david schaeffer engineering ltd

120 Iber Road, Suite 103
Ottawa, Ontario K2S 1E9
Tel. (613) 836-0856
Fax (613) 836-7183
www.DSEL.ca

FUNCTIONAL SERVICING REPORT

FOR

NATIONAL CAPITAL BUSINESS PARK

4120 & 4055 RUSSELL ROAD

CITY OF OTTAWA

PROJECT NO.: 19-1155

MARCH 2020 – REV 1

FUNCTIONAL SERVICING REPORT
FOR
4120 & 4055 RUSSELL ROAD

NATIONAL CAPITAL BUSINESS PARK

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FOR
4120 & 4055 RUSSELL ROAD
NATIONAL CAPITAL BUSINESS PARK

MARCH 2020 – REV 1

CITY OF OTTAWA
PROJECT NO.: 19-1155

1.0 INTRODUCTION

David Schaeffer Engineering Limited (DSEL) has been retained by National Capital Business Park to prepare this Functional Servicing Report in support of application(s) for development approval(s) at 4120 & 4055 Russell Road.

The subject properties are located within the City of Ottawa urban boundary, in the northwest quadrant of the Intersection of Highway 417 with Hunt Club Road – as illustrated in **Figure 1**. The subject properties, owned by the National Capital Commission, are currently zoned IH-Heavy Industrial and are proposed to be split into 3 development parcels measuring approximately ***40.5 ha*** in total area.

Figure 1: Site Location

The proposed plan consists of the development of six light industrial buildings with street access, truck loading and parking. The proposed development would include approximately ***10,108 m²*** of office space and ***91,302 m²*** of warehouse, with primary access to Sites 1,2 and 3 from Russel Road and a secondary access from Hunt Club Road into Site 2. A copy of the ***Site Plan*** is included in ***Drawings/Figures***.

The objective of this report is to present the proposed development servicing plan for city and agency review, prior to advancing the detailed design for the development sites.

1.1 Existing Conditions

Sites 1 and 2 (4120 Russell Road) are currently undeveloped and consist of grassed and vegetated areas. The two sites are grade-separated by an existing embankment with a slope ranging from approximately 4V:1H (25%) to 10H:1V (10%) between existing elevations of approximately 77.0 m and 72.0 m. Site 2 has a gentle existing slope (~1%) falling from west to east toward the top of the embankment, and Site 1 is nearly flat from the bottom of the embankment to the eastern boundary of the property at Russell Road.

Site 3 (4055 Russell Road) is mainly covered with grassed and vegetated areas, with the exception of an existing house, barn and wet/dry pond areas. The property is bordered by Russell Road to the east, Highway 417 to the west, an existing hydro transformer yard to the north, and Hunt Club Road to the south. The existing Mather Award Drain bisects Site 3, toward the southern end of the property. With exception to the Mather Award Drain, Site 3 generally gently slopes from west to east. An existing 1350mm diameter municipal wastewater collector sewer and easement crosses the site, conveying flow to the north toward the Robert. O. Pickard Environmental Centre (ROPEC). Site 3 development limits adjacent to the Mather Award Ditch have been established based on the greater of: 15m from top of bank, 30m from high water mark, or the geotechnical limit of hazard.

Sewer and watermain mapping collected from the City of Ottawa indicate that the following services exist in close proximity to the subject properties:

Watermains

- 400 mm capped watermain within Russell Road to the north of Site 3;
- 300 mm capped watermain within Belgreen Drive at Russell Road;
- 300 mm capped watermain within Hunt Club Road to the west of Site 2.

Sanitary Sewers

- 900mm -1350 mm diameter Green Creek Collector South trunk sewer runs north of Site 2 and bisects Site 3 diagonally.

Storm Sewers

- 375 mm diameter PVC storm sewer within Hunt Club Road.

1.2 Required Permits / Approvals

The proposed development will be subject to the site plan control approval process. The City of Ottawa must approve the engineering design drawings and reports prior to the issuance of site plan control.

Ontario Water Resources Act (OWRA) s.53 approval will be required from the Ministry of the Environment and Climate Change (MECP) for sanitary and stormwater and falls under the Transfer of Review process.

Conservation Authorities Act approval will be required from Rideau Valley Conservation Authority for development within regulatory limits and the release of stormwater runoff to watercourses.

A land use permit will be required from the Ministry of Transportation due to the proximity of the site to Highway 417.

The subject property contains large trees, and re-grading the site to accommodate the proposed development may require removal of existing trees. Trees requiring removal will be subject to the City of Ottawa Urban Tree Conservation By-law No. 2009-200.

1.3 Pre-consultation

Pre-consultation correspondence is located in ***Appendix A***.

2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

The following studies were utilized in the preparation of this report:

- **Ottawa Sewer Design Guidelines**,
  City of Ottawa, *SDG002,* October 2012.
  (City Standards)
  - **Technical Bulletin ISTB-2018-01**
    City of Ottawa, March 21, 2018.
    (*ISTB-2018-01*)
  - **Technical Bulletin ISTB-2018-03**
    City of Ottawa, March 21, 2018.
    (*ISTB-2018-03*)
- **Ottawa Design Guidelines – Water Distribution**
  City of Ottawa, July 2010.
  (Water Supply Guidelines)
  - **Technical Bulletin ISD-2010-2**
    City of Ottawa, December 15, 2010.
    (*ISD-2010-2*)
  - **Technical Bulletin ISDTB-2014-02**
    City of Ottawa, May 27, 2014.
    (*ISDTB-2014-02*)
  - **Technical Bulletin ISDTB-2018-02**
    City of Ottawa, March 21, 2018.
    (*ISDTB-2018-02*)
- **Design Guidelines for Sewage Works,**
  Ministry of the Environment, 2008.
  (MOE* Design Guidelines*)
- **Stormwater Planning and Design Manual,**
  Ministry of the Environment, March 2003.
  (SWMP Design Manual)
- **Ontario Building Code Compendium**
  Ministry of Municipal Affairs and Housing Building Development Branch, January 1, 2010 Update.
  (OBC)

- **McEwan Creek Water Quality & Erosion Study – Functional Design**
  CH2MHill, February 2001
  (McEwan Creek – Functional Design)

- **McEwan Creek Stormwater Management Facility Design Brief**
  IBI Group, November 2009
  (McEwan Creek – SWMF)

- **Preliminary Geotechnical Investigation**
  Paterson Group, October 7, 2019
  (Paterson 2019)

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies within the City of Ottawa 2W2C pressure zone, as shown by the Pressure Zone map in ***Appendix B***. The following existing municipal watermains are available to provide service to support development.

- Existing 400 mm capped watermain within Russell Road to the north of Site3.
- Existing 300 mm capped watermain within Belgreen Drive at Russell Road.
- Existing 300 mm capped watermain within Hunt Club Road to the west of Site 2.

3.2 Water Supply Servicing Design

It is proposed that a network of 200, 250 and 400 mm watermains will connect to the existing municipal watermains to provide a loop to supply water to the proposed development. Refer to the ***Water Servicing Sketch*** in ***Drawings/Figures*** for the proposed servicing layout and connection points. An extension of the 400mm diameter municipal watermain along Russell Road is proposed to provide service across the frontage of the 4055 Russell Road property.

Table 1 summarizes the ***Water Supply Guidelines*** employed in the preparation of the preliminary water demand estimate.

Table 1
Water Supply Design Criteria

Design Parameter	Value
Light Industrial Daily Demand**	35,000 L/gross ha/d
Commercial Office	75 L/9.3m^2/d
Industrial Maximum Daily Demand	1.5 x avg. day
Industrial Maximum Hour Demand	1.8 x max. day
Minimum Watermain Size	150 mm diameter
Minimum Depth of Cover	2.4 m from top of watermain to finished grade
During normal operating conditions desired operating pressure is within	350 kPa and 480 kPa
During normal operating conditions pressure must not drop below	275 kPa
During normal operating conditions pressure must not exceed	552 kPa
During fire flow operating pressure must not drop below	140 kPa

Daily average based on Appendix 4-A from **Water Supply Guidelines*
*** Industrial Max. Daily and Max. Hourly peaking factors per* **Water Supply Guidelines**.
-Table updated to reflect ISD-2010-2

Table 2 summarizes the estimated water supply demand and boundary conditions for the proposed development based on the ***Water Supply Guidelines***.

Table 2
Water Demand and Boundary Conditions
Proposed Conditions

	Anticipated Demand			Boundary Conditions		
Design Parameter	**Site 1 (L/min)**	**Site 2 (L/min)**	**Site 3 (L/min)**	**Connection 1 Russell Road (PSI / kPa)**	**Connection 2 Belgreen Dr. (PSI / kPa)**	**Connection 3 Hunt Club Rd (PSI / kPa)**
Average Day Demand	22.9	47.8	207.8	77.1 / 531.7	84.2 / 580.4	68.3 / 470.9
Max Day	34.3	71.7	311.8	-	-	
Peak Hour	61.8	129.1	561.2	68.6 / 472.8	75.6 / 521.5	59.8 / 412.0
Water demand calculation per Water Supply Guidelines. See Appendix B for detailed calculations. Boundary conditions supplied by the City of Ottawa for the demands indicated in the correspondence; assumed ground elevation 70.84m for Connection 1, 82.00m for Connection 2. And 75.80m for Connection 3						

The City provided corresponding boundary conditions for the maximum fire flow scenarios at each site. See ***Table 3*** for maximum fire flow demand and corresponding boundary conditions.

Table 3
Maximum Fire Flow Demands and Boundary Conditions
Proposed Conditions

Design Parameter	**Anticipated Fire Flow Demand (L/min)**	**Boundary Conditions**		
		Connection 1 Russell Road (PSI / kPa)	**Connection 2 Belgreen Dr. (PSI / kPa)**	**Connection 3 Hunt Club Rd (PSI / kPa)**
Site 1	7000	68.6 / 472.8	69.9 / 482.3	56.9 / 392.4
Site 2	8000	67.2 / 463.0	60.0 / 413.6	56.9 / 392.4
Site 3	19000	50.1 / 345.3	250 L/s @ 20 psi	28.5 / 196.2

Two scenarios were analyzed:

Scenario 1: Development of 4120 Russell Road only (Sites 1 & 2) with connections to watermains at Belgreen Drive and Hunt Club Road.

Scenario 2: Full development of 4120 and 4055 Russell Road (Sites 1, 2 & 3) with connections to watermains at Belgreen Drive, Hunt Club Road and Russell Road.

Fire flow requirements are to be determined in accordance with City of Ottawa ***Water Supply Guidelines*** and the Ontario Building Code.

Fire flow requirements were estimated per City of Ottawa Technical Bulletin ***ISTB-2018-02***. The following parameters were assumed:

- Type of construction – Non-Combustible Construction;
- Occupancy type – Limited Combustibility; and
- Sprinkler Protection – Supervised Sprinkler System.

The above assumptions result in an estimated maximum fire flow of approximately ***19,000 L/min***, noting that actual building materials selected will affect the estimated flow. A certified fire protection system specialist will need to be employed to design the building fire suppression system and confirm the actual fire flow demand.

3.3 Watermain Modelling

EPANet was utilized to determine the availability of pressures throughout the system during average day, max day plus fire flow, and peak hour demands. This static model determines pressures based on the available head obtained from the boundary conditions provided by the City of Ottawa.

The model utilizes the Hazen-Williams equation to determine pressure drop, while the pipe properties have been selected in accordance with ***Water Supply Guidelines***. The model was prepared to assess the available pressure at each building, as well as, the pressures the watermain provides to fire hydrants during fire flow conditions.

The maximum fire flow indicated in ***Table 3*** was used to model fire demand at each of the nodes representing hydrants to service ***Site 3***. Please refer to ***Appendix B*** for a model sketch showing the node locations, fire demands assigned to each hydrant and the resulting pressures. ***Table 4*** indicates the hydrant resulting in the lowest pressure in the fire flow scenario.

Table 4
Fire Demand and Minimum Pressure at Hydrants

Node ID[1]	Fire Demand at Node (L/min)	Total Fire Demand (L/min)	Minimum Pressure at Node (kPa)
11	5,000	19,000	219.74

1) See EPANET model in ***Appendix B*** for Node ID

As shown above, hydrants on-site can provide the required fire flow while maintaining minimum pressures described in ***Table 1***.

The fire flow yielding the lowest pressure, which occurred with ***5,000 L/min*** applied to Node 11, was utilized in the analysis below. ***Appendix B*** contains output reports and model schematics for each scenario.

Table 5
Model Simulation Output Summary

Location	Average Day (kPa)	Max Day + Fire Flow (117 L/s) (kPa)	Max Day + Fire Flow (133 L/s) (kPa)	Max Day + Fire Flow (317 L/s) (kPa)	Peak Hour (kPa)
1	597.43	495.80	429.48	322.75	538.57
2	602.33	491.48	416.14	327.65	543.47
3	523.85	417.91	308.72	249.17	464.90
4	518.95	419.48	268.99	244.27	459.99
5	518.95	421.93	256.73	244.27	459.99
6	518.95	424.87	258.00	244.27	459.99
7	499.33	420.06	402.70	224.65	440.47
8	563.09	503.84	493.54	372.39	504.23
9	604.30	506.59	438.41	323.34	545.44
10	602.24	526.99	494.82	235.64	543.08
11	602.33	521.21	479.61	219.74	543.18
12	602.33	514.63	462.74	221.90	543.28
13	602.33	507.96	445.18	261.73	543.38

As demonstrated in ***Table 5***, the anticipated pressures during the peak hour and max day + fire flow scenarios simulations are within the allowable pressure range described in ***Table 1*** from the ***Water Supply Guidelines***. Pressures during average day demand are above the recommended pressures outlined in ***Table 1***. A pressure check should be conducted at the time of construction to determine if pressure control is required.

3.4 Water Supply Conclusion

The estimated water demand was submitted to the City of Ottawa for establishing boundary conditions. The City provided both the anticipated minimum and maximum water pressures, as well as the estimated water pressure during fire flow.

Fire flow requirements were estimated in accordance with City of Ottawa ***Water Supply Guidelines*** and the Ontario Building Code.

The EPANET water distribution model confirmed adequate pressure exists within fire hydrants during fire flow, and within the system for the Average Day, Max Day + Fire Flow and Peak Hour scenarios. A pressure check should be conducted at the time of construction to determine if pressure control is required.

An extension of the 400mm diameter municipal watermain along Russell Road is proposed to provide service across the frontage of the 4055 Russell Road property.

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The subject site lies within the Green Creek Collector South Sewer catchment area, as illustrated in the City sewer mapping included in ***Appendix C***. The existing 900mm-1200mm diameter collector sewer runs from west to east, to the north of the 4120 Russell Road property (Sites 1 & 2); and the existing 1350 mm diameter collector sewer bisects the 4055 Russell Road property (Site 3).

4.2 Wastewater Design

It is proposed that the development will be serviced via a network of gravity sewers designed in accordance with the City of Ottawa design criteria and will outlet to the Green Creek Collector South Sewer. It is proposed that site development will be serviced via connection to an existing 250 mm drop pipe at manhole 13, within Russell Road at the intersection with Belgreen Drive, in accordance with City pre-consultation correspondence included ***Appendix A.*** The configuration of the connection to existing manhole #13 will be determined at the time of detailed design, based on site investigation of the existing manhole conditions. The extension of 250mm local sanitary sewer within Russell Road is prosed to extend servicing to Sites 1, 2 and 3. Refer to ***Wastewater Servicing Sketch*** in ***Drawings/Figures*** for servicing layout details.

Based on the ***Site Plan***, the proposed development will require a private internal sanitary sewer system to convey flow to the municipal sewer system. The Ontario Water Resources Act, Section 53 specifies that any private sewage system over 10,000 L/day requires MECP approval via Environmental Compliance Approval (ECA). The private sewage system will be designed in accordance with with relevant City of Ottawa and MECP design guidelines.

Table 6, below***,*** summarizes the ***City Standards*** that will be employed in the design of the proposed wastewater sewer system.

Table 7, below, demonstrates the estimated peak flow rates to be generated from the proposed development. See ***Appendix C*** for associated calculations.

The total estimated peak wastewater flow rate to be generated by the proposed development, and directed to the Green Creek Collector South Sewer, is ***20.74 L/s***. Detailed calculations are included in ***Appendix C***.

Table 6
Wastewater Design Criteria

Design Parameter	Value
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0 Harmon's Corrector Factor 0.8
Commercial Office Space	75 L/9.3m^2/d
Infiltration and Inflow Allowance	0.05 L/s/ha (Dry Weather) 0.28 L/s/ha (Wet Weather) 0.33 L/s/ha (Total)
Industrial - Light	35,000 L/gross ha/d
Industrial Peaking Factor	1.5 if contribution area >20%, otherwise 1.0
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sewer Size	200 mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5 m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6 m/s
Maximum Full Flowing Velocity	3.0 m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012 and Technical Bulletins.	

Table 7
Summary of Estimated Peak Wastewater Flow

Design Parameter	Estimated Sanitary Flow for Site 1 (L/s)	Estimated Sanitary Flow for Site 2 (L/s)	Estimated Sanitary Flow for Site 3 (L/s)	Total Estimated Sanitary Flow (L/s)
Average Dry Weather Flow Rate	0.65	1.24	5.19	6.08
Peak Dry Weather Flow Rate	0.65	1.68	7.08	9.41
Peak Wet Weather Flow Rate	1.95	3.77	15.02	20.74

4.3 Wastewater Servicing Conclusions

The site is tributary to the Green Creek Collector South Sewer. It is proposed to discharge wastewater to the existing 1350 mm diameter collector sewer via connection to the existing 250 mm sanitary drop pipe at manhole 13 located within Russell Road at the intersection Belgreen Drive.

5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Drainage

The subject property is within to the McEwan Creek watershed, and is subject to review and approval from the City of Ottawa and Rideau Valley Conservation Authority (RVCA). Refer to Figure 2 below for an illustration of the McEwan Creek alignment in close proximity to the site, along with the alignment of the Mather Award Ditch that bisects the 4055 Russell Road property (Site 3).

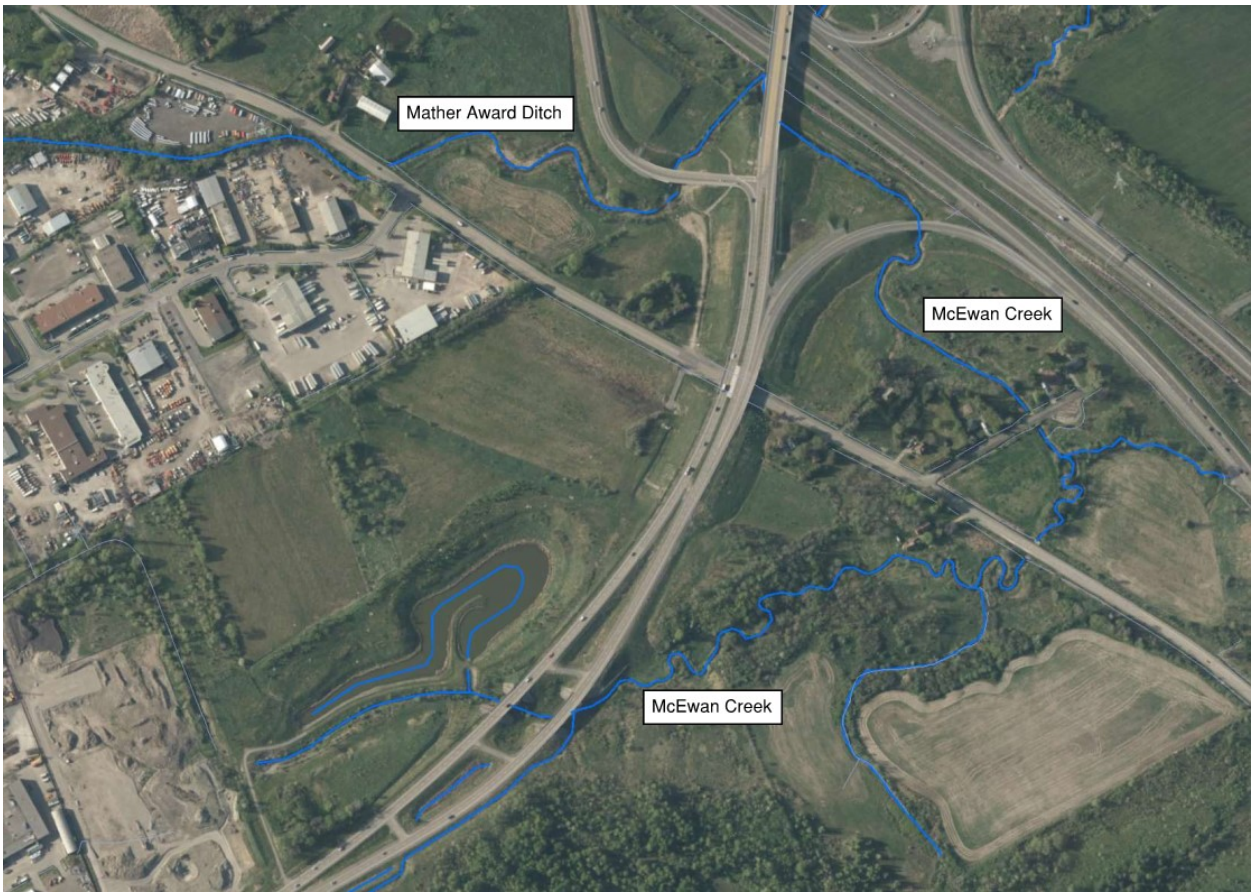

Figure 2: Existing Watercourses

Existing drainage characteristics are illustrated in the ***Pre-development Drainage Characteristics Sketch.***

4120 Russell Road (Sites 1 and 2) generally drains to the northeast towards a road-side ditch that discharges into the Mather Award Ditch through a culvert crossing Russel Road. The southern area of Site 2 drains to the existing McEwan Creek stormwater management pond located to the south of Sites 1 and 2.

4055 Russell Road to the north of the Mather Award Ditch (Site 3A), drains northeast into a ditch that borders the adjacent Highway 417 right-of-way and leads back toward the Mather Award Ditch. The southern area of 4055 Russell Road (Site 3B) drains directly into the Mather Award Ditch.

It is assumed, for the purpose of calculating stormwater management requirements for development, that the existing properties currently contain no stormwater management controls for flow attenuation. The estimated pre-development peak flows for the 2, 5, and 100-year events are summarized in ***Table 8***:

Table 8
Summary of Existing Peak Storm Flow Rates

City of Ottawa Design Storm	Estimated Peak Flow Rate			
	Site 1 (L/s)	Site 2 (L/s)	Site 3A (L/s)	Site 3B (L/s)
2-year	153.8	147.6	430.6	99.8
5-year	208.0	198.6	578.5	135.5
100-year	444.4	422.5	1229.0	290.2

5.2 Post-development Stormwater Management Target

Pre-consultation with City of Ottawa and RVCA staff indicates that the following stormwater management controls will be required for development of the properties:

- Maximum peak flow rates must not exceed pre-development values for storms with return periods ranging from 2 to 100 years.
- Enhanced quality level treatment (80% TSS removal) will be required.
- Water budget and potential benefits of LIDs will need to be evaluated.

Pre-consultation correspondence is included in ***Appendix A.***

5.3 Proposed Stormwater Management System

It is proposed that the primary stormwater outlet points from proposed development will be direct to new inlet locations that are in close proximity to the existing conditions inlet points in the Mather Award Ditch. It is proposed that an area of Site 2 will be directed to the existing McEwan Creek stormwater pond, in keeping with existing drainage conditions onsite.

To meet stormwater quantity control targets, the proposed design will consist of a combination of rooftop and surface/subsurface flow attenuation storage.

Table 6 summarizes preliminary Rational Method post-development flow rates and calculated attenuation storage requirements to attenuate runoff release rates to pre-development values.

Table 9
Stormwater Flow Rate Summary

Control Area	5-Year Release Rate	5-Year Storage	100-Year Release Rate	100-Year Storage
	(L/s)	(m^3)	(L/s)	(m^3)
Site 1	141.4	452.0	444.9	924.6
Site 2	198.6	1244.0	422.5	2175.2
Site 3 A	578.9	3693.3	1229.8	7180.7
Site 3 B	135.5	227.4	290.2	479.6

It is anticipated that approximately ***10,760m³*** of storage, consisting of ***3524 m³*** roof storage and ***7236 m³*** surface storage, will be required to attenuate flow rates to pre-development values. Runoff rate and storage calculations are included in ***Appendix D***. Actual storage volumes will need to be confirmed at the detailed design stage, based on the final site layout and details.

With exception to a small area of Site 2 that will be directed to the existing McEwan Creek pond, Site 1 and 2 stormwater drainage is proposed to be directed to a storm sewer that will cross Russell Road, where it will be combined with drainage from Site 3B prior to passing through a separator unit for quality control and release into the Mather Award Ditch. An undeveloped area to the north of Site 3B is reserved to provide the potential for additional attenuation storage and groundwater infiltration opportunities.

Site 3A stormwater drainage is proposed to be collected into a storm sewer between the proposed buildings and Russell Road. Drainage to the east of the proposed buildings is proposed to be directed over the surface toward a greenspace buffer that will separate the development from the Highway 417 corridor. This greenspace will contain a gently sloped channel to provide stormwater conveyance to the Mather Award Ditch, along with the potential for additional attenuation storage and groundwater infiltration opportunities. Both the storm sewer and channel will be directed to a junction point prior to passing through a separator unit for quality control and release into the Mather Award Ditch.

Refer to ***Storm Servicing Sketch*** in ***Drawings/Figures*** for and illustration of the proposed site drainage plan.

Groundwater infiltration potential and water budget targets and requirements will be further evaluated prior to detailed design, along with opportunities to incorporate Low Impact Development practices (LIDs).

5.4 Stormwater Servicing Conclusions

Drainage from the existing properties is primarily directed to the Mather Award Ditch. It is proposed that the primary stormwater outlet points from the proposed development will be direct to new inlet locations that are in close proximity to the existing inlet points in the Mather Award Ditch; and that a small area within Site 2 will be directed to the existing McEwan Creek stormwater pond, matching existing drainage conditions.

Post development stormwater runoff release rates must not exceed pre-development values for storms with return periods ranging from 2 to 100 years. It is estimated that ***10,760m^3*** of combined roof and surface/subsurface attenuation storage will be required to meet pre-development runoff release rates for the entire development.

Stormwater runoff from the proposed development will be treated for 80% Total Suspended Solids removal by separator units, prior to release into the Mather Award Ditch. Groundwater infiltration potential and water budget targets and requirements will be further evaluated prior to detailed design, along with opportunities to incorporate Low Impact Development practices (LIDs).

6.0 SITE GRADING

Existing grading and drainage conditions are described in ***Section 1.1*** and ***5.1***, respectively. The Paterson 2019 geotechnical investigation contains preliminary permissible grade raise recommendations ranging from 1.0m to 3.0m throughout the development sites. Refer to the ***Preliminary Permissible Grade Raise Plan*** for illustration.

The proposed grading design will be controlled by the following factors:

- Match into surrounding grade and street networks;
- Respect grade-controlled areas of proposed development plan;
- Adhere to permissible grade raise restrictions;
- Maintain depth of cover over gravity servicing infrastructure (storm and wastewater);
- Maintain freeboard above 100-year storm water levels; and
- Maximize efficiency of earthworks (cut-to-fill, import and export) operations.

Preliminary site grading design is illustrated in the ***Preliminary Grading Sketch*** in ***Drawings/Figures***.

