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DESIGN BRIEF

FOR

BARRHAVEN CONSERVANCY DEVELOPMENT CORPORATION

PROPOSED RESIDENTIAL SITE PLAN

CONSERVANCY STACKED TOWNS

CITY OF OTTAWA

PROJECT NO.: 24-1398

JANUARY 2025

DESIGN BRIEF
FOR
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CITY OF OTTAWA
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1.0 INTRODUCTION

David Schaeffer Engineering Limited (DSEL) has been retained to prepare a Design Brief in support of a site plan application for the stacked townhouse condo block within Barrhaven Conservancy East on behalf of the Barrhaven Conservancy Development Corporation (BCDC).

The overall Conservancy land area is approximately 139.7 ha (all land use components) and is located within the City of Ottawa urban boundary in the Barrhaven ward. The Conservancy East development area has previously had detailed design prepared and approved with initial phases of servicing/homebuilding currently under construction. The subject site plan block is within Phase 3 of the Conservancy East lands and is bound by the proposed townhomes fronting Les Emmerson (N) to the north, Les Emmerson (N) to the west, Conservancy Drive to the south, and Mineral Street to the east. The site plan block design (Q4 Architects Inc., December 2024) is provided in **Appendix A**.

The objective of this report is to provide sufficient detail with respect to the availability of site services to support the application of site plan control.

1.1 Existing Conditions

The ***Conservancy East*** lands containing the site plan block are relatively flat with the existing elevations ranging from 91.9 m in the north to 91 m in the south. All existing flows are either overland to the Jock River or conveyed to the Jock River by way of the Fraser-Clarke Watercourse (and its tributaries) and Borrisokane Road ditches which run through the subject property. The property is within the Jock River watershed and is under the jurisdiction of the RVCA.

1.2 Site Plan Layout

The proposed project consists of 10 blocks of stacked dwellings, above ground parking, walkways, and amenity space. See proposed site plan in **Appendix A**.

The predicted populations currently associated with the development concept are described in the following table below.

Table 1: Development Statistics for BCDC East Condo Site Plan

Land Use	Total Area (ha)	Projected Residential Units	Residential Population per Unit *	Projected Population
Stacked Townhouses	0.48	196	2.3	451
Parkette/Amenity	0.36			
Roads/parking/walkways	0.92			
Total	**1.76**	**196**		**451**

** NOTE: Population projections may differ from population estimates used in background Transportation Studies, Planning Rationale, and other studies.*

1.3 Consultation Summary

Consultation with the with City of Ottawa Planning and Engineering Staff was initiated in July 2024 for the Conservancy East Stacked Condo block to review City Standards, submission requirements, and the availability of background information. The subject Site Plan was contemplated in the servicing of the Conservancy East Phase 3 & 4 subdivision area.

1.4 Required Permits / Approvals

The City of Ottawa must approve detailed engineering design drawings and reports prior to construction of the proposed infrastructure identified in this report.

The following additional approvals and permits listed in **Table 2** are expected to be required prior to construction of the municipal infrastructure detailed herein. Other permits and approvals may be required, as detailed in the other studies submitted as part of the Planning Act applications (e.g. *Tree Conservation Report, Phase 1 Environmental Site Assessment, etc*.).

Table 2: Potential Required Permits/Approvals

Agency	Permit/Approval Required	Trigger	Remarks
MECP / City of Ottawa	Environmental Compliance Approval	Construction of new sanitary & storm sewers.	MECP is expected to review the stormwater collection system and wastewater collection system by transfer of review.

MECP	Permit to Take Water	Construction of proposed land uses (e.g. basements for residential homes) and services.	Pumping of groundwater will be required during construction, given groundwater conditions and proposed land uses/ municipal infrastructure.
City of Ottawa	MOE Form 1 – Record of Watermains Authorized as a Future Alteration	Construction of watermains.	The City of Ottawa is expected to review the watermains on behalf of the MECP.

2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

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

- **Ottawa Sewer Design Guidelines,**
  City of Ottawa, *SDG002,* October 2012.
  (City Standards)

  - **Technical Bulletin ISDTB-2014-01, Revisions to Ottawa Design Guidelines – Sewer,**
    City of Ottawa, February 5, 2014.
    (*ISDTB-2014-01*)

  - **Technical Bulletin PIEDTB-2016-01, Revisions to Ottawa Design Guidelines – Sewer,**
    City of Ottawa, September 6, 2016.
    (*PIEDTB-2016-01*)

  - **Technical Bulletin ISTB-2018-01, Revisions to Ottawa Design Guidelines – Sewer,**
    City of Ottawa, March 21, 2018.
    (*ISTB-2018-01*)

  - **Technical Bulletin ISTB-2018-03, Revisions to Ottawa Design Guidelines – Sewer,**
    City of Ottawa, June, 2018.
    (*ISTB-2018-04*)

  - **Technical Bulletin ISTB-2019-02, Revisions to Ottawa Design Guidelines – Sewer,**
    City of Ottawa, July 8, 2019.
    (*ISTB-2019-02*)

  - **Technical Bulletin IWSTB-2024-04, Screening Criteria – Infiltration-type LIDs for Development,**
    City of Ottawa, September 12, 2024.

- **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 ISTB-2018-02 City of Ottawa, March 21, 2018. *(*ISTB-2018-02*)***
- **Technical Bulletin ISTB-2021-03 City of Ottawa, August 18, 2021 *(ISTB-2021-03)***
- **Technical Bulletin IWSTB-2024-05 City of Ottawa, November 18, 2024 *(IWSTB-2024-05)***

- **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)***
- **Mississippi-Rideau Source Water Protection Plan, MVCA & RVCA, August 2014.**
- **Erosion & Sediment Control Guidelines for Urban Construction, Greater Golden Horseshoe Area Conservation Authorities, December 2006.**
- **Hydraulic Potable Water Assessment for Barrhaven Conservancy Development Corporation**
  Stantec, March 2021
  (Stantec Hydraulic Analysis)
- **Jock River Reach One Subwatershed Study**
  Stantec, 2007
  (Jock River SWS)
- **Geotechnical Investigation, Proposed Residential Development, Conservancy Lands East, Ottawa, Ontario**
  Paterson Group, September 24, 2019 (Project No. PG5036-1)
  (Geotechnical Report)
- **Barrhaven Conservancy East (Phases 2, 3, 4 & Jock River): Water Distribution System Analysis**
  Stantec, June 2, 2022
  (Stantec Hydraulic Analysis - East)

- **Adequacy of Services Report for Barrhaven Conservancy Development Corporation, Barrhaven Conservancy East**
  David Schaeffer Engineering Ltd., July 2021
  (DSEL East FSR)

- **Design Brief for Barrhaven Conservancy East – Phase 2, 3, & Jock River**
  David Schaeffer Engineering Ltd., June 2022

- **Barrhaven Conservancy East Site Plan (Conservancy Stacked Towns) – Stormwater Analysis**
  JFSA, January 2025
  (JFSA SWM Analysis)

- **Caivan Barrhaven Conservancy East Development – Phase 3.1 and 4 Detailed Design**
  Stantec, October 29, 2024
  (Stantec Hydraulic Analysis Update - Memo)

- **Design Brief for Barrhaven Conservancy East – Phase 3**
  David Schaeffer Engineering Ltd., January 2025
  (DSEL East Design Brief)

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The Conservancy East lands are located adjacent to the City of Ottawa's Pressure Zone (PZ) 3SW (previously known as PZ BARR). PZ SUC services the lands that are east of the subject property, as well as south of the Jock River.

An extension of the watermain network is proposed within the Conservancy East Subdivision, which will also provide a feed for the subject site plan block. The watermains for the subdivision were designed in conjunction with the **Stantec Hydraulic Analysis - East** and the **Stantec Hydraulic Analysis Update - Memo** prepared by Stantec included in **Appendix B**.

3.2 Water Supply Servicing Design

As shown in the **General Plan**, water servicing will be provided internal to the site via 200mm and 150mm watermains that will be looped within the site plan block and connect to the 200mm diameter watermain on Mineral Street and Les Emmerson (N). Units 1-4 within Blocks 1 and 9 will be serviced via 50mm copper watermains fed from the 150mm watermain off Private Street 6 and 4, respectively. The subject lands will be metered at the connections to Les Emerson Drive (N) and Mineral Street, and all mains contained within are private.

The **Stantec Hydraulic Analysis - East** and for the broader subdivision previously estimated the required fire flow at 217 L/s (13,000 L/min). The City of Ottawa's recent Technical Bulletin (IWSTB-2024-05) states that the requirement for levels of fire protection on private property in urban areas is covered in Section A-3.2.5.7 of the OBC and as such a fire flow requirement of 6,300 L/min was determined for the subject site plan blocks. At the time of publishing this design brief, Stantec has not received the boundary conditions from the City and will update the hydraulic model once received. An update from Stantec will be provided under separate cover to demonstrate conformance with City guidelines.

Table 3: Water Supply Design Criteria

Design Parameter	Value
Extracted from Section 4: Ottawa Design Guidelines, Water Distribution (July 2010)	
Residential – Detached Single	2.3 p/unit
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 480kPa
During fire flow operating pressure must not drop below	140 kPa
Stantec Hydraulic Analysis, Stantec, June 2022 for Population Exceeding 3000 Persons	
Residential – SFH, MLT	280 L/cap/day
Residential – Average Day Demand	Population x Demand
Residential – Max Day Demand	AVDY x 2.5
Residential – Peak Hour Demand	MXDY x 2.2

Fire Flow Requirement	13,000 L/min

Table 4 summarizes the estimated water supply demands seen in **Appendix B** for the proposed site plan based on the **Water Supply Guidelines**. Fire flows were estimated for the most constrained blocks within the site plan and yielded a required fire flow of 6,300 L/min.

Table 4: Water Demand Proposed Conditions

Design Parameter	Estimated Demand[1] (L/min)	Boundary Condition (m H_2O / kPa)
Average Daily Demand	103.2	
Max Day + Fire Flow	257.4 + 6,300= 6557.4	
Peak Hour	565.8	

1) Water demand calculation per ***Water Supply Guidelines***. See ***Appendix B*** for detailed calculations.

3.3 Water Supply Conclusion

The site plan blocks will be serviced internally and ultimately be looped back to the subdivision. The system has been reviewed for required domestic demand and fire flows and meets all necessary requirements.

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The subject site was considered in the design of the Barrhaven Conservancy East Subdivision and will drain to the the existing SNC sanitary sewer which serves as the ultimate outlet for the overall development. Please refer to the **Sanitary Drainage Plan** prepared by DSEL, included in **Appendix C**.

4.2 Wastewater Design

The site plan blocks fronting the Les Emmerson Drive (N), Conservancy Drive, and Mineral Street will connect directly to the sanitary sewers within the public ROW with one lateral servicing two units (upper and lower). The internal sanitary sewer layout within the site plan will consist of a 200mm PVC sanitary sewer that will follow Lane 1, connecting to Les Emmerson (MH17A) at the west and Mineral Street (MH46A) at the east. Internally, one lateral will service two units (upper and lower).

The site was originally assumed to have a population of 470 during the subdivision design. However, the estimated population of the proposed subdivision is now lower (451 persons) given updates to the proposed number of units, and as such total flows to the existing SNC sanitary sewer will be marginally reduced.

Table 5 below summarizes the design standards used in the development of the proposed wastewater sewer system for the Barrhaven Conservancy East Subdivision. The sanitary calculation sheets have been updated to reflect the revised population and are included in **Appendix C**.

Table 5: Wastewater Design Criteria

Design Parameter	Value
Current Design Guidelines	
Residential – Stacked TH Condo	2.3 p/unit
Average Daily Demand	280 L/d/person
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0
Commercial / Institutional Flows	28,000 L/ha/day
Commercial / Institutional Peak Factor	1.5
Infiltration and Inflow Allowance	0.33 L/s/ha
Park Flows	28,000 L/ha/d
Park Peaking Factor	1.0
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} A R^{2/3} S^{1/2}$
Minimum Sewer Size	200mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012, and associated Technical Bulletins.	

4.3 Wastewater Servicing Conclusions

The subject property will be serviced by local sanitary sewers which will outlet to the existing infrastructure. The subject site has been contemplated in the downstream sewers. Sufficient capacity exists to support the development.

5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Services

As discussed in the **Serviceability in Support of Draft Plan Updates Memo (DSEL, 2024)**, the development of the site plan block was considered in the functional subdivision design.

5.2 Stormwater Management Design and Objectives

The Barrhaven Conservancy East Subdivision Phase 3 & 4 functional design made the following assumptions regarding the proposed site plan block:

- The site plan block has a drainage area of approximately 1.76 hectares with 81% imperviousness.
- As modeled in the **April 2024 Preliminary HGL Analysis (Phase 3 & 4 FSR Submission)**, the site plan block shows a drainage split where the minor system is serviced by MH704 at Les Emmerson Drive (N) and by MH507 on Mineral Street. All flows are ultimately conveyed to the downstream OGS units (OGS 5, 6 and 7), with no on-site storage considered.
- The excess major system flows were anticipated to drain east and west overland to Les Emmerson Drive (N) and Mineral Street and subsequently to the Jock River.
- Quality and erosion control treatment for the site plan block is considered in the design of the treatment train approach.
- The 100-year Chicago 3 Hour Event & 5-year Jock River Water Level results in a Hydraulic Grade Line (HGL) as reported in *Table 3* of the **JFSA SWM Analysis** in **Appendix D**.

On-site storm flows will be captured by local CB infrastructure and allocated to infiltration chambers within the parking areas. **Table 6** below summarizes the design standards used for the proposed on-site storm sewer system. Storm calculation sheets for the subject property have been appended to this technical brief in **Appendix D**.

Table 6: Storm Sewer Design Criteria

Design Parameter	Value
Minor System Design Return Period	1:2 year (PIEDTB-2016-01) for private roads, without ponding
Major System Design Return Period	1:100 year
Intensity Duration Frequency Curve (IDF) 2-year storm event: A=732.951 | B=6.199 | C=0.810 5-year storm event: A = 998.071 | B = 6.053 | C = 0.814	$i = \frac{A}{(t_c + B)^C}$
Minimum Time of Concentration	10 minutes
Rational Method	$Q = CiA$
Storm sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} A R^{2/3} S^{1/2}$

Runoff coefficient for paved and roof areas	0.9
Runoff coefficient for landscaped areas	0.2
Minimum Sewer Size	250 mm diameter
Minimum Manning's 'n' for pipe flow	0.013
Minimum Depth of Cover	1.5 m from crown of sewer to grade
Minimum Full Flowing Velocity	0.8 m/s
Maximum Full Flowing Velocity	6.0 m/s
Clearance from 100-Year Hydraulic Grade Line to Building Opening	0.30 m
Design Parameter	**Value**
Max. Allowable Flow Depth on Municipal Roads	35 cm above gutter (PIEDTB-2016-01)
Extent of Major System	To be contained within the private road and parking areas or adjacent to the ROW provided that the water level must not touch any part of the building envelope and must remain below the lowest building opening during the stress test event (100-year + 20%) and 15cm vertical clearance is maintained between spill elevation on the street and the ground elevation at the nearest building envelope (PIEDTB-2016-01)
Stormwater Management Model	PCSWMM (version 7.4) – See JFSA report File No. 1474(03) in Appx D
Model Parameters	Fo = 76.2 mm/hr, Fc = 13.2 mm/hr, DCAY = 4.14/hr, D.Stor.Imp. = 1.57 mm, D.Stor.Per. = 4.67 mm
Imperviousness	Based on runoff coefficient (C) where Percent Imperviousness = (C - 0.2) / 0.7 x 100%.
Design Storms	Chicago 3-hour Design Storms and 24-hour SCS Type II Design Storms. Maximum intensity averaged over 10 minutes.
Historical Events	July 1st, 1979, August 4th, 1988 and August 8th, 1996
Climate Change Street Test	20% increase in the 100-year, 3-hour Chicago storm
Extracted from City of Ottawa Sewer Design Guidelines, October 2012, and ISSU, and based on recent residential subdivisions in City of Ottawa.	

5.3 Hydraulic Grade Line Analysis

A detailed hydraulic grade line (HGL) modelling analysis has been completed for the proposed system based on the 100-year 3-hour Chicago and 24-hour SCS design storms, including

historical design storms and climate change stress test as required. The HGL and freeboard clearances are tabled in **Appendix D** for reference.

5.4 Major System Design

Major system conveyance, or overland flow (OLF), is provided to accommodate flows in excess of the minor system capacity. OLF is accommodated by generally storing stormwater up to the 100-year design event in road sags then routing additional surface flow along the road network and rear yards storm retention tank between Lane 1 and Private Street 4 & 6, as shown in the *Storm Drainage Plans*.

5.5 Grading and Drainage Design

The following additional grading criteria and guidelines are applied to detailed design, per City of **Ottawa Guidelines** and standard industry practices:

- Slope in grassed areas will be between 2% and 7%;
- Grades in excess of 7% will require terracing to a maximum of a 3:1 slope;
- Swales are to be 0.15m deep with 3:1 side slopes unless otherwise indicated on the drawings; and,
- Perforated pipe will be required for drainage swales if they are less than 1.5% in slope;
- Grades within the roads and parking stalls are limited to min 1% and max 5%.

Drawing 9 illustrates the proposed detailed grading. External areas north of the development will be captured by the proposed system in the interim condition. It is expected that once those parcels are developed, stormwater will be attenuated on-site and directed toward Mineral Street and Les Emmerson Drive (N) per City Standards. Where required, External lands to the east will be conveyed around the development in a cut of swale.

5.6 Quality Controls

The subject lands are required to provide quality controls prior to directing stormwater to the municipal sewers and ultimately the Jock River. Quality control is provided through a treatment train system including CB Shields, deep sump catch basins, and infiltration chambers. The treatment train system is tributary to a downstream Oil Grit Separator sized with consideration for the subjection lands.

DSEL reviewed tributary areas and associated percent imperviousness to the receiving OGS units (OGS 5, 6 and 7). **Appendix D** contains an overall figure illustrating tributary areas and corresponding OGS sizing.

It is proposed to provide infiltration through ADS Stormtech Chambers at strategic locations throughout the site. **Appendix D** contains preliminary layouts provided by the manufacturer which have been incorporate into the design plans.

Appendix D contains detailed description and calculations demonstrating that 80% TSS removal will be achieved through the treatment train system.

5.7 Stormwater Servicing Conclusions

The SWM design for the site plan block assumes that all flow is directed to the Jock River, with on-site infiltration, deep sump catchbasins, and CB shields in conformance with the overall development treatment train approach for water quality control.

6.0 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 construction, erosion and sediment controls will be implemented and will be maintained throughout construction.

Silt fencing will be installed around the perimeter of the active part of the site (and headwater features) and will be cleaned and maintained throughout construction. The 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.

A mud mat will be installed at the construction access to prevent mud tracking onto adjacent roads.

The following additional 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 entering any existing ditches.
- No refueling or cleaning of equipment near existing watercourses.
- Provide sediment traps and basins during dewatering.

The Contractor will be required to complete regular 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.

7.0 CONCLUSION AND RECOMMENDATIONS

David Schaeffer Engineering Ltd. (DSEL) has been retained by BCDC to prepare a Design Brief in support of their application for site plan control. The preceding report outlines the following:

- Water – surrounding water main infrastructure within the Conservancy East Subdivision is available to support the subject lands. Sufficient pressure is available within the City's desired pressure range.
- Wastewater – Sanitary sewers within the development have been proposed or are under construction. The sanitary sewer network will be available and have capacity to support the site plan block.
- Stormwater – Storm servicing was previously considered in the design of the receiving sewers and downstream OGS units. The subject property consists of a series of gravity sewers servicing the landscape and parking lot areas. Runoff from the development will be treated by CB shields, deep sump CBs, infiltration chambers, and OGS units prior to outletting to the Jock River.

The submitted materials demonstrate that the water, sanitary, and storm services currently proposed and/ or under construction can accommodate the contemplated development.

Prepared by,
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Per: Peter Mott, P.Eng.

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APPENDIX A

SITE AREA	17,615.32 m² (1.76 ha)
PAVED AREA	5874m² (33.34%)
LANDSCAPED AREA	7057.08 m² (40.06%)
TOTAL BUILDING COVERAGE	4684.2325 m² (26.592%)
TOTAL GROSS FLOOR AREA	17,617.5428 m²
DENSITY (UPH)	111 UPH
ZONE CATEGORY	R4(2)

DWELLING BLOCK	DWELLING TYPE	GROSS FLOOR AREA (m²)	UNITS
BLOCKS 8 - 10	24 UNITS STACKED DWELLING		48
BLOCKS 4 - 5 - 6 - 7 - 9	20 UNITS STACKED DWELLING		100
BLOCKS 1 - 2 - 3	16 UNITS STACKED DWELLING		48
	TOTAL UNITS		196

ZONE PROVISION - PLANNED UNIT DEVELOPMENT		REQUIRED	PROPOSED
162A(2)	Min. Lot Area (m2)	[illegible] ツ	[illegible] ツ
162A(2)	Min. Lot Width (m)	18	223.9
162A(2)	Min. Front Yard Setback (m)	3	>3.4
162B.6	Min. Rear yard setback (m)	6	4.5
162B(2)	Min. Comerside setback	3	3
162A(2)	Max Building Height (m	15	13.5
161	Landscaped Area	30%	39%
131.1	Min. Width of Private Way / Parking Aisle (m)	6	6.1
131.4a	Min. Setback for Any Wall of a Residential Buildings Within a Planned Unit Development	1.2	5
131.2	Min. setback for any wall of a residential use building to a private way	1.8	>4.5
137	**AMENITY AREA**		
137.6	Total min. amenity area (6m² per unit)	[illegible] ツ	[illegible] ツ
137.6	A[illegible] ツ	[illegible] ツ	[illegible] ツ
55	**PERMITTED PROJECTION INTO REQUIRED YARDS**		
55.5.i	Fire escapes, Open Stairways, Stoop (m)	>0.6m to lot line	0.5 m
65.6.a(i)	Covered or Uncovered Balcony, Porch and Deck	2m no closer than 1 to a lot line	2m no closer than 1.74 to a lot line

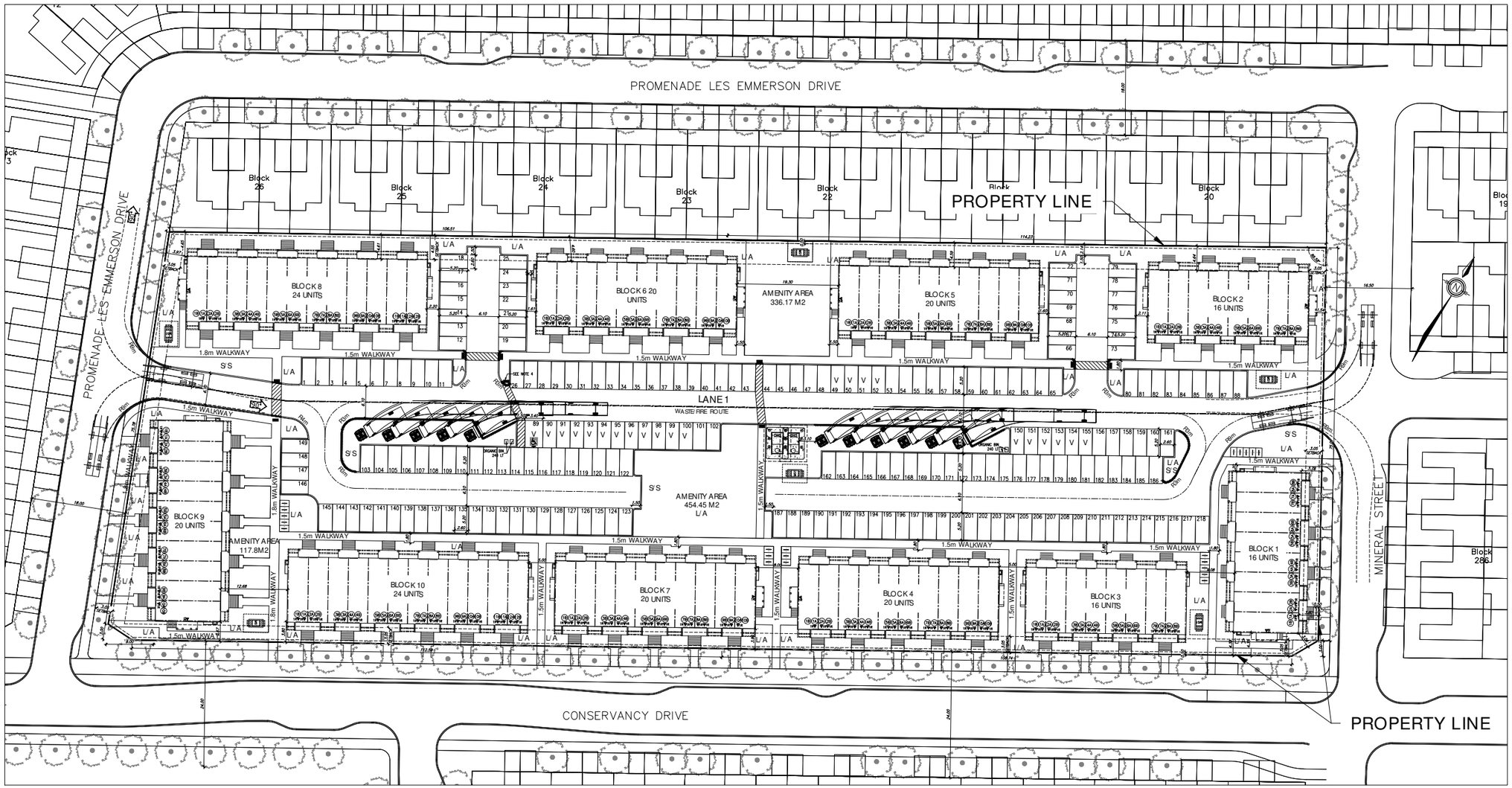
	PARKING REQUIREMENTS	REQUIRED	PROPOSED
101 (Table R10)	Resident Parking - 1.2 spaces/unit	235	196 (1.0)
102 (Table column III)	Visitor Parking - 0.2 spaces/unit	39	22 (0.11)
106.1	Min. Perpendicular Parking Space Size (m)	2.6 x 5.2	2.6 x 5.2
107 (Table 107.d)	Min. Requires Aisle Width	6.0	6.1
	BARRIER FREE PARKING		
Traffic and Parking Bylaw Section 111	Min. Barrier Free Parking **	1	1
111	**BICYCLE STORAGE**		
111B	Min. bicycle parking space dimension, horizontal (m).	Width: 0.6m Length: 1.8m	0.6 1.8
111A(b)	Min. Bicycle parking space accessaisle Width (m)	1.5	1.5
111.11	Min. Bicycle Parking 0.5 spaces/unit	98	100
110(a)(b)	**LANDSCAPE AREA SURROUNDING PARKING LOT**		
110.a	Abutting a Street (m)	3	>16m
110.b	Not Abutting a street (m)	3	>3m
110.1.b	Min. % of parking lot landscape	15%	>19%
110	**REFUSE COLLECTION AREAS**		
110.3b	Min. Waste collection setback to lot line	3	>30m
110.3.c/d	Opaque Screen Min. Height (m)	2	2***

**Per the 2015 Guide Accessibility Design Standards - Section 3.1 Design of Public Parking 4% of parking spaces provided for public use must be accessible. 1 of the provided 21 visitor spaces have been designed to be barrier-free. 1 Type A size provided.
***Section 110(3)(d) where an in-ground refuse container is provide, the screening requirement of Section (3)(c) above may be achieved with soft landscaping (Bylaw 2020-289)

GARBAGE:

REQUESTED BY ZONING:	PH X		
GARBAGE: 0.231 CUBIC YARD / UNIT	0.231 X 196= 45.27 CUBIC YARD (6.5 CU.YD./BIN)	= 7 BINS	PROPOSED: 8 BINS
RECYCLING (GMP) 0.018 CUBIC YARD / UNIT	0.018 X 196 = 0.54 CUBIC YARDS (6.5 CU.YD./BIN)	= 1 BIN	PROPOSED: 1 BINS
RECYCLING (FIBRE) 0.062 CUBIC YARD / UNIT	0.062 X 196 = 12.15 CUBIC YARDS (6.5 CU.YD./BIN)	= 2 BINS	PROPOSED: 2 BINS
ORGANIC 240L PER 50 UNITS	240 L X 3.92 = 940 L (240 L / BIN)	= 4 BINS	PROPOSED: 4 BINS
		TOTAL BINS = 11 BINS	TOTAL PROPOSED: 15 BINS

SITE PLAN NOTES
1. DO NOT SCALE DRAWINGS FOR PRINT.
2. THIS DRAWING IS THE EXCLUSIVE PROPERTY OF Q4 ARCHITECTS AND CAIVAN . COPYRIGHT RESERVED.
3. WALKWAYS AND CURBS TO BE TIED INTO PUBLIC ROW WHERE APPLICABLE.
4. REFERENCE CITY OF OTTAWA T.W.S.I. DETAIL SC7.3



SCALE 1:400 0 5 10 15 20 25 30

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The contractor / builder must verify all dimensions on the job and report any discrepancy to the designer before proceeding with the work.

