 933 Gladstone Avenue - Gladstone Village OCH
Roof Drain Design Sheet, Estimated Roof Area in Block 1 (L103D-Roof)
Standard Watts Model R1100 Accuflow Roof Drain

Rating Curve				Volume Estimation				
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	Water Depth (m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0022	0	0.025	42	0	0	0.025
0.050	0.0006	0.0044	3	0.050	169	2	3	0.050
0.075	0.0009	0.0061	9	0.075	380	7	9	0.075
0.100	0.0011	0.0077	22	0.100	675	13	22	0.100
0.125	0.0013	0.0094	44	0.125	1054	21	44	0.125
0.150	0.0016	0.0110	76	0.150	1518	32	76	0.150

Drawdown Estimate

Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
2.5	557.1	2.5	0.154753
9.1	1099.7	6.7	0.460238
22.1	1682.7	13.0	0.927655
43.6	2284.6	21.4	1.56227
75.6	2897.0	32.0	2.366984

Rooftop Storage Summary

Total Building Area (sq.m)		1898
Assume Available Roof Area (sq.m)	80%	1518.4
Roof Imperviousness		0.99
Roof Drain Requirement (sq.m/Notch)		232
Number of Roof Notches*		7
Max. Allowable Depth of Roof Ponding (m)		0.15
Max. Allowable Storage (cu.m)		76
Estimated 100 Year Drawdown Time (h)		2.2

* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).

* Note: Number of drains can be reduced if multiple-notch drain used.

From Watts Drain Catalogue

Head (m)	L/s Open	75%	50%	25%	Closed
0.025	0.3155	**0.31545**	0.31545	0.31545	0.31545
0.050	0.6309	**0.6309**	0.6309	0.6309	0.6309
0.075	0.9464	**0.86749**	0.78863	0.70976	0.6309
0.100	1.2618	**1.10408**	0.94635	0.78863	0.6309
0.125	1.5773	**1.34067**	1.10408	0.86749	0.6309
0.150	1.8927	**1.57726**	1.2618	0.94635	0.6309

Calculation Results

	5yr	100yr	Available
Qresult (cu.m/s)	0.008	0.011	-
Depth (m)	0.097	0.145	0.150
Volume (cu.m)	20.7	69.5	75.9
Draintime (hrs)	0.9	2.21	

Project #160401614, 933 Gladstone Avenue - Gladstone Village OCH
Roof Drain Design Sheet, Estimated Roof Area in Block 2 (L103C-Roof)
Standard Watts Model R1100 Accuflow Roof Drain

Rating Curve				Volume Estimation				
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	Water Depth (m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0022	0	0.025	39	0	0	0.025
0.050	0.0006	0.0044	3	0.050	157	2	3	0.050
0.075	0.0009	0.0061	9	0.075	352	6	9	0.075
0.100	0.0011	0.0077	21	0.100	626	12	21	0.100
0.125	0.0013	0.0094	41	0.125	978	20	41	0.125
0.150	0.0016	0.0110	70	0.150	1409	30	70	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
2.3	516.9	2.3	0.1435824
8.5	1020.4	6.2	0.4270178
20.5	1561.2	12.1	0.8606954
40.4	2119.7	19.9	1.4495038
70.1	2687.9	29.7	2.1961322

Rooftop Storage Summary

Total Building Area (sq.m)		1761
Assume Available Roof Area (sq.n	80%	1408.8
Roof Imperviousness		0.99
Roof Drain Requirement (sq.m/Notch)		232
Number of Roof Notches*		7
Max. Allowable Depth of Roof Ponding (m)		0.15
Max. Allowable Storage (cu.m)		70
Estimated 100 Year Drawdown Time (h)		2.0

* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).

* Note: Number of drains can be reduced if multiple-notch drain used.

From Watts Drain Catalogue

Head (m)	L/s Open	75%	50%	25%	Closed
0.025	0.3155	0.31545	0.31545	0.31545	0.315451
0.050	0.6309	0.6309	0.6309	0.6309	0.630902
0.075	0.9464	0.86749	0.78863	0.70976	0.630902
0.100	1.2618	1.10408	0.94635	0.78863	0.630902
0.125	1.5773	1.34067	1.10408	0.86749	0.630902
0.150	1.8927	1.57726	1.2618	0.94635	0.630902

Calculation Results

	5yr	100yr	Available
Qresult (cu.m/s)	0.007	0.011	-
Depth (m)	0.095	0.144	0.150
Volume (cu.m)	18.6	62.8	70.4
Draintime (hrs)	0.8	2.0	

Project #160401614, 933 Gladstone Avenue - Gladstone Village OCH
Roof Drain Design Sheet, Estimated Roof Area in Block 4 (L104B-Roof)
Standard Watts Model R1100 Accuflow Roof Drain

Rating Curve				Volume Estimation				Water Depth
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	(m)
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0019	0	0.025	33	0	0	0.025
0.050	0.0006	0.0038	2	0.050	134	2	2	0.050
0.075	0.0008	0.0047	8	0.075	301	5	8	0.075
0.100	0.0009	0.0057	18	0.100	535	10	18	0.100
0.125	0.0011	0.0066	35	0.125	836	17	35	0.125
0.150	0.0013	0.0076	60	0.150	1204	25	60	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
2.0	515.4	2.0	0.143161
7.2	1119.1	5.3	0.454025
17.6	1816.1	10.3	0.958498
34.6	2566.4	17.0	1.671382
59.9	3350.0	25.4	2.60193

Rooftop Storage Summary

Total Building Area (sq.m)		1505
Assume Available Roof Area (sq.m)	80%	1204
Roof Imperviousness		0.99
Roof Drain Requirement (sq.m/Notch)		232
Number of Roof Notches*		6
Max. Allowable Depth of Roof Ponding (m)		0.15
Max. Allowable Storage (cu.m)		60
Estimated 100 Year Drawdown Time (h)		2.5

* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).

* Note: Number of drains can be reduced if multiple-notch drain used.

From Watts Drain Catalogue

Head (m) L/s

Head (m)	Open	75%	50%	25%	Closed
0.025	0.3155	0.31545	**0.31545**	0.31545	0.31545
0.050	0.6309	0.6309	**0.6309**	0.6309	0.6309
0.075	0.9464	0.86749	**0.78863**	0.70976	0.6309
0.100	1.2618	1.10408	**0.94635**	0.78863	0.6309
0.125	1.5773	1.34067	**1.10408**	0.86749	0.6309
0.150	1.8927	1.57726	**1.2618**	0.94635	0.6309

Calculation Results

	5yr	100yr	Available
Qresult (cu.m/s)	0.006	0.007	-
Depth (m)	0.098	0.148	0.150
Volume (cu.m)	17.1	57.8	60.2
Draintime (hrs)	0.9	2.5	

Project #160401614, 933 Gladstone Avenue - Gladstone Village OCH
Roof Drain Design Sheet, Estimated Roof Area in Block 6 (L103B-Roof)
Standard Watts Model R1100 Accuflow Roof Drain

Rating Curve				Volume Estimation				Water Depth (m)
Elevation (m)	Discharge Rate (cu.m/s)	Outlet Discharge (cu.m/s)	Storage (cu. m)	Elevation (m)	Area (sq. m)	Volume (cu. m) Increment	Volume (cu. m) Accumulated	
0.000	0.0000	0.0000	0	0.000	0	0	0	0.000
0.025	0.0003	0.0025	0	0.025	48	0	0	0.025
0.050	0.0006	0.0050	3	0.050	192	3	3	0.050
0.075	0.0009	0.0069	11	0.075	432	8	11	0.075
0.100	0.0011	0.0088	26	0.100	768	15	26	0.100
0.125	0.0013	0.0107	50	0.125	1201	24	50	0.125
0.150	0.0016	0.0126	86	0.150	1729	36	86	0.150

Drawdown Estimate			
Total Volume (cu.m)	Total Time (sec)	Vol (cu.m)	Detention Time (hr)
0.0	0.0	0.0	0
2.8	555.0	2.8	0.1541717
10.4	1095.6	7.6	0.4585107
25.2	1676.4	14.8	0.9241723
49.6	2276.0	24.4	1.5564057
86.0	2886.1	36.4	2.3580985

Rooftop Storage Summary

Total Building Area (sq.m)		2161
Assume Available Roof Area (sq.	80%	1728.8
Roof Imperviousness		0.99
Roof Drain Requirement (sq.m/Notch)		232
Number of Roof Notches*		8
Max. Allowable Depth of Roof Ponding (m)		0.15
Max. Allowable Storage (cu.m)		86
Estimated 100 Year Drawdown Time (h)		2.2

* As per Ontario Building Code section OBC 7.4.10.4.(2)(c).

From Watts Drain Catalogue

Head (m)	L/s Open	75%	50%	25%	Closed
0.025	0.3155	0.31545	0.31545	0.31545	0.315451
0.050	0.6309	0.6309	0.6309	0.6309	0.630902
0.075	0.9464	0.86749	0.78863	0.70976	0.630902
0.100	1.2618	1.10408	0.94635	0.78863	0.630902
0.125	1.5773	1.34067	1.10408	0.86749	0.630902
0.150	1.8927	1.57726	1.2618	0.94635	0.630902

* Note: Number of drains can be reduced if multiple-notch drain used.

Calculation Results

	5yr	100yr	Available
Qresult (cu.m/s)	0.009	0.012	-
Depth (m)	0.097	0.145	0.150
Volume (cu.m)	23.5	79.0	86.4
Draintime (hrs)	0.9	2.2	

D.3 CORRESPONDENCE WITH THE CITY OF OTTAWA (SWM CRITERIA)

Gladstone Village Meeting Minutes

Date: February 16th, 2021
Time: 11:00am –12:00 pm

Attendees:

City: Shawn Wessel (IPM), Eric Tousignant (Water Resources Dept., Eng.), Abdul Mottalib (Sr. Eng.), Edith Tam (Planner -City Realty), Doug James (Central Branch Manager). Andrew McCreight (File Lead), Amy Whelan (EIT)

Applicant Team: Robert MacNeil (OCHC), Christa Allevato, Peter Moroz (Stantec), Karin Smadella (Stantec)

Location: Online @ MTeams

Agenda Items:

SWM Criteria
Relocation of Combined Sewer and Domestic Water Mains
Capacity Issues
Park Land

Karin Smadella-
For Gladstone village - this is intended to be a public street running through the subdivision and connecting in with oak street along Plouffe (18m cross-section).

Across these lands there is quite a lot of significant infrastructure. The collector storm sewer has to be relocated either along the multi-use pathway (NCC ownership) or through the subdivision itself.

Design criteria- We understand that a 2-year predevelopment with a max C= 0.4 to discharge to the combined sewer is to be used, although there was no mention of the collector storm sewer. Our first question is can there be a connection to this storm sewer and if so, what is the allowable release rate?

Eric Tousignant-
This storm sewer collects from the highway as well and we must check if the MTO has ownership. MTO will typically have ownership even outside of their property and drainage rights. If there is a proposal to add more flow to the sewer, we need to ensure that there are no issues with capacity and this scenario is a better option then trying to connect to the combined sewer, if possible. We will also be able to assess impacts to the storm sewer. A storm model has been created for the whole system in this area.

Robert MacNeil-
This storm sewer is conflicting with the placement of our buildings and extends on the city lands to the north is also conflicting with the envisioned development there. Therefore, it will need to be shifted to the west to be below the MUP which is owned partially by the NCC (90%) and the City. Robin working with Steven Willis to acquire the NCC owned portion of the MUP this Calander year.

Another factor to consider is that the city is considering extending district energy down to this site. My understanding is that if that is to ever occur the best place to extend district energy to connect would be along below the MUP giving added reasoning to acquire the NCC lands so that they are not a party to these discussions.

Alternatively, the storm sewer can be within the public street in the subdivision.

Abdul Mottalib-
Additionally, because the storm sewer is taking flows from the highway (partial ownership by MTO) if we move it below and along the MUP that would take care of the issue of MTO drainage rights.

Karin Smadella-
Why don't we look at the property as a whole and come up with a 5-year predevelopment flow rate and determine the flows and see if the storm sewer has the capacity.

Eric Tousignant-
This storm sewer was likely designed with 2-year criteria due to its age, as well we must consider the extra flow from the highway. Also keep in mind that the MTO is likely discharging as much flow as possible to the storm sewer and for a highway is likely designed with a 10-year capture.

Karin Smadella-
Stantec to provide 2-year predevelopment flow for City to verify if it can be accommodated in the storm collector sewer.
The city has acquired the lands next to the rec-center and the park and is planning to redevelop. We would like to know what their plan is for storm water management and what their plan is with respect to the storm sewer that cuts across in order to coordinate efficiently. As well if it is possible to share a storm water management and storage.

Edith Tam-
So far there is no storm water management in place for the above noted lands right now. We are in the process of acquiring 1010 Somerset and approximately 1 hector of those lands are tentatively being allocated to the development of a soccer field. Currently Plouffe park is depressed and from what I understand is currently a storm water pond for 100-year flood. With this in mind, it is likely the proposed soccer field will also be depressed. As far as I know we are coordinating with Ottawa community housing because they have 933 Gladstone. We are planning on building a community center, there might be a French elementary school, and would like to coordinate effectively for this development.

Robert MacNeil-
The main trunk sewer will need to be shifted so that it doesn't fall below building footprints. The water and the combined sewers that run alongside one another run will have an opportunity to continue with some of the servicing still positioned there.
Edith's group has been focussing on acquiring the lands right now and therefore will be behind us by several years in terms of development. There scoping and design work will not catch up to us so the challenge for us is to continue working with their group and the City in making decisions that are going to be fortuitous for everyone.
Other than phase one, Plouffe park is going to be extended westerly and run all the way through the site likely with no buildings along its length. It would be a massive city park. There could be underground parking below as well as dry underground storage.

Eric Tousingnant-

The Pluoffe park SWM Pond is a 50-year design, so during a 100-year event the lower part of Preston just in front of Pluoffe will continue to flood. What we have is an improvement from what was there before. If you are keeping the park lands to the west of Plouffe there is a good opportunity to create more storage for Pluoffe park and upgrade to a 100-year design, removing the ponding that will happen on Preston street during a 100-year event. This potential expansion of storage could also be allocated to the city lands to the north as well as Gladstone's lands to south.

Karin Smadella-
Our other major question is if the existing major infrastructure that crosses through the site must stay in service? As part of the subdivision design, will connections have to be maintained to the existing public and private mains located within the City lands to the north?
Similarly, the combined collector sewer that runs through the development will need to be relocated. Are there known constraints that should be considered in the design and construction phasing?

Abdul Mottalib
Advised that City will consult with Asset Management to ask if connections will have to be maintained to the City watermains to the north.

Eric Tousingant-
In terms of moving the combined collector sewer, it can be moved as long as it has no hydraulic impact to the system and can continue to be a relief system for the Preston Trunk. If there is a realignment it must maintain the existing crossing location under Somerset Street.

Robert MacNeil-
Can you foresee any issues with moving the Nepean Storm under the MUP and potentially coupled with district energy running side by side? The MUP easement is about 50ft in width.

Shawn Wessel-

Moving the Nepean storm will require a certain offset from infrastructure (clearances) in order to be able to access the sewer for future maintenance/replacement. This will be something that will need to be looked into with more detail (plan & profile, cross sections, etc.) to determine if there is room, depending on what is required for development.

<u>Karin Smadella-</u>
For the sanitary sewage and potentially combined sewage for these lands should it be directed to the local or combined collector system.

<u>Eric Tousingant-</u>
It would be preferable to the local system if it has capacity. Typically, we do not connect to the collector systems. If the storm can be directed elsewhere and it is just the sanitary discharge to the local system there shouldn't be any issues with capacity.

<u>Shawn Wessel-</u>
Detailed Design -
It is important to note that for your submission we would require grading, site servicing, stormwater management plans and roof plans. The roof and grading plans should include all ponding for 5- and 100-year events. Roof Plans are to include drain and scupper locations as well as what table speaking to the prescribed drain types (manufacture and model #), weir openings and flows for all buildings with flat roofs on this all sites.