7.0 UTILITIES

Hydro One has advised that a three-phase, pole-mounted 27 kV transmission line exists along Belgreen Drive, extending Russell Road; and that a single-phase, pole-mounted 27 kV line exists along Russell Road, across the site frontage. The developer will provide load estimates to Hydro One for evaluation of capacity within the existing circuit, and to assess whether offsite infrastructure upgrades will be required to service the proposed development. Poles along Russell Road will likely need to be upgraded to extend new infrastructure to service the proposed development.

Enbridge has advised that a gas main extension along Russel Road from Belgreen Drive, will be required to service the proposed development.

Bell and Rogers has advised that telecommunications infrastructure exists at the intersection of Belgreen Drive and Stevenage Drive. Bell has existing fibre optic extended to this location. Extension of servicing along the existing Belgreen Drive and Russell Road pole lines will be required to service the proposed development.

7.0 EROSION AND SEDIMENT CONTROL

Soil erosion occurs naturally and is a function of soil type, climate and topography. The extent of erosion losses is exaggerated during construction where vegetation has been removed and the top layer of soil becomes agitated.

Prior to topsoil stripping, earthworks or underground construction, erosion and sediment controls will be implemented and will be maintained throughout construction.

Silt fence will be installed around the perimeter of the active part of the site and will be cleaned and maintained throughout construction. Silt fence will remain in place until the working areas have been stabilized and re-vegetated.

Catchbasins will have catchbasin inserts installed during construction to protect from silt entering the storm sewer system.

The following specific recommendations to the contractor will be included in contract documents.

- Limit extent of exposed soils at any given time.
- Re-vegetate exposed areas as soon as possible.
- Minimize the area to be cleared and grubbed.
- Protect exposed slopes with plastic or synthetic mulches.
- Install silt fence to prevent sediment from leaving the site and entering existing ditches.
- Install mud mat in order to prevent mud tracking onto adjacent roads.
- No refueling or cleaning of equipment near existing watercourses.
- No material stockpiles within the Jock River floodplain.
- Provide sediment traps and basins during dewatering.
- Install catchbasin inserts.
- Plan construction at proper time to avoid flooding.

The contractor will, at every rainfall, complete inspections and guarantee proper performance. The inspection is to include:

- Verification that water is not flowing under silt barriers.
- Clean and change inserts at catch basins.

8.0 CONCLUSION AND RECOMMENDATIONS

David Schaeffer Engineering Limited (DSEL) has been retained by Avenue 31 to prepare this Functional Servicing Report in support of application(s) for development approval(s) at 4120 & 4055 Russell Road. This Functional Servicing Report provides details related to the planned on-site and off-site municipal servicing, grading and drainage design for the subject properties, and demonstrates that adequate municipal infrastructure capacity is expected to be available for the planned development.

- Based on boundary conditions provided by the City, the existing municipal water infrastructure is capable of providing the proposed development with water within the City's required pressure range.
- The FUS method for estimating fire flow indicates that ***19,000 L/min*** fire flow supply is required for the proposed development.
- An extension of the 400mm diameter municipal watermain along Russell Road is proposed to provide service across the frontage of the 4055 Russell Road property.
- The proposed development will generate a total peak wet weather wastewater flow rate of approx. ***20.74 L/s*** to be discharged into the Green Creek Collector Sewer.
- Drainage from the existing properties is primarily directed to the Mather Award Ditch. It is proposed that the primary stormwater outlet points from proposed development will be directed to new inlet locations that are in close proximity to the existing inlet points in the Mather Award Ditch; and that a small area within Site 2 will be directed to the existing McEwan Creek stormwater pond, matching existing drainage conditions.
- Post development stormwater runoff release rates must not exceed pre-development values for storms with return periods ranging from 2 to 100 years. It is estimated that ***10,760m^3*** of combined roof and surface/subsurface attenuation storage will be required to meet pre-development runoff release rates for the entire development.
- Stormwater runoff from the proposed development will be treated for 80% Total Suspended Solids removal by separator units, prior to release into the Mather Award Ditch.
- Groundwater infiltration potential and water budget targets and requirements will be further evaluated prior to detailed design, along with opportunities to incorporate Low Impact Development practices (LIDs).
- Site grading will be designed to match into surrounding grade and street networks, respect grade-controlled areas of proposed development plan, adhere to permissible grade raise restrictions, maintain depth of cover over gravity servicing

infrastructure (storm and wastewater), maintain freeboard above 100-year storm water levels, and maximize efficiency of earthworks (cut-to-fill, import and export) operations.

- Erosion and sediment control measures will be implemented prior to commencing construction activities onsite, and will be maintained until the site is stabilized.

Prepared by,
David Schaeffer Engineering Ltd.

Per: Amr Salem

Per: Brandon Chow,

Per: Matt Wingate, P.Eng

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APPENDIX A

Pre-Consultation

JenniferKMurray@outlook.com

From:	Gervais, Melanie <Melanie.Gervais@ottawa.ca>
Sent:	November 28, 2019 2:58 PM
To:	mpilon@ave31.com; Jennifer Murray
Cc:	isabel.barrios@ncc-ccn.ca; Barakengera, Martin; gaelle.grangien@ncc-ccn.ca; tiera.zukerman@ncc-ccn.ca; bill.leonard@ncc-ccn.ca; jennifer.halsall@ncc-ccn.ca; Leclerc-Morin, Isabelle; Lee Sheets; Jennifer Luong
Subject:	4055 and 4120 Russell Road - pre-application consultation
Attachments:	McEwanCreekFunctionalDesign2001.pdf; Pre-con Applicant's Study and Plan Identification List.pdf

Hi Michel and Jennifer,

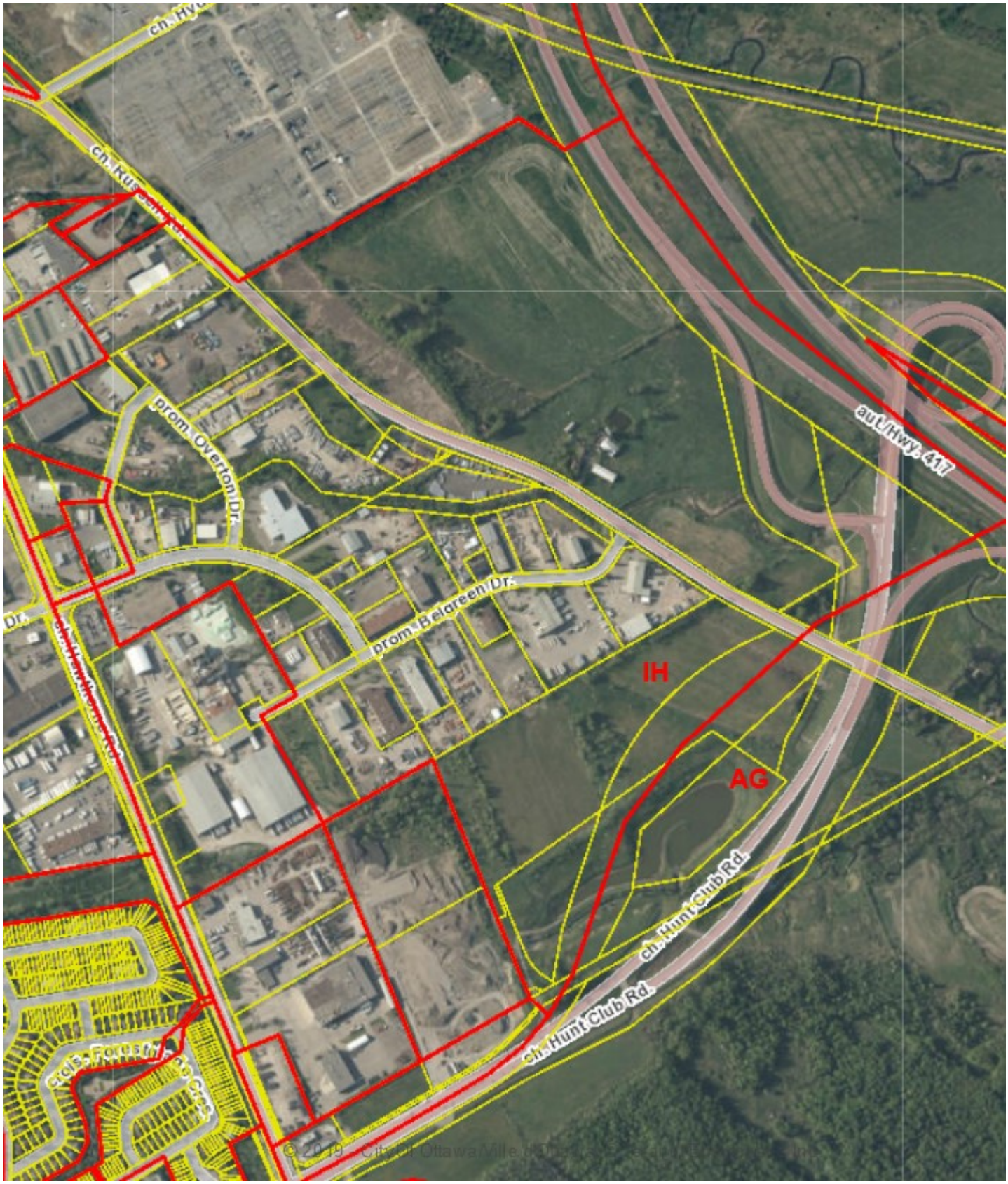
As a follow up to the pre-application consultation meeting held on November 18th, please find below a recap of the meeting.

Planning:

We could approve a Concept Master Site Plan and any other master studies or master plans that would make sense to guide future individual site plans. For example, you could submit a Concept Master Site Plan, transportation study, servicing plan/study and EIS that would be approved for the entire site (2 parcels). Each subsequent building would come forward on the regular (complex) site plan control application basis but would benefit from the master plans/studies approved.

The 2-stage site plan approach is much different, it is rarely used, and is more or less a draft approval of a site plan where we condition the detailed plans and studies after a 'draft approved site plan' draft approved. In order to complete the site plan approval process on a 2-stage site plan application you need to come forward and clear your conditions on your detailed plans/studies. This is most often used for financing where an applicant wants to get 'approval' up front to finance the project.

In this case I think the Master Plan approach is what makes most sense. It is not a separate application, it is the 'complex' site plan control application with certain plans/reports approved for the entire site (two parcels) and the detailed plans/reports approved for the first phase. You would therefore need to submit a New - Complex Site Plan application with a fee of $32,106.89 + engineering review fees + $995 (Conservation Authority fee). Please note that the fees may increase in 2020.



The properties identified as 4055 and 4120 Russell Road are zoned IH (Heavy Industrial Zone). The zoning provisions for Business Park Industrial can be found here and all the provisions for parking lots can be found here. Please note that a small portion of the site is designated Agricultural Resource Area in the Official Plan and zoned AG (Agricultural Zone), these discrepancies resulted

from a small shift in the location of the Hunt Club Road extension and interchange. The City will be correcting these Official Plan and zoning discrepancies which must be in force prior to any Site Plan Control approval.

Proper landscaping will be required on site. This includes the addition of trees within landscape buffers and landscaped islands. Please note that all Landscape Plans need to be stamped by a Landscape Architect.

Schedule I of the Official Plan identifies Highway 417 and Hunt Club Road as Scenic-Entry Routes. The policies of Section 4.6.4 of the Official Plan will have to be respected and the Planning Rationale will have to indicate how the policies are respected.

The Planning Rationale will have to explain the proposal, review the applicable Official Plan and Secondary Plan policies, review the applicable Zoning By-law provisions and review the Accessibility Design Standards. The Planning Rationale should also include a section on the environmental components (key points).

Please see the attached list identifying the submission requirements.

Forestry:

1. a Tree Conservation Report (TCR) must be supplied for review; an approved TCR is a requirement for Site Plan approval. Please try and retain as many trees as possible.
2. any removal of privately-owned trees 10cm or larger in diameter requires a tree permit issued under the Urban Tree Conservation Bylaw; the permit is based on the approved TCR
3. any removal of City-owned trees will require the permission of Forestry Services who will also review the submitted TCR
4. for this site, the TCR may be combined with the Environmental Impact Statement provided all information is clearly displayed
5. the TCR must list all trees on site by species, diameter and health condition – stands of trees may be combined using averages
6. the TCR must address all trees with a critical root zone that extends into the developable area – all trees that could be impacted by the construction that are outside the developable area need to be addressed.
7. trees with a trunk that crosses/touches a property line are considered co-owned by both property owners; permission from the adjoining property owner must be obtained prior to the removal of co-owned trees
8. If trees are to be removed, the TCR must clearly show where they are, and document the reason they can not be retained – please provide a plan showing retained and removed treed areas
9. All retained trees must be shown and all retained trees within the area impacted by the development process must be protected as per City guidelines listed on Ottawa.ca
10. the City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
11. Tree removal restrictions to accommodate for nesting birds will be in place from April 1 to August 15
12. Please ensure newly planted trees have an adequate soil volume for their size at maturity
13. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca

Transportation:

Russell Road is designated as an Arterial road within the City's Official Plan with a ROW protection limit of 30.0 metres. The ROW protection limit and the offset distance (15.0 metres) are to be dimensioned from the existing centerline of pavement and shown on the drawings.

ROW interpretation – Land for a road widening will be taken equally from both sides of a road, measured from the centreline in existence at the time of the widening if required by the City. The centreline is a line running down the middle of a road surface, equidistant from both edges of the pavement. In determining the centreline, paved shoulders, bus lay-bys, auxiliary lanes, turning lanes and other special circumstances are not included in the road surface.

The City's policy for the provision of pedestrian facilities as set forth by the Official Plan (OP), the Transportation Master Plan (TMP) and the Pedestrian Plan (OPP) specifically direct pedestrian facilities on City roads that lead to areas of work and employment ("retail/commercial/employment").

The concrete sidewalk is to meet City standards and be 2.0 metres in width and to be continuous along property frontage and depressed through the proposed accesses (please refer to the City's sidewalk and curb standard drawing SC7.1 for unsignalized entrance).

Proposed road modifications and new signals will require the delegated authority approval from the Manager of Design Review, Transportation Engineering Services.

The TIA (Transportation Impact Assessment) Guidelines (2017) were approved by Transportation Committee and City Council on June 14, 2017. The new version of the TIA Guidelines (2017) that are posted on the web are now to be used for the TIA Submission for development applications. The following list highlights the significant changes to the 2006 TIA Guidelines

1. A Screening Test (Step 1) quickly determines if a transportation study is required. Consultants should fill in the form in Appendix B.
2. Should the development generate 60 peak hour person trips, the TIA guidelines Step 2 – Scoping report would be required.
3. Study Scope (Step 2) is site specifically tailored; there are no longer three defined types of TIA reports. Scoping report is required and needs to be signed off by TPM before the consultant moves on to Forecasting volumes.
4. Sign off from City Transportation Project Manager is required at key points in the review process prior to TIA Submission (Step 5). See Figure 1 on page 9 for a good flow chart of the process.
5. Multi Modal Level of Service (MMLOS) and Complete Street analysis is required to assess the impact of all modes of travel rather than just vehicle traffic.
6. There is no longer a requirement for consultant pre-approval. Consultants must now sign and submit the Credentials Form included in the Appendix A with each TIA report.
7. The TIA Submission (report, drawings and/or monitoring plan) is required with the development application.
8. The TIA report is to review the potential for "Short Cutting" through the proposed development (Site #2 & 3).

Start this process asap. The application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).

- https://ottawa.ca/en/transportation-impact-assessment-guidelines

On site plan:

- Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
- Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions).
- Show all curb radii measurements; ensure that all curb radii are reduced as much as possible
- Show lane/aisle widths.
- Ensure pedestrian connections are provided on the site.
- Grey out any area that will not be impacted by this application.

AODA legislation (link) is in effect for all organizations, please ensure that the design conforms to these standards, see attached checklist for guidance.

For any transportation questions, please contact Wally Dubyk (Wally.Dubyk@ottawa.ca).

Concerning the access on Hunt Club Rd, the distance between intersections was substandard but the City agreed that we would accept it, as per the *Shared Access Road Term Sheet* dated for reference purposes as of August 17, 2016. The details of the road itself were not discussed at that time and will have to be determine through this Site Plan process (ex. private or public road).

Engineering:

Storm

- When draining to a surface drainage system, the post development peak flow rate must match the pre-development pear flow rate.
- RVCA require 80% TSS removal through on-site treatment prior to outletting to a natural watercourse.

Sanitary

- As an industrial site the peak flow timing will be different than residential, so the impact on the trunk system will be low.
- No direct connections to the trunk sewer would be permitted; they would have to make use of one of the existing MH/shafts on the sewer.

- For 4055, they have the existing chambers on the property.

- For 4120, the preference would either be to either install a sewer in Russel Rd to their property, or to negotiate with the neighbouring properties and the City to allow them access to one of the existing chambers on the south side of the properties that front onto Belgreen Dr. The Hunt Club outlet is only a 250mm sewer and is likely inadequate.

Water

- To be looped via a new watermain along Russell Rd. Please submit a request for boundary conditions.

MECP ECA's would be required for the industrial use (direct submission), any new sewers within the right of way (new sanitary along Russell) (transfer of review) and any storm outlets (transfer of review).

Noise Impact Study will be required if you have any on-site noise sensitive uses (typ. Offices) to analyze the noise levels to ensure the building components mitigate sound levels to acceptable levels at the plane of window.

Urban Design:

Site 3: Building 'A' orientation. Back of house facing street? Main entrance hidden from street front and 417.
Is the volume of parking reflective of zoning or actual demand?
There are opportunities for site sustainability:

- Break up huge expanses of hard surface with soft or permeable paving;
- Tree cover to reduce heat island effect;
- Pedestrian access across the site and through large parking areas;
- Everything seems over-sized probably because the initial design has had a certain level of redundancy applied, however, I think there is room now to apply a more sensitive design and environmental brush to only take what you need and apply a lens of ecological sensitivity and human safety and comfort to the site design;
- Study the primary views (Gateway, street-front, etc.);

Site 1 & 2:

- See sustainable opportunities for creative organization and landscape integration to improve human safety, comfort, accessibility etc.

Environmental

4055 Russell Road:

The watercourse here is called the Mather Award Drain and is part of the McEwan Creek study (approved in 2001). It will require a setback. The setback to the watercourse will be the greater of 30 m from Normal High Water Mark, 15 m from Top Of Bank or geotechnical limit of hazard. Further, the McEwan Creek study had some restoration/improvements plan as per the attached. This will need to be implemented through this application. In addition to the restoration work on the Mather Award Drain, there will be a requirement for an EIS.

4120 Russell Rd:

A watercourse runs along the east side of the Hydro site and is mapped in Schedule L1 of the Official Plan as part of the Natural Heritage System. This watercourse is also in the McEwan Creek study. The development of this parcel will require an EIS.

These watercourses may have status under the drainage act, a by-law may be required under the Drainage Superintendent process. Please contact the drainage superintendent to confirm status.

Endangered and Threatened Species - the EIS for each site will need to address the endangered and threatened species habitat. The database indicates that there are bobolinks, butternuts, barn swallows and bank swallows present in the area however the EIS will need to address all potential species.

RVCA

- Water Quality Control should provide enhanced treatment (80% TSS removal).
- Water course setbacks of 30 metres to be maintained.

- Any alterations to existing watercourses would require a permit from the Conservation Authority (albeit not proposed at the meeting). A small watercourse is identified as draining to the storm pond south of the site, and enclosure of this feature would be considered an alteration to a watercourse.

****

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

These pre-consultation comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change.

Please do not hesitate to contact me if you have any questions.

Regards,

Mélanie Gervais *MCIP, RPP*
Planner / Urbaniste
Development Review /
Examen des demandes d'aménagement
Planning, Infrastructure and Economic Development Department /
Services de la planification, de l'infrastructure et du développement économique
City of / Ville d'Ottawa
110, avenue Laurier Avenue West / Ouest,
4th Floor / 4ième étage
Ottawa, ON K1P 1J1
Tel. : 613-580-2424 ext. 24025
Fax / Télécopieur : 613-580-2576
E-mail / Courriel : Melanie.Gervais@ottawa.ca
Mail Code: 01-14

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Amr Salem

From: Brandon Chow
Sent: March 11, 2020 1:37 PM
To: Amr Salem
Subject: FW: 4055/4120 Russell Road
Attachments: p&p05.pdf; p&p06.pdf; details01.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

fyi

Brandon Chow
Project Coordinator / Intermediate Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext.532
fax: (613) 836-7183
email: bchow@DSEL.ca

From: Oram, Cody <Cody.Oram@ottawa.ca>
Sent: January 22, 2020 3:21 PM
To: Matt Wingate <MWingate@dsel.ca>
Cc: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>; Gervais, Melanie <Melanie.Gervais@ottawa.ca>; jamie.batchelor@rvca.ca
Subject: RE: 4055/4120 Russell Road

Hi Matt,
Please find the servicing comments below in response to your information requests:

Watermain:

- Request for boundary conditions have been sent. I'll pass along the results when received.

Storm Drainage:

- As confirmed with the RCVA – for stormwater management, the report should be prepared with reference to Section 3.0 of the MOE Stormwater Manual to determine the environmental design criteria required for the site. This includes consideration of the water balance, water quality, erosion control/geomorphology, and water quantity. When it comes to water quantity, the manual itself says that "generally, accepted criteria are that maximum peak flow rates must not exceed pre-development values for storms with return periods ranging from 2 to 100

years". The appropriate water quality criteria for this area is enhanced (80% TSS removal). The Conservation Authority encourages the use of LID technologies where feasible. Given that the outlets will likely be to the Mather Award Ditch portion which meanders and where erosion is likely a concern, the stormwater management plan will have to demonstrate that erosion will not be exacerbated. This will require confirmation that the stormwater will not exceed the erosion threshold for this section of the watercourse.
- The minimum setbacks from any watercourse for this area will be 30 metres from the normal highwater mark, 15 metres from top of bank or that determined by a geotechnical study (whichever is the greater of all the setbacks). The geotechnical report will need to be completed in accordance with the MNR Technical Guides for Natural Hazards and an appropriate Limit of Hazard Lands identified for the site. There will be no encroachment into the setbacks for structures, roads, parking areas etc. The RVCA will be requiring fencing along the perimeter of the site and the setback.
- All five phases of the work described in the McEwen Report have been completed.

Wastewater:
- For 4120, the preference would be either to install a sanitary sewer along Russel Road or to negotiate with the neighbouring property and the City to allow access to one of the existing chambers on the south side of the properties that front onto Belgreen Drive. The Hunt Club outlet is only a 250mm sewer and is likely inadequate.
- For 4055, no direct connections to the trunk sewer are permitted, however, connections to an existing MH/shaft on the trunk sewer is permissible.
- There appears to be an existing 225mm buried drop pipe @ MH13 (MHSA00545 – and should be field verified, refer to attached drawings) which may be a servicing option, especially for 4120 Russel Road if an easement or property issues to the sewer north of the property prove problematic.

Please note, all plans attached are for reference only. It is the Consultant's responsibility to verify the information in the field.

Should you have any questions or concerns, please do not hesitate to contact me.

Regards,
Cody

Cody Oram, P.Eng. Senior Engineer
Development Review, South Services
Planning, Infrastructure and Economic Development Department | Services de planification, d'infrastructure et de développement économique
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West. Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste **13422**, fax/téléc:613-580-2576, cody.oram@ottawa.ca

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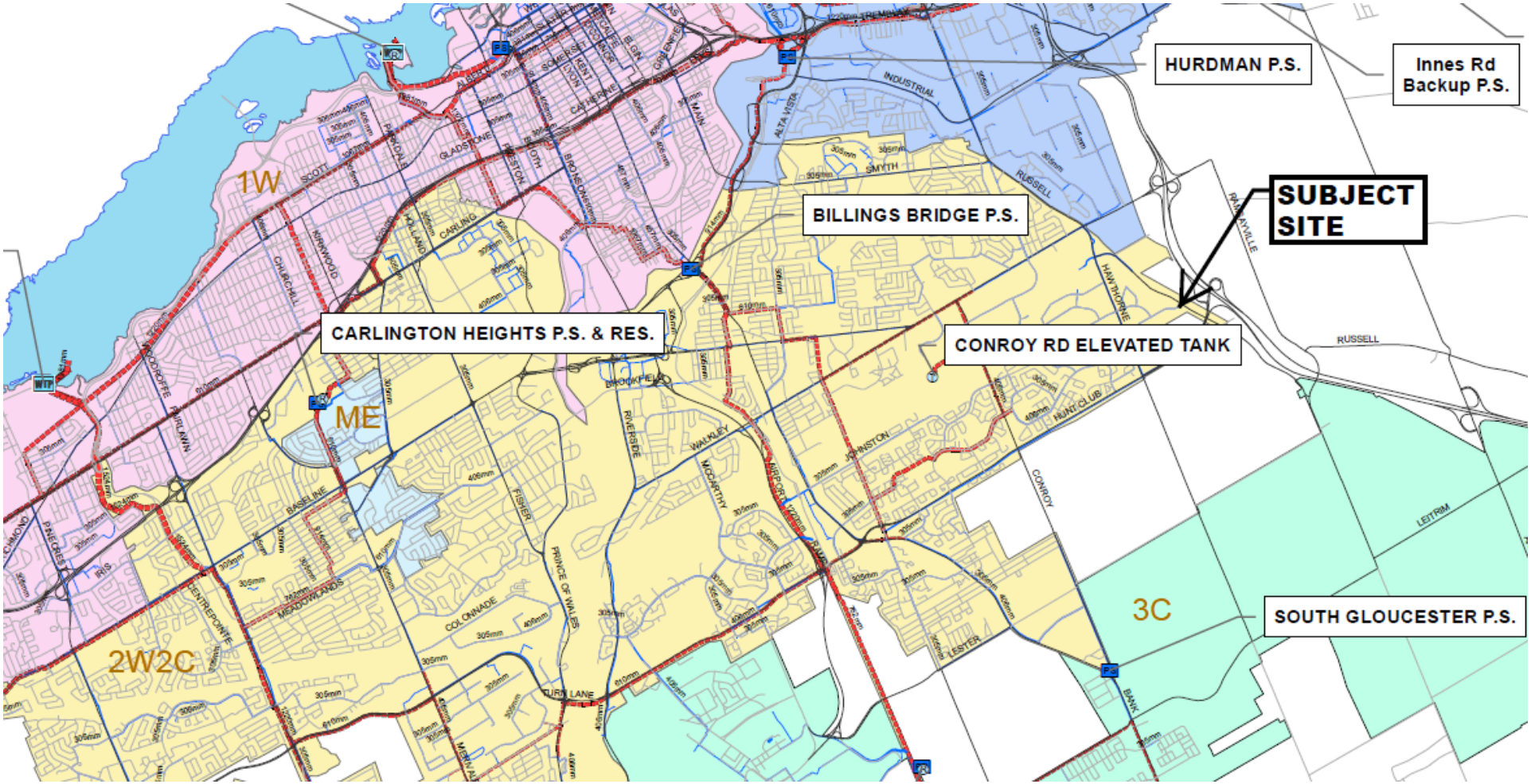
From: Shillington, Jeffrey <jeff.shillington@ottawa.ca>
Sent: January 14, 2020 9:04 AM
To: Oram, Cody <Cody.Oram@ottawa.ca>
Subject: FW: 4055/4120 Russell Road