Drawings are NOT to be scaled. All drawings and specifications are instruments of service and the copyright property of the designer and must be returned upon request.

LEGEND

- STACKED TOWNS
- ENTRANCE
- BALCONY
- PORCH
- PROJECTION (STAIRS)
- PAVERS
- SODDING
- LIGHT DUTY ASPHALT PAVING
- CROSSWALK
- CURB (0.2m)
- DEPRESSED CURB
- TACTILE WALKING SURFACE INDICATOR
- BLOCK BOUNDARY
- WASTE ENCLOSURE FENCE
- WOOD PRIVACY FENCE
- NO PARKING
- BARRIER FREE PARKING
- BARRIER FREE PARKING SIGNAGE
- V VISITOR PARKING
- BIKE RACKS
- EARTH BIN (6.5 yd ³)
- HYDRO TRANSFORMER
- LIGHT POLE
- SS SNOW STORAGE AREA
- L/A LANDSCAPED AREA
- MEDIUM DECIDUOUS TREE*
- SMALL DECIDUOUS TREE*
- DECIDUOUS SHRUB*
- CONIFEROUS SHRUB*
- GRASSES PERENNIALS*

ATTACHED MPLAN, FROM THE SURVEYED PLAN SEPT 13, XREF INTO DRAWING
*TREES AND SHRUB LOCATIONS TO BE CONFIRMED ON LANDSCAPE PLAN

12	ADDITIONAL COMMENT-ISSUED TO CLIENT	2024.12.10
11	NEW LAYOUT-ISSUED TO CLIENT	2024.11.27
10	ADDITIONAL COMMENTS-ISSUED TO CLIENT	2024.08.27
9	ADDITIONAL COMMENTS-ISSUED TO CLIENT	2024.08.26
8	ADDITIONAL COMMENTS-ISSUED TO CLIENT	2024.08.16
7	ADDITIONAL COMMENTS-ISSUED TO CLIENT	2024.08.06
6	ADDITIONAL SITE STATS-ISSUED TO CLIENT	2024.07.25
5	REVISED AS PER CITY AND CLIENT COMMENTS	2024.07.17
4	REVISED GARBAGE LAYOUT	2024.07.16
3	SP1-2 AFTER CITY'S COMMENTS	2024.07.15
2	ADD HYDRO TRANSFORMER	2024.07.05
1	Q4A SP1	2024.06.27

Issued / Revision Chart

Project Title

CONSERVANCY STACKED TOWNS

Location: 3285 Borrisokane Rd OTTAWA, ON.

Plan No. 18754 and File No. D07-12-24-0097

Legal Name: Part of Lot 14, Concession 3 (Rideau Front), Geographic Township of Nepean Part of PIN 04595-4929 (LT)

Client: CAIVAN

Project No.

Scale: 1:500

Drawn By: CT

Checked By: CT

OVERALL SITE PLAN

SP1

David Schaeffer Engineering Ltd.
120 Iber Road, Suite 103
Stittsville, ON K2S 1E9
613-836-0856
dsel.ca

APPENDIX B

Caivan
BCDC Site Plan
Required Fire Flow

Required Fire Flow per IWSTB-2024-05 (OBC A-3.2.5.7)
Block 10

$Q = K\ V\ S_{tot}$

Where,

Q	201,272	minimum supply of water in litres
K	18	water supply coefficient from Table 1
V	7,454.50	total building volume in cubic metres
S_{tot}	1.50	total spacial coefficient from property line exposures

Buidling Volume	Area (m^2)	h (m)	V (m^3)
Basement	45.01	3.05	137.3
Ground	42.09	3.4	143.1
2nd floor	44.71	3.4	152.0
3rd floor	46.65	2.47	115.2
Attic	23.74	3.1	73.6

621.2	X	12	7454.50	m^3

units total vol

Required minimum water supply flow rate, L/min

Q (L)		RFF (L/min)	
	108,000	2700	
108,000	135,000	3600	
135,000	162,000	4500	
162,000	190,000	5400	
190,000	270,000	6300	**<---- Required Fire Flow**
270,000		9000	

Spacial Coefficient

	m	S
North	44.7	0.00
South	30.9	0.00
West	12.7	0.00
East	5	0.50

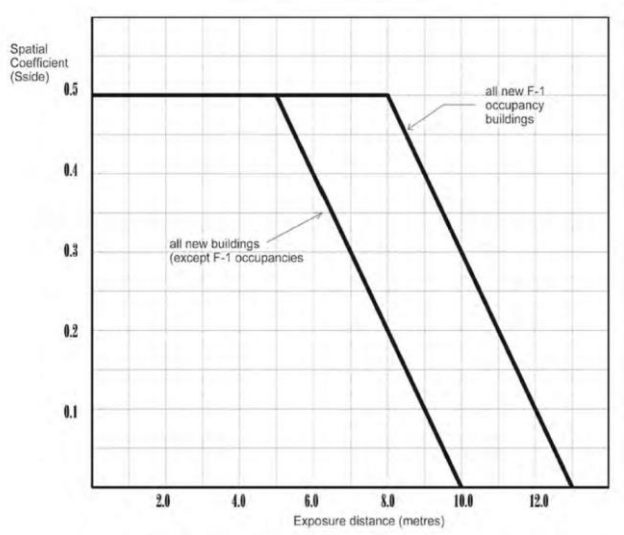


Figure 1
Spatial Coefficient vs Exposure Distance

Caivan
BCDC Site Plan
Required Fire Flow

Required Fire Flow per IWSTB-2024-05 (OBC A-3.2.5.7)
Block 8

$Q = K\ V\ S_{tot}$

Where,

Q	144,916	minimum supply of water in litres
K	18	water supply coefficient from Table 1
V	7,454.50	total building volume in cubic metres
S_{tot}	1.08	total spacial coefficient from property line exposures

Buidling Volume	Area (m^2)	h (m)	V (m^3)
Basement	45.01	3.05	137.3
Ground	42.09	3.4	143.1
2nd floor	44.71	3.4	152.0
3rd floor	46.65	2.47	115.2
Attic	23.74	3.1	73.6

621.2	X	12	7454.50	m^3

units total vol

Required minimum water supply flow rate, L/min

Q (L)		RFF (L/min)	
	108,000	2700	
108,000	135,000	3600	
135,000	162,000	4500	**<---- Required Fire Flow**
162,000	190,000	5400	
190,000	270,000	6300	
270,000		9000	

Spacial Coefficient

	m	S
North	9.2	0.08
South	18.9	0
West	25.1	0
East	20.7	0

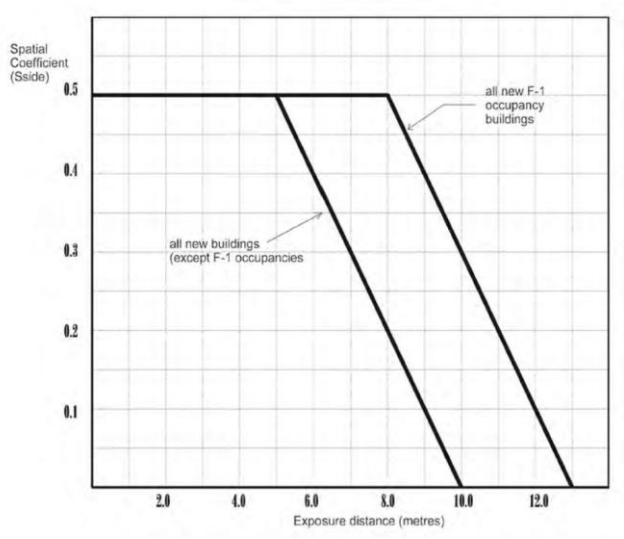


Figure 1
Spatial Coefficient vs Exposure Distance

Caivan
BCDC Site Plan
Required Fire Flow

Required Fire Flow per IWSTB-2024-05 (OBC A-3.2.5.7)
Block 1

$Q = K\ V\ S_{tot}$

Where,

Q	97,505	minimum supply of water in litres
K	18	water supply coefficient from Table 1
V	4,969.67	total building volume in cubic metres
S_{tot}	1.09	total spacial coefficient from property line exposures

Buidling Volume	Area (m^2)	h (m)	V (m^3)
Basement	45.01	3.05	137.3
Ground	42.09	3.4	143.1
2nd floor	44.71	3.4	152.0
3rd floor	46.65	2.47	115.2
Attic	23.74	3.1	73.6

units	total vol			
621.2	X	8	4969.67	m^3

Required minimum water supply flow rate, L/min

Q (L)		RFF (L/min)	
	108,000	2700	**<---- Required Fire Flow**
108,000	135,000	3600	
135,000	162,000	4500	
162,000	190,000	5400	
190,000	270,000	6300	
270,000		9000	

Spacial Coefficient

	m	S
North	25.8	0
South	31.9	0
West	9.1	0.09
East	23.3	0

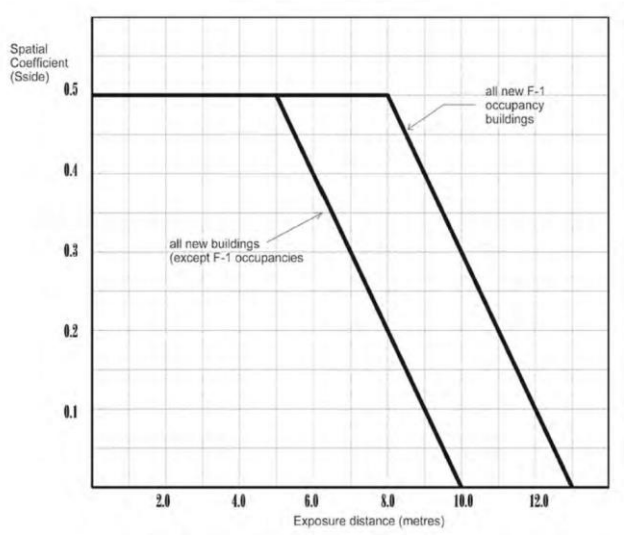
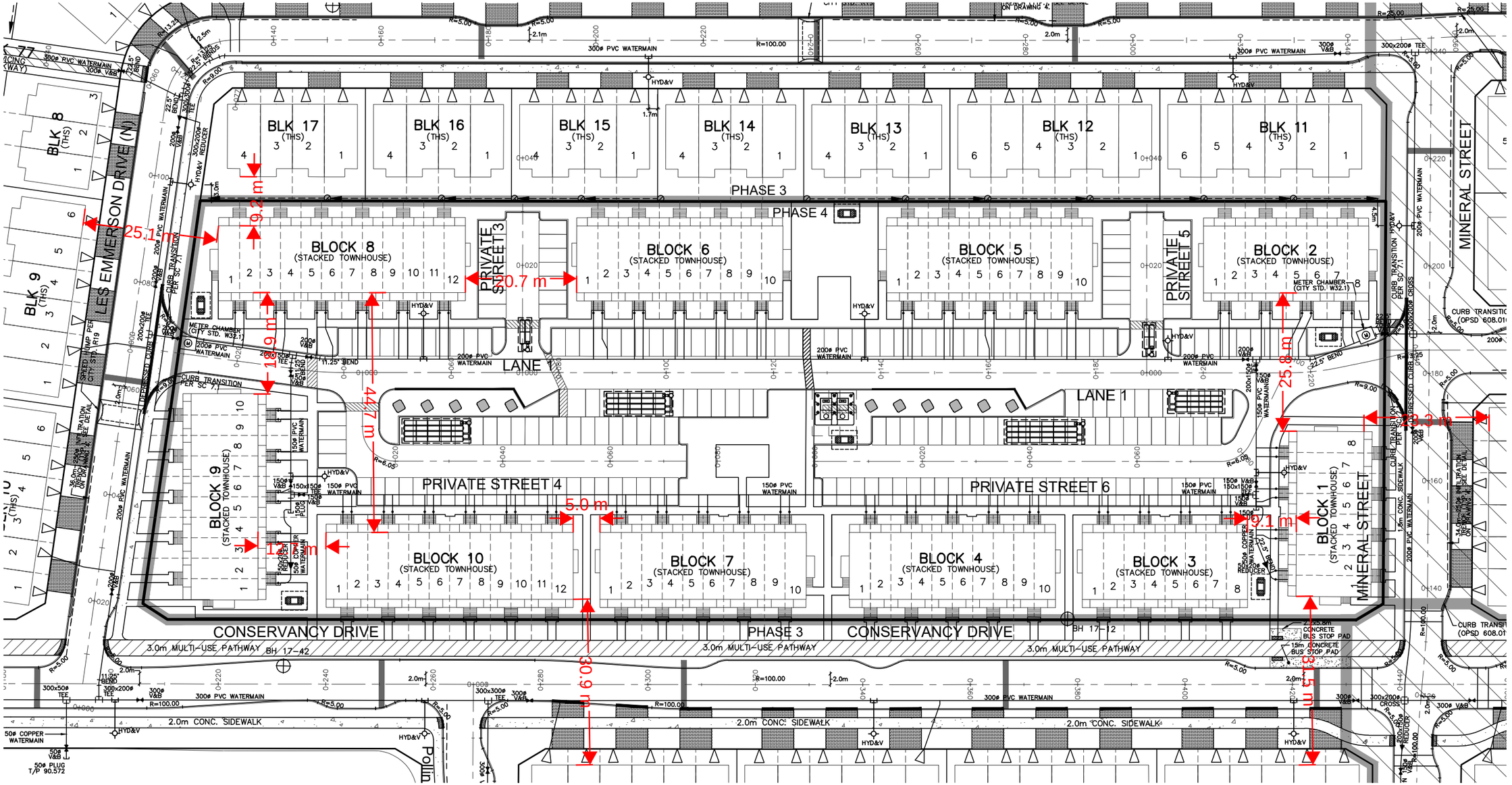


Figure 1
Spatial Coefficient vs Exposure Distance


BLK 17 (THS)
BLK 16 (THS)
BLK 15 (THS)
BLK 14 (THS)
BLK 13 (THS)
BLK 12 (THS)
BLK 11 (THS)
PHASE 3
PHASE 4
BLOCK 8 (STACKED TOWNHOUSE)
BLOCK 6 (STACKED TOWNHOUSE)
BLOCK 5 (STACKED TOWNHOUSE)
BLOCK 2 (STACKED TOWNHOUSE)
BLOCK 9 (STACKED TOWNHOUSE)
BLOCK 10 (STACKED TOWNHOUSE)
BLOCK 7 (STACKED TOWNHOUSE)
BLOCK 4 (STACKED TOWNHOUSE)
BLOCK 3 (STACKED TOWNHOUSE)
BLOCK 1 (STACKED TOWNHOUSE)
LES EMMERSON DRIVE (N)
MINERAL STREET
PRIVATE STREET 3
PRIVATE STREET 4
PRIVATE STREET 5
PRIVATE STREET 6
LANE
LANE 1
CONSERVANCY DRIVE
3.0m MULTI-USE PATHWAY
2.0m CONC. SIDEWALK
300ø PVC WATERMAIN
200ø PVC WATERMAIN
150ø PVC WATERMAIN
HYD&V
METER CHAMBER (CITY STD. W32.1)
CURB TRANSITION PER SC 7.1
25.1 m
9.2 m
10.7 m
44.7 m
5.0 m
10.1 m
30.9 m
25.8 m
9.3 m
15m CONCRETE BUS STOP PAD
BH 17-42
BH 17-12

Stantec

Memo

To:	Marc Pichette Barrhaven Conservancy Development Corporations	From:	Hamidreza Mohabbat / Alexandre Mineault-G Stantec Consulting Ltd.
Project/File:	163401964	Date:	October 29, 2024

Reference: Caivan Barrhaven Conservancy East Development - Phases 3.1 and 4 Detailed Design

1 Overview

Stantec previously completed the Barrhaven Conservancy East Water Distribution System Analysis report in June 2022 in support of David Schaeffer Engineering Limited (DSEL)'s update to their Functional Servicing Report for the subject lands, which at the time included future developments west of Borrisokane Road that have since then been switched to the Barrhaven Conservancy West lands. In addition, Stantec completed a technical memo in June 2024 in support of functional design for the Barrhaven Conservancy East Development Phases 3 and Phase 4 (now Phase 4, and Phases 3.1 and 3.2 respectively), which included phasing changes, as well as revisions to the proposed road layout and unit configurations.

DSEL is currently advancing the detailed design for the Conservancy East Phases 4 and 3.1 as shown in **Figure 1**, which include phasing changes and revised unit configurations. To support DSEL's efforts, Stantec compared the previous concept plan with the latest plan dated September 18, 2024.

This memo summarizes the changes in unit counts, and associated water demands from what was previously considered in Stantec's June 2024 Update and outlines the fire flow requirements for the proposed phases.

1.1 Concept Plan Layout & Phasing Comparison

In addition to the changes to unit counts (discussed in **Section 1.2**), phasing modifications are proposed within the Barrhaven Conservancy East Lands. **Table 1**, compares the phasing considered as part of the June 2024 Study to what is being proposed now. Please refer to the attached concept plans for additional information on phasing boundaries.

Table 1: Phasing Comparison for Barrhaven Conservancy East Lands

June 2024 Update (March 2024 Concept Plan)	September 2024 Update (September 2024 Concept Plan)	Design/Construction Status
Conservancy East Phase 2	Conservancy East Phase 2	Under Construction
Conservancy East Phase 3	Conservancy East Phase 4	Undergoing Detailed Design
Conservancy East Phase 4	Conservancy East Phase 3.1	Undergoing Detailed Design
	Conservancy East Phase 3.2	Future Detailed Design Forthcoming
Jock River Phase 1	Jock River Phase 1	Under Construction

June 2024 Update (March 2024 Concept Plan)	September 2024 Update (September 2024 Concept Plan)	Design/Construction Status
Jock River Phase 2	Jock River Phase 2	Designed and Approved
Jock River Phase 3	Jock River Phase 3	Designed and Approved

As shown in the table above and as depicted in **Figure 1** the current Phase 4 which is a private block currently being designed for site plan approval, was referred to as Phase 3 in the June 2024 update, and the current Phases 3.1 and 3.2 were referred to as Phase 4 in the June 2024 report. Given the changes in the proposed phasing, an interim condition hydraulic assessment for the proposed Conservancy East Phases 3.1 and 4 will be required in order to confirm that the watermain sizing is appropriate to meet previously established design criteria. In addition, fire flow requirements (FFR) and resulting fire flow measures required will need to be confirmed for the proposed phases to ensure that the FFR do not exceed the maximum allowable fire flow.

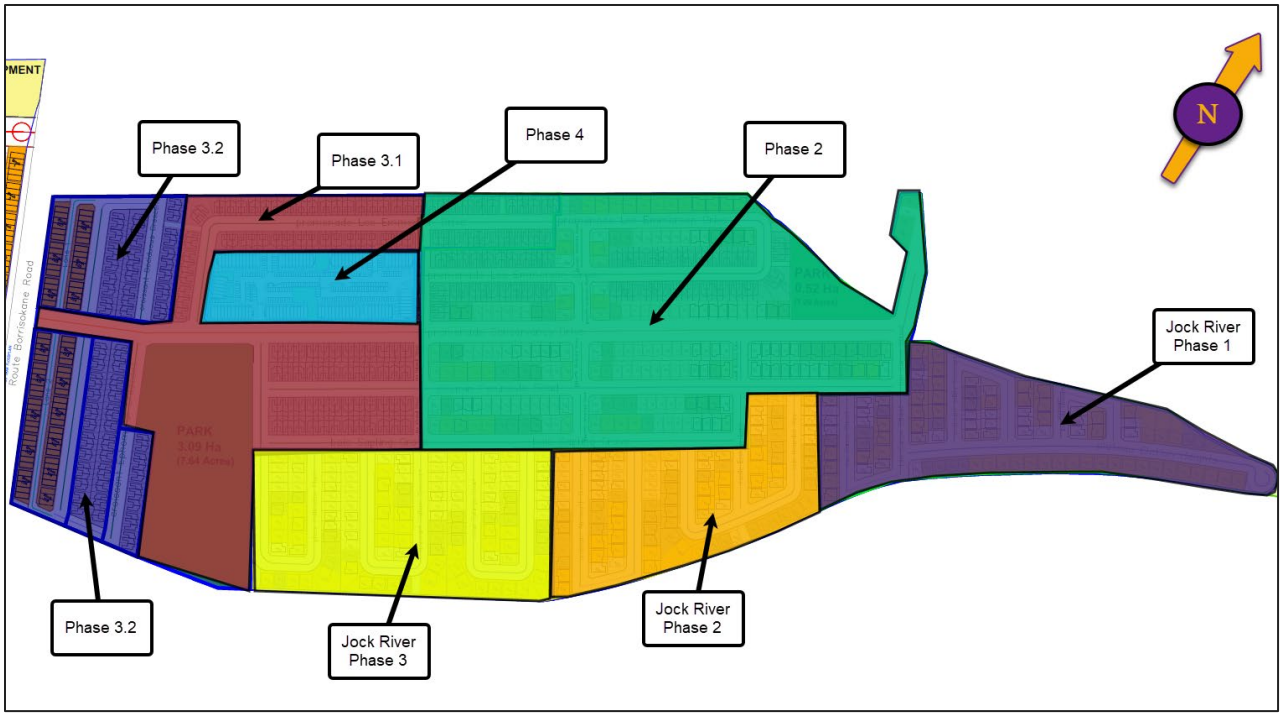


Figure 1: Revised Phasing Boundaries

1.2 Growth Projection Update

The residential population was estimated based on household sizes as per population densities (or persons per unit, PPU) specified in the City's Water Design Guidelines. As part of the June 2024 Study, the total number of units for Barrhaven Conservancy East was estimated to be 1,272 (527 Single Family Homes or SFH and 745 Townhome MTL), with a total residential population of 3,803.

Based on the updated draft plan for Phase 3.1 and site plan for Phase 4, the total number of units for Barrhaven Conservancy East was estimated to be 1,267 (527 SFH, 740 MTL), with a total residential population of 3,790.

Table 2 shows the new estimated number of units per phase of development, and the projected populations based on the distribution of unit types.

Table 2: Estimated Unit Counts and Populations Based on Updated Concept Plan

Phase	Sub-phase	Unit Type	Units	PPU	Population (ppl)
2		Singles	204	3.4	694
		Towns	99	2.7	267
		Phase 2 Sub-total	***303***	***-***	***961***
3	3.1	Singles	0	3.4	0
		Towns	182	2.7	491
		Phase 3.1 Sub-total	***182***	***-***	***491***
	3.2	Singles	0	3.4	0
		Towns	204	2.7	551
		Phase 3.2 Sub-total	***204***	***-***	***551***
		Phase 3 Sub-total	***386***	***-***	***1,042***
4		Singles	0	3.4	0
		Towns	196	2.7	529
		Phase 4 Sub-total	***196***	***-***	***529***
Jock River (JR)	JR1	Singles	105	3.4	357
		Towns	0	2.7	0
		Jock River 1 Sub-total	***105***	***-***	***357***
	JR2	Singles	91	3.4	309
		Towns	0	2.7	0
		Jock River 2 Sub-total	***91***	***-***	***309***
	JR3	Singles	127	3.4	432
		Towns	59	2.7	159
		Jock River 3 Sub-total	***186***	***-***	***591***
		Jock River Phases Sub-total	***382***	***-***	***1,258***
		East Development Grand Total	***1,267***	***-***	***3,790***

1.3 Water Demand Projection Comparison

The City's Water Design Guidelines refer to the MECP Guidelines for consumption rates for buildout population greater than 3,000. The MECP Guidelines provide a consumption rate range of 270 L/cap/day to 450 L/cap/day. The City's Water Design Guidelines consumption rates for subdivisions of 501 to 3,000 persons (i.e., 280 L/cap/day) fall within that range. The demand rates and peaking factors from the Water Design Guidelines and Technical Bulletin ISTB-2021-03 were applied in the June 2024 Study, and the same approach was used for this assessment. The average day (AVDY) demands, maximum day (MXDY)

demands, and peak hour (PKHR) demands were identified as 12.33 L/s, 30.81 L/s, and 67.79 L/s, respectively, for Barrhaven Conservancy East in the June 2024 Study.

The updated buildout population of the proposed development is 3,790, as discussed in **Section 1.2**. The estimated AVDY, MXDY and PKHR demand projections, based on the updated concept plan, are summarized in **Table 3**.

Table 3: Estimated Demand Projects Based on Updated Concept Plan

Phase	Sub-phase	Unit Types	Units	Population (ppl)	AVDY (L/s)	MXDY (L/s)	PKHR (L/s)
2		Singles	204	694	2.25	5.62	12.36
		Towns	99	267	0.87	2.17	4.76
		Phase 2 Sub-total	***303***	***961***	***3.11***	***7.79***	***17.13***
3	3.1	Singles	0	0	0.00	0.00	0.00
		Towns	182	491	1.59	3.98	8.76
		Phase 3 .1 Sub-total	***182***	***491***	***1.59***	***3.98***	***8.76***
	3.2	Singles	0	0	0.00	0.00	0.00
		Towns	204	551	1.79	4.46	9.82
		Phase 3.2 Sub-total	***204***	***551***	***1.79***	***4.46***	***9.82***
		Phase 3 Sub-total	***386***	***1,042***	***3.38***	***8.44***	***18.58***
4		Singles	0	0	0.00	0.00	0.00
		Towns	196	529	1.72	4.29	9.43
		Phase 4 Sub-total	***196***	***529***	***1.72***	***4.29***	***9.43***
Jock River	JR1	Singles	105	357	1.16	2.89	6.36
		Towns	0	0	0.00	0.00	0.00
		Jock River 1 Sub-total	***105***	***357***	***1.16***	***2.89***	***6.36***
	JR2	Singles	91	309	1.00	2.51	5.51
		Towns	0	0	0.00	0.00	0.00
		Jock River 2 Sub-total	***91***	***309***	***1.00***	***2.51***	***5.51***
	JR3	Singles	127	432	1.40	3.50	7.70
		Towns	59	159	0.52	1.29	2.84
		Jock River 3 Sub-total	***186***	***591***	***1.92***	***4.79***	***10.54***
		Jock River Phase Sub-total	***382***	***1,258***	***4.08***	***10.19***	***22.41***
East Development Grand Total			***1,267***	***3,790***	***12.28***	***30.70***	***67.55***

Based on the updated draft plan for Phase 3.1 and site plan for Phase 4, the AVDY, MXDY and PKHR demands decreased by 0.05 L/s, 0.11 L/s and 0.24 L/s, respectively, in comparison to what was established in the June 2024 Study. This change is negligible and will not impact the overall water system distribution results in the ultimate condition.

2 Fire Flow Requirement Analysis

It is important to note that the overall watermain network recommendations are governed by fire flow requirements. As part of the 2022 Study, a maximum required fire flow (RFF) of 216.67 L/s (13,000 L/min) was identified. This RFF was linked to the governing unit design at the time, which consisted of rear-lane townhome blocks. Given the change in proposed unit configuration, detailed FUS calculations are required for the area.

Additionally, from the provisions listed in the City of Ottawa's Technical Bulletin ISDTB-2014-02, if specific conditions listed below are met, the RFF can be capped at 10,000 L/min.

1. The building footprint is less than 600 m^2.
2. The rear unit exposure is at least 10 m.
3. The total number of residential units in a block is less than or equal to 6.

