



MORRISON HERSHFIELD

Site Servicing and Stormwater Management Design Brief

OCH –FRIEL STREET / CHAPEL

200/201 Friel Street

Ottawa, Ontario

Presented to:

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

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TABLE OF CONTENTS

	Page
1 INTRODUCTION	3
1.1 Site Description and Proposed Development	3
1.1.1 Statement of Objectives and Servicing Criteria	3
1.1.2 Location Map and Plan	3
1.2 Background Documents	4
1.3 Consultation and Permits	4
1.3.1 Pre-consultation Meeting	4
1.3.2 Adherence to Zoning and Related Requirements	5
1.4 Available Existing Infrastructure	5
2 GEOTECHNICAL STUDY	6
3 WATER SERVICES	7
3.1 Design Criteria	7
3.2 Adequacy of Supply for Domestic and Fire Flows	8
3.3 Check of High Pressures	9
3.4 Reliability Requirements	9
3.5 Summary and Conclusions	9
4 SANITARY SERVICING	9
4.1 Background and Existing Infrastructure	9
4.2 Proposed Servicing and Calculations	9
4.2.1 Sanitary Sewer System, Backflow Prevention & Wastewater Sampling	10
4.3 Summary and Conclusions	10
5 STORM SERVICING AND STORMWATER MANAGEMENT	10
5.1 Background	10
5.2 Storm Servicing Strategy including analysis of Existing Infrastructure	10
5.3 Proposed Storm Servicing	11
5.3.1 Design Criteria (Minor and Major Systems)	11
5.3.2 Stormwater Quantity Control & Runoff Coefficient and Peak Flows	12
5.3.3 Stormwater Management Concept	13
5.3.4 Receiving Capacity and Backwater Prevention	15
5.3.5 Water Quality Control	15
5.3.6 Pre-Consultation with the Ontario Ministry of the Environment and Conservation and Parks, and Conservation Authority	15

TABLE OF CONTENTS (Continued)

	Page
5.3.7 Minor and Major Systems	15
5.3.8 Impacts to Receiving Watercourses	15
5.3.9 100 Year Flood Levels and Major Flow Routing	15
5.4 Foundation Drainage	15
5.5 Grading	15
5.6 Emergency Overland Flow	16
5.7 Fire Access Routes	16
5.8 Erosion and Sediment Control	16
6 CONCLUSIONS	16
7 APPENDICES	17
Appendix A Site Servicing, Grading and Erosion and Sediment Control, Catchments Plans and Details	17
Appendix B MECP, RVCA and City of Ottawa Specific Requirements Correspondence	17
Appendix C Water Demand and FUS Calculations	17
Appendix D Sanitary Flow Calculations	17
Appendix E Storm Sewer Design Calculations	17
Appendix F Topographic Survey	17
Appendix G Site Servicing Checklist	17

1 Introduction

1.1 Site Description and Proposed Development

This report presents the site servicing and stormwater management design for a proposed 20-storey apartment building, which includes the demolition of an existing underground parking structure, and the addition of a Privately Owned Public Space (POPS).

The project site is located at the south-west corner of Beausoleil Drive and Chapel Street. The ground floor of the development will be provided with building entrances from Chapel Street and along Beausoleil Drive. Vehicular access will be provided from Friel Street and a proposed vehicular ramp will provide access to the new development's underground parking. There is a public school and an elementary school located north of the proposed development, along Beausoleil Drive.

The existing OCHC community of 155 mixed residential units contains 2 towers located at 200 and 201 Friel Street. The site is currently occupied entirely by a decommissioned, underground parking garage structure, and the neighboring buildings to the south and west are between 14 and 25 storeys.

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

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

The existing 0.20 ha site consists of above ground parking, pedestrian sidewalks, a terrace between 200 and 201 Friel Street, tree planters and a cul-de-sac along Friel Street. The site is currently graded with a gentle slope towards the north and west. Access to the existing underground parking structure is from Chapel 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 G**.

1.1.1 Statement of Objectives and Servicing Criteria

The objective of this design brief is to demonstrate that the proposed design meets the servicing requirements for the proposed development, while adhering to the appropriate regulatory requirements.

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



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

A pre-consultation meeting was held with representatives of the City of Ottawa and the consultant design team on September 15th, 2022. The City provided follow-up notes included site-specific stormwater management design criteria. Key requirements are listed in **below**.

- The City requires post-development flows from the site to be restricted to the 1:5 year pre-development level for all storm events up to and including 1:100 year storm.
- Pre-development flow to be calculated using the smaller of a runoff coefficient of 0.5 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
- Maximum ponding on the public and private roadways and parking lot surfaces during 1:100 year storm event = 350mm max.
- Consult with the RVCA regarding storm water quality control requirements/restrictions (Note: RVCA advised to contact City of Ottawa and MECP to confirm quality control requirements).
- Two separate sewer laterals (one for sanitary and other for storm) will be required and foundation drains are to be independently connected to the sewermain.
- Roof drains are to be connected downstream of any incorporated ICD within the SWM system. Provide Roof plan showing roof drain and scupper locations with a table that indicates flow rates, drain type and weir opening, if controlled. Provide Manufacturer Specifications on drains and also provide 5- and 100-year ponding limits on plan.

- Updated CB Erosion and Sediment Control measures are required as wrapping CB grates with geotextile fabric is no longer acceptable.
- 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.
- Provide required cover over pipe and details, chart of storage values, capacity etc. and provide cleaning of sediment and debris method.

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 R5B H(18) F(2.0) residential density, allowing for mid-high apartment dwellings.

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 (Beausoleil Drive)

- 203mm diameter ductile iron watermain, 1972.
- 300mm diameter concrete sanitary sewer, 1971, drains to Patrick Street Sewer and conveys to interceptor sewer.
- 600mm diameter concrete storm sewer, 1971, outlets to Patrick Street Sewer and outlets to the Rideau River.

East (Chapel Street)

- 203mm diameter watermain (material unknown), 1972.
- 750mm diameter concrete sanitary sewer, 1971
- 525mm diameter concrete storm sewer, 1971.

South (Rideau Street)

- 305mm diameter PVC watermain, 2013.
- 300mm diameter PVC sanitary sewer, 2012.
- 750mm diameter concrete storm sewer, 2012.

West (Friel Street)

- 610mm diameter concrete watermain, 1972.
- 250mm diameter concrete sanitary sewer, 1971.
- 525mm diameter concrete storm sewer, 1971.

On Site (Friel Street)

- Copper watermain services for 201 Friel Street and the existing underground parking garage.

- Storm and sanitary services from the existing building at 201 Friel Street to Friel Street.
- Third party utility conduits such as Hydro, Gas, and Bell.

Figure 2 illustrates the location of existing infrastructure.

The existing hydro utilities within the Privately Owned Public Space will be relocated due to conflicts with the proposed stormwater retention tank. The existing watermain service to the underground parking structure will be capped and replaced with a new water service.

Figure 2 GeoOttawa Infrastructure Excerpt



Existing watermains and sewers (and proposed relocations) are shown in detail in Plan C001 found in **Appendix A**.

2 Geotechnical Study

A Geotechnical Investigation was undertaken by Paterson Group and is documented in Report No. PG4129-1 Revision 2, June 20, 2023.

Three boreholes were drilled to depths up to a maximum of 5.8m below the existing ground surface. The subsurface profiles consist of an asphaltic pavement structure within the decommissioned underground parking garage overlying a fill layer consisting of brown silty sand with gravel. The fill is variable in nature and consists of sand with varying amounts of silt and sand. The fill was underlain by a stiff, native clay deposit. Bedrock depth vary between 10m – 15m below grade. A similar profile is shown where asphalt is present.

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 5.5-6.5 m below the existing ground surface, although subject to seasonal fluctuations. The geotechnical report provides recommendations for excavation, backfill, pavement structure and pipe bedding and backfill.

A permissible grade raise restriction of 1.0 m above existing ground surface is recommended for the subject site. The pipe bedding for sewer and water pipes should consist of a minimum 150 mm of

OPSS Granular A material. Where the bedding is located within the firm grey silty clay, the thickness of the bedding material should be increased to a minimum of 300 mm.

Underfloor drainage may be required to control water infiltration due to groundwater infiltration at the proposed founding elevation. Based on recommendations in the geotechnical report, 150 mm diameter perforated pipes shall be placed at spacing of 6 to 8 m. The foundation design is to include a perimeter foundation drain consisting of 150 mm diameter perforated corrugated pipe, surrounded on all sides by 150 mm of 19 mm clear crushed stone. This is to be placed based on the the footing elevation as defined in the structural design package. The foundation drain will drain to the building's sump pit, which will outlet to the foundation drain service that drains by gravity to the municipal storm sewer.

3 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 200mm diameter watermain within Beausoleil Drive north of the proposed development. The calculations below use the boundary pressure of the 200mm watermain north of the site while including pressure loss along its length to the proposed servicing location (indicated in **Appendix C**). 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 1 summarizes the parameters used to estimate water demands, assess adequacy of service, and design the proposed watermains:

Table 1– Summary of Water Demand Parameters

Design Parameter	Design Criteria
Water Demand Parameter	
Residential Average Daily Demand	280 l/person/day Table 3-3 of the MOE Design Guideline
Residential Max. Daily Peaking Factor	Ministry of the Environment Design Guidelines for Drinking-Water System, Table 3-3
Residential Max. Hourly Peaking Factor	Ministry of the Environment Design Guidelines for Drinking-Water System, Table 3-3
Fire Flow	Ottawa Design Guidelines (2010 incl. Technical Bulletins) and the Fire Underwriters Survey (2020)
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 2 summarizes the water demand/fire flow for the development based on the **Ottawa Design Guidelines (2010 incl. Technical Bulletins)** and the **Fire Underwriters Survey (2020)**:

Table 2– Summary of Water Demand Calculations

Design Parameter	Water Demand
Residential Average Daily Demand	0.7 L/s (90 m ³ /d)
Residential Max. Daily Demand	2.9 L/s
Residential Max. Hourly Demand	16.8 L/s
Fire Flow	83.3L/s (5,000 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 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 3– Summarization of Water Servicing Design Parameters/Calculation Results

	Scenario			Source of Data
	Max Day + Fire	Max Hourly	Max Day	
Flow Demand (L/s)	86.2	16.8	2.9	Calculated
Boundary Condition ¹ : Available Pressure under proposed demand (kPa) ²	415.0	428.7	428.7	Provided by City of Ottawa (minimum HGL)
Residual Pressure at Service Entry including pipe losses (150mm diameter pipe) (kPa)	396.9	427.8 ³	428.7 ³	Calculated
Minimum Allowable Pressure (kPa)	140.0	275.0	345.0	City of Ottawa Water Design Guidelines
¹ Boundary conditions provided by City of Ottawa (See Appendix C) ² The City of Ottawa Boundary Conditions minus finished floor elevation (62.50m) of the proposed building. ³ A booster pump is required for all floors greater than 15.5m above ground floor.				

Considering the calculated fire flow, and anticipated fire pump capacity, dual 150 mm 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 4 – 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.)
5,000	4	1	20,880

Table 4 is based on the minimum number of hydrants expected to be present to meet hydrant spacing standards (i.e. maximum spacing of 90 m).

More than one additional hydrant is located within 45m of the proposed fire department connection, which is located 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 53kPa, which falls under the maximum 552kPa defined in the guidelines.

3.4 Reliability Requirements

Because the average demand exceeds 50 m³/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 200mm diameter Beausoleil Drive 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 150 mm diameter water services connected to the 200mm diameter watermain north 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 proposed development will require a new 250 mm diameter PVC sanitary service. The new 250 mm diameter PVC sanitary service will extend from the north side of the building. The service will outlet to the existing 300 mm sanitary sewer, connected with a tee. The sanitary servicing design parameters are defined in **Table 5**.

Table 5– Summary of Sanitary Servicing Design Parameters

Design Parameter	Value
Occupancy	230 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	$Q = \frac{1}{n} \pi AR^{2/3} S^{1/2}$
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 March 2023.	

The site will produce a sanitary flow of **2.8 L/s** as determined in accordance with the City of Ottawa 2012 Sewer Design Guidelines. The proposed 250 mm PVC service lateral (at 2% slope) has a maximum capacity of 84.1 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 & Wastewater Sampling

The receiving 300 mm sanitary sewer in Beausoleil Drive has sufficient capacity to accommodate this calculated flow. A backflow preventor will be included as part of the mechanical system within the building. A wastewater sampling chamber outside of the building is included in the design.

4.3 Summary and Conclusions

The development will be serviced by a 250 mm sanitary connection to an existing 300 mm sanitary sewer in Beausoleil Drive. 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 northwest and continues north along Beausoleil Drive towards the Ottawa River. Stormwater also enters catch basins contained within the site limits of 200/201 Friel Street and drains via the City storm sewer.

The City of Ottawa's Sewer Design Guidelines require the 100-year post-development storm flow to be restricted to the 5-year pre-development run-off.

5.2 Storm Servicing Strategy including analysis of Existing Infrastructure

The 100-year post-development flow is required to be restricted to the 5-year pre-development run-off, with excess run-off from all events greater than the 5-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 5-year event and will also reduce overland flows and associated flooding risks.

A catch basin manhole is proposed within the Privately Owned Public Space draining the local area to the east and north. A new catch basin will be installed south of 201 Friel Street to drain the regraded



parking lot area leading up to the parking garage ramp, replacing an existing catch basin to the east that will be removed. Runoff from the regraded parking garage ramp will be collected a new catch basin (replacing an existing catch basin at the same location) and connected to the building sump. Dual pumps are required within the sump room. Building run-off will be collected through roof drains and area drains connected to internal plumbing. Runoff to the roof drains will drain to the east building service. Storm laterals 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, which will be located within the building as well as an Inlet Control device located in the Privately Owned Public Space.

During design development, opportunities to utilize low impact development technologies were explored. 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 5-year pre-development level.
- Pre-development flow to be calculated using the smaller of a runoff coefficient of 0.5 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. The correspondence is included as part of **Appendix B**.

5.3.2 Stormwater Quantity Control & Runoff Coefficient and Peak Flows

Table 6 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 6– Pre-development Run-off Coefficients

Storm Event	Pre-Development Run-off Coefficients	
	5-Year Storm	100-Year Storm
Site Area (in ha)	0.20	0.20
Run-off Coefficients	0.50	0.63

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 7**.

Table 7– Pre-Development Peak Flows

Storm Event	Pre-Development Peak Flows (actual run-off coefficients)	
	5-Year Storm	100-Year Storm
Intensity (mm/hr)	104.2	178.6
Peak Flow (L/s)	29.4	63.1

Considering time of concentration of 10 minutes, site area of 0.20 hectares and a 5-year storm, **the allowable release rate is 29.4 L/s**.

The project will result in an increase in impervious area. The post-development run-off coefficients are indicated in **Table 8**:



Table 8– Overall Post-Development Run-off Coefficients

Storm Event	Overall Post-Development Run-off Coefficients	
	5-Year Storm	100-Year Storm
Project Area (in ha)	0.20	0.20
Weighted Run-Off Coefficient	0.72	0.82

5.3.3 Stormwater Management Concept

Uncontrolled Drainage Areas (B1-B2)

It is not feasible to capture run-off the from ramp (B1), which is graded towards the building and captured at the entrance with a catch basin. The catch basin is connected to the building’s mechanical system and therefore bypasses stormwater detention. The area in front of the main building entrance (B2) at Chapel Street (including hardscape and softscape) between the property line and building will be uncontrolled as well. This run-off will be released uncontrolled to the adjacent public ROW. These areas will be graded to direct the run-off to appropriate outlets.

Table 9– Post-Development Uncontrolled Release

Storm Event	Post-Development Uncontrolled Release	
	5-Year Storm	100-Year Storm
Drainage area (ha)	0.04	0.04
Run-off Coefficient	0.90	1.00
Peak Flow (L/s)	11.7	22.3

This leaves a remaining allowable release rate of **7.1 L/s**.

Controlled Drainage Areas A1, A2, A3

The drainage from the roof (A1), as well as the building frontage to the south (A3) will be captured and directed to a stormwater cistern located in the underground parking. A portion of the unoccupiable roof will be controlled via controlled flow roof drains so as to reduce the peak flow into the tank. The courtyard will drain via area drains directly into the stormwater tank. Outflow from the tank will be controlled via 2 stormwater pumps with constant release rates which will be restricted to 4.1L/s. Downstream of the pumps, the storm service will outlet to the existing storm sewer in Chapel Street.

As indicated by the proposed storage calculations, the required cistern size is 25.3m³. This will be provided using a cistern. A detailed drawing for the tank is provided in in the set of plans in **Appendix A**. The tank will be specified to be watertight with a maintenance access which meet OBC requirements. The tank will be designed such that the tank volume exceeds the volume required to detain the 100-year storm event.

Additionally, the POPS on the west side of the site (A2) will drain to a maintenance hole outfitted with an ICD. Based on the orifice calculation, the outlet will require a Hydrovex 50VHV-1 Vortex ICD, providing a maximum release rate of 3.0 L/s during the 100-year event. In the 100-year event a storage volume of approximately 8.1m³ is required. The majority of this volume is contained in the upstream system (CBMH1 and STMH1). The remaining 3.1m³ will be contained on-site as surface ponding. This will result in approximately 110mm of surface ponding in the 100-year event. The SWM calculations are provided in **Appendix E**.

Summary

Table 10 summarizes the proposed release rates and confirms that the total release rate does not exceed the allowable release rate.



Table 10 – Post-Development Controlled Peak Flows

	Post-Development Controlled Peak Flows (L/s)
Allowable Release Rate	29.4
Release Rate from Uncontrolled Drainage Areas	22.3
Release Rate from Controlled Flow Roof Drainage Areas (controlled downstream)	15.8
Maximum Release Rate from Controlled Drainage areas	7.1
Total Release Rate from Controlled Drainage Areas	29.4

Table 11 summarizes the stormwater management measures for the proposed development.

Table 11 – Stormwater Management Summary Table

Area ID	Area (ha)	Release Rates (L/s)		Storage Required		Max Storage Available		ICD Size
		5-Yr	100-Yr	5-Yr	100-Yr	5-Yr	100-Yr	
Controlled Flow Roof Drainage (A1)	0.05	1.0	2.7	0.8	2.2	12	12	Watts Model R1100 Accuflow Single Notch Roof Drains
A1+A3	0.09	4.1	4.1	4.3	25.3	69	69	Constant flow stormwater pumps draining cistern
A2	0.06	2.1	3.0	4.4	8.1	14.6	14.6	Surface Storage at CBMH1

Impact on Existing Stormwater Infrastructure

Overall run-off from the site to the storm sewers by the proposed development is shown below:

Table 12 – Pre-Development Peak Flows vs. Post-Development Controlled Peak Flows

Storm Event	Pre-Development Peak Flow (L/s)		Post-Development Peak Flow (L/s)	
	5-Year Storm	100-Year Storm	5-Year Storm	100-Year Storm
Total run-off (L/s)	29.4	63.1	17.9	29.4

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

Area Drain Capture Analysis

Proposed area drains are required to capture the 100-year flow, their inlet capacity is described below: The 100-year flow at AD1 is 15.7 L/s. As indicated by Figure A in **Appendix E**, the ponding depth under this flow rate is 150 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 61.02 m, which is lower than the springline of the 525 mm diameter receiving storm sewer at the connection location (61.00m). The pump will pump with a HGL above existing sewer in Chapel. The POPS outlet will also be connected above the existing springline of the 600mm storm sewer in Beausoleil.

5.3.5 Water Quality Control

As indicated in **Section 5.3.1** above, the Rideau Valley Conservation Authority (RVCA) has been contacted. They have indicated that they are not responsible for stormwater quality control for this site.

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. 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 Beausoleil Drive and Chapel Street, from where flow can continue north towards the Ottawa River. Further discussion is provided in **Section 5.5** 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 Foundation Drainage

Proposed perimeter foundation drainage is required as part of the geotechnical investigation report. The foundation drainage requirements are described in further detail in **Section 2**. The mechanical design includes a sump pit with a pump to drain the elevator overrun. This sump pit will be located lower than the perimeter foundation drains, therefore the foundation drainage will drain by gravity to the sump pit. The sump pump will then pump the subdrain system to a stormwater outlet located on the north side of the proposed building. This outlet bypasses any/all flow restricting devices.

5.5 Grading

The proposed grading plan is shown in Drawing C002 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 accounted for in the stormwater management calculations in **section 5.3.3**. A small retaining wall is required on the south-east face of the property to overcome the grade change at the property limit. This retaining wall will extend a minimum of 1.1m beyond the upper grade elevation to ensure it meets AODA requirements. A

proposed transformer with an electrical foundation pad will be located to the south of the building. This area will be graded away from the building.

5.6 Emergency Overland Flow

The site grading design provides emergency overland flow to the northeast as well as the existing asphalt access to the west, which are designated as major system flow routes.

5.7 Fire Access Routes

Fire access will be provided from Beausoleil Drive up to the principal entrance. The proposed Siamese connection is proposed to be located within 15 meters of the principal entrance and will allow the emergency fire vehicle(s) direct access.

5.8 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 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



Daniel Glauser, P.Eng.
Municipal Engineer

A handwritten signature in black ink, appearing to read 'Dillon O'Neil', written over a horizontal dashed line.

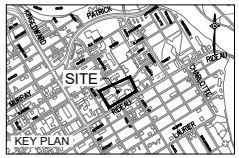
Dillon O'Neil, B. Eng.
Municipal Designer

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
- Appendix D Sanitary Flow Calculations
- Appendix E Storm Sewer Design Calculations
- Appendix F Topographic Survey
- Appendix G Site Servicing Checklist

Appendix A

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



ISSUED

No.	Date	Description
0	2023 MAR 22	ISSUED FOR SITE PLAN APPROVAL
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LEGEND

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

CATCH BASIN DATA

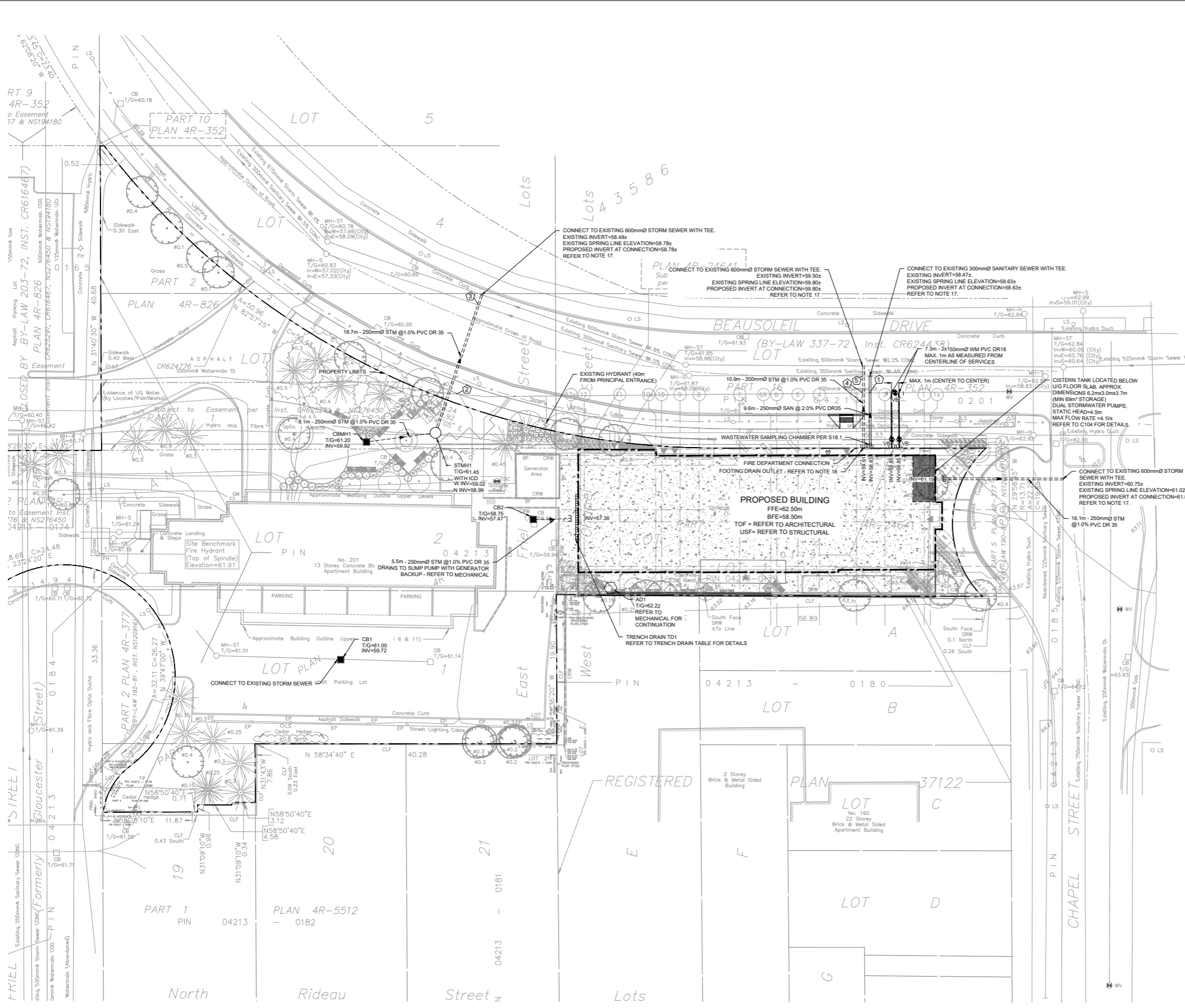
NO.	COVER	STRUCT.	ELEVATION		NOTES	CB CONNECTION		
			T/FRAME	LOW/INV		DIA (mm)	TYPE	LENGTH (m)
CB1	S22	705.010B	61.00	59.72		250	PVC DR35	N/A
CB2	S22	705.010B	58.78	57.50		250	PVC DR35	5.5
CBMH1	S28.1	701.011	61.20	59.92		250	PVC DR35	7.5

NEW STORM STRUCTURE

NO.	COVER	STRUCT.	ELEVATION		LOCATION		NOTES
			T/FRAME	INVERTS	NORTHING	EASTING	
STMH1	S24.1 OR OPSD 401.010 TYPE B	701.011	61.45	59.02 (N) 58.99 (S/W)	5032694.90	368763.08	

PIPE CROSSING TABLE

NO.	PIPE	CLEARANCE	OVER	UNDER	NOTES
1	200mmØ WM	0.97m	CLEARANCE	OVER 250mmØ SAN	WM INV=59.90, STM OBV=58.93
2	200mmØ WM	0.30m	CLEARANCE	OVER 250mmØ STM	WM INV=59.50, STM OBV=59.20
3	250mmØ STM	0.48m	CLEARANCE	OVER 600mmØ SAN	STM INV=58.78, SAN OBV=58.30
4	200mmØ WM	0.41m	CLEARANCE	OVER 200mmØ STM	WM INV=59.48, STM OBV=59.07
5	200mmØ STM	0.60m	CLEARANCE	OVER 600mmØ SAN	STM INV=58.88, SAN OBV=58.28



- NOTES:**
- GENERAL**
 - TOPOGRAPHICAL SURVEY PREPARED BY FARLEY, SMITH & DENIS SURVEYING LTD. DATED SEPT 13, 2022. MTD ZONE 8. GEODETIC DATUM CGVD-1928:1978. SITE BENCHMARK: HYDRANT TOP OF SPINDLE ELEV. 61.91
 - SERVICES ARE TO BE CONSTRUCTED TO 1.0m FROM FACE OF BUILDING.
 - REFER TO "SITE SERVICING AND STORMWATER MANAGEMENT DESIGN BRIEF" PREPARED BY MORRISON HERSHFIELD.
 - REFER TO GEOTECHNICAL INVESTIGATION REPORT (AUG 2017) GEOTECH REPORT FOR 22-11 PREPARED BY PATTERSON GROUP FOR SUBSURFACE CONDITIONS. CONSTRUCTION RECOMMENDATIONS AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT SHALL REVIEW EXCAVATIONS PRIOR TO THE PLACEMENT OF GRANULAR MATERIAL.
 - CONTRACTOR TO VERIFY ALL EXISTING UTILITY ELEVATIONS AT CONNECTION AND CROSSING LOCATIONS PRIOR TO CONSTRUCTION AND ADVISE THE ENGINEER OF ANY DISCREPANCIES.
 - UNLESS DIRECTED OTHERWISE ANY DAMAGED ASPHALT OR CURB (REGARDLESS OF WHETHER WITHIN OR EXTERNAL TO THE SITE) SHALL BE REINTEGRATED IN ACCORDANCE WITH CITY STD. DET. R10 AND S1.
 - UNLESS DIRECTED OTHERWISE THE CONTRACTOR SHALL REINSTATE ALL SIGNS, LIGHTING AND OTHER STREET FURNITURE DISTURBED BY THE WORK.
 - THE CONTRACTOR SHALL DEVELOP AND IMPLEMENT TRAFFIC MANAGEMENT PLANS FOR WORK IN RIGHT OF WAY IN ACCORDANCE WITH OTM BOOK 7.
 - THE CONTRACTOR SHALL PROVIDE ANY TEMPORARY SERVICING NEEDED, AND SHALL ALSO COORDINATE WITH OTHER TRADES AS NECESSARY.