APPENDIX B

Water Supply

Pressure Zone Map



4120 Russell Rd - Site 1
Proposed Site Conditions

Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

Institutional / Commercial / Industrial Demand

Property Type	Unit Rate	Units	Avg. Daily m^3/d	Avg. Daily L/min	Max Day m^3/d	Max Day L/min	Peak Hour m^3/d	Peak Hour L/min
Commercial floor space	2.5 $L/m^2/d$	-	0.00	0.0	0.0	0.0	0.0	0.0
Office	75 $L/9.3m^2/d$	832	6.71	4.7	10.1	7.0	18.1	12.6
Industrial - Light	35,000 L/gross ha/d	0.7	26.23	18.2	39.3	27.3	70.8	49.2
		Total I/CI Demand	32.9	22.9	49.4	34.3	88.9	61.8
		Total Demand	**32.9**	**22.9**	**49.4**	**34.3**	**88.9**	**61.8**

4120 Russell Rd - Site 2
Proposed Site Conditions

Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

Institutional / Commercial / Industrial Demand

				Avg. Daily		Max Day		Peak Hour	
Property Type	**Unit Rate**		**Units**	**m^3/d**	**L/min**	**m^3/d**	**L/min**	**m^3/d**	**L/min**
Commercial floor space	2.5	$L/m^2/d$	-	0.00	0.0	0.0	0.0	0.0	0.0
Office	75	$L/9.3m^2/d$	1,740	14.03	9.7	21.0	14.6	37.9	26.3
Industrial - Light	35,000	L/gross ha/d	1.6	54.81	38.1	82.2	57.1	148.0	102.8
			Total I/CI Demand	68.8	47.8	103.3	71.7	185.9	129.1
			Total Demand	**68.8**	**47.8**	**103.3**	**71.7**	**185.9**	**129.1**

4120 Russell Rd - Site 3
Proposed Site Conditions

Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

Institutional / Commercial / Industrial Demand

				Avg. Daily		Max Day		Peak Hour	
Property Type	**Unit Rate**		**Units**	**m^3/d**	**L/min**	**m^3/d**	**L/min**	**m^3/d**	**L/min**
Commercial floor space	2.5	$L/m^2/d$	-	0.00	0.0	0.0	0.0	0.0	0.0
Office	75	$L/9.3m^2/d$	7,536	60.77	42.2	91.2	63.3	164.1	114.0
Industrial - Light	35,000	L/gross ha/d	6.8	238.53	165.6	357.8	248.5	644.0	447.2
		Total I/CI Demand		299.3	207.8	448.9	311.8	808.1	561.2
		Total Demand		**299.3**	**207.8**	**448.9**	**311.8**	**808.1**	**561.2**

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	8352.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	16084.5	L/min	
	16000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**13600.0**	**L/min**

3. Reduction for Sprinkler Protection

Sprinklered - Supervised	-50%	
Reduction	**-6800**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Non-Combustible	>45m	0	1	0	0%	
S	Non-Combustible	>45m	0	0	0	0%	
E	Non-Combustible	>45m	0	1	0	0%	
W	Non-Combustible	>45m	0	0	0	0%	
		% Increase				**0%**	*value not to exceed 75%*

Increase	**0.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	6800.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	7000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _____.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min *Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	8700.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	16416.2	L/min	
	16000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible -15%

Fire Flow	**13600.0**	**L/min**

3. Reduction for Sprinkler Protection

Sprinklered - Supervised -50%

Reduction	**-6800**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Non-Combustible	>45m	0	0	0	0%	
S	Non-Combustible	>45m	0	0	0	0%	
E	Non-Combustible	>45m	0	1	0	0%	
W	Non-Combustible	20.1m-30m	60	1	60	8%	
		% Increase				**8%**	*value not to exceed 75%*

Increase	**1088.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	7888.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	8000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _____.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min

*Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Non-Combustible Construction

C	0.8		*Type of Construction Coefficient per FUS Part II, Section 1*
A	64520.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	44705.4	L/min	
	45000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%
Fire Flow	**38250.0 L/min**

3. Reduction for Sprinkler Protection

Sprinklered - Supervised	-50%
Reduction	**-19125 L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC
N	Non-Combustible	>45m	0	0	0	0%
S	Non-Combustible	>45m	0	0	0	0%
E	Non-Combustible	>45m	105	1	105	0%
W	Non-Combustible	>45m	0	0	0	0%
		% Increase				**0%** *value not to exceed 75%*

Increase	**0.0 L/min**

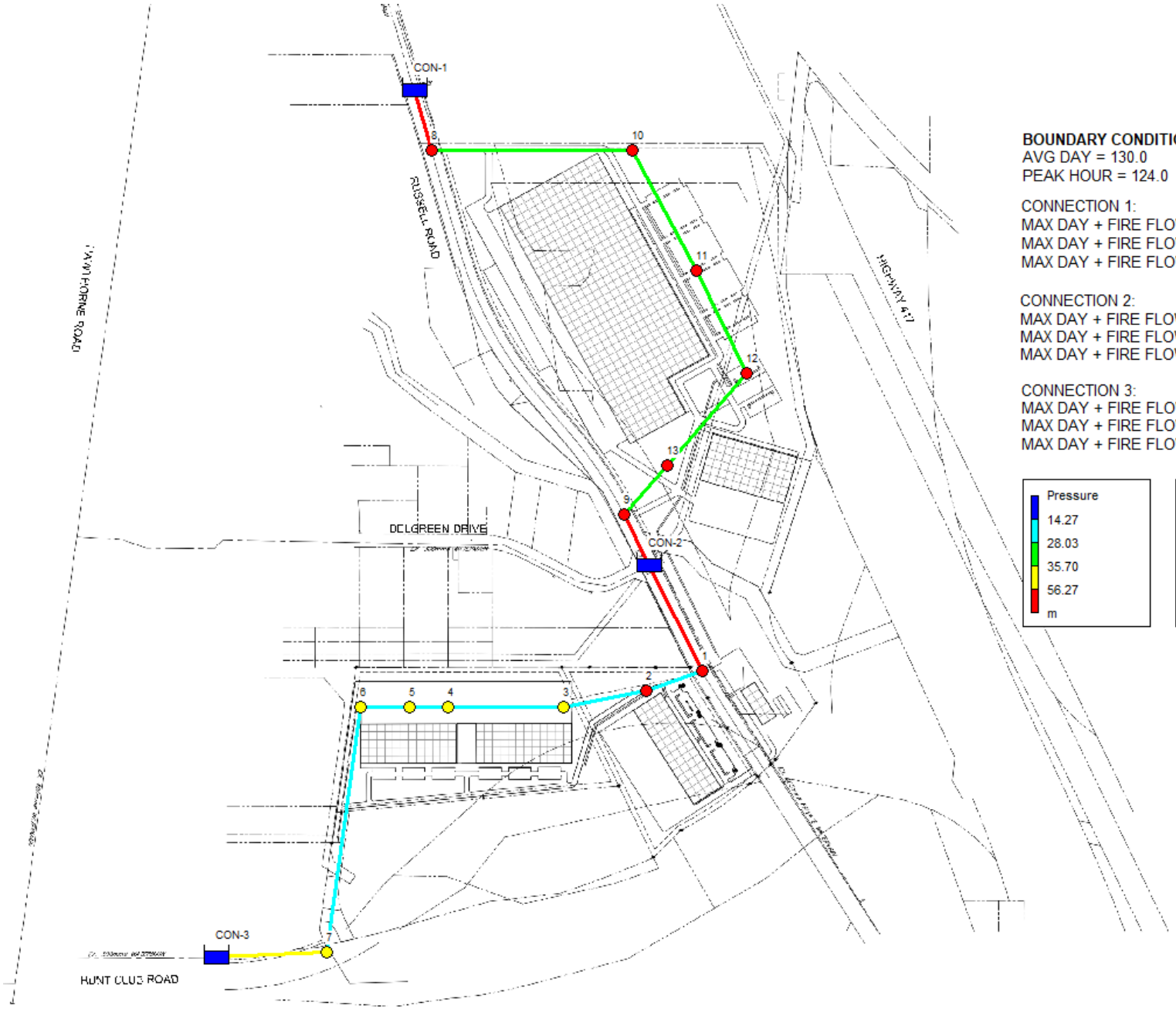
Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure. Max 5 stories
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	19125.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	19000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _____.
-Calculations based on Fire Underwriters Survey - Part II

AVERAGE DAY



BOUNDARY CONDITIONS
AVG DAY = 130.0
PEAK HOUR = 124.0

CONNECTION 1:
MAX DAY + FIRE FLOW (117L/s) = 124.0
MAX DAY + FIRE FLOW (133L/s) = 123.0
MAX DAY + FIRE FLOW (317L/s) = 111.0

CONNECTION 2:
MAX DAY + FIRE FLOW (117L/s) = 120.0
MAX DAY + FIRE FLOW (133L/s) = 113.0
MAX DAY + FIRE FLOW (317L/s) = 250L/s AVAILABLE AT 20psi

CONNECTION 3:
MAX DAY + FIRE FLOW (117L/s) = 122.0
MAX DAY + FIRE FLOW (133L/s) = 121.0
MAX DAY + FIRE FLOW (317L/s) = 102.0

Pressure
14.27
28.03
35.70
56.27
m

Diameter
200.00
250.00
300.00
400.00
mm

```
*************************************************************************
*                            E P A N E T                                *
*                     Hydraulic and Water Quality                       *
*                     Analysis for Pipe Networks                        *
*                          Version 2.0                                  *
*************************************************************************
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Input File: 2020-03-17_1155_AVG.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	CON-2	1	176	400
2	1	2	75	200
3	2	3	140	200
4	3	4	175	200
5	4	5	60	200
6	5	6	75	200
7	CON-3	7	160	300
8	7	6	375	200
9	CON-1	8	95	400
11	9	CON-2	115	400
12	8	10	365	250
13	10	11	165	250
14	11	12	195	250
15	12	13	195	250
16	13	9	85	250

Node Results:

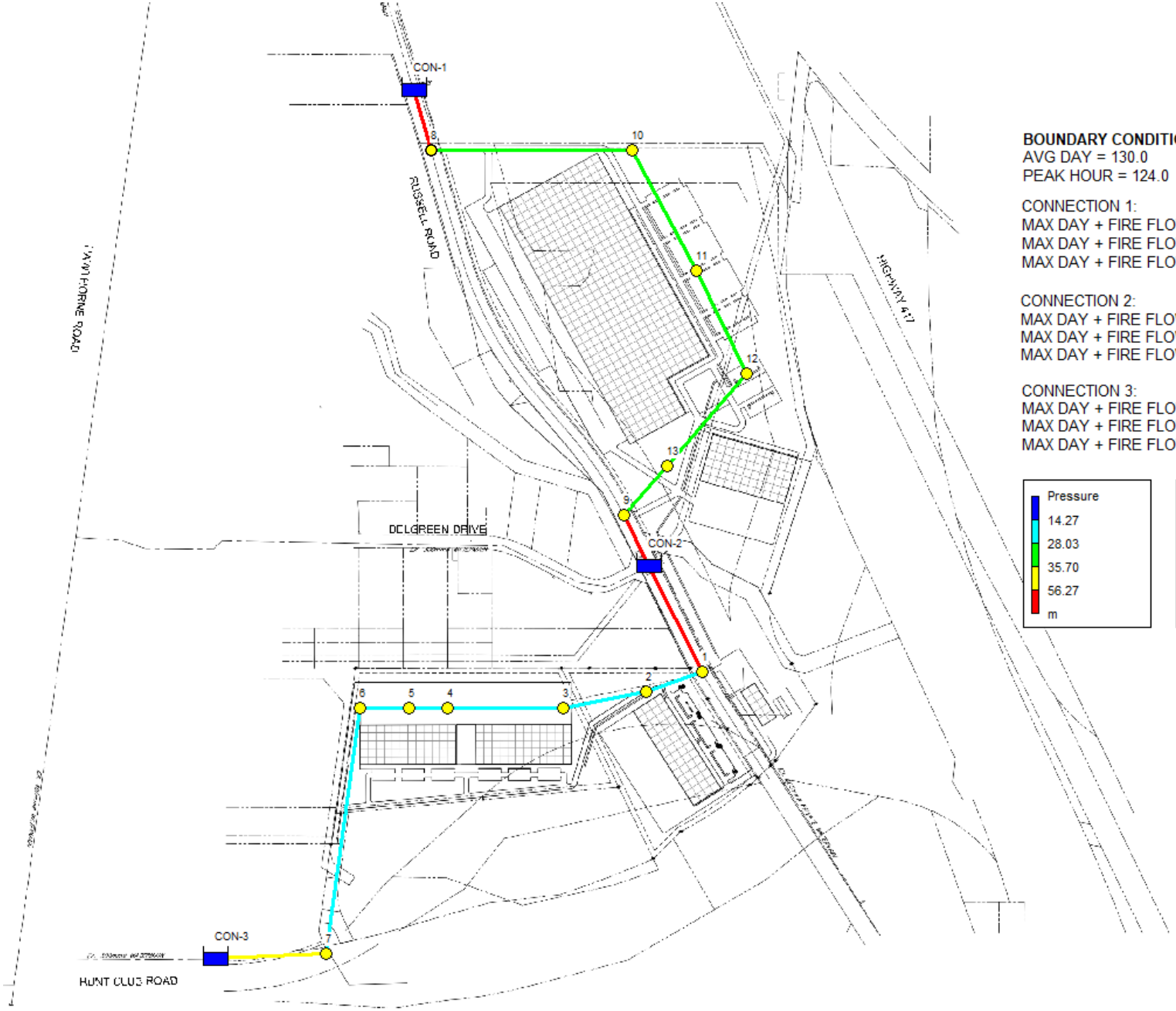
Node ID	Demand LPM	Head m	Pressure m	Quality	
1	0.00	130.00	60.90	0.00	
2	22.90	130.00	61.40	0.00	
3	23.90	130.00	53.40	0.00	
4	23.90	130.00	52.90	0.00	
5	0.00	130.00	52.90	0.00	
6	0.00	130.00	52.90	0.00	
7	0.00	130.00	50.90	0.00	
8	0.00	130.00	57.40	0.00	
9	0.00	130.00	61.60	0.00	
10	207.80	129.99	61.39	0.00	
11	0.00	130.00	61.40	0.00	
12	0.00	130.00	61.40	0.00	
13	0.00	130.00	61.40	0.00	
CON-2	-136.44	130.00	0.00	0.00	Reservoir
CON-1	-119.59	130.00	0.00	0.00	Reservoir
CON-3	-22.48	130.00	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
1	48.22	0.01	0.00	Open
2	48.22	0.03	0.01	Open
3	25.32	0.01	0.00	Open
4	1.42	0.00	0.00	Open
5	-22.48	0.01	0.00	Open

				AVERAGE DAY
6	-22.48	0.01	0.00	Open
7	22.48	0.01	0.00	Open
8	22.48	0.01	0.00	Open
9	119.59	0.02	0.00	Open
11	-88.21	0.01	0.00	Open
12	119.59	0.04	0.02	Open
13	-88.21	0.03	0.01	Open
14	-88.21	0.03	0.01	Open
15	-88.21	0.03	0.01	Open
16	-88.21	0.03	0.01	Open

PEAK HOUR



BOUNDARY CONDITIONS
AVG DAY = 130.0
PEAK HOUR = 124.0

CONNECTION 1:
MAX DAY + FIRE FLOW (117L/s) = 124.0
MAX DAY + FIRE FLOW (133L/s) = 123.0
MAX DAY + FIRE FLOW (317L/s) = 111.0

CONNECTION 2:
MAX DAY + FIRE FLOW (117L/s) = 120.0
MAX DAY + FIRE FLOW (133L/s) = 113.0
MAX DAY + FIRE FLOW (317L/s) = 250L/s AVAILABLE AT 20psi

CONNECTION 3:
MAX DAY + FIRE FLOW (117L/s) = 122.0
MAX DAY + FIRE FLOW (133L/s) = 121.0
MAX DAY + FIRE FLOW (317L/s) = 102.0

```
*************************************************************************
*                            E P A N E T                                *
*                     Hydraulic and Water Quality                       *
*                     Analysis for Pipe Networks                        *
*                          Version 2.0                                  *
*************************************************************************
```

Input File: 2020-03-17_1155_PEAK.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	CON-2	1	176	400
2	1	2	75	200
3	2	3	140	200
4	3	4	175	200
5	4	5	60	200
6	5	6	75	200
7	CON-3	7	160	300
8	7	6	375	200
9	CON-1	8	95	400
11	9	CON-2	115	400
12	8	10	365	250
13	10	11	165	250
14	11	12	195	250
15	12	13	195	250
16	13	9	85	250

Node Results:

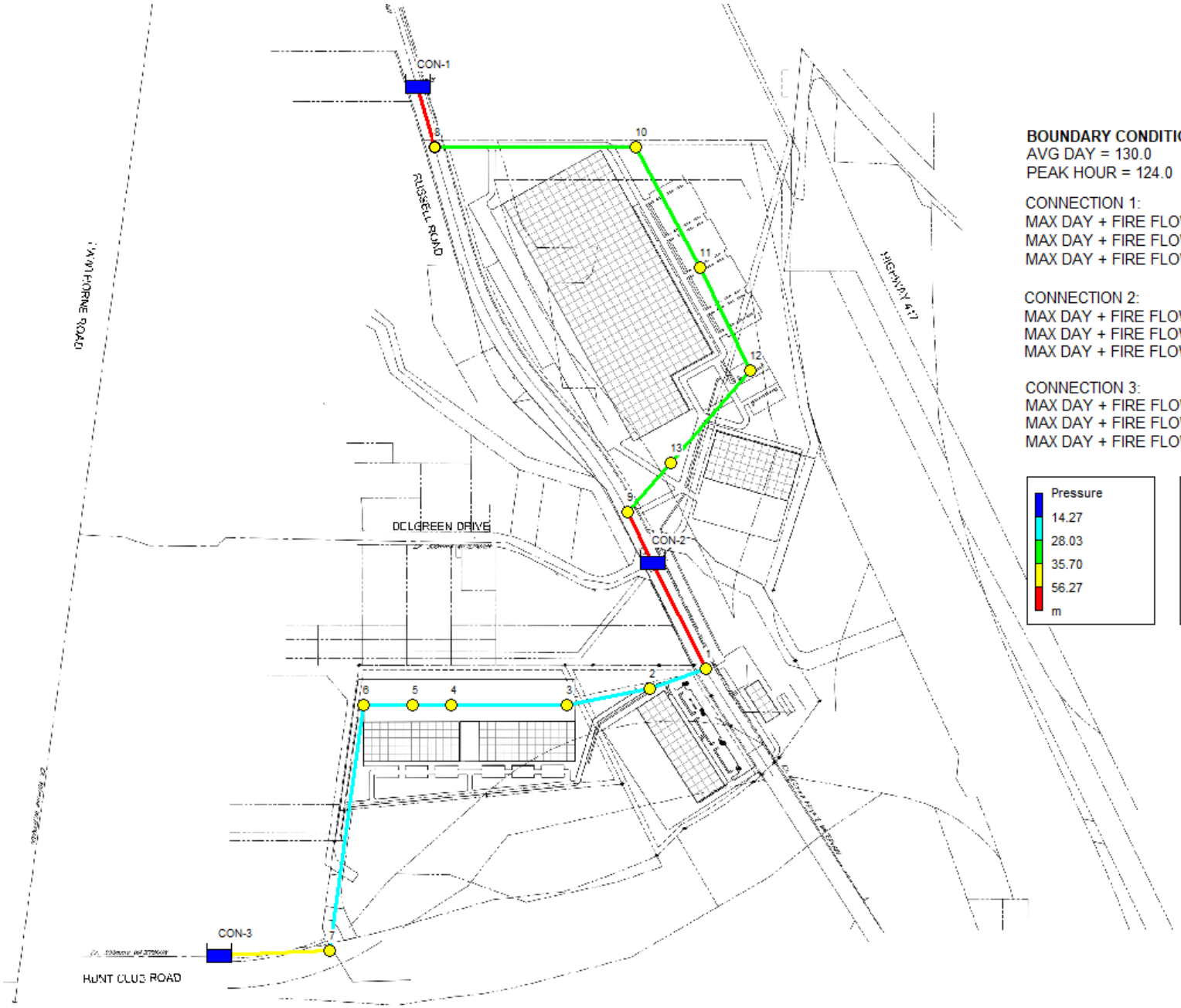
Node ID	Demand LPM	Head m	Pressure m	Quality	
1	0.00	124.00	54.90	0.00	
2	61.80	124.00	55.40	0.00	
3	64.60	123.99	47.39	0.00	
4	64.60	123.99	46.89	0.00	
5	0.00	123.99	46.89	0.00	
6	0.00	123.99	46.89	0.00	
7	0.00	124.00	44.90	0.00	
8	0.00	124.00	51.40	0.00	
9	0.00	124.00	55.60	0.00	
10	561.20	123.96	55.36	0.00	
11	0.00	123.97	55.37	0.00	
12	0.00	123.98	55.38	0.00	
13	0.00	123.99	55.39	0.00	
CON-2	-368.26	124.00	0.00	0.00	Reservoir
CON-1	-323.07	124.00	0.00	0.00	Reservoir
CON-3	-60.87	124.00	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
1	130.13	0.02	0.00	Open
2	130.13	0.07	0.06	Open
3	68.33	0.04	0.02	Open
4	3.73	0.00	0.00	Open
5	-60.87	0.03	0.01	Open

				PEAK HOUR
6	-60.87	0.03	0.01	Open
7	60.87	0.01	0.00	Open
8	60.87	0.03	0.01	Open
9	323.07	0.04	0.01	Open
11	-238.13	0.03	0.01	Open
12	323.07	0.11	0.10	Open
13	-238.13	0.08	0.06	Open
14	-238.13	0.08	0.06	Open
15	-238.13	0.08	0.06	Open
16	-238.13	0.08	0.06	Open

MAX DAY FIRE FLOW (117L/s)



BOUNDARY CONDITIONS
AVG DAY = 130.0
PEAK HOUR = 124.0

CONNECTION 1:
MAX DAY + FIRE FLOW (117L/s) = 124.0
MAX DAY + FIRE FLOW (133L/s) = 123.0
MAX DAY + FIRE FLOW (317L/s) = 111.0

CONNECTION 2:
MAX DAY + FIRE FLOW (117L/s) = 120.0
MAX DAY + FIRE FLOW (133L/s) = 113.0
MAX DAY + FIRE FLOW (317L/s) = 250L/s AVAILABLE AT 20psi

CONNECTION 3:
MAX DAY + FIRE FLOW (117L/s) = 122.0
MAX DAY + FIRE FLOW (133L/s) = 121.0
MAX DAY + FIRE FLOW (317L/s) = 102.0

Pressure
14.27
28.03
35.70
56.27
m

Diameter
200.00
250.00
300.00
400.00
mm

```
*********************************************************************
*                          E P A N E T                              *
*                   Hydraulic and Water Quality                     *
*                   Analysis for Pipe Networks                      *
*                        Version 2.0                                *
*********************************************************************
```

Input File: 2020-03-17_1155_MAX(117Ls).net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	CON-2	1	176	400
2	1	2	75	200
3	2	3	140	200
4	3	4	175	200
5	4	5	60	200
6	5	6	75	200
7	CON-3	7	160	300
8	7	6	375	200
9	CON-1	8	95	400
11	9	CON-2	115	400
12	8	10	365	250
13	10	11	165	250
14	11	12	195	250
15	12	13	195	250
16	13	9	85	250

Node Results:

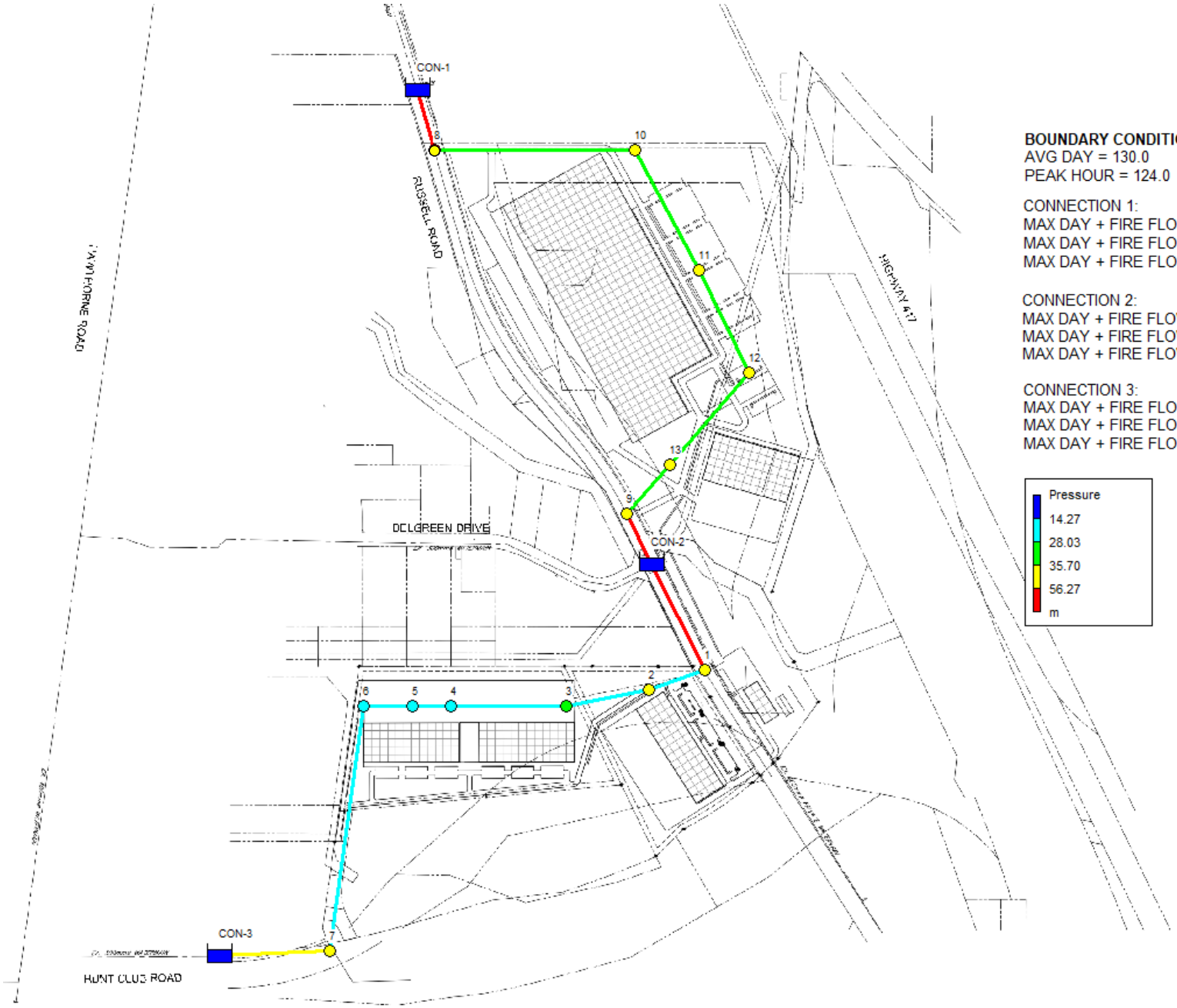
Node ID	Demand LPM	Head m	Pressure m	Quality	
1	3500.00	119.64	50.54	0.00	
2	3534.30	118.70	50.10	0.00	
3	35.90	119.20	42.60	0.00	
4	35.90	119.86	42.76	0.00	
5	0.00	120.11	43.01	0.00	
6	0.00	120.41	43.31	0.00	
7	0.00	121.92	42.82	0.00	
8	0.00	123.96	51.36	0.00	
9	0.00	120.04	51.64	0.00	
10	311.80	122.32	53.72	0.00	
11	0.00	121.73	53.13	0.00	
12	0.00	121.06	52.46	0.00	
13	0.00	120.38	51.78	0.00	
CON-2	-3579.78	120.00	0.00	0.00	Reservoir
CON-1	-2512.82	124.00	0.00	0.00	Reservoir
CON-3	-1325.30	122.00	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
1	5780.80	0.77	2.05	Open
2	2280.80	1.21	12.51	Open
3	-1253.50	0.67	3.60	Open
4	-1289.40	0.68	3.74	Open
5	-1325.30	0.70	4.10	Open

				MAX DAY + FIRE FLOW (117L/s)
6	-1325.30	0.70	4.05	Open
7	1325.30	0.31	0.48	Open
8	1325.30	0.70	4.04	Open
9	2512.82	0.33	0.41	Open
11	2201.02	0.29	0.32	Open
12	2512.82	0.85	4.49	Open
13	2201.02	0.75	3.60	Open
14	2201.02	0.75	3.41	Open
15	2201.02	0.75	3.53	Open
16	2201.02	0.75	3.99	Open

MAX DAY FIRE FLOW (133L/s)



BOUNDARY CONDITIONS
AVG DAY = 130.0
PEAK HOUR = 124.0

CONNECTION 1:
MAX DAY + FIRE FLOW (117L/s) = 124.0
MAX DAY + FIRE FLOW (133L/s) = 123.0
MAX DAY + FIRE FLOW (317L/s) = 111.0

CONNECTION 2:
MAX DAY + FIRE FLOW (117L/s) = 120.0
MAX DAY + FIRE FLOW (133L/s) = 113.0
MAX DAY + FIRE FLOW (317L/s) = 250L/s AVAILABLE AT 20psi

CONNECTION 3:
MAX DAY + FIRE FLOW (117L/s) = 122.0
MAX DAY + FIRE FLOW (133L/s) = 121.0
MAX DAY + FIRE FLOW (317L/s) = 102.0

Pressure
14.27
28.03
35.70
56.27
m

Diameter
200.00
250.00
300.00
400.00
mm