Some residential blocks in Phase 3.1 will meet the conditions outlined above, and as such, the RFF may be capped at 10,000 L/min for such blocks. However, the rear exposure distance is less than 10 m in some instances, and as such, detailed FUS calculations are required. Furthermore, the proposed stacked townhome building blocks in Phase 4 comprise more than six (6) stacked townhouses, and as such, detailed FUS calculations are also required.

To calculate the fire flow requirements, it is assumed that the units will be built using "Wood Frame" construction and its occupancy content will classify as "Limited Combustible". Additionally, it is assumed that neither the subject building nor the neighbouring buildings are equipped with a sprinkler system. Lastly, since Phase 4 will proceed before Phase 3.1, interim conditions were considered for the fire flow requirements in Phase 4. For these interim conditions, the exposure distances between adjacent buildings were calculated without including the buildings in Phase 3.1.

Table 4 outlines the fire flow requirements for the residential blocks in Phase 4 (interim) based on FUS calculations. **Table 5** summarizes the fire flow requirements for the residential blocks in Phases 4 and 3.1 upon construction of Phase 3.1. Detailed calculations can be found in the **Appendix A3**.

For the interim Phase 4 conditions, the maximum RFF is 15,000 L/min. Once Phase 3.1 is constructed, the RFFs within Phase 4 increase due to shorter exposure distances to adjacent buildings. The maximum RFF for Phases 4 and 3.1 is 16,000 L/min and 15,000 L/min, respectively. These values exceed the fire flow objective of 13,000 L/min established in the 2022 Study. Therefore, additional hydraulic modelling analyses are necessary to assess the network's capacity to provide these fire flows while maintaining a residual pressure of 138 kPa (20 psi).

Reference: Caivan Barrhaven Conservancy East Development - Phases 3.1 and 4 Detailed Design

Table 4: Fire Flow Requirements for Phase 4 (Interim)

Block No	Number of Townhouses	Number of Storeys	Total Number of Units	Fire Flow Requirements (L/min) [L/s]	Required Duration of FF (hrs)	Meets Technical Bulletin ISDTB-2014-02 Conditions?
1	8	3	16	12,000 [200]	2.5	No
2	8	3	16	10,000 [167]	2	No
3	8	3	16	13,000 [217]	2.5	No
4	12	3	24	15,000 [250]	3	No
5	10	3	20	12,000 [200]	2.5	No
6	10	3	20	12,000 [200]	2.5	No
7	12	3	24	15,000 [250]	3	No
8	12	3	24	13,000 [217]	2.5	No
9	6	3	12	11,000 [183]	2	No
10	12	3	24	15,000 [250]	3	No

Table 5: Fire Flow Requirements for Phases 3.1 and 4

Phase	Block No	Number of Townhouses	Number of Storeys	Total Number of Units	Fire Flow Requirements (L/min) [L/s]	Required Duration of FF (hrs)	Meets Technical Bulletin ISDTB-2014-02 Conditions?
3.1	**3**	3*	2	3	9,000 [150]	2	No
	13	4*	2	4	11,000 [183]	2	No
	12	6*	2	6	15,000 [250]	3	No
4	**1**	8	3	16	13,000 [217]	2.5	No
	2	8	3	16	12,000 [200]	2.5	No
	3	8	3	16	14,000 [233]	3	No
	4	12	3	24	16,000 [267]	3.5	No
	5	10	3	20	14,000 [233]	3	No
	6	10	3	20	13,000 [217]	2.5	No
	7	12	3	24	15,000 [250]	3	No
	8	12	3	24	16,000 [267]	3.5	No
	9	6	3	12	12,000 [200]	2.5	No
	10	12	3	24	16,000 [267]	3.5	No

* Worst-case reported only.

3 Hydraulic Assessment

The original water system model was developed using the Infowater Pro software. Following the latest concept plans received for the Barrhaven Conservancy East lands, the water system model was updated to capture the new unit densities and water demands, as well as the proposed road alignment within Phase 4.

Although the proposed development will ultimately have three (3) connection points to the City's existing water distribution system, this hydraulic analysis only considered servicing for Caivan's Barrhaven Conservancy East Development via two (2) initial connections:

- Connection #1: The existing 305 mm stub extending from Chapman Mills Drive; and
- Connection #2: The T-junction on the existing 203 mm watermain at Danson Gardens Grove and Darjeeling Avenue.

Furthermore, the hydraulic analysis and watermain sizing documented in this memo only consider the Zone SUC servicing conditions. At this time, updated water boundary conditions, inclusive of updated residential water demands and bigger fire flows, are not available. To proceed with the analysis, the latest water boundary conditions received from the City (dated May 3, 2024) were used to estimate the water boundary conditions for the updated water demands. This included extrapolating what would be the hydraulic conditions for larger fire flows (RRF of 15,000 L/min and 16,000 L/min) using the previously received boundary conditions as a base. For this exercise, a linear relationship was established at each connection from the previous boundary conditions.

Details on the water boundary condition estimates are reported in **Appendix A4**. A summary of the water boundary conditions considered for this analysis are listed in **Table 6** (Phase 4) and **Table 7** (Phase 3.1). For the analysis of Phase 4, it is assumed that Phases 2, JR1 and 4 are fully developed. For Phases 3.1, it is assumed that Phases 2, JR1, 4, and 3.1 are fully developed.

Table 6: Estimated Boundary Condition under Interim Phase 4

		HGL (m)	
Scenario	**Water Demand (L/s)**	**Connection 1 - Chapman Mills Drive**	**Connection 2 - Danson Gardens Grove & DarJeeling Ave**
Average Daily Demand	5.99	146.3	146.9
Peak Hour Demand	32.92	145.2	145.2
Maximum Day Demand + FF (250 L/s)	264.96	135.3	130.8

Table 7: Estimated Boundary Condition under Interim Phase 3.1

Scenario	Water Demand (L/s)	HGL (m)	
		Connection 1 - Chapman Mills Drive	Connection 2 - Danson Gardens Grove & DarJeeling Ave
Average Daily Demand	7.58	146.2	146.8
Peak Hour Demand	41.68	144.8	144.7
Maximum Day Demand + FF (250 L/s)	268.95	135.2	130.6
Maximum Day Demand + FF (267 L/s)	285.62	134.4	129.5

The updated water model was used to evaluate the hydraulic conditions during interim conditions (Phase 4 and Phase 3.1). Specifically, the model was used to assess fire flow capacity within the interim hydraulic network. The assumed watermain network, sized in previous studies, is presented in **Appendix A5**. It includes a 200 mm dia. loop crossing Phase 4, as well as additional 300 mm dia. looping once Phase 3.1 is constructed.

3.1 Interim Phase 4

Under MXDY+FF conditions, a minimum residual pressure of 20 psi must be maintained under the required fire flow of 250 L/s (15,000 L/min). Modelled results under MXDY+FF conditions (**Appendix A5**) suggest that using the alternative procedure as outlined in Appendix I (Guidelines on Coordination of Hydrant Placement with Required Fire Flow) of the City's Technical Bulletin ISDTB-2018-02, a fire flow of 250 L/s (15,000 L/min) is achievable within Phase 4 under interim conditions. This alternative procedure consists of assuming a maximum flow capacity of 5,700 L/min per class AA hydrant within 75 m of the model nodes, and a maximum flow capacity of 3,800 L/min for Class AA hydrants between 75 and 150 m. To ensure appropriate hydrant coverage, at least two Class AA hydrants are required within Phase 4. It is assumed that additional Class AA hydrants will be located along adjacent streets, such as Conservancy Drive and Mineral Street, to meet the necessary coverage.

These results suggest that the proposed watermain network, sized in previous studies, would offer adequate fire flow protection, provided that appropriate hydrant coverage is in place. However, this shall be confirmed once updated water boundary conditions are received from the City.

If there are any limitations in providing the RFF of 15,000 L/min, additional fire control measures would be necessary. These measures could range from architectural changes to the units, changing the construction materials from "Wood Frame" to "Ordinary Construction" materials, to implementation of fire walls. The need for fire mitigation measures will be confirmed with the revised potable water hydraulic analysis, which will be completed upon receipt of the revised boundary conditions and summarized in a report that will be submitted under separate cover.

3.2 Interim Phase 3.1

Under MXDY+FF conditions, a minimum residual pressure of 20 psi must be maintained under the required fire flow of 250 L/s (15,000 L/min) within Phase 3.1, and 267 L/s (16,000 L/min) for Phase 4. Modelled results under MXDY+FF conditions (**Appendix A5**), suggest that the proposed watermain network, sized in previous studies, can provide the required fire flows for Phase 3.1 and Phase 4 provided that appropriate hydrant coverage is in place (alternative procedure as outlined in Appendix I of ISDTB-2018-02). However, this shall be confirmed once updated water boundary conditions are received from the City.

4 Conclusions

Based on the updated development plan for the Barrhaven Conservancy East Development, the number of units decreased by 5 compared to the June 2024 development plan. This results in an estimated population decrease of 13 and slightly lower AVDY, MXDY and PKHR demands for the development compared to the values assessed in the June 2024 study.

Based on the updated draft plan for Phase 3.1 and site plan for Phase 4, the AVDY, MXDY and PKHR demands decreased by 0.05 L/s, 0.11 L/s and 0.24 L/s, respectively, in comparison to what was established in the June 2024 Study. This change is negligible and will not impact the overall water system distribution results in the ultimate condition.

Furthermore, FUS calculations for the proposed stacked townhome blocks within Phase 4, as well as 6-unit townhouse blocks within Phase 3.1, show that in some cases, the RFF exceeds the previously required fire flow objective of 13,000 L/min (216.67 L/s), identified as part of previous analyses for these development lands.

To assess the hydraulic conditions under interim conditions, the latest water boundary conditions received from the City (dated May 3, 2024) were used to estimate the water boundary conditions for the updated water demands. This included extrapolating the hydraulic conditions for larger flows (RFFs of 15,000 L/min and 16,000 L/min) than those considered in the previously received boundary conditions.

The model was then used to assess fire flow capacity within the interim hydraulic network. Modelled results under MXDY+FF conditions suggest that if the alternative procedure as outlined in Appendix I of the City's ISDTB-2018-02 is employed, the required fire flows for Phase 3.1 and Phase 4 are achievable with the previously established watermain network. However, this shall be confirmed once updated water boundary conditions are received from the City.

This memo serves as a preliminary summary of initial observations in support of DSEL's update to the Servicing Design Brief for Phases 3.1 and 4 of the Barrhaven Conservancy East Development.

However, a detailed hydraulic analysis for interim phasing conditions is required to confirm watermain sizing at dead ends. The interim condition analysis requires obtaining updated water boundary conditions from the City. As a result, the revised potable water hydraulic analysis will be completed upon receipt of the revised boundary conditions and a report will be submitted under separate cover.

5 Closure

We trust this information meets your needs. Should you have any questions, please contact the undersigned.

Regards,

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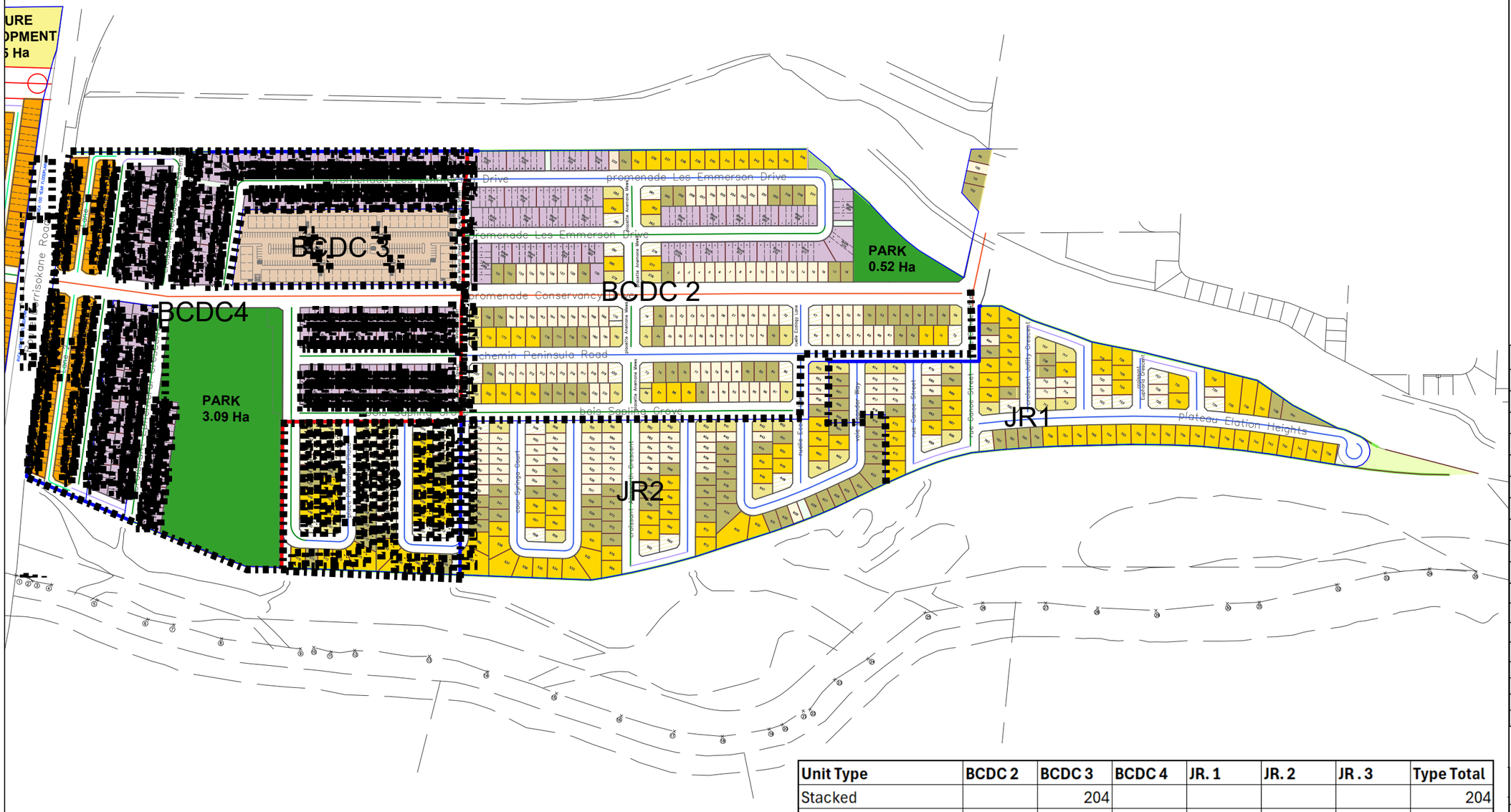
Attachments:

A1 – Site Plan (June 2024)
A2 – Updated Site Plan (September 2024)
A3 – Fire Underwriter Survey Fire Flow Requirement Calculations
A4 – Water Boundary Condition Estimates
A5 – Modelling Results

October 29, 2024
Marc Pichette

Reference: **Caivan Barrhaven Conservancy East Development - Phases 3.1 and 4 Detailed Design**

APPENDIX A1: Unit Plans (Dated June 2024)



East of Mineral (1/300)	2.2233	ha
West of Mineral (1/600)	1.0083	ha
Total Required	3.2317	ha
Total Parkland in Provided BCDC E	3.6100	ha
Total Overdedication in BCDC East	0.3783	ha

Unit Type	BCDC 2	BCDC 3	BCDC 4	JR. 1	JR. 2	JR . 3	Type Total
Stacked		204					204
RLT			87				87
19.6' TH	140		314				454
35' Single	100			18	47	24	189
41' Regular	16			10	15	5	46
41' Oversize	13			9	6	5	33
42' Single	46			19	48	11	124
50' Single	29			49	35	22	135
Sub-Total	344	204	401	105	151	67	1272
Total	1272						

CAIVAN

LEGEND:

- RLTH (18.9m DEPTH)
- 19.6' STANDARD TOWNHOUSE
- 35' DETACHED HOME
- 41' DETACHED HOME (REGULAR)
- 41' DETACHED HOME (OVERSIZED)
- 42' DETACHED HOME
- 50' DETACHED HOME
- STACKED CONDO BLOCK
- PARKS
- WALKWAY/SERVICING BLOCK
- PHASE BOUNDARY
- BCDCE DRAFT PLAN DEVISING LINE

- 24m ROW
- 18m ROW
- 16.5m ROW
- 14/14.75m ROW
- 8.5m ROW

BCDCE LOT COUNT

UNIT TYPE	# UNITS
STACKED	204
18.9m RLTH	87
19.6' TH	454
35' SINGLE	189
41' REGULAR	52
41' OVERSIZED	33
42' SINGLE	118
50' SINGLE	135
Total	1272

REV#	DESCRIPTION	DATE
15	Unit count recount, tables updated to reflect	24-03-07
14	revisions made on sk-8.2 now sk-8.3	24-02-21
13	SK8.2 NEW UNIT COUNT REOPTIMIZED BANKS	24/02/21
12	Revised Les Emmerson, removed TH block for singles	24/02/13
11	Updated STND TH to new 19.6' TH	24/01/18
10	Updated Plan and Phasing and unit counts	24/01/11
09	Revised BCDC 4 5 from Stacks to 19' THs	23/12/15

DATE: 2024-03-07

DRAWN BY: LV

PROJECT NO.: OTL400.2

PROJECT NAME: CONSERVANCY EAST

DRAWING #: SK-08.3

October 29, 2024
Marc Pichette

Reference: Caivan Barrhaven Conservancy East Development - Phases 3.1 and 4 Detailed Design

APPENDIX A2: Unit Plans (Dated September 2024)

CAIVAN

LEGEND:

- RLTH (18.9m DEPTH)
- 19.6' STANDARD TOWNHOUSE
- 35' DETACHED HOME
- 41' DETACHED HOME (REGULAR)
- 41' DETACHED HOME (OVERSIZED)
- 42' DETACHED HOME
- 50' DETACHED HOME
- STACKED CONDO BLOCK
- PARKS
- WALKWAY/SERVICING BLOCK
- PHASE BOUNDARY

Conservancy and Jock River Unit Count

PHASE: UNIT TYPE:	PH2	PH3	PH4	JR. 1	JR. 2	JR.3	TYPE TOTAL
STACKED	0	0	196	0	0	0	196
18.9m RLTH	0	90	0	0	0	0	90
19.6' TH	99	296	0	0	0	59	454
35' SINGLE	100	0	0	18	22	49	189
41' REGULAR	15	0	0	10	11	9	45
41' OVERSIZED	14	0	0	9	3	8	34
42' SINGLE	46	0	0	19	35	24	124
50' SINGLE	29	0	0	49	20	37	135
Sub-Total	303	386	196	105	91	186	1267
Phase Total	689		196	382			
Total	1267						

REV#	DESCRIPTION	DATE
19	unit count updated per new phase lines	240918
18	Updated phase lines	240822
17	Added stacked condo block SP-1_0816	240816
16	Updated to reflect changes in mplan.	24-05-06
15	Unit count recount, tables updated to reflect	24-03-07
14	revisions made on sk-8.2 now sk-8.3	24-02-21
13	SK8.2 NEW UNIT COUNT REOPTIMIZED BANKS	24/02/21
12	Revised Les Emmerson, removed TH block for singles	24/02/13
11	Updated STND TH to new 19.6' TH	24/01/18
10	Updated Plan and Phasing and unit counts	24/01/11

DATE: 2024-09-18

DRAWN BY: LV

PROJECT NO.: OTL400.2_OTL402_OTL400.4

PROJECT NAME: BCDC EAST

DRAWING #: SK-9.0

APPENDIX A3: Fire Underwriter Survey Fire Flow Requirement Calculations (No Fire Control Measure)

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 1
Description: Phase 4; Block #1

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #1 comprises a total of 16 stacked townhouse units. For FUS calculations, the block was considered as 8 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 6 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 510 sq. ft. Wood Frame Construction, no sprinklers. Interim Conditions: Phase 3.1 not constructed.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		379	379	379								1,137	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	11,000
4	Determine Occupancy Charge	Limited Combustible										-15%	9,350
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	3.1 to 10	12	3	21-41	Type V	NO				16%	2,805
		Right	20.1 to 30	31	3	81-100	Type V	NO				8%	
		Rear	20.1 to 30	37	2	61-80	Type V	NO				6%	
		Left	> 30	0	0	0-20	Type V	NO				0%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**12,000**
		Total Required Fire Flow in L/s											**200**
		Required Duration of Fire Flow (hrs)											**2.50**
		Required Volume of Fire Flow (m^3)											**1,800**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 2
Description: Phase 4; Block #2

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #2 comprises a total of 16 stacked townhouse units. For FUS calculations, the block was considered as 8 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 6 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 510 sq. ft. Wood Frame Construction, no sprinklers. Interim Conditions: Phase 3.1 not constructed.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		379	379	379								1,137	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	11,000
4	Determine Occupancy Charge	Limited Combustible										-15%	9,350
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	20.1 to 30	12	3	21-41	Type V	NO				2%	561
		Right	20.1 to 30	14	2	21-41	Type V	NO				2%	
		Rear	> 30	0	0	0-20	Type V	NO				0%	
		Left	20.1 to 30	12	3	21-41	Type V	NO				2%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**10,000**
		Total Required Fire Flow in L/s											**167**
		Required Duration of Fire Flow (hrs)											**2.00**
		Required Volume of Fire Flow (m^3)											**1,200**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 3
Description: Phase 4; Block #3

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #3 comprises a total of 16 stacked townhouse units. For FUS calculations, the block was considered as 8 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 6 inside units, and 2 end unitsconfiguration with an average floor area of 510 sq. ft. Wood Frame Construction, no sprinklers.* ***Interim Conditions: Phase 3.1 not constructed.***

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		379	379	379								1,137	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	11,000
4	Determine Occupancy Charge	Limited Combustible										-15%	9,350
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	> 30	0	0	0-20	Type V	NO				0%	3,273
		Right	3.1 to 10	31	3	81-100	Type V	NO				19%	
		Rear	> 30	31	3	81-100	Type V	NO				0%	
		Left	3.1 to 10	12	3	21-41	Type V	NO				16%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**13,000**
		Total Required Fire Flow in L/s											**217**
		Required Duration of Fire Flow (hrs)											**2.50**
		Required Volume of Fire Flow (m^3)											**1,950**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 4
Description: Phase 4; Block #4

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #4 comprises a total of 24 stacked townhouse units. For FUS calculations, the block was considered as 12 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 10 inside units, and 2 end units configuration with an average floor area of 509 sq. ft. Wood Frame Construction, no sprinklers. Interim Conditions: Phase 3.1 not constructed.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		568	568	568								1,704	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	14,000
4	Determine Occupancy Charge	Limited Combustible										-15%	11,900
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	> 30	0	0	0-20	Type V	NO				0%	3,213
		Right	3.1 to 10	12	3	21-41	Type V	NO				16%	
		Rear	> 30	38	2	61-80	Type V	NO				0%	
		Left	10.1 to 20	12	3	21-41	Type V	NO				11%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**15,000**
		Total Required Fire Flow in L/s											**250**
		Required Duration of Fire Flow (hrs)											**3.00**
		Required Volume of Fire Flow (m^3)											**2,700**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 5
Description: Phase 4; Block #5

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #5 comprises a total of 20 stacked townhouse units. For FUS calculations, the block was considered as 10 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 8 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 509 sq. ft. Wood Frame Construction, no sprinklers. Interim Conditions: Phase 3.1 not constructed.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		473	473	473								1,420	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	12,000
4	Determine Occupancy Charge	Limited Combustible										-15%	10,200
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	> 30	46	3	> 100	Type V	NO				0%	1,326
		Right	20.1 to 30	12	3	21-41	Type V	NO				2%	
		Rear	> 30	0	0	0-20	Type V	NO				0%	
		Left	10.1 to 20	12	3	21-41	Type V	NO				11%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**12,000**
		Total Required Fire Flow in L/s											**200**
		Required Duration of Fire Flow (hrs)											**2.50**
		Required Volume of Fire Flow (m^3)											**1,800**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 6
Description: Phase 4; Block #6

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #6 comprises a total of 20 stacked townhouse units. For FUS calculations, the block was considered as 10 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 8 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 509 sq. ft. Wood Frame Construction, no sprinklers.* ***Interim Conditions: Phase 3.1 not constructed.***

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		473	473	473								1,420	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	12,000
4	Determine Occupancy Charge	Limited Combustible										-15%	10,200
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	> 30	46	3	> 100	Type V	NO				0%	1,326
		Right	10.1 to 20	12	3	21-41	Type V	NO				11%	
		Rear	> 30	0	0	0-20	Type V	NO				0%	
		Left	20.1 to 30	12	3	21-41	Type V	NO				2%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**12,000**
		Total Required Fire Flow in L/s											**200**
		Required Duration of Fire Flow (hrs)											**2.50**
		Required Volume of Fire Flow (m^3)											**1,800**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 7
Description: Phase 4; Block #7

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #7 comprises a total of 24 stacked townhouse units. For FUS calculations, the block was considered as 12 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 10 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 509 sq. ft. Wood Frame Construction, no sprinklers.* ***Interim Conditions: Phase 3.1 not constructed.***

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		568	568	568								1,703	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	14,000
4	Determine Occupancy Charge	Limited Combustible										-15%	11,900
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	> 30	0	0	0-20	Type V	NO				0%	2,618
		Right	10.1 to 20	12	3	21-41	Type V	NO				11%	
		Rear	> 30	38	3	> 100	Type V	NO				0%	
		Left	10.1 to 20	12	3	21-41	Type V	NO				11%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**15,000**
		Total Required Fire Flow in L/s											**250**
		Required Duration of Fire Flow (hrs)											**3.00**
		Required Volume of Fire Flow (m^3)											**2,700**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 8
Description: Phase 4; Block #8

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #8 comprises a total of 24 stacked townhouse units. For FUS calculations, the block was considered as 12 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 10 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 509 sq. ft. Wood Frame Construction, no sprinklers. Interim Conditions: Phase 3.1 not constructed.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		568	568	568								1,703	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	14,000
4	Determine Occupancy Charge	Limited Combustible										-15%	11,900
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	10.1 to 20	12	3	21-41	Type V	NO				11%	1,547
		Right	20.1 to 30	12	3	21-41	Type V	NO				2%	
		Rear	> 30	0	0	0-20	Type V	NO				0%	
		Left	> 30	36	2	61-80	Type V	NO				0%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**13,000**
		Total Required Fire Flow in L/s											**217**
		Required Duration of Fire Flow (hrs)											**2.50**
		Required Volume of Fire Flow (m^3)											**1,950**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 9
Description: Phase 4; Block #9

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #9 comprises a total of 12 stacked townhouse units. For FUS calculations, the block was considered as 6 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 4 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 511 sq. ft. Wood Frame Construction, no sprinklers.* ***Interim Conditions: Phase 3.1 not constructed.***

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		284	284	284								852	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	10,000
4	Determine Occupancy Charge	Limited Combustible										-15%	8,500
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	> 30	72	2	> 100	Type V	NO				0%	2,975
		Right	3.1 to 10	46	3	> 100	Type V	NO				20%	
		Rear	> 30	31	3	81-100	Type V	NO				0%	
		Left	10.1 to 20	46	3	> 100	Type V	NO				15%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**11,000**
		Total Required Fire Flow in L/s											**183**
		Required Duration of Fire Flow (hrs)											**2.00**
		Required Volume of Fire Flow (m^3)											**1,320**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 10
Description: Phase 4; Block #10

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #10 comprises a total of 24 stacked townhouse units. For FUS calculations, the block was considered as 12 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 10 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 509 sq. ft. Wood Frame Construction, no sprinklers. Interim Conditions: Phase 3.1 not constructed.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		568	568	568								1,703	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	14,000
4	Determine Occupancy Charge	Limited Combustible										-15%	11,900
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	> 30	0	0	0-20	Type V	NO				0%	3,213
		Right	10.1 to 20	12	3	21-41	Type V	NO				11%	
		Rear	3.1 to 10	12	3	21-41	Type V	NO				16%	
		Left	> 30	0	0	0-20	Type V	NO				0%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**15,000**
		Total Required Fire Flow in L/s											**250**
		Required Duration of Fire Flow (hrs)											**3.00**
		Required Volume of Fire Flow (m^3)											**2,700**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 11
Description: Phase 4; Block #1