<u>Karin Smadella</u>
Noted that Gladstone Village application will be for a plan of subdivision. Rochester Heights may be a site plan application. For site plans with buildings of this nature (mid-high rise), detailed design of the buildings (including building mechanical) is normally not available when the site plan control application is being approved. Discussion about this request can be undertaken separately.
Actionable items:

- Determine if the collector storm sewer (that drains the highway) is owned by the MTO or the City.
- Check with parks to determine if it is possible to create more storage to upgrade the park from a 50-year design to a 100-year design and ultimately reduce the potential of flooding on Preston.
- Provide a plan & profile and section drawings for the proposed relocation of the Nepean Storm under the MUP coupled with district energy to determine if there is enough clearance for City approval. (KS – I believe that only a section was discussed for high level feasibility – Plan and profile drawings would accompany the detailed design submission based on the preferred sewer alignment)
- Determine if the 406mm water main that crosses through the development site can be abandoned once the new development is up and running or if it must remain. Please see image below. Note: There is a FH at rear of 332 Preston that is connected to the private water line of 933 Gladstone property. Need to check if abandoning this FH is an option or if there is a way to connect to WM on Balsam St. and if so, who pays for this?

- I've spoken with Robin Souchen about the watermains on the 1010 Somerset property and to both of us it makes the most sense to keep this 406mm watermain that runs adjacent to the Booth Street Trunk and continues on under City Centre Avenue.
- As Rob MacNeil has noted, the City is behind OCH by a few years in regards to master planning subject lands. All we know is the we have a number of items we may have to accommodate on the lands:
- Approx. 1 hectare park – to be depressed
- Underground parking 800+ parking spots similar to Lansdowne
- Twin pad arena – to be confirmed by Linda Tremblay
- An elementary school for 389 students
- Expansion of Plant Bath community centre space
- Gym
- 150-300 residential units
- Approximately 6 floors of office space
- Retail space

This may give you an idea of what capacity is required for the area.

-


406mm watermain in question.
Combined Collector sewer
rue Somerset St. O.W.
Corridor ferroviaire Trillium rail corridor
rue Oak St
rue Anderson

From:	Smadella, Karin
To:	Paerez, Ana
Subject:	FW: Gladstone Village - Storm Collector Contributions
Date:	Wednesday, March 17, 2021 5:20:49 PM
Attachments:	image002.png

FYI

Karin Smadella, P.Eng
Project Manager

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Karin.Smadella@stantec.com

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From: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Sent: Wednesday, March 17, 2021 3:54 PM
To: Smadella, Karin <Karin.Smadella@stantec.com>
Subject: RE: Gladstone Village - Storm Collector Contributions

The Nepean Bay SWM model assumed an imperviousness of 0.55, which is roughly a C of 0.6. Since this is only a 2 year system and there is a risk of this storm system backing up into the LRT corridor, let's try to match existing conditions, especially since the LRT team is currently using hydrographs from this system to come up with a flood proofing solution.

Eric

Eric Tousignant, P.Eng.
Senior Water Resources Engineer
Infrastructure Services
613-580-2424 ext 25129

From: Smadella, Karin <Karin.Smadella@stantec.com>
Sent: March 17, 2021 3:49 PM
To: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Subject: RE: Gladstone Village - Storm Collector Contributions

Yes the storm trunk along the LRT – in your correspondence below you noted that the storm sewer has capacity but that discharge to the system should be controlled to the 2 year storm. My mtg will be done in the next 15 min and I can give you a call.

The Nepean Bay storm model assumes 4.7 ha of these lands draining to the storm sewer uncontrolled (No ICDs) (see blue areas in figure below). There is a total of 20 ha drainage to this trunk sewer system (starting at highway 417) with a peak flow of about 2 cms. In short, there is available capacity in the storm system for your flows.

Given the extremely tight nature of these systems and the potential for backup onto the future LRT system, I would recommend that we set the target release rates at 2 year. Also, since we did not account for any of these areas in the Preston combined system model, any area draining to the combined would also need to be controlled to 2 year.

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Project Manager

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From: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Sent: Wednesday, March 17, 2021 3:42 PM
To: Smadella, Karin <Karin.Smadella@stantec.com>
Subject: RE: Gladstone Village - Storm Collector Contributions

Unfortunately I am in meetings all day tomorrow. Is this the storm trunk next to the LRT corridor?

From: Smadella, Karin <Karin.Smadella@stantec.com>
Sent: March 17, 2021 3:41 PM

To: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Cc: Paerez, Ana <Ana.Paerez@stantec.com>
Subject: RE: Gladstone Village - Storm Collector Contributions

Hi Eric – Sorry I'm in a meeting but otherwise would give you a call to avoid these emails back and forth. The C-value we are looking for is for the contribution to the existing storm trunk and not the combined sewer.

I can call you tomorrow to discuss if that is easier.

Karin

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Project Manager

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From: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Sent: Wednesday, March 17, 2021 3:37 PM
To: Smadella, Karin <Karin.Smadella@stantec.com>
Cc: Paerez, Ana <Ana.Paerez@stantec.com>
Subject: RE: Gladstone Village - Storm Collector Contributions

Hi Karin

Unfortunately, the entire Preston combined sewer Model assumed an existing imperviousness of roughly 0.45, which is equivalent to a C of roughly 0.5. You would have to stick with the 0.5.

As for the major system. As you noted, You will have to control development sites up to the 100 year event on-site, but internal roadways (if they are city streets) can drain to existing roadway. I would only ask that you check the impact of the runoff on the local street to make sure that it is not excessive.

Eric

Eric Tousignant, P.Eng.
Senior Water Resources Engineer
Infrastructure Services
613-580-2424 ext 25129

From: Smadella, Karin <Karin.Smadella@stantec.com>
Sent: March 12, 2021 2:18 PM
To: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Cc: Paerez, Ana <Ana.Paerez@stantec.com>
Subject: RE: Gladstone Village - Storm Collector Contributions

Thanks Eric

I have summarized the sewer and swm criteria below. Can you please confirm the criteria and provide a response to the two questions highlighted?

Minor Storm System Design Criteria
To be controlled to 2 year flow, C = ?
Please confirm the runoff coefficient to be assumed for the allowable 2 year flow into the minor system. Given the predevelopment condition where the site was all hard surface with no inlet control, can we use 2 year flow at C=0.9?

Major System Design Criteria
Major system flow from Public Streets to be directed to Preston Street. Is there any known restriction from directing some of the major system flows down the local streets abutting the site (Oak, Laurel, Larch, Balsam)?
Private Blocks to provide on-site storage for stormwater in excess of the allowable minor system contributions up to the 100-year event.

Combined System Design Criteria
To be controlled to the 2 year flow, maximum C=0.4.

Thanks for your quick responses. Have a great weekend.

Karin

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From: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Sent: Tuesday, March 09, 2021 2:47 PM
To: Smadella, Karin <Karin.Smadella@stantec.com>
Cc: Paerez, Ana <Ana.Paerez@stantec.com>
Subject: RE: Gladstone Village - Storm Collector Contributions

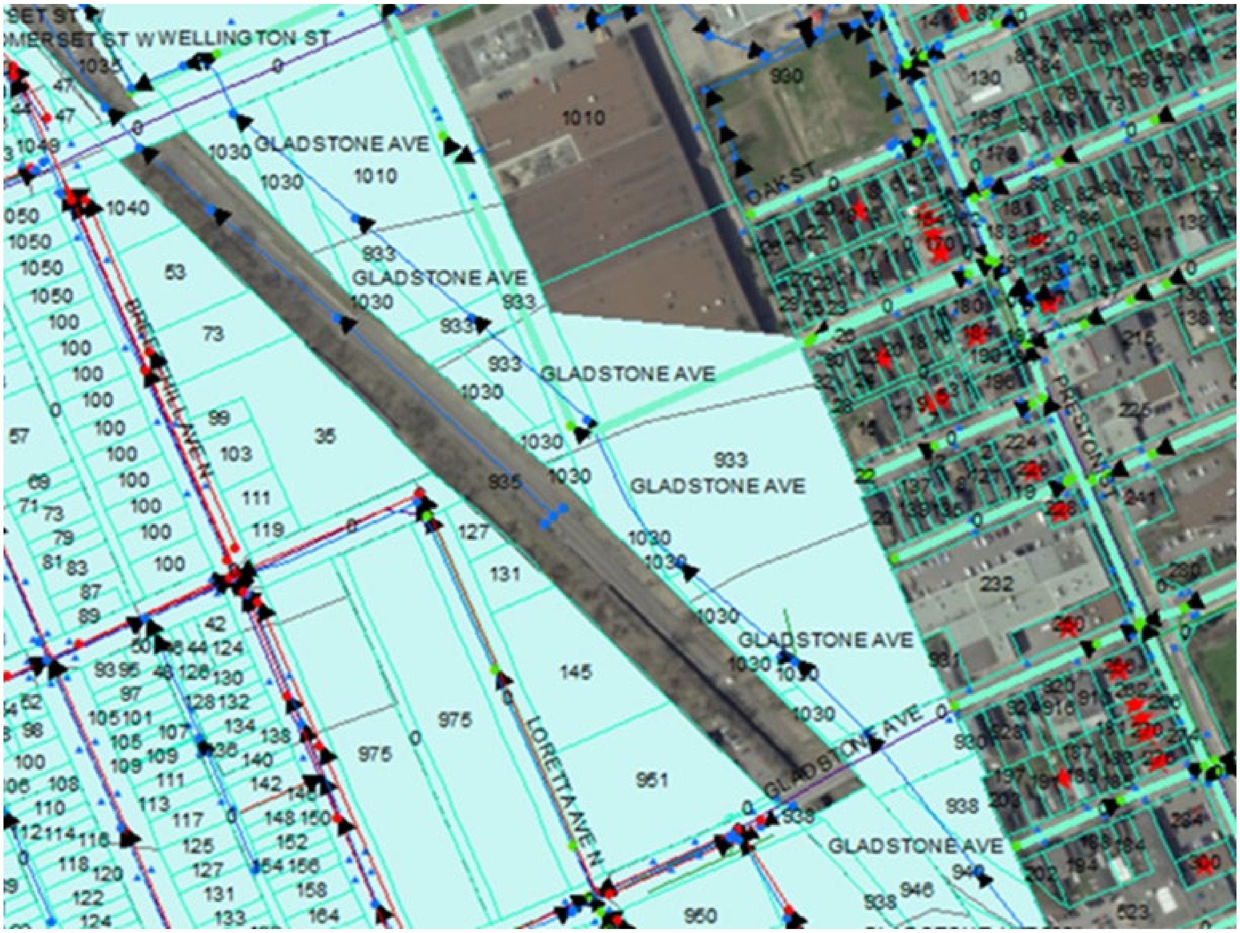
Hi Karin

Attached is the DDSWMM sketch for the Preston combined sewer model. As you can see, the lands in question do not drain to the combined system in our model and have been assumed draining to the storm sewer next to the rail corridor.

The Nepean Bay storm model assumes 4.7 ha of these lands draining to the storm sewer uncontrolled (No ICDs) (see blue areas in figure below). There is a total of 20 ha drainage to this trunk sewer system (starting at highway 417) with a peak flow of about 2 cms. In short, there is available capacity in the storm system for your flows.

Given the extremely tight nature of these systems and the potential for backup onto the future LRT system, I would recommend that we set the target release rates at 2 year. Also, since we did not account for any of these areas in the Preston combined system model, any area draining to the combined would also need to be controlled to 2 year.

Eric



From: Smadella, Karin <Karin.Smadella@stantec.com>
Sent: March 09, 2021 11:57 AM
To: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Cc: Paerez, Ana <Ana.Paerez@stantec.com>
Subject: RE: Gladstone Village - Storm Collector Contributions

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Hi Eric – Yes, the questions below are related to the Gladstone Village site at 933 Gladstone Avenue. Both sites have Gladstone addresses so it is confusing.

We require clarity on what will be permitted for the storm/combined outlets prior to layout out the sewers for this subdivision development. Thanks for clarifying that the major system from the public roadway can be directed to Preston Street.

Karin

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From: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Sent: Tuesday, March 09, 2021 11:12 AM
To: Smadella, Karin <Karin.Smadella@stantec.com>
Subject: RE: Gladstone Village - Storm Collector Contributions

Hi again Karin

Just to be on the same page, your email from March 3rd is not for the Gladstone/Rochester site. I think there is some confusion. I have asked my modeler to model the new combined sewer location through the site at Rochester/Gladstone, but I think you are looking for answers about the old Fed buildings site.

We just completed updating the Nepean Bay storm sewer model so we can add flow to the storm pipe, but that system is very tight, and it can impact the future light rail.

Unfortunately, we are very backlogged right now due to light rail and I will try to get on this site ASAP.

As for your question about the SWM facility. I don't anticipate any changes to it. Plouffe park is there to protect a low point on Preston and **not to accommodate future development**. You will need to provide on-site detention for any site plan in the development area. If there are city streets within the future development area, then they will just flow onto Preston and will form part of the overall major system flow strategy for Preston Street. Their impact on the Plouffe park SWM facility will be negligible given that the park captures all the excess major flow for the Preston drainage area north of Carling.

Eric

Eric Tousignant, P.Eng.
Senior Water Resources Engineer
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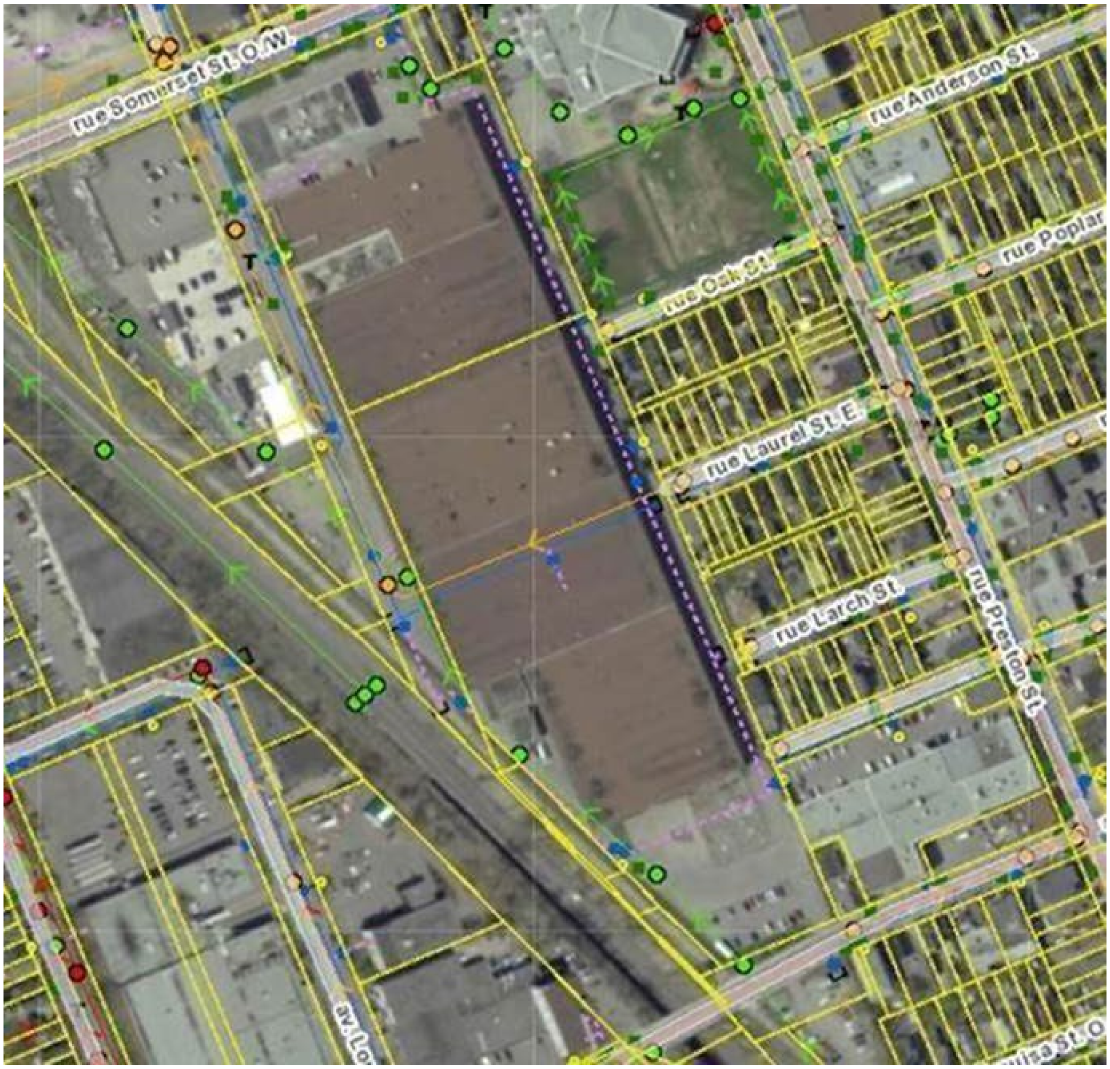
613-580-2424 ext 25129

From: Smadella, Karin <Karin.Smadella@stantec.com>
Sent: March 09, 2021 10:42 AM
To: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Cc: Paerez, Ana <Ana.Paerez@stantec.com>
Subject: RE: Gladstone Village - Storm Collector Contributions

Hi Eric,

Please see the attached figure which the infrastructure picked up in the survey. It appears that the inlets at the south end of the site would contribute to the storm system and those on the eastern limit the combined.