```
**********************************************************************
*                            E P A N E T                             *
*                     Hydraulic and Water Quality                    *
*                     Analysis for Pipe Networks                     *
*                          Version 2.0                               *
**********************************************************************
```

Input File: 2020-03-17_1155_MAX(133Ls).net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	CON-2	1	176	400
2	1	2	75	200
3	2	3	140	200
4	3	4	175	200
5	4	5	60	200
6	5	6	75	200
7	CON-3	7	160	300
8	7	6	375	200
9	CON-1	8	95	400
11	9	CON-2	115	400
12	8	10	365	250
13	10	11	165	250
14	11	12	195	250
15	12	13	195	250
16	13	9	85	250

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality	
1	0.00	112.88	43.78	0.00	
2	34.30	111.02	42.42	0.00	
3	35.90	108.07	31.47	0.00	
4	35.90	104.52	27.42	0.00	
5	4000.00	103.27	26.17	0.00	
6	4000.00	103.40	26.30	0.00	
7	0.00	120.15	41.05	0.00	
8	0.00	122.91	50.31	0.00	
9	0.00	113.09	44.69	0.00	
10	311.80	119.04	50.44	0.00	
11	0.00	117.49	48.89	0.00	
12	0.00	115.77	47.17	0.00	
13	0.00	113.98	45.38	0.00	
CON-2	397.49	113.00	0.00	0.00	Reservoir
CON-1	-3988.00	123.00	0.00	0.00	Reservoir
CON-3	-4827.38	121.00	0.00	0.00	Reservoir

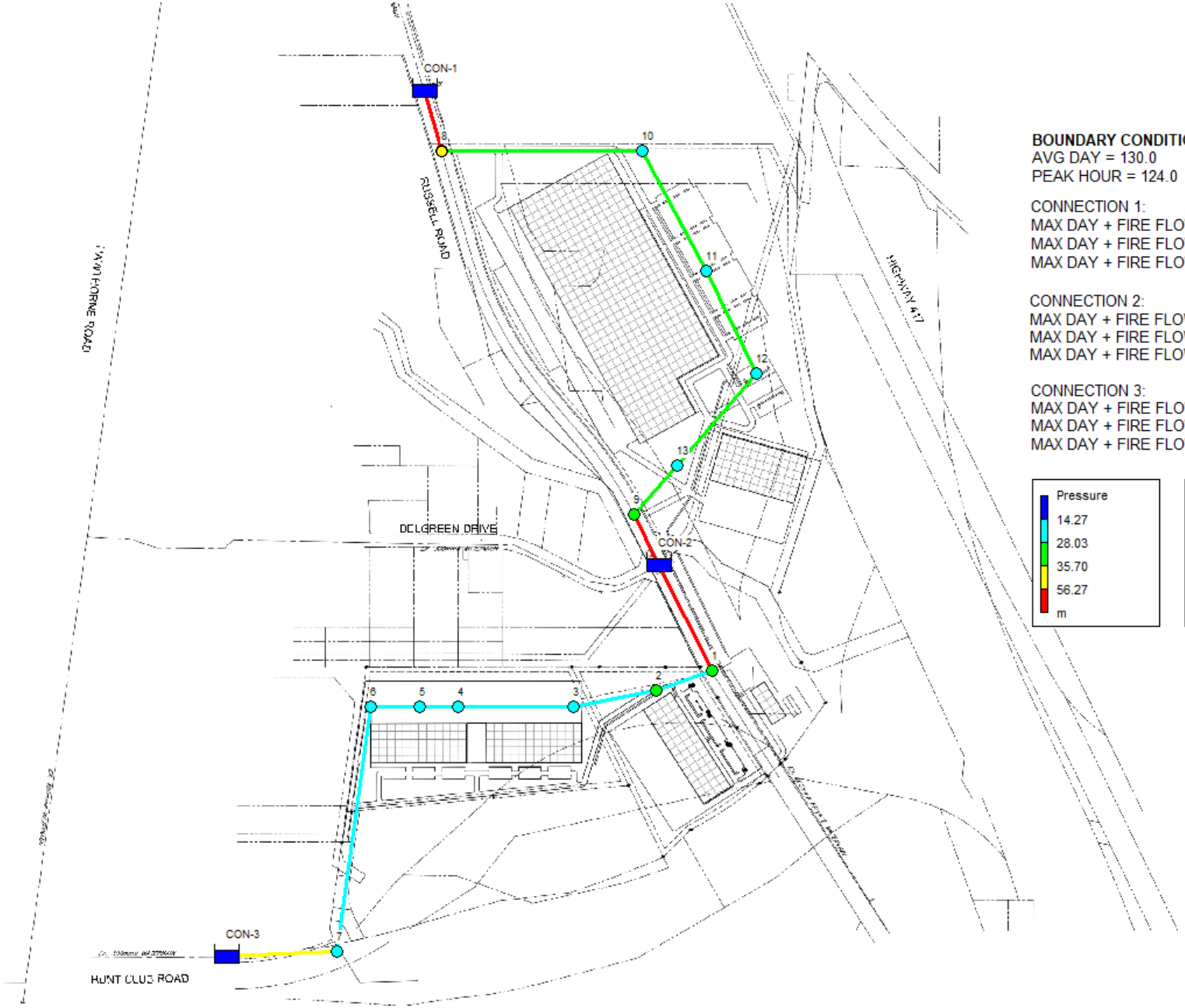
Link Results:

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
1	3278.72	0.43	0.71	Open
2	3278.72	1.74	24.72	Open
3	3244.42	1.72	21.07	Open
4	3208.52	1.70	20.30	Open
5	3172.62	1.68	20.83	Open

MAX DAY + FIRE FLOW (133L/s)

6	-827.38	0.44	1.69	Open
7	4827.38	1.14	5.31	Open
8	4827.38	2.56	44.68	Open
9	3988.00	0.53	0.98	Open
11	3676.20	0.49	0.83	Open
12	3988.00	1.35	10.60	Open
13	3676.20	1.25	9.36	Open
14	3676.20	1.25	8.83	Open
15	3676.20	1.25	9.16	Open
16	3676.20	1.25	10.46	Open

MAX DAY FIRE FLOW (317L/s)



BOUNDARY CONDITIONS
AVG DAY = 130.0
PEAK HOUR = 124.0

CONNECTION 1:
MAX DAY + FIRE FLOW (117L/s) = 124.0
MAX DAY + FIRE FLOW (133L/s) = 123.0
MAX DAY + FIRE FLOW (317L/s) = 111.0

CONNECTION 2:
MAX DAY + FIRE FLOW (117L/s) = 120.0
MAX DAY + FIRE FLOW (133L/s) = 113.0
MAX DAY + FIRE FLOW (317L/s) = 250L/s AVAILABLE AT 20psi

CONNECTION 3:
MAX DAY + FIRE FLOW (117L/s) = 122.0
MAX DAY + FIRE FLOW (133L/s) = 121.0
MAX DAY + FIRE FLOW (317L/s) = 102.0

Pressure
14.27
28.03
35.70
56.27
m

Diameter
200.00
250.00
300.00
400.00
mm