- SEWERS**
- ALL STORM SEWERS, SANITARY SEWERS AND CATCH BASINS LEADS SHALL BE PVC DR 35 UNLESS OTHERWISE SPECIFIED.
 - REFER TO CITY STD. DETAIL S6 ON DRAWING C102 FOR SEWER INSTALLATION.
 - CONTRACTOR SHALL MAINTAIN EXISTING SEWER FLOWS DURING CONSTRUCTION IN ACCORDANCE WITH CITY OF OTTAWA SPECIFICATIONS.
 - ALL MAINTENANCE HOLES, CATCHBASINS AND AREA DRAINS SHALL BE ADJUSTED TO POST-CONSTRUCTION GRADE.
 - 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.
 - BACKWATER VALVES TO BE INSTALLED AS PER CITY OF OTTAWA STANDARD S14 & S14.2.
 - CONTRACTOR TO CONFIRM EXACT ELEVATION OF SEWER PRIOR TO CONSTRUCTION AND NOTIFY ENGINEER OF ANY DISCREPANCIES. ROAD CUT REINSTATEMENT AS PER CITY OF OTTAWA STANDARD R10. CONNECTION TO SEWERMAIN PER S11.1
 - FOOTING DRAINS OUTLET TO THE BUILDING'S SUMP PUMP. THE BUILDING SUMP PUMP IS CONNECTED TO THE BACKUP GENERATOR.

- WATERMANS**
- REFER TO CITY STD. DETAIL W17 ON DRAWING C102 FOR WATERMAIN INSTALLATION.
- REGISTERED**

- 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.
- 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.
- ALL VALVES 300mm DIAMETER AND SMALLER SHALL INCLUDE A VALVE BOX AS PER W24.
- THE NEW WATERMAIN IS TO BE INSTALLED WITH A MINIMUM OF 2.4m COVER. WHERE 2.4m COVER IS NOT POSSIBLE, PROVIDE INSULATION IN ACCORDANCE WITH CITY OF OTTAWA STANDARD DETAILS W22 & W23.
- 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.
- TRACER WIRE SHALL BE PROVIDED FOR ALL NEW PVC WATERMANS IN ACCORDANCE WITH THE SPECIFICATIONS AND CITY OF OTTAWA STANDARD DETAIL W36.
- CATHODIC PROTECTION SHALL BE PROVIDED FOR ALL NEW WATERMANS IN ACCORDANCE WITH THE SPECIFICATIONS AND CITY OF OTTAWA STANDARD DETAILS W39, W40, W41, W42 AND W47. CATHODIC PROTECTION OF EXISTING WATERMANS SHALL ALSO BE PROVIDED AT CONNECTIONS BETWEEN EXISTING AND NEW WATERMANS.

- UTILITY NOTE**
- THE POSITION OF POLE LINES, CONDUITS, WATERMANS, 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.
 - ALL CROSSING OF EX. UTILITIES TO BE IN ACCORDANCE WITH CITY STD. DET. S10

TRENCH DRAIN DATA

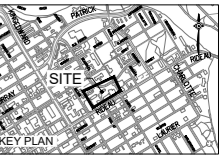
NO.	TRENCH DRAIN WIDTH	GRATE	ELEVATION		TO CONNECTION			
			T/FRAME	LOW/INV	DIA (mm)	TYPE	LENGTH (m)	INV.
T01	100mm	STAINLESS STEEL, ACCESSIBLE, HEEL SAFE, LIGHT DUTY (ACO 447D1448D OR APPROVED EQUIVALENT)	58.50	57.70	200	PVC DR35	1.2	REFER TO MECHANICAL

NOTE: POLYMER CONCRETE TRENCH DRAIN WITH 2% INTERNAL SLOPE AND MATCHING CATCH BASIN, UNLESS OTHERWISE SPECIFIED.

INLET CONTROL DEVICE DATA TABLE - STMH1

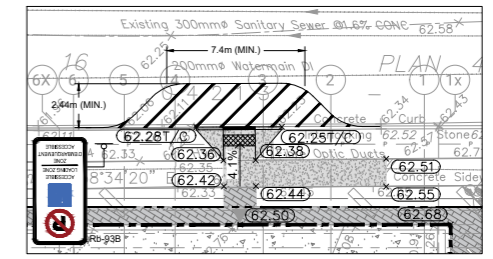
DESIGN EVENT	ICD TYPE	DIAMETER OF OUTLET PIPE (mm)	DESIGN FLOW (L/s)	WATER ELEVATION (m)	REQUIRED VOLUME (m³)	TOTAL VOLUME PROVIDED (m³)
1.5 YR	HYDROVEX 50VHV-2	250mmØ PVC	2.1	60.17	4.9	42
1:100 YR	HYDROVEX 50VHV-2	250mmØ PVC	3.0	61.32	9.1	42



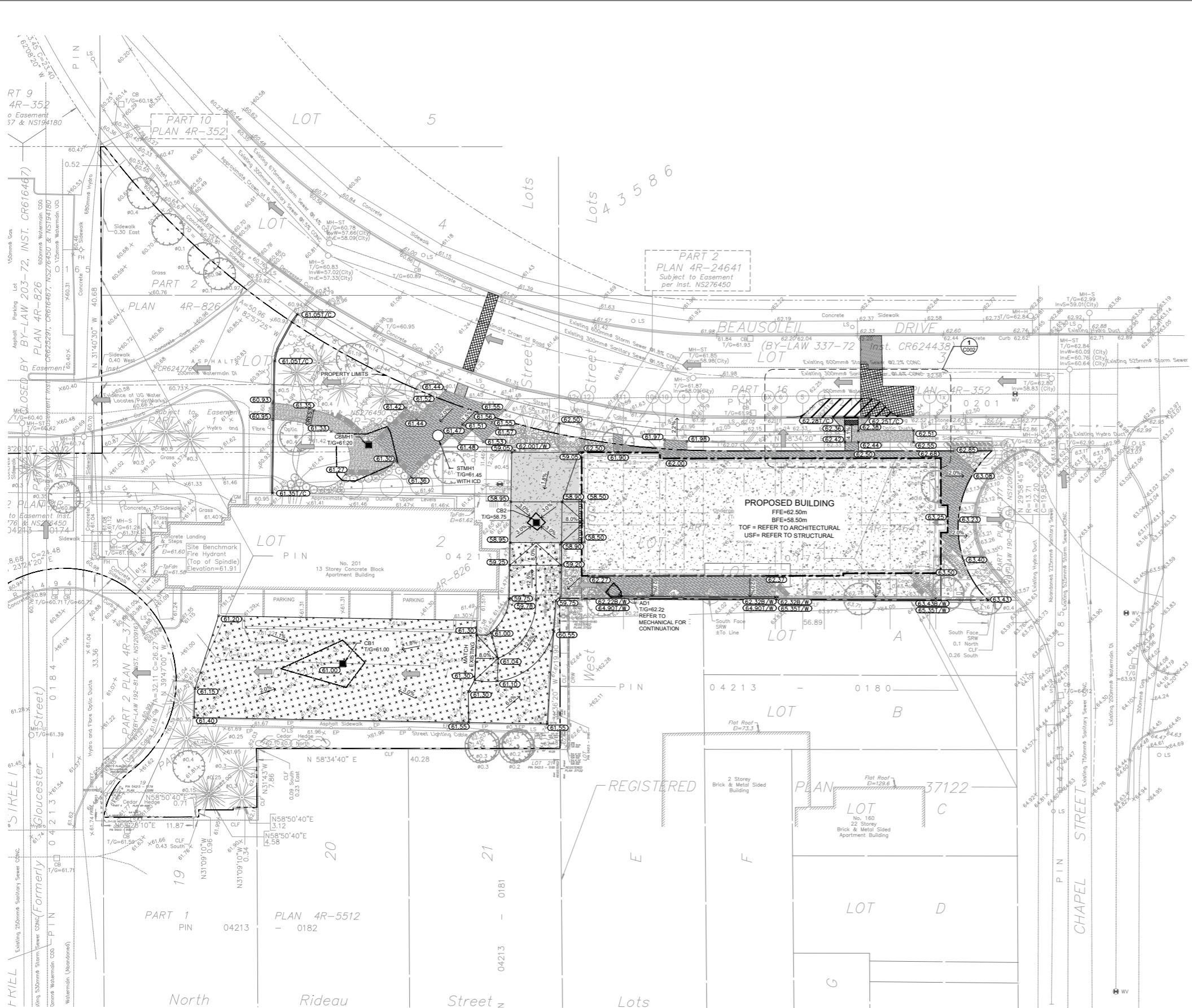


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No.	Date	Description
0	2023 MAR 22	ISSUED FOR SITE PLAN APPROVAL
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3	2023 JUL 13	ISSUED FOR SITE PLAN CONTROL - RESUBMISSION #2



1 PASSENGER LOADING ZONE DETAIL
SCALE: 1:150



LEGEND

- NEW AREA DRAIN
- ⊙ PROPOSED MANHOLE
- ⊙ (62.55) PROPOSED ELEVATION
- ⊙ (62.71) PROPOSED TOP OF CURB ELEVATION
- ⊙ (62.71) PROPOSED TOP OF WALL ELEVATION
- ➔ PROPOSED SLOPE DIRECTION
- ➔ MAJOR OVERLAND FLOW PATH
- ▨ PAVERS - REFER TO LANDSCAPE
- ⊙ (62.71) LIGHT/HEAVY DUTY ASPHALT PAVING
- ▨ LIGHT DUTY CONCRETE
- ▨ HEAVY DUTY CONCRETE
- ▨ 40mm MILLING & REINSTATEMENT WITH H3 OR SP12.5 ASPHALTIC CONCRETE
- EXISTING ELEVATION
- EXISTING MANHOLE
- ▬ CONCRETE CURB AS PER SC 1.1
- ▬ PONDING ELEVATION (MAX 110mm)
- ▬ NEW ENTRANCE
- ▬ ENTRANCE OF PARKING GARAGE ACCESS RAMP
- ▬ PROPERTY LINE

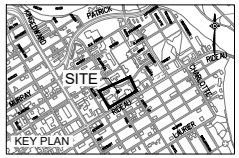
- NOTES:**
1. ALL ELEVATIONS ARE GEODETIC AND IN METERS UNLESS OTHERWISE NOTED.
 2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS.
 3. REFER TO ARCHITECTURAL AND LANDSCAPE DRAWINGS FOR LAYOUT, DIMENSIONS AND SURFACE FINISHES.
 4. ALL ELEVATIONS BY CURBS ARE EDGE OF PAVEMENT UNLESS 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 UNLESS SHOWN OTHERWISE.
 13. CONCRETE BARRIER CURBS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD DRAWING SC1.1 UNLESS SHOWN OTHERWISE.
 14. SAW CUT AND KEY GRIND ASPHALT AT ALL TIE-INS PER CITY OF OTTAWA STANDARD R10.
 15. REINSTATE ANY LANE PAINTING DISTURBED BY THE WORK.
 16. REFER TO GEOTECHNICAL INVESTIGATION REPORT (AUG 2017 GEOTECH REPORT PG4129-1) PREPARED BY PATTERSON GROUP FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT SHALL REVIEW EXCAVATIONS PRIOR TO THE PLACEMENT OF GRANULAR MATERIAL.

6. THE POSITION OF POLE LINES, CONDUITS, WATERMANS, 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.
7. CONTRACTOR IS RESPONSIBLE TO KEEP THE ROADS FREE AND CLEAN FROM THE MUD OR DEBRIS.
8. SWALES MUST HAVE MINIMUM 1.5% LONGITUDINAL AND SIDE SLOPE AND MAX 3H:1V SIDE SLOPE (S29).
9. **BENCHMARK NOTE**
TOPOGRAPHICAL SURVEY PREPARED BY FARLEY, SMITH & DENIS SURVEYING LTD. DATED SEPT 13, 2022. MTM ZONE 9, GEODETIC DATUM CQVD-1928-1978
SITE BENCHMARK: HYDRANT TOP OF SPINDLE ELEV. 61.91



CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS ON THE JOB. SEE 100% SCALE DRAWINGS.
ALL DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS ARE THE COPYRIGHT PROPERTY OF THE ARCHITECT AND MUST BE RETURNED UPON REQUEST. REPRODUCTION OF DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS IN PART OR IN WHOLE IS FORBIDDEN WITHOUT THE WRITTEN PERMISSION OF THE ARCHITECT.
THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION UNLESS SIGNED BY THE ARCHITECT.

OCH FRIEL STREET / CHAPEL
202021 FRIEL STREET
221021

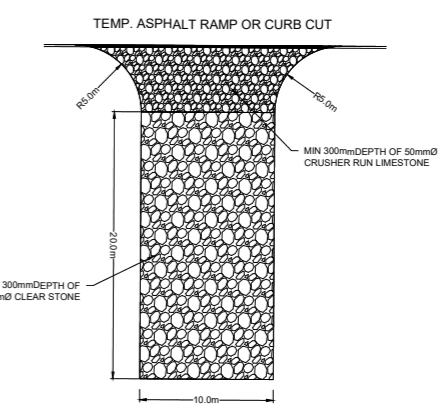
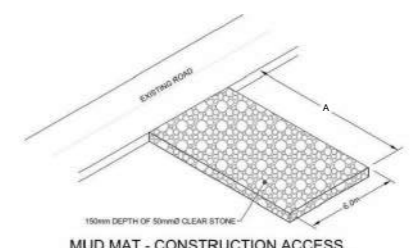


ISSUED

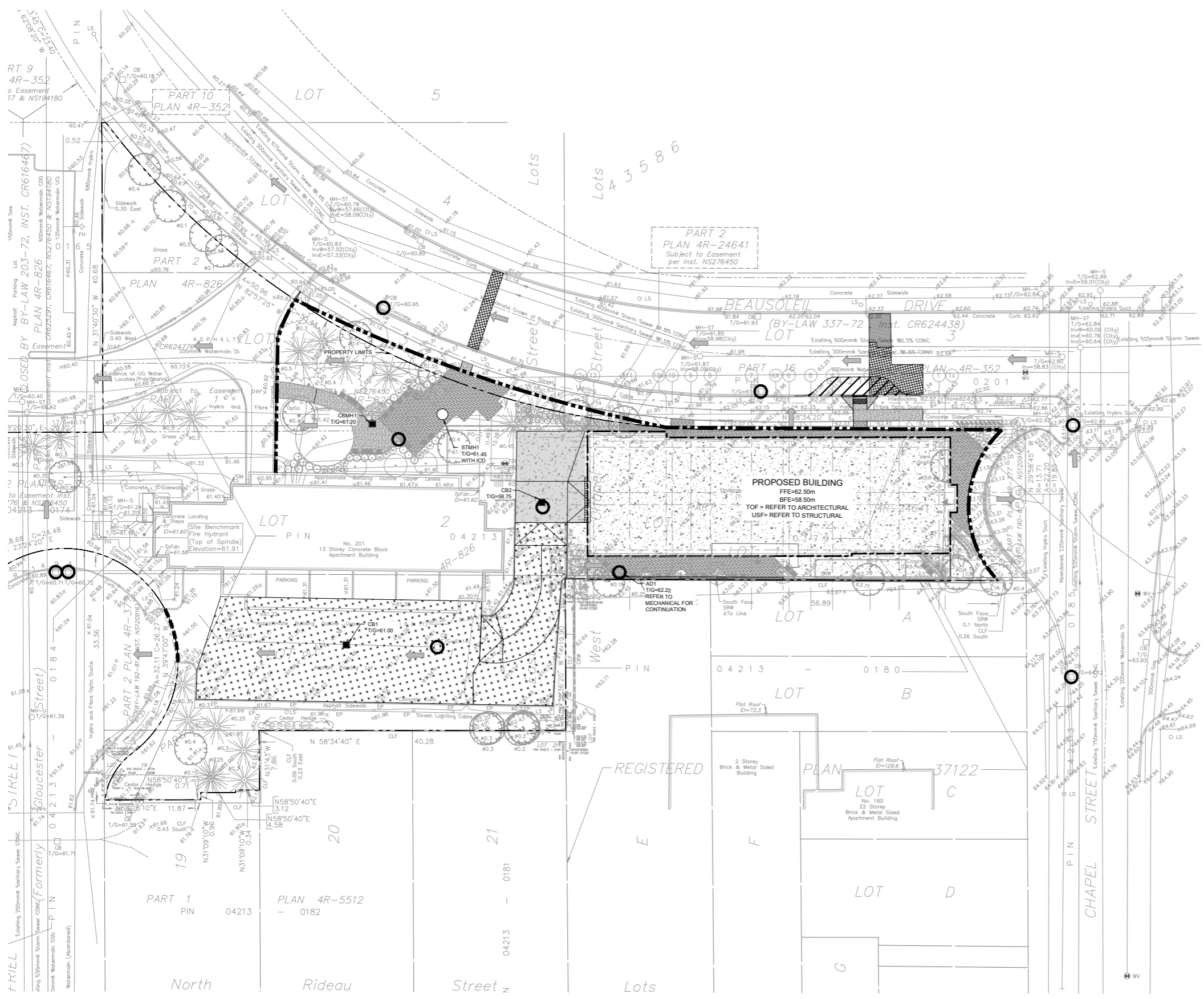
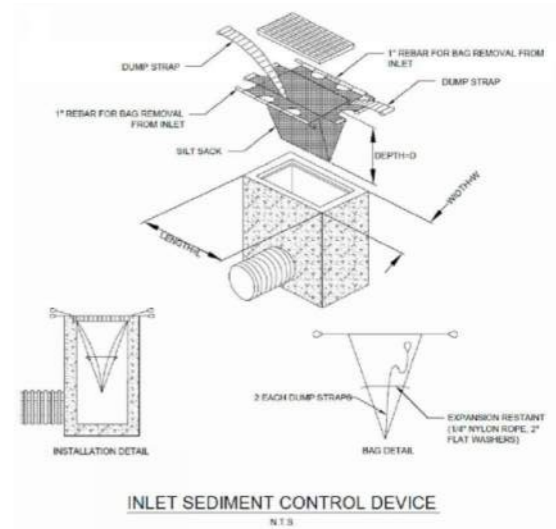
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LEGEND

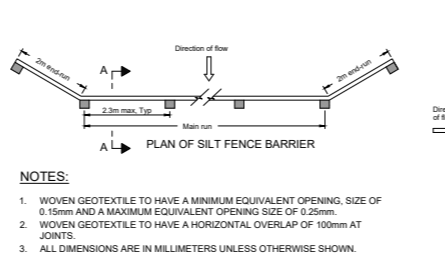
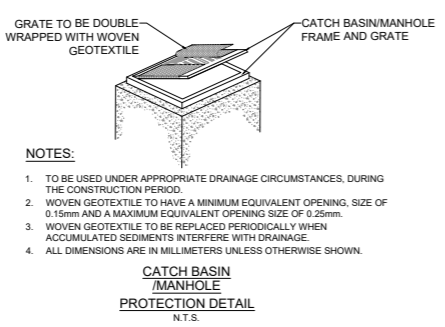
- LIGHT DUTY SILT FENCE BARRIER (PER OPSD 219.110)
- CATCH BASIN PROTECTION (SILT SACK WITHIN CB, OR SURROUND CB WITH SILT SOCK)
- SEDIMENT CAPTURE FILTER SOCK HELD IN PLACE USING SANDBAGS



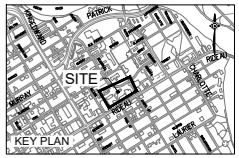
- NOTES:**
- INSTALL AT ALL SITE ACCESS LOCATIONS.
 - TEMPORARY CONSTRUCTION ACCESS SHALL BE REMOVED ON COMPLETION OF THE WORK AND ALL DISTURBED AREAS SHALL BE RESTORED TO ORIGINAL OR BETTER CONDITION.



- EROSION AND SEDIMENT CONTROL**
- THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE FOR PROTECTION OF THE 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.
 - EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE IMPLEMENTED PRIOR TO CONSTRUCTION AND REMAIN IN PLACE UNTIL VEGETATION IS ESTABLISHED.
 - 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.
 - 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.
 - 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.



LIGHT DUTY SILT FENCE BARRIER
AS PER OPSD 219.110
N.T.S.



ISSUED

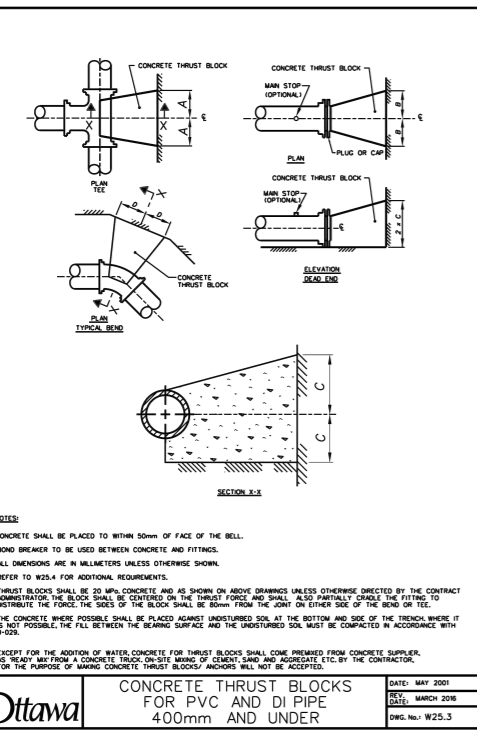
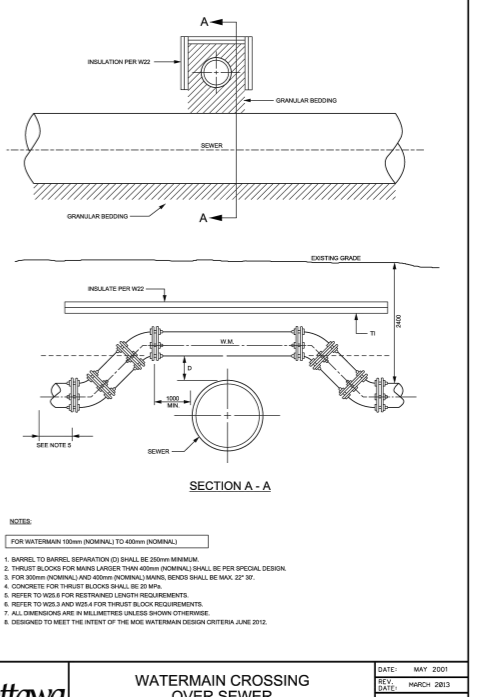
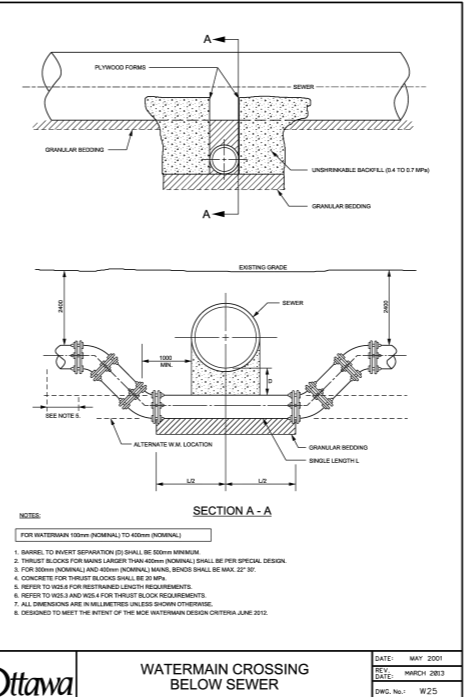
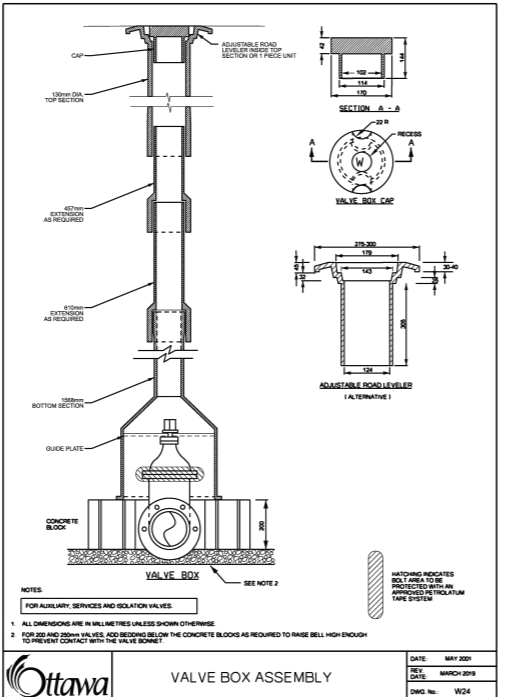
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INSULATION REFERENCE TABLE

2023 PERM. U.S. OF INS. VAL.	REQUIRED INSULATION THICKNESS (mm)
0.020	100
0.025	150
0.030	200
0.035	250
0.040	300

Ottawa THERMAL INSULATION OF WATERMAINS AT OPEN STRUCTURES

DATE: MAY 2001
REV: MARCH 2013
DWG. No.: W25.1



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	600
406	1050	1050	600	850

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	400	450	300	350
305	500	500	350	400
406	750	750	400	600

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	350
406	650	650	300	450

Ottawa THRUST BLOCK DIMENSION TABLES FOR PVC AND DI PIPE 400mm AND UNDER

DATE: MAY 2001
REV: MARCH 2011
DWG. No.: W25.4

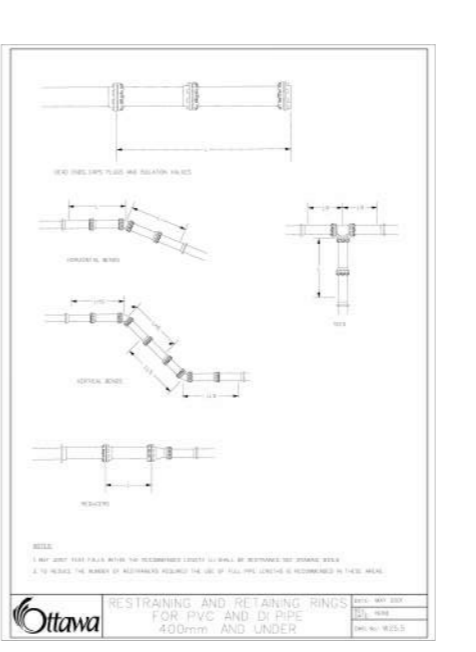


TABLE OF RESTRAINED LENGTHS FOR DI AND PVC WATERMAIN PIPE IN STANDARD GRANULAR A EMBEDMENT IN SOILS OF BEARING CAPACITY OF 100 KPa AND OVER

REDUCERS	LARGER DIAMETER SIDE (TO BE RESTRAINED)			
	100mm	150mm	200mm	300mm
100mm	N/A	3	6	10
150mm	N/A	N/A	4	9
200mm	N/A	N/A	N/A	3
250mm	N/A	N/A	N/A	N/A
300mm	N/A	N/A	N/A	N/A
400mm	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

TURNS

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
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Ottawa TABLES OF RESTRAINED LENGTHS FOR PVC AND DI PIPE 400mm AND UNDER

DATE: MAY 2001
REV: MARCH 2011
DWG. No.: W25.6

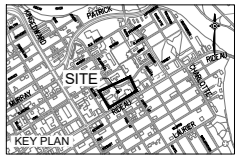


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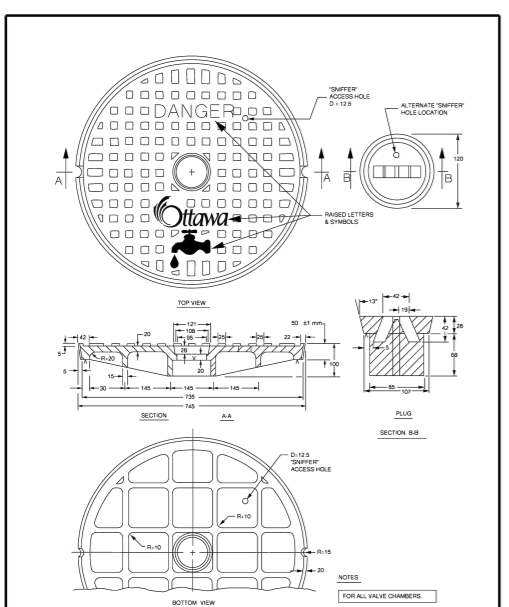
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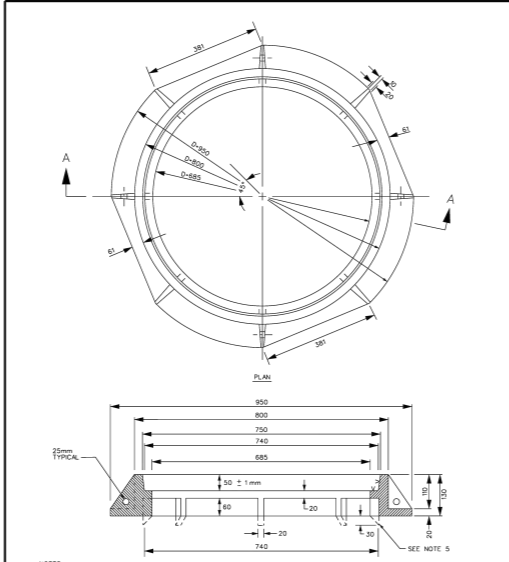
ISSUED

No.	Date	Description
0	2023 MAR 22	ISSUED FOR SITE PLAN APPROVAL
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2	2023 MAY 18	ISSUED FOR REZONING AND SITE PLAN CONTROL - RESUBMISSION #1
3	2023 JUL 13	ISSUED FOR SITE PLAN CONTROL - RESUBMISSION #2



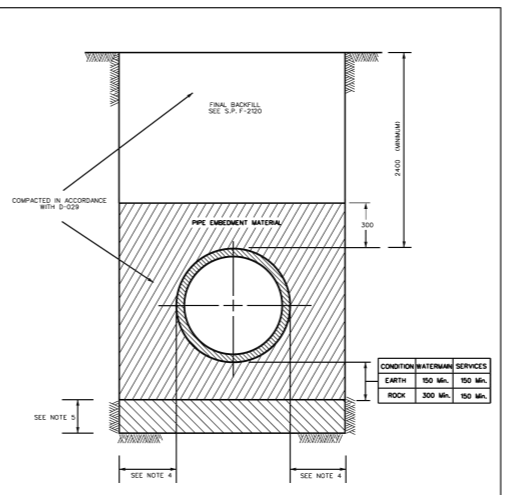
Ottawa STANDARD COVER FOR VALVE CHAMBERS