Below I have included the aerials from 1958 and 2014. During that period the site was covered in a large building and asphalt. I do not expect that there were stormwater controls installed at the time of construction.



Let us know if you require anything further.

Karin

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From: Tousignant, Eric <Eric.Tousignant@ottawa.ca>

Sent: Tuesday, March 09, 2021 8:43 AM
To: Smadella, Karin <Karin.Smadella@stantec.com>
Subject: RE: Gladstone Village - Storm Collector Contributions

HI again Karin

A question that has come back to me from the modelers is if the existing site has CBs on it. This will help us determine the next increase in runoff. No problem if you don't have the answer. What we will do then, is figure out how much water runs off onto the street in the existing system and gets into street CBs. We will then subtract this flow from the future flow go get the net increase.

Eric

From: Smadella, Karin <Karin.Smadella@stantec.com>
Sent: March 08, 2021 5:18 PM
To: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Cc: Paerez, Ana <Ana.Paerez@stantec.com>; Robert MacNeil <Robert_MacNeil@och.ca>
Subject: RE: Gladstone Village - Storm Collector Contributions

Hi Eric – I realize that this request was only sent to you mid-last week but can you please confirm receipt and advise when you expect to be able to provide direction? As I am certain you are aware, this is a very important project for OCH and they want to move forward with the functional design as soon as possible.

Thanks,

Karin

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Project Manager

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From: Smadella, Karin
Sent: Wednesday, March 03, 2021 11:01 AM

To: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Cc: Wessel, Shawn <shawn.wessel@ottawa.ca>; Ana Paerez (Ana.Paerez@stantec.com) <Ana.Paerez@stantec.com>; Robert MacNeil <Robert_MacNeil@och.ca>; Moroz, Peter <peter.moroz@stantec.com>; Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Subject: Gladstone Village - Storm Collector Contributions

Hi Eric,

Further to our meeting on February 16th, I am providing storm flows based on a contributing area of 3.24ha from the Gladstone Village site. We understand that it is the City's preference that storm flow be separated from the combined system if possible. **Please advise whether or not the stormwater flows below can be accommodated in the storm collector sewer that currently runs along the western limit of the site.** Should discharge be permitted to the storm system, all sanitary flows will be directed to the local sewers on the adjacent roadways.

Flows are based on the following:

Scenario 1

- Full capture of the 2 year event from the proposed municipal ROW to avoid ponding in the street in the 2 year event. Major flows would be directed to a shared SWM facility on neighbouring City lands.
- Allowable release rate from the private blocks based on the 5 year event with a maximum C=0.4 (equivalent to the allowable discharge to the combined system). Storage for the affordable housing units to be provided in the new/expanded City SWM facility – alternatively storage to be provided on the individual development blocks.
- **Based on these assumptions, the 100 year target flow rate for minor system discharge to the storm trunk would be 406.4 L/s.**

Scenario 2

- Full capture of the 2 year event from the proposed municipal ROW to avoid any ponding in the street in the 2 year event. Major flows would be directed to a shared SWM facility on neighbouring City lands.
- Allowable release rate from the private blocks based on the 2 year event with a maximum C=0.4. Storage for the affordable housing units to be provided in the new/expanded City SWM facility – alternatively storage to be provided on the individual development blocks.
- **Based on these assumptions, the 100 year target flow rate for minor system discharge to the storm trunk would be 329.0 L/s.**

If capacity in the storm collector sewer is not available, the flow from Scenario 1 would be directed to the combined system. **Under this condition, please advise if the local combined sewers have capacity to receive a combined sewage flow of 406.4 L/s or if the flow should be directed to the combined collector sewer.**

Timing:
Do you have an idea if the timing if the development of the City lands and the expansion of the SWM facility? Should the development of the Gladstone Village subdivision proceed in advance of the SWM works on the City lands, will the major system flow from the municipal ROW (and potentially flow from the private development blocks) be permitted to outlet to Plouffe Park or would an interim facility on the City development lands be required?

Thanks and please let me know if you have any questions.

Karin

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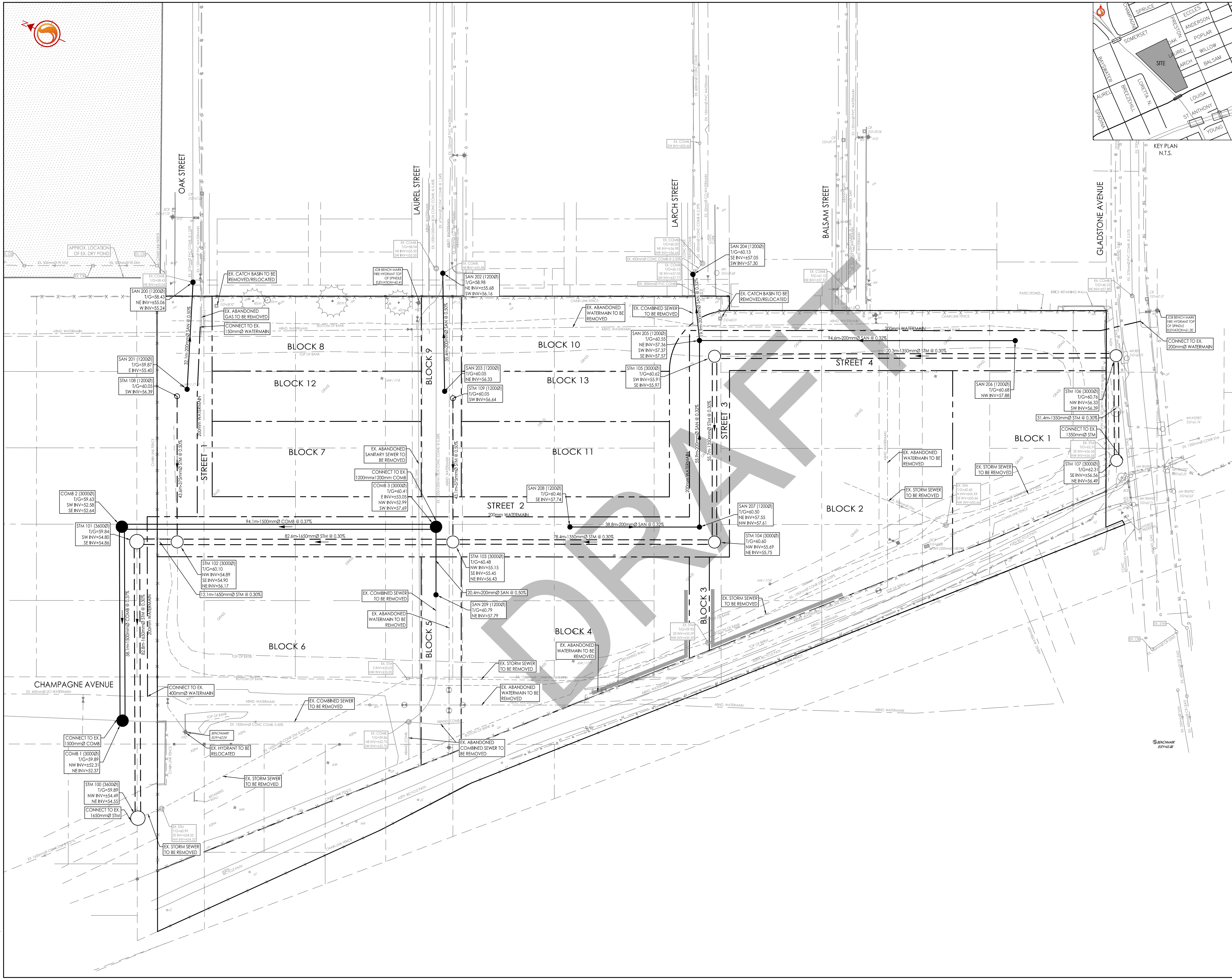
Appendix E BACKGROUND REPORTS

Appendix F CONCEPTUAL SERVICING DRAWINGS



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Legend

- PROPOSED WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- EXISTING WATERMAIN
- EXISTING VALVE AND VALVE BOX
- EXISTING VALVE CHAMBER
- EXISTING FIRE HYDRANT
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- EXISTING STREETLIGHT CONDUIT
- EXISTING TRAFFIC CONDUIT
- EXISTING CABLE CONDUIT
- EXISTING GAS MAIN
- EXISTING OVERHEAD WIRES
- PROPOSED RETAINING WALL

Notes

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		By	Appd.	YY.MM.DD
1	ISSUED FOR REVIEW	WAJ	AMP	21.04.15

Revision

File Name: 160401614-DB	Dwn.	Chkd.	Dsgn.	YY.MM.DD
	WAJ	AMP	WAJ	21.03.02

Permit-Seal

Client/Project

OTTAWA COMMUNITY HOUSING CORPORATION

GLADSTONE VILLAGE
933 GLADSTONE AVENUE
OTTAWA, ON

Title

CONCEPTUAL OVERALL SERVICING PLAN

Project No. 160401614

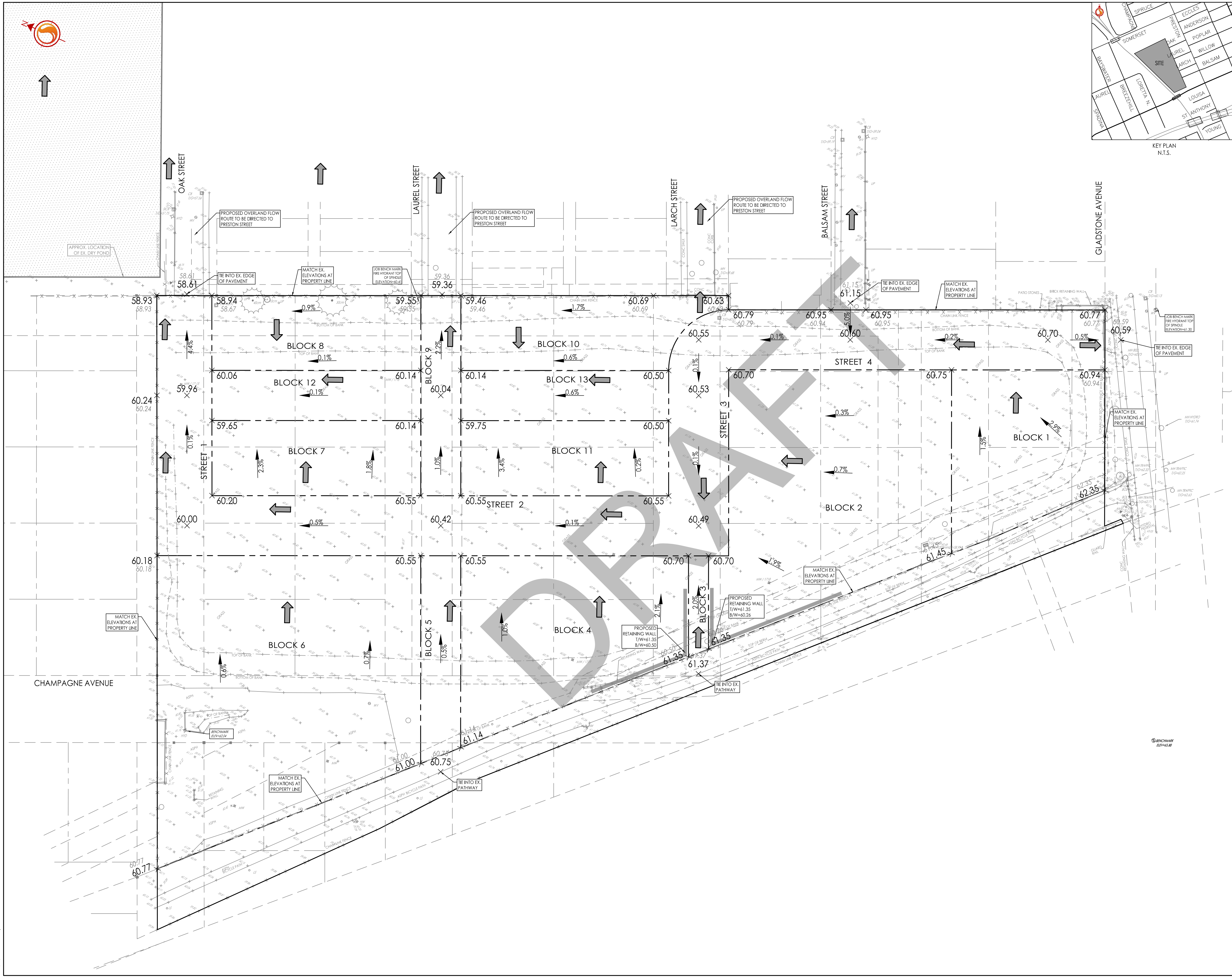
Scale 1:500 (0 5 15 25m)

Drawing No. OSSP-1

Sheet 1 of 6

Revision 1

ORIGINAL SHEET - ARCH D



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- PROPOSED ELEVATION
- FLOW DIRECTION AND GRADE
- TERRACING 3:1 SLOPE MAXIMUM (UNLESS OTHERWISE SHOWN)
- PROPOSED SWALE
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Client/Project

OTTAWA COMMUNITY HOUSING CORPORATION

GLADSTONE VILLAGE
933 GLADSTONE AVENUE

OTTAWA, ON

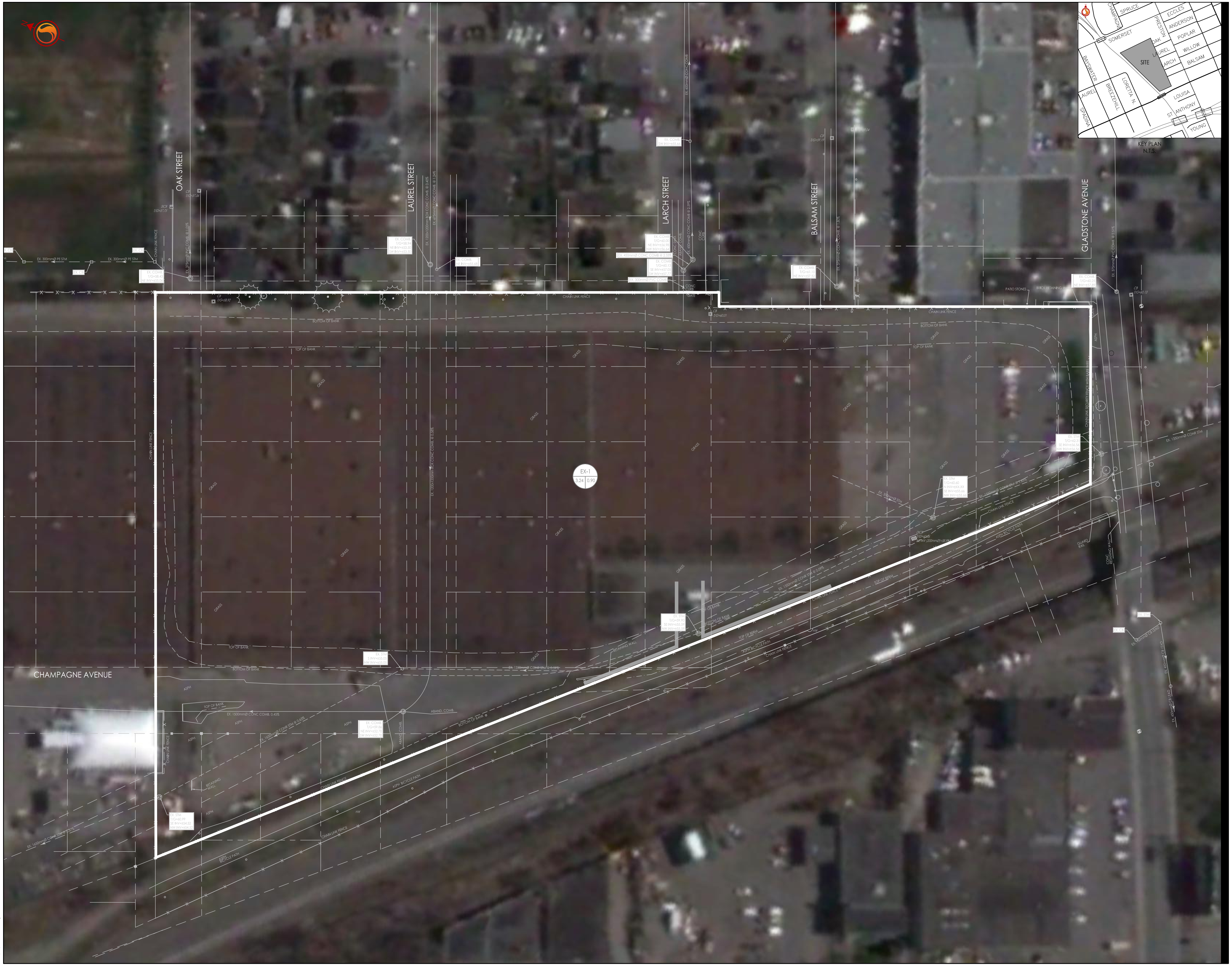
Title

CONCEPTUAL
OVERALL GRADING PLAN

Project No.	Scale
160401614	1:500

Drawing No.	Sheet	Revision
OGP-1	2 of 6	1

ORIGINAL SHEET - ARCH D



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Legend

1-1 — AREA ID
0.60 — RUNOFF COEFFICIENT
1.13 — STORM DRAINAGE AREA ha.