```
**********************************************************************
*                            E P A N E T                             *
*                     Hydraulic and Water Quality                    *
*                     Analysis for Pipe Networks                     *
*                          Version 2.0                               *
**********************************************************************
```

Input File: 2020-03-13_1155_MAX(317Ls).net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	CON-2	1	176	400
2	1	2	75	200
3	2	3	140	200
4	3	4	175	200
5	4	5	60	200
6	5	6	75	200
7	CON-3	7	160	300
8	7	6	375	200
9	CON-1	8	95	400
11	9	CON-2	115	400
12	8	10	365	250
13	10	11	165	250
14	11	12	195	250
15	12	13	195	250
16	13	9	85	250

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality	
1	0.00	102.00	32.90	0.00	
2	34.30	102.00	33.40	0.00	
3	35.90	102.00	25.40	0.00	
4	35.90	102.00	24.90	0.00	
5	0.00	102.00	24.90	0.00	
6	0.00	102.00	24.90	0.00	
7	0.00	102.00	22.90	0.00	
8	0.00	110.56	37.96	0.00	
9	0.00	101.36	32.96	0.00	
10	5311.80	92.62	24.02	0.00	
11	5000.00	91.00	22.40	0.00	
12	4500.00	91.22	22.62	0.00	
13	4500.00	95.28	26.68	0.00	
CON-2	-10291.18	102.00	0.00	0.00	Reservoir
CON-1	-9092.94	111.00	0.00	0.00	Reservoir
CON-3	-33.77	102.00	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
1	72.33	0.01	0.00	Open
2	72.33	0.04	0.02	Open
3	38.03	0.02	0.01	Open
4	2.13	0.00	0.00	Open
5	-33.77	0.02	0.00	Open
6	-33.77	0.02	0.00	Open
7	33.77	0.01	0.00	Open
8	33.77	0.02	0.00	Open
9	9092.94	1.21	4.59	Open
11	-10218.86	1.36	5.57	Open

				MAX DAY + FIRE FLOW (317L/s)
12	9092.94	3.09	49.15	Open
13	3781.15	1.28	9.86	Open
14	-1218.85	0.41	1.14	Open
15	-5718.85	1.94	20.85	Open
16	-10218.86	3.47	71.48	Open

Brandon Chow

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: March 12, 2020 3:57 PM
To: Brandon Chow
Cc: Matt Wingate; Robert Freel; Oram, Cody
Subject: RE: 4055/4120 Russell Road - Boundary Conditions
Attachments: 4055_4120 Russell Jan 2020.pdf

Good Afternoon Brandon,

The following are boundary conditions, HGL, for hydraulic analysis at 4055 and 4120 Russell (zone 2W2C) for the following scenarios and connections

- Scenario 1: Development of 4120 Russell Road only
- Scenario 2: Development of both 4120 and 4055 Russell Road.
- For scenario 1: A) connection to ONLY to the 305mm Belgreen Drive watermain, and B) connection to both the 305mm Belgreen Drive watermain and the 305mm Hunt Club Road watermain.
- For scenario 2: A) connection to the 305mm Belgreen Drive watermain and the 406mm Russell Road watermains, and B) connection to the 305mm Belgreen + 305mm Hunt Club + 406mm Russell Road watermains.

Please note the HGL is the same for all scenarios.

	Belgreen connection	Hunt Club connection	Russell Road connection
Min HGL	124.0m	124.0m	124.0m
Max HGL	130.0m	130.0m	130.0m

The maximum pressure at the Belgreen connection is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

Fire Flow Analysis:

Please note the following analysis assumes the design fire flow is tested at a single node at a time. Furthermore, no future watermains on the subject site was included that could potentially impact the results (e.g. watermain looping, …).

Belgreen connection

Max Day + FF (117 L/s) = 120.0m

Max Day + FF (133 L/s) = 113.0m

Max Day + FF (317 L/s) = Can't be provided. Available flow @20psi = 250L/s

Hunt Club connection

Max Day + FF (117 L/s) = 122.0m

Max Day + FF (133 L/s) = 121.0m

Max Day + FF (317 L/s) = 102.0m

Russell connection

Max Day + FF (117 L/s) = 124.0m

Max Day + FF (133 L/s) = 123.0m

Max Day + FF (317 L/s) = 111.0m

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.

Best Regards,

Mohammed Fawzi, E.I.T.
Engineering Intern
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

From: Fawzi, Mohammed
Sent: March 10, 2020 4:05 PM
To: Brandon Chow <BChow@dsel.ca>
Cc: Matt Wingate <MWingate@dsel.ca>; Robert Freel <RFreel@dsel.ca>; Oram, Cody <Cody.Oram@ottawa.ca>
Subject: RE: 4055/4120 Russell Road - Boundary Conditions

Hi Brandon,

I have forwarded your request.

As for timelines, I'll let you know of any approximate timelines once I hear back. Thanks Brandon.

Best Regards,

Mohammed Fawzi, E.I.T.
Engineering Intern
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1

613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

From: Brandon Chow <BChow@dsel.ca>
Sent: March 10, 2020 3:56 PM
To: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Cc: Matt Wingate <MWingate@dsel.ca>; Robert Freel <RFreel@dsel.ca>; Oram, Cody <Cody.Oram@ottawa.ca>
Subject: RE: 4055/4120 Russell Road - Boundary Conditions

Good afternoon Mohammed,

Would you be able to provide updated boundary conditions based on the below fire flow and demand estimation? Can you let me know your timing as we are hoping we can get this info as soon as possible.

Site 1

	L/min	L/s
Avg. Daily	22.9	0.38
Max Day + Fire Flow (FUS)	34.3 + 7,000	0.57 + 116.67
Peak Hour	61.8	1.03

Site 2

	L/min	L/s
Avg. Daily	47.8	0.80
Max Day + Fire Flow (FUS)	71.7 + 8,000	1.20 + 133.33
Peak Hour	129.1	2.15

Site 3

	L/min	L/s
Avg. Daily	207.8	3.46
Max Day + Fire Flow (FUS)	311.8 + 19,000	5.20 + 316.67
Peak Hour	561.2	9.35

Feel free to contact me if any questions.

Thank you,

Brandon Chow
Project Coordinator / Intermediate Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext.532
fax: (613) 836-7183
email: bchow@DSEL.ca

From: Matt Wingate <MWingate@dsel.ca>
Sent: January 29, 2020 9:46 AM
To: Robert Freel <RFreel@dsel.ca>; Brandon Chow <BChow@dsel.ca>
Subject: FW: 4055/4120 Russell Road - Boundary Conditions

fyi

From: Fawzi, Mohammed <mohammed.fawzi@ottawa.ca>
Sent: January 29, 2020 9:38 AM
To: Matt Wingate <MWingate@dsel.ca>
Cc: Oram, Cody <Cody.Oram@ottawa.ca>
Subject: 4055/4120 Russell Road - Boundary Conditions

Good Morning Matt,

The boundary conditions provided below are for existing conditions, as such, no future watermain on Russel Road was assumed for modeling purposes. Also, the provided available flow is in the watermain, not through the hydrants. Please refer to Appendix I of technical bulletin ISTB-2018-02 for available flow from hydrants. Furthermore, , the two subject properties are adding to existing Vulnerable Service Areas (VSA). To my understanding, it is the City's policy not to add to existing VSAs unless there are measures (such as providing a redundant feed) to eliminate the VSA.

The following are boundary conditions, HGL, for hydraulic analysis at 4055 and 4120 Russell (zone 2W2C) for the following scenarios and connections:

- Scenario 1: Development of 4120 Russell Road only
- Scenario 2: Development of both 4120 and 4055 Russell Road.
- For scenario 1: A) connection to ONLY to the 305mm Belgreen Drive watermain, and B) connection to both the 305mm Belgreen Drive watermain and the 305mm Hunt Club Road watermain.
- For scenario 2: A) connection to the 305mm Belgreen Drive watermain and the 406mm Russell Road watermains, and B) connection to the 305mm Belgreen + 305mm Hunt Club + 406mm Russell Road watermains.

Please note the HGL and available fire flow are the same for all scenarios.

	Belgreen connection	Hunt Club connection	Russell Road connection
Min HGL	124.0m	124.0m	124.0m
Max HGL	130.0m	130.0m	130.0m
Available Flow @20psi	250 L/s	350 L/s	500 L/s

The maximum pressure at the Belgreen connection is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

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

Should you have any questions or concerns, please do not hesitate to contact me. Thank you Matt .

Best Regards,

Mohammed Fawzi, E.I.T.
Engineering Intern
Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique
Development Review - Central Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca

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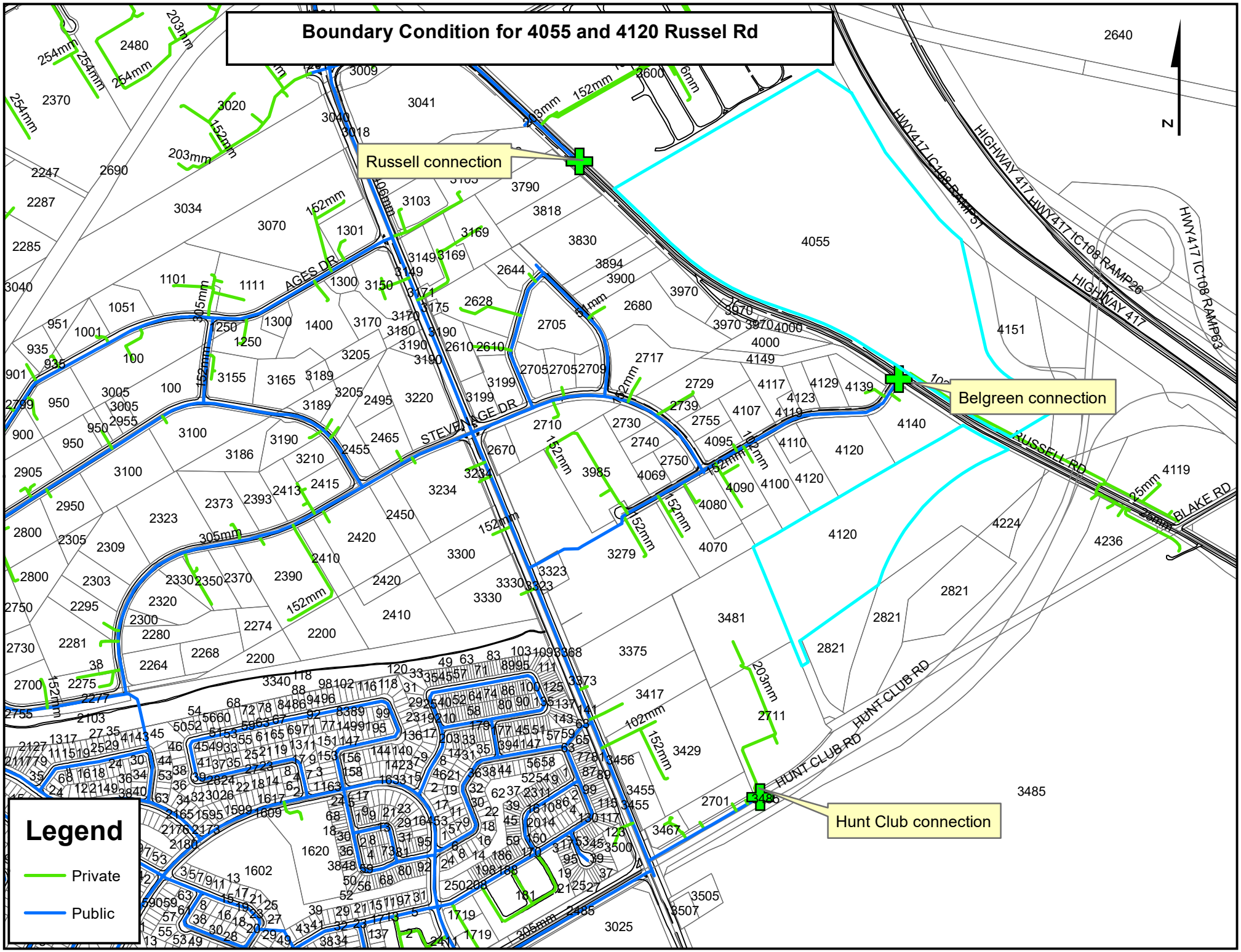
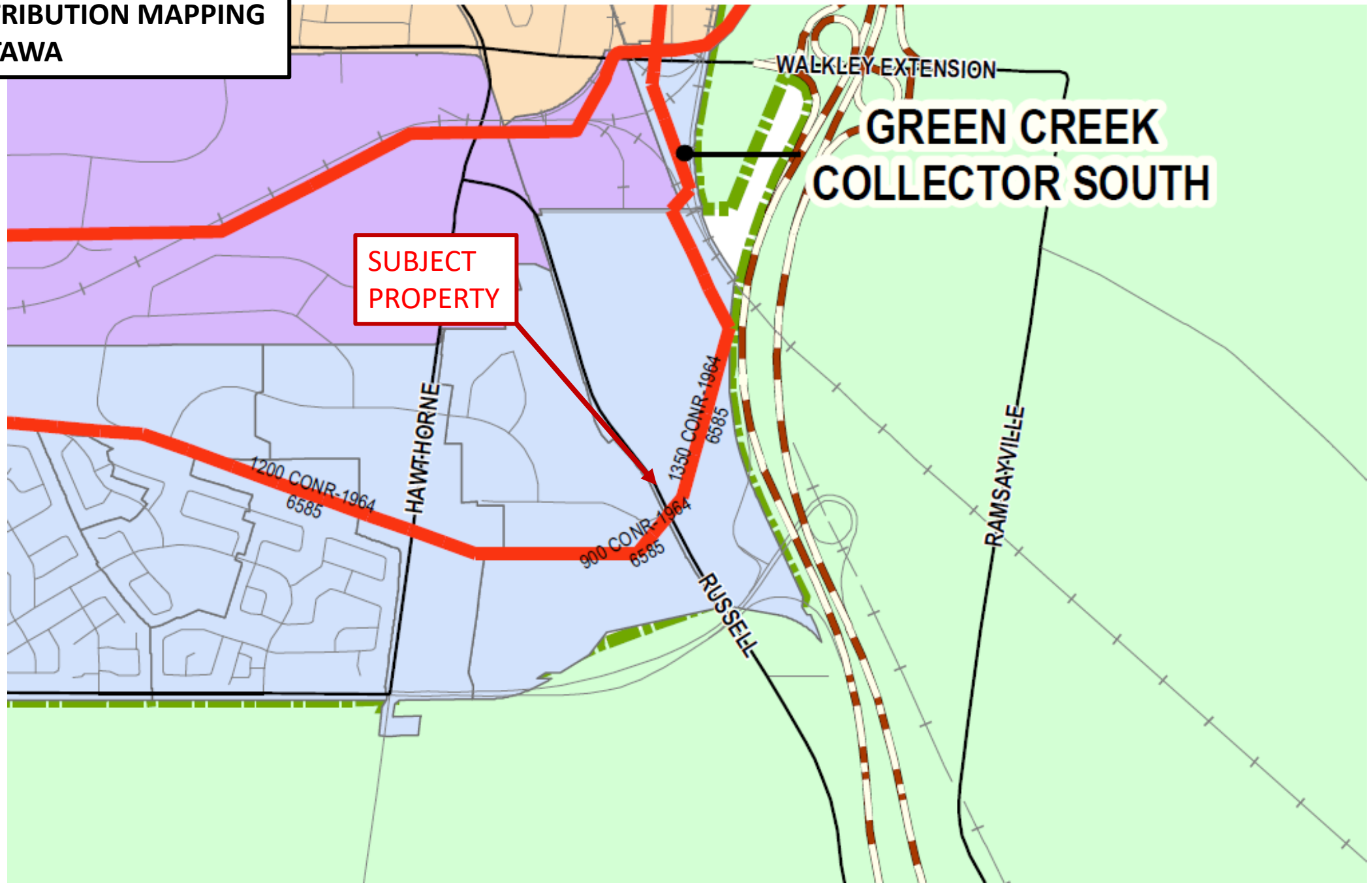

Boundary Condition for 4055 and 4120 Russel Rd
Russell connection
Belgreen connection
Hunt Club connection
HIGHWAY 417
HWY417 IC108 RAMP26
HWY417 IC108 RAMP31
HWY417 IC108 RAMP63
AGES DR
STEVENAGE DR
RUSSELL RD
HUNT CLUB RD
BLAKE RD
Legend
Private
Public

APPENDIX C

Wastewater Collection

SEWER DISTRIBUTION MAPPING
CITY OF OTTAWA



4120/4055 Russell Rd - Site 1
Proposed Site Conditions

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2004

Site Area 4.665 **ha**

Extraneous Flow Allowances

Infiltration / Inflow (Dry)	**0.23**	**L/s**
Infiltration / Inflow (Wet)	**1.31**	**L/s**
Infiltration / Inflow (Total)	**1.54**	**L/s**

Domestic Contributions

Unit Type	**Unit Rate**	**Units**	**Pop**
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7		0
Stacked Townhouse	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

Total Pop	**0**	
Average Domestic Flow	**0.00**	**L/s**
Peaking Factor	**3.80**	
Peak Domestic Flow	**0.00**	**L/s**

Institutional / Commercial / Industrial Contributions

Property Type	**Unit Rate**		**No. of Units**	**Avg Wastewater (L/s)**
Commercial floor space*	5	$L/m^2/d$		0.00
Office	75	$L/9.3m^2/d$	832	0.11
School	70	L/student/d		0.00
Industrial - Light**	35,000	L/gross ha/d	0.749	0.30
Industrial - Heavy**	55,000	L/gross ha/d		0.00

Average I/C/I Flow	**0.42**
Peak Institutional / Commercial Flow	0.11
Peak Industrial Flow**	0.30
Peak I/C/I Flow	**0.42**

** assuming a 12 hour commercial operation*
*** peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B*

Total Estimated Average Dry Weather Flow Rate	**0.65**	**L/s**
Total Estimated Peak Dry Weather Flow Rate	**0.65**	**L/s**
Total Estimated Peak Wet Weather Flow Rate	**1.95**	**L/s**

4120/4055 Russell Rd - Site 2
Proposed Site Conditions

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2004

Site Area 7.472 **ha**

Extraneous Flow Allowances

Infiltration / Inflow (Dry)	**0.37**	**L/s**
Infiltration / Inflow (Wet)	**2.09**	**L/s**
Infiltration / Inflow (Total)	**2.47**	**L/s**

Domestic Contributions

Unit Type	**Unit Rate**	**Units**	**Pop**
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7		0
Stacked Townhouse	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

Total Pop	**0**	
Average Domestic Flow	**0.00**	**L/s**
Peaking Factor	**3.80**	
Peak Domestic Flow	**0.00**	**L/s**

Institutional / Commercial / Industrial Contributions

Property Type	**Unit Rate**		**No. of Units**	**Avg Wastewater (L/s)**
Commercial floor space*	5	$L/m^2/d$		0.00
Office	75	$L/9.3m^2/d$	1,740	0.23
School	70	L/student/d		0.00
Industrial - Light**	35,000	L/gross ha/d	1.566	0.63
Industrial - Heavy**	55,000	L/gross ha/d		0.00

Average I/C/I Flow	**0.87**
Peak Institutional / Commercial Flow	0.35
Peak Industrial Flow**	0.95
Peak I/C/I Flow	**1.30**

** assuming a 12 hour commercial operation*

*** peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B*

Total Estimated Average Dry Weather Flow Rate	**1.24 L/s**
Total Estimated Peak Dry Weather Flow Rate	**1.68 L/s**
Total Estimated Peak Wet Weather Flow Rate	**3.77 L/s**

4120/4055 Russell Rd - Site 3
Proposed Site Conditions

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2004

Site Area	28.370	**ha**

Extraneous Flow Allowances

Infiltration / Inflow (Dry)	**1.42**	**L/s**
Infiltration / Inflow (Wet)	**7.94**	**L/s**
Infiltration / Inflow (Total)	**9.36**	**L/s**

Domestic Contributions

Unit Type	**Unit Rate**	**Units**	**Pop**
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7		0
Stacked Townhouse	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

Total Pop	**0**	
Average Domestic Flow	**0.00**	**L/s**
Peaking Factor	**3.80**	
Peak Domestic Flow	**0.00**	**L/s**

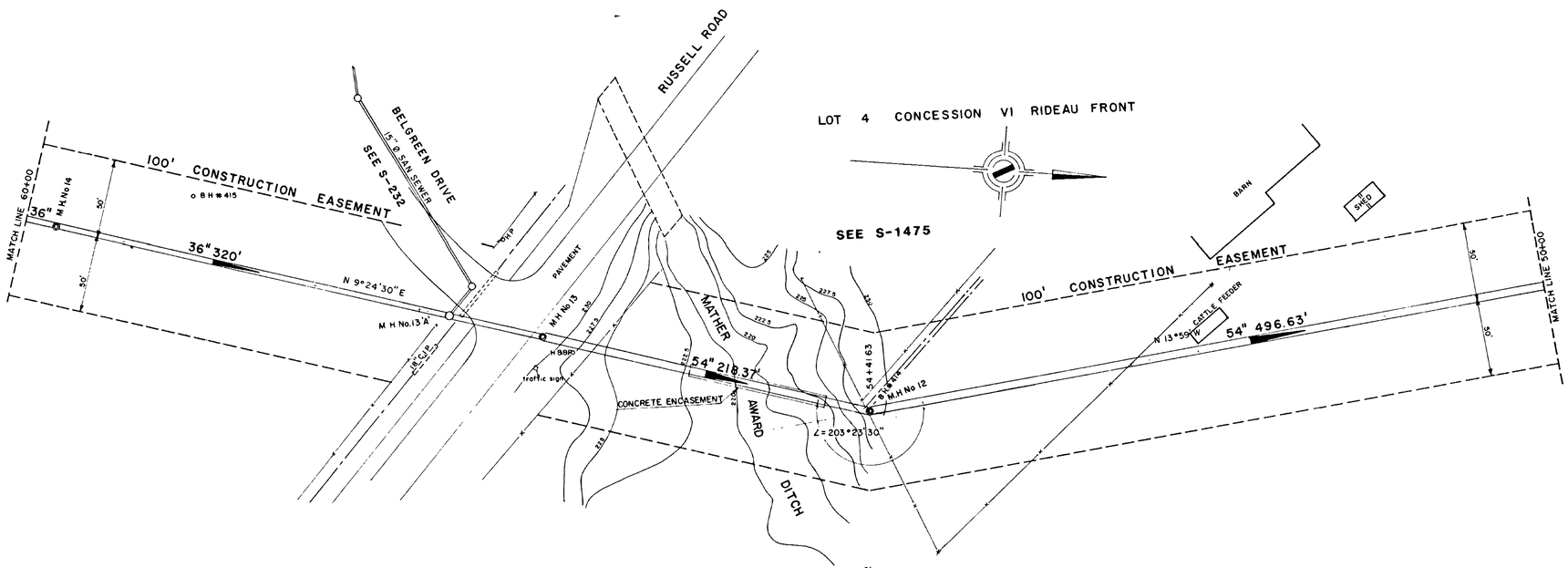
Institutional / Commercial / Industrial Contributions

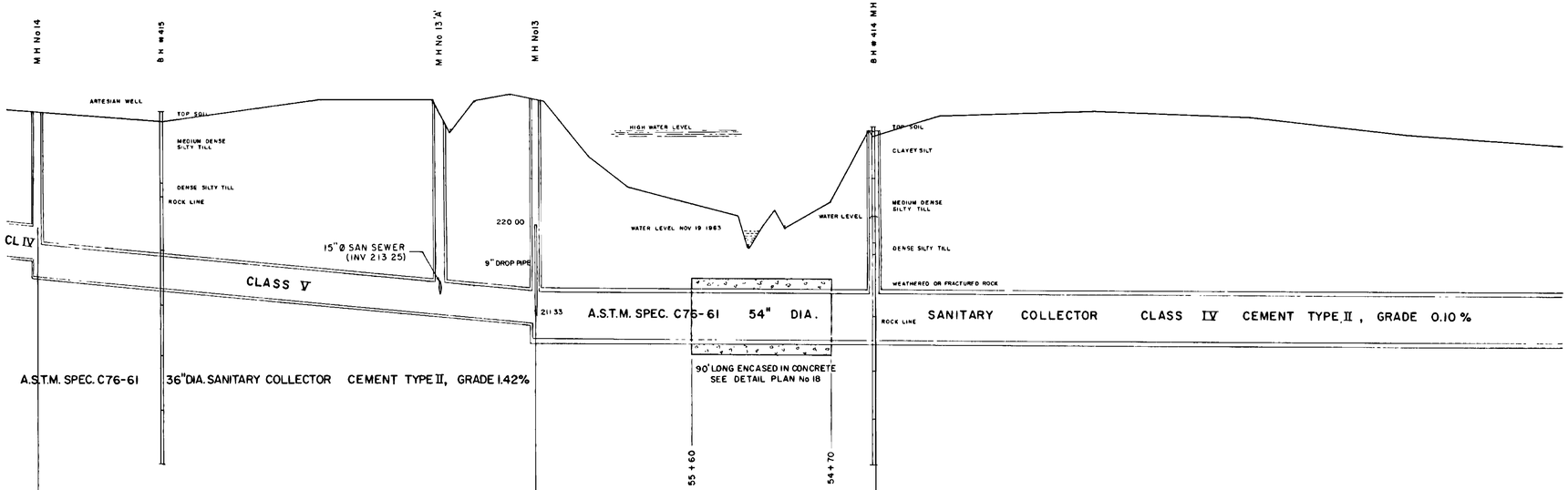
Property Type	**Unit Rate**		**No. of Units**	**Avg Wastewater (L/s)**
Commercial floor space*	5	$L/m^2/d$		0.00
Office	75	$L/9.3m^2/d$	7,536	1.01
School	70	L/student/d		0.00
Industrial - Light**	35,000	L/gross ha/d	6.815	2.76
Industrial - Heavy**	55,000	L/gross ha/d		0.00

Average I/C/I Flow	**3.77**
Peak Institutional / Commercial Flow	1.52
Peak Industrial Flow**	4.14
Peak I/C/I Flow	**5.66**

** assuming a 12 hour commercial operation*
*** peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B*

Total Estimated Average Dry Weather Flow Rate	**5.19 L/s**
Total Estimated Peak Dry Weather Flow Rate	**7.08 L/s**
Total Estimated Peak Wet Weather Flow Rate	**15.02 L/s**





SURFACE ELEVATION	2310		2299		2320		2320 2289	2326		2235	2207	2214 2174 2195	2220	2290	2303	2307	2301	2284	2273
INVERT ELEVATION	216.66	215.11					36"210.57	54"209.08						208.85					
STATION	60+00	59+80	59+00		58+00		57+00	56+60		56+00		55+00		54+41.63	54+00	53+00	52+00	51+00	50+00

PROFILE FIELD BOOK 3189, 3167
DETAIL FIELD BOOK 3200

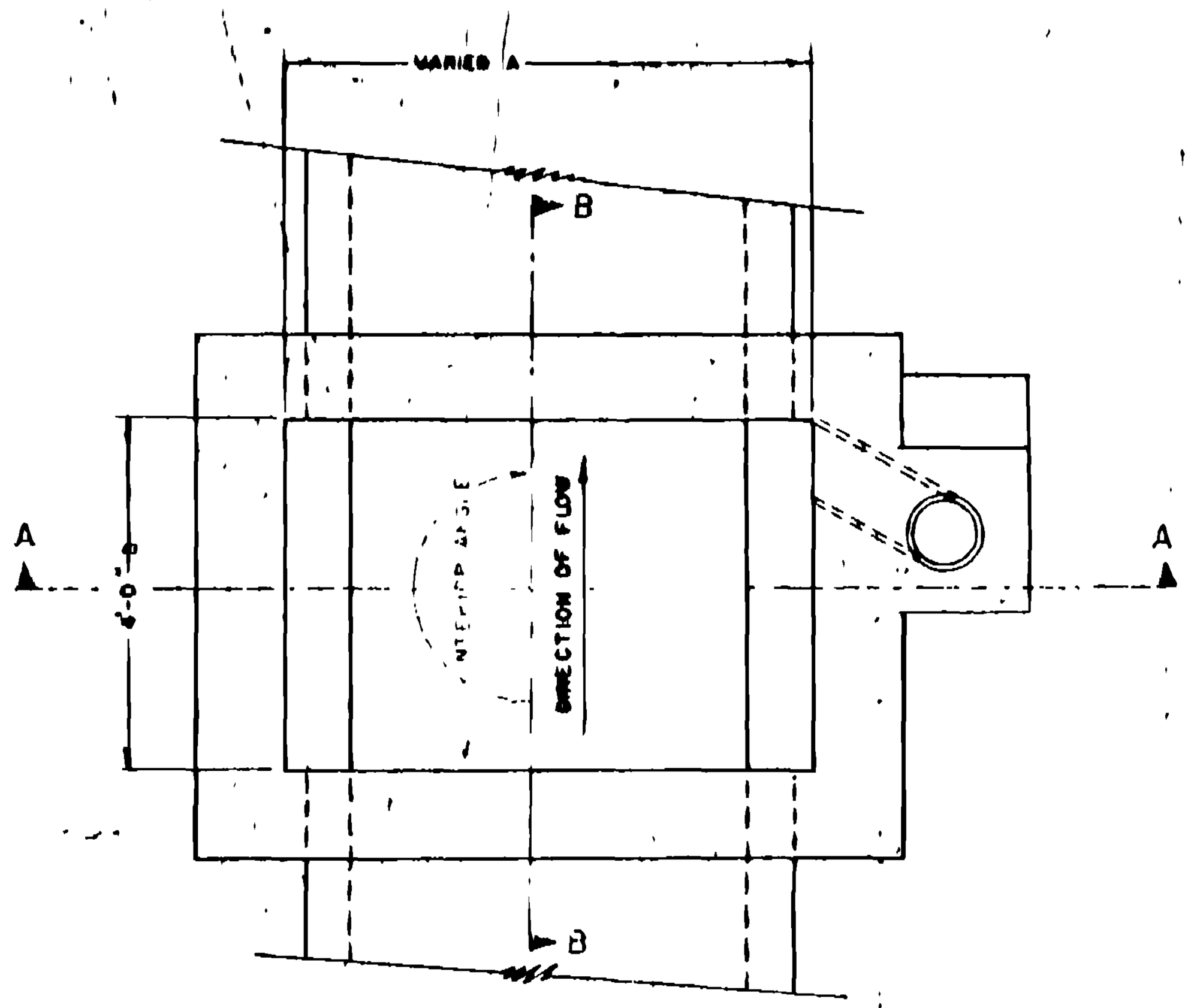
REVISIONS			
DATE	SUBJECT	DRWN BY	APPRVD
1964 Jan 5	ADDED DROP PIPE TO M H No. 13	P de L	

CITY OF OTTAWA
DEPARTMENT OF PLANNING and WORKS
SEWERAGE and DRAINAGE BRANCH

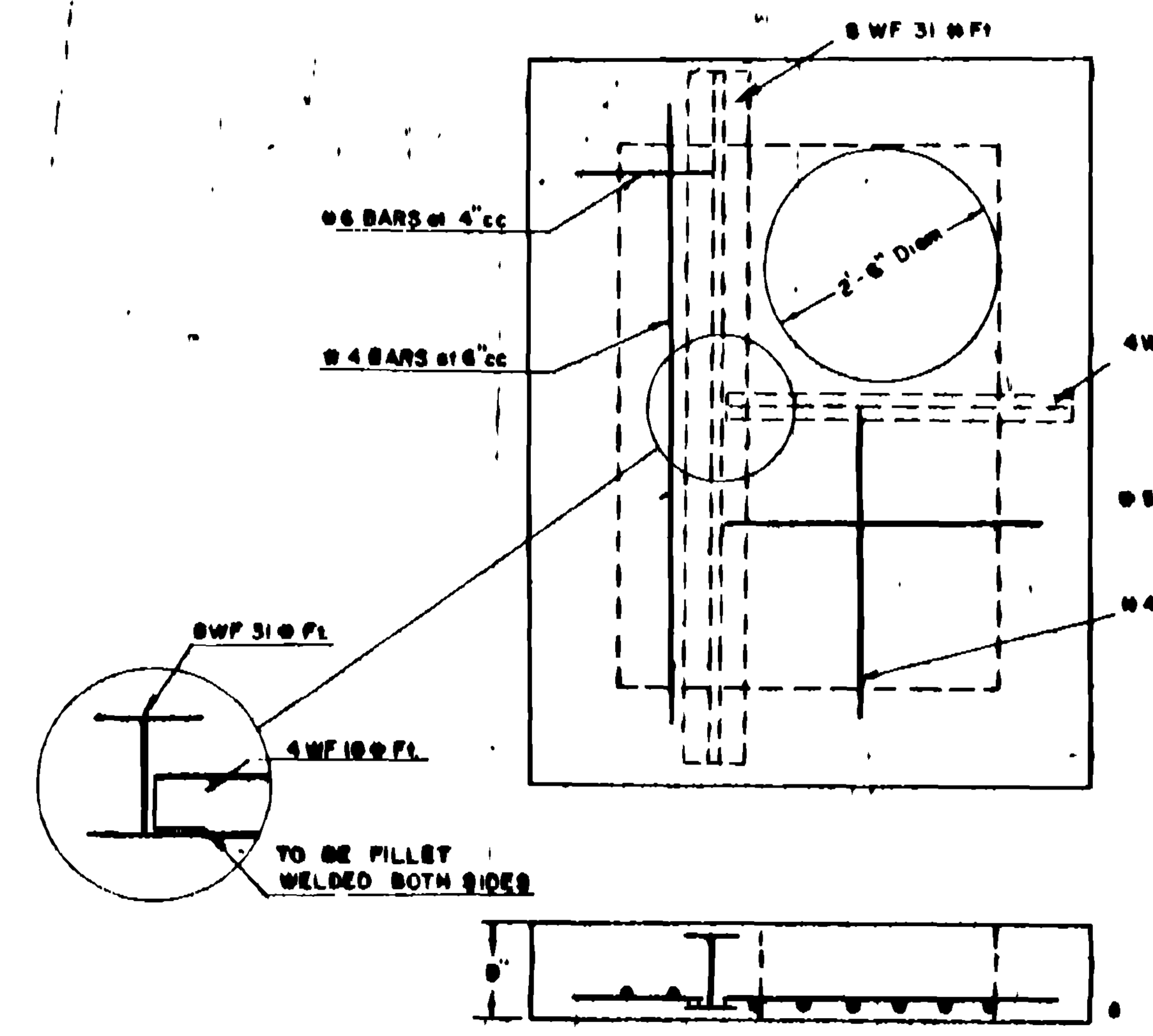
GREEN CREEK COLLECTOR
CONTRACT No. 4
STATION 50+00 to STATION 60+00

Sewer Design Engineer
Engineer I/c of Sewerage and Drainage
F. E. AYERS, P.Eng
Director of Planning and Works

DESIGNED BY:	SCALES HOR. 1" = 40' VER. 1" = 6'
DRAWN BY: P.d.L.	
CHECKED BY:	PLAN No. 6 OF 18
DATE NOV 1963	



PLAN C-C

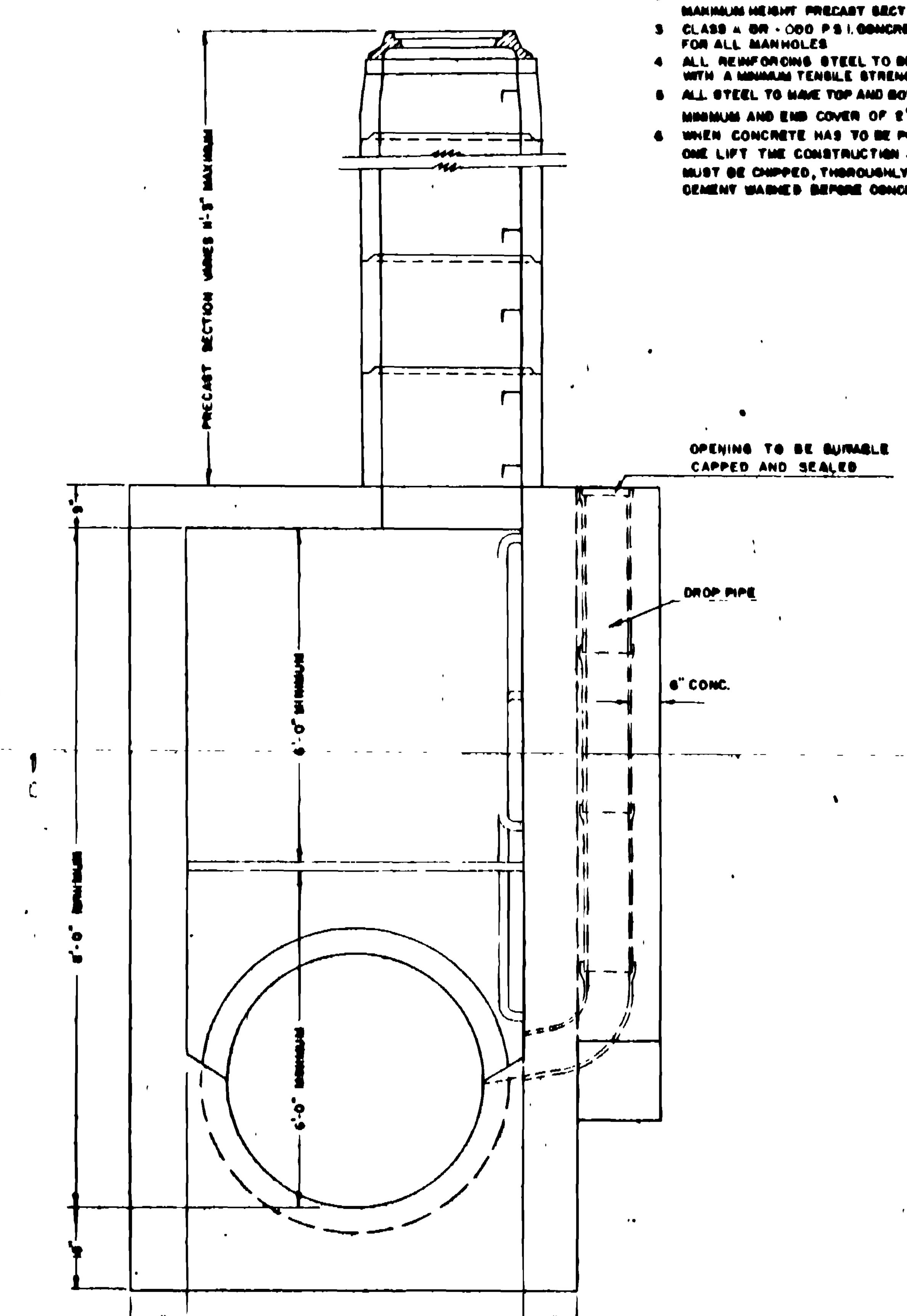


ROOF SLAB DETAIL

NOT TO SCALE

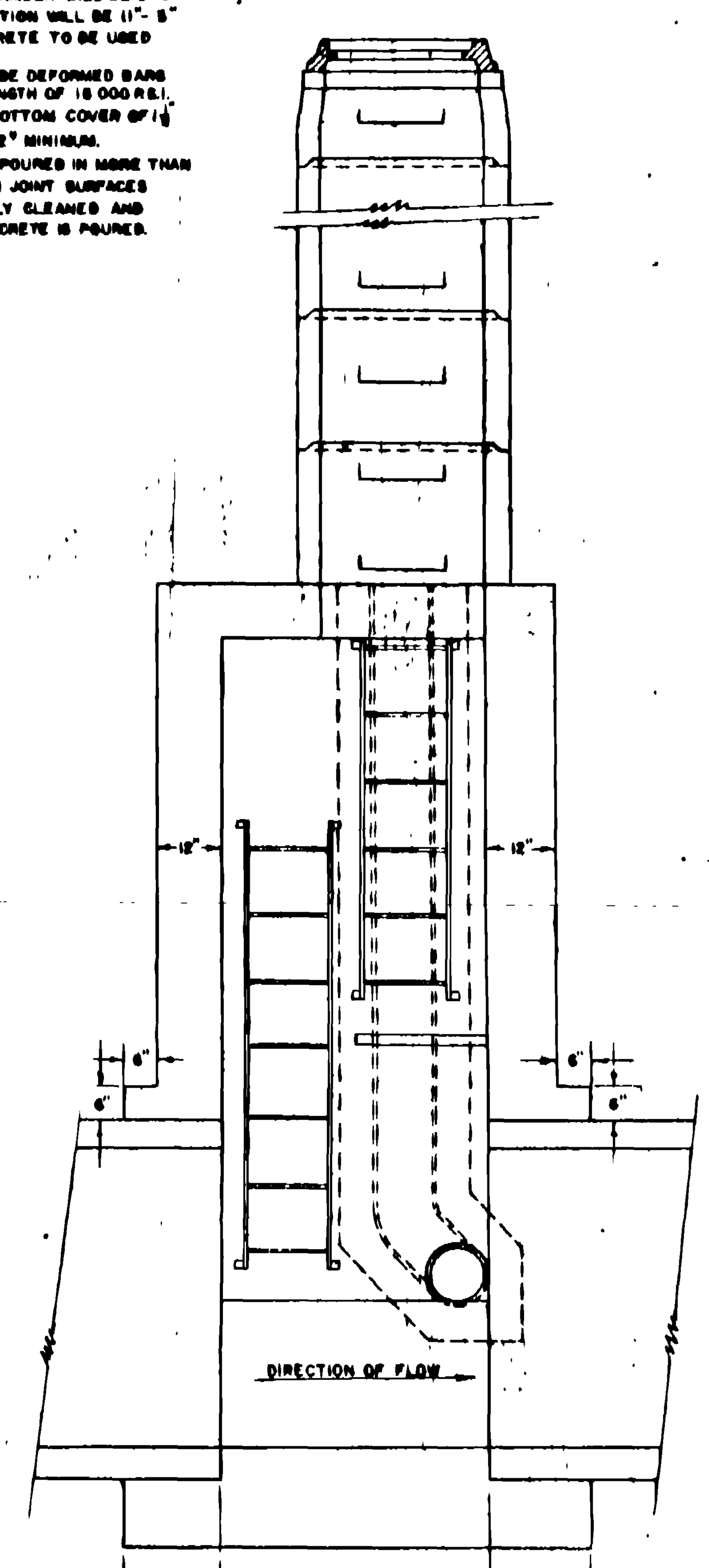
NOTES:

1. IF THE DEPTH FROM MANHOLE COVER TO INVERT EXCEEDS 18'-0" THEN A LANDING MUST BE INSTALLED AS PER MANHOLE DETAIL DRAWING.
2. MINIMUM HEIGHT MANHOLE CHAMBER WILL BE 8'-0" MAXIMUM HEIGHT PRECAST SECTION WILL BE 11'-8"
3. CLASS A OR -000 P.S.I. CONCRETE TO BE USED FOR ALL MANHOLES
4. ALL REINFORCING STEEL TO BE DEFORMED BARS WITH A MINIMUM TENSILE STRENGTH OF 18 000 P.S.I.
5. ALL STEEL TO HAVE TOP AND BOTTOM COVER OF 1½" MINIMUM AND END COVER OF 2" MINIMUM.
6. WHEN CONCRETE HAS TO BE POURED IN MORE THAN ONE LIFT THE CONSTRUCTION JOINT SURFACES MUST BE CHIPPED, THOROUGHLY CLEANED AND CEMENT WASHED BEFORE CONCRETE IS POURED.

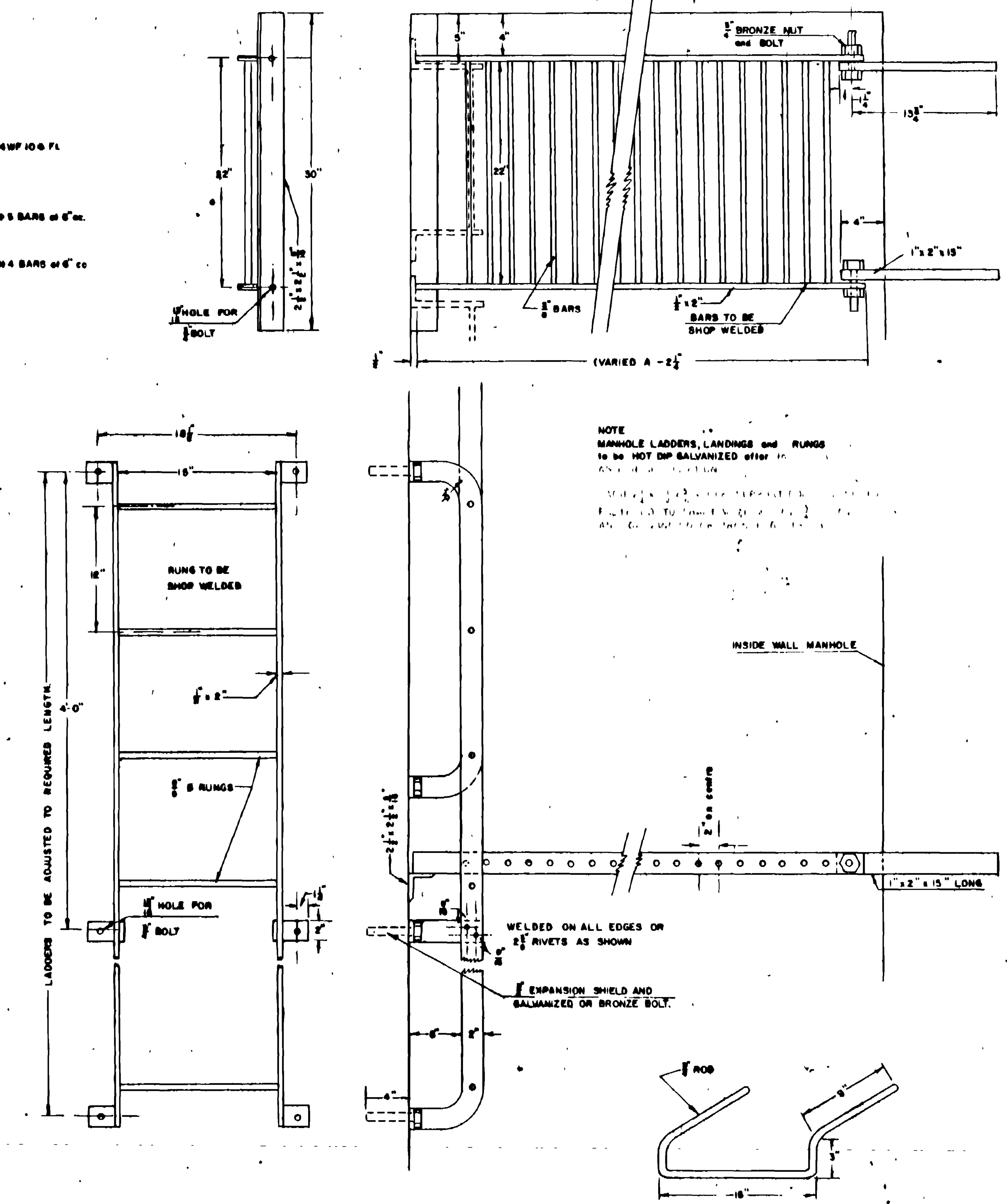


SECTION A-A

SCALE ½" = 1'-0"



SECTION B-B



NOTE
MANHOLE LADDERS, LANDINGS and RUNGS to be HOT DIP GALVANIZED after

DETAIL FOR LADDERS, LANDINGS and RUNGS.

SCALE 1½" = 1'-0"

CITY OF OTTAWA
DEPARTMENT OF PLANNING and WORKS
SEWERAGE and DRAINAGE BRANCH

GREEN CREEK COLLECTOR
CONTRACT No. 4
MISCELLANEOUS

Sewer Design Engineer
Engineer of Sewerage and Drainage

DESIGNED BY
DRAWN BY
CHECKED BY
SCALE as shown
PLAN No.

APPENDIX D

Stormwater Management

Estimated Peak Stormwater Flow Rate
City of Ottawa Sewer Design Guidelines, 2012

Existing Drainage Charateristics From Site 1

Area ID	A1	
Area	4.64	ha
C	0.20	Rational Method runoff coefficient
t_c	15.9	min

Estimated Peak Flow

	2-year	5-year	100-year
i	59.7	80.7	137.9
Q	153.8	208.0	444.4

* C value calculated as a composite value based on existing site soil conditions and topography.
value derived using Table 5.7 Runoff Coefficients for Various Soil Conditions from the Ottawa Sewer Design Guidelines,

Drainage Basin Characteristics

Area ID	
A (ha)	4.64
L (m)	171
Up Elev	77.81
Dn Elev	70.12
S (%)	4.5
CN (-)	61
Tc (min)	15.9

**CN value was selected assuming Hydrologic Soil Group B and good conditions (grass covering >75%)*

Time of Concentration per SCS lag equation

$$t_c = \frac{100L^{0.8}\left[\left(\frac{1000}{CN}\right)-9\right]^{0.7}}{1900S^{0.5}}$$

L, length in ft
CN, SCS runoff curve number
S, average watershed slope in (%)

Existing Drainage Charateristics From Site 2

Area ID	A2	
Area	7.47	ha
C	0.20	Rational Method runoff coefficient
t_c	35.7	min

Estimated Peak Flow

	2-year	5-year	100-year
i	35.6	47.9	81.4
Q	147.6	198.6	422.5

* C value calculated as a composite value based on existing site soil conditions and topography.
value derived using Table 5.7 Runoff Coefficients for Various Soil Conditions from the Ottawa Sewer Design Guidelines,

Drainage Basin Characteristics

Area ID	
A (ha)	7.47
L (m)	320
Up Elev	80.11
Dn Elev	72.3
S (%)	2.4
CN (-)	61
Tc (min)	35.7

**CN value was selected assuming Hydrologic Soil Group B and good conditions (grass covering >75%)*

Time of Concentration per SCS lag equation

$$t_c = \frac{100L^{0.8}\left[\left(\frac{1000}{CN}\right)-9\right]^{0.7}}{1900S^{0.5}}$$

L, length in ft
CN, SCS runoff curve number
S, average watershed slope in (%)

Existing Drainage Charateristics From Site 3A

Area ID	A3	
Area	24.70	ha
C	0.21	Rational Method runoff coefficient
t_c	45.7	min

Estimated Peak Flow

	2-year	5-year	100-year
i	29.9	40.2	68.2
Q	430.6	578.5	1229.0

* C value calculated as a composite value based on existing site soil conditions and topography.
value derived using Table 5.7 Runoff Coefficients for Various Soil Conditions from the Ottawa Sewer Design Guidelines,

Drainage Basin Characteristics

Area ID	
A (ha)	24.7
L (m)	341
Up Elev	72.19
Dn Elev	66.58
S (%)	1.6
CN (-)	61
Tc (min)	45.7

**CN value was selected assuming Hydrologic Soil Group B and good conditions (grass covering >75%)*

Time of Concentration per SCS lag equation

$$t_c = \frac{100L^{0.8}\left[\left(\frac{1000}{CN}\right)-9\right]^{0.7}}{1900S^{0.5}}$$

L, length in ft
CN, SCS runoff curve number
S, average watershed slope in (%)

Existing Drainage Charateristics From Site 3B

Area ID	A3B	
Area	2.34	ha
C	0.20	Rational Method runoff coefficient
t_c	10.0	min

Estimated Peak Flow

	2-year	5-year	100-year
i	76.8	104.2	178.6
Q	99.8	135.5	290.2

* C value calculated as a composite value based on existing site soil conditions and topography.
value derived using Table 5.7 Runoff Coefficients for Various Soil Conditions from the Ottawa Sewer Design Guidelines,

Drainage Basin Characteristics

Area ID	
A (ha)	2.34
L (m)	75.7
Up Elev	71.04
Dn Elev	68.3
S (%)	3.6
CN (-)	61
Tc (min)	9.3

**CN value was selected assuming Hydrologic Soil Group B and good conditions (grass covering >75%)*

Time of Concentration per SCS lag equation

$$t_c = \frac{100L^{0.8}\left[\left(\frac{1000}{CN}\right)-9\right]^{0.7}}{1900S^{0.5}}$$

L, length in ft
CN, SCS runoff curve number
S, average watershed slope in (%)

4120 4055 Russel Rd-
Site 1
Proposed Conditions

Stormwater - Proposed Development
City of Ottawa Sewer Design Guidelines, 2012

Target Flow Rate

Area	4.64	ha
C	0.20	Rational Method runoff coefficient
t_c	15.9	min

	5-year		**100-year**
i	80.8	mm/hr	138.1
Q	208.2	L/s	444.9

Estimated Post Development Peak Flow from Unattenuated Areas

Total Area	0.00	ha
C	0.00	Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
20.0	70.3	0.0	0.0	0.0	0.0	120.0	0.0	0.0	0.0	0.0

Note:
C value for the 100-year storm is increased by 25%, to a maximum of 1.0 per Ottawa Sewer Design Guidelines (5.4.5.2.1)

Estimated Post Development Peak Flow from Attenuated Areas

Building ID	C	
Roof Area	0.833	ha
Avail Storage Area	0.791	
C	0.90	Rational Method runoff coefficient
t_c	10	min, tc at outlet without restriction

Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations

Estimated Number of Roof Drains

Building Length	169.2	
Building Width	49.2	
Number of Drains	35	
m^2 / Drain	226.0	max 232.25m^2/notch as recommended by Zurn for Ottawa

Roof Top Rating Curve per Zurn Model Z-105-5

d (m)	A (m^2)	V_{acc} (m^3)	V_{avail} (m^3)	Q_{notch} (L/s)	Q_{roof} (L/s)	$V_{drawdown}$ (hr)
0.000	0	0.0	0.0	0.00	0.00	0.00
0.025	494.3	4.1	4.1	0.63	22.08	0.05
0.050	1977.2	28.8	33.0	1.26	44.17	0.23
0.075	4448.7	78.3	111.2	1.89	66.26	0.56
0.100	7908.8	152.4	263.6	2.52	88.34	1.04
0.125	7908.8	197.7	461.3	3.16	110.43	1.54
0.150	7908.8	197.7	659.1	3.79	132.48	1.95

* Assumes one notch opening per drain, assumes maximum slope of 10cm. Each notch estimates a maximum flow rate of 10 GPM (US) (37.8 L/min) per inch of head as per Manufacturer Specifcations (710E)

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10	104.2	216.9	63.0	153.8	92.3	178.6	412.9	84.1	328.9	197.3
15	83.6	173.9	63.0	110.9	99.8	142.9	330.4	84.1	246.4	221.7
20	70.3	146.2	63.0	83.2	99.8	120.0	277.4	84.1	193.3	232.0
25	60.9	126.7	63.0	63.7	95.6	103.8	240.1	84.1	156.1	234.1
30	53.9	112.2	63.0	49.2	88.6	91.9	212.4	84.1	128.4	231.1
35	48.5	101.0	63.0	37.9	79.7	82.6	191.0	84.1	106.9	224.5
40	44.2	92.0	63.0	28.9	69.4	75.1	173.8	84.1	89.7	215.3
45	40.6	84.6	63.0	21.5	58.1	69.1	159.7	84.1	75.6	204.2
50	37.7	78.4	63.0	15.3	46.0	64.0	147.9	84.1	63.8	191.5
55	35.1	73.1	63.0	10.1	33.2	59.6	137.9	84.1	53.8	177.6
60	32.9	68.6	63.0	5.5	19.9	55.9	129.3	84.1	45.2	162.7
65	31.0	64.6	63.0	1.6	6.1	52.6	121.7	84.1	37.7	147.0
70	29.4	61.1	61.1	0.0	0.0	49.8	115.1	84.1	31.1	130.5
75	27.9	58.0	58.0	0.0	0.0	47.3	109.3	84.1	25.2	113.5
80	26.6	55.3	55.3	0.0	0.0	45.0	104.0	84.1	20.0	95.9
85	25.4	52.8	52.8	0.0	0.0	43.0	99.3	84.1	15.3	77.9
90	24.3	50.6	50.6	0.0	0.0	41.1	95.1	84.1	11.0	59.4
95	23.3	48.5	48.5	0.0	0.0	39.4	91.2	84.1	7.1	40.6
100	22.4	46.6	46.6	0.0	0.0	37.9	87.7	84.1	3.6	21.5
105	21.6	44.9	44.9	0.0	0.0	36.5	84.4	84.1	0.3	2.1
110	20.8	43.3	43.3	0.0	0.0	35.2	81.4	81.4	0.0	0.0

5-year Q_{roof}	**63.04 L/s**	**100-year Q_{roof}**	**84.06 L/s**
5-year Max. Storage Required	**99.8 m^3**	**100-year Max. Storage Required**	**234.1 m^3**
5-year Storage Depth	**0.071 m**	**100-year Storage Depth**	**0.095 m**
5-year Estimated Drawdown Time	**0.51 hr**	**100-year Estimated Drawdown Time**	**0.95 hr**

4120 4055 Russel Rd-
Site 1
Proposed Conditions

Estimated Post Development Peak Flow from Attenuated Areas

Area ID A1
Total Area 3.81 ha
C 0.59 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10	104.2	650.6	145.1	505.5	303.3	178.6	1393.7	360.8	1032.9	619.7
20	70.3	438.7	145.1	293.5	352.2	120.0	936.2	360.8	575.4	690.5
30	53.9	336.7	145.1	191.6	344.9	91.9	717.1	360.8	356.2	641.2
40	44.2	275.9	145.1	130.8	313.8	75.1	586.5	360.8	225.7	541.7
50	37.7	235.1	145.1	90.0	269.9	64.0	499.2	360.8	138.4	415.1
60	32.9	205.7	145.1	60.6	218.0	55.9	436.3	360.8	75.5	271.7
70	29.4	183.4	145.1	38.3	160.7	49.8	388.6	360.8	27.8	116.8
80	26.6	165.9	145.1	20.7	99.4	45.0	351.2	360.8	0.0	0.0
90	24.3	151.7	145.1	6.5	35.2	41.1	320.9	360.8	0.0	0.0
100	22.4	139.9	139.9	0.0	0.0	37.9	295.8	360.8	0.0	0.0
110	20.8	130.0	130.0	0.0	0.0	35.2	274.8	360.8	0.0	0.0
120	19.5	121.6	121.6	0.0	0.0	32.9	256.8	360.8	0.0	0.0
130	18.3	114.2	114.2	0.0	0.0	30.9	241.2	360.8	0.0	0.0
140	17.3	107.8	107.8	0.0	0.0	29.2	227.5	360.8	0.0	0.0
150	16.4	102.2	102.2	0.0	0.0	27.6	215.5	360.8	0.0	0.0
160	15.6	97.1	97.1	0.0	0.0	26.2	204.8	360.8	0.0	0.0
170	14.8	92.6	92.6	0.0	0.0	25.0	195.2	360.8	0.0	0.0
180	14.2	88.5	88.5	0.0	0.0	23.9	186.6	360.8	0.0	0.0
190	13.6	84.8	84.8	0.0	0.0	22.9	178.7	360.8	0.0	0.0
200	13.0	81.5	81.5	0.0	0.0	22.0	171.6	360.8	0.0	0.0
210	12.6	78.4	78.4	0.0	0.0	21.1	165.0	360.8	0.0	0.0

5-year $Q_{attenuated}$ 78.40 L/s **100-year $Q_{attenuated}$ 360.81 L/s**
5-year Max. Storage Required 352.2 m^3 **100-year Max. Storage Required 690.5 m^3**

Summary of Release Rates and Storage Volumes

Control Area	5-Year Release Rate (L/s)	5-Year Required Storage (m^3)	100-Year Release Rate (L/s)	100-Year Required Storage (m^3)
Unattenuated Areas	0.0	0.0	0.0	0.0
Roof Controls	63.0	99.8	84.1	234.1
Attenutated Areas	78.4	352.2	360.8	690.5
Total	**141.4**	**452.0**	**444.9**	**924.6**

Stormwater - Proposed Development
City of Ottawa Sewer Design Guidelines, 2012

Target Flow Rate

Area	7.47	ha
C	0.20	Rational Method runoff coefficient
t_c	35.7	min

	5-year		**100-year**
i	47.9	mm/hr	81.4
Q	198.6	L/s	422.5

Estimated Post Development Peak Flow from Unattenuated Areas

Area ID		
Total Area	0.00	ha
C	0.00	Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
20.0	70.3	0.0	0.0	0.0	0.0	120.0	0.0	0.0	0.0	0.0

Note:
C value for the 100-year storm is increased by 25%, to a maximum of 1.0 per Ottawa Sewer Design Guidelines (5.4.5.2.1)

Estimated Post Development Peak Flow from Attenuated Areas

Building ID	D		
Roof Area	0.870	ha	
Avail Storage Area	0.827		
C	0.90	Rational Method runoff coefficient	*Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*
t_c	10	min, tc at outlet without restriction	

Estimated Number of Roof Drains

Building Length	144.3	
Building Width	60.3	
Number of Drains	36	
m^2 / Drain	229.6	max 232.25m^2/notch as recommended by Zurn for Ottawa

Roof Top Rating Curve per Zurn Model Z-105-5

d (m)	A (m^2)	V_{acc} (m^3)	V_{avail} (m^3)	Q_{notch} (L/s)	Q_{roof} (L/s)	$V_{drawdown}$ (hr)
0.000	0	0.0	0.0	0.00	0.00	0.00
0.025	516.6	4.3	4.3	0.63	22.71	0.05
0.050	2066.5	30.1	34.4	1.26	45.43	0.24
0.075	4649.6	81.8	116.2	1.89	68.15	0.57
0.100	8266.0	159.3	275.5	2.52	90.86	1.06
0.125	8266.0	206.6	482.2	3.16	113.58	1.56
0.150	8266.0	206.6	688.8	3.79	136.26	1.98

* Assumes one notch opening per drain, assumes maximum slope of 10cm. Each notch estimates a maximum flow rate of 10 GPM (US) (37.8 L/min) per inch of head as per Manufacturer Specifcations (710E)

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10	104.2	226.6	65.1	161.5	96.9	178.6	431.6	86.7	344.9	206.9
15	83.6	181.8	65.1	116.7	105.0	142.9	345.4	86.7	258.7	232.8
20	70.3	152.8	65.1	87.7	105.3	120.0	289.9	86.7	203.2	243.8
25	60.9	132.5	65.1	67.4	101.0	103.8	251.0	86.7	164.3	246.4
30	53.9	117.3	65.1	52.2	94.0	91.9	222.0	86.7	135.3	243.6
35	48.5	105.5	65.1	40.4	84.9	82.6	199.6	86.7	112.9	237.0
40	44.2	96.1	65.1	31.0	74.4	75.1	181.6	86.7	94.9	227.8
45	40.6	88.4	65.1	23.3	62.9	69.1	166.9	86.7	80.2	216.5
50	37.7	81.9	65.1	16.8	50.4	64.0	154.6	86.7	67.9	203.6
55	35.1	76.4	65.1	11.3	37.3	59.6	144.1	86.7	57.4	189.4
60	32.9	71.7	65.1	6.6	23.6	55.9	135.1	86.7	48.4	174.2
65	31.0	67.5	65.1	2.4	9.5	52.6	127.2	86.7	40.5	158.1
70	29.4	63.9	63.9	0.0	0.0	49.8	120.3	86.7	33.6	141.2
75	27.9	60.7	60.7	0.0	0.0	47.3	114.2	86.7	27.5	123.8
80	26.6	57.8	57.8	0.0	0.0	45.0	108.7	86.7	22.0	105.7
85	25.4	55.2	55.2	0.0	0.0	43.0	103.8	86.7	17.1	87.2
90	24.3	52.8	52.8	0.0	0.0	41.1	99.4	86.7	12.7	68.3
95	23.3	50.7	50.7	0.0	0.0	39.4	95.3	86.7	8.6	49.0
100	22.4	48.7	48.7	0.0	0.0	37.9	91.6	86.7	4.9	29.4
105	21.6	46.9	46.9	0.0	0.0	36.5	88.2	86.7	1.5	9.4
110	20.8	45.3	45.3	0.0	0.0	35.2	85.1	85.1	0.0	0.0

5-year Q_{roof}	**65.10 L/s**		**100-year Q_{roof}**	**86.71 L/s**
5-year Max. Storage Required	**105.3 m^3**		**100-year Max. Storage Required**	**246.4 m^3**
5-year Storage Depth	**0.072 m**		**100-year Storage Depth**	**0.095 m**
5-year Estimated Drawdown Time	**0.53 hr**		**100-year Estimated Drawdown Time**	**0.97 hr**

Building ID	E	
Roof Area	0.870	ha
Avail Storage Area	0.827	
C	0.90	Rational Method runoff coefficient
t_c	10	min, tc at outlet without restriction

Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations

Estimated Number of Roof Drains

Building Length	144.3	
Building Width	60.3	
Number of Drains	36	
m^2 / Drain	229.6	max 232.25m^2/notch as recommended by Zurn for Ottawa

Roof Top Rating Curve per Zurn Model Z-105-5

d	A	V_{acc}	V_{avail}	Q_{notch}	Q_{roof}	$V_{drawdown}$
(m)	(m^2)	(m^3)	(m^3)	(L/s)	(L/s)	(hr)
0.000	0	0.0	0.0	0.00	0.00	0.00
0.025	516.6	4.3	4.3	0.63	22.71	0.05
0.050	2066.5	30.1	34.4	1.26	45.43	0.24
0.075	4649.6	81.8	116.2	1.89	68.15	0.57
0.100	8266.0	159.3	275.5	2.52	90.86	1.06
0.125	8266.0	206.6	482.2	3.16	113.58	1.56
0.150	8266.0	206.6	688.8	3.79	136.26	1.98

* Assumes one notch opening per drain, assumes maximum slope of 10cm. Each notch estimates a maximum flow rate of 10 GPM (US) (37.8 L/min) per inch of head as per Manufacturer Specifcations (7105)

	5-year					100-year				
t_c	i	Q_{actual}	$Q_{release}$	Q_{stored}	V_{stored}	i	Q_{actual}	$Q_{release}$	Q_{stored}	V_{stored}
(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
10	104.2	226.6	65.1	161.5	96.9	178.6	431.6	86.7	344.9	206.9
15	83.6	181.8	65.1	116.7	105.0	142.9	345.4	86.7	258.7	232.8
20	70.3	152.8	65.1	87.7	105.3	120.0	289.9	86.7	203.2	243.8
25	60.9	132.5	65.1	67.4	101.0	103.8	251.0	86.7	164.3	246.4
30	53.9	117.3	65.1	52.2	94.0	91.9	222.0	86.7	135.3	243.6
35	48.5	105.5	65.1	40.4	84.9	82.6	199.6	86.7	112.9	237.0
40	44.2	96.1	65.1	31.0	74.4	75.1	181.6	86.7	94.9	227.8
45	40.6	88.4	65.1	23.3	62.9	69.1	166.9	86.7	80.2	216.5
50	37.7	81.9	65.1	16.8	50.4	64.0	154.6	86.7	67.9	203.6
55	35.1	76.4	65.1	11.3	37.3	59.6	144.1	86.7	57.4	189.4
60	32.9	71.7	65.1	6.6	23.6	55.9	135.1	86.7	48.4	174.2
65	31.0	67.5	65.1	2.4	9.5	52.6	127.2	86.7	40.5	158.1
70	29.4	63.9	63.9	0.0	0.0	49.8	120.3	86.7	33.6	141.2
75	27.9	60.7	60.7	0.0	0.0	47.3	114.2	86.7	27.5	123.8
80	26.6	57.8	57.8	0.0	0.0	45.0	108.7	86.7	22.0	105.7
85	25.4	55.2	55.2	0.0	0.0	43.0	103.8	86.7	17.1	87.2
90	24.3	52.8	52.8	0.0	0.0	41.1	99.4	86.7	12.7	68.3
95	23.3	50.7	50.7	0.0	0.0	39.4	95.3	86.7	8.6	49.0
100	22.4	48.7	48.7	0.0	0.0	37.9	91.6	86.7	4.9	29.4
105	21.6	46.9	46.9	0.0	0.0	36.5	88.2	86.7	1.5	9.4
110	20.8	45.3	45.3	0.0	0.0	35.2	85.1	85.1	0.0	0.0

5-year Q_{roof}	**65.10**	**L/s**	**100-year Q_{roof}**	**86.71**	**L/s**
5-year Max. Storage Required	**105.3**	**m^3**	**100-year Max. Storage Required**	**246.4**	**m^3**
5-year Storage Depth	**0.072**	**m**	**100-year Storage Depth**	**0.095**	**m**
5-year Estimated Drawdown Time	**0.53**	**hr**	**100-year Estimated Drawdown Time**	**0.97**	**hr**

Estimated Post Development Peak Flow from Attenuated Areas

Area ID A200
Total Area 4.65 ha
C 0.68 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10	104.2	915.2	37.0	878.2	526.9	178.6	1960.4	202.1	1758.3	1055.0
30	53.9	473.7	37.0	436.7	786.0	91.9	1008.6	202.1	806.5	1451.8
50	37.7	330.7	37.0	293.7	881.1	64.0	702.2	202.1	500.1	1500.2
70	29.4	258.0	37.0	221.0	928.1	49.8	546.6	202.1	344.5	1447.1
90	24.3	213.3	37.0	176.3	952.2	41.1	451.4	202.1	249.3	1346.0