DATE: MAY 2001
REV: MARCH 2019
DWG. No.: W15



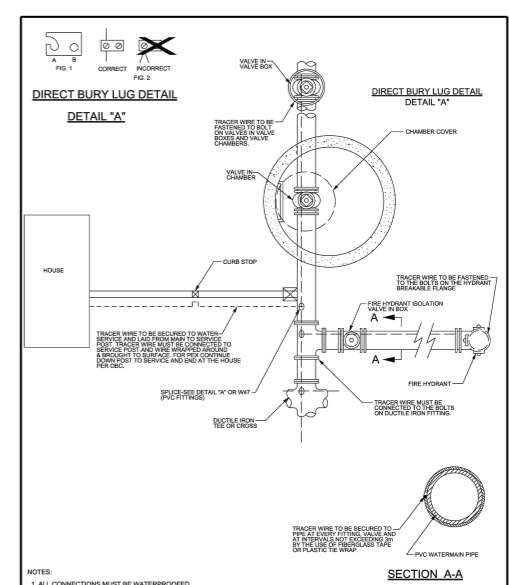
Ottawa STANDARD FRAME FOR VALVE CHAMBERS (MODIFIED OPSD-401.020)

DATE: MAY 2001
REV: MARCH 2006
DWG. No.: W16



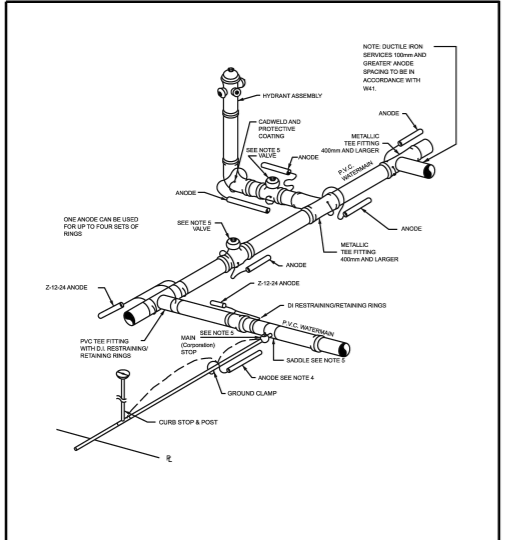
Ottawa STANDARD TRENCH DETAIL

DATE: MAY 2001
REV: MARCH 2016
DWG. No.: W17



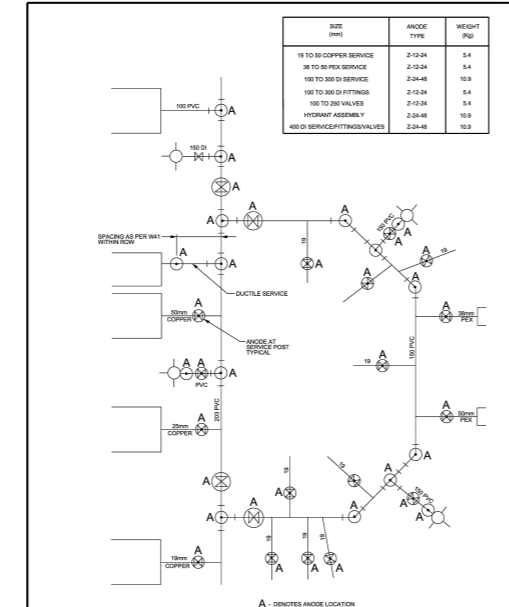
Ottawa TRACER WIRE INSTALLATION

DATE: MAY 2001
REV: MARCH 2014
DWG. No.: W36



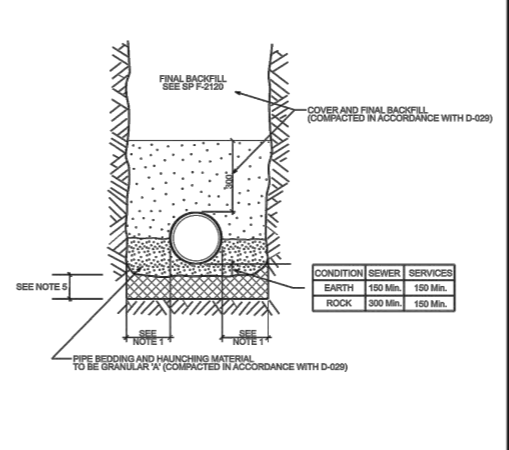
Ottawa CATHODIC PROTECTION FOR PVC WATERMAIN SYSTEMS

DATE: MAY 2001
REV: MARCH 2019
DWG. No.: W60



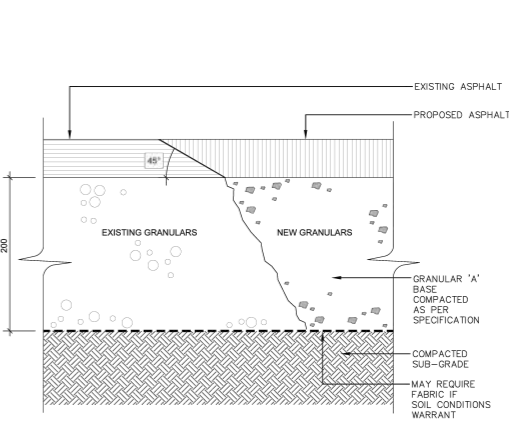
Ottawa TYPICAL ANODE INSTALLATION PVC WATERMAIN

DATE: MAY 2001
REV: MARCH 2014
DWG. No.: W42



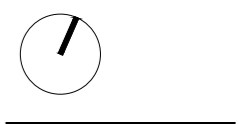
Ottawa SINGLE TRENCH (SEWER & SEWER SERVICES)

DATE: MAY 2001
REV: MARCH 2001
DWG. No.: S6



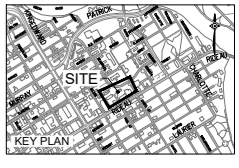
Ottawa ASPHALT REINSTATEMENT

DATE: JAN 2015
REV: MARCH 2021
DWG. No.: R25



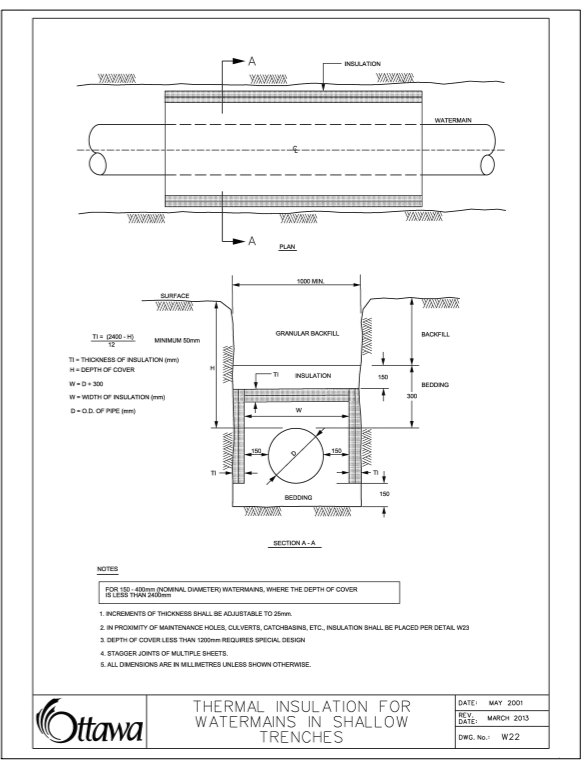
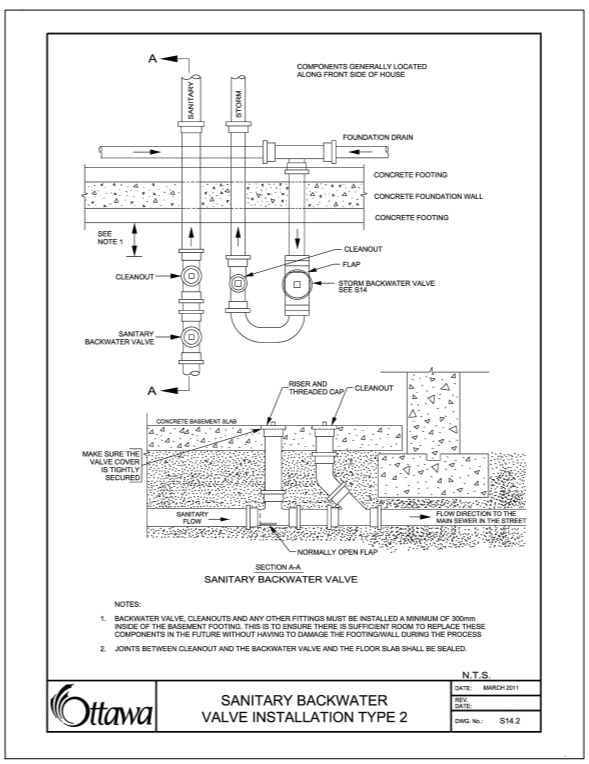
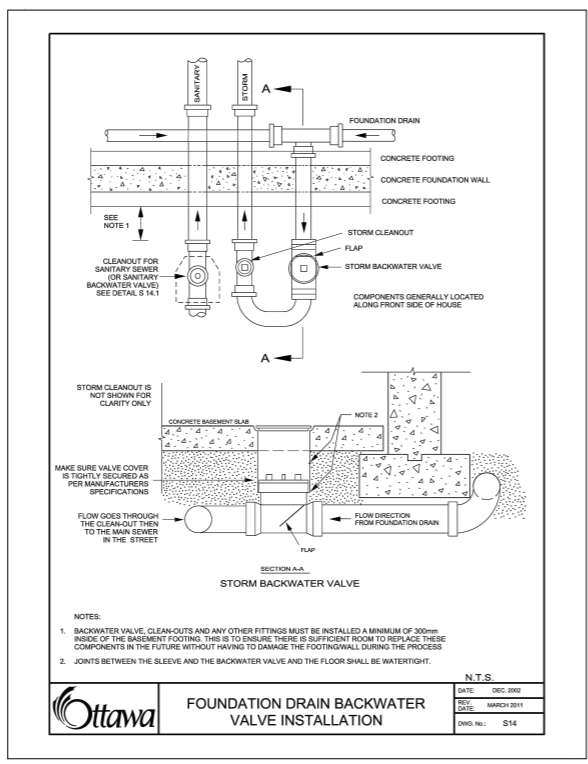
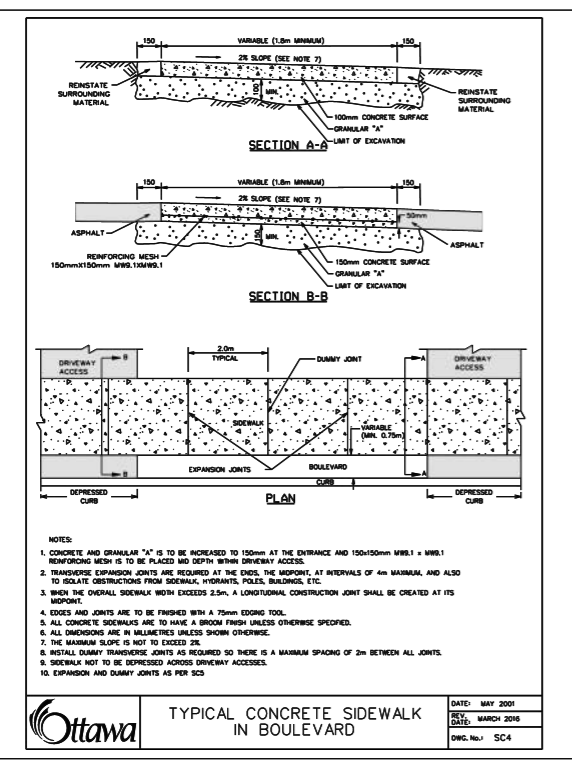
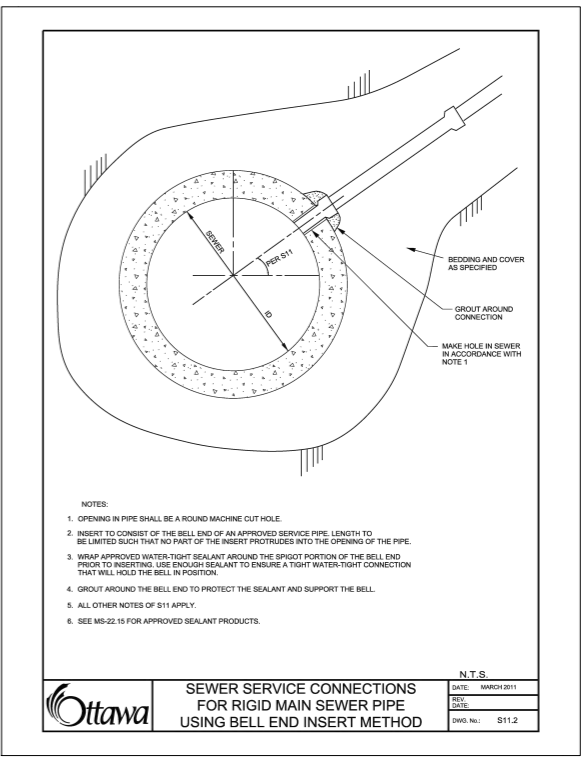
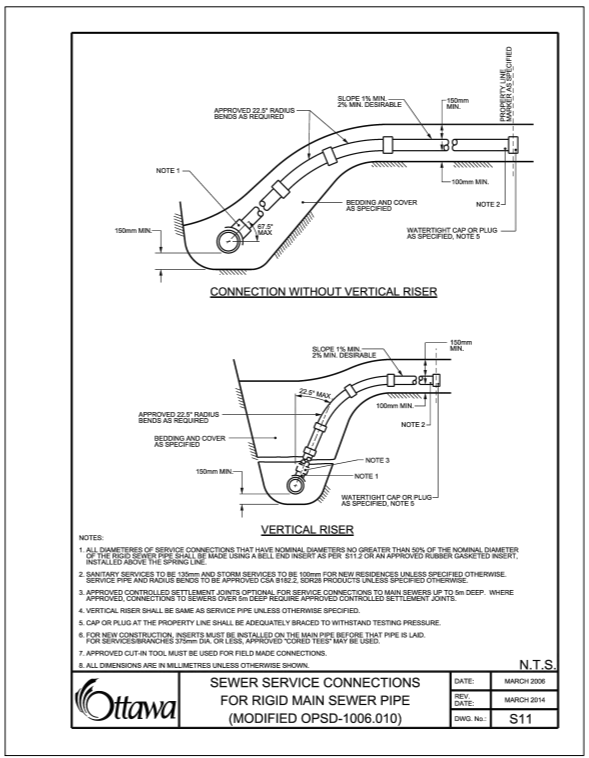
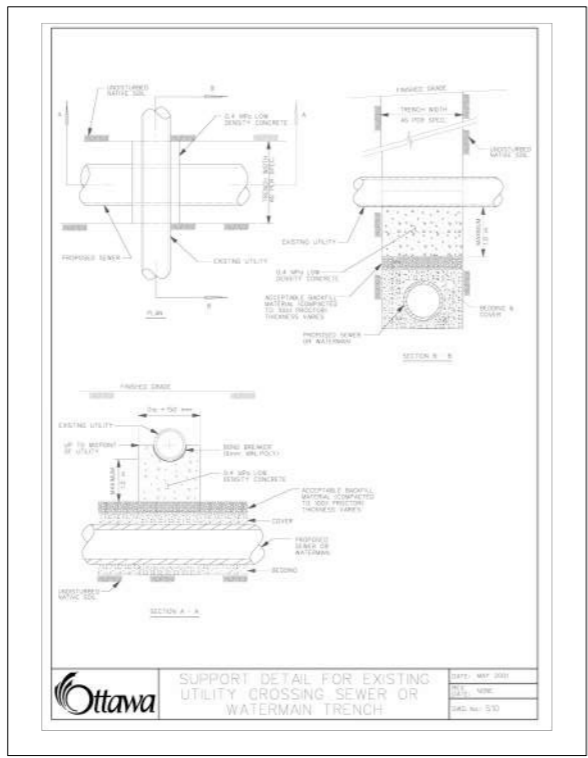
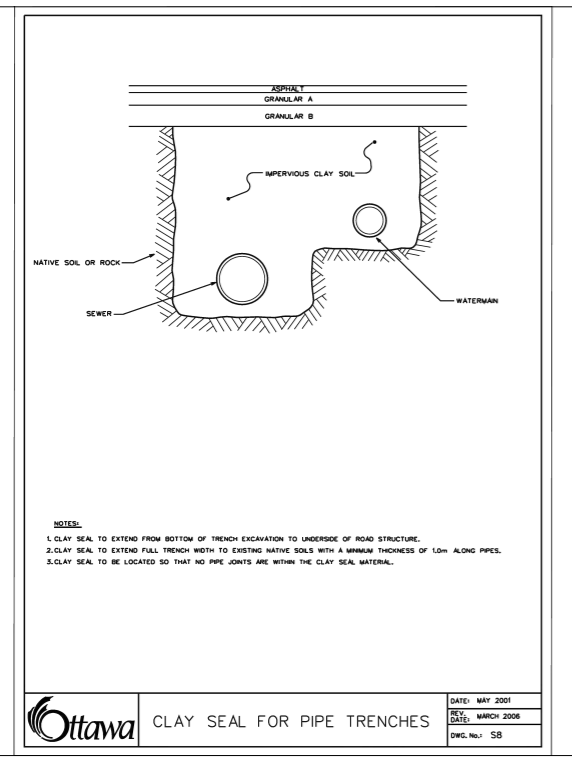
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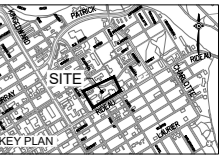
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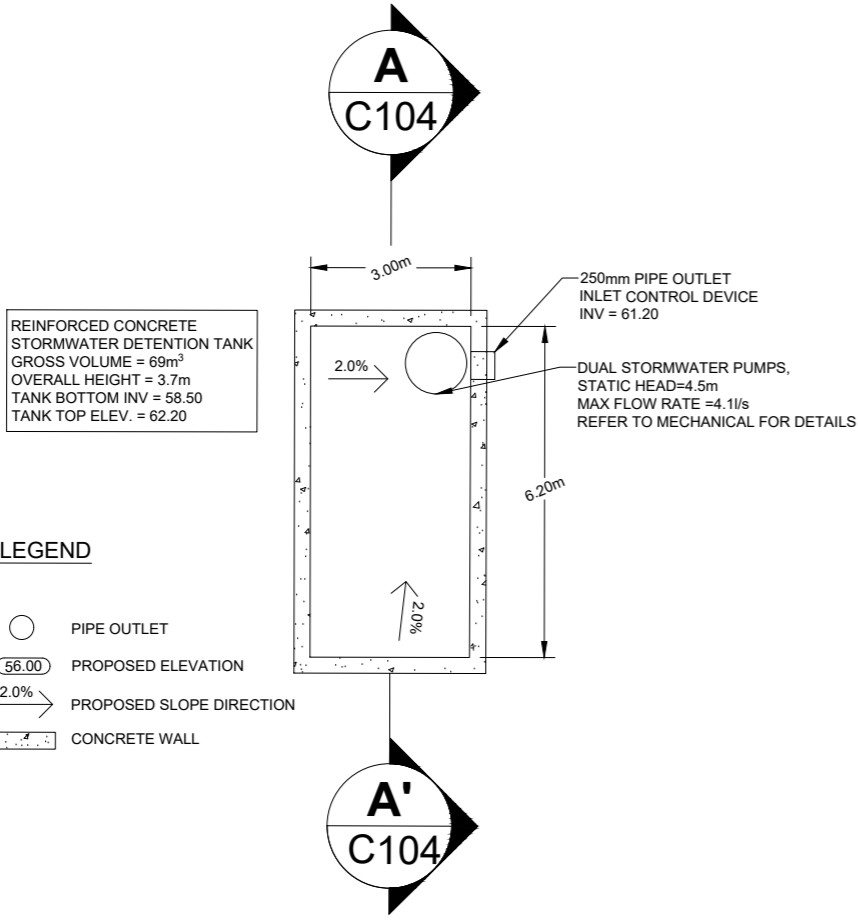
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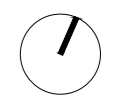
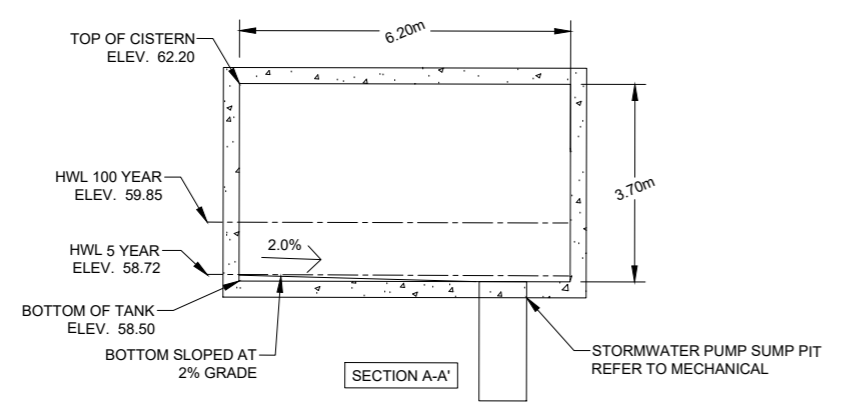
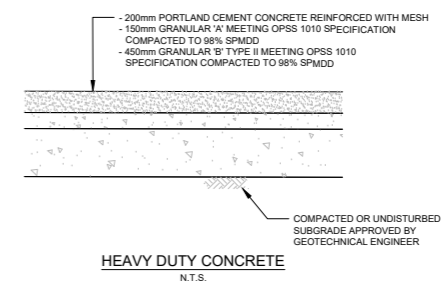
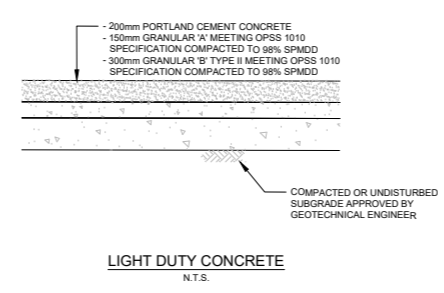
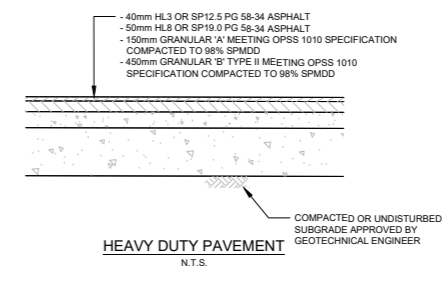
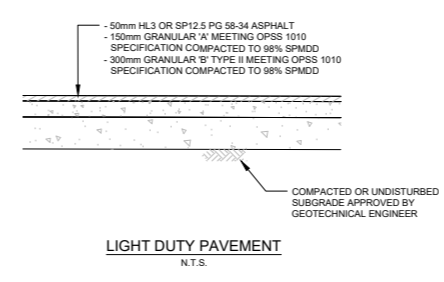
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REINFORCED CONCRETE STORMWATER DETENTION TANK
 GROSS VOLUME = 69m³
 OVERALL HEIGHT = 3.7m
 TANK BOTTOM INV = 58.50
 TANK TOP ELEV. = 62.20

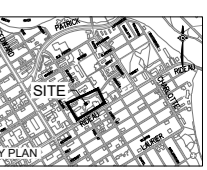
LEGEND

- PIPE OUTLET
- PROPOSED ELEVATION
- PROPOSED SLOPE DIRECTION
- CONCRETE WALL



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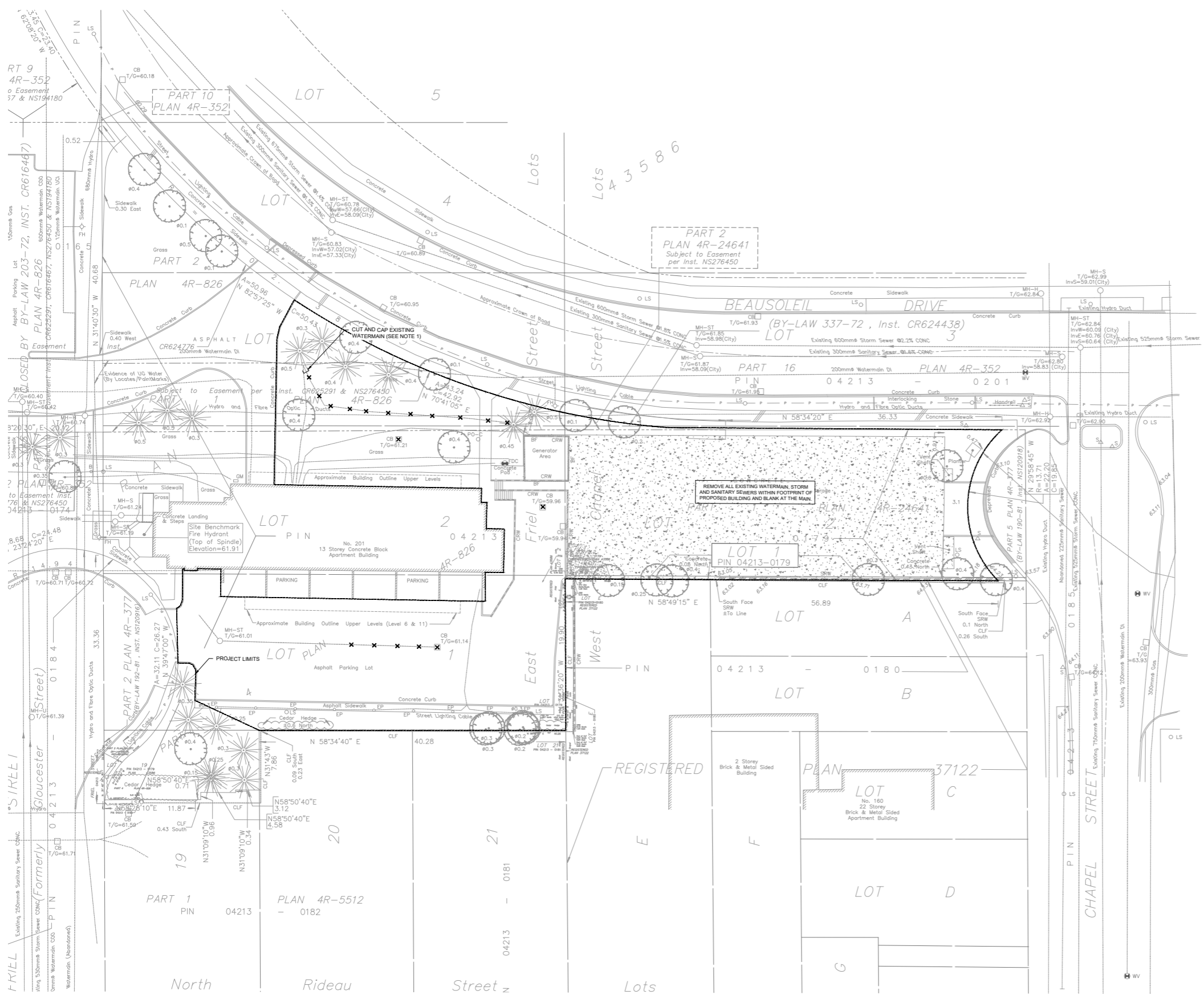


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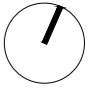
LEGEND

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



NOTES:

1. COMPLETE ALL REMOVALS AND ABANDONMENTS IN ACCORDANCE WITH OPSS MUNI. 510.



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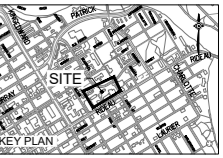
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221021

Scale: 1:200
Project No: 220262200
Date: 13/07/23

REMOVALS PLAN
DOT-12-23-0034
C700
#18930



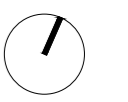
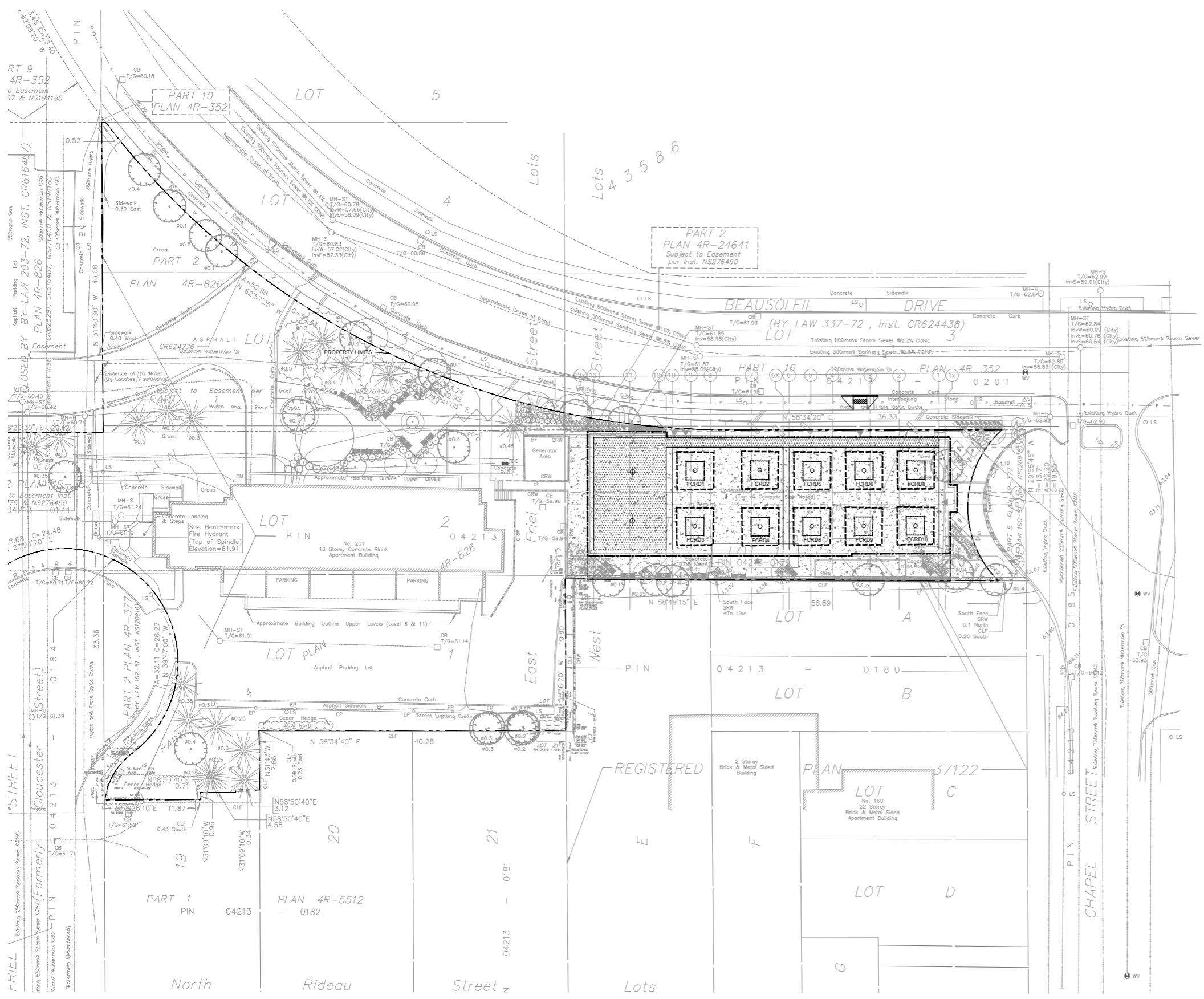
LEGEND