EXISTING STORM DRAINAGE BOUNDARY
EXISTING STORM SEWER
EXISTING SANITARY/COMBINED SEWER

Notes

1. EXISTING CONDITIONS SHOWN BASED ON PHOTOS FROM 2014.

Revision		By	Appd.	YY.MM.DD
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Client/Project

OTTAWA COMMUNITY HOUSING CORPORATION

GLADSTONE VILLAGE
933 GLADSTONE AVENUE
OTTAWA, ON

Title

CONCEPTUAL
OVERALL EXISTING STORM DRAINAGE PLAN

Project No. 160401614

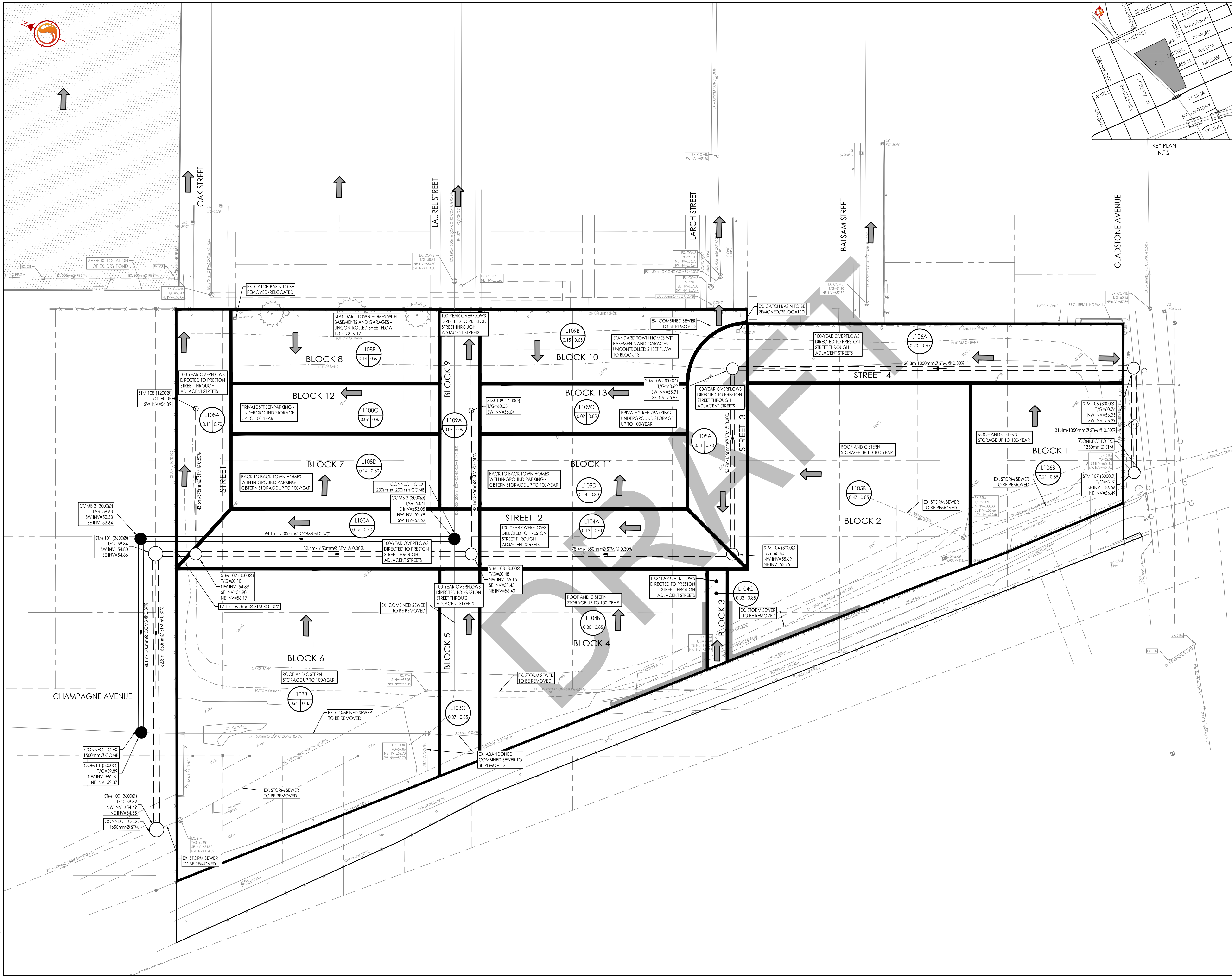
Scale 1:500 (0, 5, 15, 25m)

Drawing No. EXSD-1

Sheet 3 of 6

Revision 1

ORIGINAL SHEET - ARCH D



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Legend

AREA ID
RUNOFF COEFFICIENT
STORM DRAINAGE AREA ha.
STORM DRAINAGE BOUNDARY
EXISTING/FUTURE STORM DRAINAGE BOUNDARY
PROPOSED STORM SEWER
EXISTING STORM SEWER
EXISTING COMBINED SEWER

Notes

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OTTAWA COMMUNITY HOUSING CORPORATION

GLADSTONE VILLAGE
933 GLADSTONE AVENUE
OTTAWA, ON

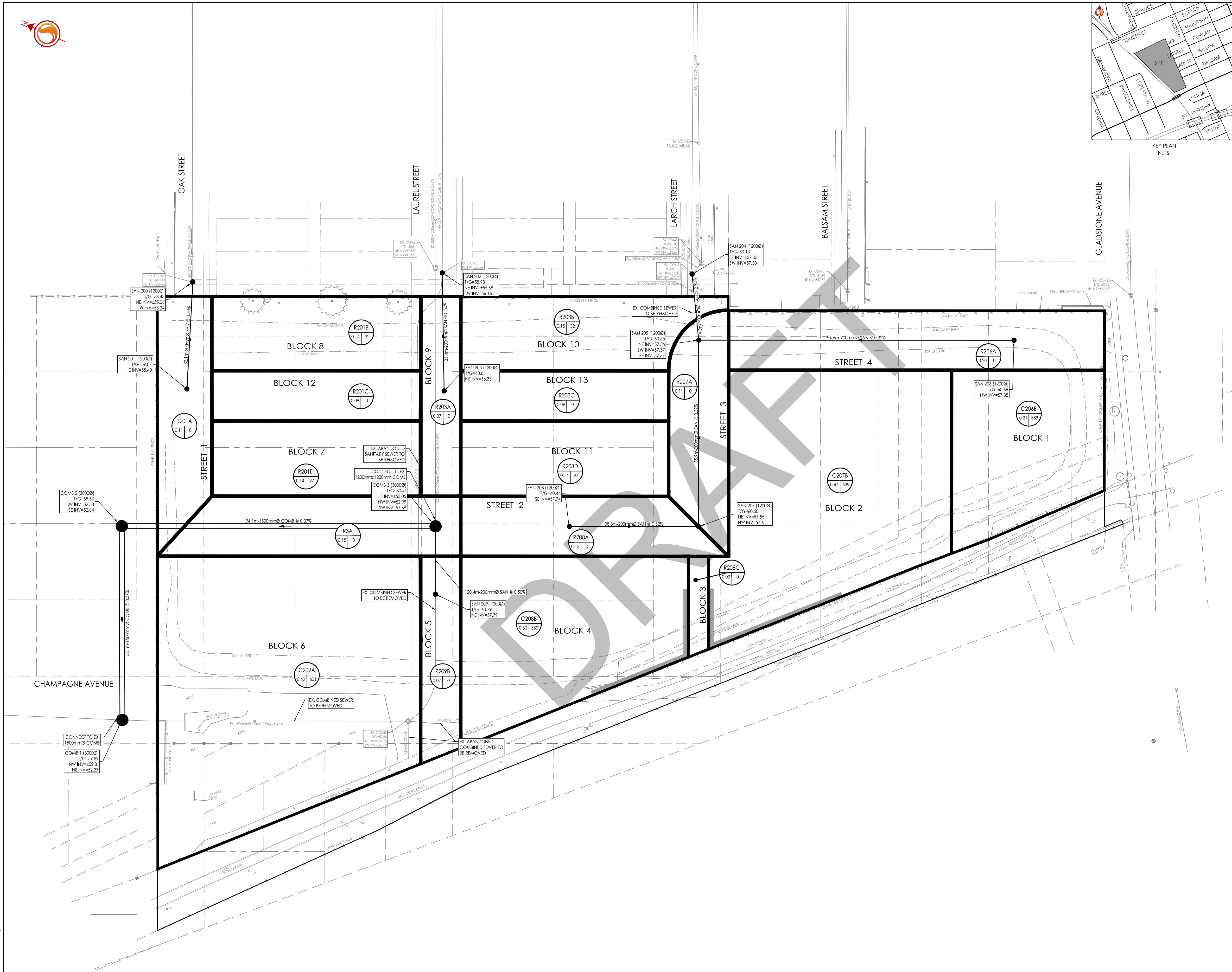
Title

CONCEPTUAL OVERALL STORM DRAINAGE PLAN

Project No.	Scale
160401614	1:500

Drawing No.	Sheet	Revision
OSD-1	4 of 6	1

ORIGINAL SHEET - ARCH D



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Legend

SA24A / 0.38 / 34 — SANITARY DRAINAGE AREA ID#; POPULATION; SANITARY DRAINAGE AREA ha.

SANITARY DRAINAGE AREA
PROPOSED COMBINED SEWER
EXISTING SANITARY/COMBINED SEWER

Notes

Revision		By	Appd.	YY.MM.DD
1	ISSUED FOR REVIEW	WAJ	AMP	21.04.15

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OTTAWA COMMUNITY HOUSING CORPORATION

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933 GLADSTONE AVENUE

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Title

CONCEPTUAL OVERALL SANITARY DRAINAGE PLAN

Project No. 160401614

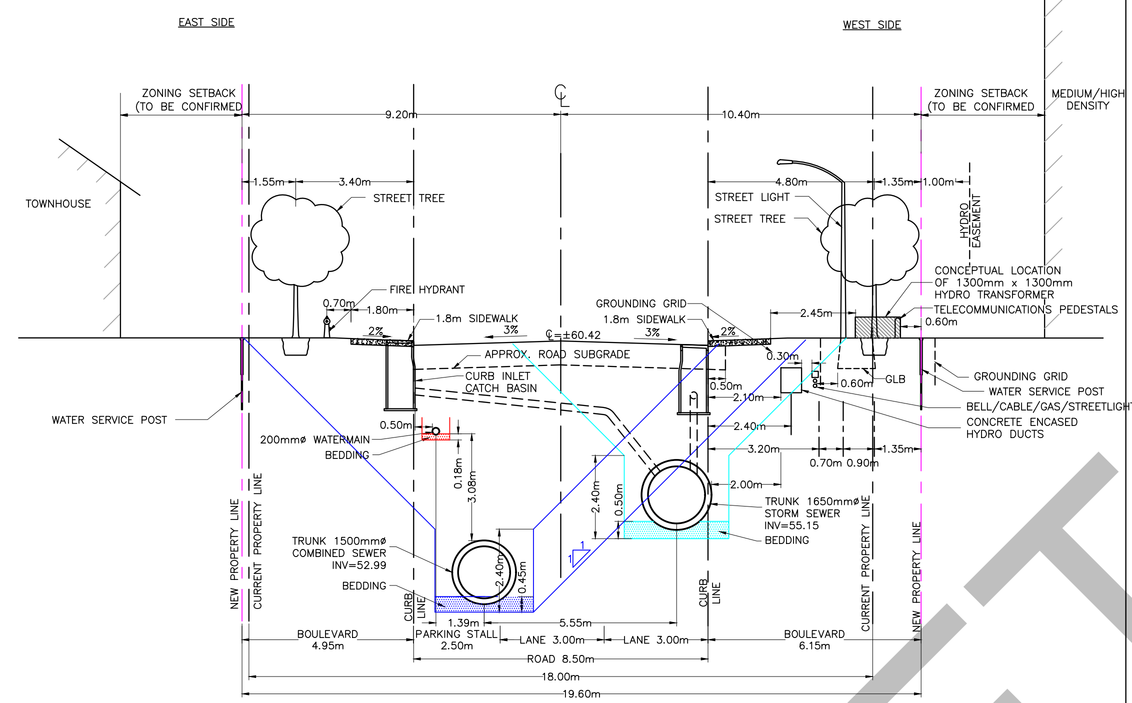
Scale 1:500

Drawing No. OSA-1

Sheet 5 of 6

Revision 1

ORIGINAL SHEET - ARCH D



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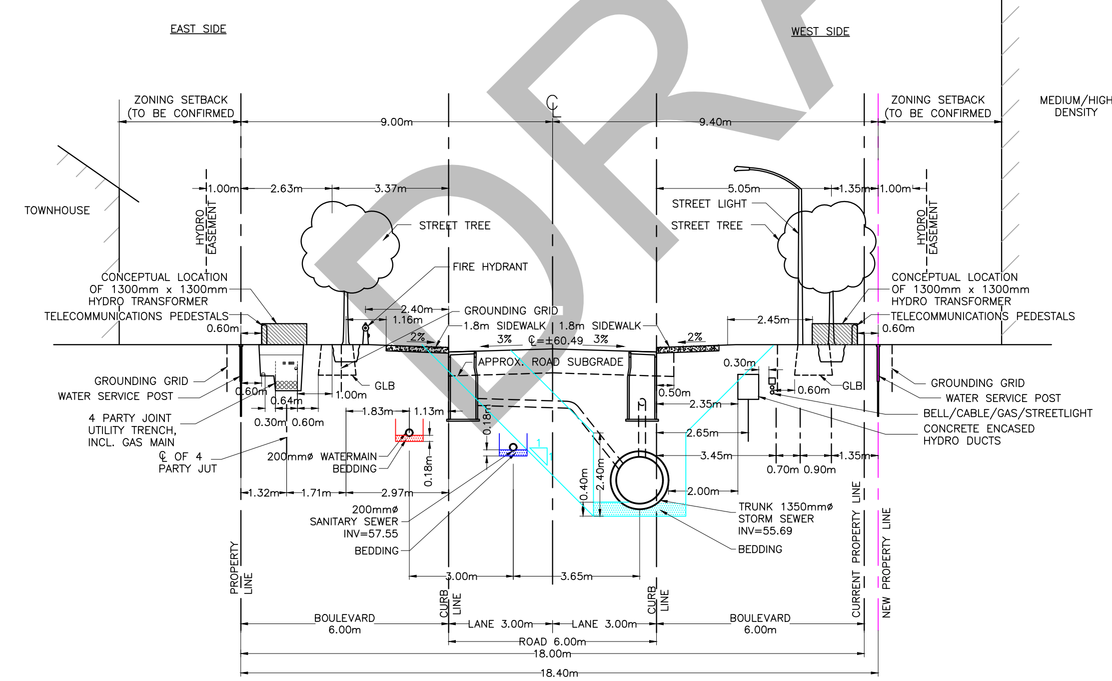
STREET 2 (8.5m ASPHALT)
CONCEPTUAL SECTION WITH COMBINED AND STORM TRUNK SEWERS
SCALE 1:100