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #1 comprises a total of 16 stacked townhouse units. For FUS calculations, the block was considered as 8 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 6 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 510 sq. ft. Wood Frame Construction, no sprinklers.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		379	379	379								1,137	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	11,000
4	Determine Occupancy Charge	Limited Combustible										-15%	9,350
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	3.1 to 10	12	3	21-41	Type V	NO				16%	3,366
		Right	20.1 to 30	31	3	81-100	Type V	NO				8%	
		Rear	20.1 to 30	37	2	61-80	Type V	NO				6%	
		Left	20.1 to 30	36	2	61-80	Type V	NO				6%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**13,000**
		Total Required Fire Flow in L/s											**217**
		Required Duration of Fire Flow (hrs)											**2.50**
		Required Volume of Fire Flow (m^3)											**1,950**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 12
Description: Phase 4; Block #2

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #2 comprises a total of 16 stacked townhouse units. For FUS calculations, the block was considered as 8 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 6 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 510 sq. ft. Wood Frame Construction, no sprinklers.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		379	379	379								1,137	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	11,000
4	Determine Occupancy Charge	Limited Combustible										-15%	9,350
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	20.1 to 30	12	3	21-41	Type V	NO				2%	2,244
		Right	20.1 to 30	14	2	21-41	Type V	NO				2%	
		Rear	3.1 to 10	36	2	61-80	Type V	NO				18%	
		Left	20.1 to 30	12	3	21-41	Type V	NO				2%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**12,000**
		Total Required Fire Flow in L/s											**200**
		Required Duration of Fire Flow (hrs)											**2.50**
		Required Volume of Fire Flow (m^3)											**1,800**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 13
Description: Phase 4; Block #3

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #3 comprises a total of 16 stacked townhouse units. For FUS calculations, the block was considered as 8 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 6 inside units, and 2 end unitsconfiguration with an average floor area of 510 sq. ft. Wood Frame Construction, no sprinklers.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		379	379	379								1,137	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	11,000
4	Determine Occupancy Charge	Limited Combustible										-15%	9,350
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	20.1 to 30	72	2	> 100	Type V	NO				10%	4,208
		Right	3.1 to 10	31	3	81-100	Type V	NO				19%	
		Rear	> 30	31	3	81-100	Type V	NO				0%	
		Left	3.1 to 10	12	3	21-41	Type V	NO				16%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**14,000**
		Total Required Fire Flow in L/s											**233**
		Required Duration of Fire Flow (hrs)											**3.00**
		Required Volume of Fire Flow (m^3)											**2,520**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 14
Description: Phase 4; Block #4

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #4 comprises a total of 24 stacked townhouse units. For FUS calculations, the block was considered as 12 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 10 inside units, and 2 end units configuration with an average floor area of 509 sq. ft. Wood Frame Construction, no sprinklers.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		568	568	568								1,704	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	14,000
4	Determine Occupancy Charge	Limited Combustible										-15%	11,900
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	20.1 to 30	72	2	> 100	Type V	NO				10%	4,403
		Right	3.1 to 10	12	3	21-41	Type V	NO				16%	
		Rear	> 30	38	2	61-80	Type V	NO				0%	
		Left	10.1 to 20	12	3	21-41	Type V	NO				11%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**16,000**
		Total Required Fire Flow in L/s											**267**
		Required Duration of Fire Flow (hrs)											**3.50**
		Required Volume of Fire Flow (m^3)											**3,360**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 15
Description: Phase 4; Block #5

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #5 comprises a total of 20 stacked townhouse units. For FUS calculations, the block was considered as 10 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 8 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 509 sq. ft. Wood Frame Construction, no sprinklers.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		473	473	473								1,420	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	12,000
4	Determine Occupancy Charge	Limited Combustible										-15%	10,200
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	> 30	46	3	> 100	Type V	NO				0%	3,366
		Right	20.1 to 30	12	3	21-41	Type V	NO				2%	
		Rear	3.1 to 10	60	2	> 100	Type V	NO				20%	
		Left	10.1 to 20	12	3	21-41	Type V	NO				11%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**14,000**
		Total Required Fire Flow in L/s											**233**
		Required Duration of Fire Flow (hrs)											**3.00**
		Required Volume of Fire Flow (m^3)											**2,520**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 16
Description: Phase 4; Block #6

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #6 comprises a total of 20 stacked townhouse units. For FUS calculations, the block was considered as 10 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 8 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 509 sq. ft. Wood Frame Construction, no sprinklers.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		473	473	473								1,420	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	12,000
4	Determine Occupancy Charge	Limited Combustible										-15%	10,200
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	> 30	46	3	> 100	Type V	NO				0%	3,264
		Right	10.1 to 20	12	3	21-41	Type V	NO				11%	
		Rear	3.1 to 10	48	2	81-100	Type V	NO				19%	
		Left	20.1 to 30	12	3	21-41	Type V	NO				2%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**13,000**
		Total Required Fire Flow in L/s											**217**
		Required Duration of Fire Flow (hrs)											**2.50**
		Required Volume of Fire Flow (m^3)											**1,950**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 17
Description: Phase 4; Block #7

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #7 comprises a total of 24 stacked townhouse units. For FUS calculations, the block was considered as 12 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 10 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 509 sq. ft. Wood Frame Construction, no sprinklers.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		568	568	568								1,703	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	14,000
4	Determine Occupancy Charge	Limited Combustible										-15%	11,900
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	20.1 to 30	37	2	61-80	Type V	NO				6%	3,332
		Right	10.1 to 20	12	3	21-41	Type V	NO				11%	
		Rear	> 30	38	3	> 100	Type V	NO				0%	
		Left	10.1 to 20	12	3	21-41	Type V	NO				11%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**15,000**
		Total Required Fire Flow in L/s											**250**
		Required Duration of Fire Flow (hrs)											**3.00**
		Required Volume of Fire Flow (m^3)											**2,700**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 18
Description: Phase 4; Block #8

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #8 comprises a total of 24 stacked townhouse units. For FUS calculations, the block was considered as 12 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 10 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 509 sq. ft. Wood Frame Construction, no sprinklers.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		568	568	568								1,703	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	14,000
4	Determine Occupancy Charge	Limited Combustible										-15%	11,900
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	10.1 to 20	12	3	21-41	Type V	NO				11%	4,522
		Right	20.1 to 30	12	3	21-41	Type V	NO				2%	
		Rear	3.1 to 10	48	2	81-100	Type V	NO				19%	
		Left	20.1 to 30	36	2	61-80	Type V	NO				6%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**16,000**
		Total Required Fire Flow in L/s											**267**
		Required Duration of Fire Flow (hrs)											**3.50**
		Required Volume of Fire Flow (m^3)											**3,360**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 19
Description: Phase 4; Block #9

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #9 comprises a total of 12 stacked townhouse units. For FUS calculations, the block was considered as 6 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 4 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 511 sq. ft. Wood Frame Construction, no sprinklers.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		284	284	284								852	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	10,000
4	Determine Occupancy Charge	Limited Combustible										-15%	8,500
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	20.1 to 30	72	2	> 100	Type V	NO				10%	3,825
		Right	3.1 to 10	46	3	> 100	Type V	NO				20%	
		Rear	> 30	31	3	81-100	Type V	NO				0%	
		Left	10.1 to 20	46	3	> 100	Type V	NO				15%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**12,000**
		Total Required Fire Flow in L/s											**200**
		Required Duration of Fire Flow (hrs)											**2.50**
		Required Volume of Fire Flow (m^3)											**1,800**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 20
Description: Phase 4; Block #10

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #10 comprises a total of 24 stacked townhouse units. For FUS calculations, the block was considered as 12 - 3 storeys units, with a basement (more than 50% below ground). It is also assumed that the block consists of 10 inside units, 1 corner unit, and 1 end unit configuration with an average floor area of 509 sq. ft. Wood Frame Construction, no sprinklers.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		568	568	568								1,703	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	14,000
4	Determine Occupancy Charge	Limited Combustible										-15%	11,900
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	> 30	0	0	0-20	Type V	NO				0%	3,927
		Right	10.1 to 20	12	3	21-41	Type V	NO				11%	
		Rear	3.1 to 10	12	3	21-41	Type V	NO				16%	
		Left	20.1 to 30	36	2	61-80	Type V	NO				6%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**16,000**
		Total Required Fire Flow in L/s											**267**
		Required Duration of Fire Flow (hrs)											**3.50**
		Required Volume of Fire Flow (m^3)											**3,360**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 21
Description: Phase 3.1; Block #3

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #3 comprises a total of 3 townhouse units of 2 storeys units, with a basement (more than 50% below ground). It is also assumed that the average floor area is 775 sq. ft. Wood Frame Construction, no sprinklers.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		216	216									432	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	7,000
4	Determine Occupancy Charge	Limited Combustible										-15%	5,950
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	20.1 to 30	14	2	21-41	Type V	NO				2%	3,273
		Right	3.1 to 10	14	2	21-41	Type V	NO				16%	
		Rear	3.1 to 10	18	2	21-41	Type V	NO				16%	
		Left	0 to 3	14	2	21-41	Type V	NO				21%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**9,000**
		Total Required Fire Flow in L/s											**150**
		Required Duration of Fire Flow (hrs)											**2.00**
		Required Volume of Fire Flow (m^3)											**1,080**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 22
Description: Phase 3.1; Block #13

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

Notes: *Block #13 comprises a total of 6 townhouse units of 2 storeys units, with a basement (more than 50% below ground). It is also assumed that the average floor area is 775 sq. ft. Wood Frame Construction, no sprinklers.*

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		288	288									576	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	8,000
4	Determine Occupancy Charge	Limited Combustible										-15%	6,800
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	20.1 to 30	36	2	61-80	Type V	NO				6%	4,624
		Right	0 to 3	14	2	21-41	Type V	NO				21%	
		Rear	3.1 to 10	38	3	> 100	Type V	NO				20%	
		Left	0 to 3	14	2	21-41	Type V	NO				21%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**11,000**
		Total Required Fire Flow in L/s											**183**
		Required Duration of Fire Flow (hrs)											**2.00**
		Required Volume of Fire Flow (m^3)											**1,320**

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 163401964
Project Name: Barrhaven Conservancy Development Project
Date: 10/22/2024
Fire Flow Calculation #: 23
Description: Phase 3.1; Block #12

Data inputted by: Alexandre Mineault-G, P.Eng.
Data reviewed by: Alexandre Mineault-G, P.Eng.

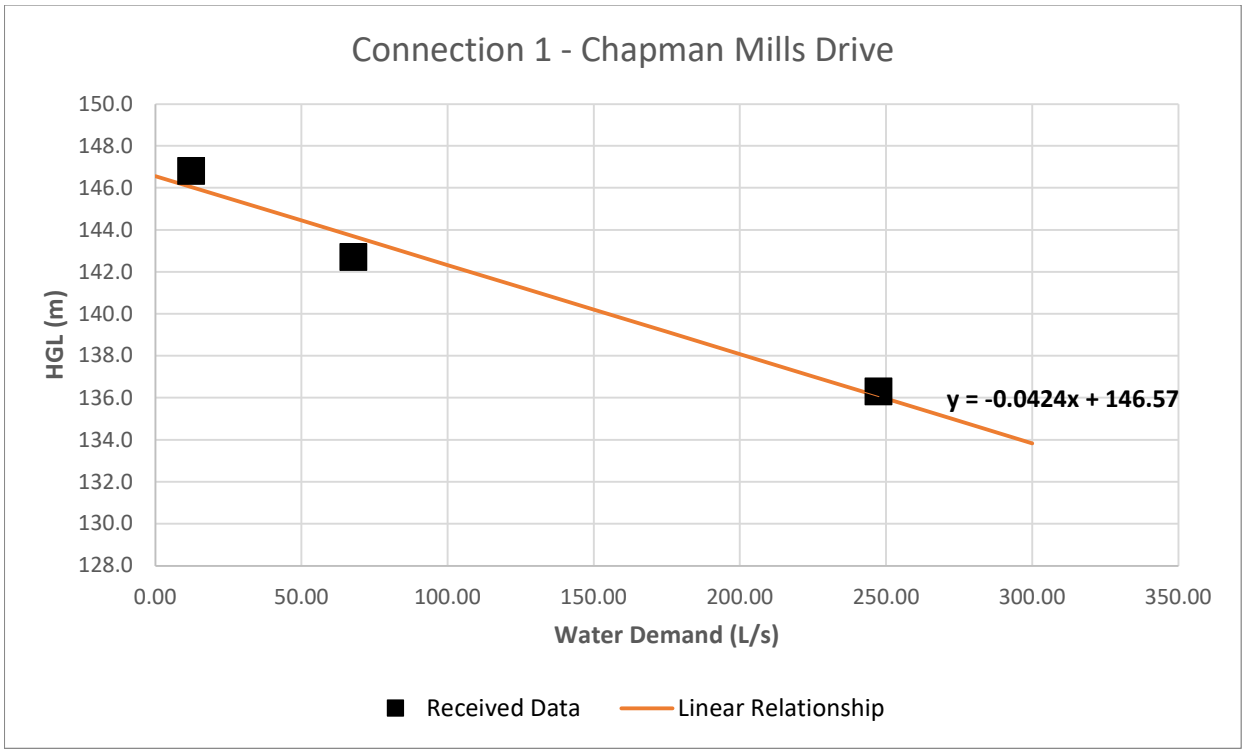
Notes: *Block #12 comprises a total of 6 townhouse units of 2 storeys units, with a basement (more than 50% below ground). It is also assumed that the average floor area is 775 sq. ft. Wood Frame Construction, no sprinklers.*

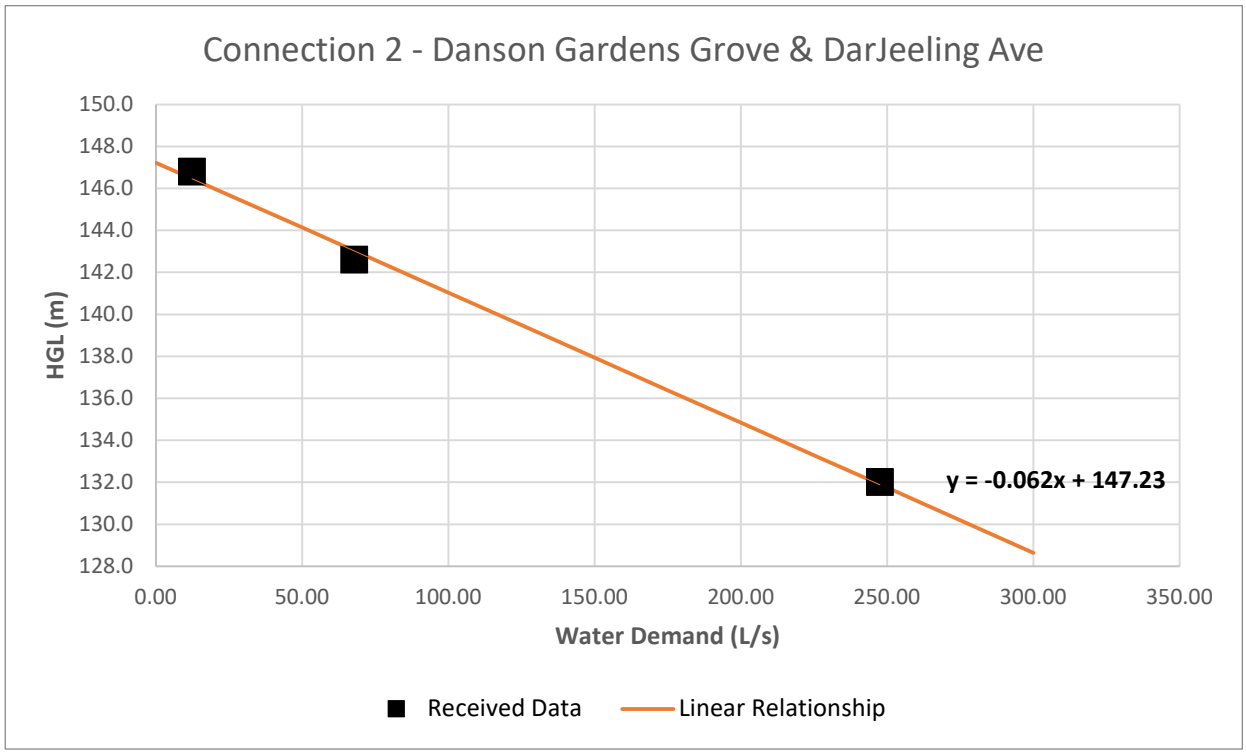
Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										YES	-
		432	432									864	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	10,000
4	Determine Occupancy Charge	Limited Combustible										-15%	8,500
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
5A	Determine Bylaw Requirement	Community bylaw requiring all building that may be built within 30m of subject building to be fully sprinkler protected										NO	-
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		Front	20.1 to 30	72	2	> 100	Type V	NO				10%	6,120
		Right	0 to 3	14	2	21-41	Type V	NO				21%	
		Rear	3.1 to 10	38	3	> 100	Type V	NO				20%	
		Left	0 to 3	14	2	21-41	Type V	NO				21%	
7	Determine Final Required Fire Flow	**Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min**											**15,000**
		Total Required Fire Flow in L/s											**250**
		Required Duration of Fire Flow (hrs)											**3.00**
		Required Volume of Fire Flow (m^3)											**2,700**

October 29, 2024
Marc Pichette

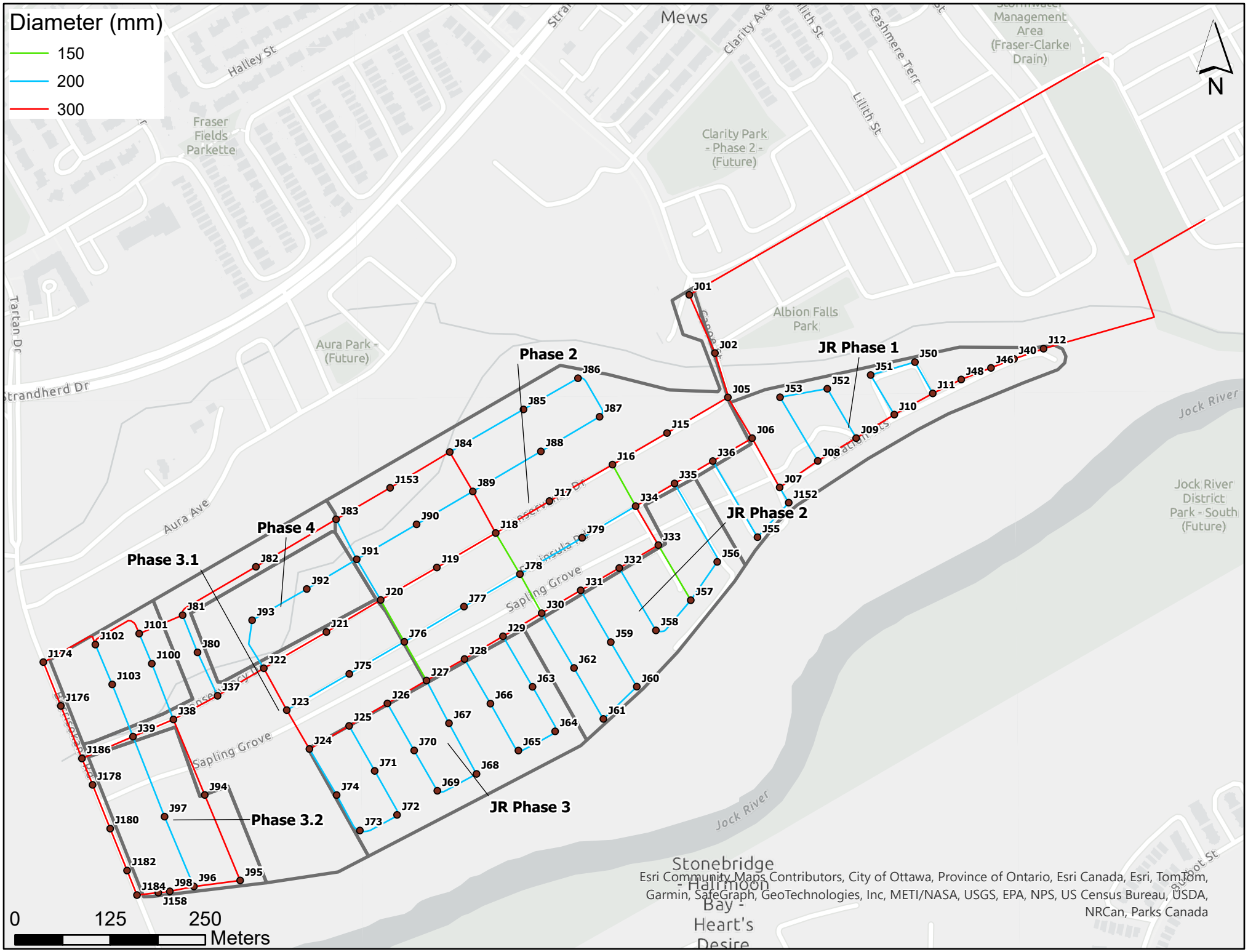
Reference: **Caivan Barrhaven Conservancy East Development - Phases 3.1 and 4 Detailed Design**

Appendix A4: Water Boundary Condition Estimates


Connection 1 - Chapman Mills Drive
150.0
148.0
146.0
144.0
142.0
140.0
138.0
136.0
134.0
132.0
130.0
128.0
HGL (m)
0.00
50.00
100.00
150.00
200.00
250.00
300.00
350.00
Water Demand (L/s)
y = -0.0424x + 146.57
Received Data
Linear Relationship


Connection 2 - Danson Gardens Grove & DarJeeling Ave
150.0
148.0
146.0
144.0
142.0
140.0
138.0
136.0
134.0
132.0
130.0
128.0
HGL (m)
0.00
50.00
100.00
150.00
200.00
250.00
300.00
350.00
Water Demand (L/s)
y = -0.062x + 147.23
Received Data
Linear Relationship

Appendix A5: Modelling Results


Diameter (mm)
150
200
300
N
Phase 2
JR Phase 1
Phase 4
Phase 3.1
JR Phase 2
Phase 3.2
JR Phase 3
Mews
Halley St
Fraser Fields Parkette
Clarity Park - Phase 2 - (Future)
Clarity Ave
Lilith St
Cashmere Terr
Stormwater Management Area (Fraser-Clarke Drain)
Albion Falls Park
Aura Park - (Future)
Aura Ave
Tartan Dr
Strandherd Dr
Sapling Grove
Jock River
Jock River District Park - South (Future)
Stonebridge - Harmony Bay - Heart's Desire
Esri Community Maps Contributors, City of Ottawa, Province of Ontario, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada
0
125
250
Meters

MXDY+FF (250 L/s) – Phase 4 (Interim)

ID	Static Demand (L/s)	Static Pressure (psi)	Static Head (m)	Hydrant Available Flow (L/s)
J01	0.00	59.21	135.15	250.00
J02	0.00	59.77	135.12	250.00
J05	0.24	60.25	135.10	250.00
J06	0.24	60.38	135.10	250.00
J07	0.00	60.54	135.09	250.00
J08	0.00	60.41	135.09	250.00
J09	0.00	59.90	135.09	250.00
J10	0.00	60.15	135.09	250.00
J11	0.00	60.04	135.09	250.00
J12	0.00	59.90	135.09	250.00
J15	0.24	60.10	135.10	250.00
J152	0.48	60.58	135.09	250.00
J153	0.24	59.57	135.08	250.00
J16	0.24	60.25	135.09	250.00
J17	0.24	60.07	135.09	250.00
J18	0.24	59.85	135.08	250.00
J19	0.24	59.64	135.08	250.00
J20	0.24	60.11	135.08	250.00
J21	1.07	59.95	135.08	250.00
J22	1.07	60.01	135.08	250.00
J27	0.24	60.39	135.09	250.00
J28	0.24	60.31	135.09	250.00
J29	0.24	60.31	135.09	250.00
J30	0.24	60.24	135.09	250.00
J31	0.24	60.37	135.09	250.00
J32	0.24	60.27	135.09	250.00
J33	0.24	60.50	135.09	250.00
J34	0.24	60.38	135.09	250.00
J35	0.24	60.33	135.09	250.00
J36	0.24	60.47	135.09	250.00
J40	0.00	59.93	135.09	250.00
J46	0.00	59.97	135.09	250.00
J48	0.00	60.01	135.09	250.00
J50	0.48	59.92	135.09	250.00
J51	0.48	60.07	135.09	250.00
J52	0.48	60.10	135.09	250.00
J53	0.48	60.20	135.09	250.00
J55	0.48	60.69	135.09	250.00
J76	0.24	60.26	135.09	250.00
J77	0.24	59.97	135.09	245.00
J78	0.24	60.13	135.09	250.00
J79	0.24	60.22	135.09	250.00
J83	0.24	59.85	135.08	250.00
J84	0.24	59.72	135.08	250.00
J85	0.24	59.82	135.08	209.02
J86	0.24	60.04	135.08	198.54
J87	0.24	59.99	135.08	198.68
J88	0.24	59.85	135.08	212.24
J89	0.24	59.85	135.08	250.00
J90	0.24	59.68	135.08	243.51
J91	0.24	59.98	135.08	250.00
J92	1.07	59.79	135.08	232.62*
J93	1.07	59.68	135.08	229.89*

* 250 L/s available from multiple hydrants, as per Technical Bulletin ISDTB-2018-02.

MXDY+FF (250 L/s) – Phase 4 (Interim)

ID	Static Demand (L/s)	Static Pressure (psi)	Static Head (m)	Hydrant Available Flow (L/s)
J01	0.00	58.95	134.97	250.00
J02	0.00	59.49	134.92	250.00
J05	0.24	59.95	134.89	250.00
J06	0.24	60.08	134.88	250.00
J07	0.00	60.24	134.88	250.00
J08	0.00	60.11	134.88	250.00
J09	0.00	59.59	134.88	250.00
J10	0.00	59.85	134.88	250.00
J11	0.00	59.74	134.88	250.00
J12	0.00	59.59	134.88	250.00
J15	0.24	59.80	134.88	250.00
J152	0.48	60.28	134.88	250.00
J153	0.24	59.26	134.86	250.00
J16	0.24	59.94	134.88	250.00
J17	0.24	59.76	134.87	250.00
J18	0.24	59.54	134.87	250.00
J19	0.24	59.33	134.86	250.00
J20	0.24	59.80	134.86	250.00
J21	1.07	59.64	134.86	250.00
J22	1.07	59.70	134.86	250.00
J23	0.44	59.82	134.86	250.00
J24	0.44	59.95	134.86	250.00
J25	0.44	59.84	134.86	250.00
J26	0.44	59.94	134.86	250.00
J27	0.24	60.07	134.86	250.00
J28	0.24	60.00	134.86	250.00
J29	0.24	60.00	134.87	250.00
J30	0.24	59.93	134.87	250.00
J31	0.24	60.06	134.87	250.00
J32	0.24	59.96	134.87	250.00
J33	0.24	60.19	134.87	250.00
J34	0.24	60.07	134.87	250.00
J35	0.24	60.03	134.88	250.00
J36	0.24	60.16	134.88	250.00
J37	0.44	59.61	134.86	250.00
J40	0.00	59.62	134.88	250.00
J46	0.00	59.67	134.88	250.00
J48	0.00	59.71	134.88	250.00
J50	0.48	59.62	134.88	250.00
J51	0.48	59.77	134.88	250.00
J52	0.48	59.79	134.88	250.00
J53	0.48	59.89	134.88	250.00
J55	0.48	60.39	134.88	250.00
J75	0.44	59.77	134.86	250.00
J76	0.24	59.94	134.86	250.00
J77	0.24	59.66	134.86	250.00
J78	0.24	59.82	134.87	250.00
J79	0.24	59.91	134.87	250.00
J80	0.44	59.47	134.86	250.00
J81	0.44	59.28	134.86	250.00
J82	0.44	59.33	134.86	250.00
J83	0.24	59.54	134.86	250.00
J84	0.24	59.41	134.86	250.00
J85	0.24	59.51	134.86	214.36
J86	0.24	59.73	134.86	202.82
J87	0.24	59.68	134.86	202.90
J88	0.24	59.54	134.86	217.47
J89	0.24	59.54	134.86	250.00

ID	Static Demand (L/s)	Static Pressure (psi)	Static Head (m)	Hydrant Available Flow (L/s)
J90	0.24	59.37	134.86	250.00
J91	0.24	59.67	134.86	250.00
J92	1.07	59.48	134.86	244.93*
J93	1.07	59.37	134.86	248.39*

* 250 L/s available from multiple hydrants, as per Technical Bulletin ISDTB-2018-02.

MXDY+FF (267 L/s) – Phase 4 (Interim)

ID	Static Demand (L/s)	Static Pressure (psi)	Static Head (m)	Hydrant Available Flow (L/s)
J01	0.00	57.81	134.17	267.00
J02	0.00	58.35	134.12	267.00
J05	0.24	58.81	134.09	267.00
J06	0.24	58.94	134.08	267.00
J07	0.00	59.10	134.08	267.00
J08	0.00	58.97	134.08	267.00
J09	0.00	58.46	134.08	267.00
J10	0.00	58.71	134.08	267.00
J11	0.00	58.60	134.08	267.00
J12	0.00	58.46	134.08	267.00
J15	0.24	58.66	134.08	267.00
J152	0.48	59.14	134.08	267.00
J153	0.24	58.12	134.06	267.00
J16	0.24	58.81	134.08	267.00
J17	0.24	58.63	134.07	267.00
J18	0.24	58.41	134.07	267.00
J19	0.24	58.19	134.06	267.00
J20	0.24	58.66	134.06	267.00
J21	1.07	58.50	134.06	267.00
J22	1.07	58.56	134.06	267.00
J23	0.44	58.69	134.06	267.00
J24	0.44	58.82	134.06	267.00
J25	0.44	58.70	134.06	267.00
J26	0.44	58.80	134.06	267.00
J27	0.24	58.93	134.06	267.00
J28	0.24	58.86	134.06	267.00
J29	0.24	58.86	134.07	267.00
J30	0.24	58.79	134.07	267.00
J31	0.24	58.92	134.07	267.00
J32	0.24	58.83	134.07	267.00
J33	0.24	59.06	134.07	267.00
J34	0.24	58.93	134.07	267.00
J35	0.24	58.89	134.08	267.00
J36	0.24	59.02	134.08	267.00
J37	0.44	58.47	134.06	267.00
J40	0.00	58.49	134.08	267.00
J46	0.00	58.53	134.08	267.00
J48	0.00	58.57	134.08	267.00
J50	0.48	58.49	134.08	267.00
J51	0.48	58.63	134.08	267.00
J52	0.48	58.66	134.08	267.00
J53	0.48	58.76	134.08	267.00
J55	0.48	59.25	134.08	267.00
J75	0.44	58.63	134.06	246.40*
J76	0.24	58.80	134.06	267.00
J77	0.24	58.52	134.06	246.10
J78	0.24	58.68	134.07	267.00
J79	0.24	58.77	134.07	262.71
J80	0.44	58.33	134.06	253.35

ID	Static Demand (L/s)	Static Pressure (psi)	Static Head (m)	Hydrant Available Flow (L/s)
J81	0.44	58.15	134.06	260.37
J82	0.44	58.19	134.06	267.00
J83	0.24	58.40	134.06	267.00
J84	0.24	58.28	134.06	267.00
J85	0.24	58.38	134.06	209.73
J86	0.24	58.59	134.06	198.46
J87	0.24	58.55	134.06	198.53
J88	0.24	58.40	134.06	212.78
J89	0.24	58.40	134.06	267.00
J90	0.24	58.23	134.06	246.86
J91	0.24	58.53	134.06	267.00
J92	1.07	58.34	134.06	239.65*
J93	1.07	58.23	134.06	243.03*

* 267 L/s available from multiple hydrants, as per Technical Bulletin ISDTB-2018-02.

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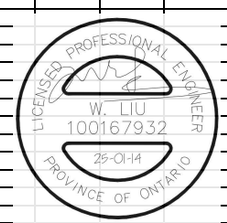
APPENDIX C

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION									COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	UNITS Singles	UNITS Townhouse	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
BCDC EAST STACKED CONDO SITE PLAN																												
	126A	130A		34				0.00					0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	87.0	200	0.65	26.44	0.00	0.84	0.05
	130A	17A		10				0.00	0				0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	36.0	200	0.35	19.40	0.00	0.62	0.03
To Les Emmerson Drive (N), Pipe 17A - 18A								0.00	0				0.00		0.00		0.00			0.00									
	132A	123A		32				0.00					0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	80.0	200	0.65	26.44	0.00	0.84	0.05
	123A	124A		4				0.00	0				0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	11.5	200	0.35	19.40	0.00	0.62	0.03
	124A	46A						0.00	0				0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	11.0	250	0.25	29.73	0.00	0.61	0.03
To Mineral Street, Pipe 46A - 47A								0.00	0				0.00		0.00		0.00			0.00									



DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha	Industrial Peak Factor = as per MOE Graph			
Average Daily Flow =	280	l/p/day			Extraneous Flow =	0.330	L/s/ha	
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Minimum Velocity =	0.600	m/s	
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Manning's n = (Conc)	0.013	(Pvc)	0.013
Max Res. Peak Factor =	4.00				Townhouse coeff=	2.7		
Commercial/Inst./Park Peak Factor =	1.50				Single house coeff=	3.4		
Institutional =	0.32	l/s/Ha						

Designed: M.S.	PROJECT: **BCDC EAST STACKED CONDO SITE PLAN (BARRHAVEN CONCERVANCY EAST PHASE 4)**		
Checked: W.L.	LOCATION: **City of Ottawa**		
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 110-112	File Ref: 20-1180	Date: **Jan 2025**	Sheet No 1 of 1

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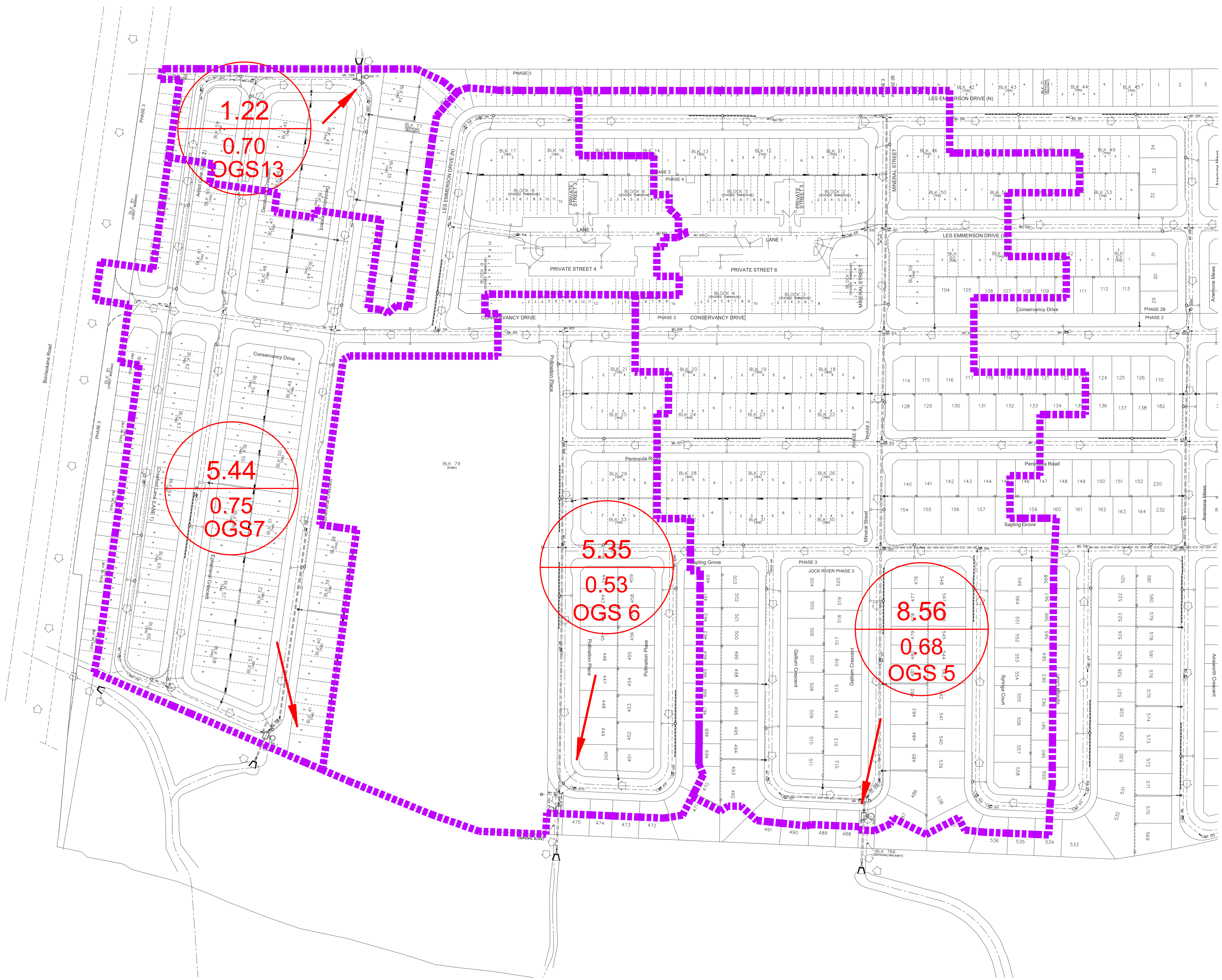
APPENDIX D



1.22
0.70
OGS13
5.44
0.75
OGS7
5.35
0.53
OGS 6
8.56
0.68
OGS 5
LES EMMERSON DRIVE (N)
LES EMMERSON DRIVE
CONSERVANCY DRIVE
Conservancy Drive
PRIVATE STREET 4
PRIVATE STREET 6
LANE 1
MINERAL STREET
Mineral Street
Peninsula Road
Sapling Grove
Pollination Place
Gallium Crescent
JOCK RIVER PHASE 3
PHASE 3
PHASE 2
BLK 79

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 891 Conservancy East
Location: Ottawa, ON
OGS #: 5

Engineer: DSEL
Contact: Peter Mott
Report Date: 29-Aug-24

Area	8.55	ha	**Rainfall Station #**	215	
Weighted C	0.68		**Particle Size Distribution**	FINE	
CDS Model	5640	(OFFLINE)	**CDS Treatment Capacity**	255	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	16.2	16.2	6.3	97.0	10.3
1.5	9.9%	29.7%	24.2	24.2	9.5	96.1	9.5
2.0	8.4%	38.1%	32.3	32.3	12.7	95.2	8.0
2.5	7.7%	45.8%	40.4	40.4	15.9	94.3	7.3
3.0	5.9%	51.7%	48.5	48.5	19.0	93.4	5.5
3.5	4.4%	56.1%	56.6	56.6	22.2	92.5	4.0
4.0	4.7%	60.7%	64.7	64.7	25.4	91.6	4.3
4.5	3.3%	64.0%	72.7	72.7	28.5	90.7	3.0
5.0	3.0%	67.1%	80.8	80.8	31.7	89.8	2.7
6.0	5.4%	72.4%	97.0	97.0	38.0	88.0	4.7
7.0	4.4%	76.8%	113.1	113.1	44.4	86.1	3.7
8.0	3.5%	80.3%	129.3	129.3	50.7	84.3	3.0
9.0	2.8%	83.2%	145.5	145.5	57.1	82.5	2.3
10.0	2.2%	85.3%	161.6	161.6	63.4	80.7	1.8
15.0	7.0%	92.3%	242.4	242.4	95.1	71.6	5.0
20.0	4.5%	96.9%	323.3	254.9	100.0	55.3	2.5
25.0	1.4%	98.3%	404.1	254.9	100.0	44.3	0.6
30.0	0.7%	99.0%	484.9	254.9	100.0	36.9	0.2
35.0	0.5%	99.5%	565.7	254.9	100.0	31.6	0.1
40.0	0.5%	100.0%	646.5	254.9	100.0	27.7	0.2
							87.9
						Removal Efficiency Adjustment[2] =	6.5%
						Predicted Net Annual Load Removal Efficiency =	**81.4%**
						Predicted Annual Rainfall Treated =	**97.6%**

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON ETV PARTICLE SIZE DISTRIBUTION

Project: Barrhaven Conservancy East
Location: Ottawa
OGS ID: OGS 6
Engineer: DSEL
Contact: Peter Mott
Report Date: 19-Dec-24

Area: 5.35 ha
C- Value: 0.53
CDS Model: 8
Treatment Capacity: 108.7 l/s
Particle Size Distribution: ETV

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.5	9.2%	9.2%	4.2	4.2	3.9	72.7	6.7
1.0	10.6%	19.8%	8.5	8.5	7.8	68.4	7.3
1.5	9.9%	29.7%	12.7	12.7	11.7	64.5	6.4
2.0	8.4%	38.1%	17.0	17.0	15.6	61.0	5.1
2.5	7.7%	45.8%	21.2	21.2	19.5	58.0	4.5
3.0	5.9%	51.7%	25.4	25.4	23.4	55.3	3.3
3.5	4.4%	56.1%	29.7	29.7	27.3	53.0	2.3
4.0	4.7%	60.7%	33.9	33.9	31.2	51.0	2.4
4.5	3.3%	64.0%	38.1	38.1	35.1	49.2	1.6
5.0	3.0%	67.1%	42.4	42.4	39.0	47.7	1.4
6.0	5.4%	72.4%	50.9	50.9	46.8	45.4	2.4
7.0	4.4%	76.8%	59.3	59.3	54.6	43.6	1.9
8.0	3.5%	80.3%	67.8	67.8	62.4	42.3	1.5
9.0	2.8%	83.2%	76.3	76.3	70.2	41.0	1.2
10.0	2.2%	85.3%	84.8	84.8	78.0	39.6	0.9
15.0	7.0%	92.3%	127.2	108.7	100.0	27.8	1.9
20.0	4.5%	96.9%	169.6	108.7	100.0	20.9	0.9
25.0	1.4%	98.3%	211.9	108.7	100.0	16.7	0.2
30.0	0.7%	99.0%	254.3	108.7	100.0	13.9	0.1
35.0	0.5%	99.5%	296.7	108.7	100.0	11.9	0.1
40.0	0.5%	100.0%	339.1	108.7	100.0	10.4	0.1
45.0	0.0%	100.0%	381.5	108.7	100.0	9.3	0.0
50.0	0.0%	100.0%	423.9	108.7	100.0	8.4	0.0
							52.1

Predicted Net Annual Load Removal Efficiency = 52.1%
Predicted % Annual Rainfall Treated = 95.6%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - TSS Removal Rate Based on ETV Testing

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON ETV PARTICLE SIZE DISTRIBUTION

Project: Barrhaven Conservancy East
Location: Ottawa
OGS ID: OGS 7
Engineer: DSEL
Contact: Peter Mott
Report Date: 19-Dec-24

Area: 5.44 ha
C- Value: 0.75
CDS Model: 10
Treatment Capacity: 169.9 l/s
Particle Size Distribution: ETV

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.5	9.2%	9.2%	5.7	5.7	3.3	73.4	6.7
1.0	10.6%	19.8%	11.3	11.3	6.7	69.6	7.4
1.5	9.9%	29.7%	17.0	17.0	10.0	66.1	6.5
2.0	8.4%	38.1%	22.7	22.7	13.4	63.0	5.3
2.5	7.7%	45.8%	28.4	28.4	16.7	60.1	4.6
3.0	5.9%	51.7%	34.0	34.0	20.0	57.6	3.4
3.5	4.4%	56.1%	39.7	39.7	23.4	55.3	2.4
4.0	4.7%	60.7%	45.4	45.4	26.7	53.3	2.5
4.5	3.3%	64.0%	51.0	51.0	30.0	51.5	1.7
5.0	3.0%	67.1%	56.7	56.7	33.4	50.0	1.5
6.0	5.4%	72.4%	68.1	68.1	40.1	47.4	2.6
7.0	4.4%	76.8%	79.4	79.4	46.7	45.4	2.0
8.0	3.5%	80.3%	90.7	90.7	53.4	43.9	1.6
9.0	2.8%	83.2%	102.1	102.1	60.1	42.6	1.2
10.0	2.2%	85.3%	113.4	113.4	66.8	41.5	0.9
15.0	7.0%	92.3%	170.1	169.9	100.0	32.5	2.3
20.0	4.5%	96.9%	226.8	169.9	100.0	24.4	1.1
25.0	1.4%	98.3%	283.6	169.9	100.0	19.5	0.3
30.0	0.7%	99.0%	340.3	169.9	100.0	16.3	0.1
35.0	0.5%	99.5%	397.0	169.9	100.0	13.9	0.1
40.0	0.5%	100.0%	453.7	169.9	100.0	12.2	0.1
45.0	0.0%	100.0%	510.4	169.9	100.0	10.8	0.0
50.0	0.0%	100.0%	567.1	169.9	100.0	9.8	0.0
							54.2

Predicted Net Annual Load Removal Efficiency = 54.2%
Predicted % Annual Rainfall Treated = 97.3%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - TSS Removal Rate Based on ETV Testing

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON ETV PARTICLE SIZE DISTRIBUTION

Project: Barrhaven Conservancy East
Location: Ottawa
OGS ID: OGS 13
Engineer: DSEL
Contact: Peter Mott
Report Date: 19-Dec-24

Area: 1.22 ha
C- Value: 0.7
CDS Model: 4
Treatment Capacity: 27.2 l/s
Particle Size Distribution: ETV

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.5	9.2%	9.2%	1.2	1.2	4.4	72.2	6.6
1.0	10.6%	19.8%	2.4	2.4	8.7	67.4	7.2
1.5	9.9%	29.7%	3.6	3.6	13.1	63.2	6.3
2.0	8.4%	38.1%	4.7	4.7	17.5	59.5	5.0
2.5	7.7%	45.8%	5.9	5.9	21.8	56.3	4.3
3.0	5.9%	51.7%	7.1	7.1	26.2	53.6	3.2
3.5	4.4%	56.1%	8.3	8.3	30.6	51.3	2.2
4.0	4.7%	60.7%	9.5	9.5	34.9	49.3	2.3
4.5	3.3%	64.0%	10.7	10.7	39.3	47.6	1.6
5.0	3.0%	67.1%	11.9	11.9	43.7	46.2	1.4
6.0	5.4%	72.4%	14.2	14.2	52.4	44.1	2.4
7.0	4.4%	76.8%	16.6	16.6	61.1	42.5	1.8
8.0	3.5%	80.3%	19.0	19.0	69.9	41.0	1.5
9.0	2.8%	83.2%	21.4	21.4	78.6	39.4	1.1
10.0	2.2%	85.3%	23.7	23.7	87.3	37.3	0.8
15.0	7.0%	92.3%	35.6	27.2	100.0	24.9	1.7
20.0	4.5%	96.9%	47.5	27.2	100.0	18.6	0.8
25.0	1.4%	98.3%	59.4	27.2	100.0	14.9	0.2
30.0	0.7%	99.0%	71.2	27.2	100.0	12.4	0.1
35.0	0.5%	99.5%	83.1	27.2	100.0	10.7	0.1
40.0	0.5%	100.0%	95.0	27.2	100.0	9.3	0.1
45.0	0.0%	100.0%	106.8	27.2	100.0	8.3	0.0
50.0	0.0%	100.0%	118.7	27.2	100.0	7.5	0.0
							50.6

Predicted Net Annual Load Removal Efficiency = 50.6%
Predicted % Annual Rainfall Treated = 94.5%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - TSS Removal Rate Based on ETV Testing

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha)														FLOW						SEWER DATA								
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
BCDC EAST STACKED CONDO SITE PLAN																															
	613	615	0.62	0.80	1.38	1.38			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	106	450	450	CONC	0.20	86.5	127.5033	0.8017	1.7983	0.831
	615	704			0.00	1.38			0.00	0.00			0.00	0.00			0.00	0.00	11.80	70.53	95.57	111.98	163.64	97	600	600	CONC	0.15	36.5	237.8056	0.8411	0.7233	0.409
To Les Emmerson Drive (N), Pipe 704 - 705						1.38				0.00				0.00				0.00	12.52													
	530	531	0.62	0.80	1.37	1.37			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	105	450	450	CONC	0.25	79.5	142.5531	0.8963	1.4783	0.738
	531	532			0.00	1.37			0.00	0.00			0.00	0.00			0.00	0.00	11.48	71.56	96.98	113.65	166.09	98	450	450	CONC	0.20	13.0	127.5033	0.8017	0.2703	0.769
	532	507	0.02	0.52	0.02	1.39			0.00	0.00			0.00	0.00			0.00	0.00	11.75	70.69	95.78	112.24	164.01	98	675	675	CONC	0.15	10.0	325.5584	0.9098	0.1832	0.302
To Mineral Street, Pipe 507 - 510						1.39				0.00				0.00				0.00	11.93													

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
25-01-14
PROVINCE OF ONTARIO

Designed: M.S.	PROJECT: BCDC EAST STACKED CONDO SITE PLAN BARRHAVEN CONSERVANCY EAST Ph4	
Checked: W.L.	LOCATION: **City of Ottawa**	
Dwg. Reference: Dwg. 113-115	File Ref: 20-1180	Date: 14 Jan 2025
		Sheet No. SHEET 1 OF 1

PATERSON GROUP

memorandum

re: **Geotechnical Review – Groundwater Infiltration**
Proposed Residential Development – Conservancy Lands East and West
Borrisokane Road – Ottawa, Ontario

to: Caivan Communities – **Hugo Lalonde** – hugo.lalonde@caivan.com

date: October 21, 2024

file: PG5036-MEMO.42

Further to your request and authorization, Paterson Group (Paterson) prepared the current memorandum to provide a geotechnical review and recommendations with respect to management of groundwater infiltration into the sump pits of townhouse blocks and back-to-back style residential dwellings. This memorandum should be read in conjunction with the Sump Pump Feasibility Report (Paterson Group Report PG5036-LET.01 Revision 3 dated September 5, 2022).

Geotechnical Review & Recommendations

The subject residential development consists of single-family homes, townhouse blocks and back-to-back style residential buildings. Buildings which include a basement level will use sump pump(s) to provide an outlet for stormwater and spring melt water collected from the perimeter foundation drainage system.

Based on the geotechnical investigation completed by others, the subsurface profile at the subject site generally consists of topsoil underlain by a very stiff to stiff, brown silty clay crust, becoming firm to stiff and grey in colour by approximate depths of 2.5 to 3.0 m below the existing ground surface. The silty clay deposit generally extended to the maximum depth of the boreholes. The long-term groundwater elevation at the subject site is expected at an approximate geodetic elevation ranging from 88.3 to 90.0 m.

Hydraulic conductivity (slug) testing was completed by Paterson and by others at select monitoring wells installed during the geotechnical investigation, by others. Based on the results of the slug testing, the silty clay within the subject site has a hydraulic conductivity ranging from 5.0×10^{-8} and 2.0×10^{-5} m/sec.

It is understood that the proposed townhouse blocks may consist of up to 12 units, with an approximate building of footprint of 720 m^2. From the hydraulic conductivity of the in-situ soils and the sizing of the building footprint, sump pumps for the proposed townhouse blocks should be sized to handle an approximate volume of up to 200,000 L/day.

As such, it is recommended that the proposed townhouse blocks be outfitted with a sufficient number of sump pumps to effectively drain this volume of water. The location(s) of the sump pump(s) should be evenly distributed across each building footprint.

We trust that the current submission meets your immediate requirements.

Best Regards,

Paterson Group Inc.

Kevin A. Pickard, P.Eng.

Scott S. Dennis, P.Eng.

JFSA Canada Inc.
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jfsa.com

January 13, 2025 Project Number: 1474(03)

David Schaeffer Engineering Ltd.
120 Iber Road, Suite 103
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K2S 1E9

Attention: **Peter Mott, P.Eng**

Subject: **Barrhaven Conservancy East Site Plan (Conservancy Stacked Towns)- Stormwater Analysis**

1.1.1 Introduction

The purpose of this Stormwater Management analysis is to outline the proposed stormwater management strategy for the development of the Barrhaven Conservancy East Site Plan located north of Conservancy Drive, east of Les Emerson Drive and west of Mineral Street, in Barrhaven Ontario. The following memo addresses the stormwater management requirements associated with the proposed development in accordance with the guidelines and regulations set forth by the City of Ottawa and the Ministry of the Environment, Conservation and Parks (MECP).

The proposed development will consist primarily of stacked town homes/ roads/parking and parkette/amenities. The total site area is approximately **1.76 ha** at **81%** imperviousness, due to grading constraints **0.53 ha** of the site plan will drain directly to nearby roads or rear yard swales within the greater subdivision. **Figure 1** provides an overview of the subcatchments within the site plan study area. All stormwater runoff from the subject property will be conveyed to the Jock River via storm sewer network within the greater Barrhaven Conservancy East Subdivision.

1.1.2 Stormwater Management Design Criteria

The stormwater management design for this site have been designed in accordance with the following regulatory guidelines:

- Ottawa Sewer Design Guidelines, City of Ottawa, SDG002, October 2012. (City Standards)
- City of Ottawa Technical Bulletin ISDTB-2014-01, Revisions to Ottawa Design Guidelines – Sewer, City of Ottawa, February 2014.
- City of Ottawa Technical Bulletin PIEDTB-2016-01, City of Ottawa, September 2016.
- City of Ottawa Technical Bulletin ISTB-2018-04, City of Ottawa, June 2018.
- Stormwater Planning and Design Manual, Ministry of the Environment, March 2003. (SWMP Design Manual)

1.1.3 Quality Control

The site will provide a minimum 80% TSS removal through a treatment train approach consisting of CB Shields, deep sump catch basins, Stormtech underground storage infiltration chambers and end of pipe Oil Grit Separator (OGS). A total of six (6) underground storage infiltration chambers will be integrated within the site to retain and infiltrate some of the runoff from **1.23 ha** of drainage area (drainage area to each underground infiltration trench is shown in **Figure 2**).

Runoff from within the development will be captured by the catch basins then conveyed to the underground storage infiltration chambers for quality treatment by infiltration. Once the storage infiltration chambers are full, the excess runoff will overflow to the main storm sewer. All storage infiltration chambers have been sized by DSEL and will provide a total storage volume of **97 m^3** or **78.8 m^3/ha**. Based on average imperviousness of **85%**, the required onsite storage volumes to provide 70% TSS removal is **30 m^3/ha** and **40 m^3/ha** for 80% TSS removal. The storage volume provided is more than twice the volume required to achieve 70% TSS removal.

Pre-treatment prior to infiltration will be provided by deep sumps and CB Shields, which will be installed at all catch basins within the site plan. Based on ETV testing, CB Shields can provide **25%** to **64%** removal efficiency depending on flow rates. The current design has **24** catch basins to service the **1.23 ha** area with an average imperviousness of **85%**. Based on 27 years of continuous simulations, the average TSS removal rate from the CB Shields has been established at **57%**. The deep sump catch basins will further enhance TSS removal by as much as **25%**. However, as there was much debate on this topic during a recent OLT, we have voluntarily reduced the TSS removal rate from deep sump catch basins to **10%**, from **25%**.

As such, stormwater quality treatment for this site will be provided through the combined use of CB Shields, deep sumps, underground storage units for infiltration and end of pipe OGS. Using a conservative TSS removal rate of **50%** for OGSs, total TSS removal for the site, can be estimated as **94.20%**, based on the elements presented above and the following equation.:

$$Total\ TSS\ Removal\ (\%) = 1 - [(1 - \%TSS\ Removal\ Method\ 1) \times (1 - \%TSS\ Removal\ Method\ 2) \times \ldots \times (1 - \%TSS\ Removal\ Method\ n)]$$

$$Total\ TSS\ Removal\ (\%) = 1 - (1 - 0.57) \times (1 - 0.10) \times (1 - 0.7) \times (1 - 0.5)$$
$$Total\ TSS\ Removal\ (\%) = 94.20\%$$

Refer to **Attachment A** and **Attachment B** for full details about the underground storage infiltration chambers and TSS removal calculations, respectively. Note that to ensure a conservative design the volume provided by the underground trenches to provide the required TSS removal has not been considered in the stormwater management modelling.

1.1.4 Quantity Control

The site does not have any specific quantity control requirements, as the site will outlet to the lower reaches of the Jock River and quantity control is not required. Although runoff from the site must be controlled to ensure that it does not adversely impact the operations of the storm sewer network within the greater Conservancy East Subdivision. To ensure that this is the case, the detailed site plan modelling has been incorporated into the greater subdivision modelling. This approach allows for the runoff and the HGLs from both the site plan and subdivision to be dynamically assessed in a single unified model.

1.1.5 Model Representation

The major system storage volume available on the site is represented by storage nodes in the model, derived from the detailed grading surface produced by DSEL, a copy of this detailed grading surface has been provided in **Figure 3**. Runoff from the site is directed to these storage nodes, which are connected to orifices that simulate the flow restriction of the CB grate. From there, the runoff is conveyed to the storm sewer network within the site. During extreme events, the CB grate may act as a constriction to flow, causing ponding at the CB. In these scenarios, the entire major system conveyance network has been modeled using a series of short (5m) open rectangular links. This allows major system flows to cascade from one low point to another during extreme events if the ponding elevation exceeds the localized high point between the two respective low points. **Figure 4** outlines the minor system connectivity within the site and **Figure 5** outlines the major system network.

1.1.6 Results

As a part of the detailed modelling the major system ponding and storm sewer HGL have been assessed in detail. **Table 1** below outlines the peak flows leaving the site for the 2, 5, 100-year events under free outlet conditions.

Table 1: Minor and Major System Outflows (m^3/s) – Free Outlet (see Figure 5)

System	Location	002yrChicago3hr	005yrChicago3hr	100yrChicago3hr
Minor System	West	0.109	0.158	0.287
	East	0.103	0.142	0.225
Major System	Northwest	0.000	0.000	0.000
	Southwest	0.000	0.000	0.000
	Northeast	0.000	0.000	0.000
	Southeast	0.001	0.002	0.004

Table 2 outlines the maximum ponding elevations during both the 100-year SCS 24Hr and 100-year CHI 3Hr event as well as the stress test event (100yr CHI 3Hr+20%). Note that this analysis assumes a fixed 5-year water level on the Jock River in accordance with the analysis completed for the greater Conservancy East Subdivision SWM analysis. Based on this analysis the maximum ponding depth on site is **22 cm** for the 100-year event and **26 cm** for the stress test event.

Table 3 outlines the maximum HGL within the storm sewer network for the site. This analysis was also complete for the design storms specified above, with the same outlet condition. Based on this analysis the minimum freeboard from the top of MH is **17 cm** at **MH-531**, for the 100-year events and **11 cm** at **MH-531**, for the stress test event. It is important to highlight that like the greater subdivision, all units within the site plan will have sump pumps in place, thus the HGL criterion for this site is to ensure that the HGL does not reach the surface. Based on this detailed analysis it is shown that this criterion has been met.

1.1.7 Conclusions

This Stormwater Management Memo has presented the proposed stormwater management strategy for the development of the Barrhaven Conservancy East Site Plan located north of Conservancy Drive, east of Les Emerson Drive and west of Mineral Street, in Barrhaven Ontario. The proposed design meets the regulatory requirements set forth by the City of Ottawa and the Ministry of the Environment, Conservation and Parks (MECP) and addresses the stormwater management objectives of quantity control, quality control, and erosion and sediment control. The implementation of the proposed measures will help to mitigate the impacts of development on the receiving water body and surrounding environment.

Yours truly,
JFSA Canada Inc.

Oumar Daly Ndiaye, M.Eng., EIT
Water Resources Engineer-in-Training

Reviewed by:

J.F Sabourin, M.Eng, P.En
Director of Water Resources Projects

Figures

Figure 1: Subcatchments Overview
Figure 2: Underground Storage Infiltration Chambers Drainage Areas Overview
Figure 3: Detailed Grading Surface
Figure 4: Minor System
Figure 5: Major System

Tables

Table 1: Minor and Major System Outflows – Free Outlet
Table 2: Maximum Ponding Depths / Elevations for the 100-Year SCS Storm, 100-Year Chicago Storm & 100-Year Chicago Storm +20%
Table 3: Freeboard Results - 100-Year Events & Stress Test Event with 5 Year Jock River Water Level

Attachments

Attachment A: Stormtech Underground Storage Infiltration Chambers Design Tables and Sizing Calculations
Attachment B: TSS Removal Calculations

Table 2: Maximum Ponding Depths / Elevations for the 100-Year SCS Storm, 100-Year Chicago Storm & 100-Year Chicago Storm +20%

Catch Basin ID	Total Depth			Water Surface Elevation		
	100 Year 24 Hr SCS (cm)	100 Year 3 Hr CHI (cm)	100 Year 3 Hr CHI+20% (cm)	100 Year 24 Hr SCS (m)	100 Year 3 Hr CHI (m)	100 Year 3 Hr CHI+20% (m)
CB_362	11	13	15	93.23	93.25	93.27
CB_363	7	11	15	93.19	93.23	93.27
CB_364	12	16	19	93.09	93.13	93.16
CB_365	14	16	19	93.11	93.13	93.16
CB_366	16	19	23	93.02	93.05	93.09
CB_367	15	19	23	93.02	93.05	93.09
CB_368	16	19	24	93.15	93.19	93.23
CB_369	16	19	24	93.15	93.19	93.23
CB_370	12	15	17	93.16	93.18	93.21
CB_371	12	15	17	93.16	93.18	93.20
CB_372	11	14	17	93.21	93.24	93.27
CB_373	3	9	12	93.14	93.19	93.23
CB_374	14	18	21	93.02	93.05	93.09
CB_375	8	10	12	93.05	93.07	93.09
CB_376	2	3	4	93.12	93.12	93.13
CB_377	3	3	4	93.12	93.12	93.13
CB_378	7	12	18	93.10	93.14	93.20
CB_379	6	12	18	93.09	93.14	93.20
CB_380	12	14	16	93.19	93.21	93.24
CB_381	19	22	26	93.02	93.05	93.09
CB_383	8	11	16	93.15	93.18	93.23
CB_384	10	14	19	93.15	93.19	93.23
CB_385	8	11	13	93.15	93.18	93.21
CB_386	1	2	9	93.10	93.11	93.18
CB_387	2	3	4	93.01	93.02	93.03
Max	**19**	**22**	**26**	**93.23**	**93.25**	**93.27**

Table 3: Freeboard Results - 100-Year Events & Stress Test Event

MH-ID	Invert Elevation (m)	Top of MH (m)	Max HGL			Freeboard		
			100 Year 24 Hr SCS (m)	100 Year 3 Hr CHI (m)	100 Year 3 Hr CHI+20% (m)	100 Year 24 Hr SCS (m)	100 Year 3 Hr CHI (m)	100 Year 3 Hr (m)
MH-530	90.77	93.40	92.96	93.01	93.07	0.44	0.39	0.33
MH-531	90.54	93.08	92.83	92.91	92.97	0.25	0.17	0.11
MH-532	90.29	93.11	92.80	92.89	92.96	0.31	0.22	0.15
MH-613	90.96	93.45	93.03	93.08	93.13	0.42	0.37	0.32
MH-615	90.64	93.15	92.87	92.96	93.02	0.28	0.19	0.13
					Min	**0.25**	**0.17**	**0.11**
					Max	**0.44**	**0.39**	**0.33**
					Average	**0.34**	**0.27**	**0.21**

Legend

Site Plan

Site Plan Boundary

Subcatchments
<ID>
<AREA>
<IMP>

SCALE: 1:750

0 20 40 m

JFSA CANADA INC.
WATER RESOURCE ENGINEERING, ENVIRONMENTAL MANAGEMENT AND LAND PLANNING CONSULTANTS

DSEL

Barrhaven Conservancy East Site Plan
(Conservancy Stacked Towns)

Figure 1: Subcatchments Overview

PROJECT	1474 (03)
DRAWN	ON
DATE	JANUARY 2025

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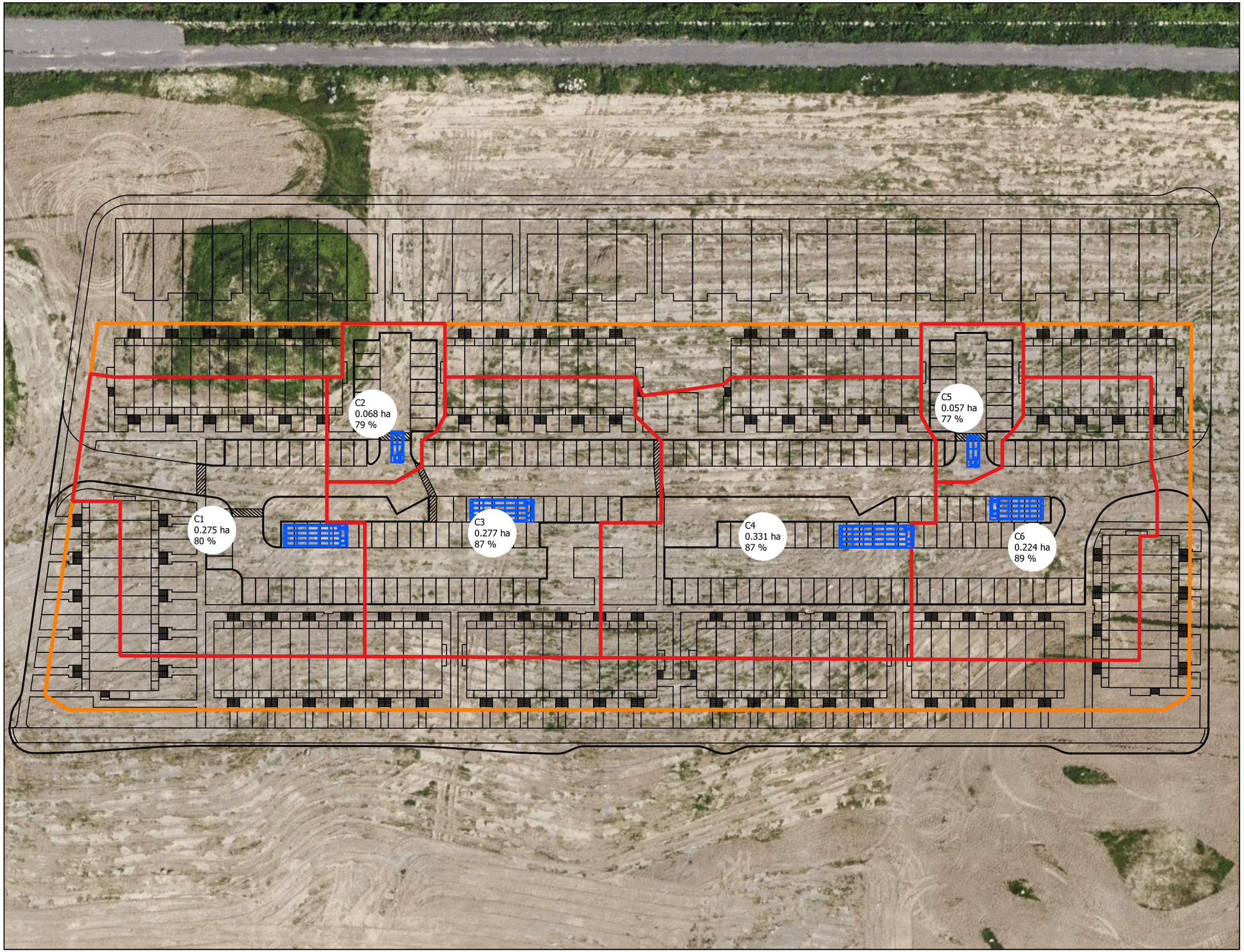

Legend

- Site Plan Boundary
- Site Plan
- Underground Chamber Drainage Areas
  <Chamber ID>
  <DRAINAGE AREA>
  <IMP>
- Underground Chamber Locations

SCALE: 1:750

0 20 40 m

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Barrhaven Conservancy East Site Plan
(Conservancy Stacked Towns)

Figure 2: Underground Chamber Drainage Areas

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DRAWN	ON
DATE	JANUARY 2025

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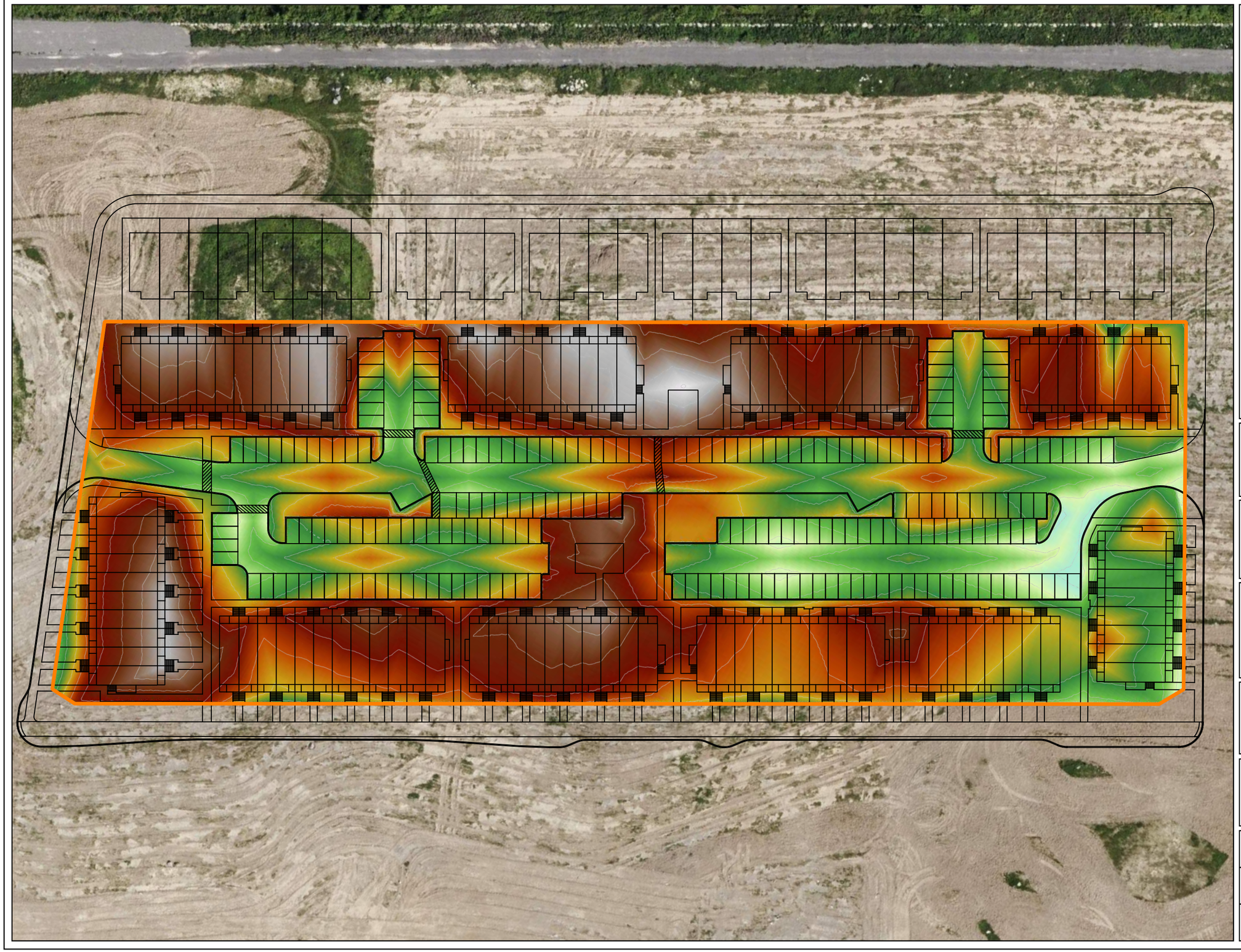

Legend

- Site Plan Boundary
- Site Plan
- Contours (0.1m)

Detailed Grading Surface (m)

- 92.90
- 93.00
- 93.10
- 93.20
- 93.30
- 93.40
- 93.50
- 93.60
- 93.70
- 93.80
- 93.90

SCALE: 1:750

0 20 40 m

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Barrhaven Conservancy East Site Plan
(Conservancy Stacked Towns)

Figure 3: Detailed Grading Surface

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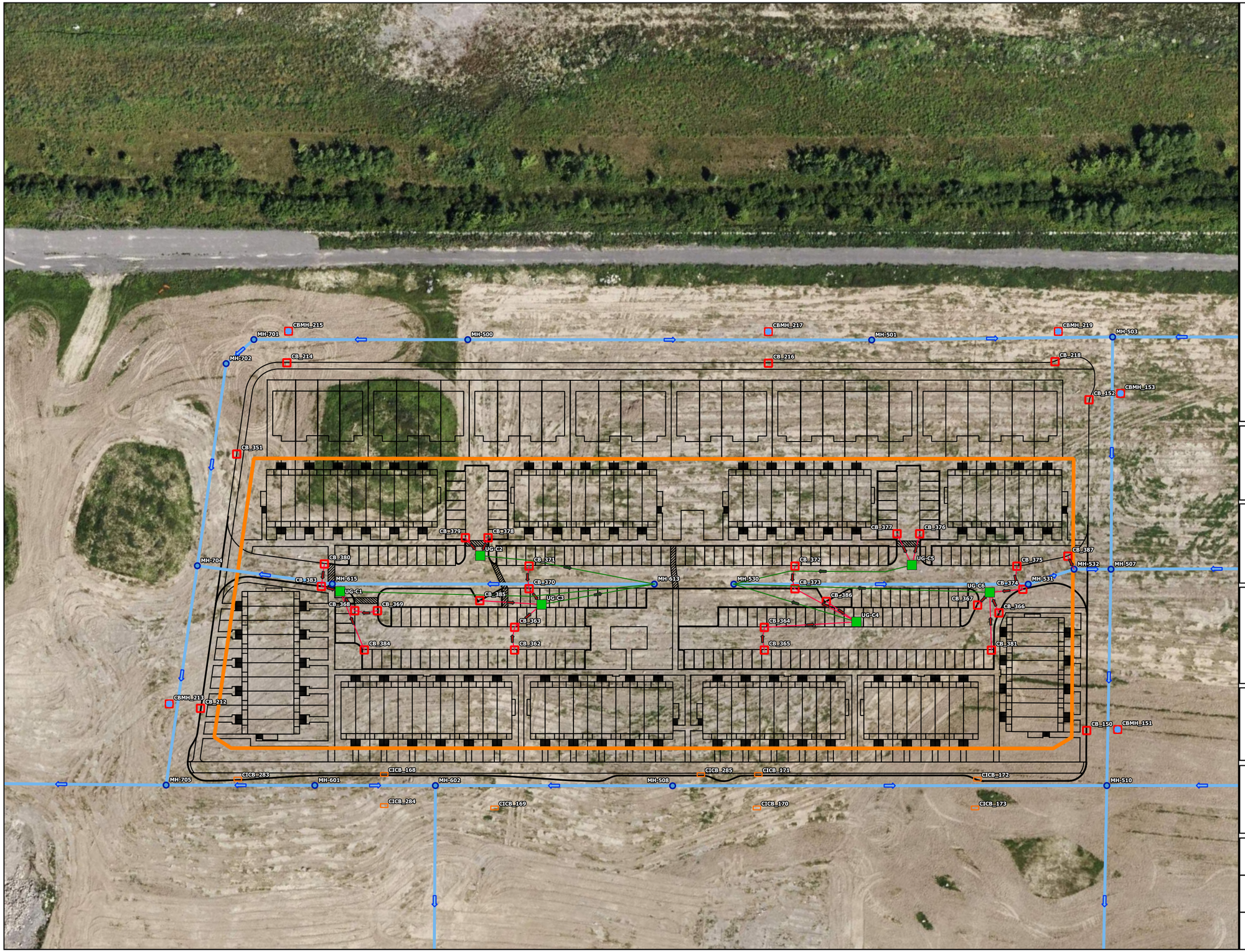

Legend

- Site Plan
- Site Plan Boundary

Conduits & Lead Pipes

- STM
- CB Lead
- Underground Storage Lead

Junctions

- CB
- CBMH
- CICB
- EX._CICB
- MH
- Underground Storage

SCALE: 1:1000

0 20 40 m

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Barrhaven Conservancy East Site Plan
(Conservancy Stacked Towns)

Figure 4: Minor System

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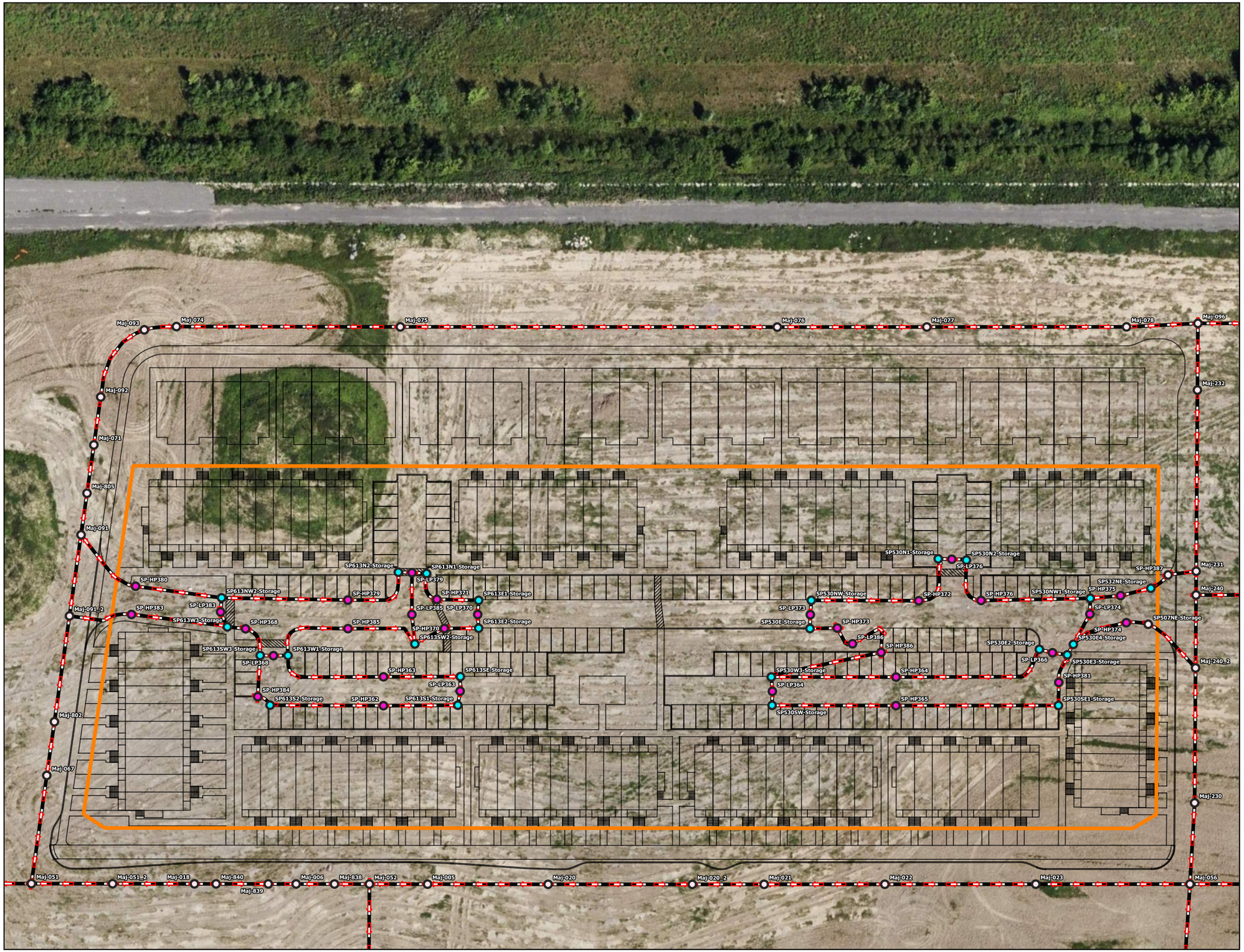

Legend

- Site Plan
- Site Plan Boundary

Conduits

- Major System

Junctions

- Maj
- Maj (Low Point)
- Maj (High Point)

SCALE: 1:800

0 20 40 m

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Barrhaven Conservancy East Site Plan
(Conservancy Stacked Towns)

Figure 5: Major System

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Attachment A

Stormtech Underground Storage Infiltration Chambers Design Tables and Sizing Calculations

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	HAIDER NASRULLAH 647-850-9417 HAIDER.NASRULLAH@ADSPIPE.COM
ADS SALES REP	BRAD DUNLOP 613-893-7336 BRAD.DUNLOP@ADS-PIPE.COM
PROJECT NO.	S430138

Advanced Drainage Systems, Inc.