- FLOW CONTROLLED ROOF DRAIN
- UNCONTROLLED FLOW ROOF DRAIN
- AMENITY/UNOCCUPIABLE ROOF - NO FLOW CONTROL
- 5 YR=22mm DEPTH
- 100 YR=60mm 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

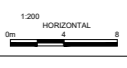
- NOTES:**
- PRODUCT - ADJUSTABLE ACCUTROL WEIR SETTING - 3/4 FLOW RATE APPROX. 0.8L/s IN 100-YR EVENT
 - FOR SCUPPER / EMERGENCY OVERFLOW LOCATIONS / ELEVATION REFER TO ARCHITECTURAL

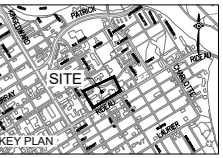


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21021

ROOF DRAIN LAYOUT & PONDING
Scale: 1:200
Project No: 220262300
Date: 13/07/23
C701
#18930

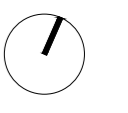
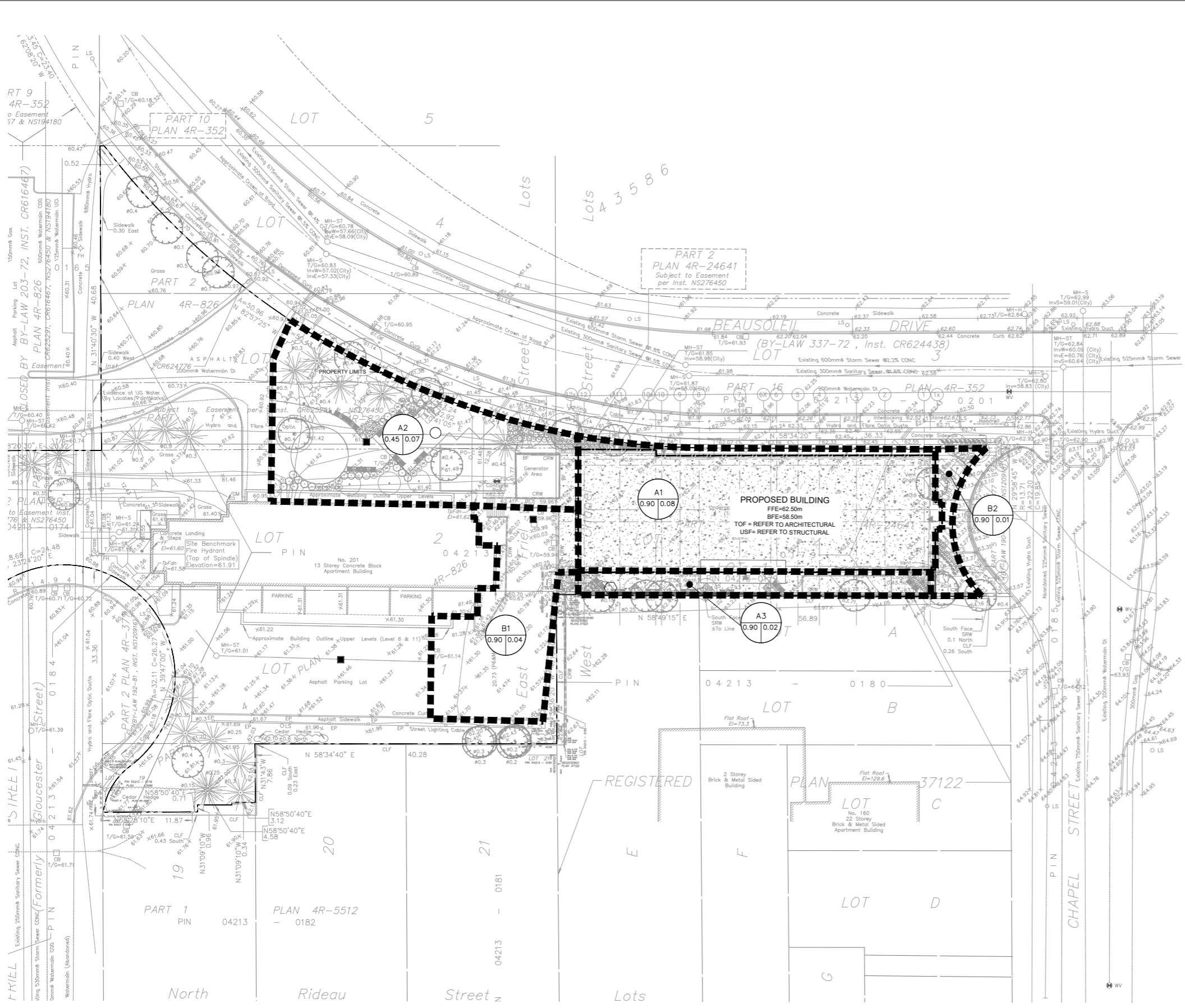
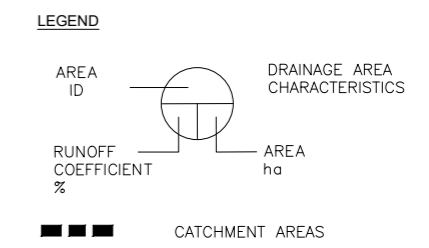




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NOTES
1. A1, A2 & A3 ARE PROPOSED CONTROLLED CATCHMENTS.
B1 & B2 ARE PROPOSED UNCONTROLLED CATCHMENTS.



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221021



Appendix B

MECP, RVCA and City of Ottawa Specific Requirements Correspondence

Pre-Consul Meeting Notes to the File Lead - Erin O'Connell

October 3, 2022

Re: 200-201 Friel

Ward 12 - Rideau-Vanier, Councillor Stéphanie Plante

18-Storey, Mixed-Use Residential Apt. Building with 146 units and UG & Surface Parking

For **Zoning applications**, please provide Adequacy of Servicing for the site, demonstrating that the site can be appropriately serviced and is able to achieve SWM, servicing and grading requirements, as per City Guidelines as well as City Policies such as, but not limited to, Standard Detail Drawings and By-Laws. Please also note the following:

Infrastructure:

Beausoleil Drive :

A 203 mm dia. DI Watermain (c. 1972) is available.

A 300 mm dia. Conc. Sanitary Sewer (c. 1971) is available, which drains to Patrick Street Sewer and conveys effluent to the Interceptor Sewer.

A 600 mm dia. Conc. Storm Sewer (c. 1971) is available, which drains to Patrick Street Sewer and Outlets to the Rideau River at Forsey St.

Friel Street:

A 610 mm dia. COO Feeder (HP) Watermain (c. 1972). No connections permitted and due to proximity of this infrastructure to site, a vibration monitoring program will be needed for construction with a \$25M separate insurance policy.

A 250 mm dia. Conc. Sanitary Sewer (c. 1971) is available, which drains to Patrick Street Sewer and conveys effluent to the Interceptor Sewer.

A 525 mm dia. Conc. Storm Sewer (c. 1971) is available, which drains to Cobourg Street Sewer Outlets to the Rideau

York Street Easement:

A 203 mm dia. DI Watermain (c. 1972) is available.

A 250 mm dia. Conc. Sanitary Sewer (c. 1971) is available, which drains to Patrick Street Sewer and conveys effluent to the Interceptor Sewer.

A 525 mm dia. Conc. Storm Sewer (c. 1971) is available, which drains to Cobourg Street Sewer Outlets to the Rideau

The following apply to this site and any development within a separated sewer area:

- Total allowable release rate will be 5-year pre-development rate.
- Coefficient (C) of runoff will need to be determined **as per existing conditions** but in no case more than 0.5
- TC = 20 minutes or can be calculated
TC should be no less than 10 minutes, since IDF curves become unrealistic at less than 10 min.
- Any storm events greater than 5 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.

Please 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. Provide Roof plan showing roof drain and scupper locations with a table that indicates flow rates, drain type and weir opening, if controlled. Provide Manufacturer Specifications on drains and also provide 5- and 100-year ponding limits on plan.

Boundary Conditions will be provided at request of consultant after providing Average Daily Demands, Peak Hour Demands & Max Day + Fire Flow Demands

If window wells are proposed, they are to be indirectly connected to the footing drains. A detail of window well with indirect connection is required, as is a note at window well location speaking to indirect connection.

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

Other:

Environmental Noise Study is required due to within 100m proximity of Rideau Street.

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.

When equal to or greater than 9-storey in height, a Shadow Study is required for all buildings/dwellings.

When equal to or greater than 9-storey in height, a Wind Study is required for all buildings/dwellings.

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 m³ / 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.



W12.pdf

Site Lighting:

Site lighting certificate and photometric plan required for this site. This will be a condition of agreement(s).

Site lighting certificate and photometric plan required for this site, particularly looking at light spillage and effects on nearby residential properties.

A gas pressure regulating station may be required depending on HVAC needs (typically for 12+ units). Be sure to include this on the Grading, Site Servicing, SWM and Landscape plans.

This is to ensure that there are no barriers for overland flow routes (SWM) or conflicts with any proposed grading or landscape features with installed structures and has nothing to do with supply and demand of any product.



Gas Pressure
Regulating Station.pdf

Regarding Quantity Estimates:

Please note that external Garbage and/or bicycle storage structures are to be added to QE under Landscaping as it is subject to securities.

In addition, sump pumps for Sanitary and Storm laterals and/or cisterns are to be added to QE under Hard items as it is subject to securities, even though it is internal and is spoken to under SWM and Site Servicing Report and Plan.

Source Protection Policy Screening (SPPS):

SPPS will be provided to applicant by City Risk Mgmt. Officer within Asset Mgmt. Dept.

PM – Send Request to Tessa Di Iorio tessa.diiorio@ottawa.ca

Applicant to contact Rideau Valley Conservation Authority (RVCA) for possible restrictions due to quality control. Provide correspondence in Report.

Where servicing involves three or more service trenches, either a full road width or full lane width 40 mm asphalt overlay will be required, as per amended Road Activity By-Law 2003-445 and City Standard Detail Drawing R10. The amount of overlay will depend on condition of roadway and width of roadway(s).

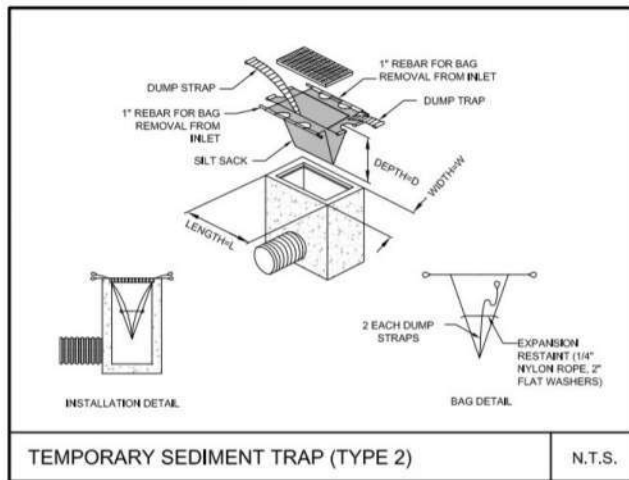
Vibration monitoring will be required for all backbone watermains (600 mm dia.) in proximity of site. Conditions for Vibration will be applied to agreements.

Note: In addition to requirement of a vibration specialist engineer required to design and monitor vibration, a certificate of liability insurance shall be submitted to the City wherein the Owner is the named insured and the City of Ottawa is an additional insured. The limits of the policy shall be in the amount of \$25,000,000 and shall be kept in full force and effect for the term of the construction work.

Pre-Construction (Piling/Hoe Ramming or excavation in close proximity to City Assets) and/or Pre-Blasting (if applicable) Survey required for any buildings/dwellings in proximity of 75m of site and circulation of notice of vibration/noise to residents within 150 m of site. Conditions for

Pre-Construction/ Pre-Blast Survey & Use of Explosives will be applied to agreements. Refer to City's Standard S.P. No. F-1201 entitled *Use of Explosives*, as amended. The intent is to protect nearby property owners, City and Utility Assets and, if applicable, unsupported claims against the applicant.

For Erosion and Sediment Control, provide details of specified and approved products. Please note that wrapping CB grates with geotextile fabric is not longer acceptable, see example of accepted CB protection, below:



UG storage and Surface Ponding for 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 $\frac{1}{2}$ 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 be 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

Rear yard on grade parking to be permeable pavement. Refer to City Standard Detail Drawings SC26 (maintenance/temp parking areas), SC27 or permeable asphalt materials. No gravel or stone dust parking areas permitted.

Severance:

If severance is planned, this needs to be addressed in servicing to satisfy severance requirements. Where a large parcel with multiple buildings is planned, City will require an ultimate servicing plan so as to appropriately understand how severance requirements are being met.

Info "Provided Info to applicant" by City:

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:

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>.

Specific information has been incorporated into both the [Guide to Preparing Studies and Plans](#) for a site plan. The guide outlines the requirement for a statement to be provided on the plan about where the property boundaries have been derived from.

Added to the general information for servicing and grading plans is a note that an O.L.S. should be engaged when reporting on or relating information to property boundaries or existing conditions. The importance of engaging an O.L.S. for development projects is emphasized.

Provide TBM location and elevation as well s Survey Monument information (taken from Survey Plan). Monument information should look like the following:

BENCH MARK No. 0011968U124
ELEVATIONS SHOWN ARE GEODETIC AND ARE REFERRED TO BENCHMARK No. 0011968U124 HAVING A PUBLISHED ELEVATION OF 95.185m. LOCATION: BRIDGE OVER JOCK RIVER IN RICHMOND, 0.8 KM SOUTH OF RICHMOND ROAD, BARSS CAP IN TOP OF EAST WALL, 2.7M FROM NORTH END.

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 all current and relative ISTDB 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 all current and relative ISTDB 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 drawings, by-Laws and guidelines.

Lane Closures:

Special Condition is required for SPC – Applicant to contact Traffic Eng. Reviewer PM and/or File Lead to contact Britney McGrath at Britney.McGrath@ottawa.ca (Ext. 44218)

Structural Works within ROW:

Constructability Report required for any structural works (i.e. Tiebacks) within the ROW.
PM and/or File Lead to contact Greg Kent (Mgr., Traffic Mgmt.) Ext # 21707 -
Greg.Kent@ottawa.ca

Fourth (4th) Review Charges,

Please note that additional charges (per day) for each review, for 4th and each consecutive review, will be applicable to each file. No exceptions.

Construction approach – Please contact the Right-of-Ways Permit Office TMconstruction@ottawa.ca early in the OP / Zoning and/or Site Plan process to determine the ability to construct site and copy Erin O'Connell on this request.

Fire Routes - fireroutes@ottawa.ca

Contact me by e-mail shawn.wessel@ottawa.ca if you have any questions.

Sincerely,



Shawn Wessel, A.Sc.T., rcji
Project Manager
Development Review, Central Branch
Planning, Infrastructure and Economic Development Department (PIED)
City of Ottawa

Description:

A Design Brief is the core submission document that illustrates how the development is designed to work with its existing and planned context, to improve its surroundings and also demonstrate how the proposal supports the overall goals of the Official Plan, relevant secondary plans, Council approved plans and design guidelines. The purpose of the Terms of Reference is to assist the applicant to organize and substantiate the design justification in support of the proposed development and to assist staff and the public in the review of the proposal.

Authority to Request a Design Brief:

The *Planning Act* gives municipalities the authority to require that a Design Brief be prepared. Under Sections 22(4), (5) and Section 41(4) of the *Planning Act*, a Council has the authority to request such other information or material that the authority needs in order to evaluate and make a decision on an application. Section 5.2.6 of the Official Plan sets out the general requirement for a Design Brief.

Preparation:

The Design Brief should be signed by an urban designer, licenced architect, landscape architect, or a full member of the Canadian Institute of Planners.

When Required:

A Design Brief is required for a Site Plan Control planning application.

A Scoped Design Brief* is required when the following planning applications are applied for and not accompanied by a Site Plan Control application:

- Official Plan Amendment
- Zoning By-law Amendment (exception: a change in use which does not result in an increase in height or massing)

The requirement and scope of a Design Brief will be determined at the formal pre-application consultation meeting. Should an application be required to go to the [Urban Design Review Panel \(UDRP\)](#), the Design Brief may be submitted as part of the submission materials to the panel.

Contents for Design Brief Submissions:

A Design Brief will contain and/or address the points identified during the pre-consultation meeting. Failure to address the critical elements identified in the pre-consultation meeting may result in the application being considered incomplete.

* A *Scoped Design Brief* is composed of:

- Section 1 should be combined into the *Planning Rationale* submission, and
- Section 2 items will be confirmed in the pre-application consultation meeting.

SECTION 1 Note: This section may be combined with the Planning Rationale report

Application Submission:

Not Required

Required

State the: type of application, legal description, municipal address, purpose of the application and provide an overall vision statement and goals for the proposal.

Response to City Documents:

Not Required

Required

State the Official Plan land use designation for the subject property and demonstrate how the proposal conforms to the Official Plan as it relates to the design of the subject site. Reference specific policy numbers from the Official Plan to show consistency. Justify areas of non-compliance and explain why there is non-compliance.

State the applicable plans which apply to the subject proposal: community design plan, secondary plan, concept plan and design guideline. Reference the relevant design related policies within the applicable plans/guidelines and provide a comprehensive analysis as to how the proposed development incorporates the objectives or why it does not incorporate the objectives.

Context Plan:

Not Required

Required

Provide a contextual analysis that discusses/illustrates abutting properties, key destinations and linkages within a 100 meter radius (a larger radius may be requested for larger/more complex projects), such as transit stations, transportation networks for cars, cyclists, and pedestrians, focal points/nodes, gateways; parks/open spaces, topography, views towards the site, the urban pattern (streets, blocks), future and current proposals (if applicable), public art and heritage resources.

Photographs to illustrate existing site conditions and surrounding contexts. Include a map pinpointing (with numbers) where each photo is taken and correspond these numbers with the site photos. Arrows illustrating the direction the photo is taken is also useful.

SECTION 2

Design Proposal:

The purpose of the Design Proposal is to show the building elevations, exterior details, transitions in form, treatment of the public realm and compatibility with adjacent buildings, using 3-D models, illustrations, diagrams, plans, and cross sections. Referencing Official Plan, Section 5.2.1, as determined at time of pre-application consultation meeting, submissions will need to address the following in the form of labelled graphics and written explanation:

Massing and Scale

Not Required

Required

Images which show:

Building massing – from:

- at least two sides set within its current context (showing the entire height and width of the building) **OR**
- all four sides set within its current context (showing the entire height and width of the building).

Views – of the entire block, from:

- at least two perspectives to show how the proposed building is set within its current context **OR**
- all four perspectives to show how the proposed building is set within its current context.

Building transition – to adjacent uses, with labelled explanation of the transition measures used.

Grading – if grades are an issue.

Alternative building massing – additional imagery and site layouts considered and provide justification for the ultimate proposal sought.

Public Realm

Not Required

Required

Labelled graphics and a written explanation which show:

Streetscape – cross sections which illustrate the street design and right of way (referencing the City's design manuals).

Relationship to the public realm – illustrating how the first few storeys of the proposed development responds to and relates to the existing context (e.g. through a podium plan and first floor plan). This is to include detailed explanation on:

- Architectural responses
- Landscaping details
- Public art features (in accordance with Official Plan, Section 4.11)
- For developments in Design Priority Areas, detail the building and site features, (in accordance with Official Plan, Section 4.11) which will enhance the public realm. Provide explanation for features which are not provided.

Building Design

Not Required

Required

Labelled graphics (e.g. building elevations and floor plans) and a written explanation which document the proposed exterior architectural details and design (in accordance with Official Plan, Section 5.2.1).

For high-rise development applications, detail the building design and massing and scale elements and how they relate to the proposed high-rise development (in accordance with Official Plan, Section 5.2.1).

Sustainability

Not Required

Required

Any sustainable design features to be incorporated, such as green roofs or walls, sun traps, reflective or permeable surfaces.

Heritage

Not Required

Required

How the building relates to the historic details, materials, site and setting of any existing historic resources on or adjacent to the subject property (if applicable).

Additional Contents:

Some proponents may be requested to provide submission material which complements the Design Brief. These additional requirements could be incorporated into the Design Brief submission for ease of review. These will be identified at the time of application consultation meeting:

- Site Plan
- Landscape Plan
- Elevations
- POPS plan
- Master Plan for entire site
- Plan showing existing and proposed servicing
- Shadow Analysis

Submission Requirements

- Digital copies only

APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

Legend: **S** indicates that the study or plan is required with application submission.

A indicates that the study or plan may be required to satisfy a condition of approval/draft approval.

For information and guidance on preparing required studies and plans refer [here](#):

S/A	ENGINEERING		S/A
S	1. Site Servicing Plan	2. Site Servicing Study / Assessment of Adequacy of Public Services	S
S	3. Grade Control and Drainage Plan	4. Geotechnical Study / Slope Stability Study	S
<input type="checkbox"/>	5. Composite Utility Plan	6. Groundwater Impact Study	<input type="checkbox"/>
<input type="checkbox"/>	7. Servicing Options Report	8. Wellhead Protection Study	<input type="checkbox"/>
<input type="checkbox"/>	9. Transportation Impact Assessment (TIA)	10. Erosion and Sediment Control Plan / Brief	S
S	11. Storm water Management Report / Brief	12. Hydro geological and Terrain Analysis	<input type="checkbox"/>
<input type="checkbox"/>	13. Hydraulic Water main Analysis	14. Noise / Vibration Study	S
<input type="checkbox"/>	15. Roadway Modification Functional Design	16. Confederation Line Proximity Study	<input type="checkbox"/>
S	17. Existing Conditions and Removals Plan	18. Pre- and Post-Development Drainage Plans	<input type="checkbox"/>
S	19. Roof Drainage Plan	20.	

S/A	PLANNING / DESIGN / SURVEY		S/A
<input type="checkbox"/>	21. Draft Plan of Subdivision	22. Plan Showing Layout of Parking Garage	S
<input type="checkbox"/>	23. Draft Plan of Condominium	24. Planning Rationale	S
S	25. Site Plan	26. Minimum Distance Separation (MDS)	S
S	27. Concept Plan Showing Proposed Land Uses and Landscaping	28. Agrology and Soil Capability Study	<input type="checkbox"/>
<input type="checkbox"/>	29. Concept Plan Showing Ultimate Use of Land	30. Cultural Heritage Impact Statement	S
S	31. Landscape Plan	32. Archaeological Resource Assessment Requirements: S (site plan) A (subdivision, condo)	S
S	33. Survey Plan	34. Shadow Analysis	S
S	35. Architectural Building Elevation Drawings (dimensioned)	36. Design Brief (includes the Design Review Panel Submission Requirements)	S
S	37. Wind Analysis		

S/A	ENVIRONMENTAL		S/A
S	38. Phase 1 Environmental Site Assessment	39. Impact Assessment of Adjacent Waste Disposal/Former Landfill Site	<input type="checkbox"/>
A	40. Phase 2 Environmental Site Assessment (depends on the outcome of Phase 1)	41. Assessment of Landform Features	<input type="checkbox"/>
<input type="checkbox"/>	42. Record of Site Condition	43. Mineral Resource Impact Assessment	<input type="checkbox"/>
<input type="checkbox"/>	44. Tree Conservation Report	45. Environmental Impact Statement / Impact Assessment of Endangered Species	<input type="checkbox"/>
<input type="checkbox"/>	46. Mine Hazard Study / Abandoned Pit or Quarry Study	47. Integrated Environmental Review (Draft, as part of Planning Rationale)	<input type="checkbox"/>

S/A	ADDITIONAL REQUIREMENTS		S/A
S	48. Applicant's Public Consultation Strategy (may be provided as part of the Planning Rationale)	49. Site Lighting Plan	S
A	50. Site Lighting Certification Letter	51.	

Meeting Date: September 15, 2022

Application Type: *Official Plan (to be confirmed), Zoning By-law Amendment & Site Plan Control*

File Lead (Assigned Planner): Nader Kadri

Infrastructure Approvals Project Manager: Mohammed Fawzi

Site Address (Municipal Address): 200-201 Friel Street *Preliminary Assessment: 1 2 3 4 5

*One (1) indicates that considerable major revisions are required before a planning application is submitted, while five (5) suggests that proposal appears to meet the City's key land use policies and guidelines. **This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.**

It is important to note that the need for additional studies and plans may result during application review. If following the submission of your application, it is determined that material that is not identified in this checklist is required to achieve complete application status, in accordance with the Planning Act and Official Plan requirements, the Planning, Real Estate and Economic Development Department will notify you of outstanding material required within the required 30 day period. Mandatory pre-application consultation will not shorten the City's standard processing timelines, or guarantee that an application will be approved. It is intended to help educate and inform the applicant about submission requirements as well as

municipal processes, policies, and key issues in advance of submitting a formal development application. This list is valid for one year following the meeting date. If the application is not submitted within this timeframe the applicant must again pre-consult with the Planning, Real Estate and Economic Development Department.

Pre-Application Consultation Meeting Notes

Property Address: 200-201 Friel Street
PC2022-0223

September 15, 2022; 2:00 PM – 3:00 PM – Microsoft Teams

Attendees:

City of Ottawa:

Nader Kadri – *File Lead, Planner II*
Jenny Kluge – *Housing Developer*
Shawn Wessel – *Infrastructure PM*
Ann O'Connor – *Urban Designer*
Amber Chen – *Student Planner*

Applicants:

Barron Meyerhoffer – *OCH*
Kevin Feng – *OCH*
Dylan Bennett – *OCH*
Emily Essex – *Diamond Schmidt Architects*
Alison Modi – *Diamond Schmidt Architects*
Arne Suraga – *Diamond Schmidt Architects*
Nadia De Santi – *WSP*
Ashwani Kumar – *WSP*
Jill MacDonald – *WSP*
Colin MacKenzie – *Morrison Hershfield*
Daniel Glausier – *Morrison Hershfield*
James Fookes – *Morrison Hershfield*
Ryan Paliga – *Lashley + Associates Corporation*
Ran Zaig – *KWC Architects*

Community Representatives:

Warren Waters

Regrets:

Wally Dubyk – *Infrastructure PM*

Subject: 200-201 Friel Street

Meeting notes:

- Opening & attendee introduction
 - Introduction of meeting attendees

Overview of Proposal

- Designated as a downtown core policy area: intended as a 15-minute neighbourhood
- Site is part of the Uptown Rideau Secondary Plan - has been renamed Central and East Downtown Core Secondary Plan
 - Maximum height of nine storeys with the potential for density redistribution subject to conditions
- Zoning: mature neighborhoods overlay, R5B H(18) F(2.0)
- Seniors home development
- 18-storey building plus mechanical penthouse (65m overall building height)
- 146 units, 110 of those would be typical standard units, 36 would be accessible
- Additional opportunities to engage the neighbourhood with the community facilities and amenity spaces in the building
- Parking oversupply relative to OCH program, current parking spaces are often vacant

Planning (Nader Kadri) and Urban Design (Ann O'Connor) (applicant response)

- What is the function of the site today? Is there anything below grade?
 - *One storey underground garage that's never been used, top is a surface parking*
- Will the proposed development be 100% affordable or will it be a joint venture with market housing?
 - *They will all be affordable units which will fall under OCH*
- Would the proposal form part of a larger redevelopment planned for the site? If so, what are OCH's long term plans for the site?
 - *No long term development plans for the existing buildings at 200 and 201 Friel Street*
- The Uptown Rideau Secondary Plan includes key criteria for density redistribution. Will the criteria be met, if so, what is the proposed location for the required POPS? If not, what amendments would sought by way of OPA? What will the resulting of FSI of the entire site be?
 - *Unsure about FSI – to be explored further.*
 - *Other criteria is being met with the exception of the tall tower policies embedded into the Secondary Plan*
- What is the proposed floor plate for the tower?
 - *Floor plate is 482 square metres*
- The URSP calls for a 6-storey podium – is there a reason that 7 is proposed? Best approach moving forward is to avoid an OPA, may need to look into changing the design
 - *It is to reference the building at Chapel Street*
- Tower break needed along the east façade to distinguish tower from podium.
- Has the development team looked at the shadow impacts on the school?
 - *Minimal shadow impacts expected – applicant to explore further.*
- Is parking planned as part of the proposal?
 - *Limited parking is being explored to support the building program.*
- Opportunity for shared parking and loading with the other buildings?
 - Staff are not supportive of the idea of loading/unloading in the public realm
 - Explore a below grade option
- Design excellence is key, and I really appreciate some of the efforts made on the podiums and lower-scale buildings to fit with the surrounding context. Ground floor

animation is important, so please ensure that this is prioritized relative to all four sides of the building with your formal submission. Could the community space face out onto the POPS as well?