110	20.8	182.9	37.0	145.9	962.8	35.2	386.5	202.1	184.4	1217.0
130	18.3	160.7	37.0	123.7	964.7	30.9	339.2	202.1	137.1	1069.6
150	16.4	143.7	37.0	106.7	960.4	27.6	303.1	202.1	101.0	909.3
170	14.8	130.3	37.0	93.3	951.4	25.0	274.6	202.1	72.5	739.4
190	13.6	119.4	37.0	82.3	938.8	22.9	251.4	202.1	49.3	561.9
210	12.6	110.3	37.0	73.3	923.2	21.1	232.1	202.1	30.0	378.5
230	11.7	102.6	37.0	65.6	905.4	19.7	215.9	202.1	13.8	190.2
250	10.9	96.0	37.0	59.0	885.5	18.4	202.0	202.1	0.0	0.0
270	10.3	90.3	37.0	53.3	863.9	17.3	189.9	202.1	0.0	0.0
290	9.7	85.3	37.0	48.3	840.9	16.3	179.3	202.1	0.0	0.0
310	9.2	80.9	37.0	43.9	816.7	15.5	169.9	202.1	0.0	0.0
330	8.8	77.0	37.0	40.0	791.3	14.7	161.6	202.1	0.0	0.0
350	8.4	73.4	37.0	36.4	765.0	14.0	154.1	202.1	0.0	0.0
370	8.0	70.2	37.0	33.2	737.8	13.4	147.4	202.1	0.0	0.0
390	7.7	67.3	37.0	30.3	709.8	12.9	141.2	202.1	0.0	0.0
410	7.4	64.7	37.0	27.7	681.0	12.4	135.6	202.1	0.0	0.0

5-year $Q_{attenuated}$ 37.00 L/s **100-year $Q_{attenuated}$ 202.11 L/s**
5-year Max. Storage Required 964.7 m^3 **100-year Max. Storage Required 1500.2 m^3**

Area ID A201
Total Area 1.08 ha
C 0.43 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10	104.2	134.4	31.4	103.0	61.8	178.6	287.9	46.9	241.0	144.6
30	53.9	69.6	31.4	38.2	68.7	91.9	148.1	46.9	101.2	182.2
50	37.7	48.6	31.4	17.2	51.5	64.0	103.1	46.9	56.2	168.6
70	29.4	37.9	31.4	6.5	27.3	49.8	80.3	46.9	33.3	140.0
90	24.3	31.3	31.3	0.0	0.0	41.1	66.3	46.9	19.4	104.5
110	20.8	26.9	26.9	0.0	0.0	35.2	56.8	46.9	9.8	64.8
130	18.3	23.6	23.6	0.0	0.0	30.9	49.8	46.9	2.9	22.5
150	16.4	21.1	21.1	0.0	0.0	27.6	44.5	46.9	0.0	0.0
170	14.8	19.1	19.1	0.0	0.0	25.0	40.3	46.9	0.0	0.0
190	13.6	17.5	17.5	0.0	0.0	22.9	36.9	46.9	0.0	0.0
210	12.6	16.2	16.2	0.0	0.0	21.1	34.1	46.9	0.0	0.0
230	11.7	15.1	15.1	0.0	0.0	19.7	31.7	46.9	0.0	0.0
250	10.9	14.1	14.1	0.0	0.0	18.4	29.7	46.9	0.0	0.0
270	10.3	13.3	13.3	0.0	0.0	17.3	27.9	46.9	0.0	0.0
290	9.7	12.5	12.5	0.0	0.0	16.3	26.3	46.9	0.0	0.0
310	9.2	11.9	11.9	0.0	0.0	15.5	25.0	46.9	0.0	0.0
330	8.8	11.3	11.3	0.0	0.0	14.7	23.7	46.9	0.0	0.0
350	8.4	10.8	10.8	0.0	0.0	14.0	22.6	46.9	0.0	0.0
370	8.0	10.3	10.3	0.0	0.0	13.4	21.6	46.9	0.0	0.0
390	7.7	9.9	9.9	0.0	0.0	12.9	20.7	46.9	0.0	0.0
410	7.4	9.5	9.5	0.0	0.0	12.4	19.9	46.9	0.0	0.0

5-year $Q_{attenuated}$ 31.39 L/s **100-year $Q_{attenuated}$ 46.94 L/s**
5-year Max. Storage Required 68.7 m^3 **100-year Max. Storage Required 182.2 m^3**

Summary of Release Rates and Storage Volumes

Control Area	5-Year Release Rate (L/s)	5-Year Required Storage (m^3)	100-Year Release Rate (L/s)	100-Year Required Storage (m^3)
Unattenuated Areas	0.0	0.0	0.0	0.0
Roof Controls 1	65.1	105.3	86.7	246.4
Roof Controls 2	65.1	105.3	86.7	246.4
Attenutated Areas A200	37.0	964.7	202.1	1500.2
Attenutated Areas A201	31.4	68.7	46.9	182.2
Total	**198.6**	**1244.0**	**422.5**	**2175.2**

Stormwater - Proposed Development
City of Ottawa Sewer Design Guidelines, 2012

Target Flow Rate

Area	24.70	ha
C	0.21	Rational Method runoff coefficient
t_c	45.7	min

	5-year		**100-year**
i	40.2	mm/hr	68.3
Q	578.9	L/s	1229.8

Estimated Post Development Peak Flow from Unattenuated Areas

Total Area	1.53	ha
C	0.20	Rational Method runoff coefficient

	5-year					**100-year**				
t_c (min)	**i (mm/hr)**	**Q_{actual} (L/s)**	**$Q_{release}$ (L/s)**	**Q_{stored} (L/s)**	**V_{stored} (m^3)**	**i (mm/hr)**	**Q_{actual}* (L/s)**	**$Q_{release}$ (L/s)**	**Q_{stored} (L/s)**	**V_{stored} (m^3)**
20.0	70.3	59.7	59.7	0.0	0.0	120.0	127.4	127.4	0.0	0.0

Note:
C value for the 100-year storm is increased by 25%, to a maximum of 1.0 per Ottawa Sewer Design Guidelines (5.4.5.2.1)

Estimated Post Development Peak Flow from Attenuated Areas

Building ID	A	
Roof Area	6.453	ha
Avail Storage Area	6.130	
C	0.90	Rational Method runoff coefficient
t_c	10	min, tc at outlet without restriction

Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations

Estimated Number of Roof Drains

Building Length	408.3	
Building Width	168.6	
Number of Drains	265	
m^2 / Drain	231.3	max 232.25m^2/notch as recommended by Zurn for Ottawa

Watts Adjustable Accutrol Weir Fully Open

d (m)	**A (m^2)**	**V_{acc} (m^3)**	**V_{avail} (m^3)**	**Q_{notch} (L/s)**	**Q_{roof} (L/s)**	**$V_{drawdown}$ (hr)**
0.000	0	0.0	0.0	0.00	0.00	0.00
0.025	3831.5	31.9	31.9	0.32	83.61	0.11
0.050	15325.9	223.5	255.4	0.63	167.22	0.48
0.075	34483.2	606.6	862.1	0.95	250.82	1.15
0.100	61303.5	1181.4	2043.5	1.26	334.43	2.13
0.125	61303.5	1532.6	3576.0	1.58	418.04	3.15
0.150	61303.5	1532.6	5108.6	1.89	501.65	4.00

	5-year					**100-year**				
t_c (min)	**i (mm/hr)**	**Q_{actual} (L/s)**	**$Q_{release}$ (L/s)**	**Q_{stored} (L/s)**	**V_{stored} (m^3)**	**i (mm/hr)**	**Q_{actual} (L/s)**	**$Q_{release}$ (L/s)**	**Q_{stored} (L/s)**	**V_{stored} (m^3)**
10	104.2	1680.9	266.7	1414.2	848.5	178.6	3200.7	353.2	2847.4	1708.5
15	83.6	1348.0	266.7	1081.3	973.2	142.9	2561.4	353.2	2208.1	1987.3
20	70.3	1133.3	266.7	866.7	1040.0	120.0	2150.1	353.2	1796.9	2156.3
25	60.9	982.4	266.7	715.7	1073.6	103.8	1861.5	353.2	1508.2	2262.3
30	53.9	870.0	266.7	603.3	1086.0	91.9	1646.7	353.2	1293.5	2328.3
35	48.5	782.7	266.7	516.0	1083.7	82.6	1480.2	353.2	1127.0	2366.7
40	44.2	712.8	266.7	446.1	1070.7	75.1	1347.0	353.2	993.7	2385.0
45	40.6	655.4	266.7	388.8	1049.7	69.1	1237.7	353.2	884.5	2388.1
50	37.7	607.4	266.7	340.8	1022.3	64.0	1146.4	353.2	793.1	2379.4
55	35.1	566.6	266.7	300.0	989.9	59.6	1068.8	353.2	715.5	2361.2
60	32.9	531.5	266.7	264.8	953.3	55.9	1001.9	353.2	648.7	2335.2
65	31.0	500.8	266.7	234.1	913.2	52.6	943.7	353.2	590.5	2302.8
70	29.4	473.8	266.7	207.2	870.1	49.8	892.5	353.2	539.2	2264.8
75	27.9	449.9	266.7	183.2	824.6	47.3	847.1	353.2	493.8	2222.2
80	26.6	428.5	266.7	161.8	776.9	45.0	806.5	353.2	453.2	2175.5
85	25.4	409.3	266.7	142.6	727.2	43.0	769.9	353.2	416.7	2125.2
90	24.3	391.8	266.7	125.2	675.9	41.1	736.9	353.2	383.7	2071.9
95	23.3	376.0	266.7	109.3	623.1	39.4	706.9	353.2	353.6	2015.7
100	22.4	361.5	266.7	94.8	568.9	37.9	679.4	353.2	326.2	1957.1
105	21.6	348.2	266.7	81.5	513.5	36.5	654.2	353.2	301.0	1896.2
110	20.8	335.9	266.7	69.2	457.0	35.2	631.0	353.2	277.8	1833.3

5-year Q_{roof}	**266.67 L/s**		**100-year Q_{roof}**	**353.23 L/s**
5-year Max. Storage Required	**1086.0 m^3**		**100-year Max. Storage Required**	**2388.1 m^3**
5-year Storage Depth	**0.080 m**		**100-year Storage Depth**	**0.106 m**
5-year Estimated Drawdown Time	**1.34 hr**		**100-year Estimated Drawdown Time**	**2.36 hr**

Building ID B
Roof Area 0.963 ha
Avail Storage Area 0.915
C 0.90 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*
t_c 10 min, tc at outlet without restriction

Estimated Number of Roof Drains
Building Length 132.6
Building Width 72.6
Number of Drains 40
m^2 / Drain 228.7 max 232.25m^2/notch as recommended by Zurn for Ottawa

Watts Adjustable Accutrol Weir Fully Open

d	A	V_{acc}	V_{avail}	Q_{notch}	Q_{roof}	$V_{drawdown}$
(m)	(m^2)	(m^3)	(m^3)	(L/s)	(L/s)	(hr)
0.000	0	0.0	0.0	0.00	0.00	0.00
0.025	571.8	4.8	4.8	0.32	12.62	0.10
0.050	2287.1	33.4	38.1	0.63	25.24	0.47
0.075	5146.0	90.5	128.7	0.95	37.86	1.14
0.100	9148.5	176.3	305.0	1.26	50.48	2.11
0.125	9148.5	228.7	533.7	1.58	63.10	3.11
0.150	9148.5	228.7	762.4	1.89	75.72	3.95

	5-year					100-year				
t_c	i	Q_{actual}	$Q_{release}$	Q_{stored}	V_{stored}	i	Q_{actual}	$Q_{release}$	Q_{stored}	V_{stored}
(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
10	104.2	250.8	40.2	210.6	126.4	178.6	477.6	53.2	424.4	254.6
15	83.6	201.2	40.2	161.0	144.9	142.9	382.2	53.2	329.0	296.1
20	70.3	169.1	40.2	128.9	154.7	120.0	320.9	53.2	267.6	321.2
25	60.9	146.6	40.2	106.4	159.6	103.8	277.8	53.2	224.6	336.8
30	53.9	129.8	40.2	89.6	161.3	91.9	245.7	53.2	192.5	346.5
35	48.5	116.8	40.2	76.6	160.9	82.6	220.9	53.2	167.7	352.1
40	44.2	106.4	40.2	66.2	158.8	75.1	201.0	53.2	147.8	354.7
45	40.6	97.8	40.2	57.6	155.6	69.1	184.7	53.2	131.5	355.0
50	37.7	90.7	40.2	50.5	151.4	64.0	171.1	53.2	117.8	353.5
55	35.1	84.6	40.2	44.4	146.4	59.6	159.5	53.2	106.3	350.6
60	32.9	79.3	40.2	39.1	140.8	55.9	149.5	53.2	96.3	346.6
65	31.0	74.7	40.2	34.5	134.7	52.6	140.8	53.2	87.6	341.6
70	29.4	70.7	40.2	30.5	128.2	49.8	133.2	53.2	79.9	335.8
75	27.9	67.1	40.2	26.9	121.2	47.3	126.4	53.2	73.2	329.3
80	26.6	63.9	40.2	23.7	114.0	45.0	120.4	53.2	67.1	322.1
85	25.4	61.1	40.2	20.9	106.5	43.0	114.9	53.2	61.7	314.5
90	24.3	58.5	40.2	18.3	98.7	41.1	110.0	53.2	56.7	306.4
95	23.3	56.1	40.2	15.9	90.7	39.4	105.5	53.2	52.2	297.8
100	22.4	53.9	40.2	13.7	82.5	37.9	101.4	53.2	48.2	288.9
105	21.6	52.0	40.2	11.8	74.1	36.5	97.6	53.2	44.4	279.7
110	20.8	50.1	40.2	9.9	65.5	35.2	94.2	53.2	40.9	270.1

5-year Q_{roof} 40.20 L/s | **100-year Q_{roof}** 53.24 L/s
5-year Max. Storage Required 161.3 m^3 | **100-year Max. Storage Required** 355.0 m^3
5-year Storage Depth 0.080 m | **100-year Storage Depth** 0.105 m
5-year Estimated Drawdown Time 1.32 hr | **100-year Estimated Drawdown Time** 2.33 hr

Estimated Post Development Peak Flow from Attenuated Areas

Area ID A4
Total Area 7.62 ha
C 0.65 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}	i	Q_{actual}‡	$Q_{release}$	Q_{stored}	V_{stored}
(min)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)	(mm/hr)	(L/s)	(L/s)	(L/s)	(m^3)
10	104.2	1433.5	102.7	1330.8	798.5	178.6	3070.8	398.3	2672.5	1603.5
20	70.3	966.5	102.7	863.8	1036.6	120.0	2062.9	398.3	1664.6	1997.5
30	53.9	742.0	102.7	639.2	1150.6	91.9	1579.9	398.3	1181.6	2126.9
40	44.2	607.9	102.7	505.2	1212.4	75.1	1292.3	398.3	894.0	2145.6
50	37.7	518.0	102.7	415.3	1245.9	64.0	1099.9	398.3	701.5	2104.6
60	32.9	453.2	102.7	350.5	1261.8	55.9	961.3	398.3	562.9	2026.6
70	29.4	404.1	102.7	301.4	1265.7	49.8	856.3	398.3	457.9	1923.4
80	26.6	365.4	102.7	262.7	1261.0	45.0	773.8	398.3	375.4	1802.0
90	24.3	334.2	102.7	231.4	1249.7	41.1	707.0	398.3	308.7	1666.9
100	22.4	308.3	102.7	205.5	1233.3	37.9	651.9	398.3	253.5	1521.1
110	20.8	286.5	102.7	183.7	1212.7	35.2	605.4	398.3	207.1	1366.7
120	19.5	267.8	102.7	165.1	1188.7	32.9	565.7	398.3	167.4	1205.2
130	18.3	251.7	102.7	149.0	1161.9	30.9	531.4	398.3	133.0	1037.8
140	17.3	237.6	102.7	134.8	1132.7	29.2	501.4	398.3	103.0	865.3
150	16.4	225.1	102.7	122.4	1101.4	27.6	474.8	398.3	76.5	688.6
160	15.6	214.0	102.7	111.3	1068.2	26.2	451.3	398.3	52.9	508.1
170	14.8	204.1	102.7	101.3	1033.5	25.0	430.1	398.3	31.8	324.3
180	14.2	195.1	102.7	92.4	997.4	23.9	411.1	398.3	12.7	137.6
190	13.6	187.0	102.7	84.2	960.0	22.9	393.8	398.3	0.0	0.0
200	13.0	179.5	102.7	76.8	921.5	22.0	378.1	398.3	0.0	0.0
210	12.6	172.7	102.7	70.0	882.0	21.1	363.6	398.3	0.0	0.0
220	12.1	166.5	102.7	63.8	841.6	20.4	350.4	398.3	0.0	0.0
230	11.7	160.7	102.7	58.0	800.3	19.7	338.2	398.3	0.0	0.0
240	11.3	155.4	102.7	52.7	758.2	19.0	326.9	398.3	0.0	0.0
250	10.9	150.4	102.7	47.7	715.4	18.4	316.4	398.3	0.0	0.0
260	10.6	145.8	102.7	43.1	672.0	17.8	306.6	398.3	0.0	0.0
270	10.3	141.5	102.7	38.8	627.9	17.3	297.4	398.3	0.0	0.0
280	10.0	137.5	102.7	34.7	583.3	16.8	288.9	398.3	0.0	0.0
290	9.7	133.7	102.7	30.9	538.2	16.3	280.8	398.3	0.0	0.0
300	9.5	130.1	102.7	27.4	492.5	15.9	273.3	398.3	0.0	0.0
310	9.2	126.7	102.7	24.0	446.4	15.5	266.2	398.3	0.0	0.0

5-year $Q_{attenuated}$ 102.74 L/s | **100-year $Q_{attenuated}$** 398.34 L/s
5-year Max. Storage Required 1265.7 m^3 | **100-year Max. Storage Required** 2145.6 m^3

Estimated Post Development Peak Flow from Attenuated Areas

Area ID A3
Total Area 8.13 ha
C 0.59 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10	104.2	1383.6	109.6	1274.0	764.4	178.6	2963.9	297.5	2666.3	1599.8
20	70.3	932.9	109.6	823.2	987.9	120.0	1991.0	297.5	1693.5	2032.2
30	53.9	716.1	109.6	606.5	1091.7	91.9	1524.9	297.5	1227.3	2209.2
40	44.2	586.7	109.6	477.1	1145.1	75.1	1247.3	297.5	949.8	2279.4
50	37.7	500.0	109.6	390.4	1171.1	64.0	1061.6	297.5	764.0	2292.0
60	32.9	437.5	109.6	327.8	1180.2	55.9	927.8	297.5	630.2	2268.8
70	29.4	390.0	109.6	280.4	1177.7	49.8	826.4	297.5	528.9	2221.4
80	26.6	352.7	109.6	243.1	1166.9	45.0	746.8	297.5	449.2	2156.4
90	24.3	322.5	109.6	212.9	1149.7	41.1	682.4	297.5	384.8	2078.1
100	22.4	297.5	109.6	187.9	1127.6	37.9	629.1	297.5	331.6	1989.6
110	20.8	276.5	109.6	166.9	1101.4	35.2	584.3	297.5	286.8	1892.7
120	19.5	258.5	109.6	148.9	1072.0	32.9	546.0	297.5	248.5	1788.9
130	18.3	242.9	109.6	133.3	1039.9	30.9	512.9	297.5	215.3	1679.5
140	17.3	229.3	109.6	119.7	1005.4	29.2	483.9	297.5	186.3	1565.2
150	16.4	217.3	109.6	107.7	968.9	27.6	458.3	297.5	160.8	1446.8
160	15.6	206.6	109.6	96.9	930.7	26.2	435.5	297.5	138.0	1324.7
170	14.8	197.0	109.6	87.3	890.9	25.0	415.1	297.5	117.6	1199.5
180	14.2	188.3	109.6	78.7	849.7	23.9	396.8	297.5	99.2	1071.4
190	13.6	180.4	109.6	70.8	807.4	22.9	380.1	297.5	82.5	940.8
200	13.0	173.3	109.6	63.7	764.0	22.0	364.9	297.5	67.3	808.0
210	12.6	166.7	109.6	57.1	719.5	21.1	351.0	297.5	53.4	673.1
220	12.1	160.7	109.6	51.1	674.2	20.4	338.2	297.5	40.6	536.4
230	11.7	155.1	109.6	45.5	628.1	19.7	326.4	297.5	28.8	398.0
240	11.3	150.0	109.6	40.4	581.2	19.0	315.5	297.5	17.9	258.1
250	10.9	145.2	109.6	35.6	533.7	18.4	305.3	297.5	7.8	116.7
260	10.6	140.7	109.6	31.1	485.5	17.8	295.9	297.5	0.0	0.0
270	10.3	136.6	109.6	27.0	436.7	17.3	287.1	297.5	0.0	0.0
280	10.0	132.7	109.6	23.1	387.3	16.8	278.8	297.5	0.0	0.0
290	9.7	129.0	109.6	19.4	337.5	16.3	271.1	297.5	0.0	0.0
300	9.5	125.6	109.6	16.0	287.2	15.9	263.8	297.5	0.0	0.0
310	9.2	122.3	109.6	12.7	236.4	15.5	256.9	297.5	0.0	0.0

5-year $Q_{attenuated}$ **109.62 L/s** **100-year $Q_{attenuated}$** **297.55 L/s**
5-year Max. Storage Required **1180.2 m^3** **100-year Max. Storage Required** **2292.0 m^3**

Summary of Release Rates and Storage Volumes

Control Area	5-Year Release Rate (L/s)	5-Year Required Storage (m^3)	100-Year Release Rate (L/s)	100-Year Required Storage (m^3)
Unattenuated Areas	59.7	0.0	127.4	0.0
Roof Controls A	266.7	1086.0	353.2	2388.1
Roof Controls B	40.2	161.3	53.2	355.0
A4	102.7	1265.7	398.3	2145.6
A3	109.6	1180.2	297.5	2292.0
Total	**578.9**	**3693.3**	**1229.8**	**7180.7**

Stormwater - Proposed Development
City of Ottawa Sewer Design Guidelines, 2012

Target Flow Rate

Area	2.34	ha
C	0.20	Rational Method runoff coefficient
t_c	10.0	min

	5-year		**100-year**
i	104.2	mm/hr	178.6
Q	135.5	L/s	290.2

Estimated Post Development Peak Flow from Unattenuated Areas

Total Area	0.23	ha
C	0.30	Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10.0	104.2	20.3	20.3	0.0	0.0	178.6	43.5	43.5	0.0	0.0

Note:
C value for the 100-year storm is increased by 25%, to a maximum of 1.0 per Ottawa Sewer Design Guidelines (5.4.5.2.1)

Estimated Post Development Peak Flow from Attenuated Areas

Building ID	F	
Roof Area	0.150	ha
Avail Storage Area	0.143	
C	0.90	Rational Method runoff coefficient
t_c	10	min, tc at outlet without restriction

Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations

Estimated Number of Roof Drains

Building Length	60.6	
Building Width	26.5	
Number of Drains	7.0	
m^2 / Drain	203.6	max 232.25m^2/notch as recommended by Zurn for Ottawa

Watts Adjustable Accutrol Weir Fully Open						
d (m)	A (m^2)	V_{acc} (m^3)	V_{avail} (m^3)	Q_{notch} (L/s)	Q_{roof} (L/s)	$V_{drawdown}$ (hr)
0.000	0	0.0	0.0	0.00	0.00	0.00
0.025	89.1	0.7	0.7	0.32	2.21	0.09
0.050	356.3	5.2	5.9	0.63	4.42	0.42
0.075	801.6	14.1	20.0	0.95	6.63	1.01
0.100	1425.0	27.5	47.5	1.26	8.83	1.87
0.125	1425.0	35.6	83.1	1.58	11.04	2.77
0.150	1425.0	35.6	118.8	1.89	13.25	3.52

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10	104.2	39.1	6.9	32.1	19.3	178.6	74.4	9.2	65.2	39.1
15	83.6	31.3	6.9	24.4	22.0	142.9	59.5	9.2	50.4	45.3
20	70.3	26.3	6.9	19.4	23.3	120.0	50.0	9.2	40.8	49.0
25	60.9	22.8	6.9	15.9	23.8	103.8	43.3	9.2	34.1	51.1
30	53.9	20.2	6.9	13.3	23.9	91.9	38.3	9.2	29.1	52.4
35	48.5	18.2	6.9	11.3	23.6	82.6	34.4	9.2	25.2	53.0
40	44.2	16.6	6.9	9.6	23.1	75.1	31.3	9.2	22.1	53.1
45	40.6	15.2	6.9	8.3	22.4	69.1	28.8	9.2	19.6	52.9
50	37.7	14.1	6.9	7.2	21.5	64.0	26.6	9.2	17.5	52.4
55	35.1	13.2	6.9	6.2	20.6	59.6	24.8	9.2	15.7	51.7
60	32.9	12.4	6.9	5.4	19.5	55.9	23.3	9.2	14.1	50.8
65	31.0	11.6	6.9	4.7	18.3	52.6	21.9	9.2	12.8	49.7
70	29.4	11.0	6.9	4.1	17.1	49.8	20.7	9.2	11.6	48.6
75	27.9	10.5	6.9	3.5	15.8	47.3	19.7	9.2	10.5	47.3
80	26.6	10.0	6.9	3.0	14.5	45.0	18.7	9.2	9.6	45.9
85	25.4	9.5	6.9	2.6	13.1	43.0	17.9	9.2	8.7	44.5
90	24.3	9.1	6.9	2.2	11.7	41.1	17.1	9.2	7.9	42.9
95	23.3	8.7	6.9	1.8	10.3	39.4	16.4	9.2	7.2	41.3
100	22.4	8.4	6.9	1.5	8.8	37.9	15.8	9.2	6.6	39.7
105	21.6	8.1	6.9	1.2	7.3	36.5	15.2	9.2	6.0	38.0
110	20.8	7.8	6.9	0.9	5.8	35.2	14.7	9.2	5.5	36.2

5-year Q_{roof}	**6.94 L/s**	**100-year Q_{roof}**	**9.18 L/s**
5-year Max. Storage Required	**23.9 m^3**	**100-year Max. Storage Required**	**53.1 m^3**
5-year Storage Depth	**0.079 m**	**100-year Storage Depth**	**0.104 m**
5-year Estimated Drawdown Time	**1.13 hr**	**100-year Estimated Drawdown Time**	**2.02 hr**

Estimated Post Development Peak Flow from Attenuated Areas

Area ID A6
Total Area 2.19 ha
C 0.65 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual}‡ (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10	104.2	412.0	108.2	303.8	182.3	178.6	882.6	237.5	645.1	387.1
20	70.3	277.8	108.2	169.6	203.5	120.0	592.9	237.5	355.4	426.5
30	53.9	213.2	108.2	105.0	189.1	91.9	454.1	237.5	216.6	389.9
40	44.2	174.7	108.2	66.5	159.6	75.1	371.4	237.5	134.0	321.5
50	37.7	148.9	108.2	40.7	122.1	64.0	316.1	237.5	78.7	236.0
60	32.9	130.3	108.2	22.1	79.4	55.9	276.3	237.5	38.8	139.7
70	29.4	116.1	108.2	7.9	33.4	49.8	246.1	237.5	8.6	36.3
80	26.6	105.0	105.0	0.0	0.0	45.0	222.4	237.5	0.0	0.0
90	24.3	96.0	96.0	0.0	0.0	41.1	203.2	237.5	0.0	0.0
100	22.4	88.6	88.6	0.0	0.0	37.9	187.3	237.5	0.0	0.0
110	20.8	82.3	82.3	0.0	0.0	35.2	174.0	237.5	0.0	0.0
120	19.5	77.0	77.0	0.0	0.0	32.9	162.6	237.5	0.0	0.0
130	18.3	72.3	72.3	0.0	0.0	30.9	152.7	237.5	0.0	0.0
140	17.3	68.3	68.3	0.0	0.0	29.2	144.1	237.5	0.0	0.0
150	16.4	64.7	64.7	0.0	0.0	27.6	136.5	237.5	0.0	0.0
160	15.6	61.5	61.5	0.0	0.0	26.2	129.7	237.5	0.0	0.0
170	14.8	58.6	58.6	0.0	0.0	25.0	123.6	237.5	0.0	0.0
180	14.2	56.1	56.1	0.0	0.0	23.9	118.1	237.5	0.0	0.0
190	13.6	53.7	53.7	0.0	0.0	22.9	113.2	237.5	0.0	0.0
200	13.0	51.6	51.6	0.0	0.0	22.0	108.7	237.5	0.0	0.0
210	12.6	49.6	49.6	0.0	0.0	21.1	104.5	237.5	0.0	0.0
220	12.1	47.9	47.9	0.0	0.0	20.4	100.7	237.5	0.0	0.0
230	11.7	46.2	46.2	0.0	0.0	19.7	97.2	237.5	0.0	0.0
240	11.3	44.7	44.7	0.0	0.0	19.0	93.9	237.5	0.0	0.0
250	10.9	43.2	43.2	0.0	0.0	18.4	90.9	237.5	0.0	0.0
260	10.6	41.9	41.9	0.0	0.0	17.8	88.1	237.5	0.0	0.0
270	10.3	40.7	40.7	0.0	0.0	17.3	85.5	237.5	0.0	0.0
280	10.0	39.5	39.5	0.0	0.0	16.8	83.0	237.5	0.0	0.0
290	9.7	38.4	38.4	0.0	0.0	16.3	80.7	237.5	0.0	0.0
300	9.5	37.4	37.4	0.0	0.0	15.9	78.5	237.5	0.0	0.0
310	9.2	36.4	36.4	0.0	0.0	15.5	76.5	237.5	0.0	0.0

5-year $Q_{attenuated}$ **108.20 L/s**
5-year Max. Storage Required **203.5 m^3**

100-year $Q_{attenuated}$ **237.45 L/s**
100-year Max. Storage Required **426.5 m^3**

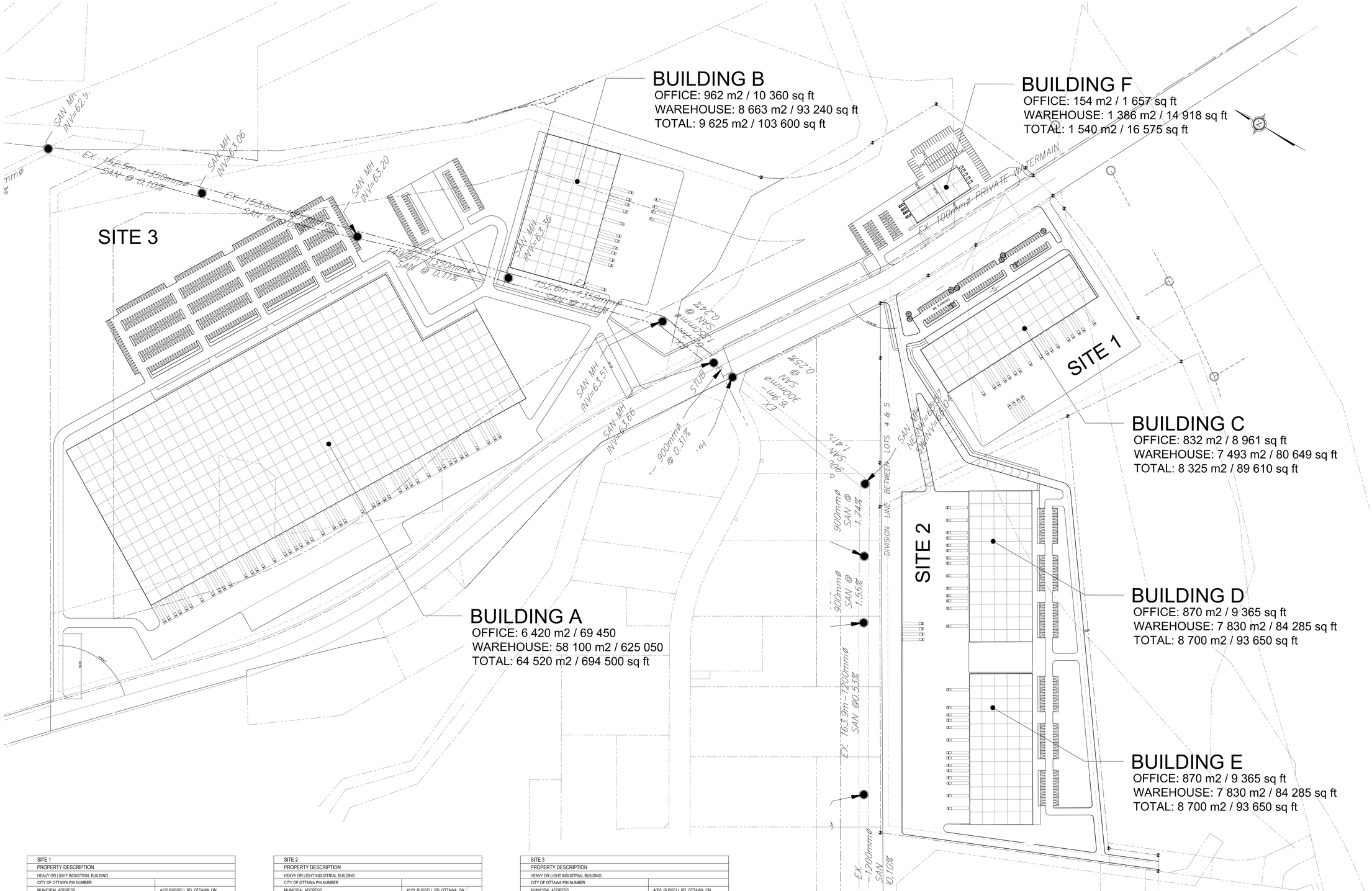
Summary of Release Rates and Storage Volumes

Control Area	5-Year Release Rate (L/s)	5-Year Required Storage (m^3)	100-Year Release Rate (L/s)	100-Year Required Storage (m^3)
Unattenuated Areas	20.3	0.0	43.5	0.0
Roof Controls BLDG F	6.9	23.9	9.2	53.1
Attenutated Areas A6	108.2	203.5	237.5	426.5
Total	**135.5**	**227.4**	**290.2**	**479.6**

											Sewer Data								
Area ID	**Total Drainage Area**	**Up**	**Down**	**Area**	**C**	**Indiv AxC**	**Acc AxC**	**T_C**	**I**	**Q**	**DIA**	**Slope**	**Length**	**$A_{hydraulic}$**	**R**	**Velocity**	**Qcap**	**Time Flow**	**Q / Q full**
	(ha)			**(ha)**	**(-)**			**(min)**	**(mm/hr)**	**(L/s)**	**(mm)**	**(%)**	**(m)**	**(m^2)**	**(m)**	**(m/s)**	**(L/s)**	**(min)**	**(-)**
		107	106	3.200	0.45	1.44	1.44	10.0	104.2	416.8	750	0.20	137	0.442	0.188	1.13	497.9	2.0	0.84
		106	106B	1.000	0.75	0.75	2.19	12.0	94.6	575.4	825	0.20	120	0.535	0.206	1.20	641.9	1.7	0.90
A3	8.31	106B	105	0.800	0.75	0.60	2.79	13.7	88.0	682.3	1050	0.15	120	0.866	0.263	1.22	1057.6	1.6	0.65
		105	104	1.500	0.65	0.98	3.77	15.3	82.5	862.9	1050	0.15	108	0.866	0.263	1.22	1057.6	1.5	0.82
		104	102B	1.630	0.70	1.14	4.91	16.8	78.2	1065.0	1200	0.15	129	1.131	0.300	1.34	1510.0	1.6	0.71
Contribution from																			
A4+U4+BLDGA+BLDGB	16.57	Headwall1	103	9.16	0.53	4.85	9.76	10.0	104.2	3231.6	1050	2.50	10	0.866	0.263	4.99	4317.7	0.0	0.75
		103	102B	0	0.00	0.00	9.76	10.0	104.0	3226.8	1050	2.50	10	0.866	0.263	4.99	4317.7	0.0	0.75
		102B	102	0.000	0.00	0.00	14.67	18.4	73.9	3012.3	1500	0.25	21	1.767	0.375	2.00	3534.4	0.2	0.85
		102	Headwall 2	0.000	0.00	0.00	14.67	18.6	73.5	2994.9	1500	0.25	57	1.767	0.375	2.00	3534.4	0.5	0.85
A200+BLDG E + BLDG D	6.39	208	207	4.650	0.68	3.16	3.16	10.0	104.2	1088.6	825	0.85	181	0.535	0.206	2.48	1323.4	1.2	0.82
		207	206	0.000	0.00	0.00	3.16	11.2	98.2	1035.7	825	3.00	65	0.535	0.206	4.65	2486.2	0.2	0.42
A1	3.81	210	209	1.800	0.70	1.26	1.26	10.0	104.2	364.7	675	0.25	110	0.358	0.169	1.17	420.3	1.6	0.87
		209	206	0.600	0.40	0.24	1.50	11.6	96.6	402.6	750	0.20	42	0.442	0.188	1.13	497.9	0.6	0.81
BLDG C*	0.83	206	205	0.000	0.00	0.00	4.66	12.2	93.9	1473.8	1050	0.35	72	0.866	0.263	1.87	1615.5	0.6	0.91
Contribution from rest of A1		DICB	205	1.410	0.57	0.80	0.80	10.0	104.2	232.6									
		205	204	0.000	0.00	0.00	5.47	12.8	91.3	1643.8	1050	0.50	65	0.866	0.263	2.23	1930.9	0.5	0.85
A5	2.19	204	202	2.190	0.60	1.31	6.78	13.3	89.4	1941.9	1050	2.70	50	0.866	0.263	5.18	4487.0	0.2	0.43
BLDG F*	0.15	203	202	0.000	0.00	0.00	0.00	10.0	104.2	53.0	300	0.50	100	0.071	0.075	0.97	68.4	1.7	0.78
		202	201	0.000	0.00	0.00	6.78	13.5	88.8	1983.6	1050	1.50	20	0.866	0.263	3.86	3344.4	0.1	0.59
		201	Headwall 3	0.000	0.00	0.00	6.78	13.6	88.5	1977.6	1050	1.50	20	0.866	0.263	3.86	3344.4	0.1	0.59

** Building Flow Equal to the 100-Year Controlled Release Rate*

DRAWINGS / FIGURES



SITE 1	
PROPERTY DESCRIPTION	
HEAVY OR LIGHT INDUSTRIAL BUILDING	
CITY OF OTTAWA PIN NUMBER	
MUNICIPAL ADDRESS	4120 RUSSELL RD, OTTAWA, ON
SITE INFORMATION	
LOT AREA: 46 652 m²	
LOT FRONTAGE: 195 m	
LOT DEPTH: 183 m /	
BUILDING INFORMATION	
BUILDING AREA: 8325m²	
BUILDING FLOOR AREA (GFA): 8325m²	
PROPOSED USE: LIGHT INDUSTRIAL BUILDING	

ZONING TABLE	IH	
CITY OF OTTAWA ZONING BY-LAW No. 2008-250	REQUIRED	PROPOSED
MINIMUM LOT AREA	4,000m²	46 652 m²
MINIMUM LOT WIDTH	No minimum	249 m
FRONT YARD SETBACK	7.5m	55 m
MINIMUM INTERIOR SIDE YARD SETBACK	7.5m	23m
MINIMUM REAR YARD SETBACK	7.5m	69 m
MAXIMUM BUILDING HEIGHT	22m	9.15m
MAXIMUM FLOOR SPACE INDEX	2	.18
PARKING AREA	N/A	2 711 m²
LANDSCAPED AREA (19 670 m2 OF LOT AREA)	0% of parking area (Section 110) 0% of Lot	476 m2 of parking area 17.8 % of parking area 42% of Lot area
VEHICLE PARKING REQUIREMENTS (AREA C, SCHEDULE 1A)	.8 per 100m2 of GFA .83 spaces required	86 new SPACES

SITE 2	
PROPERTY DESCRIPTION	
HEAVY OR LIGHT INDUSTRIAL BUILDING	
CITY OF OTTAWA PIN NUMBER	
MUNICIPAL ADDRESS	4120 RUSSELL RD, OTTAWA, ON
SITE INFORMATION	
LOT AREA: 74 718 m²	
LOT FRONTAGE: 198 m	
LOT DEPTH: 370 m /	
BUILDING INFORMATION	
BUILDING AREA: 17400m²	
BUILDING FLOOR AREA (GFA): 17400m²	
PROPOSED USE: LIGHT INDUSTRIAL BUILDING	

ZONING TABLE	IH	
CITY OF OTTAWA ZONING BY-LAW No. 2008-250	REQUIRED	PROPOSED
MINIMUM LOT AREA	4,000m²	74 718 m²
MINIMUM LOT WIDTH	No minimum	201 m
FRONT YARD SETBACK	7.5m	17.48 m
MINIMUM INTERIOR SIDE YARD SETBACK	7.5m	53.4m
MINIMUM REAR YARD SETBACK	7.5m	18.38 m
MAXIMUM BUILDING HEIGHT	22m	9.15m
MAXIMUM FLOOR SPACE INDEX	2	.23
PARKING AREA	N/A	4943.12m²
LANDSCAPED AREA (26 188 m2 OF LOT AREA)	0% of parking area (Section 110) 0% of Lot	844.29 m2 of parking area 17 % of parking area 35 % of Lot area
VEHICLE PARKING REQUIREMENTS (AREA C, SCHEDULE 1A)	.8 per 100m2 of GFA 126 spaces required	156 new SPACES

SITE 3	
PROPERTY DESCRIPTION	
HEAVY OR LIGHT INDUSTRIAL BUILDING	
CITY OF OTTAWA PIN NUMBER	
MUNICIPAL ADDRESS	4055 RUSSELL RD, OTTAWA, ON
SITE INFORMATION	
LOT AREA: 283 698 m²	
LOT FRONTAGE: 1 072 m	
LOT DEPTH: 337 m /	
BUILDING INFORMATION	
BUILDING AREA: 75 685 m²	
BUILDING FLOOR AREA (GFA): 75 685m²	
PROPOSED USE: LIGHT INDUSTRIAL BUILDING	

ZONING TABLE	IH	
CITY OF OTTAWA ZONING BY-LAW No. 2008-250	REQUIRED	PROPOSED
MINIMUM LOT AREA	4,000m²	283 698 m²
MINIMUM LOT WIDTH	No minimum	942 m
FRONT YARD SETBACK	7.5m	48.68 m
MINIMUM INTERIOR SIDE YARD SETBACK	7.5m	14.5m
MINIMUM REAR YARD SETBACK	7.5m	7.5 m
MAXIMUM BUILDING HEIGHT	22m	9.15m
MAXIMUM FLOOR SPACE INDEX	2	.26
PARKING AREA	N/A	21 604.30 m²
LANDSCAPED AREA (137 008.67 m2 OF LOT AREA)	0% of parking area (Section 110) 0% of Lot	1 950.70 m2 of parking area 9 % of parking area 48 % of Lot area
VEHICLE PARKING REQUIREMENTS (AREA C, SCHEDULE 1A)	.8 per 100m2 of GFA 601 spaces required	734 new SPACES

No.	Date	Émis pour / Object
	2020-02-03	
	2020-03-02	
	2020-03-04	

Ingénieur - Mécanique - Électricité

Ingénieur - Structure

Architecte paysagiste

PROJET | PAYSAGE

Client

AVENUE 31

Architecte / Architect

figurr collectif d'architectes

Sceau / Seal

Note:

L'entrepreneur doit vérifier toutes les données et toutes les informations sur le site et aviser immédiatement l'architecte de toutes erreurs ou omissions.

Contractor shall verify all information and dimensions on site and immediately report any errors or omissions to the architect.

Projet / Project

NATIONAL CAPITAL BUSINESS PARK

Titre / Title

SITE PLAN

Dessiné par / Drawn by: Author	No. projet / Project number: 1959
Vérifié par / Verified by: Checker	No. dessin / Drawing number: A101 — Révision: 0
Échelle / Scale: 1:2000	
Date: 2020-03-04	

LEGEND

SUBJECT LANDS

PROPOSED WATERMAIN

EXISTING WATERMAIN

RUSSELL ROAD

HIGHWAY 417

HAWTHORNE ROAD

BELGREEN DRIVE

HUNT CLUB ROAD

CONNECTION POINT 1

CONNECTION POINT 2

400mm WATERMAIN

250mm WATERMAIN

200mm WATERMAIN

DEVELOPMENT LIMIT

EX. STUB

EX. 300mmø WATERMAIN

EX. 400mmø WATERMAIN

EX. 400mmø PRIVATE WATERMAIN

LOT 2

LOT 3

LOT 4

LOT 5

LOT 6

CONCESSION 6 (RIDEAU FRONT) (GLOUCESTER)

ROAD ALLOWANCE BETWEEN LOTS 5 AND 6 BLAKE ROAD

DIVISION LINE BETWEEN LOTS 2 & 3

DIVISION LINE BETWEEN LOTS 4 & 5

PARCEL A

PARCEL B

PARCEL C

PARCEL D

PARCEL E

PARCEL F

PARCEL G

PARCEL H

PARCEL I

CARLETON CONDOMINIUM PLAN No. 435

THE QUEEN ELIZABETH THE KING'S HIGHWAY No. 417

HUNT CLUB ROAD

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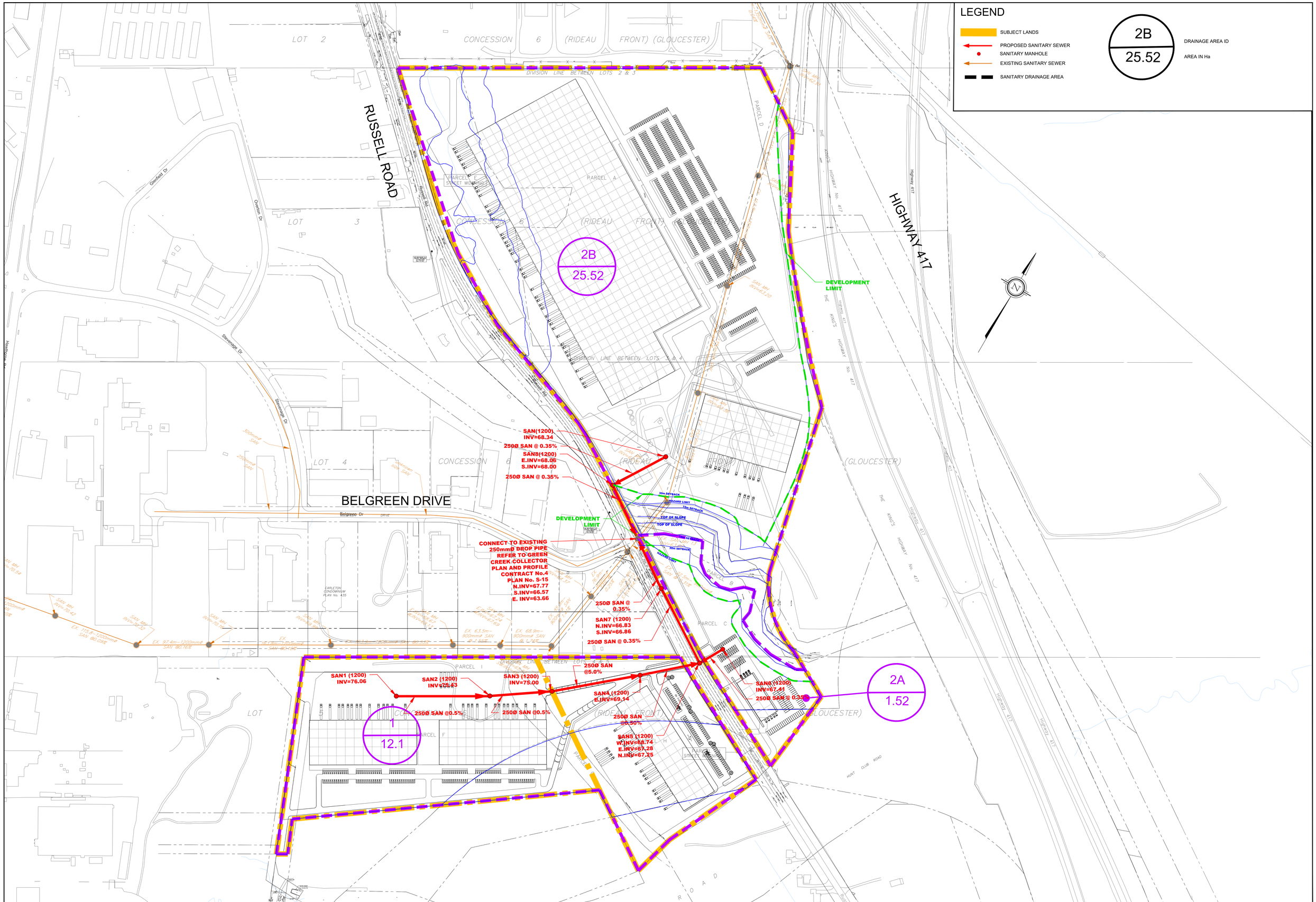
120 Iber Road Unit 103
Stittsville, Ontario, K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

4120 RUSSEL ROAD
WATER SERVICING SKETCH

PROJECT No. :	19-1155
SCALE:	1:2000
DATE:	MARCH 2020
DRAWING No.	FIG 1

z:\projects\19-1155_4120-russell-road\b_design\b2_drawings\b2-2_main (dsel)\spa_sub1\2020-03-24_1155_spa_aas.dwg



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4120 RUSSEL ROAD
SANITARY SERVICING SKETCH

PROJECT No. :	19-1155
SCALE:	1:1500
DATE:	MARCH 2020
DRAWING No.	FIG 1

EXT-3
0.45
0.49

A3-A
24.7
0.21

U
1.5

A3-B
2.34
0.20

A2
7.47
0.20

A1
4.64
0.20

RUSSELL ROAD

BELGREEN DRIVE

HIGHWAY 417

DEVELOPMENT LIMIT

LOT 2 CONCESSION 6 (RIDEAU FRONT) (GLOUCESTER)

LOT 3 CONCESSION 6 (RIDEAU FRONT) (GLOUCESTER)

LOT CONCESSION 6 (RIDEAU FRONT) (GLOUCESTER)

DIVISION LINE BETWEEN LOTS 2 & 3

DIVISION LINE BETWEEN LOTS 3 & 4

DIVISION LINE BETWEEN LOTS 4 & 5

PARCEL A

PARCEL C

PARCEL D

PARCEL E
STREET WIDENING

PARCEL F

PARCEL G
STREET WIDENING

30m SETBACK

HAZARD LIMIT

TOE OF SLOPE

TOP OF SLOPE

CARLETON CONDOMINIUM PLAN No. 435

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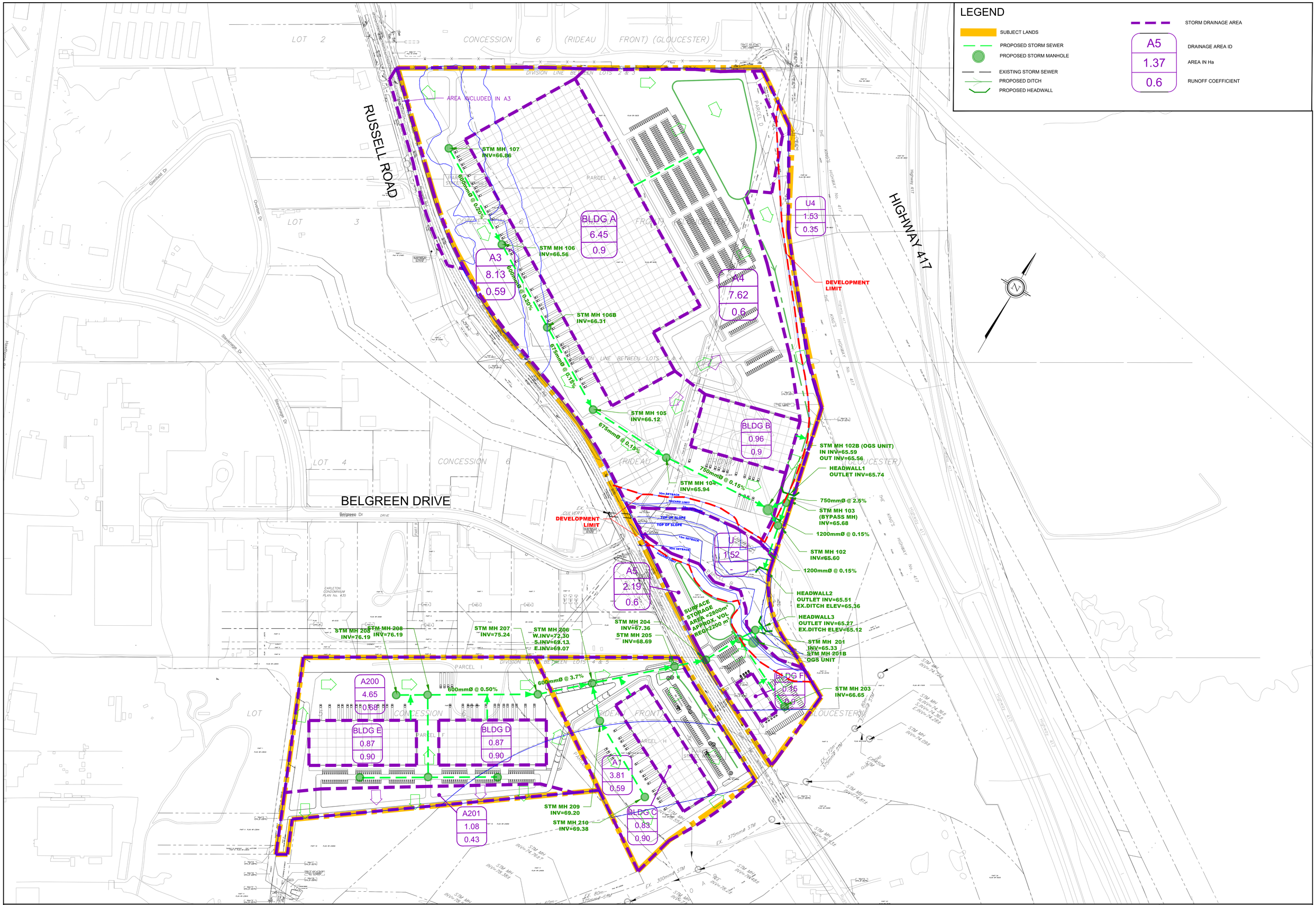
4120 RUSSEL ROAD
PRE-DEVELOPMENT DRAINAGE CHARACTERISTICS

PROJECT No. :	19-1155
SCALE:	1:1500
DATE:	MARCH 2020
DRAWING No.	FIG 1

z:\projects\19-1155_4120-russell-road\b_design\b2_drawings\b2-2_main (dsel)\spa_sub1\2020-03-24_1155_spa_aas.dwg



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4120 RUSSEL ROAD
STORM SERVICING SKETCH

PROJECT No. :	19-1155
SCALE:	1:1500
DATE:	MARCH 2020
DRAWING No.	FIG 1

LEGEND

- SUBJECT LANDS
- PROPOSED DITCH
- PROPOSED GRADE
- 69.55
- 68.60 / 68.60 — PROPOSED TIE-IN TO EXISTING ELEVATION
- PROPOSED MANHOLE
- OVERLAND FLOW ROUTE

RUSSELL ROAD

BELGREEN DRIVE

HIGHWAY 417

DEVELOPMENT LIMIT

FFE = 70.50

FFE = 69.60

FFE = 79.50

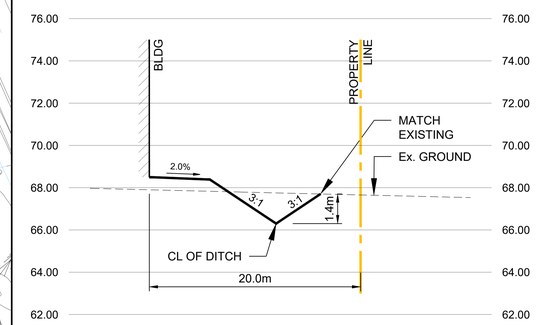
FFE = 79.20

FFE = 70.00

FFE = 72.10

SECTION A-A

SCALE H1:200, V1:100



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4120 RUSSEL ROAD
PRELIMINARY GRADING

PROJECT No. :	19-1155
SCALE:	1:1500
DATE:	MARCH 2020
DRAWING No.	FIG 1

HIGHWAY 417

HIGHWAY 417

HUNT CLUB ROAD

RUSSELL ROAD

BELGREEN DRIVE

STEVENAGE DRIVE

CREEK

BH 1
69.48
(62.60)

BH 2
69.43
(62.52)

BH 3
71.57
(66.69)

BH 4
67.49
(64.37)

BH 5
68.91
(64.85)

BH 6
70.60
(68.31)

BH 7
71.39
(67.86)

BH 8
68.59
(64.83)

BH 9
70.95

BH 10
70.69
(60.45)

BH 11
66.78
(62.87)

BH 12
70.67
(63.35)

BH 13
70.20
(65.63)

BH 14
79.45

BH 15
79.23
(72.98)

BH 16
78.64
(74.73)

PERMISSIBLE GRADE RAISES:

- UP TO 1.0m
- UP TO 1.5m
- UP TO 2.0m
- UP TO 2.5m
- UP TO 3.0m

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 69.48 GROUND SURFACE ELEVATION (m)
- (62.60) PRACTICAL REFUSAL TO AUGERING / DCPT ELEVATION (m)

BOREHOLE LOCATIONS AND GROUND SURFACE ELEVATIONS WERE PROVIDED BY ANNIS, O'SULLIVAN, VOLLEBELL LTD AND ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:750

0 10 20 30 50m

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL

AVENUE 31 CAPITAL INC.

PRELIMINARY GEOTECHNICAL INVESTIGATION
4055 AND 4120 RUSSELL ROAD

OTTAWA, ONTARIO

Title:

PRELIMINARY PERMISSIBLE GRADE RAISE PLAN

Scale: 1:750	Date: 10/2019
Drawn by: MPG	Report No.: PG4854-1
Checked by: SD	Dwg. No.: PG4854-2
Approved by: DJG	Revision No.:

11x17

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