RESIDENTIAL ROAD 18.0m RIGHT OF WAY
STREET 2 (6.0m ASPHALT)
CONCEPTUAL SECTION WITH STORM TRUNK SEWERS
SCALE 1:100

DRAFT

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OTTAWA COMMUNITY HOUSING CORPORATION

GLADSTONE VILLAGE
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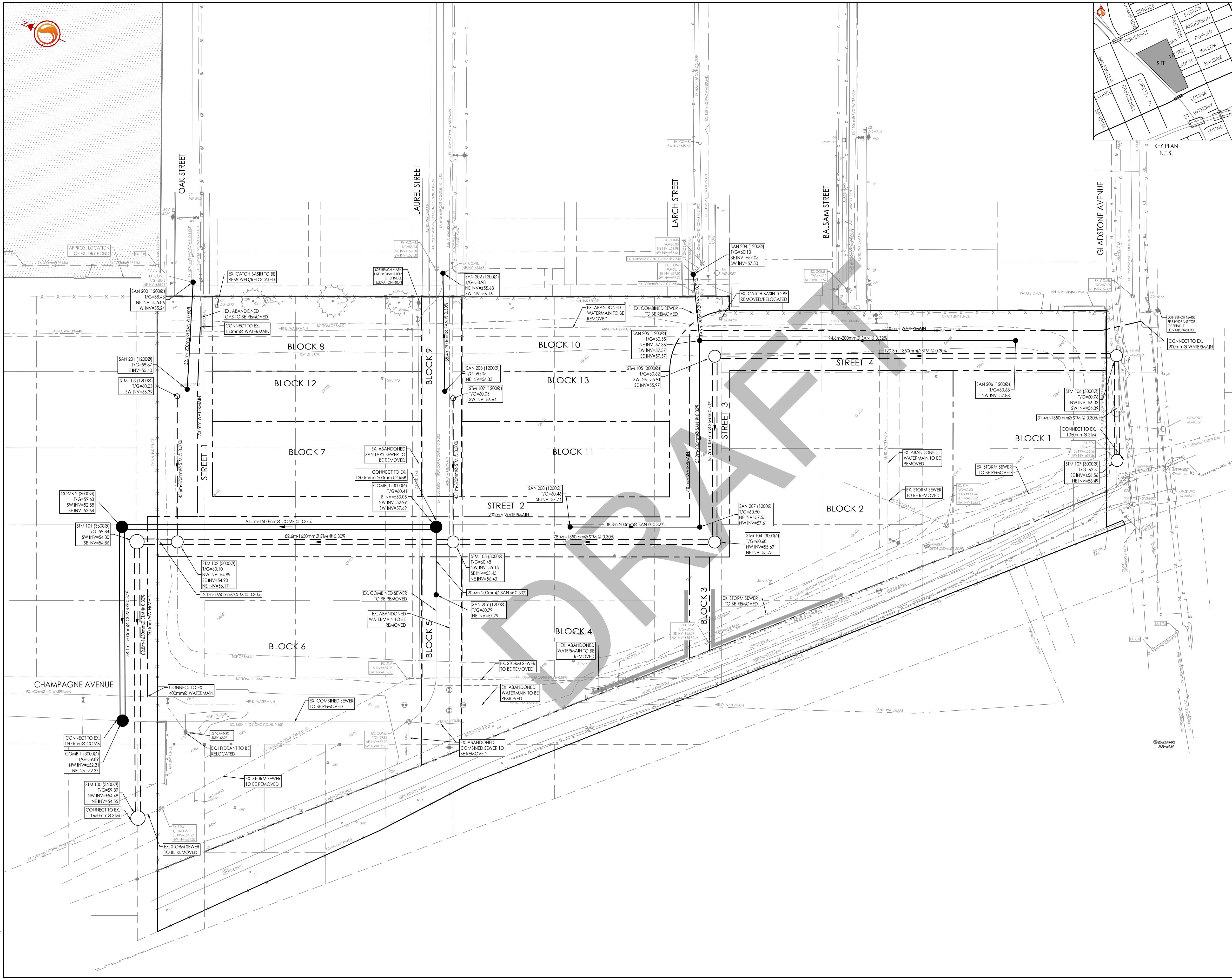
OTTAWA, ON

Title
CONCEPTUAL DETAIL SHEET

Project No. 160401614
Scale AS SHOWN
Drawing No. DS-1
Sheet 6 of 6
Revision 1

ORIGINAL SHEET - ARCH D



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Client/Project

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GLADSTONE VILLAGE
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OTTAWA, ON

Title

CONCEPTUAL
OVERALL SERVICING PLAN

Project No. 160401614

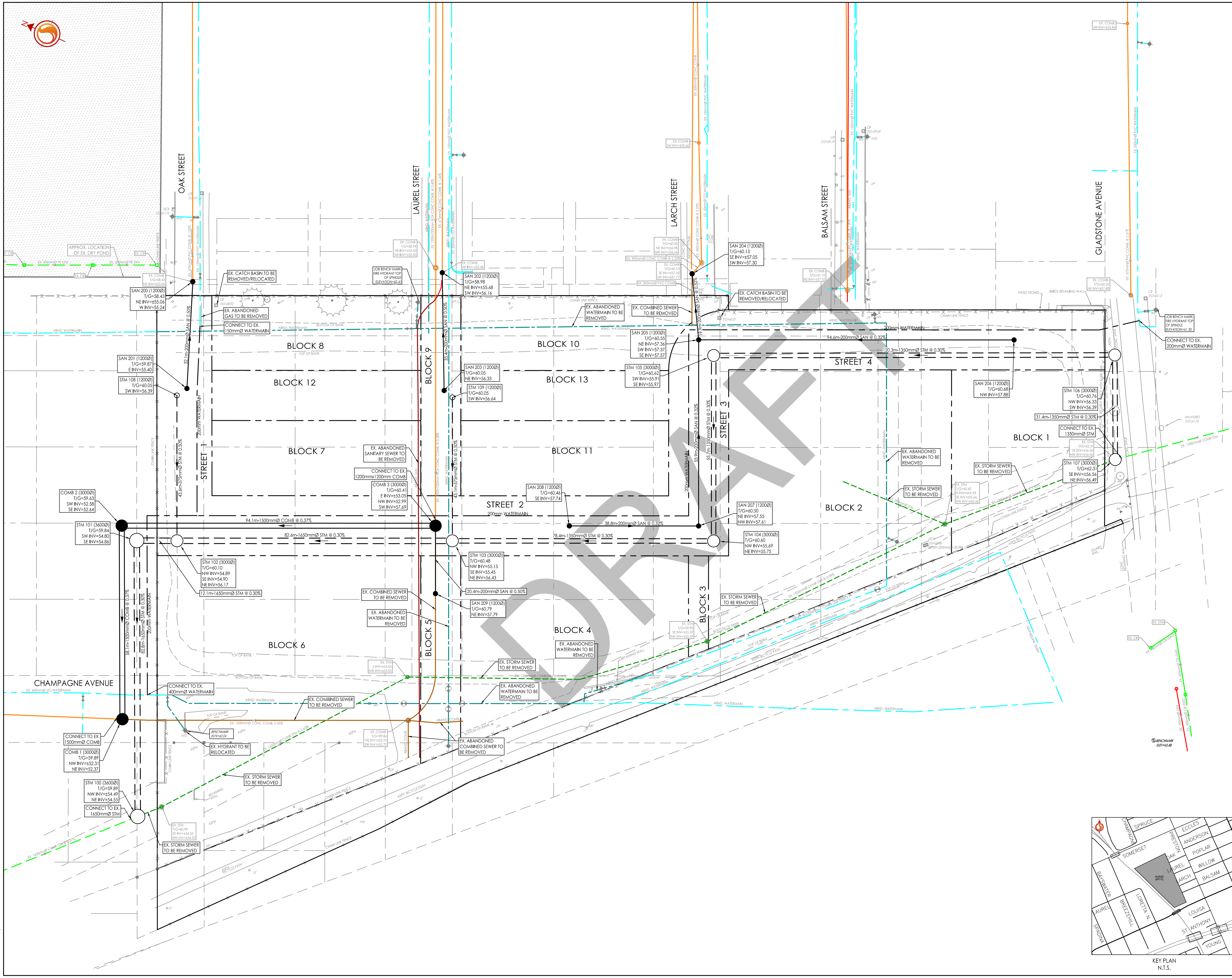
Scale 1:500 (0 5 15 25m)

Drawing No. OSSP-1

Sheet 1 of 6

Revision 1

ORIGINAL SHEET - ARCH D



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- EXISTING COMBINED SEWER
- EXISTING STORM SEWER
- EXISTING CATCHBASIN
- EXISTING SANITARY SEWER TO BE REMOVED
- EXISTING COMBINED SEWER TO BE REMOVED
- EXISTING STORM SEWER TO BE REMOVED
- EXISTING WATERMAIN TO BE REMOVED

Revision	By	Appd.	YY.MM.DD
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	WAJ	AMP	WAJ	21.03.02

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GLADSTONE VILLAGE
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Title

FIGURE 2
OVERALL SERVICING AND REMOVALS PLAN

Project No. 160401614

Scale 1:500 (0 5 15 25m)

Drawing No. FIG-2

Sheet 1 of 1

Revision 1

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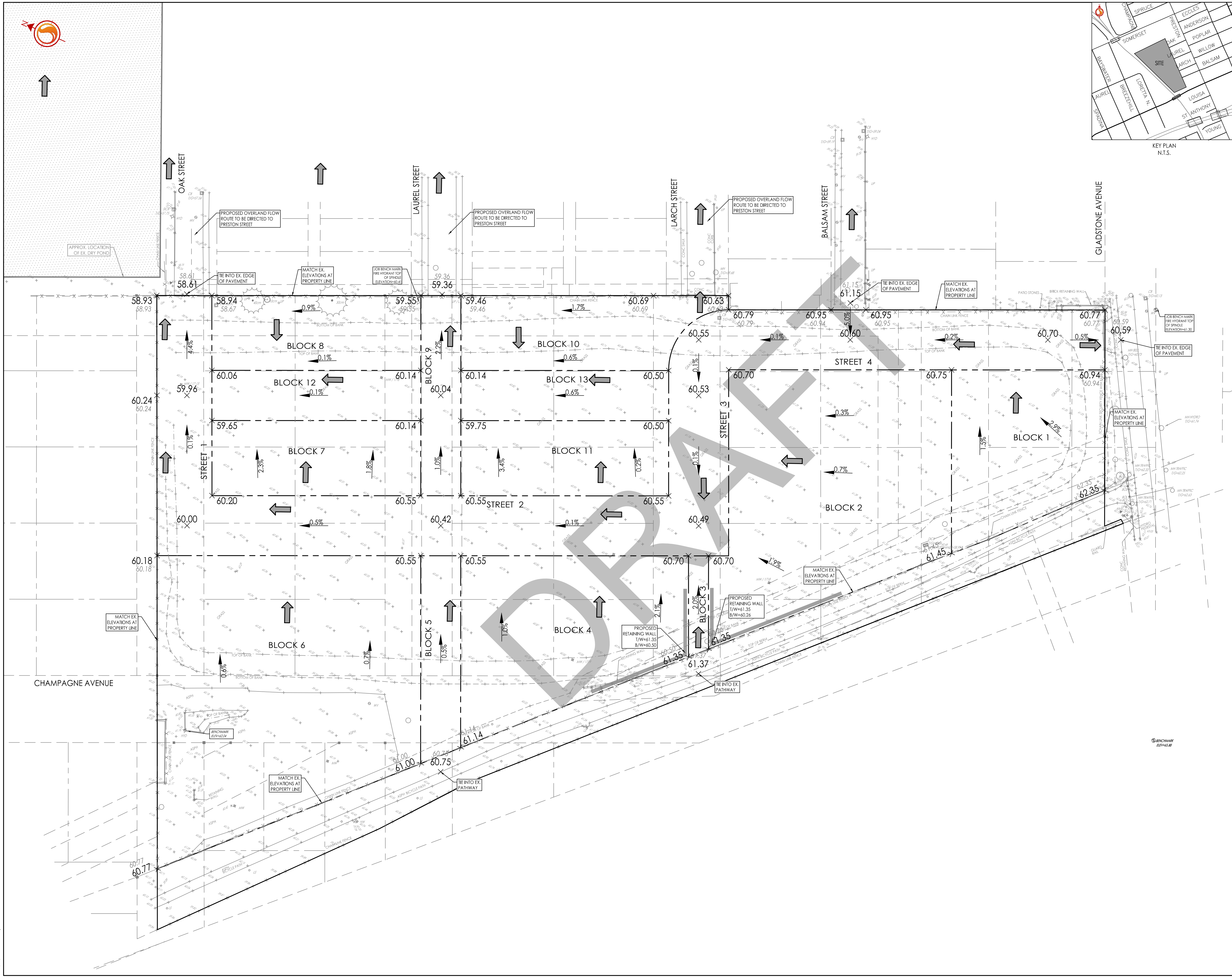
2021/04/15 11:12 AM By: Johnson, Warren

ORIGINAL SHEET - ARCH D



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933 GLADSTONE AVENUE
OTTAWA, ON

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CONCEPTUAL OVERALL GRADING PLAN

Project No. 160401614
Scale 1:500

Drawing No. OGP-1
Sheet 2 of 6
Revision 1

ORIGINAL SHEET - ARCH D

Appendix F

Storm Sewer Design Calculations

1. Existing Conditions & Release Rate

OCHC Phase 1 Gladstone Village - Blocks G & F

Project No.	210101900
Date	9/3/2022
Prepared By:	D Glauser
Checked By	J Fookes

Existing Drainage Area Characteristics

Drainage Area	Area, A (ha)	Runoff Coefficient, R*
A1	0.64	0.60
Total	0.64	0.60

**Pre-Development Runoff Coefficient per Functional Servicing Study*

Asphalt Area:	R = 0.90
Grassy Area:	R = 0.30
Building Area:	R = 0.90
Gravel Area:	R = 0.50
Concrete Area:	R = 0.90