- Materiality – please provide details on materials with submission.
- Amenity – please ensure that there are amenity areas that are supporting families as well as pets. Thinking about play areas, and pet wash and pet relief areas.
- Bicycle parking – happy to see that you are in excess of the by-law requirement, however, having lived in an urban context for many years, I also understand the importance of easy access to and from the bicycle storage area. Would like to see a consolidated room with easy access to and from the ground level.
- Please consult with the Councillor or other community orgs.
- A Design Brief that follows the provided Terms of Reference is required upon submission of the application.
- The subject site is not within a Design Priority Area (DPA) and is therefore not required to attend the Urban Design Review Panel (UDRP); however, given the complexity of the site and its surroundings, a UDRP visit is encouraged.
- Staff recommend reviewing the entirety of the site at 200 and 201 Friel St in a holistic way. Consider what potential redevelopment plans OCH has for the rest of the site; for example, if there are plans to replace the existing two 13-storey high-rises on the property. Consider what the phasing strategy would be for this master-plan type redevelopment of the entire site. Pursuing this more comprehensive piece is important in understanding the appropriateness of the proposed development as well as the location and development of the required POPS, public realm improvements, and overall connectivity and relationship this site has to its neighbours.
- Staff have concern with the proximity of the proposed high-rise building to the existing high-rise development to the south at 160 Chapel St.
 - Currently, a 3m setback is proposed, whereas the *Uptown Rideau Secondary Plan, Section 5.4 Built Form Principles, Policy (3)(h)* states the towers should be setback a minimum of 11.5m from the rear and side property lines to achieve minimum separation. Similarly, the *Urban Design Guidelines for High-rise Buildings, Section 2.25(b)* also identifies that a tower must provide a minimum 11.5m setback from the side and/or rear property lines when abutting another high-rise building.
 - Consider a mid-rise built form at this location. A mid-rise building would not require the same 11.5m separation distance.
 - Should such a reduced setback for a high-rise built form be pursued, please explore a Limiting Distance Agreement with the abutting neighbour to the south at 160 Chapel St.
- This site is identified in the *Uptown Rideau Secondary Plan* as being eligible for density distribution, provided a number of criteria and thresholds are met. Please review such criteria in the Secondary Plan, particularly *Section 5.3 Density Redistribution*. This section requires a minimum 2,000m² sized lot; that the total FSI onsite does not exceed 5; a minimum 200m² sized Privately-Owned-Public Space (POPS) be provided; and more.
 - Please confirm that the two addressed lots (200 and 201 Friel) are under the same numbered company and are legally considered one lot.
 - Please confirm the proposed total FSI (total of the existing and proposed developments onsite). Consider any future redevelopment plans onsite when reviewing this FSI.

- Please confirm where and how large the POPS space will be located. Review Section 6.2 of the Secondary Plan for guidance on the POPS design.
- Please note that a holding provision for any Zoning Bylaw Amendment applications subject to density redistribution will apply as per Section 7.1 of the Secondary Plan.
- Please review the *Uptown Rideau Secondary Plan Section 5.4 Built Form Principles* and clarify:
 - What efforts that are being made to animate the public realm. See 5.4 (1)
 - What the setbacks from the ROW streets are. Note that a setback of 3m to allow for landscaping and tree planting is encouraged. See 5.4 (1)(d).
 - What the podium height is. Note that the max podium height should be 6 storeys. See 5.4 (3)(c).
 - What the proposed floor plate is. Note that the max floor plate for a tower containing primarily residential uses should be 750m². See 5.4(3)(e).
- From an Urban Design perspective, our biggest focus on any redevelopment at this location will be to ensure: (1) a holistic approach to the redevelopment of the site is achieved; (2) the public realm is being positively addressed and enhanced; (3) the proximity of any new development on site to existing context is considered (see above notes); (4) the density thresholds in the Secondary Plan are met, including not exceeding a max 5 FSI; and (5) a POPS is provided and adheres to the Secondary Plan.
- Please ensure compliance with the Uptown Rideau Community Design Plan and Secondary Plan and the Bird-safe Design Guidelines and Urban Design Guidelines for High-Rise Development as much as possible.

Infrastructure – Shawn Wessel



- the red circled 600mm Feeder WM require vibration monitoring and an additional \$25,000,000.00 in insurance

- requires to meet stringent conditions and a special vibration engineer

Transportation - Wally Dubyk

- Beausoleil Drive is classified as a Collector road. There are no additional protected ROW limits identified in the OP.
- Both Friel Street and Chapel Street are classified as Local roads. There are no additional protected ROW limits identified in the OP.
- The Screening Form has indicated that the Trip Generation Trigger has been met. Please proceed with the TIA Step 2 – Scoping Report.
- During the Analysis, ensure that both TDM checklists are filled out and appropriate measures are taken to achieve the target modal shares. In the future, please contact Tim Wei (tim.wei@ottawa.ca) to obtain a local snapshot of the Long-Range Transportation model to help inform background growth rates.
- All underground and above ground building footprints and permanent walls need to be shown on the plan to confirm that any permanent structure does not extend either above or below into the sight triangles and/or future road widening protection limits.
- Permanent structures such as curbing, stairs, retaining walls, and underground parking foundation also bicycle parking racks are not to extend into the City's right-of-way limits.
- Minimum lane width for fire trucks is 6.0 metres. A fire truck three-point turn as it relates to the proposed lane configurations is to be confirmed by the Fire Chief.
- The Owner shall be required to enter into maintenance and liability agreement for all pavers, plant and landscaping material placed in the City right-of-way and the Owner shall assume all maintenance and replacement responsibilities in perpetuity.
- Bicycle parking spaces are required as per Section 111 of the Ottawa Comprehensive Zoning By-law. Bicycle parking spaces should be located in safe, secure places near main entrances and preferably protected from the weather.
- Should the property Owner wish to use a portion of the City's road allowance for construction staging, prior to obtaining a building permit, the property Owner must obtain an approved Traffic Management Plan from the Manager, Traffic Management, Transportation Services Department. The city has the right for any reason to deny use of the Road Allowance and to amend the approved Traffic Management Plan as required.

Housing – Jenny Kluke

- As a not-for-profit housing provider, the planning application fees for the proposed development will be waived. The initial design review and inspection fee and conservation authority fee will have to be paid by OCHC.

Please contact Jenny Kluke at jenny.kluke@ottawa.ca or 613-894-7654 for any questions related to affordable housing.

Lowertown Community Association

Warren Waters

- Affordable housing is vital and this is clearly the next natural increment of development, it can improve the neighborhood, and can easily transition to neighbouring buildings.
- Propose making this project a pilot of the OCH/OCBN Community Benefit Agreement - please ask Chris Youdale and Stephane Giguere to consider.
- The problematic laneway between Friel and Nelson runs along the north side of the property and has long had security concerns - which should be addressed also in any POP - the laneway has a high use but women and children report feeling unsafe walking even in daylight when men loiter and use drugs or drink. Animating the lane and the POPs will help but must consider crime prevention through environmental design - the community must be included in order to make both the POP and laneway safer (another reason to use the CBA pilot approach).
- Clarify if OPA or rezoning is needed - and whether all 6 density redistribution requirements will be met. Meeting them all should not be optional.
- Transition to both streets and neighbouring buildings should avoid blank walls - that is a problem with the laneway - do not repeat that here.
- Can the Youth Club get access to a proposed community space - that can blend seniors and youth to the benefit of both. (Youth deserve better than the basement they currently have).
- Garbage and moving access onto Chapel will lead to Chapel becoming a freight zone, driving people away rather than attracting them.

Conclusion and Next Steps

- Meeting minutes and comments will be circulated.
- Put together a set of meeting minutes and formal submission requirements (checklist)
- Leading up to Formal Submission – if you want to run through some changes, the city staff would be happy to hear – reach out.
- If you have questions reach out to Nader Kadri.

From: Glen McDonald <glen.mcdonald@rvca.ca>
Sent: Thursday, March 23, 2023 2:15 PM
To: Daniel Glauser <DGlauser@morrisonhershfield.com>
Cc: Jamie Batchelor <jamie.batchelor@rvca.ca>; Dillon ONeil <DONeil@morrisonhershfield.com>
Subject: RE: Residential Development - 200/201 Friel

Daniel,

Given the recent changes to the scope of comment and review imposed upon us by Bill 23 and Ontario Regulation 596/22, we are no longer able to provide any direction with respect to stormwater quality. We can only comment on quantity control as it relates to impact on natural hazards (i.e. flood and erosion control). I recommend that you refer this question to City of Ottawa or MOECP staff.

Glen

Glen McDonald MCIP RPP
Director of Planning and Watershed Science
glen.mcdonald@rvca.ca ext. 1133



3889 Rideau Valley Drive
PO Box 599, Manotick ON K4M 1A5
T 613-692-3571 | 1-800-267-3504 F 613-692-0831 | www.rvca.ca

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From: Daniel Glauser <DGlauser@morrisonhershfield.com>
Sent: Thursday, March 23, 2023 1:39 PM
To: Glen McDonald <glen.mcdonald@rvca.ca>
Cc: Jamie Batchelor <jamie.batchelor@rvca.ca>; Dillon ONeil <DONeil@morrisonhershfield.com>
Subject: Residential Development - 200/201 Friel

Hi Glen

We are designing a residential development located at 200 Friel Street ([Link to Map location](#)). The proposed development consists of a tiered 20-storey residential tower with a parking garage in the basement. This is an infill development, so there is no change in the parking count on the existing site. Stormwater from the site will be directed

into an existing storm sewer in Beausoleil which outlets in Rideau River at Island Lodge road. I've attached an overview municipal storm sewers with the proposed site in red.

The current 0.21 ha site consists of a parking lot with a level of underground parking. I've also attached some preliminary design drawings to show the proposed development.

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

Kind Regards

Daniel Glauser, P. Eng

Municipal Engineer - Infrastructure Ottawa

Office: 613 739 2910 Ext. 1022323

DGlauser@morrisonhershfield.com



2932 Baseline Road | Ottawa, ON K2H 1B1 Canada

Dir: 613 739 2910 x1022323

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Appendix C

Water Demand and FUS Calculations

200/201 Friel Street New Apartment

Project Name 200/201 Friel Street New Apartment
Project Number 220262300
Site Address 201 Friel Street
Completed By DO
Date 13-Jul-23

Per Fire Underwriters Survey, Water Supply for Public Fire Protection, 2020, 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 vA

 F= Required flow in litres / minute
 A= Total floor area in m²
 C= Coefficient related to Construction
 =1.5 for type V wood frame construction
 =0.8 for type IV-A mass timber construction
 =0.9 for type IV-B mass timber construction
 =1.0 for type IV-C mass timber construction
 =1.5 for type IV-D mass timber construction
 =1.0 for ordinary construction
 =0.8 for noncombustible construction
 =0.6 for fire-resistive construction

C= 0.8

Name	Area m2	Note:
Level 1	690	Total Effective Area is calculated based on building classification and exposed vertical openings. Building Construction Coefficient is below 1.0 and contains unprotected vertical openings, therefore we consider the two largest adjoining floor areas plus 50% of all floors immediately above them up to a maximum of eight floors.
Level 2	690	
Level 3 (50%)	345	
Level 4 (50%)	345	
Level 5 (50%)	345	
Level 6 (50%)	345	
Level 7 (50%)	228.5	
Level 8 (50%)	228.5	
Level 9 (50%)	228.5	
Level 10 (50%)	228.5	
Total	3674	

A= 3674 m² - Based on Architectural

F= 10668.0 L/min

Round to nearest 1000 L/m, F = 11000.0 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,E)		B
Adjustment Factor		-15%
Flow From 1.		11000.0 L/min
Adjusted Flow		9350.0 L/min
Minimum Flow (2000 L/min)		9350.0 L/min
Flow		9350.0 L/min

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

Flow from 2.	9350.0 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	4675.0 L/min

4. Adjacent Structures / Fire Separation with other buildings

Flow from 3.	4675.0 L/min
--------------	--------------

Figure 1: Adjacent Buildings



Exposure charge based on Table 6:
Building type II - non-combustible

Side	Separation Distance (m)	LH Factor	Exposure Charge
North	>30	83	0%
East	>30	380	0%
South	21	696	5%
West	17	58	4%

Cumulative Increase (Max 75%) 9%

Flow Increased for Adjacent Structures 5095.8 L/min
 Maximum Permitted Flow (45 000 L/min) 5095.8 L/min
 Minimum Permitted Flow (2 000 L/min) 5095.8 L/min

Required Fire Flow (rounded to nearest 1000 L/m) 5000.0 L/min
 83.33 L/s

Required fire flow is available from hydrants within 150m of building :

Hydrant	Distance from building (m)	Class	Contribution to required fire flow (L/m)
1 (existing)*	27	AA	5700
2 (existing)	50	AA	5700
3 (existing)	53	AA	5700
4 (existing)	97	AA	3780

*Hydrant within 45m of Siamese Available Flow 20880

Required Flow (FUS calc) 5000.0 L/min

200/201 Friel Street New Apartment Domestic Water Peaking Factors

Project Name 200/201 Friel Street New Apartment
Project Number 220262300
Site Address 200/201 Friel Street
Completed By DO
Date 2023-07-13

Excerpt from the MOE Design Guidelines for Drinking-Water System, Table 3-3

Dwelling Units Served	Equivalent Population	Night Minimum Hour Demand	Maximum Daily Factor	Peak Hour Factor
10	30	0.1	9.5	14.3
50	150	0.1	4.9	7.4
100	300	0.2	3.6	5.4
150	450	0.3	3	4.5
167	500	0.4	2.9	4.3

MAXIMUM DAILY DEMAND	
Actual Population	Corresponding Factor (Interpolated)
230	3.88

MAXIMUM HOURLY DEMAND	
Actual Population	Corresponding Factor (Interpolated)
230	5.82

200/201 Friel Street New Apartment

Domestic Water Demands

13-Jul-23

Project Name 200/201 Friel Street New Apartment
Project Number 220262300
Site Address 201 Friel Street
Completed By DO

Building Occupancy 230 people

Building Occupancy Breakdown

Unit type	persons per unit		
	Count	Unit	Rate
Bachelor/Studio	0	ea	1.4
1 Bedroom	149	ea	1.4
2 Bedroom	10	ea	2.1
3 Bedroom	0	ea	3.1
			Total
			229.6

Residential 230 persons < 500 persons, therefore MOE guidelines apply
 Per Capita Flow 280 l/per/d Use Table 3-3 of the MOE Design Guideline factors for 0 to 500 persons
 Daily average flow 64400 l/d >50000 l/d Therefore dual water services are required
 Daily average flow 0.745 l/s

Residential portion

Maximum Daily Demand Peak

Peak Factor 3.88 x average day MOE Design Guidelines for Drinking-Water System, Table 3-3
 Peak Flow 2.89 l/s
 45.86 GPM

Maximum Hourly Demand Peak

Peak Factor 5.82 x max day MOE Design Guidelines for Drinking-Water System, Table 3-3
 Peak Flow 16.84 l/s
 266.90 GPM

Fire Flow (refer to separate calculation) 83.33 l/s

Max Daily + Fire demand 86.23 l/s

200/201 Friel Street New Apartment

Water Service Sizing (Max Day + Fire)

13-Jul-23

HGL_{Road}= 104.80 (m)
 Building FFE= 62.5 (m)
 P_{Road}= 42.30 (m)
 P_{Road}= 415.0 (kPa)
 P_{Road}= 60.19 (psi)

Length

L= 8 (m)
 26 (ft)

Size

d= 150 (mm)
 6 (in)

Flow

Q = 0.0862 (m³/s)
 1367 (Usg/min)

Velocity

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

V= 4.88 (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 = 100

P_d= 0.1000 (psi)

h= 0.230 (ft/ft)

6.05 (ft)

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

Pressure Loss

P_{ROAD}= 60.2 (psi)

P_L= 2.6 (psi)

P_{AT METER}= 57.6 (psi)

P_{AT METER}= 396.9 (kPa)

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

Pressure is satisfactory

200/201 Friel Street New Apartment

Water Service Sizing (Max Hourly)

13-Jul-23

HGL_{Road}= 106.2 (m)
 Building FFE= 62.5 (m)
 P_{Road}= 43.7 (m)
 P_{Road}= 428.7 (kPa)
 P_{Road}= 62.18 (psi)

Length

L= 8 (m)
 26 (ft)

Size

d= 150 (mm)
 6 (in)

Flow

Q = 0.0168 (m³/s)
 267 (Usg/min)

Velocity

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

V= 0.95 (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 = 100
 P_d= 0.004874 (psi)
 h= 0.011230 (ft/ft)
 0.2947 (ft)

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

Pressure Loss

P_{ROAD}= 62.2 (psi)
 P_L= 0.1 (psi)
 P_{AT METER}= 62.1 (psi)
 P_{AT METER}= 427.8 (kpa)

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

Pressure is satisfactory

Requirement for Domestic Water Booster Pump

Roof elevation= 81.85 (m)
 Building height= 19.35 (m)
 Max height at which minimum pressure is provided= 15.5 (m) above ground floor

Booster pump is required for all floors >15.5m above ground floor

200/201 Friel Street New Apartment Water Service Sizing (Max Day)

13-Jul-23

HGL_{Road}= 106.2 (m)
 Building FFE= 62.5 (m)
 P_{Road}= 43.7 (m)
 P_{Road}= 428.7 (kPa)
 P_{Road}= 62.18 (psi)

Length

L= 8 (m)
 26 (ft)

Size

d= 150 (mm)
 6 (in)

Flow

Q = 0.0029 (m³/s)
 46 (Usg/min)

Velocity

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

V= 0.16 (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 = 100
 P_d= 0.0002 (psi)
 h= 0.000 (ft/ft)
 0.01 (ft)

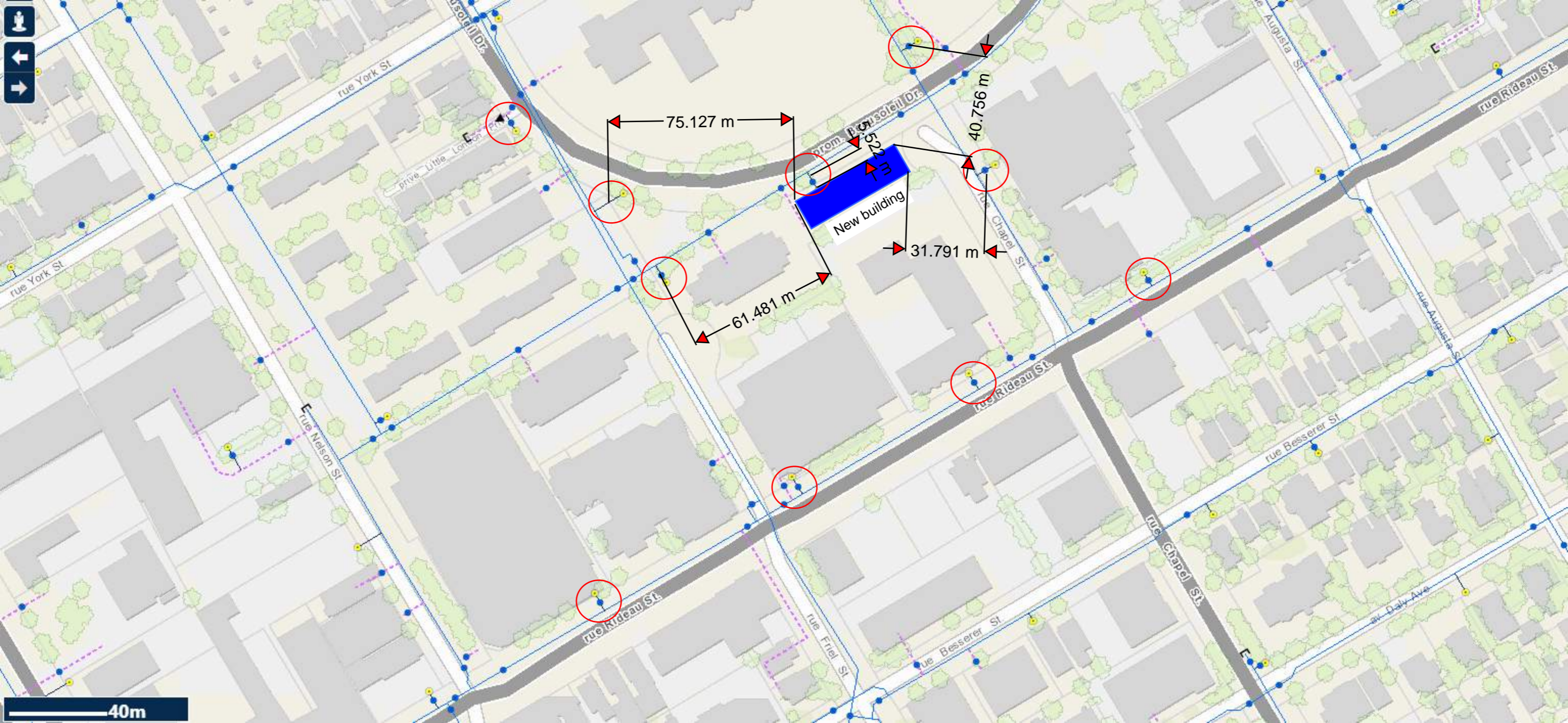
Pipe Diameter	C-Factor
150	100
200-250	110
300-600	120
600+	130

Pressure Loss

P_{ROAD}= 62.2 (psi)
 P_L= 0.0 (psi)
 P_{AT METER}= 62.2 (psi)
 P_{AT METER}= 428.7 (kPa)

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

Pressure is satisfactory



Dillon ONeil

From: Wessel, Shawn <shawn.wessel@ottawa.ca>
Sent: March 27, 2023 1:03 PM
To: Daniel Glauser
Cc: O'Connell, Erin; Kluge, Jenny; Dillon ONeil
Attachments: 200-201 Friel Street March 2023.pdf

Good afternoon, Daniel

The following are boundary conditions, HGL, for hydraulic analysis at 200-201 Friel Street (zone 1W) assumed to be connected to either the 203 mm on Chapel Street OR the 203 mm on Beausoleil Drive (see attached PDF for location).

Both Connections:

Minimum HGL: 106.2 m

Maximum HGL: 115.4 m

Max Day + Fire Flow (166.67 L/s:) 105.5 m (Chapel Connection)

Max Day + Fire Flow (166.67 L/s:) 104.8 m (Beausoleil Connection)

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

Pronouns: he/him | Pronom: il

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, Real Estate and Economic Development Department | Direction générale de la planification des biens immobiliers 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

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Dillon ONeil

From: Arne Suraga <ASuraga@dsai.ca>
Sent: March 23, 2023 4:21 PM
To: Daniel Glauser
Cc: Sarah Elliott; Dillon ONeil
Subject: RE: 200-201 Friel - Information required for Fire Underwriters Survey Calculation
Attachments: OCH-Friel - A040 Building Stats.pdf

Hi Daniel,

So at this point of the design, this is the current thinking – and in mind of the tech bulletin you provided:

1. 10,129.62m². Please see attached stats sheet, it contains GFA with exemptions, as well as GCA numbers.
2. Class 3 – Non-combustible.
3. C-2 – Limited Combustibility
4. The building will be constructed with automatic sprinkler protection.
5. Full supervised sprinkler system.

Thanks,

Arne

Arne Suraga (he/him)
Associate

Diamond Schmitt Architects
m: 416 720 8126

From: Daniel Glauser <DGlauser@morrisonhershfield.com>
Sent: March 23, 2023 1:54 PM
To: Arne Suraga <ASuraga@dsai.ca>
Cc: Sarah Elliott <SElliott@dsai.ca>; Dillon ONeil <DONEil@morrisonhershfield.com>
Subject: 200-201 Friel - Information required for Fire Underwriters Survey Calculation

Hi Arne,

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. GFA per floor and total GFA.
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 <i>C</i>
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 $\frac{2}{3}$ (67%) or more of the total wall area and $\frac{2}{3}$ (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 <i>O</i>
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.

Thanks and regards,

Daniel Glauser, P. Eng

Municipal Engineer - Infrastructure Ottawa

Office: 613 739 2910 Ext. 1022323

DGlauser@morrisonhershfield.com



2932 Baseline Road | Ottawa, ON K2H 1B1 Canada

Dir: 613 739 2910 x1022323

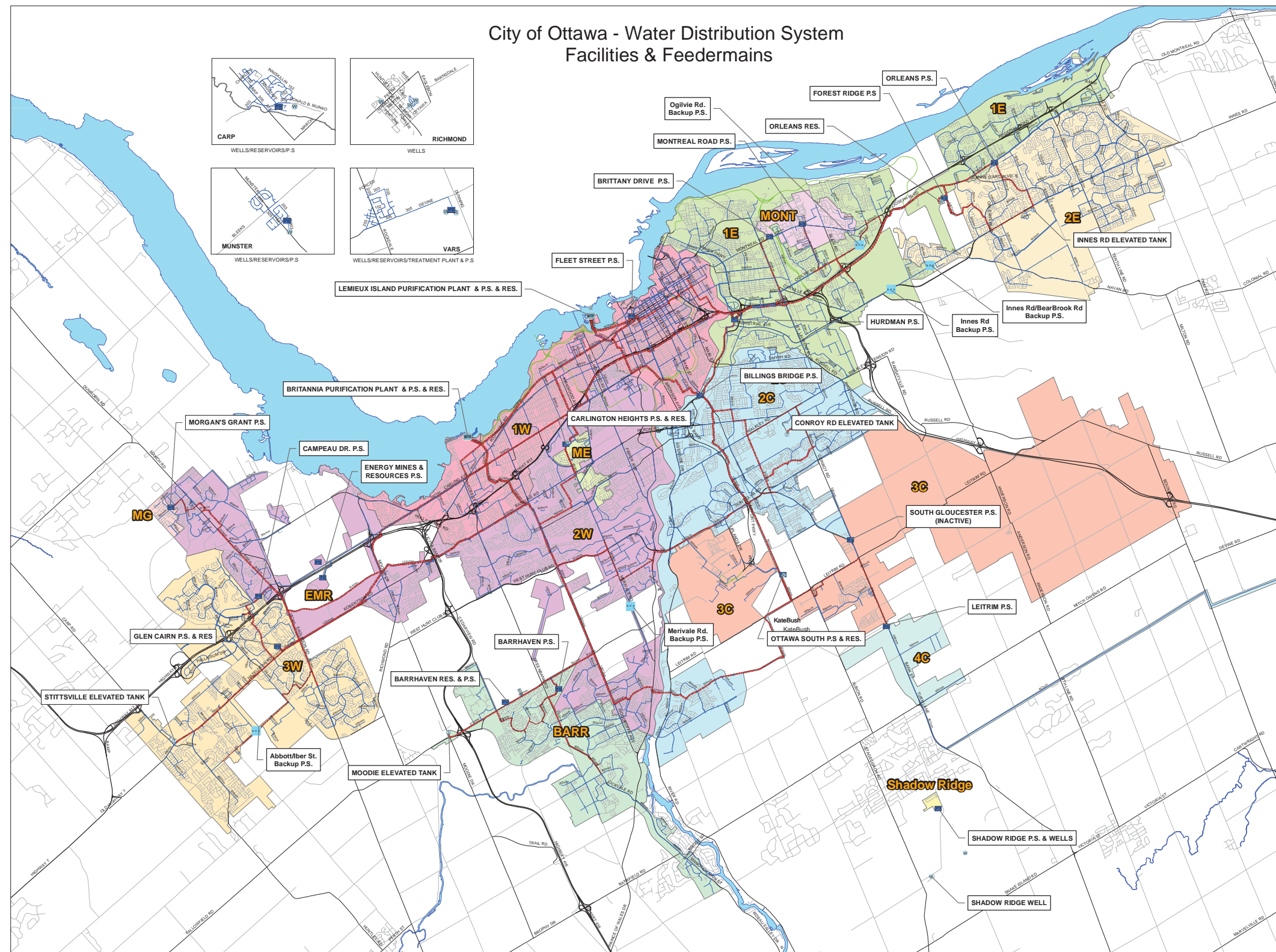
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City of Ottawa - Water Distribution System Facilities & Feeder mains



Legend

Water System Structure

- Pump Station
- Backup Pump Station
- Water Treatment Plant
- Well
- Elevated Tank
- Reservoir

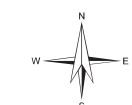
WATERMAINS

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



Infrastructure Services & Community Sustainability
Infrastructure Services

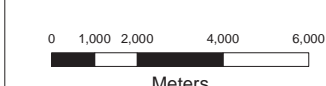
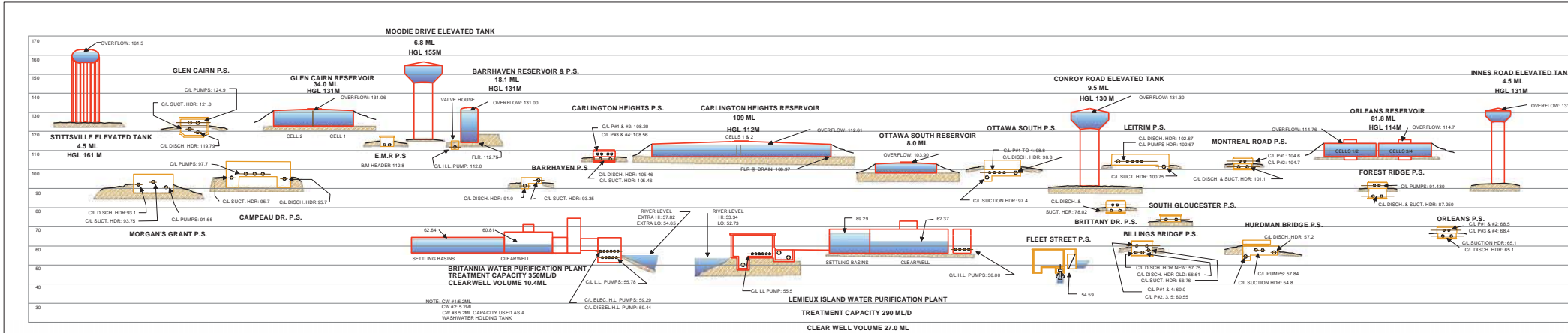