SiteAssist
FOR STORMTECH
INSTALLATION INSTRUCTIONS
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1398 BCDC

OTTAWA, ON, CANADA

SC-310 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-310.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE OR POLYETHYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 50 mm (2").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2922 SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2922 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.
10. MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE. DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
11. ADS DOES NOT DESIGN OR PROVIDE MEMBRANE LINER SYSTEMS. TO MINIMIZE THE LEAKAGE POTENTIAL OF LINER SYSTEMS, THE MEMBRANE LINER SYSTEM SHOULD BE DESIGNED BY A KNOWLEDGEABLE GEOTEXTILE PROFESSIONAL AND INSTALLED BY A QUALIFIED CONTRACTOR.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-310 SYSTEM

1. STORMTECH SC-310 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE; AASHTO M43 #3, 357, 4, 467, 5, 56, OR 57.
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

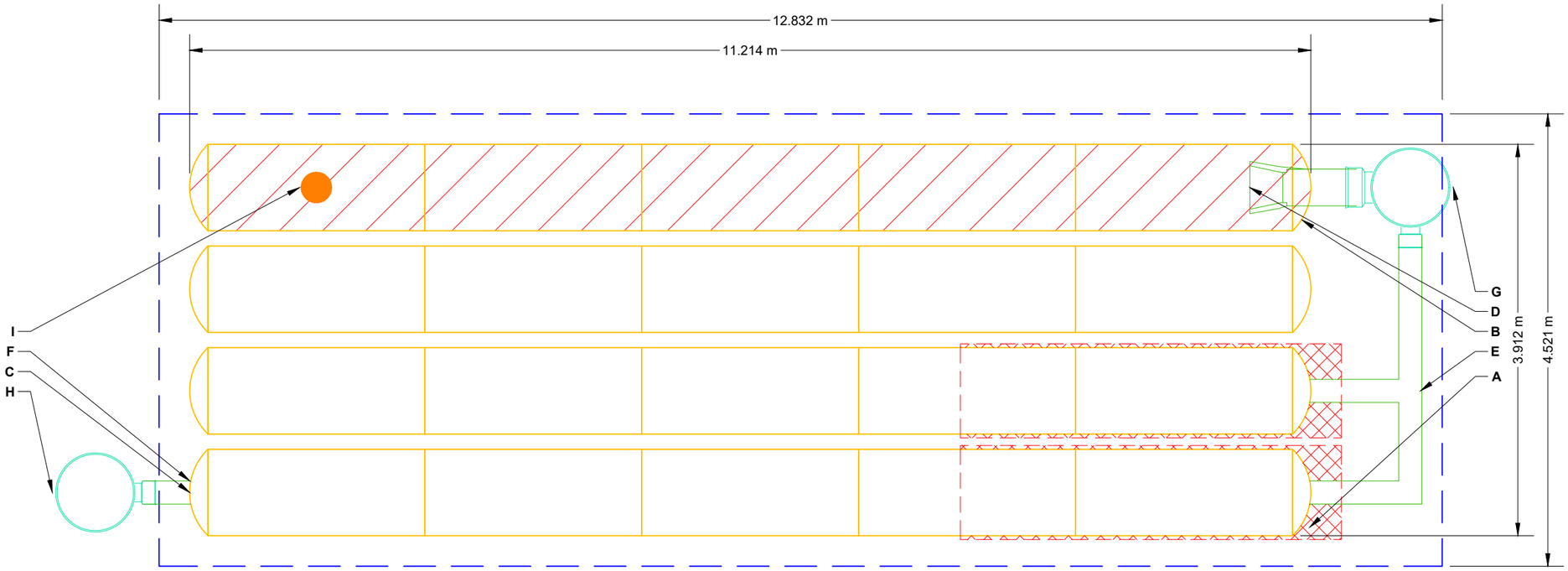
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-800-821-6710 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT: LID C1		CONCEPTUAL ELEVATIONS	
20	STORMTECH SC-310 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	2.997
8	STORMTECH SC-310 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	1.168
152	STONE ABOVE (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	1.016
152	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	1.016
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	1.016
21.5	INSTALLED SYSTEM VOLUME (m^3) BELOW ELEVATION 0.711 (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	0.711
		TOP OF SC-310 CHAMBER:	0.559
		200 mm x 200 mm TOP MANIFOLD INVERT:	0.241
		300 mm ISOLATOR ROW PLUS INVERT:	0.175
		200 mm BOTTOM CONNECTION INVERT:	0.168
58.0	SYSTEM AREA (m^2)	BOTTOM OF SC-310 CHAMBER:	0.152
34.7	SYSTEM PERIMETER (m)	BOTTOM OF STONE:	0.000

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PRE-CORED END CAP	A	200 mm TOP PRE-CORED END CAP, PART#: SC310EPE08TPC / TYP OF ALL 200 mm TOP CONNECTIONS	89 mm	
PREFABRICATED EZ END CAP	B	300 mm BOTTOM PREFABRICATED EZ END CAP, PART#: SC310ECEZ / TYP OF ALL 300 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	23 mm	
PRE-CORED END CAP	C	200 mm BOTTOM PRE-CORED END CAP, PART#: SC310EPE08BPC / TYP OF ALL 200 mm BOTTOM CONNECTIONS	15 mm	
FLAMP	D	INSTALL FLAMP ON 300 mm ACCESS PIPE / PART#: SC31012RAMP		
MANIFOLD	E	200 mm x 200 mm TOP MANIFOLD, MOLDED FITTINGS	89 mm	
PIPE CONNECTION	F	200 mm BOTTOM CONNECTION	15 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	G	750 mm DIAMETER (610 mm SUMP MIN)		38 L/s IN
NYLOPLAST (OUTLET)	H	750 mm DIAMETER (DESIGN BY ENGINEER)		20 L/s OUT
INSPECTION PORT	I	150 mm SEE DETAIL		



ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 3.810 m OF ADSPLUS625 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- **NOT FOR CONSTRUCTION**: THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

1398 BCDC
OTTAWA, ON, CANADA
DATE: 01/14/2025 | DRAWN: RT | PROJECT #: S430138 | CHECKED: RCT

DESCRIPTION	CHK	DRW	DATE

StormTech® Chamber System

1-800-821-6710 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 50

PROPOSED LAYOUT: LID C2

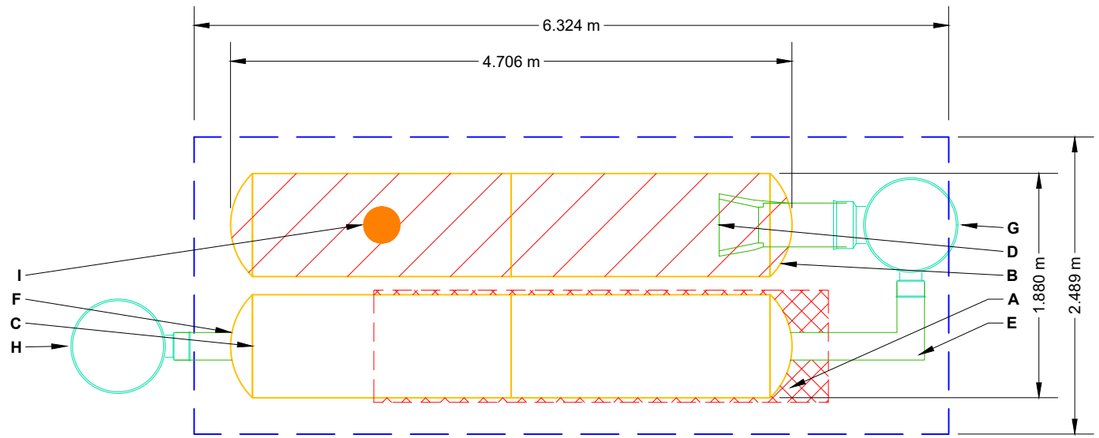
4	STORMTECH SC-310 CHAMBERS	
4	STORMTECH SC-310 END CAPS	
152	STONE ABOVE (mm)	
152	STONE BELOW (mm)	
40	STONE VOID	
5.5	INSTALLED SYSTEM VOLUME (m^3) BELOW ELEVATION 0.711 (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	
15.7	SYSTEM AREA (m^2)	
17.6	SYSTEM PERIMETER (m)	

CONCEPTUAL ELEVATIONS

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	2.997
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	1.168
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	1.016
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	1.016
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	1.016
TOP OF STONE:	0.711
TOP OF SC-310 CHAMBER:	0.559
200 mm x 200 mm TOP MANIFOLD INVERT:	0.241
300 mm ISOLATOR ROW PLUS INVERT:	0.175
200 mm BOTTOM CONNECTION INVERT:	0.168
BOTTOM OF SC-310 CHAMBER:	0.152
BOTTOM OF STONE:	0.000

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PRE-CORED END CAP	A	200 mm TOP PRE-CORED END CAP, PART#: SC310EPE08TPC / TYP OF ALL 200 mm TOP CONNECTIONS	89 mm	
PREFABRICATED EZ END CAP	B	300 mm BOTTOM PREFABRICATED EZ END CAP, PART#: SC310ECEZ / TYP OF ALL 300 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	23 mm	
PRE-CORED END CAP	C	200 mm BOTTOM PRE-CORED END CAP, PART#: SC310EPE08BPC / TYP OF ALL 200 mm BOTTOM CONNECTIONS	15 mm	
FLAMP	D	INSTALL FLAMP ON 300 mm ACCESS PIPE / PART#: SC31012RAMP		
MANIFOLD	E	200 mm x 200 mm TOP MANIFOLD, MOLDED FITTINGS	89 mm	
PIPE CONNECTION	F	200 mm BOTTOM CONNECTION	15 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	G	750 mm DIAMETER (610 mm SUMP MIN)		
NYLOPLAST (OUTLET)	H	750 mm DIAMETER (DESIGN BY ENGINEER)		20 L/s OUT
INSPECTION PORT	I	150 mm SEE DETAIL		



ISOLATOR ROW PLUS (SEE DETAIL)

PLACE MINIMUM 3.810 m OF ADSPLUS625 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
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Chamber System
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4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 50

PROPOSED LAYOUT: LID C3

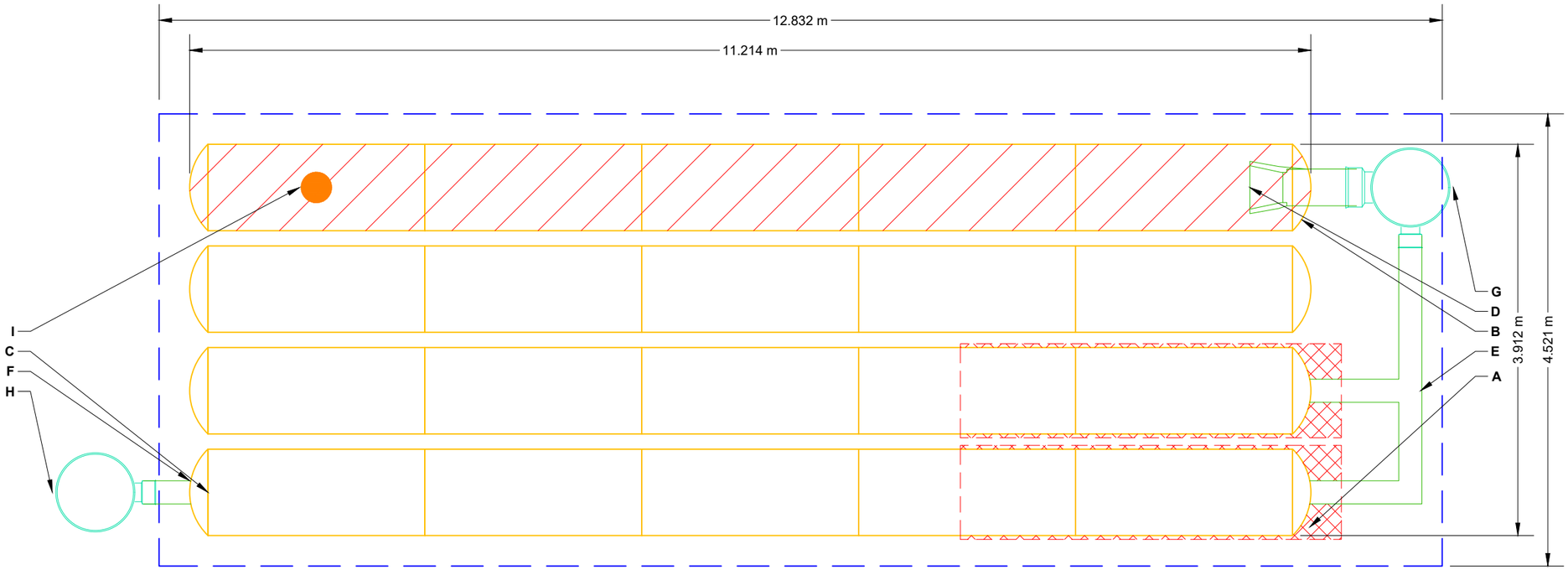
20	STORMTECH SC-310 CHAMBERS	
8	STORMTECH SC-310 END CAPS	
152	STONE ABOVE (mm)	
152	STONE BELOW (mm)	
40	STONE VOID	
21.5	INSTALLED SYSTEM VOLUME (m^3) BELOW ELEVATION 0.711 (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	
58.0	SYSTEM AREA (m^2)	
34.7	SYSTEM PERIMETER (m)	

CONCEPTUAL ELEVATIONS

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	2.997
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	1.168
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	1.016
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	1.016
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	1.016
TOP OF STONE:	0.711
TOP OF SC-310 CHAMBER:	0.559
200 mm x 200 mm TOP MANIFOLD INVERT:	0.241
300 mm ISOLATOR ROW PLUS INVERT:	0.175
200 mm BOTTOM CONNECTION INVERT:	0.168
BOTTOM OF SC-310 CHAMBER:	0.152
BOTTOM OF STONE:	0.000

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PRE-CORED END CAP	A	200 mm TOP PRE-CORED END CAP, PART#: SC310EPE08TPC / TYP OF ALL 200 mm TOP CONNECTIONS	89 mm	
PREFABRICATED EZ END CAP	B	300 mm BOTTOM PREFABRICATED EZ END CAP, PART#: SC310ECEZ / TYP OF ALL 300 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	23 mm	
PRE-CORED END CAP	C	200 mm BOTTOM PRE-CORED END CAP, PART#: SC310EPE08BPC / TYP OF ALL 200 mm BOTTOM CONNECTIONS	15 mm	
FLAMP	D	INSTALL FLAMP ON 300 mm ACCESS PIPE / PART#: SC31012RAMP		
MANIFOLD	E	200 mm x 200 mm TOP MANIFOLD, MOLDED FITTINGS	89 mm	
PIPE CONNECTION	F	200 mm BOTTOM CONNECTION	15 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	G	750 mm DIAMETER (610 mm SUMP MIN)		38 L/s IN
NYLOPLAST (OUTLET)	H	750 mm DIAMETER (DESIGN BY ENGINEER)		20 L/s OUT
INSPECTION PORT	I	150 mm SEE DETAIL		



ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 3.810 m OF ADSPLUS625 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

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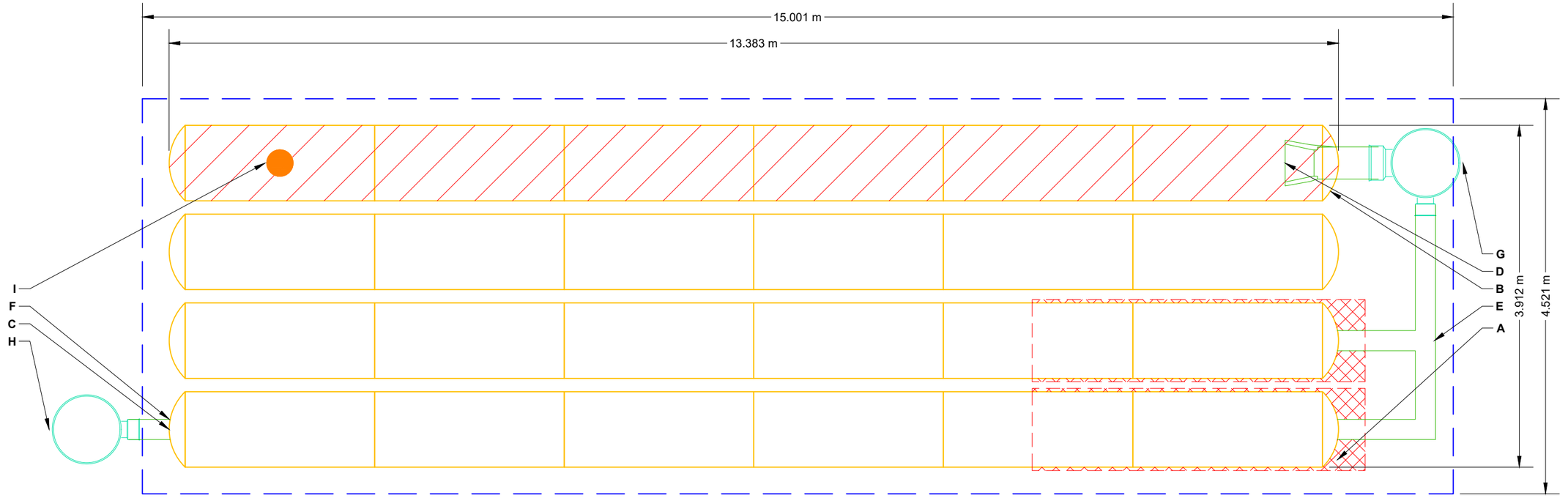
HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 50

PROPOSED LAYOUT: LID C4		CONCEPTUAL ELEVATIONS	
24	STORMTECH SC-310 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	2.997
8	STORMTECH SC-310 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	1.168
152	STONE ABOVE (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	1.016
152	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	1.016
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	1.016
25.3	INSTALLED SYSTEM VOLUME (m^3) BELOW ELEVATION 0.711 (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	0.711
		TOP OF SC-310 CHAMBER:	0.559
		200 mm x 200 mm TOP MANIFOLD INVERT:	0.241
		300 mm ISOLATOR ROW PLUS INVERT:	0.175
		200 mm BOTTOM CONNECTION INVERT:	0.168
67.8	SYSTEM AREA (m^2)	BOTTOM OF SC-310 CHAMBER:	0.152
39.0	SYSTEM PERIMETER (m)	BOTTOM OF STONE:	0.000

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PRE-CORED END CAP	A	200 mm TOP PRE-CORED END CAP, PART#: SC310EPE08TPC / TYP OF ALL 200 mm TOP CONNECTIONS	89 mm	
PREFABRICATED EZ END CAP	B	300 mm BOTTOM PREFABRICATED EZ END CAP, PART#: SC310ECEZ / TYP OF ALL 300 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	23 mm	
PRE-CORED END CAP	C	200 mm BOTTOM PRE-CORED END CAP, PART#: SC310EPE08BPC / TYP OF ALL 200 mm BOTTOM CONNECTIONS	15 mm	
FLAMP	D	INSTALL FLAMP ON 300 mm ACCESS PIPE / PART#: SC31012RAMP		
MANIFOLD	E	200 mm x 200 mm TOP MANIFOLD, MOLDED FITTINGS	89 mm	
PIPE CONNECTION	F	200 mm BOTTOM CONNECTION	15 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	G	750 mm DIAMETER (610 mm SUMP MIN)		50 L/s IN
NYLOPLAST (OUTLET)	H	750 mm DIAMETER (DESIGN BY ENGINEER)		20 L/s OUT
INSPECTION PORT	I	150 mm SEE DETAIL		



ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 3.810 m OF ADSPLUS625 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

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DESCRIPTION | CHK | DRW | DATE

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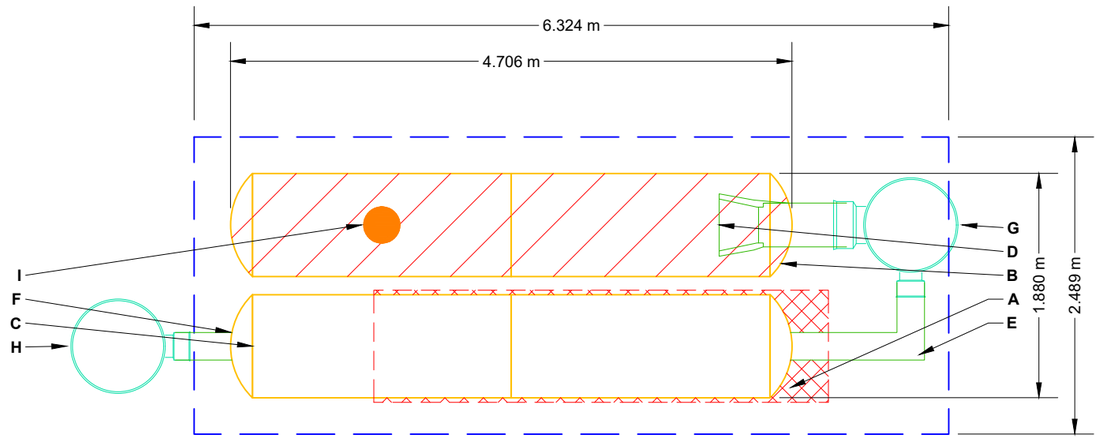
1-800-733-7473

SCALE = 1 : 50

PROPOSED LAYOUT: LID C5		CONCEPTUAL ELEVATIONS	
4	STORMTECH SC-310 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	2.997
4	STORMTECH SC-310 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	1.168
152	STONE ABOVE (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	1.016
152	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	1.016
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	1.016
5.5	INSTALLED SYSTEM VOLUME (m^3) BELOW ELEVATION 0.711 (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	0.711
		TOP OF SC-310 CHAMBER:	0.559
		200 mm x 200 mm TOP MANIFOLD INVERT:	0.241
		300 mm ISOLATOR ROW PLUS INVERT:	0.175
		200 mm BOTTOM CONNECTION INVERT:	0.168
15.7	SYSTEM AREA (m^2)	BOTTOM OF SC-310 CHAMBER:	0.152
17.6	SYSTEM PERIMETER (m)	BOTTOM OF STONE:	0.000

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PRE-CORED END CAP	A	200 mm TOP PRE-CORED END CAP, PART#: SC310EPE08TPC / TYP OF ALL 200 mm TOP CONNECTIONS	89 mm	
PREFABRICATED EZ END CAP	B	300 mm BOTTOM PREFABRICATED EZ END CAP, PART#: SC310ECEZ / TYP OF ALL 300 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	23 mm	
PRE-CORED END CAP	C	200 mm BOTTOM PRE-CORED END CAP, PART#: SC310EPE08BPC / TYP OF ALL 200 mm BOTTOM CONNECTIONS	15 mm	
FLAMP	D	INSTALL FLAMP ON 300 mm ACCESS PIPE / PART#: SC31012RAMP		
MANIFOLD	E	200 mm x 200 mm TOP MANIFOLD, MOLDED FITTINGS	89 mm	
PIPE CONNECTION	F	200 mm BOTTOM CONNECTION	15 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	G	750 mm DIAMETER (610 mm SUMP MIN)		
NYLOPLAST (OUTLET)	H	750 mm DIAMETER (DESIGN BY ENGINEER)		20 L/s OUT
INSPECTION PORT	I	150 mm SEE DETAIL		



ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 3.810 m OF ADSPLUS625 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

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1398 BCDC
OTTAWA, ON, CANADA
DATE: 01/14/2025
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DATE	DRW	CHK	DESCRIPTION

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Chamber System
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4640 TRUEMAN BLVD
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1-800-733-7473

SCALE = 1 : 50

SHEET
6 OF 11

PROPOSED LAYOUT: LID C6		CONCEPTUAL ELEVATIONS	
20	STORMTECH SC-310 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	2.997
10	STORMTECH SC-310 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	1.168
152	STONE ABOVE (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	1.016
152	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	1.016
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	1.016
21.8	INSTALLED SYSTEM VOLUME (m^3) BELOW ELEVATION 0.711 (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	0.711
		TOP OF SC-310 CHAMBER:	0.559
		200 mm x 200 mm TOP MANIFOLD INVERT:	0.241
		300 mm ISOLATOR ROW PLUS INVERT:	0.175
		200 mm BOTTOM CONNECTION INVERT:	0.168
59.0	SYSTEM AREA (m^2)	BOTTOM OF SC-310 CHAMBER:	0.152
32.4	SYSTEM PERIMETER (m)	BOTTOM OF STONE:	0.000

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PRE-CORED END CAP	A	200 mm BOTTOM PRE-CORED END CAP, PART#: SC310EPE08BPC / TYP OF ALL 200 mm BOTTOM CONNECTIONS	15 mm	
PRE-CORED END CAP	B	200 mm TOP PRE-CORED END CAP, PART#: SC310EPE08TPC / TYP OF ALL 200 mm TOP CONNECTIONS	89 mm	
PREFABRICATED EZ END CAP	C	300 mm BOTTOM PREFABRICATED EZ END CAP, PART#: SC310ECEZ / TYP OF ALL 300 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	23 mm	
FLAMP	D	INSTALL FLAMP ON 300 mm ACCESS PIPE / PART#: SC31012RAMP		
MANIFOLD	E	200 mm x 200 mm TOP MANIFOLD, MOLDED FITTINGS	89 mm	
PIPE CONNECTION	F	200 mm BOTTOM CONNECTION	15 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	G	750 mm DIAMETER (610 mm SUMP MIN)		63 L/s IN
NYLOPLAST (OUTLET)	H	750 mm DIAMETER (DESIGN BY ENGINEER)		20 L/s OUT
INSPECTION PORT	I	150 mm SEE DETAIL		

ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 3.810 m OF ADSPLUS625 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

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1398 BCDC - REV 1

OTTAWA, ON, CANADA

DATE: 01/14/2025 | DRAWN: RT | CHECKED: RCT

PROJECT #: S430138

DESCRIPTION	CHK	DRW	DATE

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StormTech®
Chamber System

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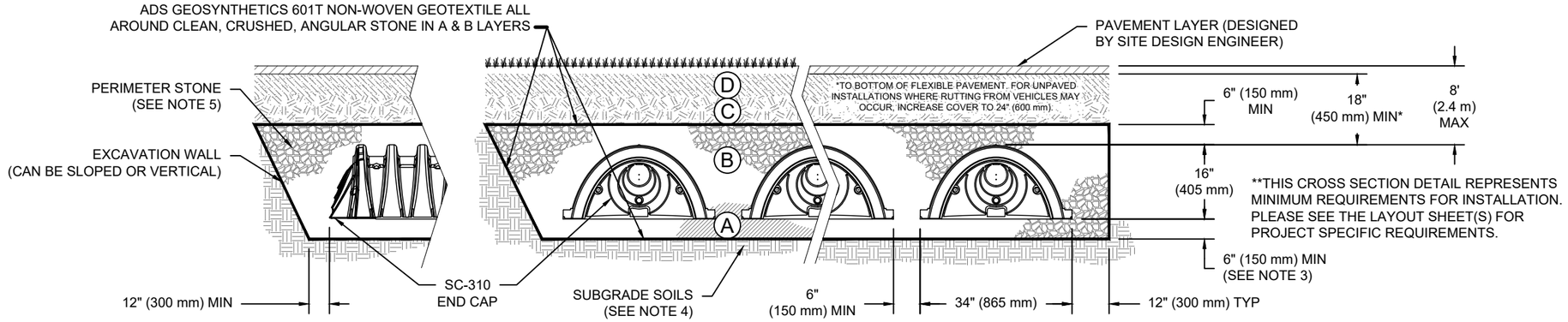
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 50

ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE5	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE5	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



NOTES:

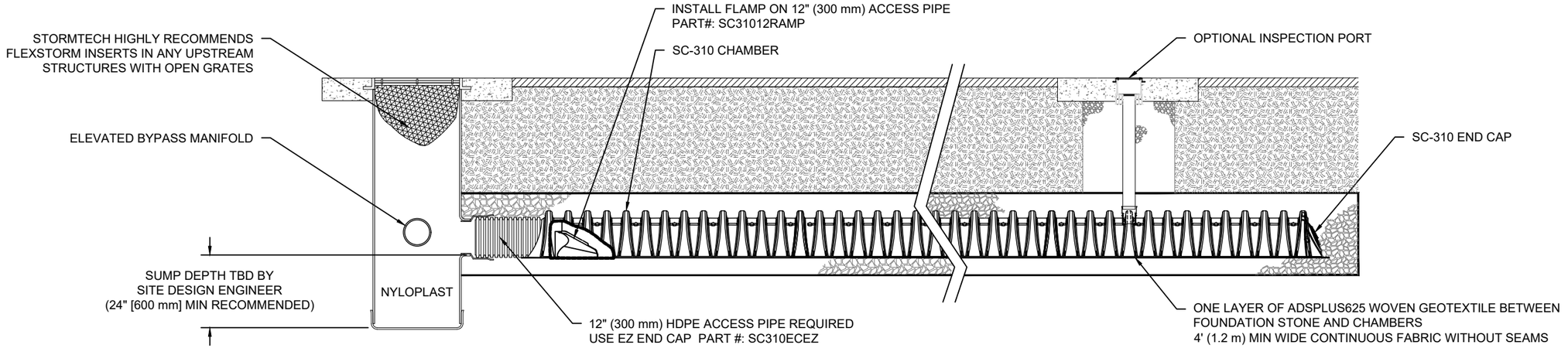
1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS. REFERENCE STORMTECH DESIGN MANUAL FOR BEARING CAPACITY GUIDANCE.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

1398 BCDC
OTTAWA, ON, CANADA
DATE: 01/14/2025 | DRAWN: RT | CHECKED: RCT
PROJECT #: S430138

DATE	DRW	CHK	DESCRIPTION

StormTech® Chamber System
1-800-821-6710 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473



SC-310 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

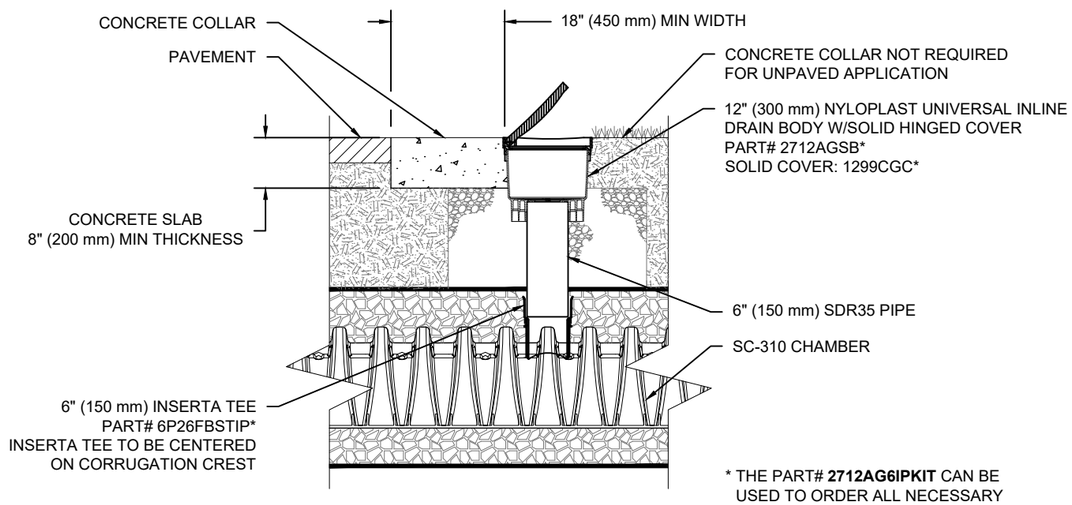
STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



SC-310 6" (150 mm) INSPECTION PORT DETAIL
NTS

1398 BCDC
OTTAWA, ON, CANADA
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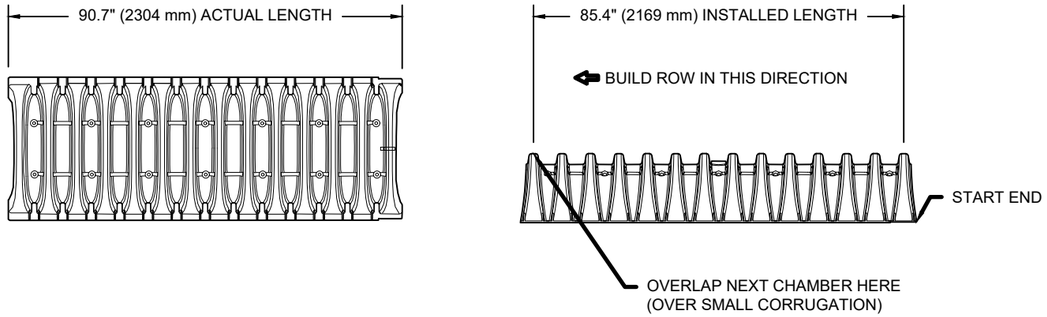
PROJECT #: S430138

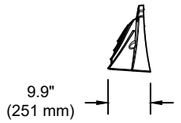
DATE	DRW	CHK	DESCRIPTION

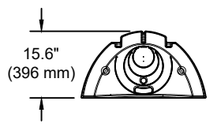
StormTech®
Chamber System
1-800-821-6710 | WWW.STORMTECH.COM
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

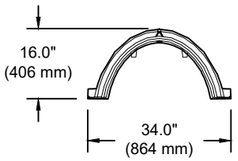
SC-310 TECHNICAL SPECIFICATION

NTS







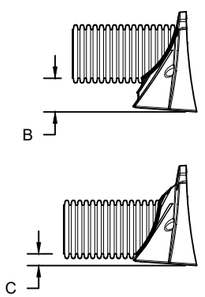


NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0.88 m³)
WEIGHT	35.0 lbs.	(16.8 kg)

*ASSUMES 6" (152 mm) ABOVE, BELOW, AND BETWEEN CHAMBERS

PART #	STUB	B	C
SC310EPE06TPC	6" (150 mm)	5.8" (147 mm)	---
SC310EPE06BPC		---	0.5" (13 mm)
SC310EPE08TPC	8" (200 mm)	3.5" (89 mm)	---
SC310EPE08BPC		---	0.6" (15 mm)
SC310EPE10TPC	10" (250 mm)	1.4" (36 mm)	---
SC310EPE10BPC		---	0.7" (18 mm)
SC310ECEZ*	12" (300 mm)	---	0.9" (23 mm)



ALL STUBS, EXCEPT FOR THE SC310ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC310ECEZ THE 12" (300 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0.25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL; PRE-CORED END CAPS END WITH "PC"

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Chamber System
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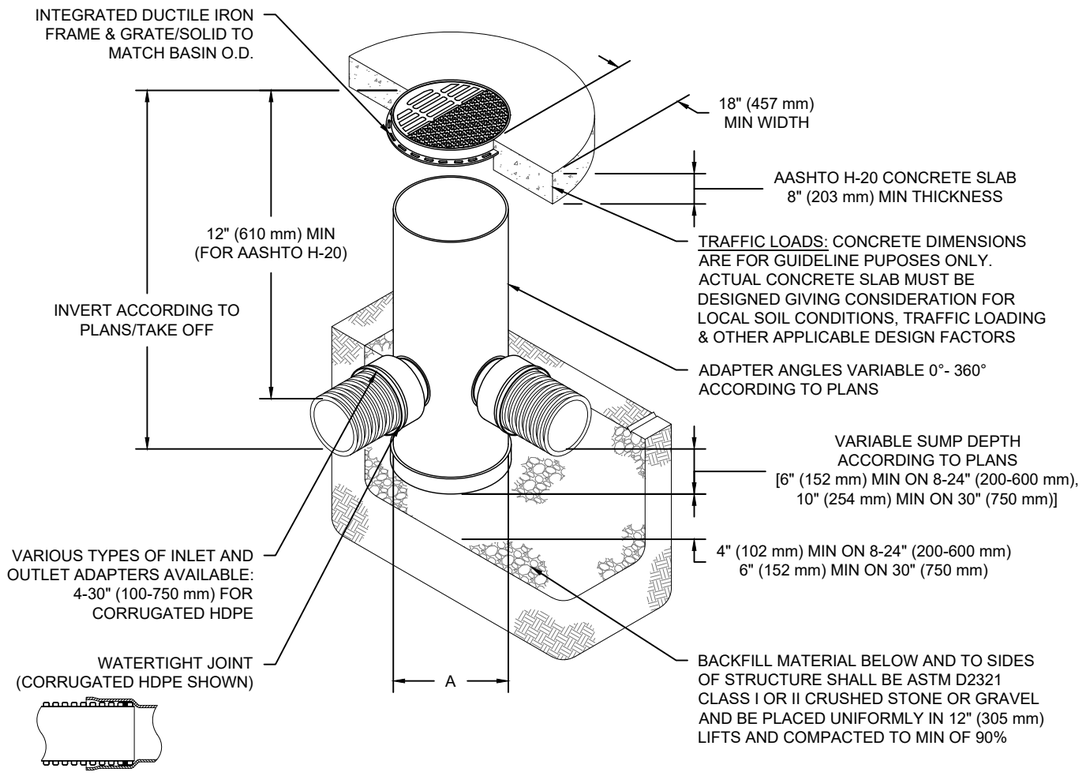
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

NYLOPLAST DRAIN BASIN

NTS



NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

1398 BCDC

OTTAWA, ON, CANADA

DATE: 01/14/2025 | DRAWN: RT | CHECKED: RCT

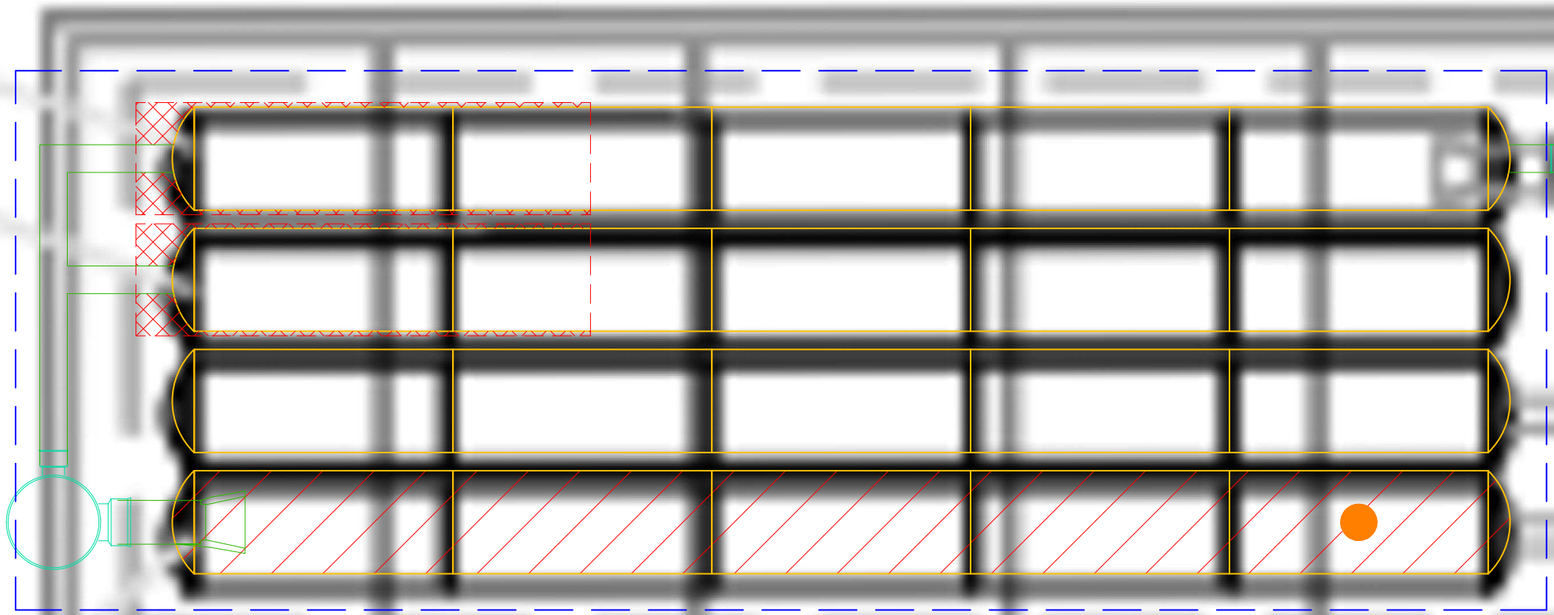
PROJECT #: S430138

DATE	DRW	CHK	DESCRIPTION

Nyloplast®

770-932-2443 | WWW.NYLOPLAST-US.COM

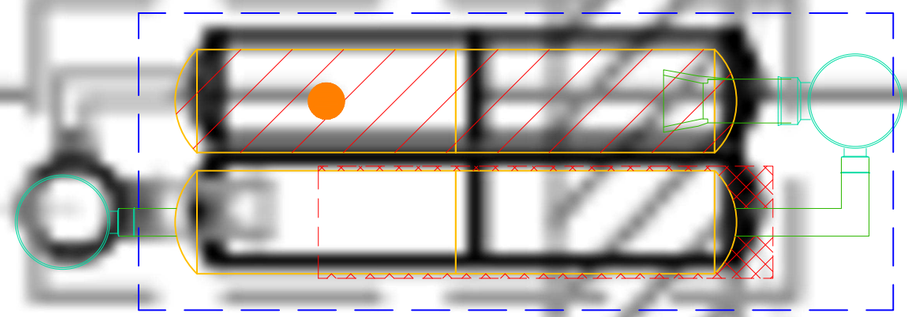
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473



STORMTECH

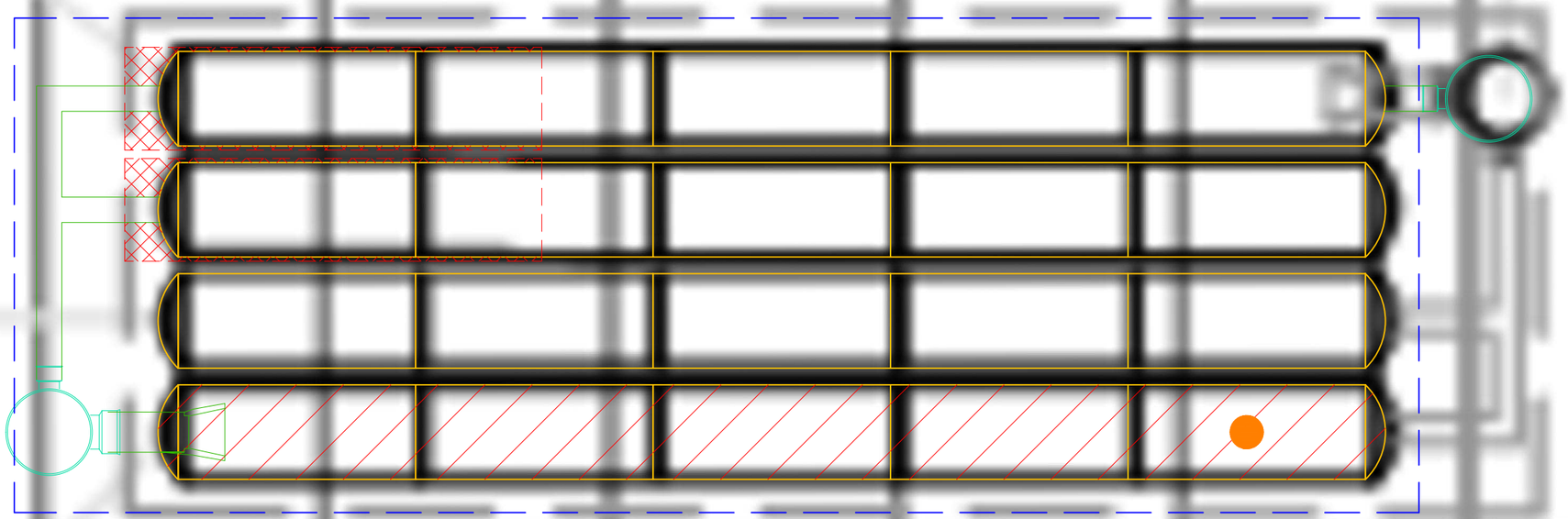
SC-310

LID CHAMBER C1



CB 370

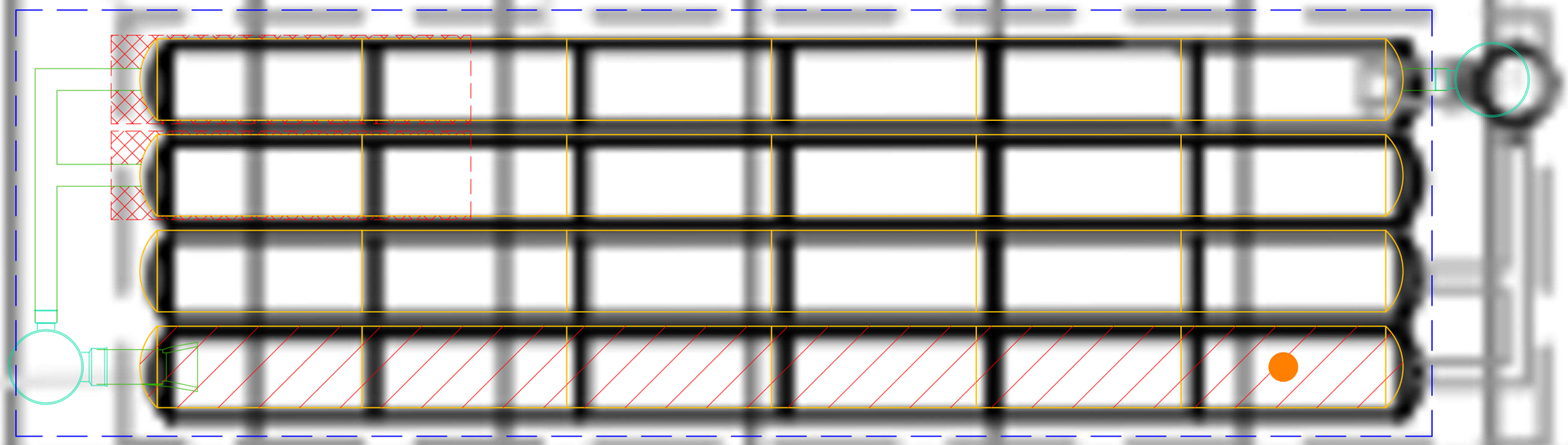
T/G 93.03



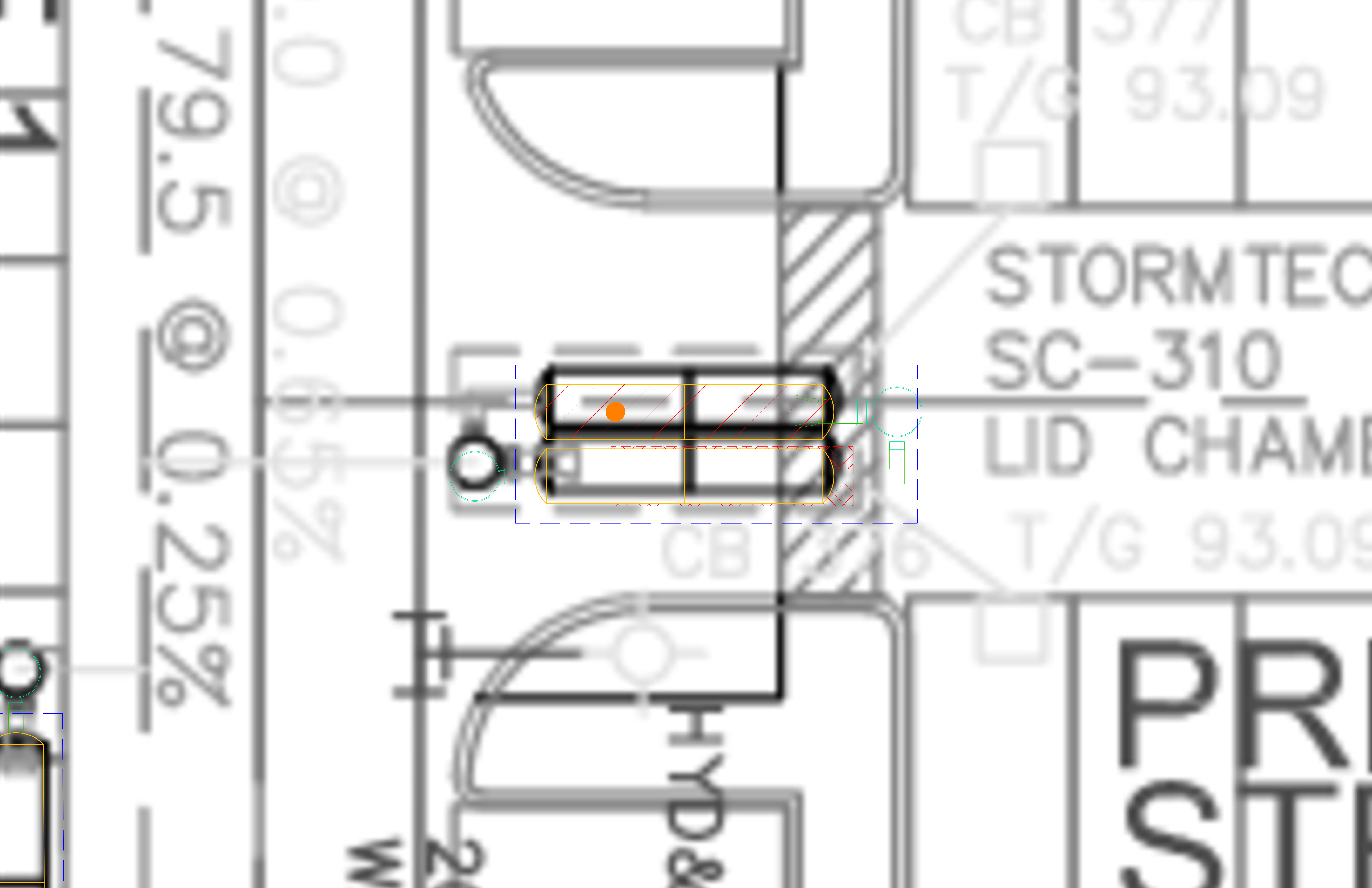
STORMTECH

SC-310

LID CHAMBER C3



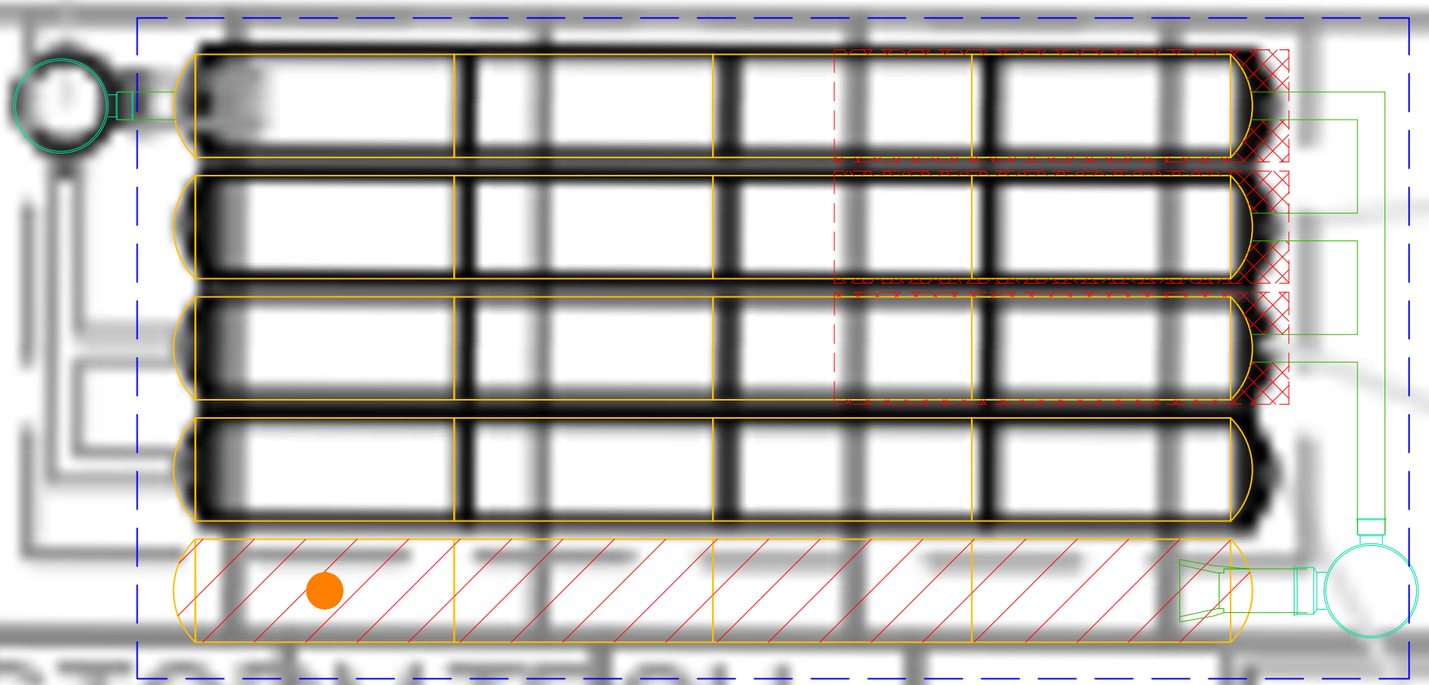
STORMTECH
SC-310
LID CHAMBER C4


79.5 @ 0.25%
CB 377
T/G 93.09
SC-310
T/G 93.09

0.65%

@ 0.25%

200x150



STORMTECH

SC-310

LID CHAMBER C6

BLK 16 (THS)
BLK 15 (THS)
BLK 14 (THS)
BLK 13 (THS)
BLK 12 (THS)
1.7m
250Ø PERFORATED HDPE 21.5 @ 0.50%
250Ø PERFORATED HDPE 21.5 @ 0.50%
250Ø PERFORATED HDPE 19.5 @ 0.50%
250Ø PERFORATED HDPE 7.5 @ 2.00%
250Ø PERFORATED HDPE 21.5 @ 2.75%
250Ø PERFORATED HDPE 19.5 @ 0.50%
250Ø PERFORATED HDPE 19.5 @ 0.50%
250Ø PERFORATED HDPE 19.5 @ 0.50%
RYCB (CITY STD. S30) T/G 93.58 OUT INV. 91.92
RYCB (CITY STD. S30) T/G 93.51 OUT INV. 92.03
RYCB (CITY STD. S30) T/G 93.38 OUT INV. 92.13
RYCB (CITY STD. S311) T/G 93.53 OUT INV. 92.28
RYCB (CITY STD. S311) T/G 93.64 OUT INV. 92.39
RYCB (CITY STD. S30) T/G 93.36 OUT INV. 91.80
RYCB (CITY STD. S30) T/G 93.24 OUT INV. 91.70
RYCB (CITY STD. S30) T/G 93.35 OUT INV. 91.60
RYCB (CITY STD. S30) T/G 93.21 OUT INV. 91.50
RYCB (CITY STD. S307) T/G 93.23 OUT INV. 91.41
PHASE 3A
PHASE 4
HYD&V
PRIVATE STREET 3
BLOCK 6 (STACKED TOWNHOUSE)
BLOCK 5 (STACKED TOWNHOUSE)
PRIVATE STREET 5
STORMTECH SC-310 LID CHAMBER C2
STORMTECH SC-310 LID CHAMBER C5
200Ø PVC WATERMAIN
LANE 1
MH 126A
MH 613
MH 132A
MH 530
200Ø PVC SAN 87.0 @ 0.65%
450Ø CONC STM 86.5 @ 0.20%
450Ø CONC STM 79.5 @ 0.25%
200Ø PVC SAN 80.0 @ 0.65%
STORMTECH SC-310 LID CHAMBER C1
STORMTECH SC-310 LID CHAMBER C3
STORMTECH SC-310 LID CHAMBER C4
STORMTECH SC-310 LID CHAMBER C6
PRIVATE STREET 4
PRIVATE STREET 6
150Ø PVC WATERMAIN
150Ø V&B
150x150Ø TEE
200x150Ø
150Ø PLUG
250Ø COPPER WATERMAIN
22.5° BEND
200Ø REDUCER
BLOCK 10 (STACKED TOWNHOUSE)
BLOCK 7 (STACKED TOWNHOUSE)
BLOCK 4 (STACKED TOWNHOUSE)
BLOCK 3 (STACKED TOWNHOUSE)
CONSERVANCY DRIVE
BH 17-12
3.0m MULTI-USE PATHWAY
MH 602
MH 508
525Ø CONC STM 117.0 @ 0.20%
R=5.00

Chamber ID	Units (SC-310)	TOP OF GRATE	CHAMBER INV	CHAMBER OBV	CHAMBER HEIGHT	CHAMBER COVER DEPTH	PERIMETER STONE THICKNESS	OUTLET PIPE INV @CHAMBER	OUTLET PIPE SIZE (mm)	OUTLET PIPE LENGTH	OUTLET PIPE SLOPE (%)	OUTLET PIPE INV @ MAIN PIPE	Trib Area (Ha)	RC	Imp	Required Volume (cu.m) for 80% TSS removal per Ha	Required Volume (cu.m) for 80% TSS removal	Provided Volume(cu.m)	Footprint (m2)
C1	20	93.12	90.72	91.12	0.405	1.20	0.15	91.92	300	7.5	1.0	91.85	0.275	0.76	80%	39	10.7	21.5	58.0
C2	4	93.09	91.34	91.74	0.405	1.20	0.15	91.89	300	6.0	1.0	91.83	0.068	0.75	79%	38	2.6	5.5	15.7
C3	20	93.05	91.30	91.70	0.405	1.20	0.15	91.85	300	2.5	1.0	91.83	0.277	0.81	87%	40	11.1	21.5	58.0
C4	24	93.05	91.30	91.70	0.405	1.20	0.15	91.85	300	7.5	1.0	91.78	0.331	0.81	87%	40	13.2	25.3	67.8
C5	4	93.17	91.42	91.82	0.405	1.20	0.15	91.97	300	5.0	1.0	91.92	0.057	0.74	77%	38	2.2	5.5	15.7
C6	16	93.11	91.26	91.66	0.405	1.30	0.15	91.81	300	2.0	1.0	91.79	0.224	0.82	89%	40	9.0	17.7	48.2
Total													1.23				48.8	97.0	263.4

As per MOE 2003, Storage (m3/ha) required for 80% TSS removal with infiltration

Imp (%)	Storage (m3/ha)
35%	**25**
55%	**30**
70%	**35**
85%	**40**

JFSA Canada Inc.
52 Springbrook Drive,
Ottawa, ON K2S 1B9
T 613-836-3884 F 613-836-0332

jfsa.com

Attachment B

TSS Removal Calculations

Selection and comparison of alternatives

Method	Optimum TSS Removal	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8	Alt. 9	Alt. 10
Street Sweeping (Monthly)	5%										
Street Sweeping (Weekly)	10%										
Street Sweeping (Weekly with Elgin Eagle)*	88%										
Curb Cut with Grass Swales	75%			X							
Curb Cut with Infiltration Trenches	80%										
Catchbasin Inserts (CB Shield)*	57%		X		X	X			X		X
Deep Sump Catch Basin	10%	X			X		X				X
Infiltration/ Filtration Trenches**	80%				X	X	X				
Infiltration at CBs, per MOE Table 3.2	70%							X			X
OGS*	50%			X				X	X	X	X
Grass Swales	25%								X	X	
JellyFish*	85%										
SWM Pond (Wet Pond)	80%		X								
		=======	=======	=======	=======	=======	=======	=======	=======	=======	=======
Overall Performace		10.0%	91.4%	87.5%	92.3%	91.4%	82.0%	85.0%	**83.88%**	**62.50%**	**94.20%**

Treatment Train Overall Perfomance = 1 - (1- TSS Removal Rate Method 1) x (1- TSS Removal Rate Method 2) x (1- TSS Removal Rate Method 3 x ...)

*) TSS Removal as documented by ETV Canada

**) includes the use of Etobicoke infiltration or filtration systems or other permutations of same