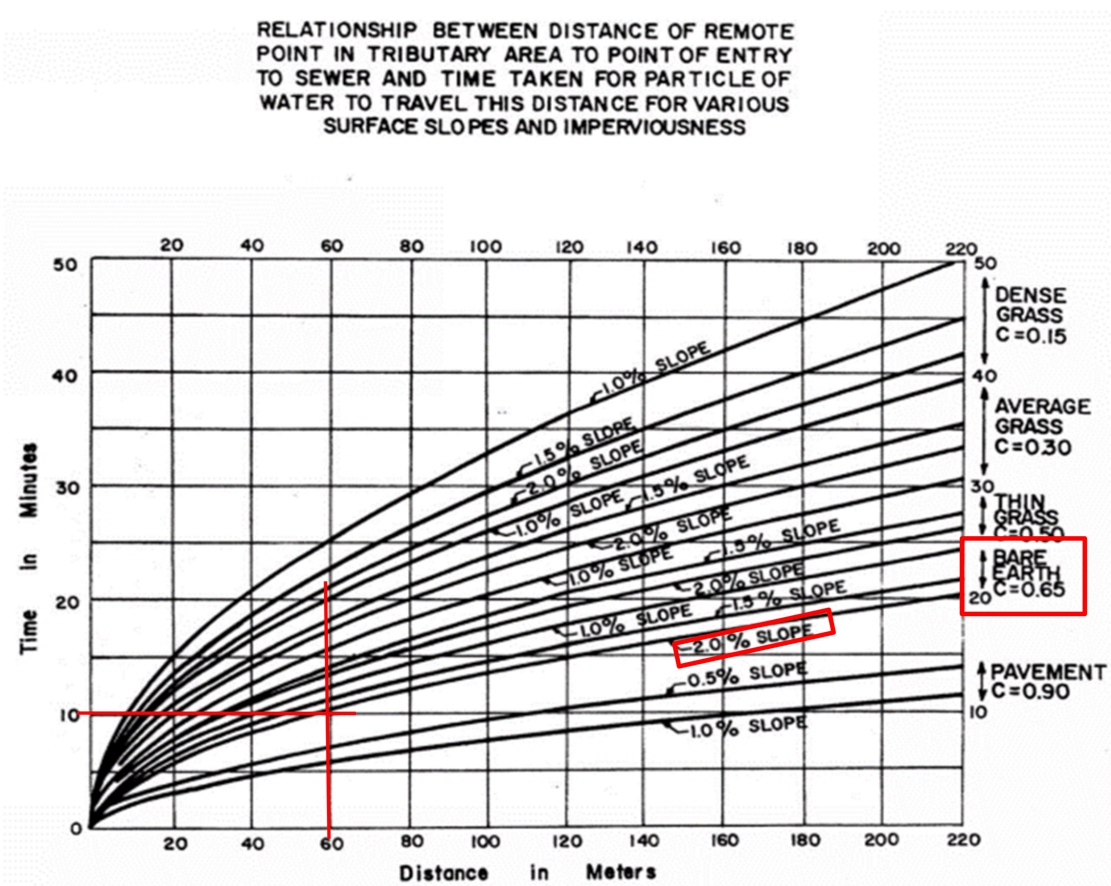
Existing Conditions

Q = RAIN where Q = runoff rate (L/s)
R = runoff coefficient
i = rainfall intensity (mm/hr)
A = drainage area (ha)
N = 2.78

and $i = \frac{A}{(T_d + C)^B}$

Determinination of Time of Concentration, using Inlet Time Graph (City of Ottawa Sewer Design Guidelines, Appendix 5D):

Existing drainage area with longest flow path = A1
Approx. length of longest flow path (remote point to point of entry) = 60 m
Surface type = Bare Earth (matches 0.6 Run-off Coefficient in Nepean SWM Model)
Approximate surface slope = <2%



T_d = Time of Concentration = 10 (min)

Return Period (Years)	A	B	C	Intensity, I (mm/hr)	Area (ha)	Runoff Coefficient, R (Note 1)	Runoff Rate, Q (L/s)
2	732.951	0.81	6.199	76.8	0.640	0.60	82.0
5	998.071	0.814	6.053	104.2	0.640	0.60	111.2
100	1735.688	0.82	6.014	178.6	0.640	0.75	238.3

Note 1: For 100-year event, Runoff Coefficient is increased by 25% to a maximum of 1.0.

Allowable Release Rate

Criteria for calculation of allowable release rate:

Return Period 2 year (Per Functional Design Study)

Time of Concentration 10 minutes

Return Period (Years)	A	B	C	Intensity, I (mm/hr)	Area (ha)	Runoff Coefficient, R	Runoff Rate, Q (L/s)
2	732.951	0.81	6.199	76.8	0.640	0.60	82.0

Allowable release rate from site in 100-year storm is 82 L/s

2. Proposed Uncontrolled Flow

OCHC Phase 1 Gladstone Village - Blocks G & F

Project No.	210101900
Date	9/3/2022
Prepared By:	D Glauser
Checked By	J Fookes

Summary of All Proposed Drainage Areas

Drainage Area	Total Area, A (ha)	Runoff Coefficient, R (2-year event)	Runoff Coefficient, R (100-year event, Note 2)
A1	0.37	0.90	1.00
A2	0.09	0.90	1.00
A3	0.04	0.30	0.38
Total (Note 2)	0.50	0.85	1.00

(Refer to Proposed Storm Drainage Area Plan)

Proposed Uncontrolled Drainage Area Characteristics

Drainage Area	Area, A (ha)	Runoff Coefficient, R (2-year event)	Runoff Coefficient, R (100-year event, Note 1)
B1 & B2	0.11	0.90	1.00
B3	0.04	0.30	0.38
Total	0.15	0.65	0.83

(Refer to Proposed Storm Drainage Area Plan)

Note 2: For 100-year event, Runoff Coefficient is increased by 25% to a maximum of 1.0.

Runoff coefficients used in calculations:

Asphalt Area:	R = 0.90
Grassy Area:	R = 0.30
Building Area:	R = 0.90
Gravel Area:	R = 0.50
Concrete Area:	R = 0.90

Proposed Uncontrolled Runoff

Q = RAIN where Q = runoff rate (L/s)

R = runoff coefficient
i = rainfall intensity (mm/hr)
A = drainage area (ha)
N = 2.78

and $i = \frac{A}{(T_d + C)^B}$

T_d = Time of Concentration = 10 (min)

Return Period (Years)	A	B	C	Intensity, I (mm/hr)	Area (ha)	Runoff Coefficient, R	Runoff Rate, Q (L/s)
2	732.951	0.81	6.199	76.8	0.145	0.65	20.2
100	1735.688	0.82	6.014	178.6	0.145	0.83	59.6

Remaining Allowable Release Rate

Total Allowable Release Rate	82.0 (L/s)
Uncontrolled Runoff (100 year)	59.6 (L/s)
Remaining Allowable Release Rate	22.4 (L/s)

Runoff from remaining drainage areas in 100-year event will be controlled to 22.4 L/s

3. Proposed Roof Storage (calculation of maximum storage)

OCHC Phase 1 Gladstone Village - Blocks G & F

Project No.	210101900
Date	9/3/2022
Prepared By:	D Glauser
Checked By	J Fookes

Rating Curve				Resulting Storage volume				Ponding depth (m)
Elevation (m)	Discharge Rate (m3/s)	Outlet Discharge (m3/s)	Storage (m3)	Elevation (m)	Area (m)	Volume (m3) Incremental	Volume (m3) Cummulative	
0.000	0.0000	0.0000	0.0	0.000	0	0.0	0.0	0.000
0.025	0.0003	0.0047	2.34	0.025	410	2.3	2.34	0.025
0.050	0.0006	0.0095	9.38	0.050	819	7.0	9.38	0.050
0.075	0.0009	0.0130	21.09	0.075	1229	11.7	21.09	0.075
0.100	0.0011	0.0166	37.50	0.100	1638	16.4	37.50	0.100
0.125	0.0013	0.0201	58.59	0.125	2048	21.1	58.59	0.125
0.150	0.0016	0.0237	**84.38**	0.150	2457	25.8	84.38	0.150

Drawdown - 100-yr			
Total Volume (m3)	Time of Concentration (sec)	Actual Volume (m3)	Detention time (hrs)
0.0	0	0.00	0.00
2.3	800	2.34	0.03
9.4	1600	7.03	0.11
21.1	2400	11.72	0.25
37.5	3200	16.41	0.44
58.6	4000	21.09	0.69
84.4	4800	25.78	0.99

Rooftop Storage Summary		
Total Building Area (m2)		5000
Usable Roof Area (m2)		2730
Assumed Roof Ponding Area (m2)	90.00%	2457
Roof Imperviousness		1.00
Actual roof drain Area		1688
Area per Roof Drain (m2/Drain)		112.50
Theorectical Number of Roof Drains		21
Actual Number of Roof Drains		15
Maximum Allowable Depth of Ponding (m)		0.15
Maximum Storage per Drain (m3)		5.63
Max. Storage (m3)		122.85
Estimated 100 Year Drawdown time (hrs)		0.99

Product Head vs. Flow	Flow (l/s)				
Ponding Depth (m)	Open	3/4	1/2	1/4	Closed
0.025	0.315	0.315	0.315	0.315	0.315
0.05	0.631	0.631	0.631	0.631	0.315
0.075	0.946	0.867	0.789	0.710	0.315
0.1	1.262	1.104	0.946	0.789	0.315
0.125	1.577	1.341	1.104	0.867	0.315
0.15	1.893	1.577	1.262	0.946	0.315

Results	2-yr	100-yr
Max Qout (m3/s)	0.0095	0.0237
Depth (m)	0.33	0.150
Volume (m3)	9.38	**84.00**
Available Vol. (m3)	122.85	122.85
Draintime (hrs)	0.28	0.99

Conclusions

The maximum amout of volume in a 100-yr event is 84m3

The maximum release rate is carried into the overall storage calculation is 23.7L/s in the 100-yr event and 9.5 in the 2-year event (Note 1)

Note 1: Actual release rate is calculated based on actual ponding depth

4. Proposed Storage
OCHC Phase 1 Gladstone Village - Blocks G & F

Project No.	210101900
Date	9/3/2022
Prepared By:	D Glauser
Checked By	J Fookes

Proposed Controlled Drainage Area Characteristics

Drainage Area	Area, A (ha)	Runoff Coefficient, R (2-year event)	Runoff Coefficient, R (100-year event, Note 1)
A1+A2+A3 (exlc. Flow controlled roof drains)	0.332	0.85	1.00
Total	0.332	0.85	1.00

(Refer to Proposed Storm Drainage Area Plan)
Note 1: For 100-year event, Runoff Coefficient is increased by 25% to a maximum of 1.0.

Allowable Release Rate from storage (100-year event) = 22.4 (L/s)
Average release rate for calculation of storage volume = 11.2 (L/s) (Conservatively estimated as 50% of allowable release rate)

Orifice Sizing

Q = CA(2gH)^0.5
C = 0.61
Design Flow Rate = 11.2 (L/s)
Proposed 100-year tank depth = 2.50 (m) (allows for gravity outlet from tank to storm sewer)
Proposed 100-year head above centreline of orifice = 2.28 (m)
Orifice Area = 2747 (mm2)
Orifice diameter = 59 (mm) (if <75mm then vortex ICD required)
Refer to Sheet 5a for detailed orifice calculations

Release Rates during 2-year event

Water depth during 2-year event = 1.29 (m) (based on result of Req. Storage Vol. calc below)
Proposed 2-year head above centreline of orifice = 1.07 (m)
Maximum release rate during 2-year event = 8.46 (L/s) (based on orifice calculation)

Required Storage Volume (using Modified Rational Method)

Q = RAIN

Q = runoff rate (L/s)
R = runoff coefficient
i = rainfall intensity (mm/hr)
A = drainage area (ha)
N = 2.78

$$i = \frac{A}{(T_d + C)^B}$$

where i = Rainfall Intensity (mm/hr)
T_d = Time of Concentration (min)

Roof (Controlled Portion)

Time, Td (min)	2-Year Event Intensity (mm/hr)	Peak Flow (L/s)	Average Release Rate (L/s)	Storage Volume (m^3)	Ponding Depth (mm)	100-Year Event Intensity (mm/hr)	Peak Flow (L/s)	Average Release Rate (L/s)	Storage Volume (m^3)	Ponding Depth (mm)
10	76.81	30.7	4.67	15.6	27.8	178.56	83.8	12.06	43.0	76.5
20	52.03	20.8	5.53	18.3	32.6	119.95	56.3	14.17	50.5	89.8
30	40.04	16.0	5.67	18.6	33.1	91.87	43.1	14.46	51.6	91.7
40	32.86	13.1	5.58	18.1	32.2	75.15	35.3	14.18	50.6	89.9
50	28.04	11.2	5.41	17.4	30.9	63.95	30.0	13.71	48.9	86.9
60	24.56	9.8	5.21	16.6	29.5	55.89	26.2	13.17	47.0	83.5
70	21.91	8.8	5.00	15.8	28.0	49.79	23.4	12.63	45.0	80.1
80	19.83	7.9	4.80	15.0	26.7	44.99	21.1	12.11	43.2	76.8
90	18.14	7.3	4.61	14.3	25.3	41.11	19.3	11.62	41.4	73.6
100	16.75	6.7	4.43	13.6	24.1	37.90	17.8	11.15	39.8	70.7
110	15.57	6.2	4.27	12.9	23.0	35.20	16.5	10.72	38.2	68.0
120	14.56	5.8	4.11	12.3	21.9	32.89	15.4	10.32	36.8	65.4
130	**13.69**	**5.5**	**3.97**	**11.7**	**20.9**	**30.90**	**14.5**	**9.95**	**35.5**	**63.1**
140	12.93	5.2	3.83	11.2	20.0	29.15	13.7	9.60	34.2	60.9
150	12.25	4.9	3.70	10.7	19.1	27.61	13.0	9.28	33.1	58.8

Cistern

Time, Td (min)	2-Year Event Intensity (mm/hr)	Peak Flow* (L/s)	Peak Flow incl. Roof (L/s)	Average Release Rate (L/s)	Storage Volume (m^3)	100-Year Event Intensity (mm/hr)	Peak Flow* (L/s)	Peak Flow incl. Roof (L/s)	Average Release Rate (L/s)	Storage Volume (m^3)
10	76.81	60.4	65.1	8.46	34.0	178.56	164.9	177.0	11.20	99.5
20	52.03	41.0	59.3	8.46	61.0	119.95	110.8	125.0	11.20	136.5
30	40.04	31.5	50.1	8.46	75.0	91.87	84.9	99.3	11.20	158.6
40	32.86	25.9	44.0	8.46	85.3	75.15	69.4	83.6	11.20	173.7
50	28.04	22.1	39.5	8.46	93.0	63.95	59.1	72.8	11.20	184.8
60	24.56	19.3	35.9	8.46	98.8	55.89	51.6	64.8	11.20	193.0
70	21.91	17.2	33.0	8.46	103.1	49.79	46.0	58.6	11.20	199.2
80	19.83	15.6	30.6	8.46	106.3	44.99	41.6	53.7	11.20	203.9
90	18.14	14.3	28.5	8.46	108.4	41.11	38.0	49.6	11.20	207.3
100	16.75	13.2	26.7	8.46	109.6	37.90	35.0	46.2	11.20	209.8
110	15.57	12.3	25.2	8.46	110.2	35.20	32.5	43.2	11.20	211.5
120	14.56	11.5	23.8	8.46	110.2	32.89	30.4	40.7	11.20	212.5
130	**13.69**	**10.8**	**22.5**	**8.46**	**109.6**	**30.90**	**28.5**	**38.5**	**11.20**	**212.9**
140	12.93	10.2	21.4	8.46	108.6	29.15	26.9	36.5	11.20	212.8
150	12.25	9.6	20.4	8.46	107.2	27.61	25.5	34.8	11.20	212.3

minimum time = time of concentration

* Excludes from from flow controlled roof drains

Storage volume used	110.2 m³	Storage volume used	212.9 m³

Minimum storage volume of 212.9 m³ is required.