FIGURE 1-1

DRAWN BY: D. HESS DATE: 31 July 2013



Appendix D

Sanitary Flow Calculations

EXISTING SANITARY SEWER CALCULATION SHEET
Proposed Development - 200/201 Friel Street

LOCATION				RESIDENTIAL AREA AND POPULATION										COMMERCIAL			INSTITUTIONAL			INDUSTRIAL				INFILTRATION			TOTAL	EXISTING SEWER											
Area ID	UP	Down	Area	Number of Units						Pop.	Cumulative area	Qres	Peak Fact.	Qres	Area	Accu	QC	Area	Accu	Qins	Q C+H	Total Area	Accu	Flow	Flow	Length	Size	Area	Grade	Minimum Slope	Full Capacity	Full Velocity	Time of Flow	Reserve Capacity	Clot/QM	Notes			
				Singles	Sem's	Town's	Apt's	P	area																												pop.	avg.	(-)
2			0.078						230	0.08	230	0.745	3.72	2.774	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.08	0.08	0.026	2.800	9.6	250	0.049	2.000	1.00	84.1	1.71	0.09	81.3	0.03	Correspondence with arch. Mechanical requests a 250mm sanitary service based on the OBC calculations for sanitary flow.		
1			1.556						0	0.000	0	0.000	3.80	0.000	0.000	0.000	0.000	1.556	1.556	0.504	0.000	0.000	0.000	0.756	1.56	1.56	0.513	1.270	46.8	300	0.071	1.580	0.34	121.6	1.72	0.45	120.3	0.01	
Design Parameters Avg. Daily Flow Res. 280 L/p/d Avg. Daily Flow Comm. 28000 L/ha/d Avg. Daily Flow Instit. 28000 L/ha/d Avg. Daily Flow Indust 55000 L/ha/d Peak Fact. Res. Harmon's Equation Commercial Contribution 0% Peak Fact. Comm. 1 Institutional Contribution 100% Peak Fact. Instit. 1.5 Peak Fact. Indust per MDE Graph Infiltration / Inflow 0.33 L/s/ha Min. Pipe Velocity 0.06 L/s Max. Pipe Velocity 3.00 L/s Mannings Roughness Coeffici 0.013																																							
Prepared By: Dillon O'Neil																																							
Checked by: Daniel Glauser																																							
Date: July 13, 2023 Project No. 220262300																																							

Appendix E

Storm Sewer Design Calculations

1. Existing Conditions & Release Rate

OCHC 200-201 Friel Street

Project No.	220262300
Date	2023-07-13
Prepared By:	D O'Neil
Checked By	D Glauser

Existing Drainage Area Characteristics

Drainage Area	Area, A (ha)	Runoff Coefficient, R*
A1	0.20	0.50
Total	0.20	0.50

*Pre-Development Runoff Coefficient actually exceeds the maximum of 0.5

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

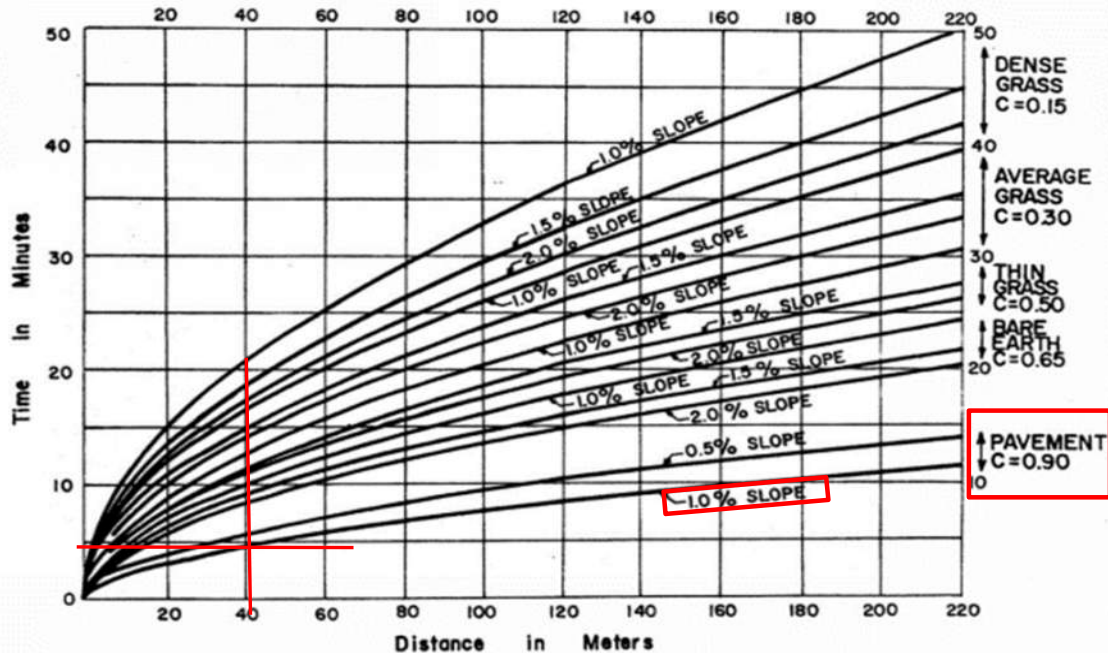
Q = RAIN where Q = runoff rate (L/s)
 R = runoff coefficient
 i = rainfall intensity (mm/hr)
 A = drainage area (ha)
 N = 2.78

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

Determination 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) = 40 m
 Surface type = Pavement
 Approximate surface slope = <2%

RELATIONSHIP BETWEEN DISTANCE OF REMOTE POINT IN TRIBUTARY AREA TO POINT OF ENTRY TO SEWER AND TIME TAKEN FOR PARTICLE OF WATER TO TRAVEL THIS DISTANCE FOR VARIOUS SURFACE SLOPES AND IMPERVIOUSNESS



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	0.203	0.50	21.7
5	998.071	0.814	6.053	104.2	0.203	0.50	29.4
100	1735.688	0.82	6.014	178.6	0.203	0.63	63.1

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 5 year (Per Pre-Consultation Notes)
 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)
5	998.071	0.814	6.053	104.2	0.203	0.50	29.4

Allowable release rate from site in 100-year storm is 29.4 L/s

2. Proposed Uncontrolled Flow

OCHC 200-201 Friel Street

Project No.	220262300
Date	2023-07-13
Prepared By:	D O'Neil
Checked By	D Glauser

Summary of All Proposed Drainage Areas

Drainage Area	Total Area, A (ha)	Runoff Coefficient, R (5-year event)	Runoff Coefficient, R (100-year event, Note 2)
A1	0.08	0.90	1.00
A2	0.06	0.45	0.56
A3	0.02	0.90	1.00
Total (Note 2)	0.16	0.72	0.82

(Refer to Proposed Storm Drainage Area Plan)

Proposed Uncontrolled Drainage Area Characteristics

Drainage Area	Area, A (ha)	Runoff Coefficient, R (5-year event)	Runoff Coefficient, R (100-year event, Note 1)
B1	0.04	0.90	1.00
B2	0.01	0.90	1.00
Total	0.04	0.90	1.00

(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)
5	998.071	0.814	6.053	104.2	0.045	0.90	11.7
100	1735.688	0.82	6.014	178.6	0.045	1.00	22.3

Remaining Allowable Release Rate

Total Allowable Release Rate 29.4 (L/s)
Uncontrolled Runoff (100 year) 22.3 (L/s)
Remaining Allowable Release Rate 7.1 (L/s)

Runoff from remaining drainage areas in 100-year event will be controlled to 7.1 L/s

3. Proposed Roof Storage (calculation of maximum storage)
OCHC 200-201 Friel Street

Project No.	220262300
Date	2023-07-13
Prepared By:	D O'Neil
Checked By	D Glauser

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	Cummulative	
0.000	0.0000	0.0000	0.0	0.000	0	0.0	0.0	0.000
0.025	0.0003	0.0032	0.34	0.025	80	0.3	0.34	0.025
0.050	0.0006	0.0063	1.36	0.050	159	1.0	1.36	0.050
0.075	0.0009	0.0087	3.06	0.075	239	1.7	3.06	0.075
0.100	0.0011	0.0110	5.44	0.100	318	2.4	5.44	0.100
0.125	0.0013	0.0134	8.51	0.125	398	3.1	8.51	0.125
0.150	0.0016	0.0158	12.25	0.150	477	3.7	12.25	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
0.3	800	0.34	0.01
1.4	1600	1.02	0.02
3.1	2400	1.70	0.05
5.4	3200	2.38	0.10
8.5	4000	3.06	0.15
12.3	4800	3.74	0.22

Roof Storage Summary

Total Building Area (m2)	790
Usable Roof Area (m2)	530
Assumed Roof Ponding Area (m2)	90.00% 477
Roof Imperviousness	1.00
Actual roof drain Area	245
Area per Roof Drain (m2/Drain)	24.50
Theoretical Number of Roof Drains	19
Actual Number of Roof Drains	10
Maximum Allowable Depth of Ponding (m)	0.15
Maximum Storage per Drain (m3)	1.23
Max. Storage (m3)	23.85
Estimated 100 Year Drawdown time (hrs)	0.22

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

Results	5-yr	100-yr
Max Qout (m3/s)	0.0063	0.0158
Depth (m)	0.14	0.150
Volume (m3)	1.36	12.00
Available Vol. (m3)	23.85	23.85
Drain time (hrs)	0.06	0.22

Conclusions

The maximum amount of volume in a 100-yr event is 12m3
 The maximum release rate is carried into the overall storage calculation is 15.8L/s in the 100-yr event and 6.3 in the 5-year event (Note 1)
 Note 1: Actual release rate is calculated based on actual ponding depth

4.a Proposed Cistern Storage

OCHC 200-201 Friel Street

Project No.	220262300
Date	2023-07-13
Prepared By:	D O'Neil
Checked By	D Glauser

Proposed Controlled Drainage Area Characteristics

Drainage Area	Area, A (ha)	Runoff Coefficient, R (5-year event)	Runoff Coefficient, R (100-year event, Note 1)
A1+A3 (excl. Flow controlled roof drains)	0.070	0.63	0.79
Total	0.070	0.63	0.79

(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) = 4.1 (L/s)
 Actual Release Rate = 4.1 (L/s) (Constant Release Rate from Dual Stormwater Pump System)

Orifice Sizing

$$Q = CA(2gH)^{0.5}$$

$$C = 0.61$$

Design Flow Rate = 4.1 (L/s)
 Proposed 100-year tank depth = 2.20 (m)

Release Rates during 5-year event

Water depth during 5-year event = 0.22 (m) (based on result of Req. Storage Vol. calc below)
 Maximum release rate during 5-year event = 4.1 (L/s) (based on orifice calculation)

Required Storage Volume (using Modified Rational Method)

$Q = \text{RAIN}$

$Q = \text{runoff rate (L/s)}$ where $i = \text{Rainfall Intensity (mm/hr)}$
 $R = \text{runoff coefficient}$ $i = \frac{A}{(T_d + C)^B}$ $T_d = \text{Time of Concentration (min)}$
 $i = \text{rainfall intensity (mm/hr)}$
 $A = \text{drainage area (ha)}$
 $N = 2.78$

Roof (Controlled Portion)

Time, Td (min)	5-Year Event					100-Year Event				
	Intensity (mm/hr)	Peak Flow (L/s)	Average Release Rate (L/s)	Storage Volume (m ³)	Ponding Depth (mm)	Intensity (mm/hr)	Peak Flow (L/s)	Average Release Rate (L/s)	Storage Volume (m ³)	Ponding Depth (mm)
10	76.81	3.3	1.43	1.1	13.8	178.56	9.6	4.16	3.3	40.1
20	52.03	2.2	1.35	1.1	13.1	119.95	6.5	3.90	3.1	37.6
30	40.04	1.7	1.20	1.0	11.7	91.87	4.9	3.43	2.7	33.5
40	32.86	1.4	1.06	0.9	10.4	75.15	4.0	3.03	2.4	29.8
50	28.04	1.2	0.95	0.8	9.4	63.95	3.4	2.71	2.2	26.8
60	24.56	1.1	0.86	0.7	8.7	55.89	3.0	2.46	2.0	24.4
70	21.91	0.9	0.79	0.6	7.9	49.79	2.7	2.24	1.8	22.5
80	19.83	0.9	0.73	0.6	7.3	44.99	2.4	2.07	1.7	20.8
90	18.14	0.8	0.68	0.5	6.7	41.11	2.2	1.92	1.6	19.4
100	16.75	0.7	0.63	0.5	6.7	37.90	2.0	1.79	1.5	18.4
110	15.57	0.7	0.59	0.5	6.5	35.20	1.9	1.68	1.4	17.4
120	14.56	0.6	0.56	0.5	5.9	32.89	1.8	1.59	1.3	16.4

Cistern

Time, Td (min)	5-Year Event					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)	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	9.5	10.9	4.14	4.1	178.56	27.5	31.7	4.14	16.5
20	52.03	6.4	7.8	4.14	4.3	119.95	18.5	22.4	4.14	21.9
30	40.04	4.9	6.1	4.14	3.6	91.87	14.2	17.6	4.14	24.2
40	32.86	4.1	5.1	4.14	2.3	75.15	11.6	14.6	4.14	25.1
50	28.04	3.5	4.4	4.14	0.8	63.95	9.9	12.6	4.14	25.3
60	24.56	3.0	3.9	4.14	0.0	55.89	8.6	11.1	4.14	24.9
70	21.91	2.7	3.5	4.14	0.0	49.79	7.7	9.9	4.14	24.2
80	19.83	2.4	3.2	4.14	0.0	44.99	6.9	9.0	4.14	23.3
90	18.14	2.2	2.9	4.14	0.0	41.11	6.3	8.3	4.14	22.2
100	16.75	2.1	2.7	4.14	0.0	37.90	5.8	7.6	4.14	20.9
110	15.57	1.9	2.5	4.14	0.0	35.20	5.4	7.1	4.14	19.5
120	14.56	1.8	2.4	4.14	0.0	32.89	5.1	6.7	4.14	18.1

minimum time = time of concentration

* Excludes from flow controlled roof drains

Storage volume used	4.3 m ³	Storage volume used	25.3 m ³
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Minimum storage volume of 25.3 m³ is required.

4b. Proposed POPS ICD Storage
OCHC 200-201 Friel Street

Project No.	220262300
Date	2023-07-13
Prepared By:	D O'Neil
Checked By	D Glauser

Proposed Controlled Drainage Area Characteristics

Drainage Area	Area, A (ha)	Runoff Coefficient, R (5-year event)	Runoff Coefficient, R (100-year event, Note 1)
A2	0.065	0.45	0.56
Total	0.065	0.45	0.56

(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.

Max Allowable Release Rate from CB (100-year event) = 3.00 (L/s)

Orifice Sizing

$Q = CA(2gH)^{0.5}$
 C = 0.61
 Design Flow Rate = 3.0 (L/s)
 MH ICD Depth = 2.06 (m)
 Proposed 100-year head above centreline of orifice = 2.17 (m)
 Orifice Area = 755 (mm²)
 Orifice diameter = 31 (mm) (if <83mm then vortex ICD required)
Refer to Sheet 5 for Vortex ICD selection

Release Rates during 5-year event

Water depth during 5-year event = 1.11 (m) (based on result of Req. Storage Vol. calc below)
 Proposed 5-year head above centreline of orifice = 1.21 (m)
 Maximum release rate during 5-year event = 2.06 (L/s) (based on ICD performance, see Sheet 5)

Required Storage Volume (using Modified Rational Method)

Q = RAIN

Q = runoff rate (L/s) $i = \frac{A}{(T_d + C)^B}$ where i = Rainfall Intensity (mm/hr)
 R = runoff coefficient $T_d =$ Time of Concentration (min)
 i = rainfall intensity (mm/hr)
 A = drainage area (ha)
 N = 2.78

Time, Td (min)	5-Year Event				100-Year Event			
	Intensity (mm/hr)	Peak Flow (L/s)	Average Release Rate (L/s)	Storage Volume (m ³)	Intensity (mm/hr)	Peak Flow (L/s)	Average Release Rate (L/s)	Storage Volume (m ³)
10	104.19	8.4	2.06	3.8	178.56	14.5	3.00	6.9
15	83.56	6.8	2.06	4.2	142.89	11.6	3.00	7.7
20	70.25	5.7	2.06	4.4	119.95	9.7	3.00	8.1
25	60.90	4.9	2.06	4.3	103.85	8.4	3.00	8.1
30	53.93	4.4	2.06	4.2	91.87	7.4	3.00	8.0
40	44.18	3.6	2.06	3.7	75.15	6.1	3.00	7.4
50	37.65	3.1	2.06	3.0	63.95	5.2	3.00	6.6

minimum time = time of concentration

Storage volume used	4.4 m ³	Storage volume used	8.1 m ³
---------------------	--------------------	---------------------	--------------------

Storage Available in POPS (based on proposed grading)

Elevation (m)	Area (m ²)	Total Volume (m ³)
61.20	0.00	0.00
61.25	44.00	0.33
61.30	88.00	2.62
61.31	100.00	3.10
61.35	148.00	6.98
61.40	208.00	14.59

A minimum storage volume of 8.1 m³ is required.
Approx. 5.0m³ of volume is provided within STM MH1 + CBMH1. The remaining 3.1m³ results in approximately 110mm of surface ponding

4c. ICD Sizing
OCHC 200-201 Friel Street

Project No.	220262300
Date	13-Jul-23
Prepared By:	D Glauser
Checked By	J Fookes

ICD sizing - 100 year

100-yr elevation 61.31 m
 Invert elevation 59.02 m
 Outlet pipe dia 250 mm

Orifice Sizing:

100-yr depth 2.17 m (depth above centreline of orifice)
 Design flow 3.0 l/s
 Orifice area 755 mm² (calculated by Orifice Equation: $Q=CA(2gh)^{0.5}$ where $C=0.61$)
 Orifice diameter 31 mm (if less than 75mm then vortex ICD required)

ICD sizing - 5 year

2-yr elevation 60.17 m
 Invert elevation 59.02 m
 Outlet pipe dia 250 mm

Orifice Sizing:

2-yr depth 1.02 m (depth above centreline of orifice)
 Design flow 2.1 l/s

CISTERN				
DESIGN EVENT	DIAMETER OF OUTLET PIPE (mm)	ICD	DESIGN FLOW (l/s)	UPSTREAM HEAD (m)
1:5 YR	250	HYDROVEX 50VHV-1	2.1	1.02
1:100 YR	250	HYDROVEX 50VHV-1	3.0	2.17

HYDROVEX VHV ICD Design Chart:

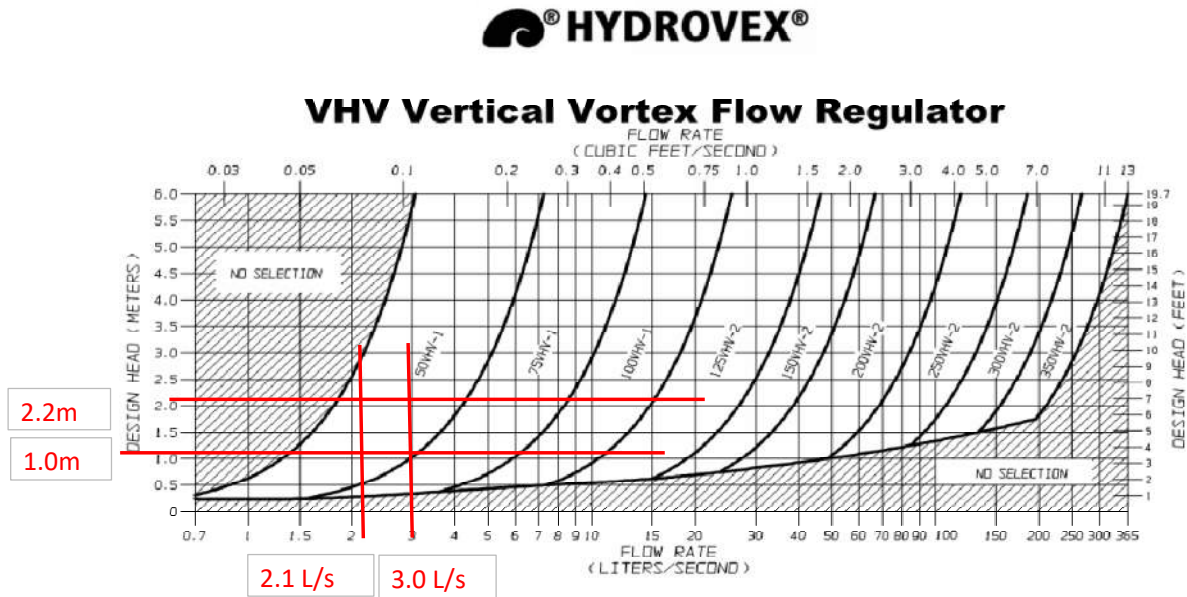


FIGURE 3 - VHV

JOHN MEUNIER

5. Catch Basin 100-yr Ponding Depth

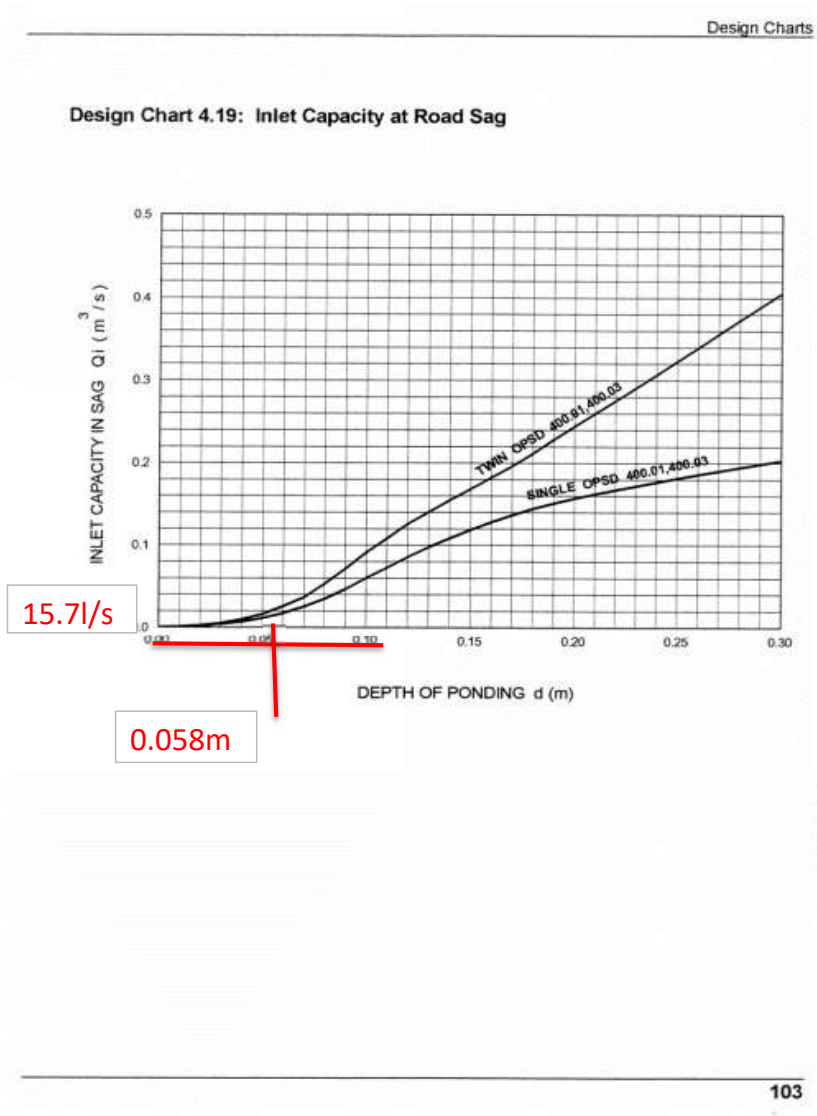
OCHC 200-201 Friel Street

Project No.	220262300
Date	2023-07-13
Prepared By:	D O'Neil
Checked By	D Glauser

Figure A

The highest 100-year flow to a single inlet flat grate catchbasin is at CBMH1 (15.7 L/s). The ponding depth under this flow rate is 58 mm.

Surface Inlet Capacity At Road Sags⁸



Summary - Stormwater Management

OCHC 200-201 Friel Street

Project No.	220262300
Date	7/13/2023
Prepared By:	D Glauser
Checked By	J Fookes

Area ID	Area (ha)	Max Allowable Release Rates (L/s)		Storage Required		Max Storage Available		Notes
		5-Yr	100-Yr	5-Yr	100-Yr	5-Yr	100-Yr	
Controlled Flow Roof Drainage	0.05	1.0	2.7	0.8	2.2	12	12	- Roof Storage as a means to reduce peak flow
A1+A3	0.09	4.1	4.1	4.3	25.3	69	69	- Cistern Storage in order to reduce overall release rate
A2	0.06	2.1	3.0	4.4	8.1	15	15	- Surface Storage at CBMH1
B1+B2	0.04	11.71	22.30	-	-	-	-	- Uncontrolled Run-off
Total	0.20	17.91	29.40	5.11	27.45	95.41	95.41	

PROPOSED STORM SEWER CALCULATION SHEET

OCHC 200-201 Friel Street

LOCATION					INDIVIDUAL							CUMULATIVE		DESIGN					PROPOSED SEWER												
Description	From	Top of Cover	To	Top of Cover	Asphalt Area	Park 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)	(m³/s)	(m)	(mm)	(m²)	(%)	(%)	(L/s)	(m/s)	(min)	(L/s)	(%)	(m)	(m)	
A1+A2	BUILDING		OUTLET				0.095			0.095	0.237	0.095	0.237	10.00	100.00	178.56	42.3	0.042	16.1	250	0.049	1.0	0.43	59.5	1.21	0.22	17.2	0.7	61.18	61.02	
A3	CBMH1	61.20	STMH1	61.45			0.065			0.065	0.081	0.065	0.318	10.00	100.00	178.56	56.7	0.057	7.5	250	0.049	1.2	0.43	65.1	1.33	0.09	8.4	0.9	59.11	59.02	STMH1 is outfitted with an ICD
	STMH1	61.45	TEE									0.065	0.318	10.00	5.00	104.19	33.1	0.033	20.9	250	0.049	1.0	0.43	59.5	1.21	0.29	26.4	0.6	58.99	58.78	STMH1 is outfitted with an ICD
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 Park Area: R = 0.45 Building Area: R = 0.90 Green Roof: R = 0.50 Concrete Area: R = 0.90		Mannings Roughness Coefficient = 0.013 *ADJUSTED					Prepared By: Dillon O'Neil Checked by: Daniel Glauser Date: July 13, 2023												
Project No. 220262300																															



Adjustable Accutrol Weir

Tag: _____

Adjustable Flow Control for Roof Drains

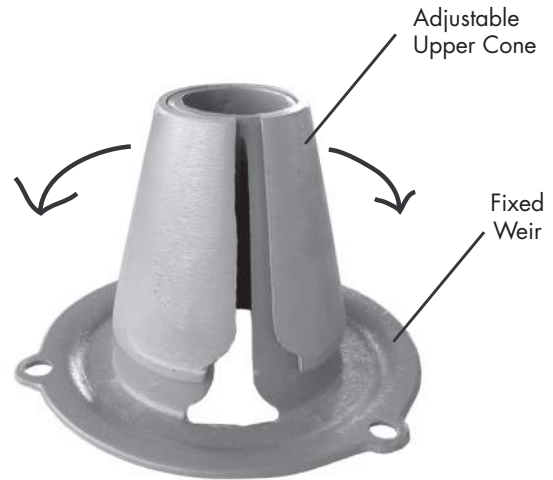
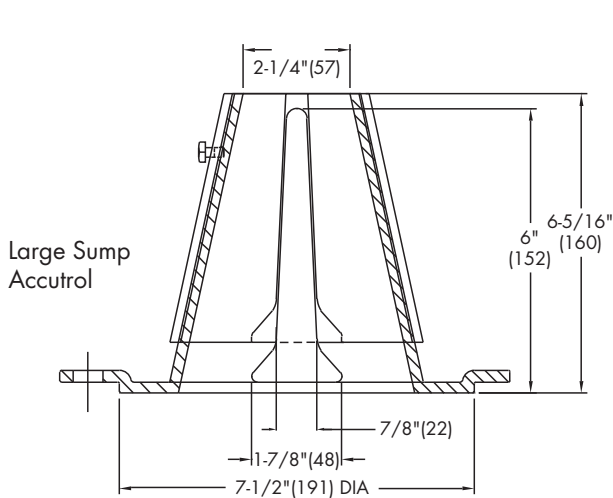
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

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 _____
 Job Location _____
 Engineer _____

Contractor _____
 Contractor's P.O. No. _____
 Representative _____

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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

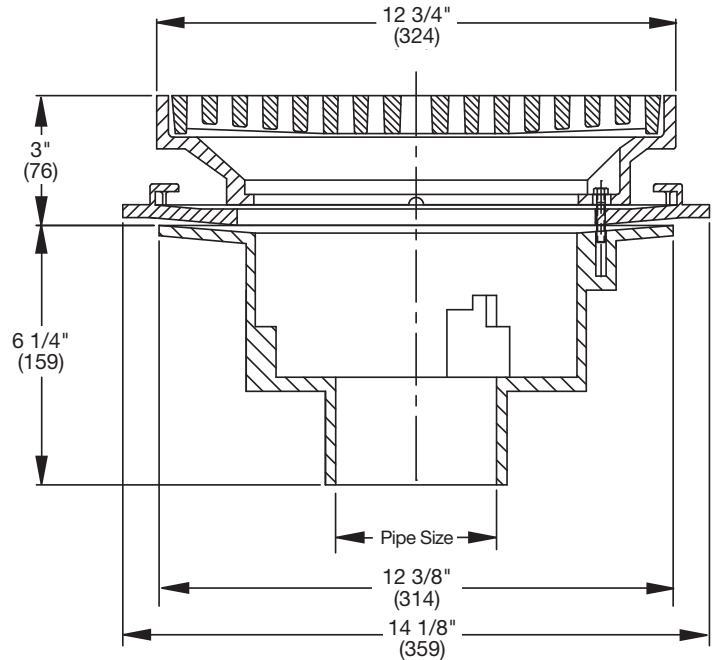
Watts RD-100-CP epoxy coated cast iron IRMA roof drain with flashing flange with seepage openings, 12 3/4"x12-3/4"(324x324) square epoxy coated ductile iron heel proof promenade top, and no hub (standard) outlet.

Pipe Sizing		
Suffix	Description	
2	2"(51) Pipe Size (NH Only)	<input type="checkbox"/>
3	3"(76) Pipe Size	<input type="checkbox"/>
4	4"(102) Pipe Size	<input type="checkbox"/>
5	5"(127) Pipe Size (NH Only)	<input type="checkbox"/>
6	6"(152) Pipe Size	<input type="checkbox"/>

Outlet Type		
Suffix	Description	
NH	No Hub (MJ)	<input type="checkbox"/>
P	Push On	<input type="checkbox"/>
T	Threaded	<input type="checkbox"/>
X	Inside Caulk	<input type="checkbox"/>

Options		
Suffix	Description	
-1	All Nickel Bronze Top	<input type="checkbox"/>
-6	Vandal Proof Top	<input type="checkbox"/>
-9	Hinged Grate	<input type="checkbox"/>
-13	Galvanized	<input type="checkbox"/>
-B	Sump Receiver	<input type="checkbox"/>
-D	Underdeck Clamp	<input type="checkbox"/>
-F	Deck Flange/Adj. Extension	<input type="checkbox"/>
-SO	Side Outlet (2", 3", 4" Only)	<input type="checkbox"/>

Optional Body Material		
Suffix	Description	
-60	PVC Body w/Socket Outlet	<input type="checkbox"/>
-61	ABS Body w/Socket Outlet	<input type="checkbox"/>



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.

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

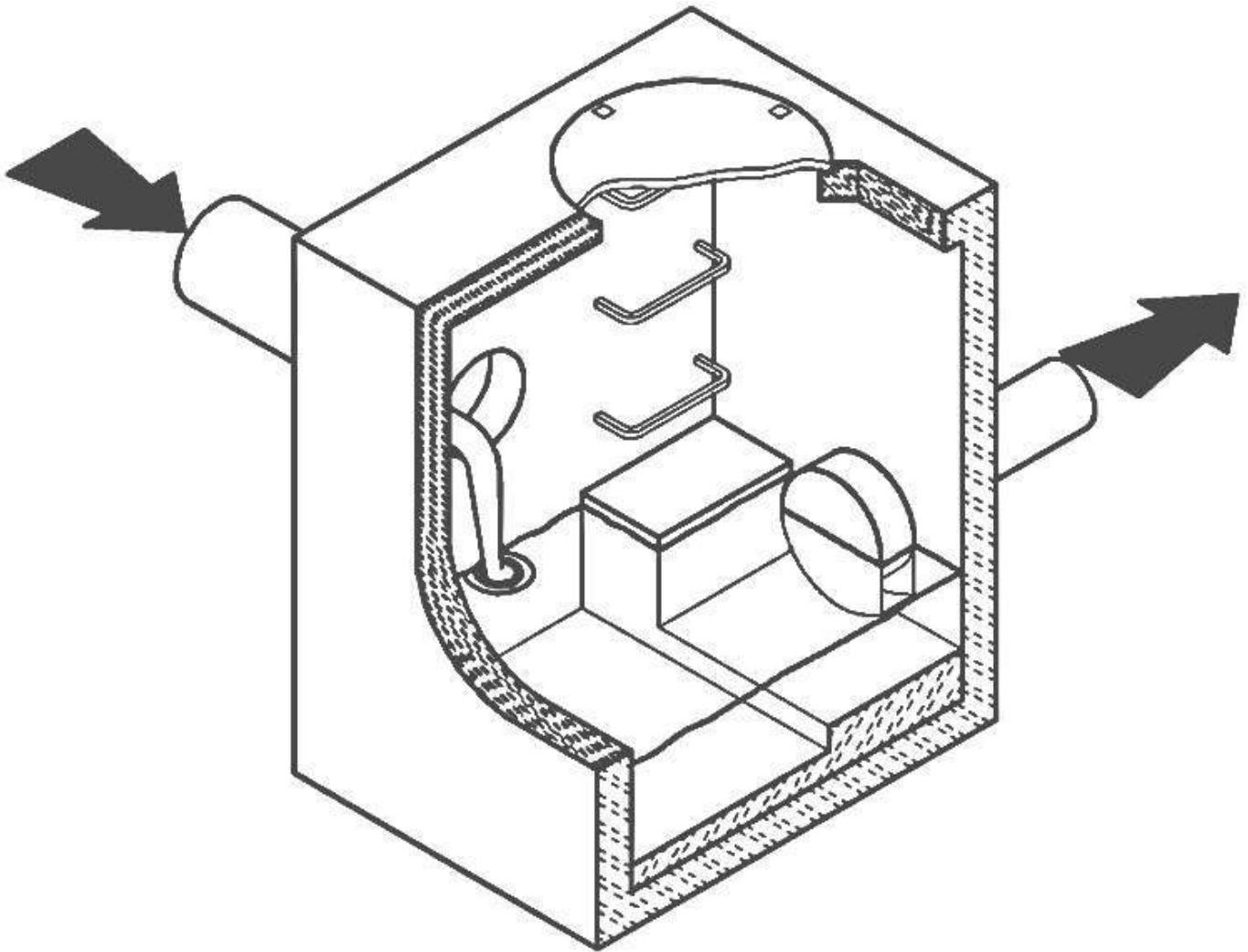


USA: T: (800) 338-2581 • F: (828) 248-3929 • Watts.com
Canada: T: (888) 208-8927 • F: (905) 481-2316 • Watts.ca
Latin America: T: (52) 55-4122-0138 • Watts.com

CSO/STORMWATER MANAGEMENT



HYDROVEX[®] VHV / SVHV
Vertical Vortex Flow Regulator



JOHN MEUNIER

HYDROVEX® VHV / SVHV VERTICAL VORTEX FLOW REGULATOR

APPLICATIONS

One of the major problems of urban wet weather flow management is the runoff generated after a heavy rainfall. During a storm, uncontrolled flows may overload the drainage system and cause flooding. Due to increased velocities, sewer pipe wear is increased dramatically and results in network deterioration. In a combined sewer system, the wastewater treatment plant may also experience significant increases in flows during storms, thereby losing its treatment efficiency.

A simple means of controlling excessive water runoff is by controlling excessive flows at their origin (manholes). **John Meunier Inc.** manufactures the **HYDROVEX® VHV / SVHV** line of vortex flow regulators to control stormwater flows in sewer networks, as well as manholes.

The vortex flow regulator design is based on the fluid mechanics principle of the forced vortex. This grants flow regulation without any moving parts, thus reducing maintenance. The operation of the regulator, depending on the upstream head and discharge, switches between orifice flow (gravity flow) and vortex flow. Although the concept is quite simple, over 12 years of research have been carried out in order to get a high performance.

The **HYDROVEX® VHV / SVHV** Vertical Vortex Flow Regulators (refer to **Figure 1**) are manufactured entirely of stainless steel, and consist of a hollow body (1) (in which flow control takes place) and an outlet orifice (7). Two rubber "O" rings (3) seal and retain the unit inside the outlet pipe. Two stainless steel retaining rings (4) are welded on the outlet sleeve to ensure that there is no shifting of the "O" rings during installation and use.

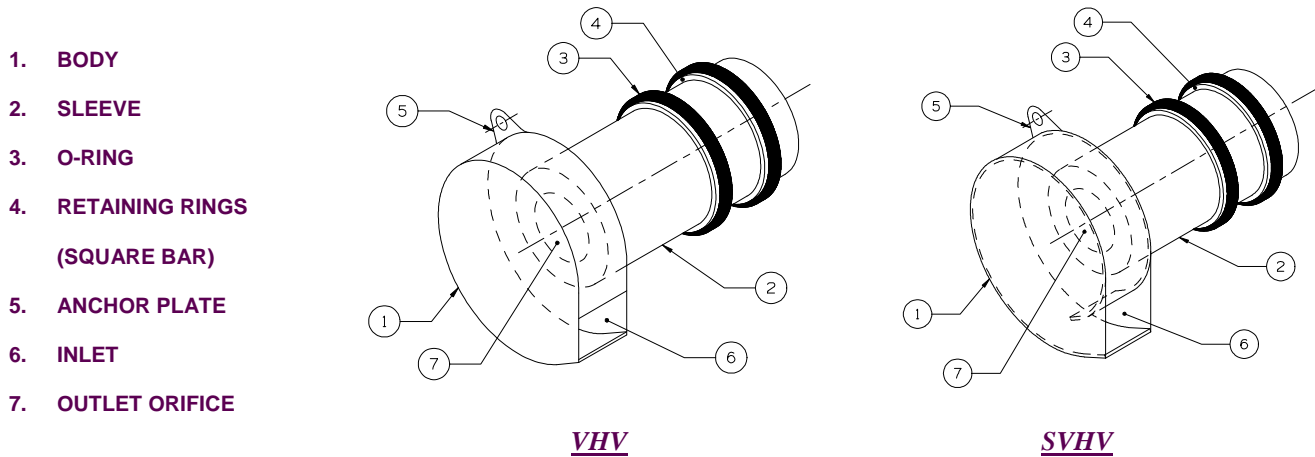


FIGURE 1: HYDROVEX® VHV-SVHV VERTICAL VORTEX FLOW REGULATORS

ADVANTAGES

- The **HYDROVEX® VHV / SVHV** line of flow regulators are manufactured entirely of stainless steel, making them durable and corrosion resistant.
- Having no moving parts, they require minimal maintenance.
- The geometry of the **HYDROVEX® VHV / SVHV** flow regulators allows a control equal to an orifice plate, having a cross section area 4 to 6 times smaller. This decreases the chance of blockage of the regulator, due to sediments and debris found in stormwater flows. **Figure 2** illustrates the comparison between a regulator model 100 SVHV-2 and an equivalent orifice plate. One can see that for the same height of water, the regulator controls a flow approximately four times smaller than an equivalent orifice plate.
- Installation of the **HYDROVEX® VHV / SVHV** flow regulators is quick and straightforward and is performed after all civil works are completed.
- Installation requires no special tools or equipment and may be carried out by any contractor.
- Installation may be carried out in existing structures.

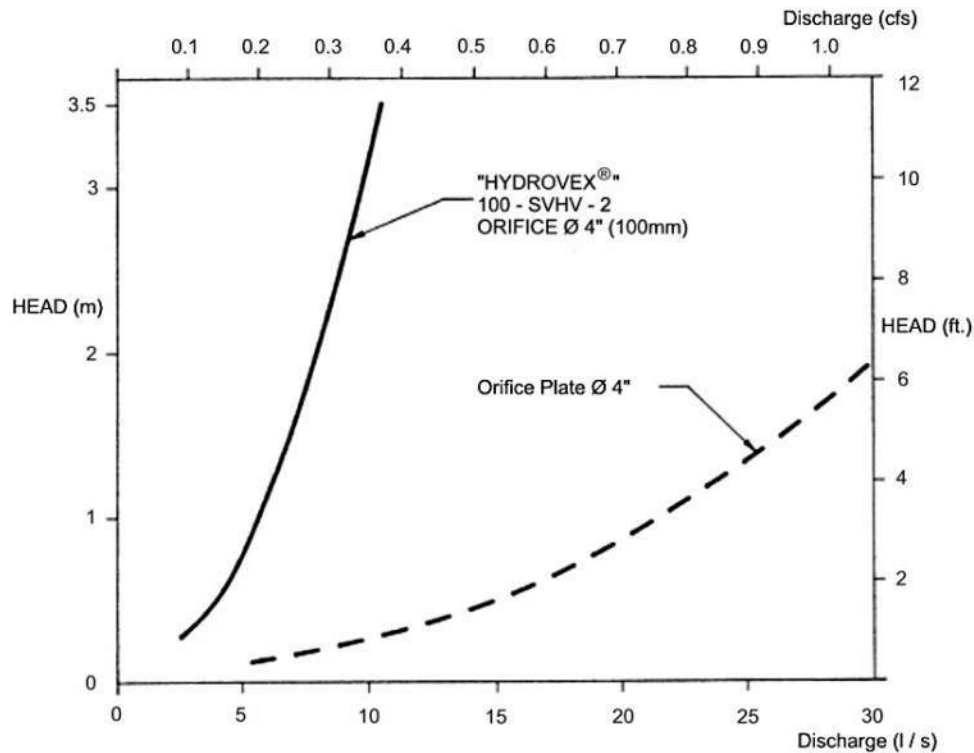


FIGURE 2: DISCHARGE CURVE SHOWING A HYDROVEX® FLOW REGULATOR VS AN ORIFICE PLATE

SELECTION

Selection of a **VHV** or **SVHV** regulator can be easily made using the selection charts found at the back of this brochure (see **Figure 3**). These charts are a graphical representation of the maximum upstream water pressure (head) and the maximum discharge at the manhole outlet. The maximum design head is the difference between the maximum upstream water level and the invert of the outlet pipe. All selections should be verified by John Meunier Inc. personnel prior to fabrication.

Example:

- ✓ Maximum design head 2m (6.56 ft.)
- ✓ Maximum discharge 6 L/s (0.2 cfs)
- ✓ Using **Figure 3** - VHV model required is a **75 VHV-1**

INSTALLATION REQUIREMENTS

All **HYDROVEX®** **VHV** / **SVHV** flow regulators can be installed in circular or square manholes. **Figure 4** gives the various minimum dimensions required for a given regulator. *It is imperative to respect the minimum clearances shown to ensure easy installation and proper functioning of the regulator.*

SPECIFICATIONS

In order to specify a **HYDROVEX**[®] regulator, the following parameters must be defined:

- The model number (ex: 75-VHV-1)
- The diameter and type of outlet pipe (ex: 6" diam. SDR 35)
- The desired discharge (ex: 6 l/s or 0.21 CFS)
- The upstream head (ex: 2 m or 6.56 ft.) *
- The manhole diameter (ex: 36" diam.)
- The minimum clearance "H" (ex: 10 inches)
- The material type (ex: 304 s/s, 11 Ga. standard)

* *Upstream head is defined as the difference in elevation between the maximum upstream water level and the invert of the outlet pipe where the **HYDROVEX**[®] flow regulator is to be installed.*

PLEASE NOTE THAT WHEN REQUESTING A PROPOSAL, WE SIMPLY REQUIRE THAT YOU PROVIDE US WITH THE FOLLOWING:

- *project design flow rate*
- *pressure head*
- *chamber's outlet pipe diameter and type*



Typical VHV model in factory

OPTIONS



FV – SVHV (mounted on sliding plate)



VHV-1-O (standard model with odour control inlet)



FV – VHV-O (mounted on sliding plate with odour control inlet)



VHV with Gooseneck assembly in existing chamber without minimum release at the bottom



VHV with air vent for minimal slopes



VHV Vertical Vortex Flow Regulator

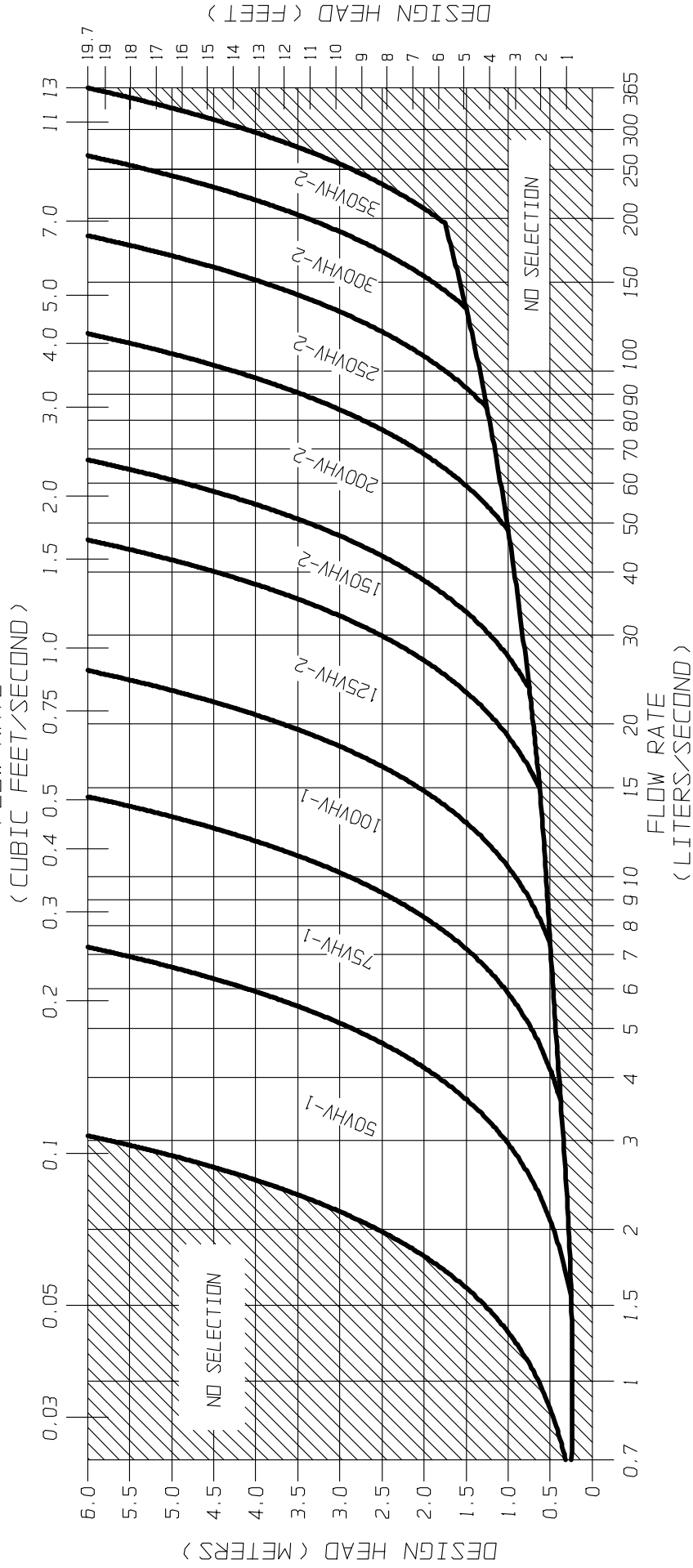


FIGURE 3 - VHV

JOHN MEUNIER



SVHV Vertical Vortex Flow Regulator

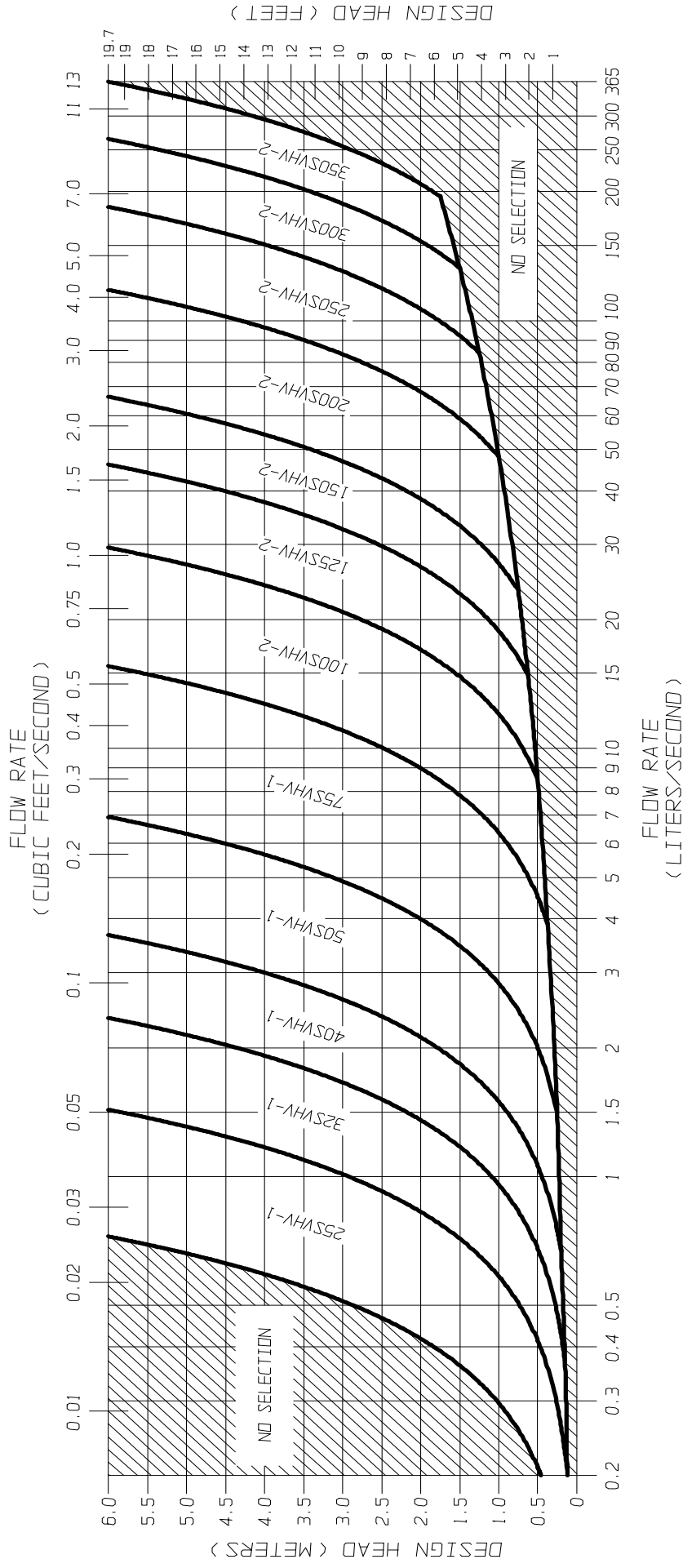
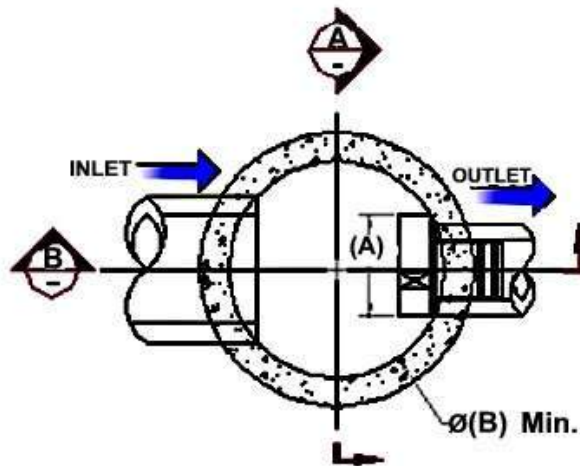


FIGURE 3 - SVHV

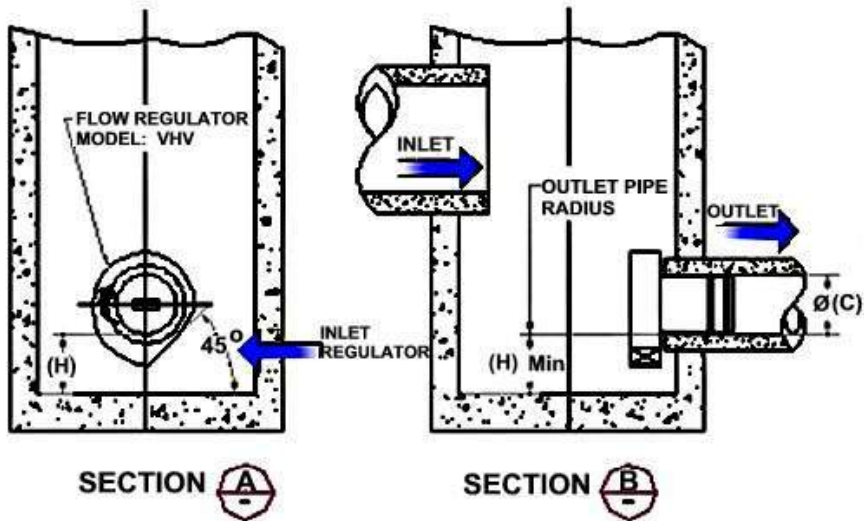
JOHN MEUNIER

**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

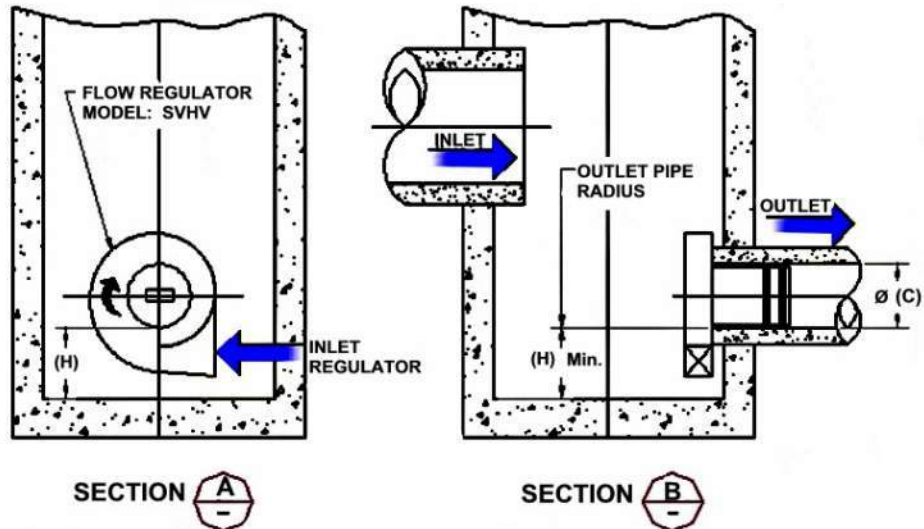
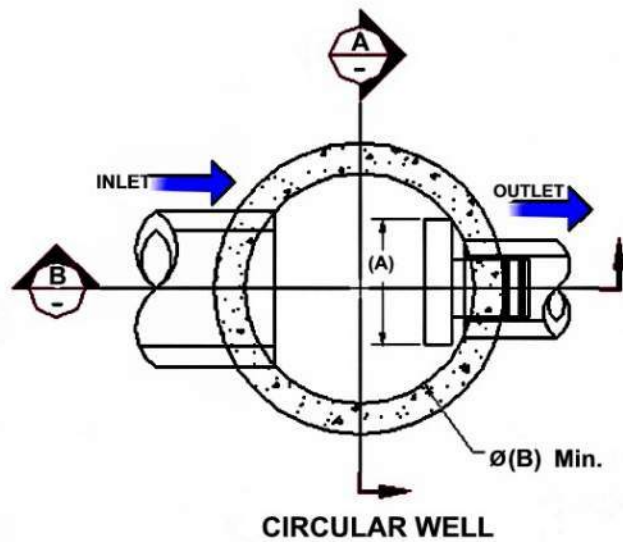


CIRCULAR WELL



FLOW REGULATOR TYPICAL INSTALLATION IN CIRCULAR MANHOLE
FIGURE 4 (MODEL SVHV)

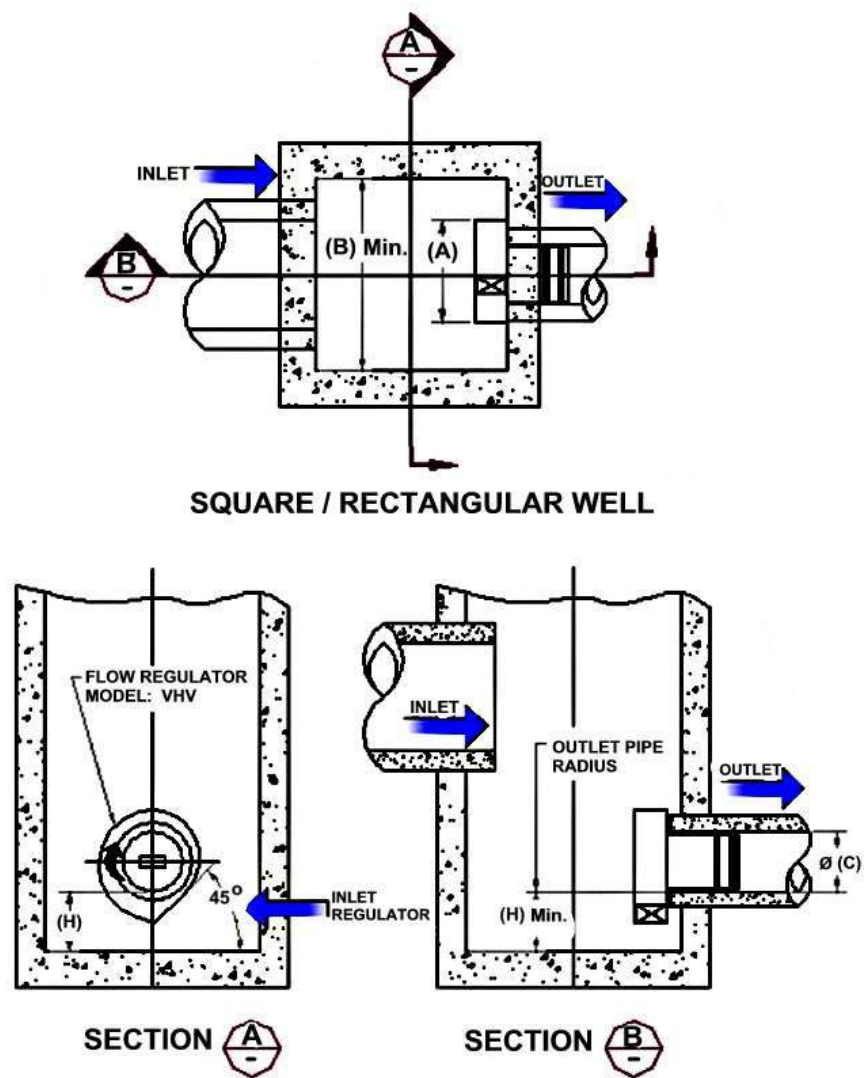
Model Number	Regulator Diameter		Minimum Manhole Diameter		Minimum Outlet Pipe Diameter		Minimum Clearance	
	A (mm)	A (in.)	B (mm)	B (in.)	C (mm)	C (in.)	H (mm)	H (in.)
25 SVHV-1	125	5	600	24	150	6	150	6
32 SVHV-1	150	6	600	24	150	6	150	6
40 SVHV-1	200	8	600	24	150	6	150	6
50 SVHV-1	250	10	600	24	150	6	150	6
75 SVHV-1	375	15	900	36	150	6	275	11
100 SVHV-2	275	11	900	36	150	6	250	10
125 SVHV-2	350	14	900	36	150	6	300	12
150 SVHV-2	425	17	1200	48	150	6	350	14
200 SVHV-2	575	23	1600	64	200	8	450	18
250 SVHV-2	700	28	1800	72	250	10	550	22
300 SVHV-2	850	34	2400	96	250	10	650	26
350 SVHV-2	1000	40	2400	96	250	10	700	28



**FLOW REGULATOR TYPICAL INSTALLATION IN SQUARE MANHOLE
FIGURE 4 (MODEL VHV)**

Model Number	Regulator Diameter		Minimum Chamber Width		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	600	24	150	6	200	8
125VHV-2	275	11	600	24	150	6	200	8
150VHV-2	350	14	600	24	150	6	225	9
200VHV-2	450	18	900	36	200	8	300	12
250VHV-2	575	23	900	36	250	10	350	14
300VHV-2	675	27	1200	48	250	10	400	16
350VHV-2	800	32	1200	48	300	12	500	20

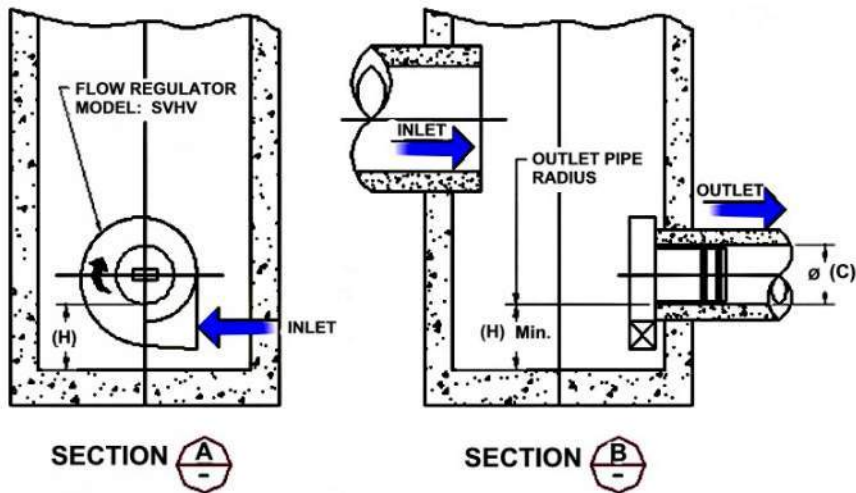
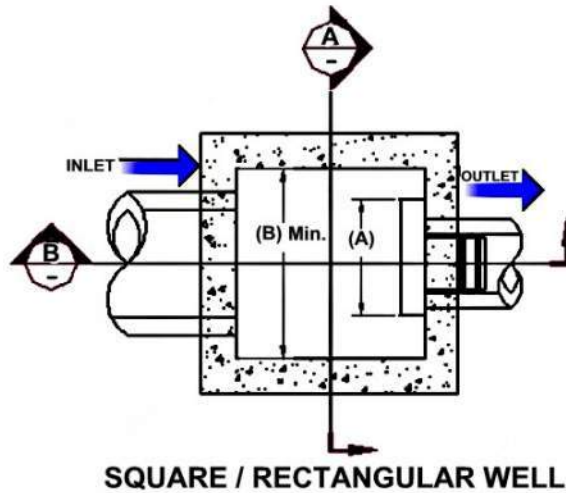
NOTE: *In the case of a square manhole, the outlet flow pipe must be centered on the wall to ensure enough clearance for the unit.*



FLOW REGULATOR TYPICAL INSTALLATION IN SQUARE MANHOLE
FIGURE 4 (MODEL SVHV)

Model Number	Regulator Diameter		Minimum Chamber Width		Minimum Outlet Pipe Diameter		Minimum Clearance	
	A (mm)	A (in.)	B (mm)	B (in.)	C (mm)	C (in.)	H (mm)	H (in.)
25 SVHV-1	125	5	600	24	150	6	150	6
32 SVHV-1	150	6	600	24	150	6	150	6
40 SVHV-1	200	8	600	24	150	6	150	6
50 SVHV-1	250	10	600	24	150	6	150	6
75 SVHV-1	375	15	600	24	150	6	275	11
100 SVHV-2	275	11	600	24	150	6	250	10
125 SVHV-2	350	14	600	24	150	6	300	12
150 SVHV-2	425	17	600	24	150	6	350	14
200 SVHV-2	575	23	900	36	200	8	450	18
250 SVHV-2	700	28	900	36	250	10	550	22
300 SVHV-2	850	34	1200	48	250	10	650	26
350 SVHV-2	1000	40	1200	48	250	10	700	28

NOTE: *In the case of a square manhole, the outlet flow pipe must be centered on the wall to ensure enough clearance for the unit.*



INSTALLATION

The installation of a **HYDROVEX**[®] regulator may be undertaken once the manhole and piping is in place. Installation consists of simply fitting the regulator into the outlet pipe of the manhole. **John Meunier Inc.** recommends the use of a lubricant on the outlet pipe, in order to facilitate the insertion and orientation of the flow controller.

MAINTENANCE

HYDROVEX[®] regulators are manufactured in such a way as to be maintenance free; however, a periodic inspection (every 3-6 months) is suggested in order to ensure that neither the inlet nor the outlet has become blocked with debris. The manhole should undergo periodically, particularly after major storms, inspection and cleaning as established by the municipality

GUARANTY

The **HYDROVEX**[®] line of **VHV / SVHV** regulators are guaranteed against both design and manufacturing defects for a period of 5 years. Should a unit be defective, **John Meunier Inc.** is solely responsible for either modification or replacement of the unit.

John Meunier Inc.

ISO 9001 : 2008

Head Office

4105 Sartelon

Saint-Laurent (Quebec) Canada H4S 2B3

Tel.: 514-334-7230 www.johnmeunier.com

Fax: 514-334-5070 cs@johnmeunier.com

Ontario Office

2000 Argentia Road, Plaza 4, Unit 430

Mississauga (Ontario) Canada L5N 1W1

Tel.: 905-286-4846 www.johnmeunier.com

Fax: 905-286-0488 ontario@johnmeunier.com

USA Office

2209 Menlo Avenue

Glenside, PA USA 19038

Tel.: 412-417-6614 www.johnmeunier.com

Fax: 215-885-4741 astele@johnmeunier.com

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

Purpose

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

Product Description

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

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

Product Function

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

Product Construction

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

Product Applications

Will accommodate both square and round applications:

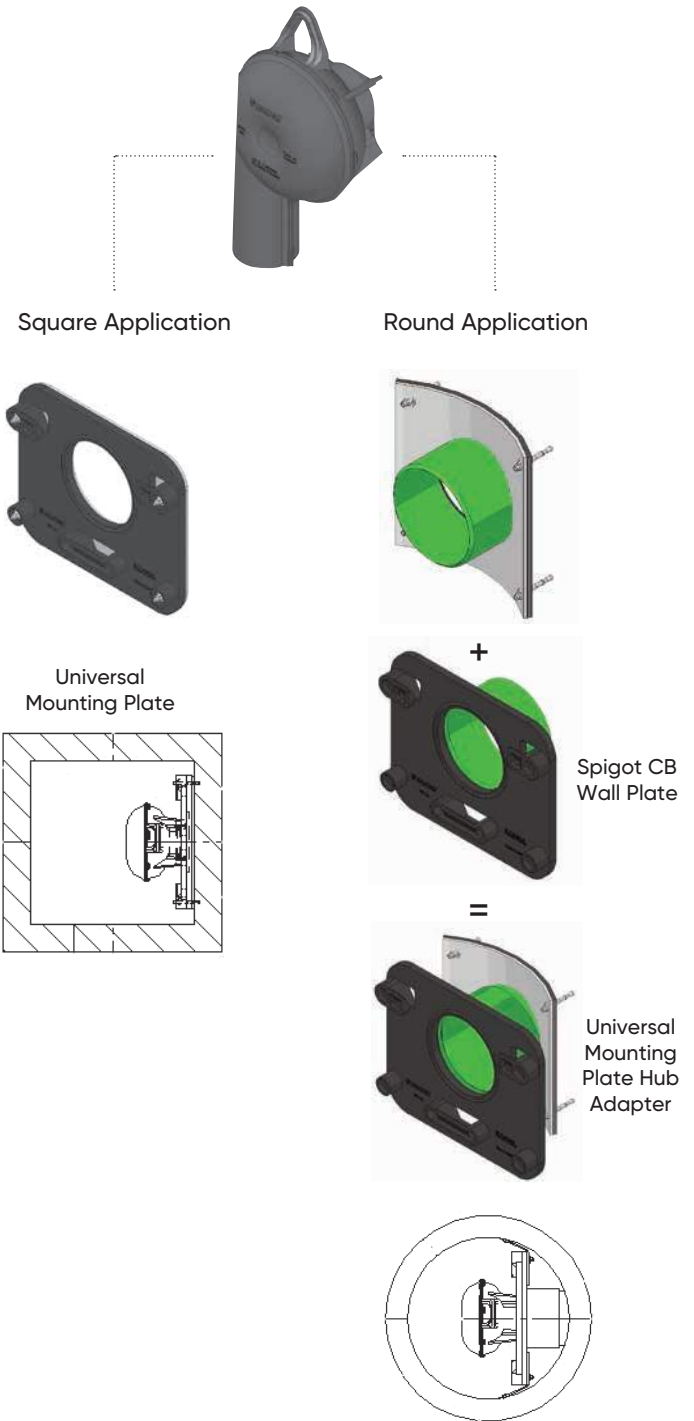


Chart 1: LMF 14 Preset Flow Curves

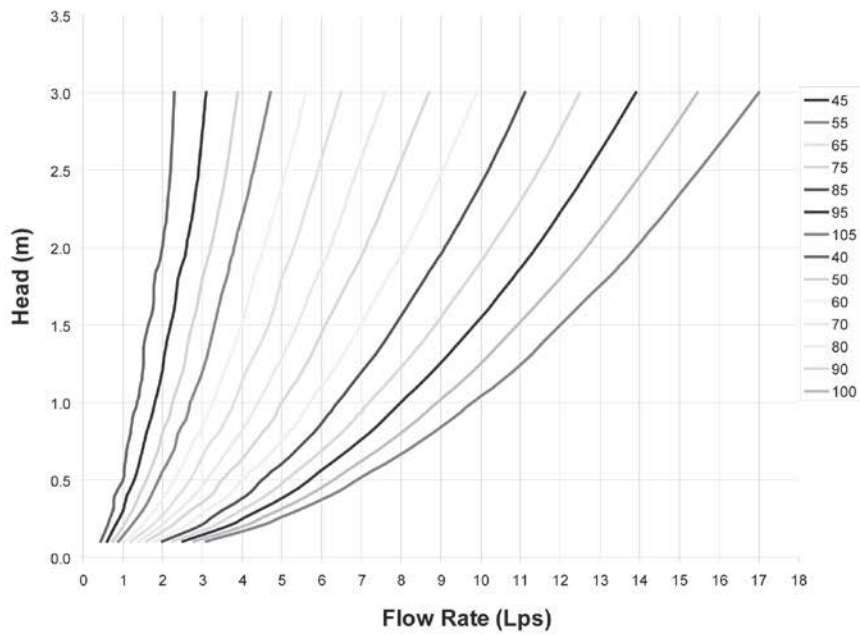
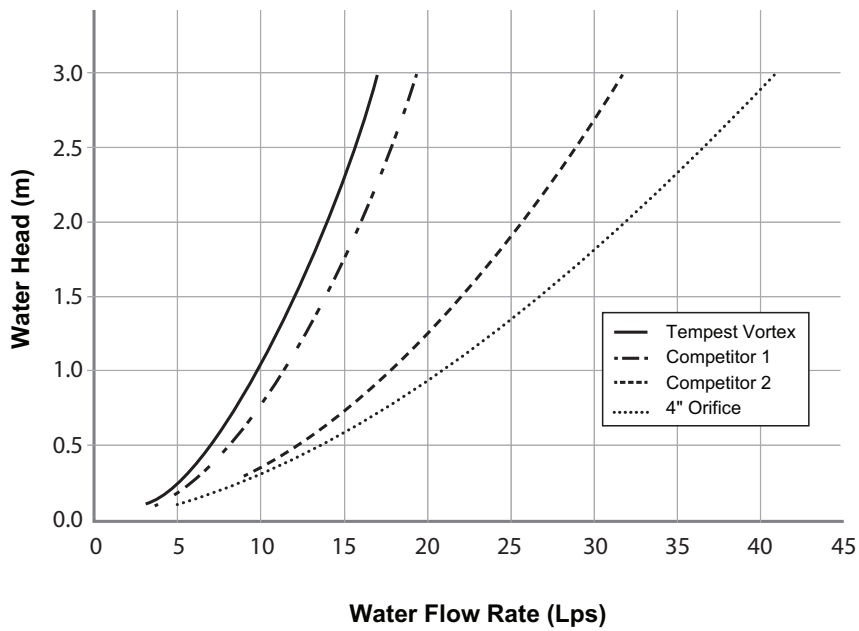


Chart 2: LMF Flow vs. ICD Alternatives



PRODUCT INSTALLATION

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

STEPS:

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



WARNING

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

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

STEPS:

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



WARNING

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

PRODUCT TECHNICAL SPECIFICATION

General

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

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

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

ICD's shall have no moving parts.

Materials

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

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

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

All hardware will be made from 304 stainless steel.

Dimensioning

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

Installation

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

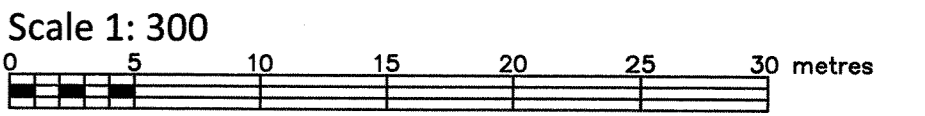
Appendix F

Topographic and Legal Survey

TOPOGRAPHIC PLAN OF

LOTS 1 AND 2 (West Friel Street), PART OF LOT 19 (North Rideau Street), PART OF LOTS 1, 2, 3 AND 4 (East Friel Street), PART OF LOTS 1, 2 AND 3 (West Chapel Street), PART OF FRIEL STREET (As Closed by By-Law 203-72, Inst. CR616467) REGISTERED PLAN 43586 CITY OF OTTAWA

FARLEY, SMITH & DENIS SURVEYING LTD. 2022



Metric Note: Distances and coordinates on this plan are in metres and can be converted to feet by dividing by 0.3048.

Bearing Note: Bearings are astronomic and are referred to the westerly limit of Friel Street having a bearing of N 31° 40' 30" W as shown on Plan 4R-352.

Elevation Notes: 1. Elevations shown are geodetic and are referred to Geodetic Datum CGVD-1928:1978. 2. Elevations derived from Vertical Benchmark Monument no. 3466 (Index no. 256) having a published elevation of 72.247m. 3. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that its relative elevation and description agrees with the information shown on this drawing.

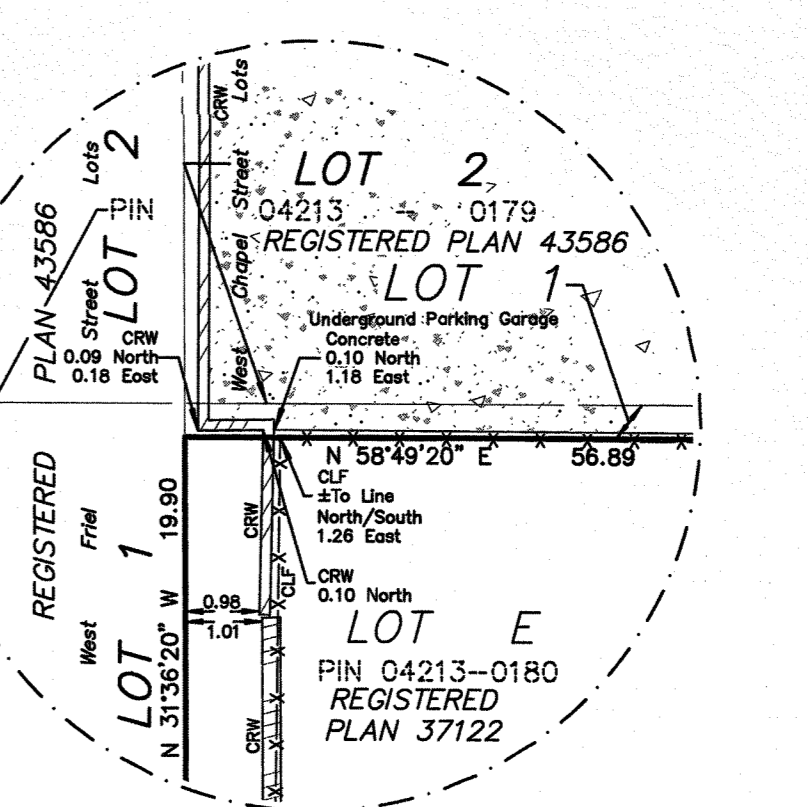
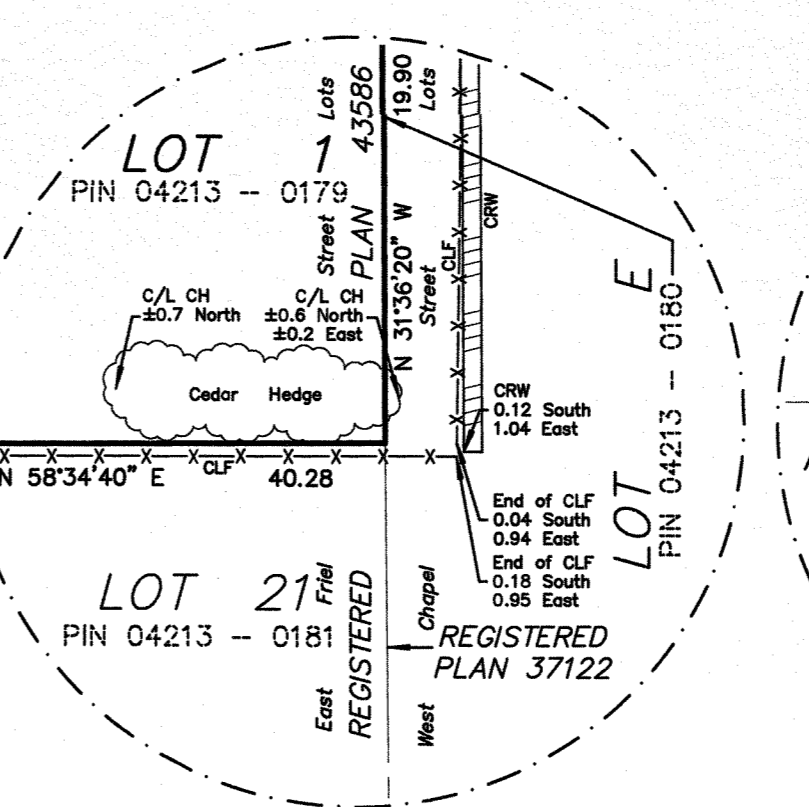
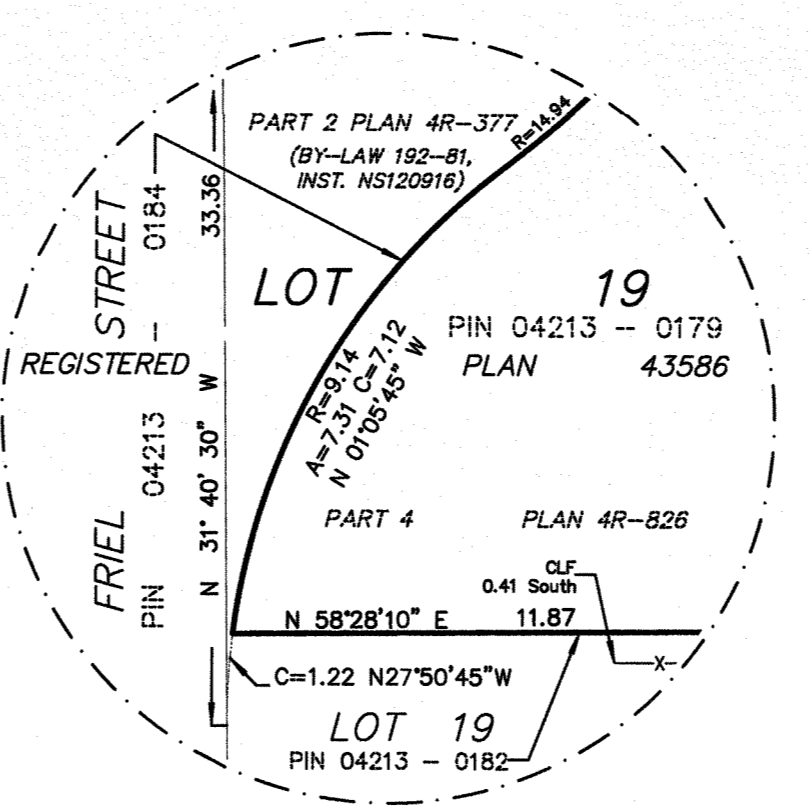
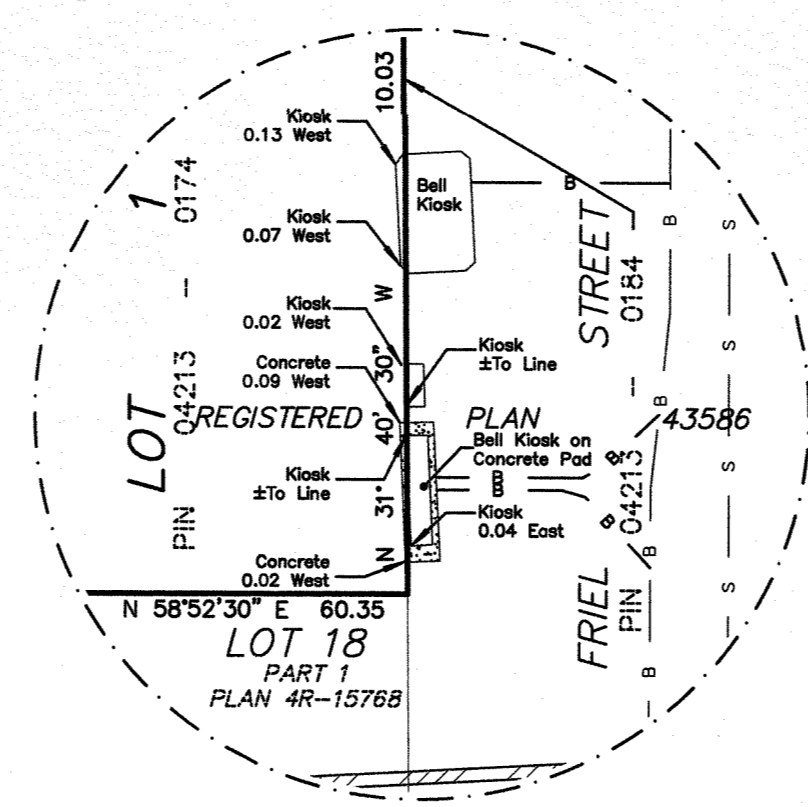
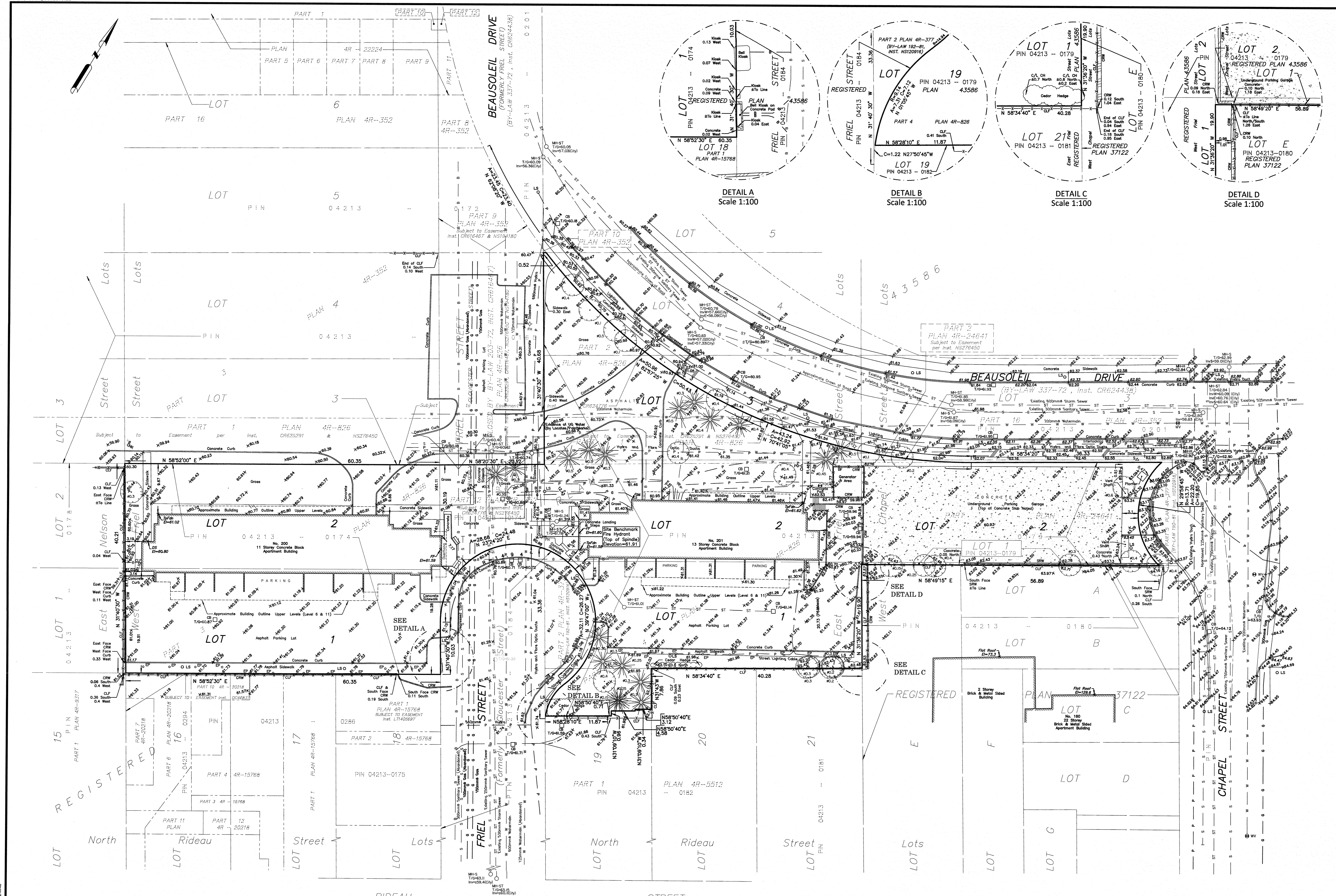
Utility Notes: 1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation. 2. Only visible surface utilities were located. 3. Underground utility data derived from City of Ottawa utility sheet references: D-14-14, D-14-15, 1252, 6368, 754-P-4, F-37A/4, F-37A/6, F37a-5, 16007 and 16091. 4. Sanitary and storm sewer grades and inverts were compiled from field measurement and City of Ottawa underground plans. 5. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.

Notes & Legend table listing symbols for various features like Chain Link Fence, Concrete Retaining Wall, Light Standard, etc.

TOPOGRAPHIC DATA WAS COLLECTED UNDER WINTER CONDITIONS. SNOW COVER AND ICE PRECLUDE DETERMINING LOCATION AND ELEVATION OF SOME TOPOGRAPHICAL DATA THAT IS OTHERWISE VISIBLE. WARNING: NO PERSON MAY COPY, REPRODUCE, DISTRIBUTE OR ALTER THIS PLAN IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF FARLEY, SMITH & DENIS SURVEYING LTD. © FARLEY, SMITH & DENIS SURVEYING LTD., 2022.

The fieldwork was completed on the 13th day of September, 2022. Signature of Daniel Robinson, Ontario Land Surveyor.

FARLEY, SMITH & DENIS SURVEYING LTD. ONTARIO LAND SURVEYORS CANADA LAND SURVEYORS Unit 275, 30 COLONNADE ROAD, OTTAWA, ONTARIO K2E 7J6 TEL: (613) 727-8226 E-mail: fdsurveys@bclinet.ca



Appendix G

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 defensible 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 feeder mains, 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