4a. ICD Sizing

OCHC Phase 1 Gladstone Village - Blocks G & F

Project No.	210101900
Date	3-Sep-22
Prepared By:	D Glauser
Checked By	J Fookes

ICD sizing - 100 year

100-yr elevation	58.35 m
Invert elevation	55.85 m
Outlet pipe dia	450 mm

Orifice Sizing:

100-yr depth	2.28 m (depth above centreline of orifice)
Design flow	11.2 l/s
Orifice area	2747 mm² (calculated by Orifice Equation: $Q=CA(2gh)^{0.5}$ where C=0.61)
Orifice diameter	59 mm (if less than 75mm then vortex ICD required)

ICD sizing - 2 year

2-yr elevation	57.38 m
Invert elevation	55.85 m
Outlet pipe dia	450 mm

Orifice Sizing:

2-yr depth	1.30 m (depth above centreline of orifice)
Design flow	8.5 l/s

CISTERN				
DESIGN EVENT	**DIAMETER OF OUTLET PIPE (mm)**	**ICD**	**DESIGN FLOW (l/s)**	**UPSTREAM HEAD (m)**
1:2 YR	450	HYDROVEX 100VHV-1	8.5	1.30
1:100 YR	450	HYDROVEX 100VHV-1	11.2	2.28

HYDROVEX VHV ICD Design Chart:

HYDROVEX®

VHV Vertical Vortex Flow Regulator

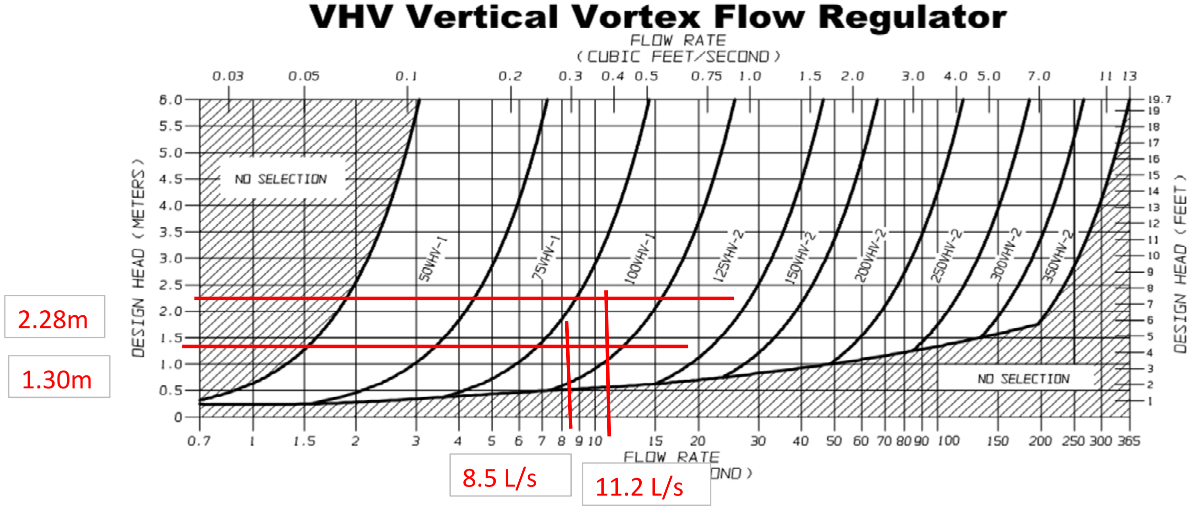


FIGURE 3 - VHV

JOHN MEUNIER

5. Area Drain 100-yr Ponding Depth

OCHC Phase 1 Gladstone Village - Blocks G & F

Project No.	210101900
Date	9/3/2022
Prepared By:	D Glauser
Checked By	J Fookes

The highest 100-year flow to an area drain is at AD1 (22.4L/s). The ponding depth under this flow rate is 21 mm.

100-yr Peak Flow

T_d = Time of Concentration = 10 (min)

Return Period (Years)	A	B	C	Intensity, I (mm/hr)	Area (ha)[1]	Runoff Coefficient, R	Runoff Rate, Q (L/s)
100	1735.688	0.82	6.014	178.6	0.045	1.00	22.4

[1] The maximum area draining to a single area drain is 450m^2

Area Drain Flow Rate Calculation

Q =	22.4	L/s
Cd =	0.61	
g	9.81	m/s2
H (max)*=	0.15	m
* max height is 150mm ponding		

A (min)**=	21405.4	mm2
Square Grating Dimensions	146.3	mm
** minimum grating area required - calculated		

Circular Outlet (based on 6in outlet)	6	in
	57249.17582	mm2
	0.057249176	m2

Actual h (max) based on selected Area Drain	**0.021**	**m - calculated**
	21	**mm**

Flow Rate Formula for Area Drains

Orifice Equation: $Q=CA(2gh)^{0.5}$ where C=0.61

Watts RD100 6-inch

Summary - Stormwater Management

OCHC Phase 1 Gladstone Village - Blocks G & F

Project No.	210101900
Date	9/3/2022
Prepared By:	D Glauser
Checked By	J Fookes

Area ID	Area (ha)	Max Allowable Release Rates (L/s)		Storage Required		Max Storage Available		Notes
		2-Yr	100-Yr	2-Yr	100-Yr	2-Yr	100-Yr	
Controlled Flow Roof Drainage	0.25	3.97	9.95	11.75	35.47	84	84	- Roof Storage as a means to reduce peak flow
A1+A2+A3	0.50	8.46	22.30	110.22	212.87	220	220	- Cistern Storage in order to reduce overall release rate
B1+B2+B3	0.15	20.18	59.60	-	-	-	-	- Uncontrolled Run-off
Total	0.65	28.64	81.90	121.97	248.34	304.00	304.00	

PROPOSED STORM SEWER CALCULATION SHEET

OCHC Phase 1 Gladstone Village - Blocks G & F

LOCATION					INDIVIDUAL							CUMULATIVE		DESIGN					PROPOSED SEWER												
Description	From	Top of Cover	To	Top of Cover	Asphalt Area	Lawn Areas	Bldg. Area	Green Roof	Conc. Area	Total	R*A*N	Area	R*A*N	Time of Conc.	Storm Event Return Period	Rainfall Intensity	Peak Flow		Length	Size	Area	Grade	Minimum Slope	Full Capacity	Full Velocity	Time of Flow	Reserve Capacity	Q/Qfull	Upstream Invert	Downstream Invert	Notes
		(m)		(m)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)		(ha)		(min.)	(year)	(mm/hr)	(L/s)	(m^3/s)	(m)	(mm)	(m^2)	(%)	(%)	(L/s)	(m/s)	(min)	(L/s)	(%)	(m)	(m)	
R1	BUILDING		STM				0.640			0.640	1.601	0.640	1.601	10.00	5.00	104.19	166.8	0.167	5.5	450	0.159	1.000	0.20	285.1	1.79	0.05	118.3	0.6	59.50	59.43	

Q = RAIN, where
Q = Peak flow (L/s)
R = Runoff coefficient
A = Area (ha)
I = Rainfall intensity (mm/hr)
N = 2.78

Asphalt Area:	R = 0.90
Grassy Area:	R = 0.30
Building Area:	R = 0.90
Green Roof	R = 0.50
Concrete Area:	R = 0.90

Mannings Roughness Coefficient = 0.013

Prepared By: Daniel Glauser

Checked by: James Fookes

Date: March 9, 2022

Project No. 210101900

Storm water Product Information Sheets

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

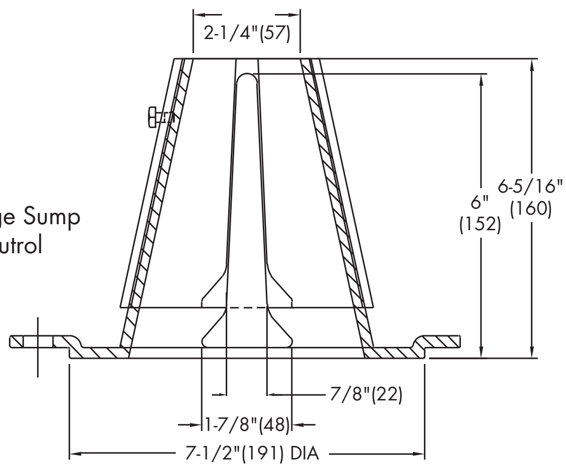
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

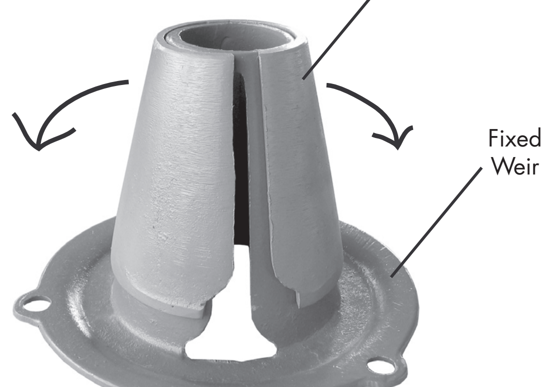
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the 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 ____________

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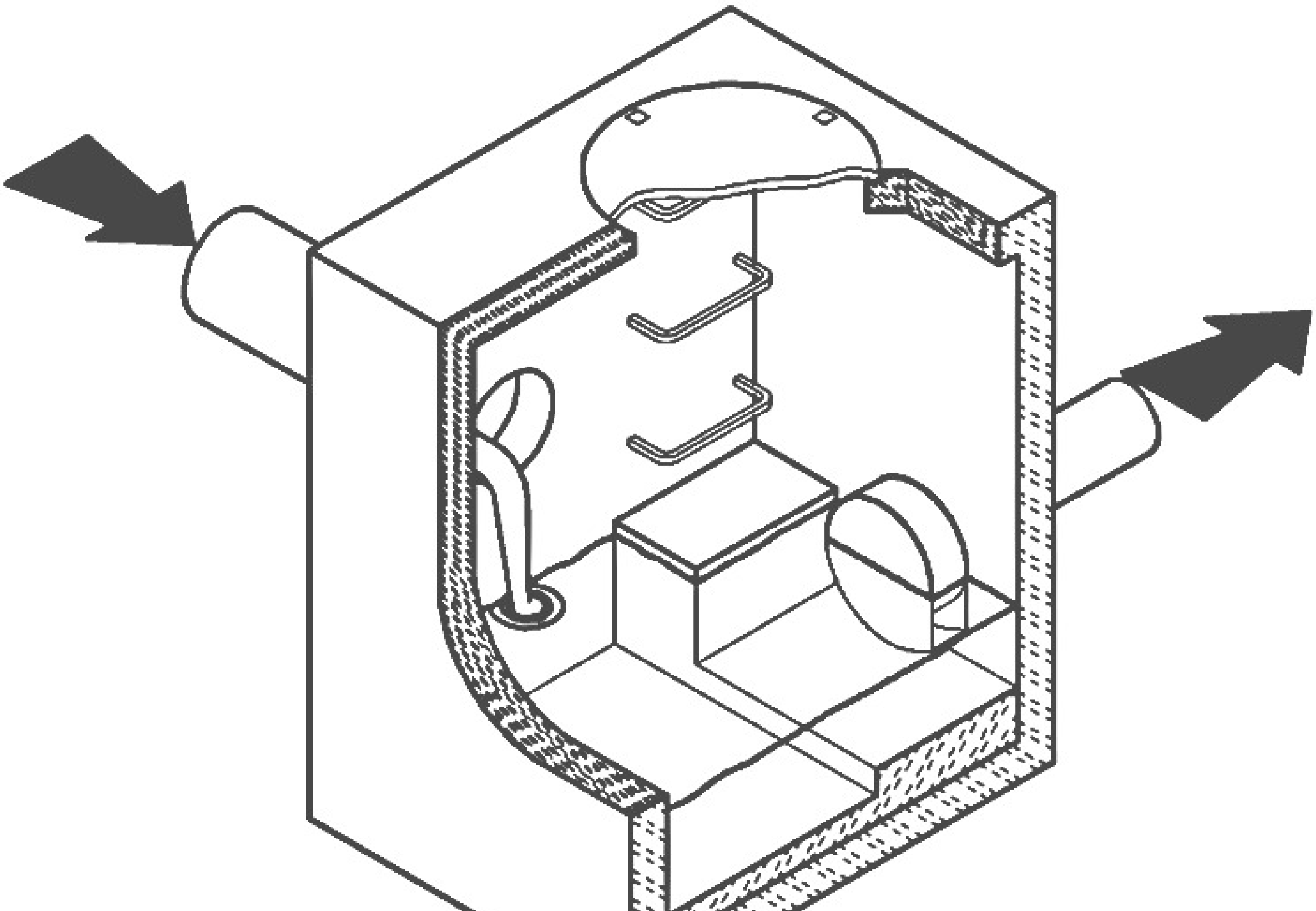
Latin America: Tel: (52) 81-1001-8600 • Fax: (52) 81-8000-7091 • Watts.com

CSO/STORMWATER MANAGEMENT

® HYDROVEX® VHV / SVHV
Vertical Vortex Flow Regulator



JOHN MEUNIER

VHV Vertical Vortex Flow Regulator

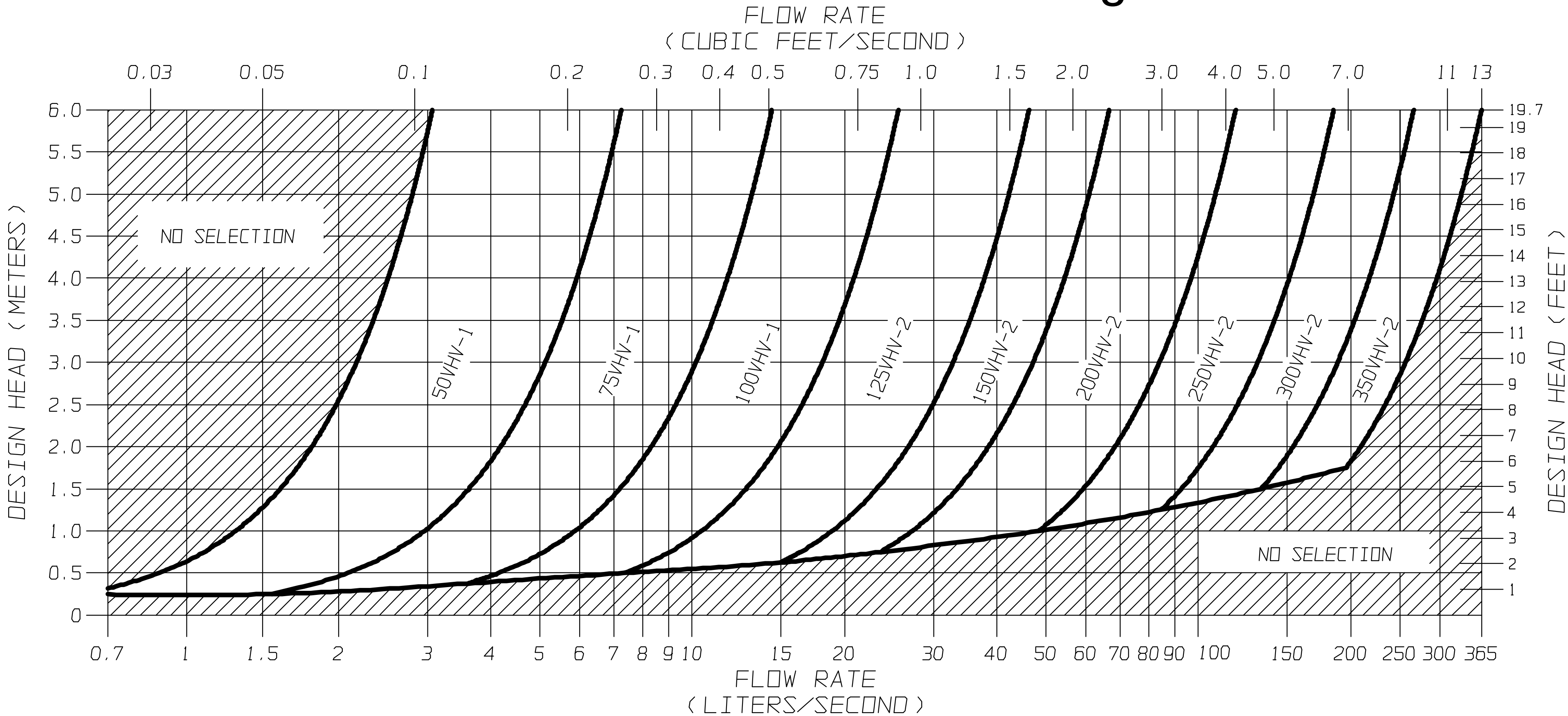
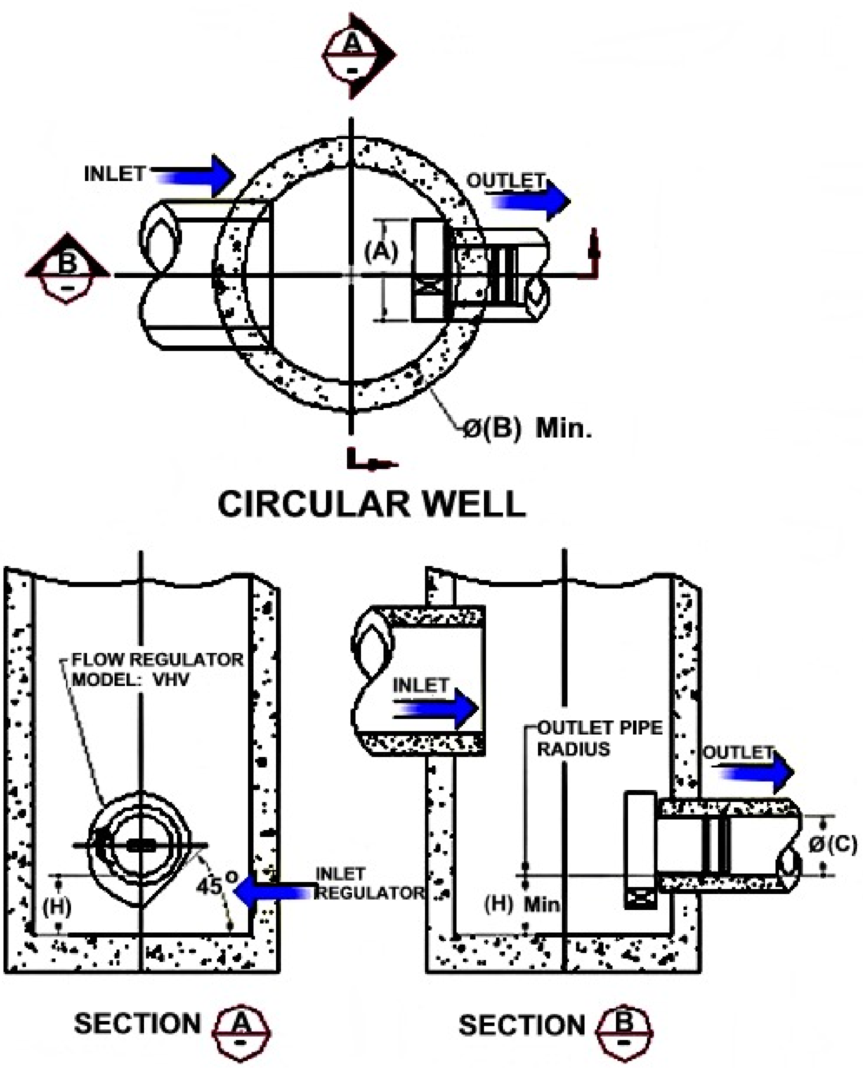


FIGURE 3 - VHV

FLOW REGULATOR TYPICAL INSTALLATION IN CIRCULAR MANHOLE
FIGURE 4 (MODEL VHV)

Model Number	Regulator Diameter		Minimum Manhole Diameter		Minimum Outlet Pipe Diameter		Minimum Clearance	
	A (mm)	**A** (in.)	**B** (mm)	**B** (in.)	**C** (mm)	**C** (in.)	**H** (mm)	**H** (in.)
50VHV-1	150	6	600	24	150	6	150	6
75VHV-1	250	10	600	24	150	6	150	6
100VHV-1	325	13	900	36	150	6	200	8
125VHV-2	275	11	900	36	150	6	200	8
150VHV-2	350	14	900	36	150	6	225	9
200VHV-2	450	18	1200	48	200	8	300	12
250VHV-2	575	23	1200	48	250	10	350	14
300VHV-2	675	27	1600	64	250	10	400	16
350VHV-2	800	32	1800	72	300	12	500	20



Engineering Specification

Job Name ______________________

Job Location ______________________

Engineer ______________________

Approval ______________________

Tag ______________________

Contractor ______________________

Approval ______________________

Contractor's P.O. No. ______________________

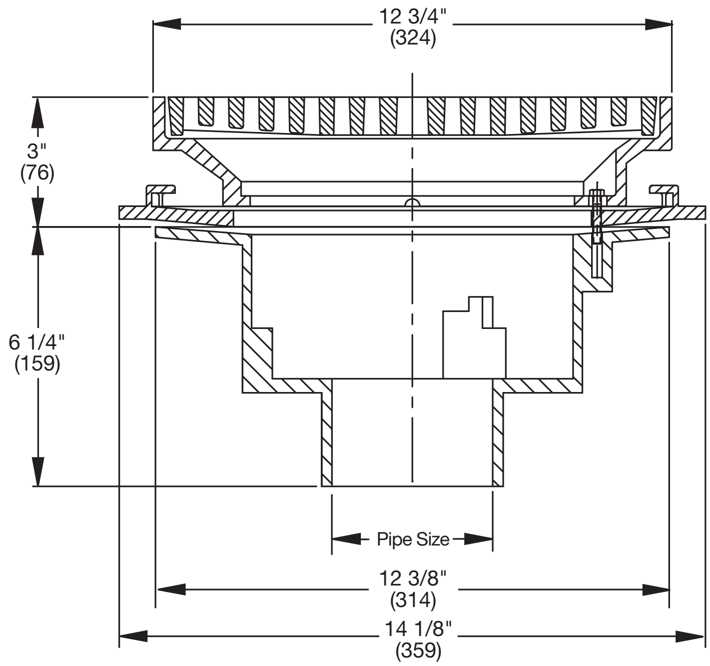
Representative ______________________

RD-100-CP

Roof Drain with 12"x12" Promenade Top

Specification

Watts RD-100-CP epoxy coated cast iron IRMA roof drain with flashing flange with seepage openings, 12 3/4"x12-3/4"(324x324) square epoxy coated ductile iron heel proof promenade top, and no hub (standard) outlet.



Pipe Sizing		
Suffix	Description	
2	2"(51) Pipe Size (NH Only)	☐
3	3"(76) Pipe Size	☐
4	4"(102) Pipe Size	☐
5	5"(127) Pipe Size (NH Only)	☐
6	6"(152) Pipe Size	☐

Outlet Type		
Suffix	Description	
NH	No Hub (MJ)	☐
P	Push On	☐
T	Threaded	☐
X	Inside Caulk	☐

Options		
Suffix	Description	
-1	All Nickel Bronze Top	☐
-6	Vandal Proof Top	☐
-9	Hinged Grate	☐
-13	Galvanized	☐
-B	Sump Receiver	☐
-D	Underdeck Clamp	☐
-F	Deck Flange/Adj. Extension	☐
-SO	Side Outlet (2", 3", 4" Only)	☐

Optional Body Material		
Suffix	Description	
-60	PVC Body w/Socket Outlet	☐
-61	ABS Body w/Socket Outlet	☐

Load Rating	Free Area Sq. In.
HD*	41

Deck Opening 10"(254) with Sump Receiver 13 1/4"(337)

NOTICE

The load classifications are in accordance with the American National Standards ASME A112.6.3 ASME Ratings are as follows:
*HD - Safe Live Load 5000-7499 lbs.(2250-3375 kg)
The above categories are given as a guide only.
Please consult factory.

NOTICE

The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product.

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Appendix G

Topographic Survey

LEGEND

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBø	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
ORP	"	OBSERVED REFERENCE POINT
P1	"	SURVEY BY STANTEC GEOMATICS MARCH 30, 2010
P2	"	PLAN 5R-4993
P8	"	PLAN 4R-28807
P9	"	PLAN 4R-28806
P10	"	PLAN 4R-989
P11	"	SURVEY BY STANTEC GEOMATICS LTD. DATED MARCH 30,2010

ACU	"	AIR CONDITIONING UNIT
AN	"	ANCHOR
AP	"	AIR PUMP
ANT	"	ANTENNA
BH	"	BOREHOLE
BIB	"	HOSE BIB
BKR	"	BIKE RACK
BENCH	"	BENCH
BOL	"	BOLLARD
BOUL	"	BOULDER
CB	"	CATCH BASIN
DCB	"	DOUBLE CB
CBMH	"	CB MANHOLE
DCBMH	"	DOUBLE CB MANHOLE
CBSI	"	SIDE INLET CB
CHM	"	CHIMNEY
CSV	"	VALVE CURB STOP
DRN	"	DRAIN
EPOST	"	ELECTRICAL OUTLET
FP	"	FLAG POLE
FL	"	FLOOD LIGHT
FTF	"	FUEL TANK FILLER CAP
GC	"	GARBAGE CAN
GFL	"	PIPE FLANGE (GAS)
GFP	"	GAS FUEL PUMP
GP	"	POLE GUYWIRE
GSR	"	GAS SERVICE REGULATOR
GV	"	GAS VALVE
HIC	"	HICKENBOTTOM
HDS	"	HEADSTONE
HLS	"	LIGHT STANDARD HYDRO
HM	"	HYDRO METER
HTN	"	HYDRO TRANSFORMER
HW	"	HAND WELL
HYD	"	FIRE HYDRANT
JBX	"	JUNCTION BOX
MB	"	MAILBOX
MP	"	MONITORING PIN

MH	"	MAINTENANCE HOLE UNIDENTIFIED
MHB	"	MAINTENANCE HOLE BELL
MHF	"	MAINTENANCE HOLE FIBRE OPTIC
MHH	"	MAINTENANCE HOLE HYDRO
MHI	"	MAINTENANCE HOLE INVERT
MHSA	"	MAINTENANCE HOLE SANITARY
MHST	"	MAINTENANCE HOLE STORM
MHT	"	MAINTENANCE HOLE TRAFFIC
MW	"	MONITORING WELL
NPB	"	NEWS PAPER BOX
OLP	"	LIGHT STANDARD ORNAMENTAL
OW	"	OBSERVATION WELL
PKM	"	PARKING METER
PLBX	"	PULL BOX
PLQ	"	PLAQUE
PLR	"	PILLAR
PZ	"	PIEZIOMETER
RLC	"	RED LIGHT CAMERA
RWSL	"	RAILWAY SIGNAL LIGHT
RWSS	"	RAILWAY SWITCH STAND
SAT	"	SATELLITE DISH
SCLP	"	SCULPTURE
SCP	"	SUMP/CATCH PIT
SCV	"	SPRINKLER CONTROL VALVE
SH	"	SPRINKLER HEAD
SIA	"	SIAMESE CONNECTION
SN	"	SIGN
SPAN	"	SOLAR PANEL
SPT	"	SEPTIC TANK LID
TBL	"	TABLE
TB BELL	"	TERMINAL BOX - BELL
TB CATV	"	TERMINAL BOX - CABLE
TCB	"	TRAFFIC CONTROL BOX
TPIT	"	TEST PIT
TSL	"	TRAFFIC SIGNAL LIGHT
UMB	"	MARKER BELL UNDERGROUND
UMC	"	MARKER CABLE UNDERGROUND
UMG	"	MARKER GAS UNDERGROUND
UMO	"	MARKER OIL UNDERGROUND
UP	"	UTILITY POLE
VB	"	VALVE BOX
VC	"	VALVE CHAMBER
WV	"	WATER VALVE
	"	TREE STUMP
	"	TREE CONIFEROUS
	"	TREE DECIDUOUS

METRIC CONVERSION

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

GRID SCALE CONVERSION

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.99995.

BEARING NOTE

BEARINGS ARE GRID, DERIVED FROM CAN-NET VRS NETWORK GPS OBSERVATIONS ON NCC HORIZONTAL CONTROL MONUMENTS 19773035 AND 19680191, CENTRAL MERIDIAN, 76° 30' WEST LONGITUDE MTM ZONE 9, NAD83 (ORIGINAL).

19773035 N:5006060.42 E:324888.04
19680191 N:5033564.26 E:388064.94

ELEVATION NOTE

ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM THE CITY OF OTTAWA VERTICAL CONTROL MONUMENTS No.'S 2011-0106 (ELEV.=62.968 M) AND 2011-0107 (ELEV=55.863).

UTILITY NOTE

LOCATION OF UNDERGROUND SERVICES ARE APPROXIMATE AND ARE PER THE CITY OF OTTAWA SHEETS AND MUST BE VERIFIED PRIOR TO CONSTRUCTION.

Stantec

Stantec Geomatics Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

TOPOGRAPHIC PLAN OF SURVEY

LOTS 1, 2 & 3 BLOCK C(SOUTH WALNUT STREET)
LOTS 1, 2, 3 & 4 BLOCK C (NORTH WALNUT STREET)
LOTS 1, 2, 3, 4 & 5 BLOCK C (SOUTH LARCH STREET)
LOTS 1, 2, 3, 4 & 5 BLOCK C (NORTH LARCH STREET)
LOTS 1, 2, 3, 4 & 5 BLOCK C (SOUTH LAUREL STREET)
LOTS 1, 2, 3, 4 & 5 BLOCK B (NORTH LAUREL STREET)
LOTS 1, 2, 3, 4 & 5 BLOCK B (SOUTH OAK STREET)
PART OF LOTS 8, 9 & 10 (WEST CHAMPAGNE AVENUE)
PART OF LOTS 1, 2 & 3 BLOCK C (NORTH GLADSTONE AVENUE)
PART OF LOTS 5A, 5B & C
PART OF OAK STREET (CLOSED BY JUDGE'S ORDER INST. NO. OC574103)
PART OF LAUREL STREET (CLOSED BY JUDGE'S ORDER INST. NO. CR574103)
PART OF LAUREL STREET (CLOSED BY JUDGE'S ORDER INST. NO. LT1402120)
PART OF LARCH STREET (CLOSED BY JUDGE'S ORDER INST. NO. OC574103)
PART OF WALNUT STREET (CLOSED BY JUDGE'S ORDER INST. NO. CR179807)
PART OF REYNOLDS STREET
PART OF CHAMPAGNE AVENUE (CLOSED BY JUDGE'S ORDER INST. NO. LT1402120)
REGISTERED PLAN NO.73

CITY OF OTTAWA

Scale 1:300

5 0 5 10 15 20 METRES

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE DAY OF , 2017.

DATE

T. HARTWICK
ONTARIO LAND SURVEYOR

DRAWN: CT CHECKED: * PM: CT FIELD: ES/CA PROJECT No.: 161613791

Appendix H

Site Servicing Checklist

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

N/A ☐ Executive Summary (for larger reports only).

☒ Date and revision number of the report.

☒ Location map and plan showing municipal address, boundary, and layout of proposed development.

☒ Plan showing the site and location of all existing services.

☒ Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.

☒ Summary of Pre-consultation Meetings with City and other approval agencies.

☒ Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.

☒ Statement of objectives and servicing criteria.

☒ Identification of existing and proposed infrastructure available in the immediate area.

N/A ☐ Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).

☒ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.

N/A ☐ Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.

☒ Proposed phasing of the development, if applicable.

☒ Reference to geotechnical studies and recommendations concerning servicing.

☒ All preliminary and formal site plan submissions should have the following information:

- Metric scale
- North arrow (including construction North)
- Key plan
- Name and contact information of applicant and property owner
- Property limits including bearings and dimensions
- Existing and proposed structures and parking areas
- Easements, road widening and rights-of-way
- Adjacent street names

4.2 Development Servicing Report: Water

☒ Confirm consistency with Master Servicing Study, if available

☒ Availability of public infrastructure to service proposed development

☒ Identification of system constraints

☒ Identify boundary conditions

☒ Confirmation of adequate domestic supply and pressure

☒ Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.

☒ Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.

N/A ☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design

☒ Address reliability requirements such as appropriate location of shut-off valves

N/A ☐ Check on the necessity of a pressure zone boundary modification.

To Follow ☐ Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range

☒ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.

N/A ☐ Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.

☒ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.

N/A ☐ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

4.3 Development Servicing Report: Wastewater

☒ Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).

☒ Confirm consistency with Master Servicing Study and/or justifications for deviations.

☒ Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.

☒ Description of existing sanitary sewer available for discharge of wastewater from proposed development.

☒ Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)

☒ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix ‘C’) format.

☒ Description of proposed sewer network including sewers, pumping stations, and forcemains.

- N/A ☐ Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).
- N/A ☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.
- N/A ☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.
- N/A ☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.
- ☒ Special considerations such as contamination, corrosive environment etc.

4.4 Development Servicing Report: Stormwater Checklist

- ☒ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)
- ☒ Analysis of available capacity in existing public infrastructure.
- ☒ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.
- ☒ Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.
- ☒ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.
- ☒ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.
- N/A ☐ Set-back from private sewage disposal systems.
- N/A ☐ Watercourse and hazard lands setbacks.
- ☒ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.
- N/A ☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.

☒ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).

N/A ☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.

☒ Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.

N/A ☐ Any proposed diversion of drainage catchment areas from one outlet to another.

☒ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.

N/A ☐ If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.

N/A ☐ Identification of potential impacts to receiving watercourses

N/A ☐ Identification of municipal drains and related approval requirements.

☒ Descriptions of how the conveyance and storage capacity will be achieved for the development.

☒ 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.

N/A ☐ Inclusion of hydraulic analysis including hydraulic grade line elevations.

☒ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.

N/A ☐ Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.

N/A ☐ Identification of fill constraints related to floodplain and geotechnical investigation.

4.5 Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

N/A ☐ Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.

N/A ☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.

N/A ☐ Changes to Municipal Drains.

☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

4.6 Conclusion Checklist

☒ Clearly stated conclusions and recommendations

☐ Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.

☒ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario