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Palladium Terrace
425 Culdaff Road

Servicing and Stormwater Management Report

Prepared for: Broadstreet Properties Inc.

Engineering excellence. Planning progress. Liveable landscapes.

Palladium Terrace

425 Culdaff Road

City of Ottawa

Servicing and Stormwater Management Report

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

October /17/ 2024

Novatech File: 123194

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Engineers, Planners & Landscape Architects

October 17,2024

City of Ottawa
Planning, Real Estate and Economic Development Department
Planning and Infrastructure Approvals Branch
110 Laurier Avenue West, 4th Floor
Ottawa ON, K1P 1J1

Attention: **Colette Gorni, MCIP RPP, Planner II, Development Review West**

Reference: **425 Culdaff Road)**
Servicing and Stormwater Management Report
Our File No.: 123194

Please find enclosed the 'Servicing and Stormwater Management Report' for the above-noted development located in the City of Ottawa. This report is being submitted in support of the site plan application for the proposed development. Should you have any questions or require additional information, please contact the undersigned.

Yours truly,

NOVATECH

Greg MacDonald, P. Eng.
Director, Land Development and Public Sector Infrastructure

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1.0 INTRODUCTION

Novatech has been retained to prepare a Servicing and Stormwater Management Report for the proposed site plan located at 425 Culdaff Road (formerly 2765 Palladium Drive) within the City of Ottawa. The proposed site is denoted as part of Block 242, and a portion of Block 243 of the Subdivision located at 195 Huntmar Drive and is presently named Palladium Terrace. The purpose of this report is to support the site plan application for the subject development. **Figure 1 Key Plan** shows the site location.

1.1 Existing Conditions

The subject site is approximately 0.97 hectares (ha.) in size and is denoted as a part of Block 242, and a portion of Block 243 of the Subdivision located at 195 Huntmar Drive. It should be noted that the proposed development is only a portion Block 242 which had a total area of 2.27ha. The remainder of Block 242 is owned by a separate entity and presently proposed to be developed with a Motorsports World by others. The site is vacant and was cleared grubbed and pre-graded as part of the overall subdivision works. Historically, the south-west portion of Block 242 was agricultural land site, while the remainder of the block consisted of unused land with predominant tree cover.

The site is bound by the future Motorsports World to the north-east (presently vacant land), Derreen Avenue to the south-east, Culdaff Road and residential dwellings to the south-west, and a future commercial block to the north-west. The site is relatively flat and primarily drains from the north-east to the south-west with a +/- 0.50m grade differential across the site. **Figure 2** shows the existing site conditions.

The 195 Huntmar subdivision was designed by David Schafer Engineering Ltd. (DSEL) and design information is provided in the following report:

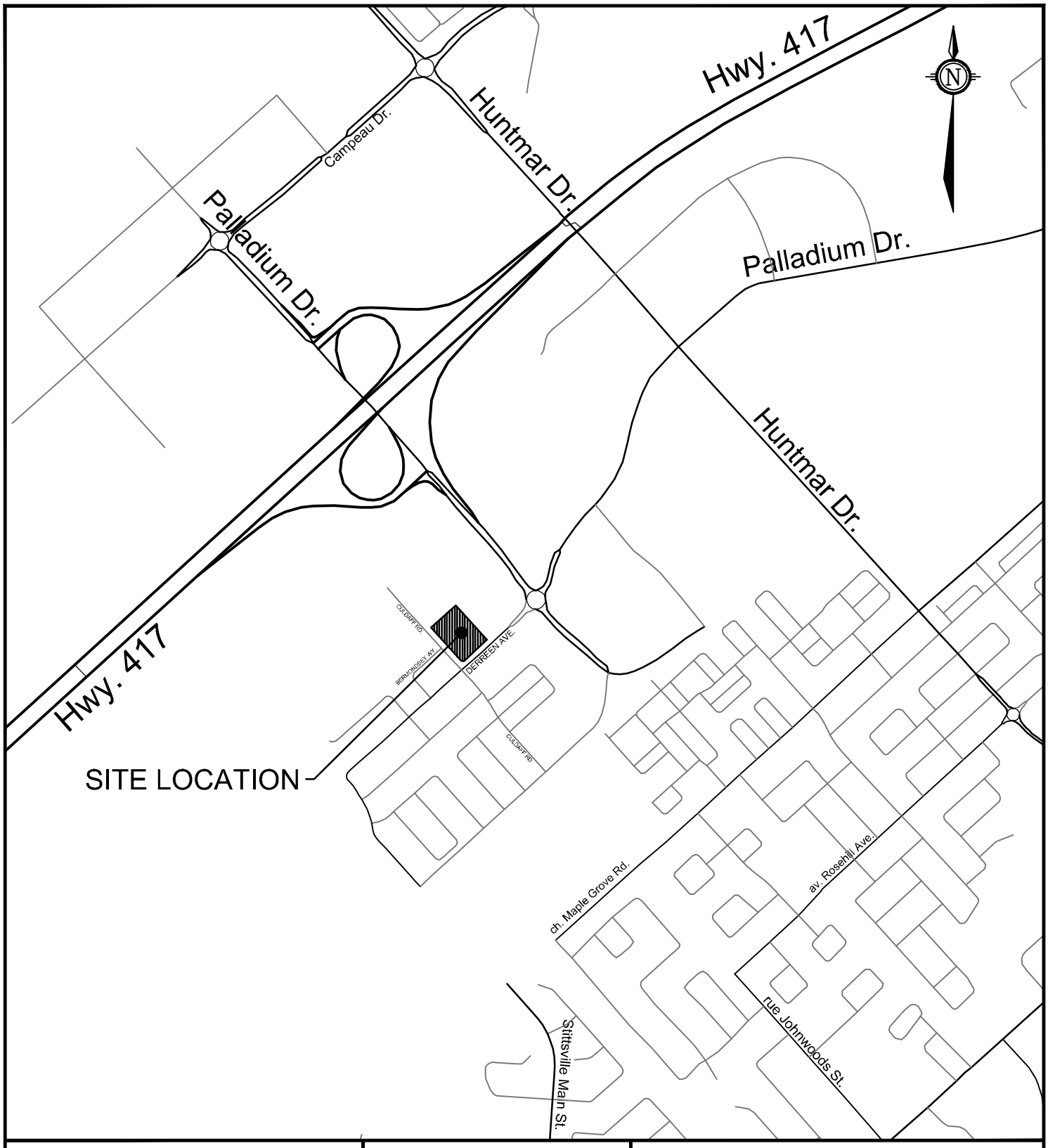
- 'Design Brief for 2325483 Ontario Ltd., 195 Huntmar Drive, City of Ottawa, Project No.: 12-624, prepared By DSEL dated July 2020, 2nd submission (Referenced as **DSEL Report**).

Additionally, the subdivision stormwater modelling was preformed by J.F. Sabourin and Associates Inc (JFSA), and design information is provided in the following report:

- 'Stormwater Management Report for the195 Huntmar Drive Subdivision to Pond 7, City of Ottawa, Project No.: 12-624, prepared By JFSA dated July 2020, 2nd submission (Referenced as **JSFA Report**).

1.2 Proposed Development

It is proposed to develop the site with a six (6) storey apartment building complete with a central above-ground parking area. The building will have one (1) level of underground parking beneath the proposed building footprint. The site will provide a total of 177 residential units. Vehicular access to the site will be provided from Derreen Avenue while pedestrian access from the site is provided from both Derreen Avenue and Culdaff Road. **Figure 3** shows the concept plan for the proposed development. Correspondence from the City pre-consultation meeting is also included in **Appendix A** for reference.



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CITY OF OTTAWA
425 CULDAFF ROAD

KEY PLAN

SCALE		
N.T.S		
DATE	JOB	FIGURE
APR. 2024	123194	FIGURE 1

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LEGEND

PROPOSED DEVELOPMENT BOUNDARY

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CITY OF OTTAWA
425 CULDAFF ROAD

EXISTING CONDITIONS

SCALE 1 : 1000 (0, 10, 20, 30, 40)

DATE JUNE 2024 | JOB 123194 | FIGURE FIGURE 2

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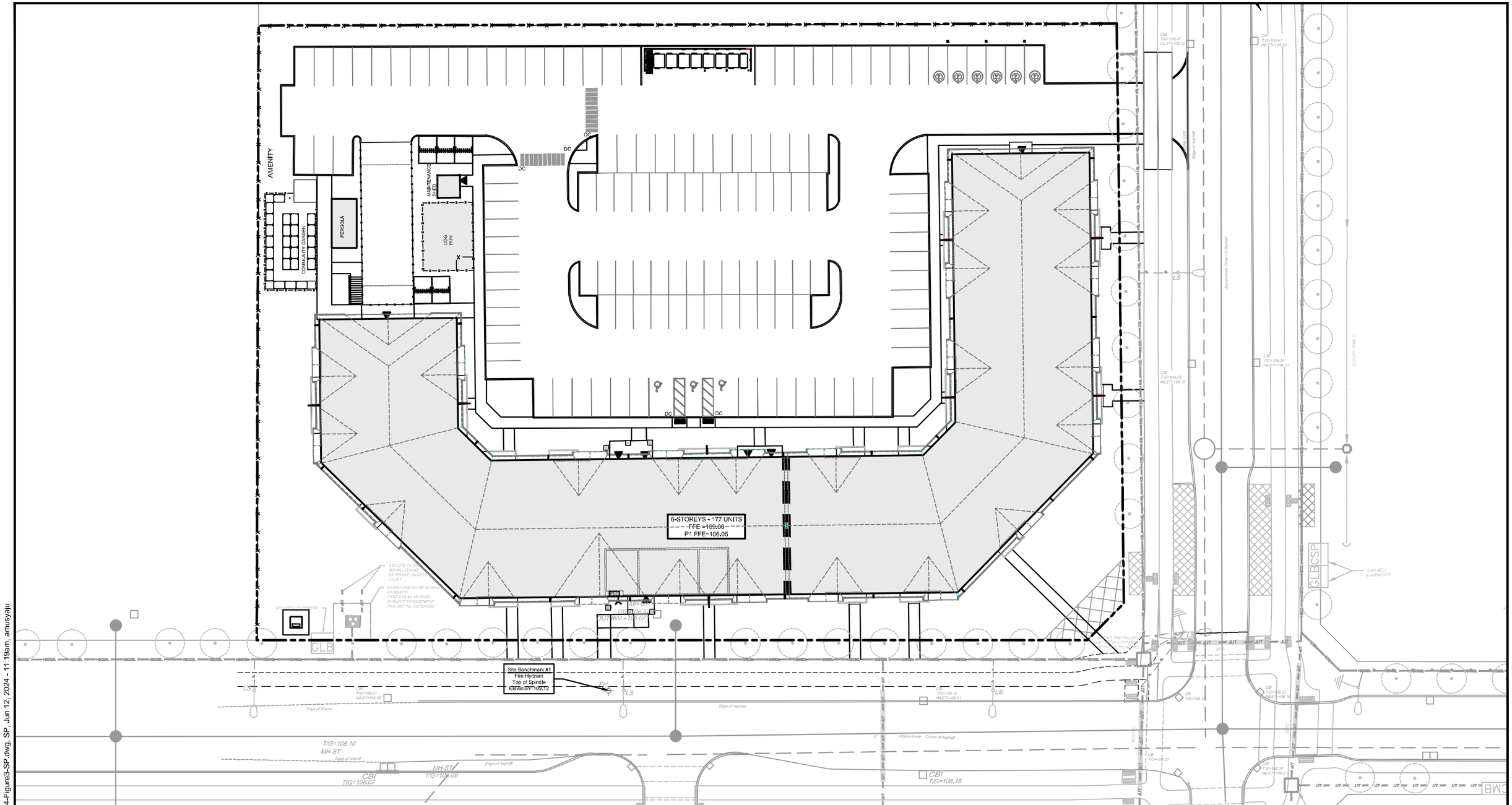

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CITY OF OTTAWA

425 CULDAFF ROAD

PROPOSED SITE PLAN

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE OCTOBER 2024 | JOB 123194 | FIGURE FIGURE 3

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2.0 GEOTECHNICAL INVESTIGATION

A geotechnical investigation was completed for the proposed development, and a report prepared entitled 'Geotechnical Investigation', Proposed Residential Development, 425 Culdaff Road, Ottawa, Ontario, prepared by Paterson Group Inc. dated May 21, 2024 (PG7040-1). The following is a summary of the findings of the reports:

- Practical refusal to augering and excavation was encountered at each test hole, with the exception of BH 4-24, at depths ranging from 2.2 to 5.3 m below ground surface, respectively.
- Ground water levels varied across the site from 4.27m to 1.26m BGS. It should also be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater levels could vary at the time of construction.
- The observed saturated hydraulic conductivity (Kfs) values and unfactored infiltration rates of the shallow unsaturated soils at the subject site ranged between 1.73×10^{-8} to 1.60×10^{-5} m/sec and 15 to 97 mm/hr, respectively. It is important to note that the estimated infiltration rates derived from the Kfs values are unfactored. Prior to use for design purposes, a safety correction factor will need to be applied to the above infiltration rates
- The measured hydraulic conductivity (K) values of the bedrock and glacial till ranged between 2.84×10^{-5} to 3.18×10^{-5} m/sec and 1.26×10^{-4} to 2.33×10^{-4} m/sec, respectively. The results are consistent with similar materials Paterson has encountered on other sites and typical published values for bedrock and glacial till with a sandy matrix.
- Excavation side slopes above the groundwater level extending to a maximum vertical height of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. The subsurface soil is considered to be mainly a Type 2 and Type 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.
- In sound bedrock, almost vertical side slopes can be constructed, provided all weathered and loose rock is removed or stabilized with rock anchors or other means determined by Paterson at the time of construction.
- A temporary Ministry of Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required if more than 400,000 L/day of ground and/or surface water are to be pumped during the construction phase. At least 4 to 5 months should be allowed for completion of the application and issuance of the permit by the MECP.
- For typical ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Persons as stipulated under O.Reg. 63/16.

3.0 WATER SERVICING

The proposed site is located within the City of Ottawa pressure Zone 3W. There are existing City watermains in the Derreen Avenue, and Culdaff Road rights-of-way fronting the proposed site, that were constructed as part of the 195 Huntmar Subdivision. There are 300mm diameter PVC watermains within both rights-of-way. As part of the subdivision development a single 200mm diameter water service stub was installed from the Culdaff Road watermain.

3.1 Watermain Design Parameters

Water Demands have been calculated using criteria from Section 4 of the City of Ottawa Water Distribution Guidelines, and ISTB-2021-03 as follows:

Table 3.1: Watermain Design Parameters and Criteria

Domestic Demand Design Parameters	**Design Parameters**
Unit Population: 1-Bed Apartments 2-bed Apartments 3 Bed Apartments	1.4 people/unit 2.1 people/unit 3.1 people/unit
Average Day Demand	280 L/c/d
Maximum Day Demand (MXDY)	Residential: 2.5 x Basic Day (> 500 Persons) MOE Table 3-3 (<500 Persons)
Peak Hour Demand (PKHR)	Residential: 2.2 x Max Day (> 500 Persons) MOE Table 3-3 (<500 Persons)
Fire Demand (FF) Design	**Design Flows**
Apartment Building Hydrant spacing	per FUS 2020 Within 45m of the building Siamese
System Pressure Criteria Design Parameters	**Criteria**
Maximum Pressure (BSDY) Condition	< 80 psi occupied areas
Minimum Pressure (PKHR) Condition	> 40 psi
Minimum Pressure (MXDY+FF) Condition	> 20 psi

3.2 Fire Demand

The required fire demand was calculated using the Fire Underwriters Survey 2020 (FUS) Guidelines and City of Ottawa ITSB-2014-02. Through correspondence with the Architect, it is understood that the proposed building is residential occupancy (Limited Combustible) and is composed of wood frame construction. The building will have an adequately designed fire system as per NFPA 13, complete with a standard water supply, a fully supervised system and 100% sprinkler coverage. Due to the size and combustible nature of the proposed building a firewall is proposed to split the building approximately in half to lower the required fire demand to achievable levels. Correspondence with the Architect is included in **Appendix B** for reference.

3.3 Water Demand

The water demand and fire flow calculations are provided in **Appendix B** for reference. A summary of the water demand and required fire flow is provided in **Table 3.2**.

Table 3.2: Domestic Water Demand Summary

Population	Ave. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand (L/s)	Fire Flow (L/s)
374	1.21	4.36	6.67	300

As per **ITSB 2021-03** the proposed development demand is above **50m^3/day** and thus, will need to be serviced with two (2) services separated by an isolation valve. Therefore, it is proposed to service by utilizing the existing 200mm diameter stub from Culdaff Road, and a second new service that will be installed on the opposite site of the existing valve at the intersection of Bermondsey Way to provide the required redundancy.

Additionally, the required site fire flow will be provided by the existing City owned fire hydrants within the Culdaff Road and Derreen Avenue rights-of-way. All existing hydrants within the vicinity of the development are blue top hydrants indicating a rating of Class AA. As per **ITSB 2018-02** the fire flow allowance from the existing hydrants was assumed to be as outlined in **Table 3.3**.

Table 3.3: Maximum Flow to be Considered from a Given Hydrant.

Hydrant Class	Distance to building (m)	Contribution to Fire Flow	
		(L/min)	(L/s)
AA	≤75	5700	95
	>75and ≥150	3800	63.33
A	≤75	3800	63.33
	>75and ≥150	2850	47.50
B	≤75	1900	31.67
	>75and ≥150	1500	25.00
C	≤75	800	13.33
	>75and ≥150	800	13.33

As the required fire demand is **300L/s** the site fire flows will need to be provided by multiple Class AA hydrants. The proposed building siamese connection is to be located adjacent to the lobby entrance from Culdaff Road. There is an existing hydrant within **45m** of the proposed siamese connection. Refer to **Appendix B** for the Hydrant Coverage figure which depicts the existing hydrants and distances to the proposed building.

3.4 Water Analysis

The above water demand information was submitted to the City for boundary conditions from the City's water model. These boundary conditions were used for analyzing the performance of the proposed and existing watermain systems for three theoretical conditions:

1) High Pressure check under Average Day conditions
2) Peak Hour demand
3) Maximum Day + Fire Flow demand.

Refer to **Table 3.4** for a summary of the proposed boundary conditions and hydraulic analysis.

Table 3.4: Water Boundary Conditions and Hydraulic Analysis Summary

Criteria	Head (m)	Pressure[1] (psi)	Pressure Requirements (psi)
Connection (300mm dia. Culdaff Road)			
Max HGL (Average Day)	161.2	74.2	< 80psi
Min HGL (Peak Hour)	156.4	67.4	> 40psi
Max Day + Fire Flow	127.2	25.9	> 20psi

[1]Pressure based on a Finished Floor elevation of 109.00m

Based on the above system pressures the existing City infrastructure has capacity to service the proposed development. Booster pumps will be utilized by the internal mechanical system to ensure adequate pressures to the upper floors. Refer to **Appendix B** for detailed water demand calculations, and excerpts from the Water Master Plan.

4.0 SANITARY SERVICING

There are existing sanitary sewers, within the Culdaff Road and Derreen Avenue rights-of-way fronting the proposed site, that were constructed as part of the 195 Huntmar Subdivision. There are 250mm diameter sewers within the Culdaff right-of-way and 450mm diameter sanitary sewer within the Derreen Avenue right-of-way. During the construction of the neighboring subdivision a 250mm sanitary service stub was provided from the Culdaff sewer for future servicing of Block 242. It is proposed to service the proposed development using the existing stub.

4.1 Sanitary Design Parameters

Sanitary flows for the proposed development were calculated using criteria from Section 4 of the City of Ottawa Sewer Design Guidelines, ITSB-2018-01, and the Ontario Building Code as follows:

Table 4.1: Sanitary Sewer Design Parameters

Design Component	Design Parameter
Unit Population: 1-Bed Apartments 2-bed Apartments 3 Bed Apartments	 1.4 people/unit 2.1 people/unit 3.1 people/unit
Residential Flow Rate	Design = 280 L/cap/day Annual / Rare = 200 L/cap/day
Residential Peaking Factor	Harmon Equation (min=2.0, max=4.0) Harmon Correction Factor = 0.8m (Design)
Extraneous Flow Rate	Design = 0.33 L/s/ha
Minimum Pipe Size	200mm (Res)
Minimum Velocity[1]	0.6 m/s
Maximum Velocity	3.0 m/s
Minimum Pipe Cover	2.0 m (Unless frost protection provided)

[1]A minimum gradient of 0.65% is required for any initial sewer run with less than 10 residential connections.

4.2 Proposed Development Flows

The proposed development will have a combination of one (1) bed, two (2) bed and three (3) bed apartments for a total of 177 units and a population of 374 persons. The proposed residential flow for the site was determined to be **4.16L/s.** The extraneous flows for the 0**.97ha** development was calculated to be **0.32L/s**. Thus, the peak sanitary flow including infiltration for the development is **4.48 L/s.** Detailed sanitary flow calculations are provided in **Appendix C** for reference.

4.3 Anticipated Block 242 Flows

As noted previously, the detailed design of the 195 Huntmar subdivision was completed by DSEL with details provided within the **DSEL Report.** The subdivision design assumed that Block 242 and 243 were to be commercial developments with an anticipated flow rate of commercial demand of **28000L/ha/day,** and an extraneous flow of **0.33 L/s/ha**. Therefore, the flow allotment for the proposed **0.97ha** development is **0.32L/s** (commercial) and **0.32l/s** extraneous for a total anticipated flow of **0.64L/s.**

It should be noted that previously the entirety of the **2.56ha** Block 242 was anticipated to be directed to the proposed connection. The remaining **1.59ha** of Block 242 which is being developed by others will instead be directed downstream to the 450mm diameter sanitary sewer within Derreen avenue. The anticipated flow from the remainder of the block would be **1.04L/s.**

4.4 Downstream Capacity

As noted above the proposed flows are higher than anticipated during the overall subdivision design. As such the capacity of the downstream system was reviewed to ensure that there is adequate capacity for the proposed development. The proposed development will result in an increase of **3.84L/s**.

The pipe run downstream of the proposed connection (72A-73A) was previously calculated to be at 76% capacity with a flow of **24.64L/s** including the entire Block 242 flows. Taking into account the new proposed flows and the flows redirected to the Derreen sewer the new design flow to the pipe run would be approximately **27.35L/s** with a capacity ratio of approximately 84%. Further downstream the pipes within Derreen Avenue increase in size to 450mm in diameter, and the design capacity ratios varied from 83% to 86% for the pipe runs from Derreen Avenue to Robert Grant Avenue. The proposed increase of **3.84L/s** would amount to 2.7% of the flow capacity of the 450mm diameter sewer resulting in a revised capacity ratio of approximately 86% to 89%. It should be noted that the above does not take into account the peaking factor reduction due to the confluence of flows which would minimize the impacts of the increased flows.

Based on the above analysis the downstream system has capacity for the proposed development.

5.0 STORM SERVICING

There is a 1650mm diameter storm sewer located within the Culdaff Road right-of-way fronting the proposed development. There is also a 1050mm diameter storm sewer within Derreen Avenue.

As part of the neighboring development a 900mm diameter service stub was provided from the Culdaff Road sewer to service Block 242. Due to the configuration of the proposed site, it is proposed to service the site with storm sewer connections from the existing sewers in both Culdaff Road and Derreen Avenue. The proposed connection to the Derreen Avenue sewer will convey the controlled above ground parking flows as well as half of the roof catchment area. The connection to the Culdaff Road sewer will convey the foundation flows half of the roof flows, and the flows from the proposed exfiltration trenches along the site frontage. It is also proposed to provide storage during storm events utilizing stormtech chambers under the central parking area. Refer to the General Plan of Services drawing (122179-GP) for more details.

The design criteria used in sizing the storm sewers are summarized below in **Table 5.1.**

Table 5.1: Storm Sewer Design Parameters

Parameter	Design Criteria
Local Roads	2 Year Return Period
Storm Sewer Design	Rational Method
IDF Rainfall Data	Ottawa Sewer Design Guidelines
Initial Time of Concentration (Tc)	10 min
Minimum Velocity	0.8 m/s
Maximum Velocity	3.0 m/s
Minimum Diameter	250 mm

Refer to **Appendix D** for detailed storm drainage area plans and storm sewer design sheets.

5.1 Downstream System

The original subdivision design anticipated that the entirety of Block 242 would be directed to the provided stub from Culdaff Road. Since the initial design Block 242 has been severed into two (2) parcels. The subject site 425 Culdaff Road (**0.97ha**), and the remaining portion to the northwest (**1.59ha**) retained by others. Due to the severance the remaining **1.59ha** parcel will need to be serviced from the Derreen Avenue sewer rather than Culdaff. Additionally due to the proposed configuration of the 425 Culdaff site **0.62ha** of the site will be conveyed to Derreen Avenue while the remaining **0.35ha** will be conveyed to Culdaff.

As such the capacity of the existing 1050mm diameter storm sewer within Derreen was reviewed to ensure that there would not be negative impacts on the system. The existing pipe runs (STMMH 81-83 and STMMH 83-84) adjacent to the site were previously utilizing **58%** and **60%** of the available pipe capacity. With the revised design the pipes will be flowing at **87.2%** and **82.5%** capacity. As such the system will continue to function as intended. Please refer to **Appendix D** for report excerpts and storm sewer design sheets.

6.0 STORM DRAINAGE AND STORMWATER MANAGEMENT

The stormwater management strategy for the site is based on the established criteria from the City of Ottawa, the **DSEL Report** and the **JFSA Report**.

6.1 Design Criteria

The following stormwater management criteria for the proposed development were prepared in accordance with the City of Ottawa Sewer Design Guidelines (October 2012), Technical Bulletins, correspondence with the City of Ottawa, the **DSEL Report**, the **JFSA Report** and our knowledge of development requirements in the area.

Minor System (Storm Sewers)

- Control proposed development flows, up to and including the 100-year storm event, to an allowable release rate based on a 2-year storm with a C=0.8.
- Runoff from a 5mm rainfall shall be retained on site through infiltration.

Major System

- Provide on-site storage for storm runoff which exceeds the allowable minor system release rate from the site up to and including the 100-year design event;
- Ponding depths are not to exceed 0.35m (static + dynamic) and are not to be within 0.30m (vertical) to the nearest building opening;
- Limit ponding to 0.15 m for all rooftop storage areas;
- No surface ponding for storms up to and including the 2-year event.

Quality Control

- The downstream Pond 7 is designed to provide 80% TSS from the minor system. Additional stormwater quality treatment is not required.
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

6.2 Allowable Release Rate

Based on the design parameters the allowable release rate for the **0.97ha** site is **166.2L/s.** The design approach for stormwater quantity control is to calculate the flows from the uncontrolled areas and provide sufficient on-site storage in the controlled areas to attenuate the total post-development runoff (controlled and uncontrolled) to the allowable release rate prior to being discharged into the storm sewers within Culdaff Road and Derreen Avenue.

6.3 Quantity Control

Design Storms

The design storms are based on City of Ottawa design storms. Design storms were used for the 5, and 100 return periods (i.e. storm events).

Model Parameters

Post-development catchments were modelled based on the proposed site plan and grading as shown on **Drawing 123194-SWM** within **Appendix E**. The building roof is sloped and has no storage.

The site has been divided into twenty-two (22) drainage areas for the post development condition. The drainage areas are as follows:

Area A-01, A02, A06, A07

- Flows from the above ground parking area will be conveyed to storm sewers within Derreen Avenue. These flows will be captured by catch basins which will be conveyed by proposed sewers to Derreen Avenue. Flows from the proposed sewers will be controlled by an inlet control device (ICD), and the flows will drain by gravity to the existing sewer system. The required storage volume will be provided by an oversized undergound storm pipe and surface parking storage. The surface parking storage will be liminted to a maximum ponding depth of 0.30m prior to spilling overland to Derreen Avenue.

Area A-03, A-04:

- Stormwater from the above ground parking access from Derreen Avenue will be captured by proposed catchbasins and conveyed uncontrolled to the existing sewers in Derreen Avenue by the proposed private sewer system.

Area R-01-R03

- Stormwater flows from the proposed building roof facing the internal parking area will be captured by proposed downspouts and conveyed directly to proposed storm sewers within the parking area. There will be a proposed ICD to restrict the flows and an underground stormtech arch chamber system to provide the required storage volume and infiltration. The flows will ultimately be conveyed to the existing sewers in Derreen Avenue. If the system were to ever exceed capacity the flows would be conveyed overland through the proposed parking area to Derreen Avenue. For details on the roof downspouts refer to the mechanical plans.

Area A-05:

- Flows from the proposed underground parking garage access will be captured by a proposed trenchdrain at the bottom of the ramp. The flows will then be conveyed to the free-flowing storm service connection to Culdaff Avenue by the internal mechanical system.

Area R-04-R06, A-08

- Stormwater flows from the proposed building roof facing the north-west will be captured by proposed downspouts and conveyed directly to proposed exfiltration trench within the landscaped area. The exfiltration trench is complete with catchbasin and landscape drain inlets to capture surface water from the landscaped area. There will be a proposed ICD to restrict the flows and promote infiltration prior to discharging to Culdaff Road. If the system were to ever exceed capacity the flows would be conveyed overland to Culdaff Road. For details on the roof downspouts refer to the mechanical plans.

Area R-08-R10, A-10

- Stormwater flows from the proposed building roof facing the south-east will be captured by proposed downspouts and conveyed directly to proposed exfiltration trench within the landscaped area. The exfiltration trench is complete with catchbasin and landscape drain inlets to capture surface water from the landscaped area. There will be a proposed ICD to restrict the flows and promote infiltration prior to discharging to Culdaff Road. If the system were to ever exceed capacity the flows would be conveyed overland to Culdaff Road. For details on the roof downspouts refer to the mechanical plans.

Area R-07a, R-07B:

- The flows from this portion of the roof will be captured by proposed downspouts and conveyed uncontrolled to the storm outlet to Culdaff Road

Area A-09

- The drainage in this area will be captured by the existing catchbasin manhole 85 and conveyed uncontrolled to the Culdaff Road sewer system.

Area D-01

- The drainage of a small portion of landscaping facing Culdaff Road will drain uncontrolled to the Culdaff Road right-of-way

6.4 Minor System Design and Analysis

The following sections outline the calculation parameters and results of the Rational method analysis pertaining to the minor system (storm sewers).

6.4.1 Orifice Controls

All the catchbasins in the parking areas and roadway are located at low points. Inflows to the storm sewer are based on the ICD specified for the inlet and the maximum depth of ponding. ICDs have been sized to limit the ultimate outlet peak flows to the allowable release rate of **166.2 L/**s.

Per the Storm Sewer Design Guidelines (October 2012), *"ICDs shall not be used in series (i.e. where the backwater from one device affect the next upstream device) unless a dynamic model is used to assess their performance and to compute the corresponding upstream water elevation and storage requirements"*. As such, ICDs have been installed in the downstream catchbasin maintenance hole to limit peak flows from the upstream series of inlets, as well as take advantage of the storage provided by the upstream storm sewers. Details are outlined as follows in **Table 6.1**. ICD information is provided in **Appendix E** and indicated on the General Plan of Services (**123194-GP**, **Appendix F**).

Table 6.1: Inlet Control Devices & Design Flows

Structure	ICD Size	ICD Invert (m)	T/G (m)	100-yr HGL* (m)	100-yr Head* (m)	100-year Release Rate* (L/s)
STMMH 101	94mm Plate	106.42	108.70	107.74	1.19	20.8
CBMH 102	94mm Plate	106.38	108.25	107.95	1.44	22.8
STMMH 203	94mm Plate	106.01	108.74	108.03	1.83	26.0
CBMH 207	127mm Plate	105.97	108.30	108.53	2.34	53.5

** From Rational Calculations based on the City of Ottawa IDF curves*

6.4.2 Underground Storage

Due to the site constraints and lack of roof storage potential underground storage was utilized to meet the allowable release rate. Underground storage will be provided using Stormtech DC-780 arch-type chambers (or approved equivalent) surrounded by 50mm dia. Clearstone, large underground storm sewers and exfiltration trenches.

- Stromtech DC-780 chambers will be installed upstream of the ICD on STMMH 203.
- There will be a 69.1m long exfiltration trench upstream of STMH 101. The trench will be complete with a 250mm perforated subdrain, 0.50m of clear stone along the sides and 0.30m of clear stone above and below the pipe.
- There will be a 97.7m long exfiltration trench upstream of CBMH 102. The trench will be complete with a 250mm perforated subdrain, 0.50m of clear stone along the sides and 0.30m of clear stone above and below the pipe.

The inverts of the storage chambers and exfiltration trenches are above the anticipated groundwater elevations noted within the geotechnical investigation report. **Table 6.2** provides details on the storage chambers, and **Table 6.3** provides a summary of the exfiltration trenches. Refer to **Appendix E** for detailed rational method calculations and details on the Stormtech chambers.

Table 6.2: Underground Storage

Location	Chamber Model	No. of Chambers	Available Storage (m^3)
STMMH 203	DC-780	8	23.3

Table 6.3: Exfiltration Trench summary

Location	Length (m)	Volumes		
		Perf Pipe (m^3)	Clear stone (m^3)	Total (m^3)
CBMH 102	97.7	4.8	24.9	29.7
STMH 101	69.1	3.4	17.6	21.0

* Assumed a 40% void ratio provided in the clear stone

6.5 Major System Design and Analysis

A summary of the anticipated ponding depths at the proposed structures is provided below within **Table 6.4.** Detailed Rational method calculations are provided in **Appendix E**.

Table 6.4: 100-year Event Ponding Depths

Structure	T/G	Max. Static Ponding (Spill Depth)		100-yr Event [1]			
		Elev.	Depth	Elev.	Depth	Cascading	Cascade Depth (m)
	(m)	(m)	(m)	(m)	(m)	Flow?	
CB01	108.40	N/A	0	N/A	0	N	0.00
CB02	108.40	N/A	0	N/A	0	N	0.00
CB03	108.30	108.58	0.28	108.53	0.23	N	0.00
CB04	108.30	108.60	0.30	108.53	0.23	N	0.00
CB05	108.30	108.60	0.30	108.53	0.23	N	0.00
CB06	108.36	108.43	0.07	107.74	0.00	N	0.00
CB07	108.28	108.45	0.17	107.74	0.00	N	0.00
CB08	108.27	108.55	0.28	107.95	0.00	N	0.00
CB09	108.30	108.60	0.30	107.95	0.00	N	0.00
CBMH102	108.25	108.48	0.23	107.95	0.00	N	0.00
CBMH103	108.24	108.42	0.18	107.95	0.00	N	0.00
CBMH207	108.30	108.55	0.25	108.53	0.23	N	0.00
LD1001	108.31	108.57	0.26	107.95	0.00	N	0.00
LD1002	108.60	108.60	0.00	107.74	0.00	N	0.00

[1] HGL information is from Rational Method Calculations based on the City of Ottawa IDF curves

Detailed Calculations are provided in **Appendix E**. Based on these results, the proposed storm drainage system will not experience any adverse flooding even with a 20% increase to the 100-year event.

6.6 Post Development Stormwater Management Summary

Please refer to the below table for an overall summary of the proposed SWM design.

Table 6.5: Post Development Stormwater Management Summary

Area ID	Area (ha)	1:5 Year Weighted Cw	1:100 Year Weighted Cw	Control Device	2- Year Release (L/s)	5-year Release (L/s)	100-Year Storm Event		
							Release (L/s)	Req'd Vol (m^3)	Max. Vol. Provided (m^3)
D-01	0.008	0.42	0.49	N/A	0.80	1.00	2.00	N/A	N/A
R-07A	0.009	0.90	1.00	N/A	1.80	2.40	4.60	N/A	N/A
R-07B	0.009	0.90	1.00	N/A	1.80	2.50	4.70	N/A	N/A
A-05	0.017	0.90	1.00	N/A	3.30	4.50	8.60	N/A	N/A
A-03	0.032	0.77	0.87	N/A	5.30	7.20	13.90	N/A	N/A
A-04	0.022	0.61	0.69	N/A	2.90	3.90	7.60	N/A	N/A
A-09	0.006	0.52	0.60	N/A	0.60	0.90	1.70	N/A	N/A
A-01,A-02,A-06,A-07 (CBMH 207)	0.428	0.79	0.88	127mm Plate Oriface	44.50	52.00	53.50	125.73	146.45
A-08,R-04,R-05,R-06 (STMMH 101)	0.147	0.53	0.60	94mm Plate Oriface	10.30	13.00	20.80	22.91	24.43
A-10,R-08,R-09,R-10 (CBMH 102)	0.157	0.63	0.71	94mm Plate Oriface	11.80	14.80	22.80	31.25	33.92
R-01,R-02,R-03 (STMMH 203)	0.135	0.90	1.00	94mm Plate Oriface	10.50	13.50	26.00	39.14	45.56
Post-Development Flow					**93.6**	**115.7**	**166.2**	**219.0**	**250.4**
Total Allowable Release Rate					**166.2**	**166.2**	**166.2**		

6.7 Major Overland Flow Route

A major overland flow route will be provided for storms greater than the 100-year storm event. Stormwater will be directed to the surrounding rights-of-way. The major overland system is shown on the Grading Plan (drawing 123194-GR).

6.8 5mm Retention

As per the Feedmill Creek Stormwater Management Criteria Study the proposed site has a 5mm retention requirement. It is proposed to provide the required retention by depressional storage within the landscaped areas, the 0.30m of clearstone beneath the exfiltration trenches and through the stormtech chambers.

Depression Storage

The default values for depression storage in the City of Ottawa were used for all catchments. Residential rooftops were assumed to provide no depression storage.

- Depression Storage (pervious areas): 4.67 mm
- Depression Storage (impervious areas): 1.57 mm

Based on the above and the above design parameters and the site characteristics the site retention requirement is as follows:

Table 6.6: Site Retention

Total Area	Hardscape	Hardscape depressional storage	Landscaping	Landscape depressional storage	Retention requirement	Required Retention
ha	ha	mm	ha	mm	mm	m3
0.973	0.733	1.57	0.239	4.67	5	25.95

The retention volume within the clearstone beneath the exfiltration trenches and stormtech chambers are summarized below.

Table 6.7: Infiltration Volume

Structure	Length (m)	Width (m)	Height (m)	Volume (m^3)
STMH 101 (Trench)	69.1	1.25	0.30	10.4
CBMH 102 (Trench)	97.7	1.25	0.30	14.7
STMH 203 (DC-780)	10.97	2.35	0.229	2.36
Total				**27.46**

The above **27.46m^3** of retention exceeds the required **25.95m^3**. It should be noted that infiltration rates for the subject soils were reviewed within the geotechnical report and all systems have been placed above the observed groundwater elevations. A detailed analysis of the site infiltration will be prepared with PCSWMM for the next submission. Detailed Calculations are provided in **Appendix E**.

7.0 EROSION AND SEDIMENT CONTROL

Temporary erosion and sediment control measures will be implemented on-site during construction in accordance with the Best Management Practices for Erosion and Sediment Control. This includes the following temporary measures:

- Filter socks (catchbasin inserts) will be placed in existing and proposed catchbasins and catchbasin manholes, and will remain in place until vegetation has been established and construction is completed;
- Silt fencing will be placed along the surrounding construction limits;
- Mud mats will be installed at the site entrances;
- The contractor will be required to perform regular street sweeping and cleaning as required, to suppress dust and to provide safe and clean roadways adjacent to the construction site;

Erosion and sediment control measures should be inspected daily and after every rain event to determine maintenance, repair or replacement requirements. Sediments or granulars that enter site sewers shall be removed immediately by the contractor. These measures will be implemented prior to the commencement of construction and maintained in good order until vegetation has been established. Refer to the Erosion and Sediment Control Plan (drawing 123194-ESC) for additional information.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Watermain

The analysis of the existing and proposed watermain network confirms the following:

- The site will be serviced by two (2) 200mm diameter PVC water services from the existing 300mm diameter watermain within Culdaff Road.
- There are adequate pressures in the existing watermain infrastructure to meet the required domestic demands for the development.
- There is adequate flow to service the proposed fire protections system.

Sanitary Servicing

The analysis of the existing and proposed sanitary system confirms the following:

- It is proposed to service the development with a 250mm diameter sanitary service from the existing mains with Culdaff Road.
- It is anticipated there is adequate capacity within the existing sanitary infrastructure to service.

Stormwater Management

The following provides a summary of the storm sewer and stormwater management system:

- The proposed storm sewer system is to connect to the existing 1650mm diameter sewer within Culdaff Road and the existing 1050mm diameter sewer within Derreen Avenue.
- Stormwater control is to be provided through the use of rooftop storage, underground storage (Stormtech Chambers DC-780), surface ponding, and Exfiltration trenches.
- Storm flows will be attenuated through the implementation of inlet control devices.
- Quality control is provided by the existing Pond 7

Erosion and Sediment control

- Erosion and sediment control measures (i.e. filter fabric, catchbasin inserts, silt fences, etc.) will be implemented prior to construction and are to remain in place until vegetation is established.

9.0 CLOSURE

The preceding report is respectfully submitted for review and approval. Please contact the undersigned should you have questions or require additional information.

NOVATECH

Prepared by:

Anthony Mestwarp, P.Eng
Project Manager
Land Development Engineering

Reviewed by:

Greg MacDonald, P.Eng
Director, Land Development and Public
Sector Infrastructure

Appendix A
Pre - Consultation Meeting Minutes

File No.: PC2023-390

James Ireland
Novatech
Via email: j.ireland@novatech-eng.com

Subject: Pre-Consultation: Meeting Feedback
Proposed Site Plan Control Application – 2765 Palladium Drive

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on January 18, 2024.

Pre-Consultation Preliminary Assessment

1 ☐	**2** ☐	**3** ☐	**4** ☒	**5** ☐

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

Next Steps

1. A review of the proposal and materials submitted for the above-noted pre-consultation has been undertaken. Please proceed to complete a Phase 3 Pre-consultation Application Form and submit it together with the necessary studies and/or plans to planningcirculations@ottawa.ca.

2. In your subsequent pre-consultation submission, please ensure that all comments or issues detailed herein are addressed. A detailed cover letter stating how each issue has been addressed must be included with the submission materials. Please coordinate the numbering of your responses within the cover letter with the comment number(s) herein.

3. Please note, if your development proposal changes significantly in scope, design, or density before the Phase 3 pre-consultation, you may be required to complete or repeat the Phase 2 pre-consultation process.

Supporting Information and Material Requirements

1. The attached **Study and Plan Identification List** outlines the information and material that has been identified, during this phase of pre-consultation, as either required (R) or advised (A) as part of a future complete application submission.

    a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline

the specific requirements that must be met for each plan or study to be deemed adequate.

Consultation with Technical Agencies

1. You are encouraged to consult with technical agencies early in the development process and throughout the development of your project concept. A list of technical agencies and their contact information is enclosed.

Proposed Development

1. The proposed development includes a six-storey residential apartment building with 165 units.

2. A total of 201 vehicular parking spaces are proposed. Parking spaces are located in both a surface parking area accessed from Derreen Avenue and in one level of underground parking that is accessed from the aforementioned surface parking lot.

3. Zoning Relief is being sought for the minimum vehicular parking space rate – 168 resident parking spaces are proposed, whereas the Zoning By-law requires 198 spaces. The applicant identified that the preferred approach to reducing the parking rate is a Minor Variance application to the Committee of Adjustment.

Planning

Comments:

1. The following policies apply to the site:

    a. Official Plan

        i. The subject site is designated “Mixed Industrial” on Schedule B5 – Suburban (West) Transect.

        ii. The subject site is subject to Area-Specific Policy 2 – Kanata West, per Annex 5 – Urban and Rural Areas Subject to Area-Specific Policies. Refer to Volume 2C of the Official Plan for applicable policies.

    b. The subject site is identified as “Prestige Business Park” in the Kanata West Concept Plan.

2. Staff have concerns with the proposed residential land use, as Policy 7 of 6.5.1 of the Official Plan directs that “residential uses are not permitted” in the Mixed Industrial designation. However, staff acknowledge the propsoed residenital use is permitted through the site’s current zoning.

3. Consider including ground floor commercial in the proposed development to support the 15-minute neighbourhood objectives of the Official Plan. Refer to the permitted non-residential uses in the GM zone (Section 187) for possible commercial uses. Please note that any non-residential uses should be of a scale to cater to a local neighbourhood clientele and future employees on the lands designated Mixed Industrial, per Policy 1 of Section 6.5.3 of the Official Plan.

4. It appears that the lots lines have been incorrectly identified on the concept plan.

    a. See zoning definitions for lot lines below.

> **Lot line** means the boundary of a lot, and includes:
>
> (a) **front lot line** which means that lot line, not including a corner lot line, which abuts a street for the shortest distance, whether or not that line jogs or curves, and extending between the side lot lines, more or less for the full width of the lot, and where more than one such lot line exists, means a lot line which abuts the same street as the front lot line of an abutting lot; (By-law 2008-462)
>
> (b) **rear lot line** which means the lot line furthest from and opposite the front lot line but if there is no such line, that point furthest from and opposite the front lot line; and
>
> (c) **side lot line** which means a lot line other than a front lot line, a corner lot line, or a rear lot line. (By-law 2008-462)
>
> (d) **corner lot line** which means that lot line that abuts a street and is also one line of a conveyed corner sight triangle, or a sight triangle included as part of a road on a plan of subdivision. (ligne de lot) (By-law 2008-462)

    b. For the purposes of applying zoning, please note that lot lines are as follows

        - Front lot line – Derreen Avenue
        - Corner lot line – Culdaff Road
        - Side lot line – lot line abutting the remainder of 2765 Palladium Drive
        - Rear lot line – lot line abutting 2775 Palladium Drive

    c. Update the zoning summary chart to reflect the correct provided amounts per the appropriate lot line. It doesn't appear that the reassignment of lot lines will cause any issues with the zoning – still complies with the required setbacks. Please confirm.

5. Please note that the minimum required front yard setback per Table 187(c) is 3 metres. The Zoning Summary chart on the Concept Plan currently identifies the required front yard setback as 7.0 metres – please update.

6. Provide further information on how Amenity Space requirements (Section 137) are being achieved. Consider opportunities for outdoor amenity area on the site as well.

7. Zoning staff have confirmed that the portion of the site currently zoned IP (highlighted below) will be addressed through an omnibus report to Planning and Housing Committee on January 31, 2024.

8. Parking Requirements

    a. The parking requirements for the proposed development, per Table 101 are the following:

        i. Dwelling, Mid-high Rise Apartment - 1.2 per dwelling unit (Area C Schedule 1A).

        ii. Zoning relief is required for resident parking as only 168 spaces are proposed, whereas the Zoning By-law requires 198 spaces. It is understood that the applicant intends to obtain relief by way of a Minor Variance application to the Committee of Adjustment. Please note that zoning relief must be obtained prior to the Site Plan Control application being complete.

    b. The minimum visitor parking requirements for the proposed development, per Table 102 are the following:

        i. Apartment dwelling, low-rise or mid or high-rise- 0.2 per dwelling unit (Area B, Area C and Area D on Schedule 1A).

    c. No concerns with the proposed compact car spaces. Based on the provided It is understood that 45 compact car parking spaces are proposed. Per Section 106 (3), up to 50% of residential parking spaces (max of 99 spaces) may be reduced to a minimum of 4.6m long and 2.4m wide.

9. Show the width of the access/driveway on the plan. Please note that a driveway providing access to a parking lot must have a minimum width of 6.0 metres for a double traffic lane, per Section 107(1)(a)(ii), and may not exceed 6.7m, per Section 107(1)(aa)(ii).

10. Landscaping Requirements

a. More information is required to confirm that the landscaping provisions for parking lots are being met. Per Section 110(1), a minimum of 15% of the area of any parking lot, whether a principal or an accessory use, must be provided as perimeter or interior landscaped area comprised of the following: (a) a landscaped buffer must be provided between the perimeter of the parking lot and a lot line in accordance with Table 110, and (b) in addition to the landscaped buffer, interior landscaping may be provided including various landscaped islands, landscaped medians, pedestrian pathways or public plazas to meet the minimum 15% requirement.

b. Show the widths of all landscaped buffers surrounding the surface parking lot on the plan. It appears that there is over 100 spaces (approximately 111 spaces) in the surface parking area, therefore a 3-metre landscaped buffer is required, per Table 110.

c. Consider reducing aisle widths and parking spot lengths to the minimum requirements in order to increase the landscaped buffers surrounding parking area.

d. It is understood that gabarge/waste produced by the building will be stored in an area within the proposed surface parking area. Please note that any outdoor refuse collection and refuse loading areas contained within or accessed via a parking lot must comply with the requirements in Section 110(3) of the Zoning By-law.

11. Bicycle Parking Requirements

a. The bicycle parking requirements for the proposed development, per Table 111A are the following:

    i. Apartment dwelling, mid rise - 0.50 per dwelling unit

b. Provide more information on bicycle parking in the next submission. Based on the information currently available, a total of 83 bicycle parking spaces are required.

c. Bicycle parking should be provided in accordance with Policy 9 of Section 4.1.2 of the Official Plan, which directs that proponents of development shall provide an adequate number of bicycle parking facilities as follows:

> a) Long-term bicycle parking facilities shall be secure, sheltered and usable by all types of cyclists. Where located inside buildings, long-term bicycle parking facilities shall provide safe, accessible, direct and convenient access to the exterior; and b) Short-term bicycle parking facilities shall be highly visible, well-lit, near building entrances and where appropriate, sheltered.

12. Consider shifting the proposed access to Culdaff Road (towards the area currently zoned IP) and extending the building frontage located along Derreen Avenue.

13. Explore opportunities for tree planting and landscaping along Culdaff Road and Derreen Avenue.

14. Required Applications

    a. A Site Plan Control (Complex) application – more information on process, timelines, fees, etc. can be found here.

    b. Zoning relief required to address the minimum parking requirements, which can be obtained through either of the following applications:

        i. Minor Variance – more information can be found here.

        ii. Minor Zoning By-law Amendment – more information can be found here. Please note that there is a mandatory pre-application consultaiton requriement for this application type.

15. Section 37 requirements / Community Benefits Charge

    a. The former Section 37 regime has been replaced with a "Community Benefits Charge", By-law No. 2022-307, of 4% of the land value. This charge will be required for ALL buildings that are 5 or more storeys and 10 or more units and will be required at the time of building permit unless the development is subject to an existing registered Section 37 agreement. Questions regarding this change can be directed to Ranbir.Singh@ottawa.ca.

Urban Design

Comments:

16. Urban Design Brief required – Terms of Reference attached.

17. Thoughtful transition to low-rise housing needed – please consider a building stepback above the third level along Derreen Avenue and Culdaff Road.

18. If possible, increase the setback along Derreen Avenue to provide additional landscaping.

19. Please explore the potential for an L-shape building vs. a U-shape building with parking concealed entirely from the public realm.

20. Explore the potential to shift the driveway access to Culdaff Road.

21. Please explore the potential for grade-related units with entrances off of Derreen Avenue and Culdaff Road.

22. Please provide outdoor and indoor amenity details.

23. Please outline the projects sustainability strategy.

24. Staff look forward to reviewing building elevations and a landscape plan as part of the next pre-consultation.

Feel free to contact Nader Kadri, Planner III (Urban Design), for follow-up questions.

Engineering

Comments:

General Servicing

25. Any capacity/allotment allocated to the 2765 Palladium Drive property through previously developed and approved reports and/or plans should be appropriately partitioned due to the property being severed.

Water

26. Existing Public Services:

    a. 305mm (PVC), SW of site, Culdaff Rd. (near side)

        i. 203mm (PVC) service stub provided @ intersection of Bermondsey Way

    b. 305mm (PVC), SE of site, Dereen Avenue (far side)

27. Boundary Conditions:

    a. Request Boundary Conditions prior to first submission. Contact assigned City Infrastructure Project Manager with the following information:

        i. Location of service(s)

        ii. Type of development

        iii. Fire flow (per FUS method – include FUS calculation sheet with boundary condition request – boundary conditions will not be requested without fire flow calculations)

        iv. Average Daily Demand (l/s)

        v. Maximum Hourly Demand (l/s)

vi. Maximum Daily Demand (l/s)

b. Fire protection (Fire demand, Hydrant Locations)

28. Per WDG 4.3.1, where basic demand is greater than 50 m3 /day, there shall be a minimum of two water services, separated by an isolation valve, to avoid creation of vulnerable service area.

29. Per WDG 4.4.7.2, District Meter Area (DMA) Chamber is required for services greater than 150mm in diameter.

Sanitary

30. Existing Public Services:

    a. 250mm (PVC), SW of site, Culdaff Road (mid street)

        i. 250mm (PVC) service stub provided @ Bermondsey Way

    b. 450mm (PVC), SE of site, Dereen Avenue

31. The servicing report should identify the proposed sanitary demand generated from the site and the available capacity as specified in the 195 Huntmar Drive report(s).

Stormwater

32. Existing Public Services:

    a. 1650mm (Conc.), SW of site, Campeau Drive

        i. 900mm (Conc.) service stub provided @ Bermondsey Way

    b. 1050mm (Conc.), SE of site, Didsbury Road

33. Stormwater Management

    a. Quality Control
        i. Pond 7 is designed to treat 80% TSS from the minor system. Additional stormwater quality treatment is not required.
    b. Quantity Control:
        i. Refer to the Functional Servicing Report for 195 Huntmar Drive for allowable release rate.
        ii. Water Balance: runoff from a 5mm rainfall shall be retained on site through infiltration. Detail calculations will be required to demonstrate that this target can be achieved.
        iii. When both underground and above ground storage is utilized, the release rate from the system will significantly differ than when

solely one level storage is being used (i.e. greater range of head vs smaller change of head during storm event). If both levels of storage are to be accounted for then there are two options for SWM calculations: 1) use a dynamic computer model or 2) use an assumed average flow rate of half (50%) of the controlled peak flow rate of the area(s) utilizing two levels of storage.

34. Grading and Drainage

    a. The proposed development shall follow the approved grading plan per the 195 Huntmar Drive report(s).

Geotechnical Investigation

35. Geotechnical Report is required for this development proposal.

36. The site is subject to water balance requirements through infiltration. All soil assumptions made in the servicing report should be supported by the geotechnical report.

General Information/Other

37. Topographic information and design grades to be tied to proper geodetic benchmark along with proper description of the Geodetic Benchmark used.

38. All submitted report and plan are to be provided in *.pdf documents (documents shall be flattened and unsecured)

References And Resources

39. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455).

40. Servicing and site works shall be in accordance with the following documents:

41. Functional Servicing Report for 2325483 Ontario Inc., 195 Huntmar Drive, Revision 3 (May 2019)

42. General City of Ottawa design guidelines

43. geoOttawa - https://maps.ottawa.ca/geoOttawa/

Should you have any questions or require additional information, please contact me directly at (613) 580-2424, ext. 32540 or by email at ryan.brault@ottawa.ca.

Noise

Comments:

44. Noise impact studies required for the following:

    a. Road, as the site is within 100m proximity to Derreen Avenue (collector) and within 500m of Highway 417.

    b. Stationary, as the site is within 100m of lands zoned Mixed Industrial on Schedule B5 of the Official Plan.

Feel free to contact Rochelle Fortier, Transportation Project Manager, for follow-up questions.

Transportation

Comments:

45. Follow Transportation Impact Assessment Guidelines:

    a. Note that the TIA guidelines have been updated to align with the new pre-application consultation process. The changes are available on the City's website.

    b. A Transportation Impact Assessment is required. Please submit the Scoping report to rochelle.fortier@ottawa.ca at your earliest convenience or, at the latest, as part of the Phase 2 pre-con package. Should a Phase 2 pre-con be waived, the applicant is still responsible to submit the Scoping Report and must allow for a 14 day circulation period.

    c. The Strategy Report must be submitted for review at the latest with the Phase 3 pre-con package. The applicant is still encouraged to submit the Strategy Report to the TMP before submission of the Phase 3 pre-con package and allow for a 14 day circulation period.

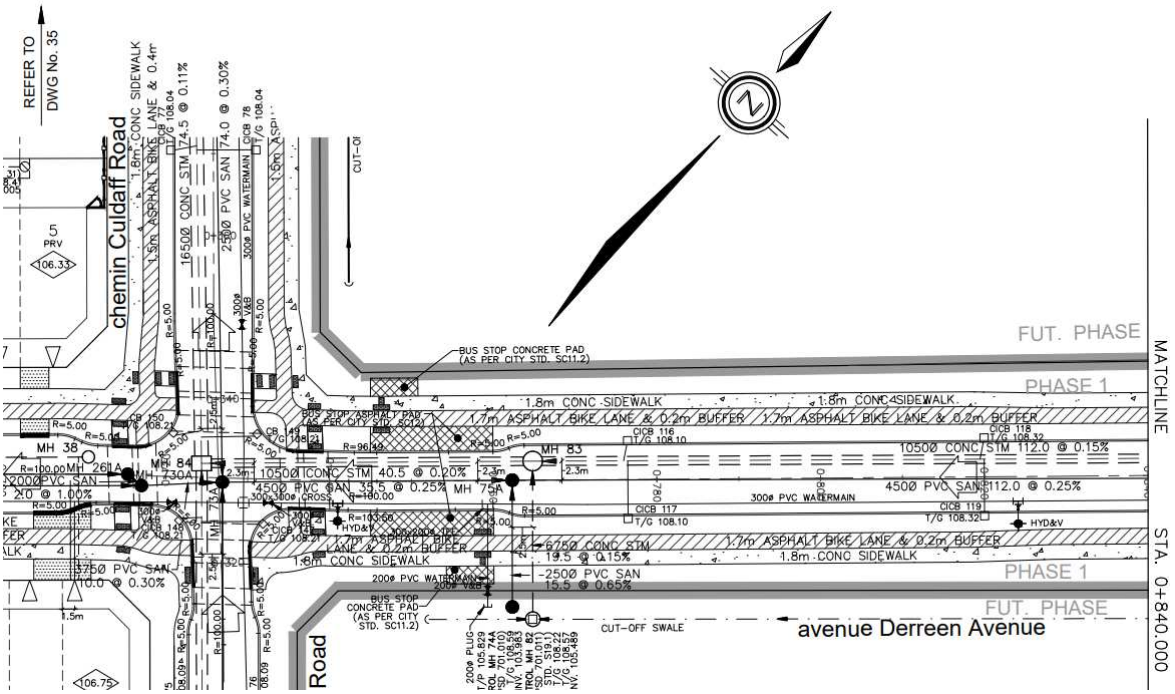
    d. If an RMA is required to support the proposed development, the functional plan and/or RMA plans must be submitted with the formal submission to deem complete. Request base mapping asap if RMA is required. Contact Engineering Services.

46. Ensure that the development proposal complies with the Right-of-Way protection requirements - See Schedule C16 of the Official Plan.

    a. ROW must be unincumbered and conveyed at no cost to the City. Note that conveyance of the ROW will be required prior to registration of the SP agreement. Additional information on the conveyance process can be provided upon request.

    b. Any requests for exceptions to ROW protection requirements must be discussed with Transportation Planning and concurrence provided by Transportation Planning management.

47. Note that Derreen Avenue will be a collector roadway with pedestrian/cycling infrastructure on both sides of the roadway. A bus stop is planned adjacent to the site, on the northeast corner of the Derreen/Culdaff intersection. See approved plan from the 195 Huntmar Dr subdivision below for reference.



48. Clear throat requirements for apartments (with 100-200 units) on a collector is 15m. Ensure this length is provided.

49. The City has completed the EA Study for the Huntmar Drive Widening (Campeau Drive to Maple Grove Road) and Stittsville Main Street Extension (Maple Grove Road to Robert Grant Avenue). The recommended plan can accommodate four travel lanes on Huntmar Drive and two travel lanes on Stittsville Main Street extension. Both roads will be complete streets. The recommended plan also includes the following:

    a. A roundabout at Stittsville Main Street and Derreen Avenue with PXOs for pedestrians.

    b. A new PXO across Stittsville Main Street extension at Culdaff Road.

    c. All-way stop control at Stittsville Main/Maple Grove.

    d. Protected intersections at Huntmar/Cyclone Taylor, Huntmar/Palladium, and Huntmar/Robert Grant.

50. TMP includes:

    a. Road projects:

i. Palladium Drive Realignment: realign in vicinity of Huntmar Road to new North-South arterial (complete).

ii. Stittsville North-South Arterial (Robert Grant Avenue): new two-lane road between Palladium Drive and Fernbank Road (under construction).

iii. Huntmar Drive: widen from two to four lanes between Campeau Drive extension to Maple Grove Road.

iv. Stittsville Main Street Extension: new two-lane road between Palladium Drive and Maple Grove Road.

v. Maple Grove Road: widen from two to four lanes between Terry Fox Drive and Huntmar Drive (network concept).

b. Transit projects:

i. Western extension of the LRT (Phase 2) to Moodie (under construction).

ii. Future extension of the LRT (Phase 3) west through Kanata north of Highway 417 to Kanata Centrum, then crossing Highway 417 to proceed south adjacent to Huntmar Drive, terminating at Hazeldean Road. O-Train stations at Kanata Centrum, the Huntmar/Palladium intersection (Canadian Tire Centre), Maple Grove Road, and Hazeldean Road.

iii. At-grade Transitway BRT extending south along Robert Grant Avenue from the terminus of the future O-train extension at Hazeldean Road.

iv. Transit priority corridor on Hazeldean Road and the new north-south arterial (Robert Grant Avenue).

51. As the site proposed is residential, AODA legislation applies for all areas accessible to the public (i.e. outdoor pathways, parking, etc.).

52. Bicycle parking spaces are required as per Section 111 of the Ottawa Comprehensive Zoning By-law. Bicycle parking spaces should be in safe, secure places near main entrances and preferably protected from the weather.

53. On site plan:

a. Ensure site accesses meet the City's Private Approach Bylaw and all driveways/aisles meet the requirements outlined in Section 107 of the Zoning By-law.

b. Show all details of the roads abutting the site; include such items as pavement markings, accesses and/or sidewalks.

c. Turning movement diagrams required for all accesses showing the largest vehicle to access/egress the site.

d. Turning movement diagrams required for internal movements (loading areas, garbage).

e. Show all curb radii measurements; ensure that all curb radii are reduced as much as possible and fall within TAC guidelines (Figure 8.5.1).

f. Show dimensions for site elements (i.e. lane/aisle widths, access width and throat length, parking stalls, sidewalks, pedestrian pathways, etc.)

g. Show slope of garage ramp on site plan. Note that underground ramps should be limited to a 12% grade and must contain a subsurface melting device when exceeding 6%. Ramp grades greater than 15% can be psychological barriers to some drivers.

h. Parking stalls at the end of dead-end parking aisles require adequate turning around space

i. Grey out any area that will not be impacted by this application.

Feel free to contact Rochelle Fortier, Transportation Project Manager, for follow-up questions.

Environment and Trees

Comments:

Planning Forester – Landscape Plan Tree Planting Requirements:

The following Tree Conservation Report (TCR) requirements have been adapted from the Schedule E of the Urban Tree Protection Guidelines – for more information on these requirements please contact mark.richardson@ottawa.ca

54. Please ensure any retained trees are shown on the LP.

55. Minimum Setbacks:

    a. Maintain 1.5m from sidewalk or MUP/cycle track or water service laterals.

    b. Maintain 2.5m from curb.

56. Coniferous species require a minimum 4.5m setback from curb, sidewalk, or MUP/cycle track/pathway.

57. Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing, except where otherwise approved in naturalization / afforestation areas.

58. Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

59. Tree specifications:

    a. Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.

    b. Maximize the use of large deciduous species wherever possible to maximize future canopy coverage.

60. Tree planting on City property shall be in accordance with the City of Ottawa's Tree Planting Specification; and, if possible include watering and warranty as described in the specification.

61. No root barriers, dead-man anchor systems, or planters are permitted.

62. No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

63. Hard surface planting:

    a. If there are hard surface plantings, a planting detail must be provided

    b. Curb style planter is highly recommended.

    c. No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.

64. Trees are to be planted at grade.

65. Soil Volume - Please demonstrate as per the **Landscape Plan Terms of Reference** that the available soil volumes for new plantings will meet or exceed the following:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18

Conifer	25	15

a. It is strongly suggested that the proposed species list include a column listing the available soil volume.

66. Sensitive Marine Clay - Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines.

67. The City requests that consideration be given to planting native species where ever there is a high probability of survival to maturity.

68. Efforts shall be made to provide as much future canopy cover as possible at a site level, through tree planting and tree retention. The Landscape Plan shall show/document that the proposed tree planting and retention will contribute to the City's overall canopy cover over time. Please provide a projection of the future canopy cover for the site to 40 years.

Environmental Planning

69. The subdivision that created this parcel undertook an Environmental Impact Statement (EIS) and identified the Feedmill Creek and the riparian lands as a significant natural feature. This feature is over 120 m from this proposed development, as such no up-dated EIS is required at this time since the site has been cleared.

70. Species at risk – the EIS completed for the subdivision did identify several species at risk and implemented several mitigation measures through the subdivision approval.

71. No new EIS is required, since one was completed for the subdivision (EIS and TCR Proposed Mixed Use Development Kanata West Lands a report for 2325483 Ontario by Muncaster Environmental Planning (revised May 2018). However, this EIS will need to be reviewed by the project team and the recommendations implemented including:

    a. As part of the landscape plan for each Block the developers are encouraged to plant a mix of native species such as sugar maple, red maple, tamarack, white spruce, white cedar, red oak, bur oak, bitternut hickory and basswood. To maximize the success of the plantings, it is strongly encouraged that stock from a local seed base be utilized. Due to the clay soils tree and shrub species that have a high water demand are generally not recommended. These species include willows, poplars, Manitoba maple and elm.

    b. Many helpful wildlife oriented mitigation measures are detailed in the City's Protocol for Wildlife Protection during Construction (City of Ottawa, 2015). Contractors are to review in detail and understand the City's Protocol for Wildlife Protection during Construction prior to commencement of construction.

c. The contractor is to be aware of the potential Species at Risk in the vicinity of the site including Blanding's turtle, barn swallow and butternut. Although unlikely since the subdivision is in the advanced stages of development, any Species at Risk sightings are to be immediately reported to the contractor administrator/ City project manager and the Ministry of Environment, Conservation and Parks and work that may impact the species suspended immediately.

72. Bird-Safe Design Guidelines – Please review and incorporate bird safe design elements. Some of the risk factors include glass and related design traps such as corner glass and fly-through conditions, ventilation grates and open pipes, landscaping, light pollution. More guidance and solutions are available in the guidelines which can be found here: https://documents.ottawa.ca/sites/documents/files/birdsafedesign_guidelines_en.pdf

Feel free to contact Matthew Hayley, Environmental Planner, or Mark Richardson, Forester, for follow-up questions.

Parkland

Comments:

Cash-In-Lieu of Parkland / Parkland Dedication

73. The amount of required parkland conveyance is to be calculated as per the City of Ottawa Parkland Dedication By-law No.2022-280 (or as amended):

    a. For cash-in-lieu of conveyance of parkland (residential > 18 units/net ha): one hectare per 1,000 net residential units but shall not exceed a maximum of 10% of the gross land area where less than or equal to five hectares.

74. PFP will be requesting **cash-in-lieu of conveyance of parkland** for parkland dedication in accordance with the Parkland Dedication By-law.

1st Pre-consultation Preliminary Parkland Dedication Calculation

75. The calculation is based on the below information:

    a. Gross land area, in square meters: 9,728.16 m^2

    b. Number of residential units proposed: 165 units

76. Preliminary parkland conveyance calculations based on information provided/identified in the pre-application consultation, is calculated to be **778.3 square meters** as per the table below.

Proposed Use	Units	GrossLand Area (m^2)	Parkland Dedication Rate	Parkland Dedication (m^2)
Residential	165	9,728.16	1ha / 1000 dwelling units, with 10% cap	972.8
Commercial (parkland Dedication collected at subdivision D07-16-16-0011, block 242, 4M1687 plan)		9,728.16	2%	194.6
Total				**778.3**

Total requirement:	**778.3**
Conveyance of Parkland:	0.00
Cash-in-lieu of Conveyance of Parkland:	**778.3**

77. Please note, if the proposed unit count, land use changes or gross floor area changes, then the parkland dedication requirement will be re-evaluated accordingly.

78. Cash-in-lieu of conveyance of parkland will be required prior to registration of the Site Plan Agreement. The Owner shall also pay the parkland appraisal fee as referenced in Schedule "B" of the site plan agreement.

79. CREO will provide an appraisal and PFP will calculate the fee for Schedule "B".

80. Full suite of park conditions will be included when a formal site plan application is submitted.

Feel free to contact Daniela Correia, Parks Planner, for follow-up questions.

Mississippi Valley Conservation Authority

Comments:

81. The subject property is not regulated by the Mississippi Valley Conservation Authority (MVCA) under Ontario Regulation 153/06, *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses.* A permit from the Conservation Authority will not be required for the proposed development.

82. MVCA may review the stormwater management plan with a focus on water quantity, with respect to natural hazards from the receiving watercourse perspective.

Feel free to contact Mercedes Liedtke, Mississippi Valley Conservation Authority (MVCA), for follow-up questions.

Other

83. The High-Performance Development Standard (HPDS) is a collection of voluntary and required standards that raise the performance of new building projects to achieve sustainable and resilient design. The HPDS was passed by Council on April 13, 2022.

    a. At this time, the HPDS is not in effect and Council has referred the 2023 HPDS Update Report back to staff with direction to bring forward an updated report to Committee with recommendations for revised phasing timelines, resource requirements and associated amendments to the Site Plan Control By-law by no later than Q1 2024.

    b. Please refer to the HPDS information attached and ottawa.ca/HPDS for more information.

Should there be any questions, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Yours Truly,
Colette Gorni

c.c. Stream Shen, Planner III, City of Ottawa
Shahira Jalal, Planner I, City of Ottawa
Nader Kadri, Planner (Urban Design), City of Ottawa
Ryan Brault, Infrastructure Project Manager, City of Ottawa
Rochelle Fortier, Transportation Project Manager, City of Ottawa
Mark Richardson, Planning Forester, City of Ottawa
Matthew Hayley, Environmental Planner, City of Ottawa
Amy McPherson, Planner (Bird Safety), City of Ottawa
Daniela Correia, Parks Planner, City of Ottawa
Charlotte Petkovic, Student Planner, City of Ottawa
Mercedes Liedtke, MVCA

Appendix B
Water Servicing

SITE INFORMATION

PROJECT DESCRIPTION	1 - MULTIFAMILY RESIDENTIAL APARTMENT (6 STOREY)		
TOTAL UNITS	177 UNITS		
CIVIC ADDRESS	425 CULDAFF RD.		
MUNICIPALITY	CITY OF OTTAWA		
ZONING	GM		
LEGAL DESCRIPTION	-		
LOT AREA	9,728.16 m^2	2.40 ACRES	0.973 HECTARES
BUILDING AREA	16,335.42	m^2	
DENSITY	74.2 DU/ACRE		
FLOOR SPACE INDEX (FSI)	1.68		

ZONING SUMMARY

	REQUIRED		PROPOSED	
MAX. BUILDING HEIGHT	18 m		18 m	
MIN. FRONT YARD S.B.	3.0	m	7.0	m
MIN. REAR YARD S.B.	7.5	m	7.5	m
MIN. INTERIOR SIDE YARD S.B.	3.0	m	3.0	m
MIN. CORNER SIDE YARD S.B.	3.0	m	3.0	m
MIN. LOT AREA	No minimum	m^2	-	m^2
MIN. LOT WIDTH	No minimum	m	-	m

VEHICULAR PARKING

	REQUIRED	UNITS/AREA	REQUIRED	PROPOSED
APARTMENT - REGULAR	1.2 / UNIT	177	212	177
VISITORS	0.2 / UNIT	177	35	35
TOTAL PARKING STALLS			**247**	**212 ***
OTHER PARKING PROVISIONS				
SMALL CAR	MAX 50%		MAX 107	75
ACCESSIBLE TYPE A			3	3

*** SUBJECT TO VARIANCE**

BUILDING INFORMATION

BUILDING	STOREYS	UNIT COUNT	FOOTPRINT	GROSS BUILDING AREA
A	**6**	**177**	2722.57 m^2	16,335.42 m^2

UNIT BREAKDOWN

	BUILDING A	
TOTAL PER BUILDING	177	
TOTAL		
		%
STUDIO	24	**13%**
1 BED / 1BATH	24	**13%**
2 BED / 1 BATH	6	**3%**
2 BED / 2 BATH	87	**51%**
3 BED / 2 BATH	36	**20%**
TOTAL	**177 UNITS**	

LANDSCAPE

	REQUIRED	PROPOSED
PERCENTAGE OF LOT AREA		35%
m^2		3387 m^2

BICYCLE PARKING

	RATE	UNITS/AREA	REQUIRED	PROPOSED
APARTMENT BUILDING	0.5 / UNIT	177	89	108
TOTAL BICYCLE			**89**	**108**
OTHER BICYCLE PROVISIONS				
MAX BIKE STALLS IN LANDSCAPED AREA	50%	-	45	40
MIN HORIZONTAL BIKE STALL	50%	-	45	48
MIN SECURED BIKE STALLS	25%	-	22	68

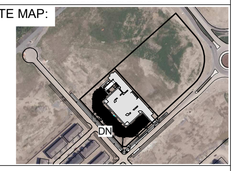
LEGEND

	PROPERTY LINE
	SETBACK LINE
	BUILDING OUTLINE
	FIRE HYDRANT
	EV CHARGER
	WOODEN FENCE
	CHAINLINK FENCE
	LANDSCAPE AREA
	CROSSWALK 1.5 X .45 STRIPS
	SIDEWALK LETDOWN
	ACCESSIBLE PARKING
	BIKE PARKING (NUMBER REPRESENTS COUNT)

1 SITE PLAN
1 : 275

BROADSTREET PROPERTIES LTD.
100 St Anns, Campbell River, B.C.
(T)250.286.8045 (F)250.286.8046
www.broadstreet.ca

SITE MAP:



PROJECT STATUS:

DEVELOPMENT PERMIT

Revision Schedule

No.	Description	Revision Date
1	ISSUED FOR D.P.	OCT 8, 2024

SEAL: **ABELE**ARCHITECTURE
THOMAS C. ABELE, ARCHITECT OAA, T: 604.682-6818

PROJECT NAME:
PALLADIUM TERRACE

PROJECT NUMBER:
VP 2402

ADDRESS:
425 CULDAFF RD
OTTAWA, ON

DRAWING TITLE:
SITE PLAN

DRAWN BY:	EC
CHECKED BY:	CG
DATE:	OCT 8, 2024
SCALE:	As indicated
DRAWING #:	REV #:
A1.00	A

10/03/2024 9:57:18 AM

From: Eric Condon <eric.condon@broadstreet.ca>
Sent: Friday, August 9, 2024 1:58 PM
To: Curtis Ferguson <c.ferguson@novatech-eng.com>
Cc: Christopher Gibson <christopher.gibson@broadstreet.ca>
Subject: RE: 425 Culdaff Road - FUS Building Construction (123194)

Hi Curtis,

Here's the floor area breakdown for you:

Main Floor

TOTAL FLOOR AREA = 2737.68 m^2

FIREWALL FLOOR AREA BREAKDOWN

LEFT SIDE FLOOR AREA = 1384.84 m^2

RIGHT SIDE FLOOR AREA = 1384.84 m^2

Typ Floor (L2 – L6)

TOTAL FLOOR AREA = 2774.61 m^2

FIREWALL FLOOR AREA BREAKDOWN

LEFT SIDE FLOOR AREA = 1387.58 m^2

RIGHT SIDE FLOOR AREA = 1387.03 m^2

Let me know if you need anything else.

Regards,

Eric Condon
Development Design Coordinator, Manitoba Regional Office

BROADSTREET PROPERTIES LTD.
SEYMOUR PACIFIC DEVELOPMENTS LTD.
570 Camiel Sys Street, Winnipeg, MB R2J 4K2
T. 431.478.0292 | **C.**
W. www.broadstreet.ca | www.seymourpacific.ca

From: Christopher Gibson <christopher.gibson@broadstreet.ca>
Sent: Friday, August 9, 2024 10:58 AM
To: Eric Condon <eric.condon@broadstreet.ca>
Subject: FW: 425 Culdaff Road - FUS Building Construction (123194)

Hi Eric,

Can you provide Curtis the information requested below.

Christopher Gibson, (he/him), MCP, MCIP, RPP
Development Manager, Manitoba Regional Office

BROADSTREET PROPERTIES LTD.
SEYMOUR PACIFIC DEVELOPMENTS LTD.
570 Camiel Sys Street, Winnipeg, MB R2J 4K2
T. 780.784.6316 | **C.** 204.218.0784
W. www.broadstreet.ca | www.seymourpacific.ca

From: Curtis Ferguson <c.ferguson@novatech-eng.com>
Sent: Friday, August 9, 2024 10:48 AM
To: Christopher Gibson <christopher.gibson@broadstreet.ca>
Cc: Anjush Musyaju <a.musyaju@novatech-eng.com>; Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Subject: RE: 425 Culdaff Road - FUS Building Construction (123194)

Christopher,

Now that the building envelope has been finalized can you confirm building floor area (of all floors)? Additionally, can you confirm the building footprint on both sides of the firewall?

Thanks,

Curtis Ferguson, B.A.Sc., E.I.T. | Land Development

NOVATECH

Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 EXT: 331

From: Christopher Gibson <christopher.gibson@broadstreet.ca>
Sent: Wednesday, June 12, 2024 4:07 PM
To: Curtis Ferguson <c.ferguson@novatech-eng.com>
Cc: Anjush Musyaju <a.musyaju@novatech-eng.com>; Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Subject: RE: 425 Culdaff Road - FUS Building Construction (123194)

Hi Curtis,

Please see below response from our Architects.

Christopher Gibson, (he/him), MCP, MCIP, RPP
Development Manager, Manitoba Regional Office

BROADSTREET PROPERTIES LTD.
SEYMOUR PACIFIC DEVELOPMENTS LTD.
570 Camiel Sys Street, Winnipeg, MB R2J 4K2
T. 780.784.6316 | **C.** 204.218.0784
W. www.broadstreet.ca | www.seymourpacific.ca

From: Igor Kuseta <igor.kuseta@seymourpacific.ca>
Sent: Wednesday, June 12, 2024 3:05 PM
To: Christopher Gibson <christopher.gibson@broadstreet.ca>; Thomas C. Abele <thomas.abele@seymourpacific.ca>
Subject: RE: 425 Culdaff Road - FUS Building Construction (123194)

Hi Chris,

Just confirmed with Tom - this would be wood frame (V), NFPA 13, Standard water supply, fully supervised.

Igor Kuseta, AAA, MRAIC
Architect

BROADSTREET PROPERTIES LTD.
SEYMOUR PACIFIC DEVELOPMENTS LTD.
100 St. Ann's Rd, Campbell River, BC V9W 4C4
T. 778.560.3225 | **C.** 778.348.2566
W. www.broadstreet.ca | www.seymourpacific.ca

From: Christopher Gibson <christopher.gibson@broadstreet.ca>
Sent: Wednesday, June 12, 2024 12:49 PM
To: Igor Kuseta <igor.kuseta@seymourpacific.ca>
Subject: FW: 425 Culdaff Road - FUS Building Construction (123194)

Hi Igor,

I received the email below from our consultants in Ottawa regarding the Culdaff project.

I assume you are the person I would send this to but let me know if this should go to Thomas.

Thank you,

Christopher Gibson, (he/him), MCP, MCIP, RPP
Development Manager, Manitoba Regional Office

BROADSTREET PROPERTIES LTD.
SEYMOUR PACIFIC DEVELOPMENTS LTD.
570 Camiel Sys Street, Winnipeg, MB R2J 4K2
T. 780.784.6316 | **C.** 204.218.0784
W. www.broadstreet.ca | www.seymourpacific.ca

From: Curtis Ferguson <c.ferguson@novatech-eng.com>
Sent: Wednesday, June 12, 2024 12:33 PM
To: Christopher Gibson <christopher.gibson@broadstreet.ca>
Cc: Anjush Musyaju <a.musyaju@novatech-eng.com>; Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Subject: 425 Culdaff Road - FUS Building Construction (123194)

Good Afternoon Christoper,

Hope you are well.

We are currently working on 425 Culdaff Road FUS calculations and hoping the architect on file can confirm the following regarding building construction;

- Confirmed building floor area (of all floors).
- Construction Material (one of below);
    - Type V – Wood Frame
    - Type IV – Mass Timber
    - Type III – Ordinary Construction
    - Type II – Non-Combustible Construction
    - Type I – Fire Resistive Construction (2hrs)
- Sprinkler Reduction;
    - Adequately Designed System (NFPA 13) – **Yes OR No**
    - Standard Water Supply – **Yes OR No**
    - Fully Supervised System – **Yes OR No**

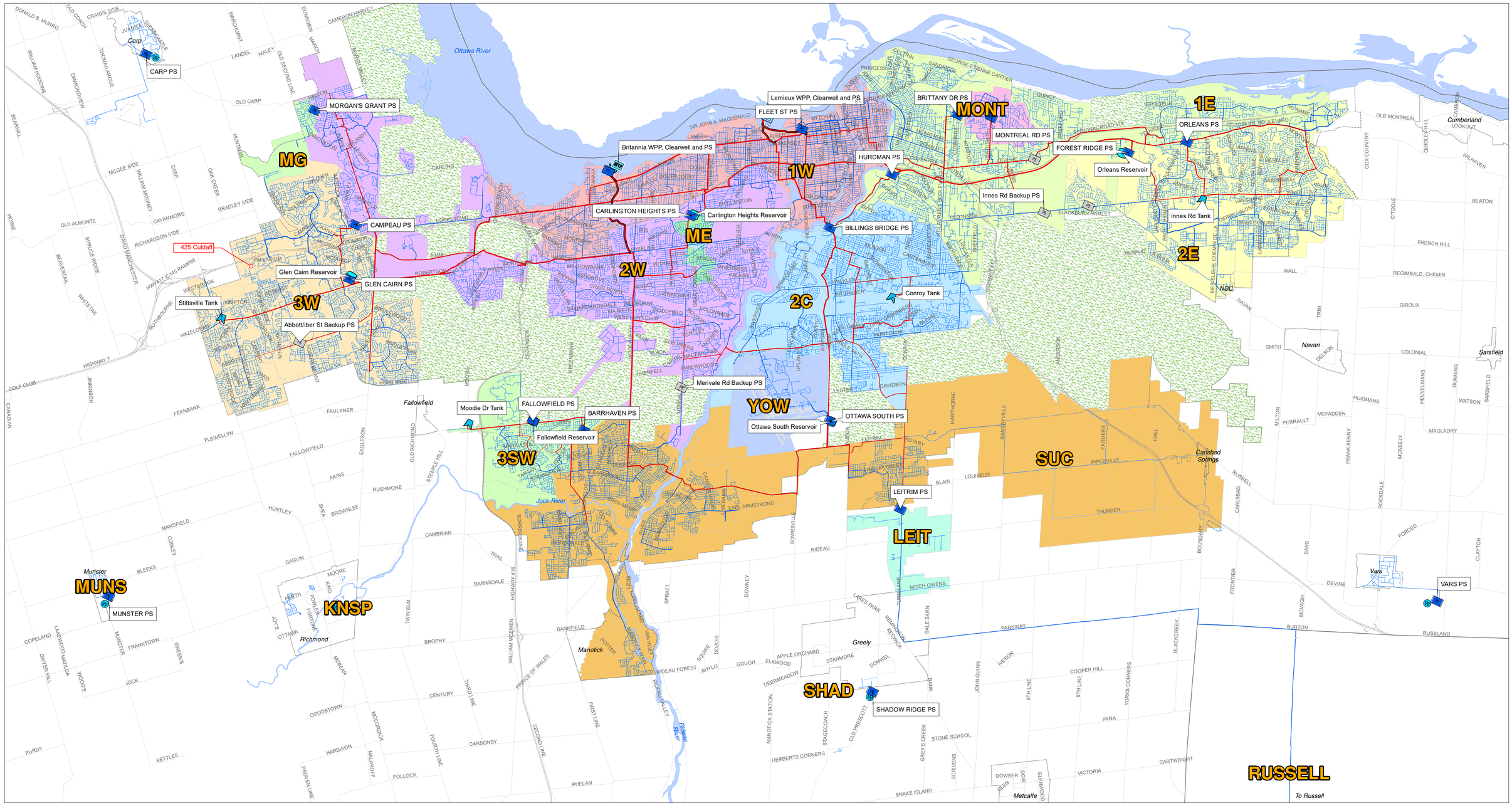
Thanks,

Curtis Ferguson, B.A.Sc., E.I.T. | Land Development

NOVATECH

Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 EXT: 331



Infrastructure Master Plan - Figure 1-1

Water Distribution System Backbone Infrastructure

Water Demand Design Sheet

NOVATECH
Engineers, Planners & Landscape Architects

Boundary Condition Request

Novatech Project #: 123194
Project Name: 425 Culdaff Road
Date: 8/6/2024
Input By: Anjush Musyaju, EIT
Reviewed By: Anthony Mestwarp, P.Eng.
Drawing Reference: Preliminary Arch set (A1.00)

Legend: Input by User | No Input Required | Calculated Cells →

Reference: Ottawa Design Guidelines - Water Distribution (2010 and TBs)
MOE Design Guidelines for Drinking-Water Systems (2008)
Fire Underwriter's Survey Guideline (2020)
Ontario Building Code, Part 3 (2012)

Small System = YES

	# of Dwellings	Area (ha.)	Pop. Equiv.	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)	Basic Day Demand (m^3/day)
Residential Input							
Singles			0.00	0.00	0.00	0.00	0.0
Semis / Townhomes			0.00	0.00	0.00	0.00	0.0
Apartments (2-BR)	93		195.30	0.63	2.28	3.48	39.1
Apartments (1-BR)	48		67.20	0.22	0.78	1.20	13.4
Apartments (3-BR)	36		111.60	0.36	1.30	1.99	22.3
Industrial / Commercial / Institutional (ICI) Input							
Industrial Area - Light				0.00	0.00	0.00	0.0
Industrial Area - Heavy				0.00	0.00	0.00	0.0
Commercial Area				0.00	0.00	0.00	0.0
Institutional Area				0.00	0.00	0.00	0.0
Other Area				0.00	0.00	0.00	0.0
Totals	**177**	**0.00**	**374.10**	**1.21**	**4.36**	**6.67**	**74.8**

Summary

i. Type of Development and Units:	6-Storey Apartment Building with 177 units	
ii. Site Address:	425 Culdaff Road, Ottawa, Ontario	
iii. Proposed Water Service Connection Location(s):	Culdaff Road (Refer to Figure for details)	
iv. Average Day Flow Demand:	1.21	L/s
v. Peak Hour Flow Demand:	6.67	L/s
vi. Maximum Day Flow Demand:	4.36	L/s
vii. Required Fire Flow #1:	18000	L/min
viii. Required Fire Flow #2:	17000	L/min

Water Demand Design Sheet

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Design Parameters

Residential							Vulnerable Service Area (VSA)
Unit Type	**Singles**	**Semis/ Towns**	**Apts (2-BR)**	**Apts (1-BR)**	**Apts (Avg)**	**Apts (3-BR)**	
Population Equiv.	3.4	2.7	2.1	1.4	1.8	3.1	
Dailly Demand	L/per person/day						50
Average Demand	280						< 50 m³/day
Basic Demand	200						> 50 m³/day

Residential Peaking Factors		**Max Day (x Avg Day)**	**Peak Hour (x Avg Day)**
	Pop.		
Small System (If Applicable)	0	9.50	14.30
	30	9.50	14.30
	150	4.90	7.40
Modified	300	3.60	*5.50*
	450	3.00	*5.50*
	500	2.90	*5.50*
Large System (Default)	> 500	2.50	5.50

Institutional / Commercial / Industrial				
Industrial		**Commercial**	**Institutional**	**Other Use**
Light	**Heavy**			
L/gross ha/day				L/m²/day
35,000	55,000	28,000	28,000	5
10,000	17,000	17,000	17,000	3

ICI Peaking Factors	**Max Day (x Avg Day)**	**Peak Hour (x Avg Day)**
	1.50	2.70

BLOCK 243
(COMMERCIAL)

BLOCK 242
(COMMERCIAL)

BLOCK 241
(COMMERCIAL)

6-STOREYS - 177 UNITS
FFE = 109.00
P1 FFE= 106.65

2HR FIREWALL

39.66m

8.64m

17.58m

31.70m

32.21m

AMENITY

TRELLIS

DC

CULDAFF ROAD

DESIGNER AVENUE

FUTURE FIREWALK (BY OTHERS)

FUTURE BIKE PATH (BY OTHERS)

LEGEND

PROPERTY LINE

PROPOSED ENTRANCE

DC — PROPOSED DEPRESSED CURB

2HR FIREWALL

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
425 CULDAFF ROAD

FUS SEPARATION

SCALE 1 : 750 (0, 10, 20, 30)

DATE JULY 2024 | JOB 123194 | FIGURE FUS

SHT11X17.DWG - 279mmX432mm

M:\2023\123194\CAD\Civil\Figures\Servicing\FUS\123194-Separation.dwg, SEP, Aug 06, 2024 - 2:51pm, amusyaju

FUS - Fire Flow Calculations

Engineers, Planners & Landscape Architects

Novatech Project #: 123194
Project Name: 425 CULDAFF
Date: 8/12/2024
Input By: Anjush Musyaju
Reviewed By: Anthony Mestwarp P.Eng.
Drawing Reference: 123194-FUS seperation

Legend: Input by User
No Input Required
Reference: Fire Underwriter's Survey Guideline (2020)
Formula Method

Building Description: Multifamily Residential Aparatment (6 STOREY) - North
Type V - Wood frame

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1387.58			
		Number of Floors/Storeys	6			
		Protected Openings (1 hr) if C<1.0	No			
		Area of structure considered (m^2)			8,325	
	F	**Base fire flow without reductions**				**30,000**
		$F = 220\ C\ (A)^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**25,500**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-12,750**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Sub-Total	**-50%**	
		Area of Sprinklered Coverage (m^2)	8325.48	100%		
				Cumulative Total	**-50%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	3.1 - 10 m		20%	**5,100**
		East Side	>30m		0%	
		South Side	2Hr Firewall		0%	
		West Side	>30m		0%	
				Cumulative Total	**20%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**18,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**300**
				or	USGPM	4,756

FUS - Fire Flow Calculations

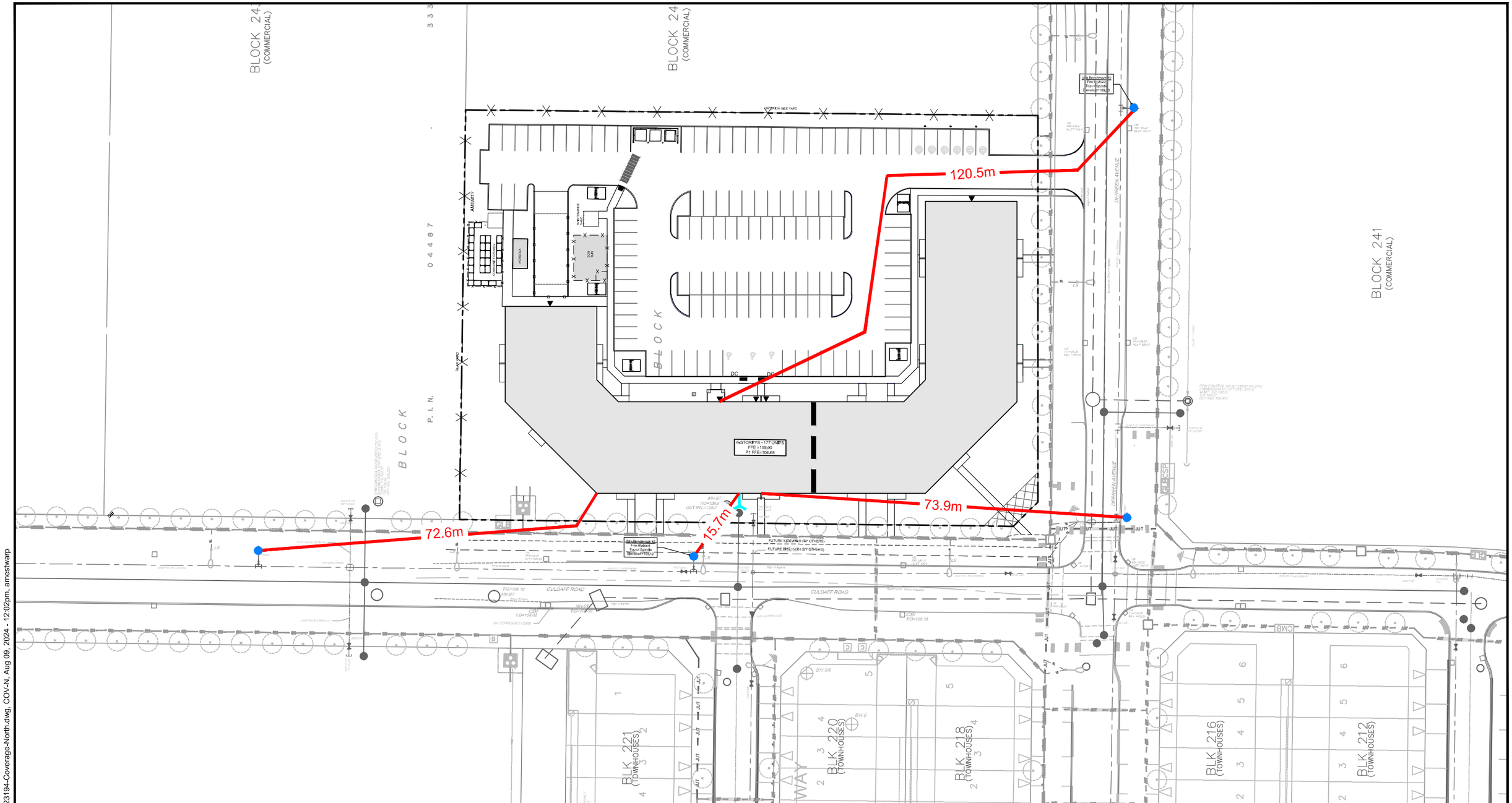
Engineers, Planners & Landscape Architects

Novatech Project #: 123194
Project Name: 425 CULDAFF
Date: 8/12/2024
Input By: Anjush Musyaju
Reviewed By: Anthony Mestwarp P.Eng.
Drawing Reference: 123194-FUS seperation

Legend: Input by User
No Input Required
Reference: Fire Underwriter's Survey Guideline (2020)
Formula Method

Building Description: Multifamily Residential Apartment (6 STOREY) - South
Type V - Wood frame

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1387.03			
		Number of Floors/Storeys	6			
		Protected Openings (1 hr) if C<1.0	No			
		Area of structure considered (m^2)			8,322	
	F	**Base fire flow without reductions**				**30,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%		
		Limited combustible	Yes	-15%		
		Combustible		0%	-15%	**25,500**
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Sub-Total	**-50%**	**-12,750**
		Area of Sprinklered Coverage (m^2)	8322.18	100%		
				Cumulative Total	**-50%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	2Hr Firewall		0%	
		East Side	10.1 - 20 m		15%	
		South Side	2Hr Firewall		0%	**3,825**
		West Side	>30m		0%	
				Cumulative Total	**15%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**17,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**283**
				or	USGPM	4,491



LEGEND

- PROPERTY LINE
- PROPOSED SIAMESE CONNECTION
- EXISTING CLASS AA HYDRANT
- PROPOSED HYDRANT
- DISTANCE FROM HYDRANT TO SIAMESE CONNECTION/ BUILDING ENTRANCE

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Website www.novatech-eng.com

CITY OF OTTAWA
425 CULDAFF ROAD

COVERAGE PLAN (NORTH)

SCALE 1 : 750 (0, 10, 20, 30)
DATE JULY 2024
JOB 123194
FIGURE COV-N

SHT11X17.DWG - 279mmX432mm

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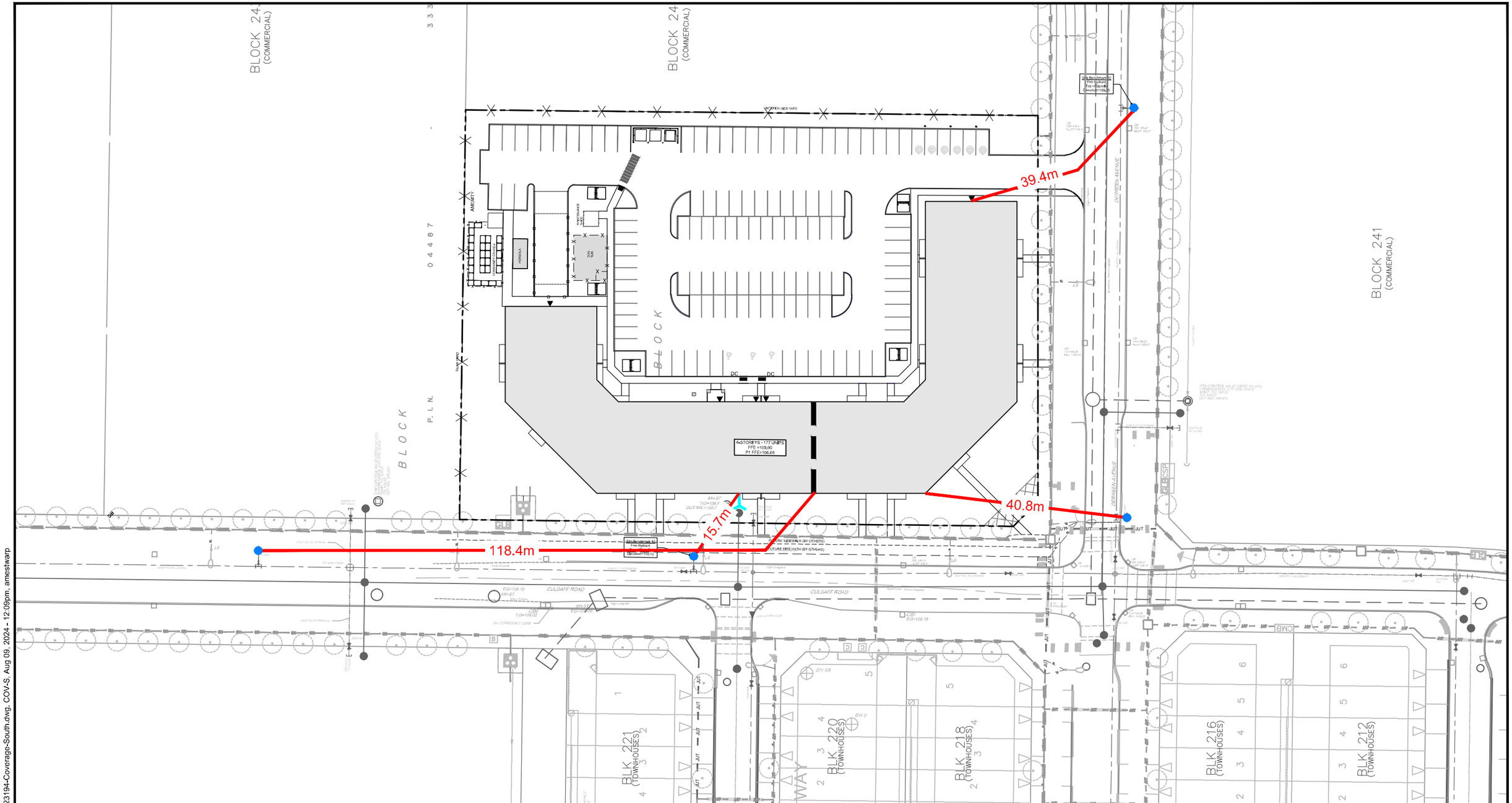

LEGEND

- PROPERTY LINE
- PROPOSED SIAMESE CONNECTION
- EXISTING CLASS AA HYDRANT
- PROPOSED HYDRANT
- DISTANCE FROM HYDRANT TO SIAMESE CONNECTION/ BUILDING ENTRANCE

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CITY OF OTTAWA
425 CULDAFF ROAD

COVERAGE PLAN (SOUTH)

SCALE 1 : 750 (0, 10, 20, 30)
DATE JULY 2024
JOB 123194
FIGURE COV-S

SHT11X17.DWG - 279mmX432mm

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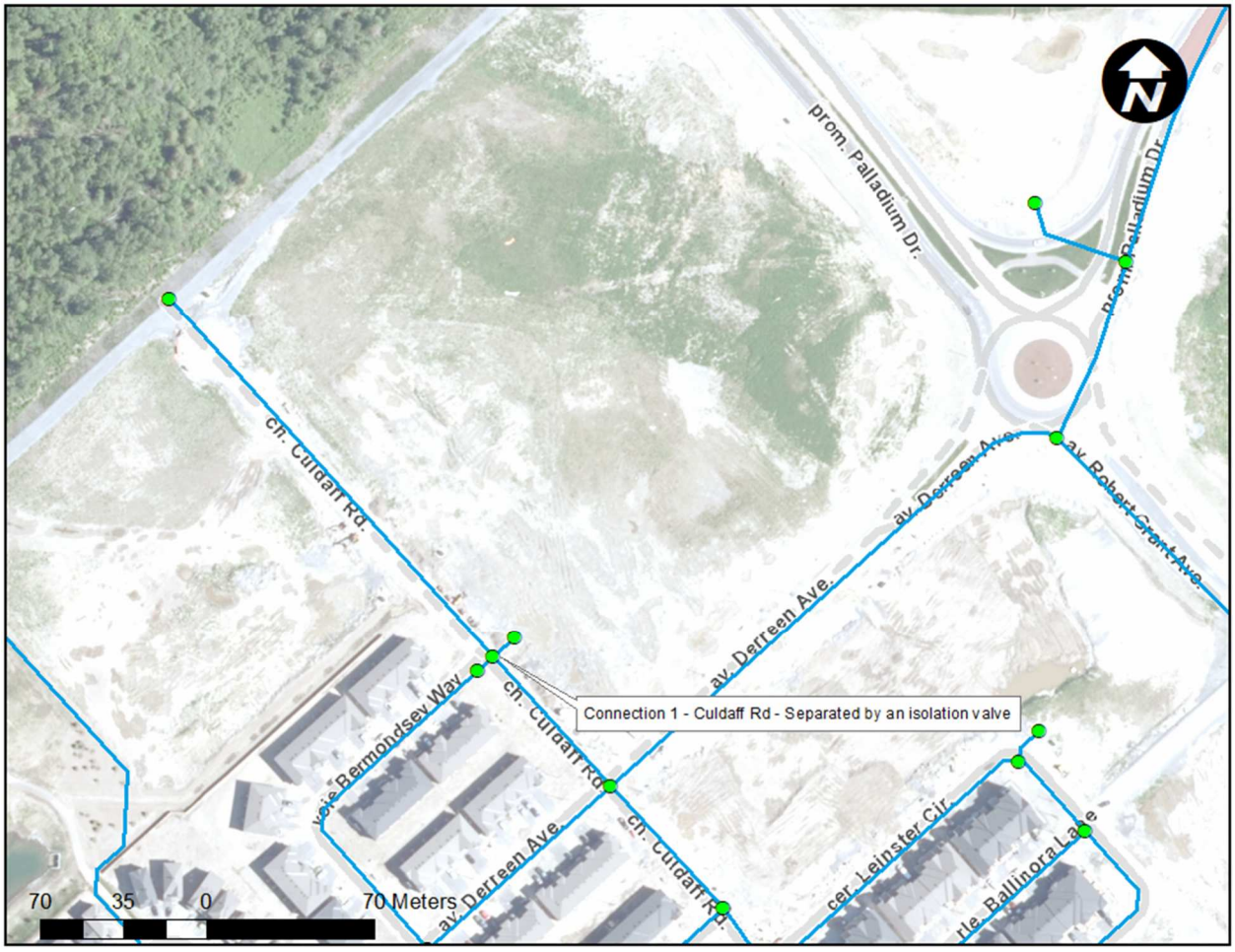
Boundary Conditions

425 Culdaff Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	73	1.21
Maximum Daily Demand	262	4.36
Peak Hour	400	6.67
Fire Flow Demand #1	18,000	300.00
Fire Flow Demand #2	17,000	283.33

Location



Results

Connection 1 – Culdaff Rd*

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	161.2	77.8
Peak Hour	156.4	71.0
Max Day plus Fire Flow #1	127.2	29.4
Max Day plus Fire Flow #2	130.1	33.6

[1] Ground Elevation = 106.5 m

Notes

1. **Boundary condition provides results at single connection to the City network representing two water service line connections to be split by an isolation valve.*

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

From: Brault, Ryan <ryan.brault@ottawa.ca>
Sent: Thursday, September 5, 2024 10:39 AM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Subject: RE: 425 Culdaff (2765 Palladium)- Boundary Conditions request - 123194

I apologize for the delay on this. Please find the attached boundary conditions for the 425 Culdaff site.

Please let me know if you have any questions or concerns.

Regards,

Ryan Brault, M.Eng., P.Eng

Project Manager - Infrastructure Approvals

City of Ottawa

Development Review - West Branch

Planning, Development, and Building Services

110 Laurier Ave West, 4th Floor East;

Ottawa ON K1P 1J1

Tel: 613-580-2424 x 32540

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: August 15, 2024 1:49 PM
To: Brault, Ryan <ryan.brault@ottawa.ca>
Subject: 425 Culdaff (2765 Palladium)- Boundary Conditions request - 123194

Hi Ryan,

Please find attached and below the necessary documentation for the Boundary Condition request for the site located at 425 Culdaff.

It is proposed to develop the site with a 6-storey wood frame apartment building. The building will be separated into two (2) fire zones by a proposed fire wall to reduce the site fire demands.

The building will have 177 units for a demand as follows:

Average Day = 1.21L/s

Max Day = 4.36 L/s

Peak Hour = 6.67 L/s

Fire demand #1 = 300L/s

Fire Demand #2 = 283L/s

Due to the high demands, it is proposed to service the site with two(2) 200mm services separated by an isolation valve to avoid the creation of a vulnerable service area.

Please refer to the attached for the supporting figures and calculations.

Please let me know if you require anything further.

Thanks,

Anthony Mestwarp, P.Eng., Project Manager | Land Development Engineering

NOVATECH

Engineers, Planners & Landscape Architects

240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216

CALCULATED WATER DEMNADS:

Water Demands

Average Day (Maximum HGL)=	1.21	L/s
Maximum Day =	4.36	L/s
Peak Hour (Minimum HGL) =	6.67	L/s
Fire Flow (FUS) =	300.00	L/s

City of Ottawa Boundary Conditions:

Average Day (Maximum HGL)=	161.2	m
Peak Hour (Minimum HGL) =	156.4	m
Max Day + Fire =	127.2	m

Watermain Analysis

Finished Floor Elevation = 109.00 m

High Pressure Test = Max. HGL -Finished Floor Elevation x 1.42197 PSI/m < 80 PSI

High Pressure = 74.2 PSI

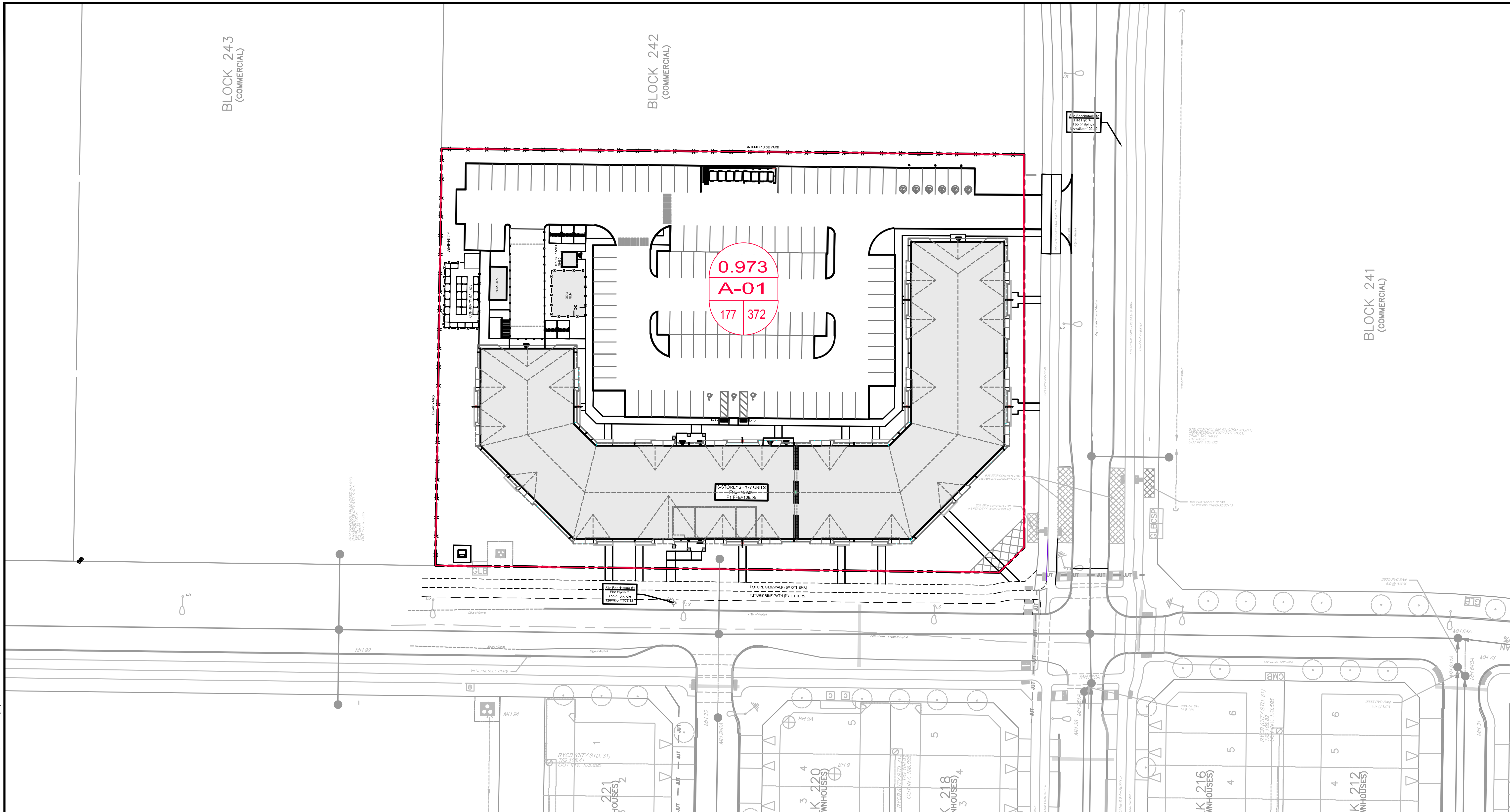
Low Pressure Test = Min. HGL - Finished Floor Elevation x 1.42197 PSI/m > 40 PSI

Low Pressure = 67.4 PSI

Max Day + Fire Test = Max Day + Fire Flow - Finished Floor Elevation x 1.42197 PSI/m > 20 PSI

Max Day + Fire (Connection #1) = 25.9 PSI

Appendix C
Sanitary Servicing



LEGEND

- PROPERTY LINE
- PROPOSED SANITARY SEWER AND MANHOLE
- SAN MH *EXISTING SANITARY MANHOLE & SEWER*
- SANITARY SEWER DRAINAGE AREA BOUNDARY
- 0.47 / 20A-19A / 71 | 128 — DRAINAGE AREA (ha) / SAN SEWER PIPE RUN / NO. UNITS/POPULATION

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CITY OF OTTAWA
425 CULDAFF ROAD

SANITARY DRAINAGE
AREA PLAN

SCALE	DATE	JOB	FIGURE
1 : 750	OCTOBER 2024	123194	SAN

SANITARY SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

ovatech Project #: 123194
Project Name: 425 Culdaff Road
Date: 6/13/2024
Input By: Anjush Musyaju
Reviewed By: Anthony Mestwarp P.Eng.
awing Reference: 123194-SAN

Legend: Design Input by User
As-Built Input by User
Cumulative Cell
Calculated Design Cell Output
Reference: City of Ottawa - Sewer Design Guidelines (2012 a
MOE - Design Guidelines for Sewage Works (200

Location				Demand												Design Capacity							
				Residential Flow										Extraneous Flow Area Method		Total Design Flow	Proposed Sewer Pipe Sizing / Design							
Street	Area ID	From MH	To MH	1 bed	2 bed	3bed	Population (in 1000's)	Cumulative Population (in 1000's)	Average Pop. Flow Q(q) (L/s)	Design Peaking Factor M	Peak Design Pop. Flow Q(p) (L/s)	Res. Drainage Area (ha.)	Cumulative Res. Drainage Area (ha.)	Cumulative Extraneous Drainage Area (ha.)	Design Extraneous Flow Q(e) (L/s)	Total Peak Design Flow Q(D) (L/s)	Pipe Length (m)	Pipe Size (mm) and Material	Pipe ID Actual (m)	Roughness n	Design Grade So (%)	Capacity Qfull (L/s)	Full Flow Velocity (m/s)	Q(D) / Qfull
Culdaff rd	A1	BLDG	Ex. 71A	48	93	36	0.374	0.374	1.21	3.43	4.16	0.973	0.973	0.973	0.32	4.48	3.0	200 PVC	0.203	0.013	1.00	34.2	1.06	13.1%
Totals				**48**	**93**	**36**	**0.374**	**0.374**	**1.21**	**3.43**	**4.16**	**0.973**	**0.973**	**0.973**	**0.32**	**4.48**	**3.0**							

Demand Equation / Parameters

1. **Q(D) =** Q(p) + Q(ici) + Q(e)
2. **Q(p) =** (P x q x M x K / 86,400)
3. **q =** 280 L/per person/day (design)
4. **M = Harmon Formula (maximum of 4.0)**
5. **K =** 0.8 (design)
6. **Park flow is considered equivalent to a single unit / ha**
   Park Demand = 4 single unit equivalent / park ha (~ 3,600 L/ha/day)
7. **Q(ici) =** ICI Area x ICI Flow x ICI Peak
8. **Q(e) =** 0.33 L/s/ha (design)

Definitions

Q(D) = Peak Design Flow (L/s)
Q(p) = Peak Design Population Flow (L/s)
Q(q) = Average Population Flow (L/s)

	1-Bed Apartmen	2-Bed Apartmer	3-Bed Apartment
P = Residential Population =	1.4	2.1	3.1

q = Average Capita Flow
M = Harmon Formula
K = Harmon Correction Factor
Q(ici) = Industrial / Commercial / Institutional Flow (L/s)
Q(e) = Extraneous Flow (L/s)

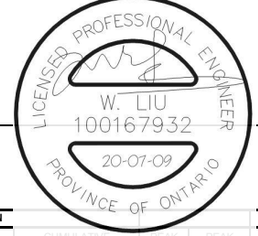
Institutional / Commercial / Indus	Industrial	Commercial / Institutional	
Design =	35000	28000	L/gross ha/day
ICI Peak *			
Design =	1.0	1.5	* ICI Peak = 1.0 Default, 1.5 if ICI in contributing area is >20% (design only)

Capacity Equation

Q full = $1000*(1/n)*A_p*R^{2/3}*So^{0.5}$

Definitions

Q full = Capacity (L/s)
n = Manning coefficient of roughness (0.013)
A_p = Pipe flow area (m^2)
R = Hydraulic Radius of wetted area (dia./4 for full pipes)
So = Pipe slope/gradient



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)
Block 240 (Commercial)																													
	76A	77A						0.00				0.64	0.64		0.00		0.00	0.31	0.64	0.64	0.21	0.52	16.0	250	0.65	47.94	0.01	0.98	0.31
To avenue Derreen Avenue, Pipe 77A - 78A								0.00	0				0.64		0.00		0.00			0.64									
Block 241 (Commercial)																													
	74A	75A						0.00				1.06	1.06		0.00		0.00	0.52	1.06	1.06	0.35	0.87	15.5	250	0.65	47.94	0.02	0.98	0.37
To avenue Derreen Avenue, Pipe 75A - 77A								0.00	0				1.06		0.00		0.00			1.06									
Block 244 (Employment)																													
	68A	70A						0.00				1.99	1.99		0.00		0.00	0.97	1.99	1.99	0.66	1.62	15.0	250	0.65	47.94	0.03	0.98	0.45
To chemin Culdaff Road, Pipe 70A - 72A								0.00	0				1.99		0.00		0.00			1.99									
Block 243 (Commercial)																													
	69A	70A						0.00				1.60	1.60		0.00		0.00	0.78	1.60	1.60	0.53	1.31	15.0	250	0.65	47.94	0.03	0.98	0.42
To chemin Culdaff Road, Pipe 70A - 72A								0.00	0				1.60		0.00		0.00			1.60									
Block 256 (Commercial)																													
	66A	67A						0.00				1.59	1.59		0.00		0.00	0.77	1.59	1.59	0.52	1.30	15.0	250	0.65	47.94	0.03	0.98	0.42
To chemin Culdaff Road, Pipe 67A - 70A								0.00	0				1.59		0.00		0.00			1.59									
Block 233 (Servicing Block)																													
Contribution From cours Curraglass Walk, Pipe 30A - 33A								1.42	139				0.00		0.00		0.00		1.42	1.42									
Contribution From cours Curraglass Walk, Pipe 32A - 33A								1.15	120				0.00		0.00		0.00		1.15	1.15									
	33A	34A	0.01				0	2.58	259	3.48	2.92		0.00		0.00		0.00	0.00	0.01	2.58	0.85	3.78	12.0	200	0.40	20.74	0.18	0.66	0.50
	34A	37A	0.05				0	2.63	259	3.48	2.92		0.00		0.00		0.00	0.00	0.05	2.63	0.87	3.79	60.5	200	0.45	22.00	0.17	0.70	0.52
To terrasse Crossway Terrace, Pipe 37A - 39A								2.63	259				0.00		0.00		0.00			2.63									
terrasse Crossway Terrace																													
	35A	36A	0.49	12	12		41	0.49	41	3.67	0.49		0.00		0.00		0.00	0.00	0.49	0.49	0.16	0.65	63.5	200	0.65	26.44	0.02	0.84	0.35
	36A	37A	0.53	15	15		51	1.02	92	3.60	1.07		0.00		0.00		0.00	0.00	0.53	1.02	0.34	1.41	77.5	200	0.70	27.44	0.05	0.87	0.45
Contribution From Block 223, Pipe 34A - 37A								2.63	259				0.00		0.00		0.00		2.63	2.63									
	37A	39A	0.19	4	4		14	3.84	365	3.43	4.06		0.00		0.00		0.00	0.00	0.19	3.84	1.27	5.33	46.5	250	0.30	32.57	0.16	0.66	0.49
Contribution From Block 236 (Park), Pipe 38A - 39A								0.00	0				0.00		0.00		0.53		0.53	0.53	0.17	0.17	11.0	200	0.65	26.44	0.01	0.84	0.23
	400A	640A	0.67	23		23	63	0.67	63	3.63	0.74		0.00		0.00		0.00	0.00	0.67	0.67	0.22	0.96	94.5	200	0.65	26.44	0.04	0.84	0.40
	640A	641A						0.67	63	3.63	0.74		0.00		0.00		0.00	0.00	0.00	0.67	0.22	0.96	2.5	200	1.00	32.80	0.03	1.04	0.46
	39A	40A	0.39	13		13	35	4.23	400	3.42	4.43		0.00		0.00		0.53	0.09	0.39	4.76	1.57	6.09	79.0	250	0.30	32.57	0.19	0.66	0.51
	40A	641A						4.23	400	3.42	4.43		0.00		0.00		0.53	0.00	0.00	4.76	1.57	6.00	89.5	250	0.30	32.57	0.18	0.66	0.51
	641A	64A						4.90	463	3.39	5.09		0.00		0.00		0.53	0.00	0.00	5.43	1.79	6.88	6.0	250	0.30	32.57	0.21	0.66	0.52
To chemin Culdaff Road, Pipe 64A - 73A								4.90	463				0.00		0.00		0.53			5.43									
rang Kindred Row																													
	45A	46A	0.71	22		22	60	0.71	60	3.64	0.71		0.00		0.00		0.00	0.00	0.71	0.71	0.23	0.94	78.5	200	0.65	26.44	0.04	0.84	0.39
	46A	47A	0.58	22		22	60	1.29	120	3.58	1.39		0.00		0.00		0.00	0.00	0.58	1.29	0.43	1.82	90.5	200	0.65	26.44	0.07	0.84	0.48
To placette Allied Mews, Pipe 47A - 48A								1.29	120				0.00		0.00		0.00			1.29									
ruelle Ballinora Lane																													
	56A	57A	0.39	18		18	49	0.39	49	3.65	0.58		0.00		0.00		0.00	0.00	0.39	0.39	0.13	0.71	61.5	200	0.65	26.44	0.03	0.84	0.36
	57A	58A	0.30			17	46	0.69	95	3.60	1.11		0.00		0.00		0.00	0.00	0.30	0.69	0.23	1.34	66.0	200	0.40	20.74	0.06	0.66	0.37
	58A	59A	0.01					0.70	95	3.60	1.11		0.00		0.00		0.00	0.00	0.01	0.70	0.23	1.34	10.5	200	0.40	20.74	0.06	0.66	0.37
To chemin Culdaff Road, Pipe 59A - 63A								0.70	95				0.00		0.00		0.00			0.70									

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha
Average Daily Flow =	280	l/p/day		
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha
Max Res. Peak Factor =	4.00			
Commercial/Inst./Park Peak Factor =	1.50			
Institutional =	0.32	l/s/Ha		

Industrial Peak Factor = as per MOE Graph

Extraneous Flow =	0.330	L/s/ha		
Minimum Velocity =	0.600	m/s		
Manning's n =	(Conc)	0.013	(Pvc)	0.013
Townhouse coeff=	2.7			
Single house coeff=	3.4			

Designed: R.A.	PROJECT: **195 Huntmar Drive**		
Checked: W.L.	LOCATION: **City of Ottawa**		
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 87-93	File Ref: 12-624	Date: **July 2020**	Sheet No. 1 of 5

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)
placette Allied Mews																													
	41A	42A	0.71	22		22	60	0.71	60	3.64	0.71		0.00		0.00		0.00	0.00	0.71	0.71	0.23	0.94	79.0	200	0.80	29.34	0.03	0.93	0.42
	42A	43A	0.57	22		22	60	1.28	120	3.58	1.39		0.00		0.00		0.00	0.00	0.57	1.28	0.42	1.81	83.0	200	0.40	20.74	0.09	0.66	0.40
	43A	44A	0.03				0	1.31	120	3.58	1.39		0.00		0.00		0.00	0.00	0.03	1.31	0.43	1.82	11.0	200	0.40	20.74	0.09	0.66	0.41
	44A	47A	0.24	7		7	19	1.55	139	3.56	1.60		0.00		0.00		0.00	0.00	0.24	1.55	0.51	2.12	61.0	200	0.40	20.74	0.10	0.66	0.42
Contribution From rang Kindred Row, Pipe 46A - 47A								1.29	120				0.00		0.00		0.00		1.29	1.29									
	47A	48A	0.30	9		9	25	3.14	284	3.47	3.19		0.00		0.00		0.00	0.00	0.30	3.14	1.04	4.23	62.0	200	0.40	20.74	0.20	0.66	0.52
	48A	59A						3.14	284	3.47	3.19		0.00		0.00		0.00	0.00	0.00	3.14	1.04	4.23	10.0	200	0.40	20.74	0.20	0.66	0.52
To chemin Culdaff Road, Pipe 59A - 63A								3.14	284				0.00		0.00		0.00			3.14									
cercle Leinster Circle																													
	49A	50A	0.22	7		7	19	0.22	19	3.71	0.23		0.00		0.00		0.00	0.00	0.22	0.22	0.07	0.30	49.5	200	0.80	29.34	0.01	0.93	0.30
	50A	51A	0.26	11		11	30	0.48	49	3.65	0.58		0.00		0.00		0.00	0.00	0.26	0.48	0.16	0.74	80.5	200	0.65	26.44	0.03	0.84	0.36
	51A	55A	0.01					0.49	49	3.65	0.58		0.00		0.00		0.00	0.00	0.01	0.49	0.16	0.74	10.5	200	0.40	20.74	0.04	0.66	0.30
To chemin Culdaff Road, Pipe 55A - 59A								0.49	49				0.00		0.00		0.00			0.49									
	60A	61A						0.00				1.67	1.67		0.00		0.00	0.81	1.67	1.67	0.55	1.36	23.5	250	0.65	47.94	0.03	0.98	0.43
	61A	62A	0.45	18		18	49	0.45	49	3.65	0.58		1.67		0.00		0.00	0.81	0.45	2.12	0.70	2.09	120.0	250	0.65	47.94	0.04	0.98	0.48
	62A	63A	0.01				0	0.46	49	3.65	0.58		1.67		0.00		0.00	0.81	0.01	2.13	0.70	2.09	9.5	250	0.65	47.94	0.04	0.98	0.48
To chemin Culdaff Road, Pipe 63A - 64A								0.46	49				1.67		0.00		0.00			2.13									
Block 232 (Condo)																													
	53A	54A	1.75				446	1.75	446	3.40	4.91		0.00		0.00		0.00	0.00	1.75	1.75	0.58	5.49	11.0	250	0.65	47.94	0.11	0.98	0.64
To chemin Culdaff Road, Pipe 54A - 55A								1.75	446				0.00		0.00		0.00			1.75									
chemin Culdaff Road																													
	65A	67A	0.07				0	0.07	0			21.99	21.99		0.00		0.00	10.69	22.06	22.06	7.28	17.97	26.5	250	0.30	32.57	0.55	0.66	0.68
Contribution From Block 256, Pipe 66A - 67A								0.00	0				1.59		0.00		0.00		1.59	1.59									
	67A	70A	0.25				0	0.32	0				23.58		0.00		0.00	11.46	0.25	23.90	7.89	19.35	97.0	250	0.30	32.57	0.59	0.66	0.69
Contribution From Block 244, Pipe 68A - 70A								0.00	0				1.99		0.00		0.00		1.99	1.99									
Contribution From Block 243, Pipe 69A - 70A								0.00	0				1.60		0.00		0.00		1.60	1.60									
			0.12				0	0.44	0				27.17		0.00		0.00		0.12	27.61									
	70A	72A	0.19				0	0.63	0				27.17		0.00		0.00	13.21	0.19	27.80	9.17	22.38	76.0	250	0.30	32.57	0.69	0.66	0.71
Contribution From Block 242, Pipe 71A - 72A								0.00	0				2.70		0.00		0.00		2.70	2.70									
	72A	73A	0.16				0	0.79	0				29.87		0.00		0.00	14.52	0.16	30.66	10.12	24.64	74.0	250	0.30	32.57	0.76	0.66	0.73
To avenue Derreen Avenue, Pipe 73A - 75A								0.79	0				29.87		0.00		0.00			30.66									
chemin Culdaff Road																													
	52A	54A	0.74	15		15	41	0.74	41	3.67	0.49		0.00		0.00		0.00	0.00	0.74	0.74	0.24	0.73	102.5	200	0.65	26.44	0.03	0.84	0.36
Contribution From Block 232, Pipe 53A - 54A								1.75	446				0.00		0.00		0.00		1.75	1.75									
	54A	55A	0.09	3		3	9	2.58	496	3.38	5.43		0.00		0.00		0.00	0.00	0.09	2.58	0.85	6.29	21.0	250	0.30	32.57	0.19	0.66	0.51
Contribution From cercle Leinster Circle, Pipe 51A - 55A								0.49	49				0.00		0.00		0.00		0.49	0.49									
	55A	59A	0.15	4		4	11	3.22	556	3.36	6.05		0.00		0.00		0.00	0.00	0.15	3.22	1.06	7.12	45.0	250	0.30	32.57	0.22	0.66	0.53
Contribution From placette Allied Mews, Pipe 48A - 59A								3.14	284				0.00		0.00		0.00		3.14	3.14									
Contribution From ruelle Ballinora Lane, Pipe 58A - 59A								0.70	95				0.00		0.00		0.00		0.70	0.70									
	59A	63A	0.07				0	7.13	935	3.25	9.86		0.00		0.00		0.00	0.00	0.07	7.13	2.35	12.22	45.0	250	0.30	32.57	0.38	0.66	0.61
Contribution From cercle Leinster Circle, Pipe 62A - 63A								0.46	49				1.67		0.00		0.00		2.13	9.26									
	63A	64A	0.03				0	7.62	984	3.24	10.34		1.67		0.00		0.00	0.81	0.03	9.29	3.07	14.22	27.5	250	0.30	32.57	0.44	0.66	0.64

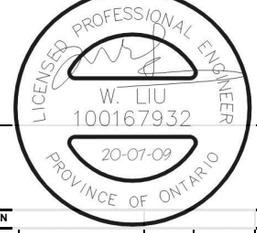
DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha
Average Daily Flow =	280	l/p/day		
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha
Max Res. Peak Factor =	4.00			
Commercial/Inst./Park Peak Factor =	1.50			
Institutional =	0.32	l/s/Ha		

Industrial Peak Factor = as per MOE Graph
Extraneous Flow = 0.330 L/s/ha
Minimum Velocity = 0.600 m/s
Manning's n = (Conc) 0.013 (Pvc) 0.013
Townhouse coeff= 2.7
Single house coeff= 3.4

Designed: R.A.
Checked: W.L.
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 87-93

PROJECT: **195 Huntmar Drive**
LOCATION: **City of Ottawa**
File Ref: 12-624
Date: **July 2020**
Sheet No. 2 of 5



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)
Contribution From terrasse Crossway Terrace, Pipe 641A - 64A								4.90	463				0.00		0.00		0.53		5.43	5.43									
	64A	73A	0.11				0	12.63	1447	3.15	14.78		1.67		0.00		0.53	0.90	0.11	14.83	4.89	20.58	73.5	250	0.85	54.83	0.38	1.12	1.03
To avenue Derreen Avenue, Pipe 73A - 75A								12.63	1447				1.67		0.00		0.53			14.83									
Block 242 (Commercial)																													
	71A	72A						0.00				2.70	2.70		0.00		0.00	1.31	2.70	2.70	0.89	2.20	15.0	250	0.65	47.94	0.05	0.98	0.49
To chemin Culdaff Road, Pipe 72A - 73A								0.00	0				2.70		0.00		0.00			2.70									
voie Bermondsey Way																													
	240A	24A	0.63	22		22	60	0.63	60	3.64	0.71		0.00		0.00		0.00	0.00	0.63	0.63	0.21	0.92	78.0	200	0.65	26.44	0.03	0.84	0.39
	24A	25A	0.11	2		2	6	0.74	66	3.63	0.78		0.00		0.00		0.00	0.00	0.11	0.74	0.24	1.02	11.0	200	0.40	20.74	0.05	0.66	0.34
	25A	26A	0.26	7		7	19	1.00	85	3.61	0.99		0.00		0.00		0.00	0.00	0.26	1.00	0.33	1.32	67.0	200	0.55	24.32	0.05	0.77	0.41
To avenue Derreen Avenue, Pipe 26A - 730A								1.00	85				0.00		0.00		0.00			1.00									
Block 236																													
	38A	39A						0.00					0.00		0.00	0.53	0.53	0.09	0.53	0.53	0.17	0.26	11.0	200	0.65	26.44	0.01	0.84	0.27
To terrasse Crossway Terrace, Pipe 39A - 40A								0.00	0				0.00		0.00		0.53			0.53									
place Unity Place																													
	18A	19A	0.59	9	9		31	0.59	31	3.68	0.37		0.00		0.00		0.00	0.00	0.59	0.59	0.19	0.56	29.5	200	2.20	48.65	0.01	1.55	0.52
	19A	20A	0.59	14	14		48	1.18	79	3.62	0.93		0.00		0.00		0.00	0.00	0.59	1.18	0.39	1.32	79.0	200	0.65	26.44	0.05	0.84	0.43
	20A	21A	0.63	16	16		55	1.81	134	3.57	1.55		0.00		0.00		0.00	0.00	0.63	1.81	0.60	2.15	80.5	200	0.70	27.44	0.08	0.87	0.51
	21A	22A	0.13	2	2		7	1.94	141	3.56	1.63		0.00		0.00		0.00	0.00	0.13	1.94	0.64	2.27	13.5	200	0.35	19.40	0.12	0.62	0.41
	22A	23A	0.27	6	6		21	2.21	162	3.54	1.86		0.00		0.00		0.00	0.00	0.27	2.21	0.73	2.59	66.0	200	0.35	19.40	0.13	0.62	0.43
To avenue Derreen Avenue, Pipe 23A - 26A								2.21	162				0.00		0.00		0.00			2.21									
croissant Billrian Crescent																													
			0.09	1		1	3	0.09	3				0.00		0.00		0.00		0.09	0.09									
	1A	2A	0.41				0	0.50	3	3.76	0.04		0.00		0.00		0.00	0.00	0.41	0.50	0.17	0.20	11.0	200	1.20	35.93	0.01	1.14	0.29
	2A	3A	0.54	21		21	57	1.04	60	3.64	0.71		0.00		0.00		0.00	0.00	0.54	1.04	0.34	1.05	75.0	200	0.65	26.44	0.04	0.84	0.41
	3A	4A	0.44	16		16	44	1.48	104	3.59	1.21		0.00		0.00		0.00	0.00	0.44	1.48	0.49	1.70	82.0	200	0.40	20.74	0.08	0.66	0.39
To cours Curraglass Walk, Pipe 4A - 5A								1.48	104				0.00		0.00		0.00			1.48									
	27A	28A	0.09	1		1	3	0.09	3	3.76	0.04		0.00		0.00		0.00	0.00	0.09	0.09	0.03	0.07	11.0	200	1.20	35.93	0.00	1.14	0.21
	28A	29A	0.57	23		23	63	0.66	66	3.63	0.78		0.00		0.00		0.00	0.00	0.57	0.66	0.22	0.99	82.5	200	0.75	28.40	0.04	0.90	0.42
	29A	30A	0.47	18		18	49	1.13	115	3.58	1.33		0.00		0.00		0.00	0.00	0.47	1.13	0.37	1.71	74.0	200	0.40	20.74	0.08	0.66	0.39
To cours Curraglass Walk, Pipe 30A - 33A								1.13	115				0.00		0.00		0.00			1.13									
Future Development																													
	10A	11A	73.25				4900	73.25	4900	2.80	44.50		0.00		0.00		0.00	0.00	73.25	73.25	24.17	68.68	16.0	375	0.25	87.67	0.78	0.79	0.88
To avenue Derreen Avenue, Pipe 11A - 12A								73.25	4900				0.00		0.00		0.00			73.25									
cours Curraglass Walk																													
	31A	32A	0.77	22		22	60	0.77	60	3.64	0.71		0.00		0.00		0.00	0.00	0.77	0.77	0.25	0.96	104.0	200	0.65	26.44	0.04	0.84	0.40
	32A	33A	0.38	22		22	60	1.15	120	3.58	1.39		0.00		0.00		0.00	0.00	0.38	1.15	0.38	1.77	62.5	200	0.80	29.34	0.06	0.93	0.51
To Block 233, Pipe 33A - 34A								1.15	120				0.00		0.00		0.00			1.15									
Contribution croissant Billrian Crescent, Pipe 29A - 30A								1.13	115				0.00		0.00		0.00		1.13	1.13									
	30A	33A	0.29	7	7		24	1.42	139	3.56	1.60		0.00		0.00		0.00	0.00	0.29	1.42	0.47	2.07	68.5	200	0.40	20.74	0.10	0.66	0.42
To Block 233, Pipe 33A - 34A								1.42	139				0.00		0.00		0.00			1.42									

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha
Average Daily Flow =	280	l/p/day		
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha
Max Res. Peak Factor =	4.00			
Commercial/Inst./Park Peak Factor =	1.50			
Institutional =	0.32	l/s/Ha		

Industrial Peak Factor = as per MOE Graph

Extraneous Flow =		0.330	L/s/ha	
Minimum Velocity =		0.600	m/s	
Manning's n =	(Conc)	0.013	(Pvc)	0.013
Townhouse coeff=		2.7		
Single house coeff=		3.4		

Designed: R.A.	PROJECT: **195 Huntmar Drive**		
Checked: W.L.	LOCATION: **City of Ottawa**		
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 87-93	File Ref: 12-624	Date: **July 2020**	Sheet No. 3 of 5

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)
	30A	4A	0.28	7	7		24	0.28	24	3.70	0.29		0.00		0.00		0.00	0.00	0.28	0.28	0.09	0.38	67.5	200	1.20	35.93	0.01	1.14	0.37
Contribution From croissant Billrian Crescent, Pipe 3A - 4A								1.48	104				0.00		0.00		0.00		1.48	1.48									
	4A	5A	0.11	2	2		7	1.87	135	3.56	1.56		0.00		0.00		0.00	0.00	0.11	1.87	0.62	2.18	24.5	200	0.40	20.74	0.10	0.66	0.42
	5A	6A	0.17	3	3		11	2.04	146	3.56	1.68		0.00		0.00		0.00	0.00	0.17	2.04	0.67	2.36	21.5	200	0.40	20.74	0.11	0.66	0.44
	6A	11A						2.04	146	3.56	1.68		0.00		0.00		0.00	0.00	0.00	2.04	0.67	2.36	16.5	200	0.40	20.74	0.11	0.66	0.44
To avenue Derreen Avenue, Pipe 11A - 12A								2.04	146				0.00		0.00		0.00			2.04									
Future Development												0.66							0.66	0.66									
	251A	200A						0.00				0.69	1.35		0.00		0.00	0.66	0.69	1.35	0.45	1.10	90.5	250	0.65	47.94	0.02	0.98	0.39
To avenue Robert Grant Avenue, Pipe 200A - 201A								0.00	0				1.35		0.00		0.00			1.35									
avenue Derreen Avenue																													
	7A	8A	0.67	7	7		24	0.67	24	3.70	0.29		0.00		0.00		0.00	0.00	0.67	0.67	0.22	0.51	90.0	200	0.65	26.44	0.02	0.84	0.33
	8A	9A	0.26	7	7		24	0.93	48	3.65	0.57		0.00		0.00		0.00	0.00	0.26	0.93	0.31	0.88	63.0	200	0.40	20.74	0.04	0.66	0.33
	9A	11A	0.07					1.00	48	3.65	0.57		0.00		0.00		0.00	0.00	0.07	1.00	0.33	0.90	28.0	200	0.40	20.74	0.04	0.66	0.33
Contribution From Future Development, Pipe 10A - 11A								73.25	4900				0.00		0.00		0.00		73.25	73.25									
Contribution From cours Curraglass Walk, Pipe 6A - 11A								2.04	146				0.00		0.00		0.00		2.04	2.04									
	11A	12A	0.19	3	3		11	76.48	5105	2.79	46.15		0.00		0.00		0.00	0.00	0.19	76.48	25.24	71.38	37.0	375	0.25	87.67	0.81	0.79	0.88
	12A	13A	0.11	1	1		4	76.59	5109	2.79	46.18		0.00		0.00		0.00	0.00	0.11	76.59	25.27	71.45	25.0	375	0.25	87.67	0.82	0.79	0.88
	13A	14A	0.10	1	1		4	76.69	5113	2.79	46.21		0.00		0.00		0.00	0.00	0.10	76.69	25.31	71.52	27.0	375	0.25	87.67	0.82	0.79	0.88
	14A	15A	0.21	3	3		11	76.90	5124	2.79	46.30		0.00		0.00		0.00	0.00	0.21	76.90	25.38	71.67	37.5	375	0.25	87.67	0.82	0.79	0.88
	15A	16A	0.07	1	1		4	76.97	5128	2.79	46.33		0.00		0.00		0.00	0.00	0.07	76.97	25.40	71.73	12.5	375	0.25	87.67	0.82	0.79	0.88
	16A	17A	0.72	17	17		58	77.69	5186	2.78	46.79		0.00		0.00		0.00	0.00	0.72	77.69	25.64	72.43	98.0	375	0.25	87.67	0.83	0.79	0.89
	17A	23A	0.48	12	12		41	78.17	5227	2.78	47.12		0.00		0.00		0.00	0.00	0.48	78.17	25.80	72.92	110.5	375	0.25	87.67	0.83	0.79	0.89
Contribution From place Unity Place, Pipe 22A - 23A								2.21	162				0.00		0.00		0.00		2.21	2.21									
	232A	231A	0.36	8	8		27	0.36	27	3.69	0.32		0.00		0.00		0.00	0.00	0.36	0.36	0.12	0.44	52.0	200	0.65	26.44	0.02	0.84	0.32
	231A	23A						0.36	27	3.69	0.32		0.00		0.00		0.00	0.00	0.00	0.36	0.12	0.44	2.0	200	0.40	20.74	0.02	0.66	0.26
To avenue Derreen Avenue, Pipe 23A - 26A								0.36	27				0.00		0.00		0.00			0.36									
	230A	260A	0.26	6		6	17	0.26	17	3.71	0.20		0.00		0.00		0.00	0.00	0.26	0.26	0.09	0.29	43.5	200	1.00	32.80	0.01	1.04	0.32
	260A	261A	0.78	25		25	68	1.04	85	3.61	0.99		0.00		0.00		0.00	0.00	0.78	1.04	0.34	1.34	104.0	200	0.40	20.74	0.06	0.66	0.37
	261A	730A						1.04	85	3.61	0.99		0.00		0.00		0.00	0.00	0.00	1.04	0.34	1.34	2.0	200	1.00	32.80	0.04	1.04	0.51
To avenue Derreen Avenue, Pipe 730A - 73A								1.04	85				0.00		0.00		0.00			1.04									
	23A	26A	0.11				0	80.85	5416	2.77	48.62		0.00		0.00		0.00	0.00	0.11	80.85	26.68	75.30	70.5	375	0.30	96.03	0.78	0.87	0.96
Contribution From voie Bermondsey Way, Pipe 25A - 26A								1.00	85				0.00		0.00		0.00		1.00	1.00									
	26A	730A						81.85	5501	2.77	49.29		0.00		0.00		0.00	0.00	0.00	81.85	27.01	76.30	93.5	375	0.30	96.03	0.79	0.87	0.96
	730A	73A						82.89	5586	2.76	49.96		0.00		0.00		0.00	0.00	0.00	82.89	27.35	77.32	10.0	375	0.30	96.03	0.81	0.87	0.97
Contribution From chemin Culdaff Road, Pipe 64A - 73A								12.63	1447				1.67		0.00		0.53		14.83	14.83									
Contribution From chemin Culdaff Road, Pipe 72A - 73A								0.79	0				29.87		0.00		0.00		30.66	30.66									
	73A	75A	0.09				0	96.40	7033	2.68	61.17		31.54		0.00		0.53	15.42	0.09	128.47	42.40	118.98	35.5	450	0.25	142.55	0.83	0.90	1.00
Contribution From Block 241, Pipe 74A - 75A								0.00	0				1.06		0.00		0.00		1.06	129.53									
	75A	77A	0.31				0	96.71	7033	2.68	61.17		32.60		0.00		0.53	15.93	0.31	129.84	42.85	119.95	112.0	450	0.25	142.55	0.84	0.90	1.00
Contribution From Block 240, Pipe 76A - 77A								0.00	0				0.64		0.00		0.00		0.64	130.48									
	77A	78A	0.20				0	96.91	7033	2.68	61.17		33.24		0.00		0.53	16.24	0.20	130.68	43.12	120.54	72.0	450	0.25	142.55	0.85	0.90	1.01
	78A	200A	0.14				0	97.05	7033	2.68	61.17		33.24		0.00		0.53	16.24	0.14	130.82	43.17	120.58	26.5	450	0.25	142.55	0.85	0.90	1.01
To avenue Robert Grant Avenue, Pipe 200A - 201A								97.05	7033				33.24		0.00		0.53			130.82									
avenue Robert Grant Avenue																													
Contribution From Future Development, Pipe 251A - 200A								0.00	0				1.35		0.00		0.00		1.35	1.35									
Contribution From avenue Derreen Avenue, Pipe 78A - 200A								97.05	7033				33.24		0.00		0.53		130.82	130.82									
			0.26				0	97.31	7033				34.59		0.00		0.53		0.26	132.43									
	200A	201A	1.93				0	99.24	7033	2.68	61.17		34.59		0.00		0.53	16.90	1.93	134.36	44.34	122.41	67.0	450	0.25	142.55	0.86	0.90	1.01

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha	
Average Daily Flow =	280	l/p/day			
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	
Max Res. Peak Factor =	4.00				
Commercial/Inst./Park Peak Factor =	1.50				
Institutional =	0.32	l/s/Ha			

Industrial Peak Factor = as per MOE Graph
Extraneous Flow = 0.330 L/s/ha
Minimum Velocity = 0.600 m/s
Manning's n = (Conc) 0.013 (Pvc) 0.013
Townhouse coeff= 2.7
Single house coeff= 3.4

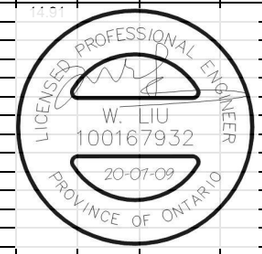
Designed: R.A.
Checked: W.L.
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 87-93

PROJECT: **195 Huntmar Drive**
LOCATION: **City of Ottawa**
File Ref: 12-624
Date: **July 2020**
Sheet No. 4 of 5

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)
	201A	202A	0.26				0	99.50	7033	2.68	61.17		34.59		0.00		0.53	16.90	0.26	134.62	44.42	122.49	70.0	450	0.25	142.55	0.86	0.90	1.01
	202A	203A	0.23				0	99.73	7033	2.68	61.17		34.59		0.00		0.53	16.90	0.23	134.85	44.50	122.57	63.5	450	0.25	142.55	0.86	0.90	1.01
	203A	204A	0.43				0	100.16	7033	2.68	61.17		34.59		0.00		0.53	16.90	0.43	135.28	44.64	122.71	83.5	450	0.25	142.55	0.86	0.90	1.01
To rue Stittsville Main Street, Pipe 204A - 205A								100.16	7033				34.59		0.00		0.53			135.28									
rue Stittsville Main Street																													
			0.06				11												0.06	0.06									
			0.12				17												0.12	0.18									
	2000A	204A	0.83				0	1.01	28	3.69	0.33		0.00		0.00		0.00	0.00	0.83	1.01	0.33	0.67	100.0	200	0.65	26.44	0.03	0.84	0.35
Contribution From avenue Robert Grant Avenue, Pipe 203A - 204A								100.16	7033				34.59		0.00		0.53		135.28	136.29									
	204A	205A	0.69				0	101.86	7061	2.68	61.38		34.59		0.00		0.53	16.90	0.69	136.98	45.20	123.48	110.0	450	0.25	142.55	0.87	0.90	1.01
	205A	206A	0.52				0	102.38	7061	2.68	61.38		34.59		0.00		0.53	16.90	0.52	137.50	45.38	123.66	114.5	450	0.25	142.55	0.87	0.90	1.01
			0.16				0	102.54	7061				34.59	1.55	1.55		0.53		1.71	139.21									
	206A	207A						102.54	7061	2.68	61.38		34.59	5.91	7.46		0.53	20.53	5.91	145.12	47.89	129.80	37.0	450	0.30	156.16	0.83	0.98	1.10
			0.16				0	102.70	7061				34.59		7.46		0.53		0.16	145.28									
	207A	208A	0.70				0	103.40	7061	2.68	61.38		34.59		7.46		0.53	20.53	0.70	145.98	48.17	130.08	43.5	450	0.30	156.16	0.83	0.98	1.10
	208A	209A	0.34				0	103.74	7061	2.68	61.38		34.59		7.46		0.53	20.53	0.34	146.32	48.29	130.19	90.5	450	0.30	156.16	0.83	0.98	1.10
	209A	210A	0.38				0	104.12	7061	2.68	61.38		34.59		7.46		0.53	20.53	0.38	146.70	48.41	130.32	101.5	450	0.30	156.16	0.83	0.98	1.10
	210A	211A	0.27				0	104.39	7061	2.68	61.38		34.59		7.46		0.53	20.53	0.27	146.97	48.50	130.41	73.0	450	0.30	156.16	0.84	0.98	1.10
	211A	217A	0.38				0	104.77	7061	2.68	61.38		34.59		7.46		0.53	20.53	0.38	147.35	48.63	130.53	110.0	450	0.30	156.16	0.84	0.98	1.10
	217A	130 Huntmar Drive						104.77	7061	2.68	61.38	5.06	39.65		7.46		0.53	22.99	5.06	152.41	50.30	134.66	110.0	450	0.30	156.16	0.86	0.98	1.10
To 130 Huntmar Drive by Atrel Engineering Ltd.								104.77	7061				39.65		7.46		0.53			152.41									
Huntmar Drive																													
			0.00				0	0.00	0			6.95	6.95		0.00	5.89	5.89		12.84	12.84									
	Fut. 214A	Fut. 215A	0.95				0	0.95	0				6.95		0.00		5.89	4.33	0.95	13.79	4.55	8.88	70.0	250	0.30	32.57	0.27	0.66	0.56
			1.12				0	2.07	0				6.95		0.00		5.89	4.33	1.12	14.91									
	Fut. 215A	130 Huntmar Drive					0	2.07	0			0.00	6.95		0.00		5.89	4.33	0.00	14.91	4.92	9.25							
To 130 Huntmar Drive by Atrel Engineering Ltd.								2.07	0				6.95		0.00		5.89												



DESIGN PARAMETERS

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

Designed: R.A.	PROJECT: **195 Huntmar Drive**		
Checked: W.L.	LOCATION: **City of Ottawa**		
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 87-93	File Ref: 12-624	Date: **July 2020**	Sheet No. 5 of 5

Appendix D
Storm Servicing

INTERIOR SIDE YARD

REAR YARD

BLOCK

P. I. N.

0 4 4 8 7 - 0 0 3

0.140 A-01 0.75

0.07 A-02 0.81

0.02 A-04 0.61

0.03 A-03 0.77

0.017 A-05 0.90

0.112 A-06 0.81

0.107 A-07 0.80

0.041 R-10 0.90

0.048 R-03 0.90

0.017 R-01 0.90

0.019 R-04 0.90

0.019 R-05 0.90

0.071 R-02 0.90

0.019 R-09 0.90

0.018 R-06 0.90

0.009 R-07A 0.90

0.009 R-07B 0.90

0.029 R-08 0.90

0.091 A-08 0.29

0.07 A-10 0.28

0.008 D-01 0.42

0.006 A-09 0.41

AMENITY

COMMUNITY GARDEN

PERGOLA

MAINTENANCE SHED

DOG RUN

TRENCH DRAIN TIO=106.64 (FLOWS TO BE CONVEYED BY THE INTERNAL MECHANICAL SYSTEM)

6-STOREYS - 177 UNITS
~~FFE =108.50~~
P1 FFE=106.05

DC

ICD

FC

GLB

Site Benchmark #1
Fire Hydrant
Top of Spindle
Elevation=105.12

Site Benchmark #2
Fire Hydrant
Top of Spindle
Elevation=105.29

FUTURE SIDEWALK (BY OTHERS)

FUTURE BIKE PATH (BY OTHERS)

DERREEN AVENUE

CULDAFF ROAD

STMMH 87
T/G=108.09
INV.W=104.20
INV.SE=104.30

STMMH 86
T/G=108.17
INV.NW=104.28
INV.NE=104.30

STMMH 83
T/G=108.35
INV.SW=105.06
INV.NE=105.08
INV.SE=105.43

975Ø CONC STM 24.0 @ 0.15%

74.3m-1650mmØ STM @ 0.11%

19.3m-675mmØ STM

40.4m-1050mmØ STM @ 0.21%

1650Ø CONC STM 16.5 @ 0.11%

3m DEPRESSED CURB

MH 94

MH 35

BH 9A

LEGEND

- DRAINAGE AREA LIMITS
- 0.085 / A-16 / 0.78 — DRAINAGE AREA (ha) / DRAINAGE AREA ID / RUNOFF COEFFICIENT
- PROPERTY LINE
- PROPOSED CURB
- DC — PROPOSED DEPRESSED CURB
- FC — PROPOSED FLUSH CURB
- PROPOSED FOUNDATION WALL C/W RAILING
- PROPOSED CAP
- PROPOSED STORM SEWER AND MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED AREA DRAIN
- R-3 — PROPOSED ROOF DRAINS
- PROPOSED TRENCH DRAIN
- ICD — PROPOSED INLET CONTROL DEVICE
- PROPOSED BUILDING ENTRANCE
- PROPOSED FIREWALL
- DIRECTION OF FLOW
- STM MH — *EXISTING STORM MANHOLE & SEWER*
- CB 1 — *EXISTING CATCHBASIN*

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
425 CULDAFF ROAD

STORMWATER MANAGEMENT PLAN

SCALE 1 : 500 (0 5 10 15 20)
DATE OCTOBER 2024
JOB 123194
FIGURE SWM

M:\2023\123194\CAD\Civil\123194-SWM.dwg, SWM, Oct 15, 2024 - 7:28pm, amestwarp

SHT11X17.DWG - 279mmX432mm

STORM SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 123194
Project Name: 425 Culdaff
Date: 10/2/2024
Input By: Anthony Mestwarp P.Eng
Reviewed By: Greg Macdonald
Drawing Reference: 123194-SWM

Storm Design Event = 2 Year

Legend:
- Design Input by User
- As-Built Input by User
- Cumulative Cell
- Calculated Design Cell Output
- Calculated Uncontrolled Peak Flow Cell Output
- Design Input Restricted Peak Flow Cell

Reference: City of Ottawa - Sewer Design Guidelines (2012 and TBs)
MOE - Design Guidelines for Sewage Works (2008)

Location				Flow									Design Capacity							
													Proposed Sewer Pipe Sizing / Design							
Outlet	Area ID	From MH	To MH	Hardscape 0.9	Pervious area 0.2	Area A (ha.)	Runoff Coefficient C	Indivi. 2.78 AC	Accum. 2.78 AC	Time of Conc. Tc (min.)	Rain Intensity I (mm/hr)	Total Uncontrolled Peak Flow Q (L/s)	Pipe Length (m)	Pipe Size (mm) and Material	Pipe ID Actual (m)	Roughness n	Design Grade So (%)	Capacity Qfull (L/s)	Full Flow Velocity (m/s)	Time of Flow (min.)	Q / Qfull
Street One	A-01	208	207	0.110	0.029	0.140	0.75	0.29													
Street One	A-06			0.098	0.015	0.112	0.81	0.25													
Street One	A-07			0.0918101	0.015	0.107	0.80	0.24	0.78	10.00	76.81	60.1	71.8	450 PVC	0.4572	0.013	0.20	133.0	0.81	1.48	45.2%
Street One	A-02	207	202	0.061	0.009	0.069	0.81	0.16	0.94	11.48	71.56	67.2	10.5	450 CONC	0.4572	0.013	0.20	133.0	0.81	0.22	50.5%
Street Two	R-01	206	205	0.017	0.000	0.017	0.90	0.04	0.04	10.00	76.81	3.2	10.8	250 PVC	0.254	0.013	0.50	43.9	0.87	0.21	7.3%
Street Two	R-02	205	204	0.071	0.000	0.071	0.90	0.18	0.22	10.21	76.02	16.6	51.9	375 PVC	0.381	0.013	0.30	100.2	0.88	0.98	16.6%
Street Two	R-03	204	203	0.048	0.000	0.048	0.90	0.12	0.34	11.19	72.51	24.6	32.2	375 PVC	0.381	0.013	0.30	100.2	0.88	0.61	24.5%
Street Two		203	202	0.000	0.000	0.000		0.00	0.34	11.80	70.51	23.9	4.9	375 PVC	0.381	0.013	0.30	100.2	0.88	0.09	23.8%
Street One	A-03	202	201	0.026	0.006	0.032	0.77	0.07													
Street One	A-04			0.013	0.009	0.022	0.61	0.04	1.39	11.90	70.22	97.3	29.3	450 CONC	0.4572	0.013	0.20	133.0	0.81	0.60	73.1%
Street One		201	EX	0.000		0.000		0.00	1.39	12.50	68.38	94.7	12.1	450 CONC	0.4572	0.013	1.00	297.4	1.81	0.11	31.9%
Street One	R-04	101	85	0.019		0.019	0.90	0.05													
Street One	R-05			0.019		0.019	0.90	0.05													
Street One	R-06			0.018		0.018	0.90	0.04													
Street One	R-07A			0.009		0.009	0.90	0.02													
Street One	A-08			0.012	0.079	0.091	0.29	0.07	0.24	10.00	76.81	18.4	11.7	250 PVC	0.254	0.013	0.50	43.9	0.87	0.22	41.9%
Street One	R-07B	102	85	0.009		0.009	0.90	0.02													
Street One	R-08			0.029		0.029	0.90	0.07													
Street One	R-09			0.019		0.019	0.90	0.05													
Street One	R-10			0.041		0.041	0.90	0.10													
Street One	A-10			0.007	0.060	0.068	0.28	0.05	0.30	10.00	76.81	22.9	17.3	250 PVC	0.254	0.013	1.00	62.0	1.22	0.24	37.0%
Street One	A-05	Bldg	85	0.017	0.000	0.017	0.90	0.04	0.04	10.00	76.81	3.3	3.0	250 PVC	0.254	0.013	2.00	87.7	1.73	0.03	3.8%
Street One	A-09	85	86	0.002	0.004	0.006	0.41	0.01	0.59	10.24	75.91	44.6	17.3	900 CONC	0.9144	0.013	0.15	731.4	1.11	0.26	6.1%
Totals						**0.96**							**223.5**								

Demand Equation / Parameters

1. Q = 2.78 ACI

Definitions

Q = Peak flow in litres per second (L/s)
A = Area in hectares (ha)
C = Weighted runoff coefficient (increased by 25% for 100-year)
I = Rainfall intensity in millimeters per hour (mm/hr)

Rainfall intensity is based on City of Ottawa IDF data presented in the City of Ottawa - Sewer Design Guidelines

Capacity Equation

Q full = $1000*(1/n)*A_p*R^{2/3}*So^{0.5}$

Definitions

Q full = Capacity (L/s)
n = Manning coefficient of roughness (0.013)
A_p = Pipe flow area (m^2)
R = Hydraulic Radius of wetted area (dia./4 for full pipes)
So = Pipe slope/gradient

STORM SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 123194
Project Name: 425 Culdaff Road
Date: 6/26/2024
Input By: Anthony Mestwarp
Reviewed By: Greg Macdonald
Drawing Reference: 123194-SWM

Legend: Design Input by User
As-Built Input by User
Cumulative Cell
Calculated Design Cell Output
Calculated Uncontrolled Peak Flow Cell Output
Design Input Restricted Peak Flow Cell
Reference: City of Ottawa - Sewer Design Guidelines (2012 and TBs)
MOE - Design Guidelines for Sewage Works (2008)

Location				Demand												Design Capacity								
				Area				Flow								Proposed Sewer Pipe Sizing / Design								
Street	Area ID	From MH	To MH	Commercial	Road 1	Total Area A (ha.)	Weighted Runoff Coefficient C	Indivi. 2.78 AC	Accum. 2.78 AC	Time of Conc. Tc (min.)	Rain Intensity (mm/hr) I				Peak Flow (L/s)	Total Uncontrolled Peak Flow Q (L/s)	Pipe Length (m)	Pipe Size (mm) and Material	Pipe ID Actual (m)	Roughness n	Design Grade So (%)	Capacity Qfull (L/s)	Full Flow Velocity (m/s)	Time of Flow (min.)	Q / Qfull
				0.80	0.73						2-yr	5-yr	10-yr	100-yr											
Derreen Avenue		81	83	2.37		2.37	0.80	5.27	8.23	13.67	65.10				535.79	961.8	112.0	1050 CONC	1.0668	0.013	0.15	1103.3	1.23	1.51	87.2%
					0.39	0.39	0.73	0.79	1.53	13.67		88.12			134.95										
						0.00		0.00	2.82	13.67			103.21		291.06										
						0.00		0.00	0.00	13.67					0.00										
Derreen Avenue		83	84			0.00		0.00	10.59	15.18	61.34				649.65	1050.7	40.5	1050 CONC	1.0668	0.013	0.20	1274.0	1.43	0.47	82.5%
						0.00		0.00	1.53	15.18		82.97			127.07										
						0.00		0.00	2.82	15.18			97.16		274.00										
						0.00		0.00	0.00	15.18					0.00										
Totals				**2.37**	**0.39**	**2.76**	**0.79**										**152.5**								

Demand Equation / Parameters

1. Q = 2.78 ACI

Definitions

Q = Peak flow in litres per second (L/s)
A = Area in hectares (ha)
C = Weighted runoff coefficient (increased by 25% for 100-year)
I = Rainfall intensity in millimeters per hour (mm/hr)

Rainfall intensity is based on City of Ottawa IDF data presented in the City of Ottawa - Sewer Design Guidelines

Capacity Equation

Q full = $1000*(1/n)*A_p*R^{2/3}*So^{0.5}$

Definitions

Q full = Capacity (L/s)
n = Manning coefficient of roughness (0.013)
A_p = Pipe flow area (m^2)
R = Hydraulic Radius of wetted area (dia./4 for full pipes)
So = Pipe slope/gradient

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) 2 YEAR				AREA (Ha) 5 YEAR				AREA (Ha) 10 YEAR				AREA (Ha) 100 YEAR				FLOW						SEWER DATA									
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA.	DIA.	TYPE	SLOPE	LENGTH	INV	OBV	T/G	CAPACITY	VELOCITY	TIME OF	RATIO
					2.78 AC	2.78 AC			2.78 AC	2.78 AC			2.78 AC	2.78 AC			2.78 AC	2.78 AC		2 Year	5 Year	10 Year	100 Year						UPS	UPS	UPS			FLOW	
Location	From Node	To Node	(Ha)				(Ha)				(Ha)				(Ha)				Conc.						(actual)	(nominal)		(%)	(m)				(l/s)	(m/s)	(min.)	Q/Q full
																			(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(mm)	(mm)										
croissant Billrian Crescent																																			
	1	2			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	300	300	PVC	0.35	11.0	106.154	106.454	108.992	57	0.81	0.23	0.00
			0.15	0.59	0.25	0.25			0.00	0.00			0.00	0.00			0.00	0.00																	
	2	3	0.45	0.74	0.93	1.17			0.00	0.00			0.00	0.00			0.00	0.00	10.23	75.95	103.01	120.75	176.51	89	375	375	PVC	0.50	82.5	106.040	106.415	108.924	124	1.12	1.22	0.72
	3	4	0.27	0.74	0.56	1.73			0.00	0.00			0.00	0.00			0.00	0.00	11.45	71.65	97.10	113.79	166.30	124	525	525	CONC	0.20	77.5	105.477	106.002	109.044	192	0.89	1.45	0.64
To cours Curraglass Walk, Pipe 4 - 26						1.73				0.00				0.00				0.00	12.91																
	5	6			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	300	300	PVC	0.35	11.5	106.231	106.531	109.136	57	0.81	0.24	0.00
			0.15	0.59	0.25	0.25			0.00	0.00			0.00	0.00			0.00	0.00																	
	6	7	0.33	0.74	0.68	0.92			0.00	0.00			0.00	0.00			0.00	0.00	10.24	75.91	102.96	120.69	176.42	70	375	375	PVC	0.35	78.0	106.116	106.491	109.067	104	0.94	1.38	0.68
			0.06	0.59	0.10	1.02			0.00	0.00			0.00	0.00			0.00	0.00																	
	7	8	0.27	0.74	0.56	1.58			0.00	0.00			0.00	0.00			0.00	0.00	11.62	71.09	96.35	112.90	164.98	112	525	525	CONC	0.30	82.5	105.768	106.218	108.940	236	1.09	1.26	0.48
To cours Curraglass Walk, Pipe 8 - 9						1.58				0.00				0.00				0.00	12.88																
cours Curraglass Walk																																			
			0.18	0.59	0.30	0.30			0.00	0.00			0.00	0.00			0.00	0.00																	
	23	24	0.36	0.74	0.74	1.04			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	80	450	450	CONC	0.20	97.5	105.981	106.431	109.055	128	0.80	2.03	0.62
			0.25	0.74	0.51	1.55			0.00	0.00			0.00	0.00			0.00	0.00																	
	24	25	0.28	0.59	0.46	2.01			0.00	0.00			0.00	0.00			0.00	0.00	12.03	69.81	94.58	110.82	161.93	140	450	450	CONC	0.70	60.5	105.766	106.216	108.952	239	1.50	0.67	0.59
	25	26	0.08	0.74	0.16	2.17			0.00	0.00			0.00	0.00			0.00	0.00	12.70	67.79	91.81	107.56	157.15	147	450	450	CONC	0.70	13.5	105.312	105.762	108.883	239	1.50	0.15	0.62
To Block 233, Pipe 26 - 27						2.17				0.00				0.00				0.00	12.85																
Contribution From croissant Billrian Crescent, Pipe 3 - 4						1.73				0.00				0.00				0.00	12.91																
	4	26	0.14	0.73	0.28	2.01			0.00	0.00			0.00	0.00			0.00	0.00	12.91	67.20	91.00	106.61	155.74	135	525	525	CONC	0.20	60.0	105.262	105.787	108.981	192	0.89	1.13	0.70
To Block 233, Pipe 26 - 27						2.01				0.00				0.00				0.00	14.03																
			0.25	0.59	0.41	0.41			0.00	0.00			0.00	0.00			0.00	0.00																	
	4	8	0.27	0.73	0.55	0.96			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	74	375	375	PVC	0.65	73.0	106.070	106.445	108.976	141	1.28	0.95	0.52
Contribution From croissant Billrian Crescent, Pipe 7 - 8						1.58				0.00				0.00				0.00	12.88																
	8	9			0.00	2.54			0.00	0.00			0.00	0.00			0.00	0.00	12.88	67.26	91.08	106.70	155.88	171	600	600	CONC	0.20	20.5	105.370	105.970	108.887	275	0.97	0.35	0.62
	9	10			0.00	2.54			0.00	0.00			0.00	0.00			0.00	0.00	13.24	66.27	89.72	105.11	153.54	168	600	600	CONC	0.20	23.5	105.299	105.899	108.731	275	0.97	0.40	0.61
	10	14	0.20	0.73	0.41	2.94			0.00	0.00			0.00	0.00			0.00	0.00	13.64	65.18	88.23	103.34	150.95	192	675	675	CONC	0.15	17.5	105.177	105.852	108.582	326	0.91	0.32	0.59
To avenue Derreen Avenue, Pipe 14 - 15						2.94				0.00				0.00				0.00	13.96																
Block 233																																			
Contribution From cours Curraglass Walk, Pipe 25 - 26						2.17				0.00				0.00				0.00	12.85																
Contribution From cours Curraglass Walk, Pipe 4 - 26						2.01				0.00				0.00				0.00	14.03																
	26	27			0.00	4.19			0.00	0.00			0.00	0.00			0.00	0.00	14.03	64.15	86.82	101.70	148.54	269	675	675	CONC	0.20	9.5	104.992	105.667	108.818	376	1.05	0.15	0.71
	27	30	0.05	0.59	0.08	4.27			0.00	0.00			0.00	0.00			0.00	0.00	14.18	63.77	86.30	101.08	147.63	272	750	750	CONC	0.11	60.0	104.898	105.648	108.775	369	0.84	1.20	0.74
To terrasse Crossway Terrace, Pipe 30 - 34						4.27				0.00				0.00				0.00	15.38																
terrasse Crossway Terrace																																			
	31	32	0.15	0.74	0.31	0.31			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	24	300	300	PVC	0.35	74.0	105.649	105.949	108.404	57	0.81	1.52	0.41
			0.36	0.59	0.59	0.90			0.00	0.00			0.00	0.00			0.00	0.00																	
	32	34	0.40	0.74	0.82	1.72			0.00	0.00			0.00	0.00			0.00	0.00	11.52	71.41	96.78	113.41	165.73	123	525	525	CONC	0.20	82.0	105.165	105.690	108.342	192	0.89	1.54	0.64
To place Unity Place, Pipe 34 - 40						1.72				0.00				0.00				0.00	13.06																
			0.18	0.59	0.30	0.30			0.00	0.00			0.00	0.00			0.00	0.00																	
	28	29	0.34	0.73	0.69	0.99			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	76	450	450	CONC	0.20	65.5	105.371	105.821	108.429	128	0.80	1.36	0.59
			0.29	0.59	0.48	1.46			0.00	0.00			0.00	0.00			0.00	0.00																	
	29	30	0.37	0.73	0.75	2.21			0.00	0.00			0.00	0.00			0.00	0.00	11.36	71.94	97.51	114.27	167.00	159	600	600	CONC	0.15	72.0	105.090	105.690	108.525	238	0.84	1.43	0.67
Contribution From Block 233, Pipe 27 - 30						4.27				0.00				0.00				0.00	15.38																
	30	34	0.03	0.73	0.06	6.54			0.00	0.00			0.00	0.00			0.00	0.00	15.38	60.89	82.36	96.44	140.82	398	900	900	CONC	0.11	51.0	104.682	105.582	108.487	600	0.94	0.90	0.66
To place Unity Place, Pipe 34 - 40						6.54				0.00				0.00				0.00	16.28																
place Unity Place																																			
	42	43	0.35	0.59	0.57	0.57			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	44	300	300	PVC	1.05	29.0	105.602	105.902	108.441	99	1.40	0.34	0.44

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
20-07-09
PROVINCE OF ONTARIO

Designed: W.L.	PROJECT: 195 Huntmar Drive		
Checked: P.P.	LOCATION: City of Ottawa		
Dwg. Reference: STM Drainage Plan, Dwgs 95 to 98	File Ref: 12-624	Date: July 2020	Sheet No. SHEET 1 OF 5

624_Stm3.xlsx

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

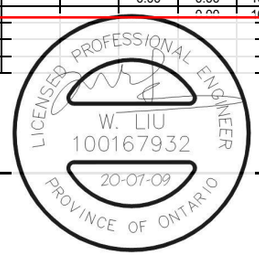
Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Arterial Roads Return Frequency = 10 years

Manning 0.013

	LOCATION		AREA (Ha) 2 YEAR				AREA (Ha) 5 YEAR				AREA (Ha) 10 YEAR				AREA (Ha) 100 YEAR				FLOW						SEWER DATA									
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA.	DIA.	TYPE	SLOPE	LENGTH	INV	OBV	T/G	CAPACITY	VELOCITY	TIME OF	RATIO
																													UPS	UPS	UPS			FLOW	
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	Conc. (min)	2 Year (mm/h)	5 Year (mm/h)	10 Year (mm/h)	100 Year (mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)				(l/s)	(m/s)	(min.)	Q/Q full
			0.13	0.59	0.21	0.79			0.00	0.00			0.00	0.00			0.00	0.00																	
	43	44	0.59	0.73	1.20	1.98			0.00	0.00			0.00	0.00			0.00	0.00	10.34	75.51	102.41	120.04	175.47	150	600	600	CONC	0.15	75.0	104.997	105.597	108.131	238	0.84	1.49	0.63
	44	45			0.00	1.98			0.00	0.00			0.00	0.00			0.00	0.00	11.83	70.42	95.42	111.81	163.39	140	600	600	CONC	0.15	71.5	104.864	105.464	108.180	238	0.84	1.42	0.59
	45	46			0.00	1.98			0.00	0.00			0.00	0.00			0.00	0.00	13.25	66.24	89.68	105.06	153.47	131	600	600	CONC	0.15	11.0	104.697	105.297	107.849	238	0.84	0.22	0.55
To Block 234, Pipe 46 - TEE47						1.98				0.00				0.00				0.00	13.47																
Contribution From place Unity Place, Pipe 34 - 40						10.25				0.00				0.00				0.00	17.55																
Contribution From avenue Derreen Avenue, Pipe 20 - 40						4.16				5.70				0.00				0.00	21.93																
Contribution From avenue Derreen Avenue, Pipe 39 - 40						1.85				1.38				0.00				0.00	14.16																
			0.09	0.59	0.15	16.41			0.00	7.08			0.00	0.00			0.00	0.00																	
			0.10	0.59	0.16	16.57			0.00	7.08			0.00	0.00			0.00	0.00																	
			0.17	0.73	0.34	16.92			0.00	7.08			0.00	0.00			0.00	0.00																	
	40	41	0.29	0.59	0.48	17.39			0.00	7.08			0.00	0.00			0.00	0.00	21.93	49.13	66.29	77.56	113.13	1324	1350	1350	CONC	0.11	63.5	104.088	105.438	108.142	1770	1.24	0.86	0.75
	41	46	0.42	0.73	0.85	18.24			0.00	7.08			0.00	0.00			0.00	0.00	22.78	47.95	64.68	75.67	110.36	1333	1350	1350	CONC	0.11	25.5	103.988	105.338	107.944	1770	1.24	0.34	0.75
To Block 234, Pipe 46 - TEE47						18.24				7.08				0.00				0.00	23.12																
place Unity Place																																			
	33	34	0.53	0.40	0.59	0.59			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	45	375	375	PVC	0.30	10.5	105.183	105.558	108.299	96	0.87	0.20	0.47
Contribution From terrasse Crossway Terrace, Pipe 30 - 34						6.54				0.00				0.00				0.00	16.28																
Contribution From terrasse Crossway Terrace, Pipe 32 - 34						1.72				0.00				0.00				0.00	13.06																
			0.07	0.74	0.14	9.00			0.00	0.00			0.00	0.00			0.00	0.00																	
			0.19	0.59	0.31	9.31			0.00	0.00			0.00	0.00			0.00	0.00																	
			0.24	0.73	0.49	9.79			0.00	0.00			0.00	0.00			0.00	0.00																	
	34	40	0.28	0.59	0.46	10.25			0.00	0.00			0.00	0.00			0.00	0.00	16.28	58.91	79.64	93.25	136.14	604	1050	1050	CONC	0.11	80.0	104.476	105.526	108.299	906	1.05	1.27	0.67
To place Unity Place, Pipe 40 - 41						10.25				0.00				0.00				0.00	17.55																
Block 234																																			
Contribution From place Unity Place, Pipe 41 - 46						18.24				7.08				0.00				0.00	23.12																
Contribution From place Unity Place, Pipe 45 - 46						1.98				0.00				0.00				0.00	13.47																
	46	47			0.00	20.23			0.00	7.08			0.00	0.00			0.00	0.00	23.12	47.49	64.06	74.94	109.30	1414	1350	1350	CONC	0.11	34.5	103.930	105.280	107.970	1770	1.24	0.46	0.80
	47	HW			0.00	20.23			0.00	7.08			0.00	0.00			0.00	0.00	23.59	46.89	63.24	73.98	107.89	1396	1350	1350	CONC	0.11	8.5	103.859	105.209	107.970	1770	1.24	0.11	0.79
To POND 7						20.23				7.08				0.00				0.00	23.70																
Block 244																																			
	91	95	1.99	0.80	4.43	4.43			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	340	825	825	CONC	0.15	6.5	104.776	105.601	107.450	556	1.04	0.10	0.61
To Block 235, Pipe 95 - TEE96						4.43				0.00				0.00				0.00	10.10																
Block 243																																			
	90	92	1.60	0.80	3.56	3.56			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	273	750	750	CONC	0.15	19.0	105.205	105.955	108.580	431	0.98	0.32	0.63
To chemin Culdaff Road, Pipe 92 - 93						3.56				0.00				0.00				0.00	10.32																
Block 256																																			
	88	89	1.59	0.80	3.54	3.54			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	272	750	750	CONC	0.15	19.0	105.358	106.108	108.640	431	0.98	0.32	0.63
To chemin Culdaff Road, Pipe 89 - 92						3.54				0.00				0.00				0.00	10.32																
Block 242																																			
	85	86	2.70	0.80	6.00	6.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	461	900	900	CONC	0.15	19.0	105.071	105.971	108.395	701	1.10	0.29	0.66
To chemin Culdaff Road, Pipe 86 - 87						6.00				0.00				0.00				0.00	10.29																
voie Bermondsey Way																																			
	35	36	0.17	0.74	0.35	0.35			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	27	300	300	PVC	0.35	76.5	105.705	106.005	108.204	57	0.81	1.58	0.47
	36	37			0.00	0.35			0.00	0.00			0.00	0.00			0.00	0.00	11.58	71.24	96.55	113.14	165.34	25	300	300	PVC	0.35	11.5	105.407	105.707	108.155	57	0.81	0.24	0.44
			0.21	0.59	0.34	0.69			0.00	0.00			0.00	0.00			0.00	0.00																	
	37	39	0.41	0.74	0.84	1.54			0.00	0.00			0.00	0.00			0.00	0.00	11.81	70.48	95.51	111.91	163.53	108	525	525	CONC	0.20	65.0	105.142	105.667	108.085	192	0.89	1.22	0.56
To avenue Derreen Avenue, Pipe 39 - 40						1.54				0.00				0.00				0.00	13.03																
Block 241																																			
	82	83	1.06	0.80	2.36	2.36			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	181	675	675	CONC	0.15	19.5	105.489	106.164	108.350	326	0.91	0.36	0.56
To avenue Derreen Avenue, Pipe 83 - 84						2.36				0.00				0.00				0.00	10.36																

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



Designed:	W.L.
Checked:	P.P.
Dwg. Reference:	STM Drainage Plan, Dwgs 95 to 98
PROJECT:	195 Huntmar Drive
LOCATION:	City of Ottawa
File Ref:	12-624
Date:	July 2020
Sheet No.	SHEET 2 OF 5

624_Stm3.xlsx

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

Manning 0.013

LOCATION			AREA (Ha) 2 YEAR				AREA (Ha) 5 YEAR				AREA (Ha) 10 YEAR				AREA (Ha) 100 YEAR				FLOW						SEWER DATA									
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA.	DIA.	TYPE	SLOPE	LENGTH	INV	OBV	T/G	CAPACITY	VELOCITY	TIME OF	RATIO
																																	FLOW	
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	Conc. (min)	2 Year (mm/h)	5 Year (mm/h)	10 Year (mm/h)	100 Year (mm/h)	Q (l/s)	(mm) (actual)	(mm) (nominal)		(%)	(m)	UPS	UPS	UPS			(min)	Q/Q full
Block 240																																		
	80	81	0.64	0.80	1.42	1.42			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	109	525	525	CONC	0.20	20.0	105.838	106.363	109.030	192	0.89	0.38	0.57
To avenue Derreen Avenue, Pipe 81 - 83						1.42				0.00				0.00				0.00	10.38																
Future Development																																		
	750	75	0.69	0.80	1.53	1.53			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	118	525	525	CONC	0.20	23.5	106.123	106.648	108.800	192	0.89	0.44	0.61
To avenue Robert Grant Avenue, Pipe 75 - 78						1.53				0.00				0.00				0.00	10.44																
avenue Derreen Avenue																																		
					0.00	0.00	0.09	0.74	0.19	0.19			0.00	0.00			0.00	0.00																	
			0.19	0.59	0.31	0.31			0.00	0.19			0.00	0.00			0.00	0.00																	
	38	39			0.00	0.31	0.34	0.74	0.70	0.88			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	116	450	450	CONC	0.30	89.0	105.354	105.804	108.403	156	0.98	1.51	0.74
Contribution From voie Bermondsey Way, Pipe 37 - 39						1.54				0.00				0.00				0.00	13.03																
	39	40			0.00	1.85	0.24	0.74	0.49	1.38			0.00	0.00			0.00	0.00	13.03	66.84	90.51	106.03	154.90	248	750	750	CONC	0.15	66.0	104.787	105.537	108.224	431	0.98	1.13	0.58
To place Unity Place, Pipe 40 - 41						1.85				1.38				0.00				0.00	14.16																
	76	78			0.00	0.00			0.00	0.00	0.51	0.70	0.99	0.99			0.00	0.00	10.00	76.81	104.19	122.14	178.56	121	450	450	CONC	0.55	94.0	106.240	106.615	108.731	211	1.33	1.18	0.57
Contribution From avenue Robert Grant Avenue, Pipe 75 - 78						1.53				0.00				1.83				0.00	11.99																
	78	79			0.00	1.53			0.00	0.00			0.00	2.82			0.00	0.00	11.99	69.93	94.75	111.02	162.23	421	975	975	CONC	0.15	56.0	105.558	106.533	108.717	868	1.16	0.80	0.48
	79	81			0.00	1.53	0.38	0.70	0.74	0.74			0.00	2.82			0.00	0.00	12.79	67.53	91.45	107.14	156.53	474	975	975	CONC	0.15	61.5	105.440	106.415	108.566	868	1.16	0.88	0.55
Contribution From Block 240, Pipe 80 - 81						1.42				0.00				0.00				0.00	10.38																
	81	83			0.00	2.96	0.39	0.73	0.79	1.53			0.00	2.82			0.00	0.00	13.67	65.09	88.11	103.21	150.75	619	1050	1050	CONC	0.15	112.0	105.273	106.323	108.651	1058	1.22	1.53	0.58
Contribution From Block 241, Pipe 82 - 83						2.36				0.00				0.00				0.00	10.36																
	83	84			0.00	5.32			0.00	1.53			0.00	2.82			0.00	0.00	15.20	61.30	82.92	97.10	141.79	727	1050	1050	CONC	0.20	40.5	105.085	106.135	108.293	1221	1.41	0.48	0.60
To chemin Culdaff Road, Pipe 84 - 86						5.32				1.53				2.82				0.00	15.68																
Contribution From rue Stittsville Main Street, Pipe 21 - 11						0.00				1.28				0.00				0.00	12.38																
			0.12	0.59	0.20	0.20			0.00	1.28			0.00	0.00			0.00	0.00																	
			0.12	0.59	0.20	0.39			0.00	1.28			0.00	0.00			0.00	0.00																	
	11	12			0.00	0.39	0.31	0.73	0.63	1.90			0.00	0.00			0.00	0.00	12.38	68.75	93.12	109.10	159.41	204	675	675	CONC	0.15	118.0	105.647	106.322	109.053	326	0.91	2.16	0.63
			0.06	0.59	0.10	0.49			0.00	1.90			0.00	0.00			0.00	0.00																	
			0.10	0.59	0.16	0.66			0.00	1.90			0.00	0.00			0.00	0.00																	
	12	13			0.00	0.66	0.40	0.73	0.81	2.72			0.00	0.00			0.00	0.00	14.54	62.88	85.08	99.65	145.53	272	750	750	CONC	0.15	63.0	105.395	106.145	108.793	431	0.98	1.08	0.63
	13	14			0.00	0.66			0.00	2.72			0.00	0.00			0.00	0.00	15.61	60.36	81.63	95.58	139.56	261	750	750	CONC	0.15	30.0	105.270	106.020	108.676	431	0.98	0.51	0.61
Contribution From cours Curraglass Walk, Pipe 10 - 14						2.94				0.00				0.00				0.00	13.96																
	14	15			0.00	3.60	0.20	0.73	0.41	3.12			0.00	0.00			0.00	0.00	16.13	59.23	80.09	93.77	136.91	463	975	975	CONC	0.11	33.0	105.000	105.975	108.738	743	1.00	0.55	0.62
	15	16			0.00	3.60			0.00	3.12			0.00	0.00			0.00	0.00	16.68	58.07	78.50	91.91	134.17	454	975	975	CONC	0.11	28.0	104.934	105.909	108.573	743	1.00	0.47	0.61
	16	17			0.00	3.60			0.00	3.12			0.00	0.00			0.00	0.00	17.15	57.12	77.21	90.39	131.94	447	975	975	CONC	0.11	27.0	104.873	105.848	108.724	743	1.00	0.45	0.60
	17	18			0.00	3.60	0.32	0.73	0.65	3.77			0.00	0.00			0.00	0.00	17.60	56.24	76.00	88.97	129.86	489	975	975	CONC	0.11	37.0	104.813	105.788	108.575	743	1.00	0.62	0.66
	18	19			0.00	3.60			0.00	3.77			0.00	0.00			0.00	0.00	18.22	55.09	74.42	87.11	127.14	479	975	975	CONC	0.11	14.0	104.742	105.717	108.446	743	1.00	0.23	0.64
	19	20			0.00	3.60	0.23	0.73	0.47	4.24			0.00	0.00			0.00	0.00	18.45	54.66	73.84	86.43	126.14	510	975	975	CONC	0.11	97.5	104.697	105.672	108.532	743	1.00	1.63	0.69
					0.00	3.60	0.16	0.73	0.32	4.56			0.00	0.00			0.00	0.00																	
			0.34	0.59	0.56	4.16			0.00	4.56			0.00	0.00			0.00	0.00																	
	20	40			0.00	4.16	0.56	0.73	1.14	5.70			0.00	0.00			0.00	0.00	20.08	51.89	70.07	81.99	119.63	615	1050	1050	CONC	0.11	115.5	104.515	105.565	108.172	906	1.05	1.84	0.68
To place Unity Place, Pipe 40 - 41						4.16				5.70				0.00				0.00	21.93																
rang Kindred Row																																		
	54	55	0.13	0.74	0.27	0.27			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	21	375	375	PVC	0.30	79.0	106.061	106.436	108.888	96	0.87	1.51	0.21
			0.28	0.59	0.46	0.73			0.00	0.00			0.00	0.00			0.00	0.00																	
			0.16	0.74	0.33	1.06			0.00	0.00			0.00	0.00			0.00	0.00																	
	55	56	0.39	0.74	0.80	1.86			0.00	0.00			0.00	0.00			0.00	0.00	11.51	71.44	96.82	113.46	165.81	133	525	525	CONC	0.20	94.0	105.674	106.199	108.775	192	0.89	1.76	0.69
To placette Allied Mews, Pipe 56 - 57						1.86				0.00				0.00				0.00	13.28																
ruelle Ballinora Lane																																		
	65	66	0.52	0.76	1.10	1.10			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	84	375	375	PVC	0.45	79.0	106.296	106.671	108.937	118	1.06	1.24	0.72
	66	67	0.17	0.76	0.36	1.46			0.00	0.00			0.00	0.00			0.00	0.00	11.24	72.36	98.09	114.95	167.99	105	450	450	CONC	0.25	68.5	105.865	106.315	108.711	143	0.90	1.27	0.74
	67	68			0.00	1.46			0.00	0.00			0.00	0.00			0.00	0.00	12.51	68.35	92.57	108.46	158.46	100	450	450	CONC	0.25	8.0	105.664	106.114	108.635	143	0.90	0.15	0.70
To chemin Culdaff Road, Pipe 68 - 72						1.46				0.00				0.00				0.00	12.66																

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
20-07-09
PROVINCE OF ONTARIO

Designed: W.L.	PROJECT: 195 Huntmar Drive
Checked: P.P.	LOCATION: City of Ottawa
Dwg. Reference: STM Drainage Plan, Dwgs 95 to 98	File Ref: 12-624 / Date: July 2020 / Sheet No. SHEET 3 OF 5

624_Stm3.xlsx

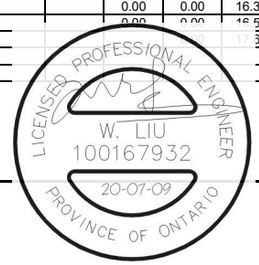
STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

	LOCATION		AREA (Ha) 2 YEAR				5 YEAR				10 YEAR				100 YEAR				FLOW						SEWER DATA										
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA.	DIA.	TYPE	SLOPE	LENGTH	INV	OBV	T/G	CAPACITY	VELOCITY	TIME OF	RATIO
																																			FLOW	
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	Conc. (min)	2 Year (mm/h)	5 Year (mm/h)	10 Year (mm/h)	100 Year (mm/h)	Q (l/s)	(mm) actual	(mm) nominal		(%)	(m)	UPS	UPS	UPS	(l/s)	(m/s)	(min.)	Q/Q full
placette Allied Mews																																				
	50	51	0.28	0.74	0.58	0.58			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	44	375	375	PVC	0.40	76.0	106.150	106.525	108.975	111	1.00	1.26	0.40
			0.27	0.59	0.44	1.02			0.00	0.00			0.00	0.00			0.00	0.00																		
	51	52	0.39	0.74	0.80	1.82			0.00	0.00			0.00	0.00			0.00	0.00	11.26	72.28	97.97	114.81	167.79	132	525	525	CONC	0.20	86.0	105.696	106.221	108.985	192	0.89	1.61	0.68
	52	53			0.00	1.82			0.00	0.00			0.00	0.00			0.00	0.00	12.87	67.29	91.12	106.75	155.95	123	525	525	CONC	0.20	11.5	105.494	106.019	108.913	192	0.89	0.22	0.64
			0.16	0.59	0.26	2.08			0.00	0.00			0.00	0.00			0.00	0.00																		
	53	56	0.21	0.74	0.43	2.52			0.00	0.00			0.00	0.00			0.00	0.00	13.09	66.67	90.28	105.76	154.50	168	600	600	CONC	0.15	64.5	105.396	105.996	108.843	238	0.84	1.28	0.71
Contribution From rang Kindred Row, Pipe 55 - 56						1.86				0.00				0.00				0.00	13.28																	
			0.14	0.59	0.23	4.60			0.00	0.00			0.00	0.00			0.00	0.00																		
	56	57	0.20	0.74	0.41	5.01			0.00	0.00			0.00	0.00			0.00	0.00	14.37	63.30	85.65	100.32	146.51	317	825	825	CONC	0.11	58.5	105.186	106.011	108.845	476	0.89	1.09	0.67
	57	68			0.00	5.01			0.00	0.00			0.00	0.00			0.00	0.00	15.46	60.69	82.09	96.13	140.36	304	825	825	CONC	0.11	9.5	105.092	105.917	108.612	476	0.89	0.18	0.64
To chemin Culdaff Road, Pipe 68 - 72						5.01				0.00				0.00				0.00	15.64																	
cercle Leinster Circle																																				
	59	60	0.41	0.76	0.87	0.87			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	67	375	375	PVC	0.50	81.0	106.193	106.568	108.724	124	1.12	1.20	0.54
	60	64			0.00	0.87			0.00	0.00			0.00	0.00			0.00	0.00	11.20	72.48	98.24	115.13	168.26	63	375	375	PVC	0.85	13.5	105.758	106.133	108.633	162	1.46	0.15	0.39
To chemin Culdaff Road, Pipe 64 - 68						0.87				0.00				0.00				0.00	11.36																	
	69	70	1.67	0.80	3.71	3.71			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	285	750	750	CONC	0.15	22.5	105.558	106.308	108.724	431	0.98	0.38	0.66
	70	71	0.50	0.76	1.06	4.77			0.00	0.00			0.00	0.00			0.00	0.00	10.38	75.36	102.21	119.80	175.12	360	825	825	CONC	0.15	116.5	105.449	106.274	108.628	556	1.04	1.87	0.65
	71	72			0.00	4.77			0.00	0.00			0.00	0.00			0.00	0.00	12.25	69.12	93.64	109.71	160.30	330	825	825	CONC	0.15	16.5	105.244	106.069	108.541	556	1.04	0.26	0.59
To chemin Culdaff Road, Pipe 72 - 73						4.77				0.00				0.00				0.00	12.52																	
Block 232																																				
	62	63	1.75	0.80	3.89	3.89			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	299	750	750	CONC	0.15	14.5	105.324	106.074	108.980	431	0.98	0.25	0.69
To chemin Culdaff Road, Pipe 63 - 64						3.89				0.00				0.00				0.00	10.25																	
chemin Culdaff Road																																				
Contribution From Block 256, Pipe 88 - 89						3.54				0.00				0.00				0.00	10.32																	
					0.00	3.54	0.11	0.73	0.22	0.22			0.00	0.00			0.00	0.00																		
	89	92			0.00	3.54	0.23	0.73	0.47	0.69			0.00	0.00			0.00	0.00	10.32	75.58	102.51	120.16	175.65	338	825	825	CONC	0.15	102.0	105.254	106.079	108.378	556	1.04	1.63	0.61
Contribution From Block 243, Pipe 90 - 92						3.56				0.00				0.00				0.00	10.32																	
	92	93			0.00	7.09			0.00	0.69			0.00	0.00			0.00	0.00	11.96	70.02	94.87	111.16	162.44	562	975	975	CONC	0.15	24.0	104.951	105.926	108.317	868	1.16	0.34	0.65
	93	94			0.00	7.09			0.00	0.69			0.00	0.00			0.00	0.00	12.30	68.96	93.42	109.46	159.93	554	975	975	CONC	0.15	16.5	104.855	105.830	108.252	868	1.16	0.24	0.64
To Block 235, Pipe 94 - 95						7.09				0.69				0.00				0.00	12.54																	
Contribution From chemin Culdaff Road, Pipe 73 - 84						18.14				1.42				0.00				0.00	17.65																	
Contribution From avenue Derreen Avenue, Pipe 83 - 84						5.32				1.53				2.82				0.00	15.68																	
	84	86			0.00	23.45	0.19	0.74	0.39	3.34			0.00	2.82			0.00	0.00	17.65	56.16	75.88	88.83	129.65	1821	1650	1650	CONC	0.11	74.5	104.404	106.054	108.428	3023	1.41	0.88	0.60
Contribution From Block 242, Pipe 85 - 86						6.00				0.00				0.00				0.00	10.29																	
	86	87			0.00	29.46			0.00	3.34			0.00	2.82			0.00	0.00	18.52	54.53	73.67	86.22	125.84	2096	1650	1650	CONC	0.11	26.0	104.292	105.942	108.384	3023	1.41	0.31	0.69
	87	94			0.00	29.46	0.18	0.74	0.37	3.71			0.00	2.82			0.00	0.00	18.83	53.99	72.93	85.36	124.56	2102	1650	1650	CONC	0.11	16.5	104.203	105.853	108.253	3023	1.41	0.19	0.70
To Block 235, Pipe 94 - 95						29.46				3.71				2.82				0.00	19.02																	
chemin Culdaff Road																																				
Contribution From rue Stittsville Main Street, Pipe 600 - 61						0.00				1.15				0.00				0.00	12.41																	
			0.11	0.74	0.23	0.23			0.00	1.15			0.00	0.00			0.00	0.00																		
					0.00	0.23	0.13	0.73	0.26	1.42			0.00	0.00			0.00	0.00																		
			0.26	0.74	0.53	0.76			0.00	1.42			0.00	0.00			0.00	0.00																		
	61	63	0.30	0.59	0.49	1.25			0.00	1.42			0.00	0.00			0.00	0.00	12.41	68.64	92.97	108.93	159.16	218	675	675	CONC	0.15	123.0	105.562	106.237	108.994	326	0.91	2.25	0.67
Contribution From Block 232, Pipe 62 - 63						3.89				0.00				0.00				0.00	10.25																	
	63	64			0.00	5.15			0.00	1.42			0.00	0.00			0.00	0.00	14.66	62.57	84.66	99.14	144.79	442	825	825	CONC	0.20	17.0	105.227	106.052	108.776	642	1.20	0.24	0.69
Contribution From cercle Leinster Circle, Pipe 60 - 64						0.87				0.00				0.00				0.00	11.36																	
	64	68	0.14	0.74	0.29	6.30			0.00	1.42			0.00	0.00			0.00	0.00	14.90	62.00	83.88	98.23	143.45	509	900	900	CONC	0.15	49.0	105.118	106.018	108.792	701	1.10	0.74	0.73
Contribution From placette Allied Mews, Pipe 57 - 68						5.01				0.00				0.00				0.00	15.64																	
Contribution From ruelle Ballinora Lane, Pipe 67 - 68						1.46				0.00				0.00				0.00	12.66																	
	68	72	0.10	0.74	0.21	12.98			0.00	1.42			0.00	0.00			0.00	0.00	15.64	60.29	81.54	95.48	139.41	898	1200	1200	CONC	0.11	45.0	104.894	106.094	108.746	1293	1.14	0.66	0.69
Contribution From cercle Leinster Circle, Pipe 71 - 72						4.77				0.00				0.00				0.00	12.52																	
	72	73			0.00	17.75			0.00	1.42			0.00	0.00			0.00	0.00	16.30	58.87	79.59	93.18	136.04	1157	1350	1350	CONC	0.11	21.0	104.694	106.044	108.703	1770	1.24	0.28	0.65
	73	84	0.19	0.74	0.39	18.14			0.00	1.42			0.00	0.00			0.00	0.00	16.58	58.27	78.78	92.23	134.64	1169	1350	1350	CONC	0.11	79.0	104.641	105.991	108.586	1770	1.24	1.06	0.66
To chemin Culdaff Road, Pipe 84 - 86						18.14				1.42				0.00				0.00	17.55																	

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



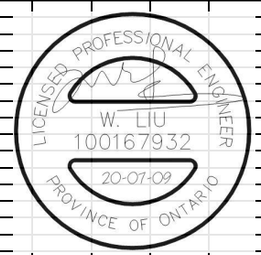
Designed: W.L.	PROJECT: 195 Huntmar Drive	
Checked: P.P.	LOCATION: City of Ottawa	
Dwg. Reference: STM Drainage Plan, Dwgs 95 to 98	File Ref: 12-624	Date: July 2020
		Sheet No. SHEET 4 OF 5

624_Stm3.xlsx

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.	DIA.	TYPE	SLOPE	LENGTH	INV	OBV	T/G	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		(mm)	(mm)				UPS	UPS	UPS			FLOW	
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)	(min.)	Q/Q full
Block 235																																			
Contribution From chemin Culdaff Road, Pipe 87 - 94						29.46				3.71				2.82				0.00	19.02																
Contribution From chemin Culdaff Road, Pipe 93 - 94						7.09				0.69				0.00				0.00	12.54																
			0.05	0.59	0.08	36.64			0.00	4.40			0.00	2.82			0.00	0.00																	
			0.12	0.59	0.20	36.83			0.00	4.40			0.00	2.82			0.00	0.00																	
	94	95	0.20	0.59	0.33	37.16			0.00	4.40			0.00	2.82			0.00	0.00	19.02	53.65	72.47	84.81	123.77	2552	1650	1650	CONC	0.15	109.0	104.155	105.805	108.157	3530	1.65	1.10	0.72
Contribution From Block 244, Pipe 91 - 95						4.43				0.00				0.00				0.00	10.10																
	95	96			0.00	41.59			0.00	4.40			0.00	2.82			0.00	0.00	20.13	51.83	69.98	81.89	119.48	2694	1650	1650	CONC	0.15	57.0	103.975	105.625	108.200	3530	1.65	0.58	0.76
	96	HW			0.00	41.59			0.00	4.40			0.00	2.82			0.00	0.00	20.70	50.93	68.75	80.45	117.36	2647	1650	1650	CONC	0.15	12.5	103.869	105.519	108.200	3530	1.65	0.13	0.75
To POND						41.59				4.40				2.82				0.00	20.83																
rue Convergence Street																																			
	Fut. 208	Fut. 209			0.00	0.00	0.51	0.70	0.99	0.99			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	103	450	450	CONC	0.25	75.5	101.982	102.432	104.432	143	0.90	1.40	0.73
To rue Stittsville Main Street, Fut. Pipe 209 - 210						0.00				0.99				0.00				0.00	11.40																
avenue Robert Grant Avenue																																			
	74	75			0.00	0.00			0.00	0.00	0.44	0.70	0.86	0.86			0.00	0.00	10.00	76.81	104.19	122.14	178.56	105	450	450	CONC	0.45	91.0	106.660	107.110	109.141	191	1.20	1.26	0.55
Contribution From Future Development, Pipe 750 - 75						1.53				0.00				0.00				0.00	10.44																
	75	78			0.00	1.53			0.00	0.00	0.50	0.70	0.97	1.83			0.00	0.00	11.26	72.28	97.97	114.81	167.80	321	750	750	CONC	0.15	42.5	105.851	106.601	108.921	431	0.98	0.73	0.74
To avenue Derreen Avenue, Pipe 78 - 79						1.53				0.00				1.83				0.00	11.99																
rue Stittsville Main Street																																			
	Fut. 22	Fut. 21			0.00	0.00	0.31	0.74	0.64	0.64			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	66	375	375	PVC	0.30	72.0	106.358	106.733	109.002	96	0.87	1.38	0.69
	Fut. 21	11			0.00	0.00	0.31	0.74	0.64	1.28			0.00	0.00			0.00	0.00	11.38	71.88	97.43	114.17	166.86	124	525	525	CONC	0.30	65.0	105.992	106.517	108.986	236	1.09	1.00	0.53
To avenue Derreen Avenue, Pipe 11 - 12						0.00				1.28				0.00				0.00	12.38																
	Fut. 590	Fut. 600			0.00	0.00	0.38	0.74	0.78	0.78			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	81	375	375	PVC	0.40	91.0	106.519	106.894	109.064	111	1.00	1.51	0.73
	Fut. 600	61			0.00	0.00	0.18	0.74	0.37	1.15			0.00	0.00			0.00	0.00	11.51	71.45	96.84	113.48	165.84	112	450	450	CONC	0.45	65.0	106.080	106.530	109.069	191	1.20	0.90	0.58
To chemin Culdaff Road, Pipe 61 - 63						0.00				1.15				0.00				0.00	12.41																
POND 7 OUTLET																							Pond 100 year outflow 116 l/s per PDB Prepared by JFSA												
	300	3000																					116	750	750	CONC	0.10	4.5	103.746	104.496	106.570	352.0491	0.7969	0.0941	0.329
	3000	301																					116	750	750	CONC	0.10	15.0	103.721	104.471	106.570	352.0491	0.7969	0.3137	0.329
	301	302																					116	750	750	CONC	0.10	120.0	103.646	104.396	106.570	352.0491	0.7969	2.5098	0.329
	302	303																					116	750	750	CONC	0.10	120.0	103.506	104.256	106.770	352.0491	0.7969	2.5098	0.329
	303	304																					116	750	750	CONC	0.10	109.5	103.366	104.116	106.554	352.0491	0.7969	2.2902	0.329
	304	305																					116	750	750	CONC	0.10	98.0	103.236	103.986	105.724	352.0491	0.7969	2.0497	0.329
	305	306																					116	750	750	CONC	0.10	20.0	103.108	103.858	107.716	352.0491	0.7969	0.4183	0.329
	306	307																					116	750	750	CONC	0.10	106.5	103.028	103.778	107.870	352.0491	0.7969	2.2274	0.329
	Contribution From existing culvert- 2-year flow																						206												
	307	308																					322	750	750	CONC	0.10	35.0	102.891	103.641	107.870	352.0491	0.7969	0.7320	0.915
	308	309																					322	750	750	CONC	0.10	85.5	102.826	103.576	107.870	352.0491	0.7969	1.7882	0.915



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

Designed: W.L.	PROJECT: 195 Huntmar Drive		
Checked: P.P.	LOCATION: City of Ottawa		
Dwg. Reference: STM Drainage Plan, Dwgs 95 to 98	File Ref: 12-624	Date: July 2020	Sheet No. SHEET 5 OF 5

Appendix E
Stormwater Management

PROJECT #: 123194
PROJECT NAME: 425 Culdaff
LOCATION: City of Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: October 11, 2024

TABLE 1A: Allowable Runoff Coefficient "C"

Area	"C"
Total	0.80
0.973	

TABLE 1B: Allowable Flows

Outlet Options	Area (ha)	"C"	Tc (min)	$Q_{2\ Year}$ (L/s)	Q_{ALLOW} (L/s)
Culdaff Road	0.973	0.80	10	**166.2**	**166.2**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

PROJECT #: 123194
PROJECT NAME: 425 Culdaff
LOCATION: City of Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: October 11, 2024

TABLE 2A: Post-Development Runoff Coefficient "C" - D-01

Area	Surface	Ha	"C"	C_{avg}	$*C_{100}$
Total	Hard	0.003	0.90	0.42	0.49
0.008	Soft	0.006	0.20		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 2B: Post-Development D-01 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Culdaff Road	0.008	0.42	10	**0.8**	**1.0**	**2.0**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

PROJECT #: 123194
PROJECT NAME: 425 Culdaff
LOCATION: City of Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: October 11, 2024

TABLE 3A: Post-Development Runoff Coefficient "C" - R-07A

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.009	0.90	0.90	1.00
0.009	Soft	0.000	0.20		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 3B: Post-Development R-07A Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Culdaff Road	0.009	0.90	10	**1.8**	**2.4**	**4.6**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

PROJECT #: 123194
PROJECT NAME: 425 Culdaff
LOCATION: City of Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: October 11, 2024

TABLE 4A: Post-Development Runoff Coefficient "C" - R-07B

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.009	0.90	0.90	1.00
0.009	Soft	0.000	0.20		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 4B: Post-Development R-07B Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Culdaff Road	0.009	0.90	10	**1.8**	**2.5**	**4.7**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

PROJECT #: 123194
PROJECT NAME: 425 Culdaff
LOCATION: City of Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: October 11, 2024

TABLE 5A: Post-Development Runoff Coefficient "C" -A-03 (CB 02)

Area	Surface	Ha	"C"	C_{avg}	$*C_{100}$
Total	Hard	0.026	0.90	0.77	0.87
0.032	Soft	0.006	0.20		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 5B: Post-Development A-03 (CB 02) Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Derreen Avenue	0.032	0.77	10	**5.3**	**7.2**	**13.9**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

PROJECT #: 123194
PROJECT NAME: 425 Culdaff
LOCATION: City of Ottawa

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: October 11, 2024

TABLE 6A: Post-Development Runoff Coefficient "C" - A-04 (CB 01)

Area	Surface	Ha	"C"	C_{avg}	$*C_{100}$
Total	Hard	0.013	0.90	0.61	0.69
0.022	Soft	0.009	0.20		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 6B: Post-Development A-04 Flows (CB 01)

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Derreen Avenue	0.022	0.61	10	**2.9**	**3.9**	**7.6**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

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PROJECT NAME: 425 Culdaff
LOCATION: City of Ottawa

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TABLE 7A: Post-Development Runoff Coefficient "C" - A-05 (Trenchdrain)

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.017	0.90	0.90	1.00
0.017	Soft	0.000	0.20		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 7B: Post-Development A-05 Flows (Trenchdrain)

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Culdaff Road	0.017	0.90	10	**3.3**	**4.5**	**8.6**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

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TABLE 8A: Post-Development Runoff Coefficient "C" - A-09 (STMMH 85)

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.002	0.90	0.41	0.47
0.006	Soft	0.004	0.20		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 8B: Post-Development A-09 Flows (STMMH 85)

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Culdaff Road	0.006	0.41	10	**0.5**	**0.7**	**1.3**

Time of Concentration	Tc=	10	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
Q = 2.78 x C x I x A
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

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TABLE 9A: Post-Development Runoff Coefficient "C" - A-01,A-02,A-06,A-07 (CBMH 207

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.360	0.90	0.79	1.00	0.88
0.428	Roof	0.000	0.90		1.00	
	Soft	0.068	0.20		0.25	

TABLE 9B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-01,A-02,A-06,A-07 (CBMH 207)

0.428 =Area (ha)
0.79 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)*	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	5	103.57	97.29	22.3	75.04	22.51
	10	76.81	72.15	22.3	49.90	29.94
	15	**61.77**	**58.02**	**22.3**	**35.77**	**32.19**
	20	52.03	48.88	22.3	26.63	31.95
	25	45.17	42.43	22.3	20.18	30.27

TABLE 9C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-01,A-02,A-06,A-07 (CBMH 207)

0.428 =Area (ha)
0.79 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)*	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	10	104.19	97.87	26.000	71.87	43.12
	15	83.56	78.49	26.000	52.49	47.24
	20	**70.25**	**65.99**	**26.000**	**39.99**	**47.99**
	25	60.90	57.20	26.000	31.20	46.80
	30	53.93	50.66	26.000	24.66	44.38

TABLE 9D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-01,A-02,A-06,A-07 (CBMH 207)

0.428 =Area (ha)
0.88 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)*	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	25	103.85	108.93	26.75	82.18	123.27
	30	91.87	96.37	26.75	69.62	125.31
	35	**82.58**	**86.62**	**26.75**	**59.87**	**125.73**
	40	75.15	78.83	26.75	52.08	124.98
	45	69.05	72.43	26.75	45.68	123.34

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient

I is the rainfall intensity, City of Ottawa IDF

A is the total drainage area

Runoff Coefficient Equation

$C_s = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

* Allowable run-off is 50% of the actual flow to calculate the required volume as per city of Ottawa Guidelines for underground storage

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TABLE 9E: Structure Details - A-01,A-02,A-06,A-07 (CBMH 207

Structures	Size Dia.(mm)	Area (m^2)	T/G	Inv OUT
CB03	610X609	0.37	108.30	107.08
CB04	610X610	0.37	108.30	107.10
CB05	610X611	0.37	108.30	107.10
CBMH207	1500	1.77	108.30	105.97
STMMH 208	1500	1.77	108.39	106.22

TABLE 9F: Pipe Details - A-01,A-02,A-06,A-07 (CBMH 207

Structures	Dia.(mm)	Area (m^2)	Upstream inv	Down stream invert	Length (m)
stmmh208 -CBMH207	675	0.37	106.28	106.15	63.70
CB03-STMMH 208	200	0.03	107.08	107.03	4.90
CB-05 - MAIN	200	0.03	107.10	106.86	23.56
CB04-MAIN	200	0.03	107.10	106.86	23.30

TABLE 9G: Storage Provided - A-01,A-02,A-06,A-07 (CBMH 207

Above Ground Ponding									
Elevation (m)	CB03 Ponding Depth (m)	CB03 Area* (m^2)	CB04 Ponding Depth (m)	CB04 Area* (m^2)	CB05 Ponding Depth (m)	CB05 Area* (m^2)	CBMH207 Ponding Depth (m)	CBMH207 Area* (m^2)	Storage Volume (m^3)
108.3	0.000	0.360	0.000	0.360	0.000	0.360	0.000	0.360	0.00
108.35	0.050	19.895	0.050	20.097	0.050	19.862	0.050	18.117	1.99
108.4	0.100	63.364	0.100	57.201	0.100	55.773	0.100	56.939	9.77
108.45	0.150	132.650	0.150	106.825	0.150	104.055	0.150	119.467	27.17
108.5	0.200	226.048	0.200	190.746	0.200	189.671	0.200	208.114	59.11
108.55	0.250	356.749	0.250	316.597	0.250	319.613	0.250	306.912	111.97

TABLE 9H: Storage Provided - A-01,A-02,A-06,A-07 (CBMH 207

Storage Table										
Elevation (m)	System Depth (m)	CB03 Volume (m^3)	CB04 Volume (m^3)	CB05 Volume (m^3)	CBMH207 Volume (m^3)	STMMH 208 Volume (m^3)	Pipe Volume (m^3)	Underground Volume (m^3)*	Ponding Volume (m^3)	**Total Volume (m^3)**
105.970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
107.100	0.02	0.01	0.00	0.00	2.00	1.56	23.57	3.56	0.00	**3.56**
107.300	0.22	0.08	0.07	0.07	2.35	1.91	25.25	29.74	0.00	**29.74**
107.450	0.37	0.14	0.13	0.13	2.62	2.17	-	30.44	0.00	**30.44**
107.600	0.52	0.19	0.19	0.19	2.88	2.44	-	31.13	0.00	**31.13**
107.750	0.67	0.25	0.24	0.24	3.15	2.70	-	31.83	0.00	**31.83**
107.900	0.82	0.31	0.30	0.30	3.41	2.97	-	32.53	0.00	**32.53**
108.050	0.97	0.36	0.35	0.35	3.68	3.23	-	33.23	0.00	**33.23**
108.200	1.12	0.42	0.41	0.41	3.94	3.50	-	33.92	0.00	**33.92**
108.300	1.22	0.45	0.45	0.45	4.12	3.68	-	34.39	0.00	**34.39**
108.350	1.27	-	-	-	-	3.76	-	34.48	1.99	**36.46**
108.400	1.32	-	-	-	-	-	-	34.48	9.77	**44.24**
108.450	1.37	-	-	-	-	-		34.48	27.17	**61.65**
108.500	1.42	-	-	-	-	-		34.48	59.11	**93.59**
108.550	1.47	-	-	-	-	-		34.48	111.97	**146.45**

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TABLE 9I: Orifice Sizing information - A-01,A-02,A-06,A-07 (CBMH 207

Control Device *127mm Plate Oriface*							
Design Event	**Flow (L/S)**	**Head (m)**	**Elev (m)**	**Outlet dia. (mm)**	**Volume (m^3)**	**Area (m^2)**	**Equivelent Dia. (mm)**
1:2 Year	44.5	1.63	107.83	450	32.19	0.0127	127.0
1:5 Year	52.0	2.22	108.41	450.00	47.99	0.0127	127.0
1:100 Year	53.5	2.34	108.53	450.00	125.73	0.0127	127.0

The design Head is calculated based on the centre of the orifice at the bottom of the pipe

Orifice Control Sizing
Q = 0.62 x A x (2gh) x 0.5
Q is the release rate in m^3/s
A is the orifice area in m^2
g is the acceleration due to gravity, 9.81 m/s^2
h is the head of water above the orifice centre in m
d is the diameter of the orifice in m

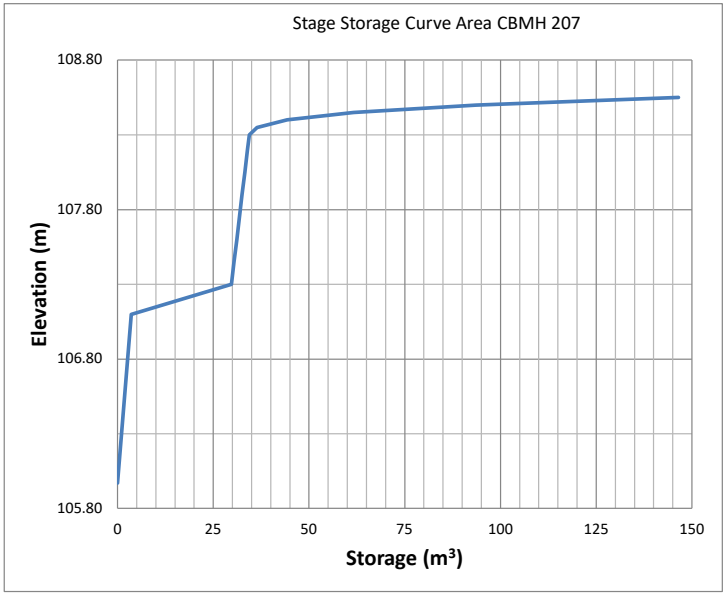

TABLE 10A: Post-Development Runoff Coefficient "C" - A-08,R-04,R-05,R-06 (STMMH 101

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.012	0.90	0.53	1.00	0.60
0.147	Roof	0.057	0.90		1.00	
	Soft	0.079	0.20		0.25	

TABLE 10B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-08,R-04,R-05,R-06 (STMMH 101)

0.147 =Area (ha)
0.53 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)*	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	5	103.57	22.35	5.15	17.20	5.16
	10	76.81	16.57	5.15	11.42	6.85
	15	**61.77**	**13.33**	**5.15**	**8.18**	**7.36**
	20	52.03	11.23	5.15	6.08	7.29
	25	45.17	9.75	5.15	4.60	6.89

TABLE 10C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT -A-08,R-04,R-05,R-06 (STMMH 101)

0.147 =Area (ha)
0.53 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)*	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	5	141.18	30.46	6.500	23.96	7.19
	10	104.19	22.48	6.500	15.98	9.59
	15	**83.56**	**18.03**	**6.500**	**11.53**	**10.38**
	20	70.25	15.16	6.500	8.66	10.39
	25	60.90	13.14	6.500	6.64	9.96

TABLE 10D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-08,R-04,R-05,R-06 (STMMH 101)

0.147 =Area (ha)
0.60 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)*	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	10	178.56	43.90	10.40	33.50	20.10
	15	142.89	35.13	10.40	24.73	22.26
	20	**119.95**	**29.49**	**10.40**	**19.09**	**22.91**
	25	103.85	25.53	10.40	15.13	22.69
	30	91.87	22.58	10.40	12.18	21.93

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient

I is the rainfall intensity, City of Ottawa IDF

A is the total drainage area

Runoff Coefficient Equation

$C_s = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

* Allowable run-off is 50% of the actual flow to calculate the required volume as per city of Ottawa Guidelines for underground storage

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TABLE 10E: Catchbasin Details -A-08,R-04,R-05,R-06 (STMMH 101)

Structures	Size Dia.(mm)	Area (m^2)	T/G	Inv OUT
STMMH 101	1200	1.13	108.70	106.42
CB06	610X610	0.37	108.36	106.52
CB07	610X611	0.37	108.28	106.69
LD1001	300	0.07	108.60	107.22

TABLE 10F: Trench Details -A-08,R-04,R-05,R-06 (STMMH 101)

Structures	Upstream inv	Down stream invert	Length (m)	Volume
stmmh208 -CBMH207	107.22	106.42	69.10	21.00

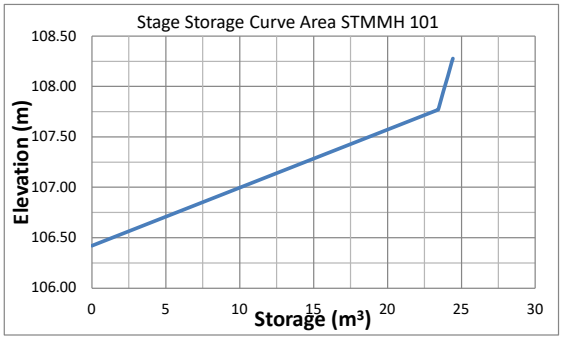

TABLE 10G: Storage Provided -A-08,R-04,R-05,R-06 (STMMH 101)

Storage Table									
Elevation (m)	System Depth (m)	STMMH 101 Volume (m^3)	CB06 Volume (m^3)	CB07 Volume (m^3)	LD1001 Volume (m^3)	Trench Volume (m^3)	Underground Volume (m^3)*	Ponding Volume (m^3)	**Total Volume (m^3)**
106.420	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
107.770	1.35	1.53	0.47	0.40	0.04	21.00	23.43	0.00	**23.43**
107.800	1.38	1.56	0.48	0.41	0.04	-	23.49	0.00	**23.49**
107.950	1.53	1.73	0.53	0.47	0.05	-	23.78	0.00	**23.78**
108.100	1.68	1.90	0.59	0.52	0.06	-	24.07	0.00	**24.07**
108.250	1.83	2.07	0.64	0.58	0.07	-	24.37	0.00	**24.37**
108.280	1.86	2.10	0.65	0.59	0.07	-	24.43	0.00	**24.43**

-

TABLE 10H: Orifice Sizing information -A-08,R-04,R-05,R-06 (STMMH 101)

Control Device *94mm Plate Oriface*							
Design Event	**Flow (L/S)**	**Head (m)**	**Elev (m)**	**Outlet dia. (mm)**	**Volume (m^3)**	**Area (m^2)**	**Equivelent Dia. (mm)**
1:2 Year	10.3	0.29	106.84	250	7.36	0.0070	94.0
1:5 Year	13.0	0.47	107.02	250.00	10.38	0.0069	94.0
1:100 Year	20.8	1.19	107.74	250.00	22.91	0.0069	94.0

The design Head is calculated based on the centre of the orifice at the bottom of the pipe

Orifice Control Sizing
$Q = 0.62 \times A \times (2gh) \times 0.5$
Q is the release rate in m^3/s
A is the orifice area in m^2
g is the acceleration due to gravity, 9.81 m/s^2
h is the head of water above the orifice centre in m
d is the diameter of the orifice in m

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TABLE 11A: Post-Development Runoff Coefficient "C" - A-10,R-08,R-09,R-10 (CBMH 102

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.007	0.90	0.63	1.00	0.71
0.157	Roof	0.089	0.90		1.00	
	Soft	0.060	0.20		0.25	

TABLE 11B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-10,R-08,R-09,R-10 (CBMH 102)

0.157 =Area (ha)
0.63 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)*	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	10	76.81	21.13	5.9	15.23	9.14
	15	61.77	17.00	5.9	11.10	9.99
	20	**52.03**	**14.32**	**5.9**	**8.42**	**10.10**
	25	45.17	12.43	5.9	6.53	9.79
	30	40.04	11.02	5.9	5.12	9.21

TABLE 11C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-10,R-08,R-09,R-10 (CBMH 102)

0.157 =Area (ha)
0.63 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)*	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	10	104.19	28.67	7.400	21.27	12.76
	15	83.56	22.99	7.400	15.59	14.03
	20	**70.25**	**19.33**	**7.400**	**11.93**	**14.32**
	25	60.90	16.76	7.400	9.36	14.03
	30	53.93	14.84	7.400	7.44	13.39

TABLE 11D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-10,R-08,R-09,R-10 (CBMH 102)

0.157 =Area (ha)
0.71 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)*	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	15	142.89	44.35	11.40	32.95	29.66
	20	119.95	37.23	11.40	25.83	31.00
	25	**103.85**	**32.23**	**11.40**	**20.83**	**31.25**
	30	91.87	28.52	11.40	17.12	30.81
	35	82.58	25.63	11.40	14.23	29.89

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient

I is the rainfall intensity, City of Ottawa IDF

A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

* Allowable run-off is 50% of the actual flow to calculate the required volume as per city of Ottawa Guidelines for underground storage

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TABLE 11E: Catchbasin - A-10,R-08,R-09,R-10 (CBMH 102)

Structures	Size Dia.(mm)	Area (m^2)	T/G	Inv OUT
CBMH 102	1200	1.13	108.25	106.38
CBMH 103	1200	1.13	108.24	107.01
CB07	610X610	0.37	108.27	107.20
LD1002	300	0.07	108.31	107.39
CB09	610X610	0.37	108.30	107.50

TABLE 11F: Trench Details - A-10,R-08,R-09,R-10 (CBMH 102)

Structures	Upstream inv	Down stream invert	Length (m)	Volume
CB09 -CBMH102	107.22	106.42	97.70	29.70

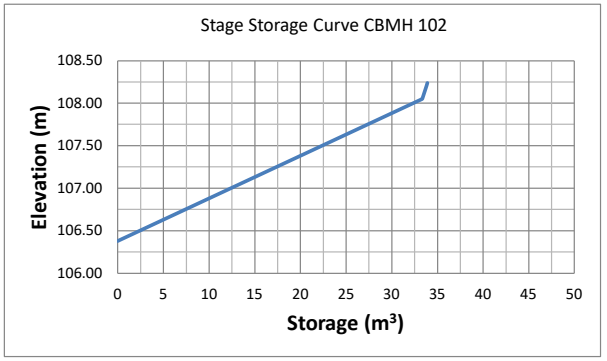

TABLE 11G: Storage Provided - A-10,R-08,R-09,R-10 (CBMH 102)

Storage Table										
Elevation (m)	System Depth (m)	CBMH 102 Volume (m^3)	CBMH 103 Volume (m^3)	CB07 Volume (m^3)	LD1002 Volume (m^3)	CB09 Volume (m^3)	Trench Volume (m^3)	Underground Volume (m^3)*	Ponding Volume (m^3)	**Total Volume (m^3)**
106.380	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
108.050	1.67	1.89	1.18	0.32	0.05	0.20	29.70	33.33	0.00	**33.33**
108.200	1.82	2.06	1.35	0.37	0.06	0.26	-	33.79	0.00	**33.79**
108.240	1.86	2.10	1.39	0.39	0.06	0.28	-	33.92	0.00	**33.92**

TABLE 11H: Orifice Sizing information - A-10,R-08,R-09,R-10 (CBMH 102)

Control Device *94mm Plate Oriface*							
Design Event	**Flow (L/S)**	**Head (m)**	**Elev (m)**	**Outlet dia. (mm)**	**Volume (m^3)**	**Area (m^2)**	**Equivelent Dia. (mm)**
1:2 Year	11.8	0.38	106.89	250	10.10	0.0070	94.0
1:5 Year	14.8	0.59	107.10	250.00	14.32	0.0070	94.0
1:100 Year	22.8	1.44	107.95	250.00	31.25	0.0069	94.0

The design Head is calculated based on the centre of the orifice at the bottom of the pipe

Orifice Control Sizing
Q = 0.62 x A x (2gh) x 0.5
Q is the release rate in m^3/s
A is the orifice area in m^2
g is the acceleration due to gravity, 9.81 m/s^2
h is the head of water above the orifice centre in m
d is the diameter of the orifice in m

PROJECT #: 123194
PROJECT NAME: 425 Culdaff
LOCATION: City of Ottawa

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TABLE 12A: Post-Development Runoff Coefficient "C" - R-01,R-02,R-03 (STMMH 203

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.135	Roof	0.135	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 12B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-01,R-02,R-03 (STMMH 203)

0.135 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)*	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	15	61.77	20.93	5.3	15.68	14.11
	20	52.03	17.63	5.3	12.38	14.86
	25	**45.17**	**15.30**	**5.3**	**10.05**	**15.08**
	30	40.04	13.57	5.3	8.32	14.97
	35	36.06	12.22	5.3	6.97	14.63

TABLE 12C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - R-01,R-02,R-03 (STMMH 203)

0.135 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)*	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	15	83.56	28.31	6.750	21.56	19.41
	20	70.25	23.80	6.750	17.05	20.46
	25	**60.90**	**20.63**	**6.750**	**13.88**	**20.83**
	30	53.93	18.27	6.750	11.52	20.74
	35	48.52	16.44	6.750	9.69	20.35

TABLE 12D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT -R-01,R-02,R-03 (STMMH 203)

0.135 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)*	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	15	142.89	53.80	13.00	40.80	36.72
	20	119.95	45.16	13.00	32.16	38.59
	25	**103.85**	**39.10**	**13.00**	**26.10**	**39.14**
	30	91.87	34.59	13.00	21.59	38.86
	35	82.58	31.09	13.00	18.09	37.99

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:

C is the runoff coefficient

I is the rainfall intensity, City of Ottawa IDF

A is the total drainage area

Runoff Coefficient Equation

$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

* Allowable run-off is 50% of the actual flow to calculate the required volume as per city of Ottawa Guidelines for underground storage

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LOCATION: City of Ottawa

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TABLE 12E: Structure Details

Structures	Size Dia.(mm)	Area (m^2)	T/G	Inv OUT
STMMH 203	1200	1.13	108.74	106.01
STMMH 204	1200	1.13	108.78	106.25
STMMH 205	1200	1.13	108.86	106.25
STMMH 206	1200	1.13	108.60	106.65

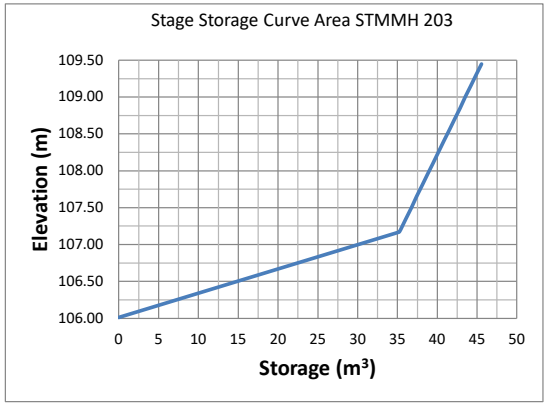

TABLE 11F: Pipe Details

Structures	Dia.(mm)	Area (m^2)	Upstream inv	Down stream invert	Length (m)
stmmh206 -STMH205	250	0.05	106.65	106.60	10.80
STMMH 205 - STMMH 204	375	0.11	106.47	106.31	51.90
CB-05 - MAIN	200	0.03	107.10	106.86	23.56
CB04-MAIN	200	0.03	107.10	106.86	23.30

TABLE 12G: Storage Provided

Storage Table

	System	STMMH 203	STMMH 204	STMMH 205	STMMH 206	STORMTECH 740	Pipe	Underground
Elevation (m)	Depth (m)	Volume (m^3)	Volume (m^3)	Volume (m^3)	Volume (m^3)	Volume (m^3)	Volume (m^3)	Volume (m^3)*
106.010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
107.170	1.16	1.31	1.04	1.04	0.59	23.28	7.98	35.24
107.200	1.19	1.35	1.07	1.07	0.62	-		35.38
107.350	1.34	1.52	1.24	1.24	0.79	-	-	36.06
107.500	1.49	1.69	1.41	1.41	0.96	-	-	36.74
107.650	1.64	1.85	1.58	1.58	1.13	-	-	37.42
107.800	1.79	2.02	1.75	1.75	1.30	-	-	38.10
107.950	1.94	2.19	1.92	1.92	1.47	-	-	38.77
108.100	2.09	2.36	2.09	2.09	1.64	-	-	39.45
108.250	2.24	2.53	2.26	2.26	1.81	-	-	40.13
108.400	2.39	2.70	2.43	2.43	1.98	-	-	40.81
108.550	2.54	2.87	2.60	2.60	2.15	-	-	41.49
108.700	2.69	3.04	2.77	2.77	2.32	-	-	42.17
108.850	2.84	3.21	2.94	2.94	2.49	-	-	42.85
109.000	2.99	3.38	3.11	3.11	2.66	-	-	43.52
109.150	3.14	3.55	3.28	3.28	2.83	-	-	44.20
109.300	3.29	3.72	3.45	3.45	3.00	-	-	44.88
109.450	3.44	3.89	3.62	3.62	3.17	-	-	45.56

volume

TABLE 12H: Orifice Sizing information

Control Device
94mm Plate Oriface

Design Event	Flow (L/S)	Head (m)	Elev (m)	Outlet dia. (mm)	Volume (m^3)	Area (m^2)	Equivelent Dia. (mm)
1:2 Year	10.5	0.31	106.51	375	15.08	0.0069	94.0
1:5 Year	13.5	0.50	106.70	375.00	20.83	0.0070	94.0
1:100 Year	26.0	1.83	108.03	375.00	39.14	0.0070	94.0

The design Head is calculated based on the centre of the orifice at the bottom of the pipe

Orifice Control Sizing
$Q = 0.62 \times A \times (2gh) \times 0.5$
Q is the release rate in m^3/s
A is the orifice area in m^2
g is the acceleration due to gravity, 9.81 m/s^2
h is the head of water above the orifice centre in m
d is the diameter of the orifice in m

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Table 13: Post-Development Stormwater Management Summary

Area ID	Area (ha)	1:5 Year Weighted Cw	1:100 Year Weighted Cw	Control Device	Outlet Location	2 Year Storm Event			5 Year Storm Event			100 Year Storm Event			
						Release (L/s)	Head (m)	Req'd Vol (cu.m)	Release (L/s)	Head (m)	Req'd Vol (cu.m)	Release (L/s)	Head (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)
D-01	0.008	0.42	0.49	N/A	Culdaff Road	0.80	N/A	N/A	1.00	N/A	N/A	2.00	N/A	N/A	N/A
R-07A	0.009	0.90	1.00	N/A	Culdaff Road	1.80	N/A	N/A	2.40	N/A	N/A	4.60	N/A	N/A	N/A
R-07B	0.009	0.90	1.00	N/A	Culdaff Road	1.80	N/A	N/A	2.50	N/A	N/A	4.70	N/A	N/A	N/A
A-05	0.017	0.90	1.00	N/A	Culdaff Road	3.30	N/A	N/A	4.50	N/A	N/A	8.60	N/A	N/A	N/A
A-03	0.032	0.77	0.87	N/A	Derreen Avenue	5.30	N/A	N/A	7.20	N/A	N/A	13.90	N/A	N/A	N/A
A-04	0.022	0.61	0.69	N/A	Derreen Avenue	2.90	N/A	N/A	3.90	N/A	N/A	7.60	N/A	N/A	N/A
A-09	0.006	0.41	0.47	N/A	Culdaff Road	0.50			0.70			1.30			
A-01,A-02,A-06,A-07 (CBMH 207)	0.428	0.79	0.88	127mm Plate Oriface	Derreen Avenue	44.50	1.632	15.08	52.00	2.215	47.99	53.50	2.335	125.73	146.45
A-08,R-04,R-05,R-06 (STMMH 101)	0.147	0.53	0.60	94mm Plate Oriface	Culdaff Road	10.30	0.29	7.36	13.00	0.47	10.38	20.80	1.19	22.91	24.43
A-10,R-08,R-09,R-10 (CBMH 102)	0.157	0.63	0.71	94mm Plate Oriface	Culdaff Road	11.80	0.38	10.10	14.80	0.59	14.32	22.80	1.44	31.25	33.92
R-01,R-02,R-03 (STMMH 203)	0.135	0.90	1.00	94mm Plate Oriface	Derreen Avenue	10.50	0.308	15.08	13.50	1.833	20.83	26.00	1.833	39.14	45.56
Post-Development Flow						**93.5**	**-**	**47.6**	**115.5**	**-**	**93.5**	**165.8**	**-**	**219.0**	**250.4**
Total Allowable Release Rate						**166.2**			**166.2**			**166.2**			

Site Infiltration Requirement

Total Area	Hardscape	Hardscape depressional storage	Landscaping	Landscape depressional storage	Retention requirement	Required Retention
ha	ha	mm	ha	mm	mm	m3
0.973	0.733	1.57	0.239	4.67	5	25.95

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Structure ID (STM Area ID)	Exfiltration Trench Dimensions (subdrain & clearstone)					Storage Volumes[2]			Infiltration Volume	Equivalent Width for Model[4]
	Perf. Pipe Dia. (mm)	Length (m)	Width (m)	Height[1] (m)	Area (m^2)	Perf. Pipe (m^3)	Clearstone (m^3)	Total[3] (m^3)	Clearstone (m^3)	(m)
Outlet 'A'										
CBMH 102 (A-01)	250	97.7	1.25	0.55	122	4.8	24.9	29.7	14.7	0.55
STMMH 101 (A-04)	250	69.1	1.25	0.55	86	3.4	17.6	21.0	10.4	0.55
OVERALL TOTAL		***166.8***			***209***	***8.2***	***42.6***	***50.8***	***25.0***	

[1] *Height of trench excluded the 0.30m of clearstone below the subdrain. As this will be utilized for infiltration only and is assumed to be saturated during significant storm events*

[2] *Assumed 40% void ratio for storage provided in the clearstone.*

Appendix F
Drawings

GENERAL NOTES:

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF `ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $5,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
6. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
7. ALL DIMENSIONS AND INVERTS MUST BE VERIFIED PRIOR TO CONSTRUCTION. IF THERE IS ANY DISCREPANCY THE CONTRACTOR IS TO NOTIFY THE ENGINEER PROMPTLY.
8. THE SITE BENCHMARK IS CURRENTLY SET ON TOP OF THE FIRE HYDRANT SPINDLE (ELEV. = 109.12), LOCATED AT THE INTERSECTIN OF CULDAFF ROAD AND BERMONDSEY WAY. BENCHMARK #2 IS THE TOP OF HYDRANT SPINDEL (ELEV = 109.29), LOCATED ON DERREEN AVENUE ACCROSS THE ROAD FROM THE PROJECTION OF THE EAST PROPERTYLINE. ELEVATIONS SHOWN ARE GEODETIC AND ARE REFERRED TO THE CGVD-1928:1978 GEODETIC DATUM. REFER TO THE FARLEY, SMITH & DENIS SURVEYING LTD. 2024 TOPOGRAPHIC SKETCH OF # 425 CULDAFF ROAD, CITY OF OTTAWA.
9. REFER TO GEOTECHNICAL REPORT (No. PG7040-1, DATED MAY 21, 2024), PREPARED BY PATERSON GROUP FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT IS TO REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.
10. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARDSURFACE AREAS AND DIMENSIONS.
11. REFER TO SERVICING AND STORMWATER MANAGEMENT REPORT PREPARED BY NOVATECH ENGINEERING CONSULTANTS LTD, (DATED OCTOBER 17, 2024).
12. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
13. PROVIDE LINE/PARKING PAINTING.
14. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GENERAL PLAN OF SERVICES INDICATING ALL SERVICING AS-BUILT INFORMATION SHOWN ON THIS PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS, VALVE AND HYDRANT LOCATIONS, T/WM ELEVATIONS AND ANY ALIGNMENT CHANGES, ETC.
15. CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT FOR CONSTRUCTION PURPOSES.

SEWER NOTES:

1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
CATCHBASIN (600x600mm)	705.010	OPSD
STORM / SANITARY MANHOLE (1200Ø)	701.010	OPSD
STORM / SANITARY MANHOLE (1500Ø)	701.011	OPSD
CB, FRAME & COVER	400.020	OPSD
STORM / SANITARY MH FRAME	S25	CITY OF OTTAWA
SANITARY COVER	S24	CITY OF OTTAWA
STORM COVER (CLOSED)	S24.1	CITY OF OTTAWA
STORM COVER (OPEN)	S28.1	CITY OF OTTAWA
SEWER TRENCH	S6 & S7	CITY OF OTTAWA
STORM SEWER	PVC DR 35	
SANITARY SEWER	PVC DR 35	
CATCHBASIN LEAD	PVC DR 35	

INSULATE ALL PIPES (SAN/STM) THAT HAVE LESS THAN 2.0m COVER WITH 50mmX1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION (REFER TO DETAIL).

2. SERVICES ARE TO BE CONSTRUCTED TO 1.0m FROM FACE OF BUILDING AT A MINIMUM SLOPE OF 1.0% (2.0% IS PREFERRED).
3. SEWER SERVICE CONNECTIONS PER CITY OF OTTAWA DETAILS S11 AND S11.1.
4. THE PIPE BEDDING FOR THE SEWER AND WATER PIPES SHOULD CONSIST OF AT LEAST 150 MM OF OPSS GRANULAR A. THE BEDDING LAYER THICKNESS SHOULD BE INCREASED TO A MINIMUM OF 300 MM WHERE THE SUBGRADE WILL CONSIST OF GREY SILTY CLAY. THE MATERIAL SHOULD BE PLACED IN A MAXIMUM 225 MM THICK LOOSE LIFTS AND COMPACTED TO A MINIMUM OF 99% OF ITS SPMDD. THE BEDDING MATERIAL SHOULD EXTEND AT LEAST TO THE SPRING LINE OF THE PIPE.
5. THE COVER MATERIAL, WHICH SHOULD CONSIST OF OPSS GRANULAR A, SHOULD EXTEND FROM THE SPRING LINE OF THE PIPE TO AT LEAST 300 MM ABOVE THE OBVERT OF THE PIPE. THE MATERIAL SHOULD BE PLACED IN MAXIMUM 225 MM THICK LIFTS AND COMPACTED TO A MINIMUM OF 99% OF ITS SPMDD.
6. WHERE HARD SURFACE AREAS ARE CONSIDERED ABOVE THE TRENCH BACKFILL, THE TRENCH BACKFILL MATERIAL WITHIN THE FROST ZONE (ABOUT 1.8 M BELOW FINISHED GRADE) SHOULD MATCH THE SOILS EXPOSED AT THE TRENCH WALLS TO MINIMIZE DIFFERENTIAL FROST HEAVING. THE TRENCH BACKFILL SHOULD BE PLACED IN MAXIMUM 300 MM THICK LOOSE LIFTS AND COMPACTED TO A MINIMUM OF 95% OF THE MATERIAL'S SPMDD.
7. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). THE CONCRETE CRADLE FOR THE PIPE CAN BE ELIMINATED.
8. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
9. STORM MANHOLES AND CBMHS ARE TO HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED.
10. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES.
11. ALL CATCHBASINS AND CATCHBASIN MANHOLES TO BE PROVIDED WITH MINIMUM 3 METER LONG PERFORATED SUBDRAINS EXTENDING IN TWO DIRECTIONS AT THE SUBGRADE LEVEL. SUBDRAIN IS TO BE PROVIDED AT THE TRANSITIONS BETWEEN DIFFERENT PAVEMENT COMPOSITIONS. THE SUBGRADE SURFACE SHOULD BE SHAPED TO PROMOTE WATER FLOW TO THE DRAINAGE LINES.

WATERMAIN NOTES:

1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
WATERMAIN TRENCHING	W17	CITY OF OTTAWA
THERMAL INSULATION IN SHALLOW TRENCHES	W22	CITY OF OTTAWA
WATERMAIN CROSSING BELOW SEWER/ABOVE SEWER	W25 / W25,2	CITY OF OTTAWA
WATERMAIN	PVC DR 18	
VALVE AND VALVE BOX	W24	CITY OF OTTAWA

2. SUPPLY AND CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN AND CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY CITY OFFICIALS.
3. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED. ANY WATERMAIN WITH LESS THAN 2.4m COVER TO BE INSULATED PER THE SHOWN DETAIL.
4. PROVIDE MINIMUM 0.25m ABOVE, 0.5m IF BELOW, CLEARANCE BETWEEN OUTSIDE OF PIPES AT ALL CROSSINGS PER CITY OF OTTAWA STANDARDS W25/W25.2
5. WATER SERVICE IS TO BE CONSTRUCTED TO WITHIN 1.0m OF FOUNDATION WALL AND CAPPED, UNLESS OTHERWISE INDICATED.
6. CATHODIC PROTECTION REQUIRED FOR ALL IRON FITTINGS CITY OF OTTAWA STANDARD DETAILS W-39, 40, 41, 42, 43 AND 44.
7. PROVIDE THERMAL INSULATION FOR WATERMAIN AT OPEN STRUCTURES PER CITY OF OTTAWA STANDARD DETAIL W-23.
8. IF WATERMAIN MUST BE DEFLECTED TO MEET ALIGNMENT, ENSURE THAT THE AMOUNT OF DEFLECTION USED IS LESS THAN HALF THAT RECOMMENDED BY THE MANUFACTURER.

GRADING NOTES:

1. TOPSOIL AND FILL, SUCH AS THOSE CONTAINING SIGNIFICANT AMOUNTS OF ORGANIC OR DELETERIOUS MATERIALS, SHOULD BE STRIPPED FROM UNDER ANY BUILDINGS, PAVED AREAS, PIPE BEDDING AND OTHER SETTLEMENT SENSITIVE STRUCTURES. AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. SITE-EXCAVATED SOIL CAN BE PLACED AS GENERAL LANDSCAPING FILL WHERE SETTLEMENT IS A MINOR CONCERN OF THE GROUND SURFACE. THESE MATERIALS SHOULD BE SPREAD IN THIN LIFTS AND AT LEAST COMPACTED BY THE TRACKS OF THE SPREADING EQUIPMENT TO MINIMIZE VOIDS. IF THESE MATERIALS ARE TO BE PLACED TO INCREASE THE SUBGRADE LEVEL FOR AREAS TO BE PAVED, THE FILL SHOULD BE COMPACTED IN MAXIMUM 300 mm THICK LIFTS AND TO A MINIMUM DENSITY OF 95% OF THE RESPECTIVE SPMDD
3. CONSIDERATION MAY BE GIVEN FOR LEAVING IN-SITU FILL IN PLACE AT THE SUBGRADE LEVEL OF PAVED AREAS PROVIDED IT IS REVIEWED IN THE FIELD AT THE TIME OF CONSTRUCTION BY PATERSON PERSONNEL AND SUBSEQUENTLY PROOF-ROLLER BY A SUITABLY-SIZED SHEEPSFOOT ROLLER. PROOF-ROLLING SHOULD BE COMPLETED UNDER DRY AND ABOVE-FREEZING CONDITIONS AND UNDER THE SUPERVISION OF PATERSON PERSONNEL PRIOR TO THE PLACEMENT OF GRANULARS.
4. IF SOFT SPOTS DEVELOP IN THE SUBGRADE DURING COMPACTION OR DUE TO CONSTRUCTION TRAFFIC, THE AFFECTED AREAS SHOULD BE EXCAVATED AND REPLACED WITH OPSS GRANULAR B TYPE II MATERIAL. AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
5. FILL USED FOR GRADING BENEATH THE BASE AND SUBBASE LAYERS OF PAVED AREAS SHOULD CONSIST, UNLESS OTHERWISE SPECIFIED, OF CLEAN IMPORTED GRANULAR FILL, SUCH AS OPSS GRANULAR A, GRANULAR B TYPE II OR SELECT SUBGRADE MATERIAL. THIS MATERIAL SHOULD BE TESTED AND APPROVED PRIOR TO DELIVERY TO THE SITE. THE FILL SHOULD BE PLACED IN LIFTS NO GREATER THAN 300 mm THICK AND COMPACTED USING SUITABLE COMPACTION EQUIPMENT FOR THE LIFT THICKNESS. FILL PLACED BENEATH THE PAVED AREAS SHOULD BE COMPACTED TO AT LEAST 95% OF ITS SPMDD.
6. THE PAVEMENT GRANULAR BASE AND SUBBASE SHOULD BE PLACED IN MAXIMUM 300 MM THICK LIFTS AND COMPACTED TO A MINIMUM OF 100% OF THE SPMDD WITH SUITABLE VIBRATORY EQUIPMENT.
7. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
8. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
9. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
10. ALL CURBS SHALL BE BARRIER CURB (150mm) UNLESS OTHERWISE NOTED.
11. BACKFILL MATERIAL BELOW SIDEWALK AND WALKWAY SUBGRADE AREAS OR OTHER SETTLEMENT SENSITIVE STRUCTURES WHICH ARE NOT ADJACENT TO THE BUILDINGS SHOULD CONSIST OF FREE-DRAINING,NON-FROST SUSCEPTIBLE MATERIAL. THIS MATERIAL SHOULD BE PLACED IN MAXIMUM 300 MM THICK LOOSE LIFTS AND COMPACTED TO AT LEAST 98% OF ITS SPMDD UNDER DRY AND ABOVE FREEZING CONDITIONS.
6. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.
7. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING AS-BUILT ELEVATIONS OF ALL DESIGN GRADES SHOWN ON THIS PLAN.

PAVEMENT STRUCTURE:

CAR ONLY PARKING AREAS
- 50mm HL3 OR SUPERPAVE 12.5
- 150mm OPSS GRAN "A" CRUSHED STONE
- 300mm OPSS GRAN "B" TYPE II

(SUBGRADE - EITHER IN SITU SOIL, FILL OR OPSS GRANULAR B TYPE I OR II MATERIAL PLACED OVER IN SITU SOIL.)

HEAVY-TRUCK TRAFFIC AND LOADING AREAS
- 40mm HL3 OR SUPERPAVE 12.5
- 50mm HL8 OR SUPERPAVE 19.0
- 150mm OPSS GRAN "A" CRUSHED STONE
- 450mm OPSS GRAN "B" TYPE II

(SUBGRADE - EITHER IN SITU SOIL, FILL OR OPSS GRANULAR B TYPE I OR II MATERIAL PLACED OVER IN SITU SOIL.)

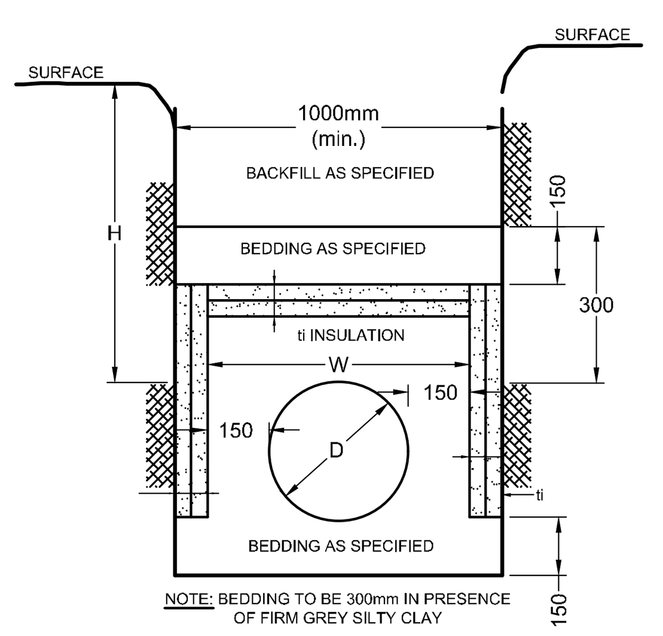
NOTE:
- MINIMUM PERFORMANCE GRADED (PG) 58-34 ASPHALT CEMENT.

SEWER & WATERMAIN INSULATION NOTES:

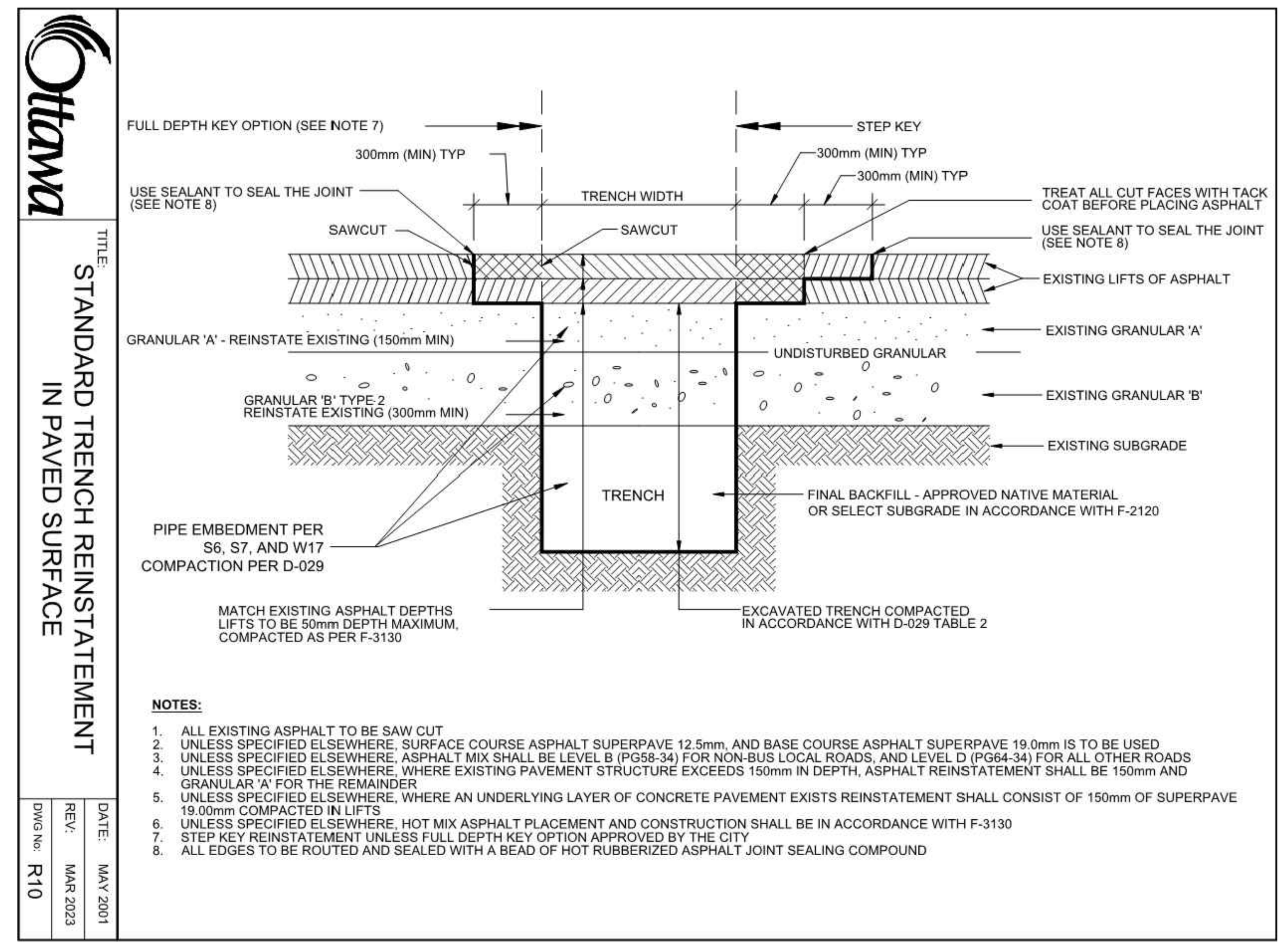
1. INSULATE ALL SEWER PIPES THAT HAVE LESS THAN 2.0m COVER AND ALL WATERMAIN WITH LESS THAN 2.4m OF COVER WITH EXPANDED POLYSTYRENE INSULATION AS PER OPSD 1109.030.
2. THE THICKNESS OF INSULATION SHALL BE THE EQUIVALENT OF 25mm FOR EVERY 300mm REDUCTION IN THE REQUIRED DEPTH OF COVER WITH 50mm MINIMUM (SEE TABLE)

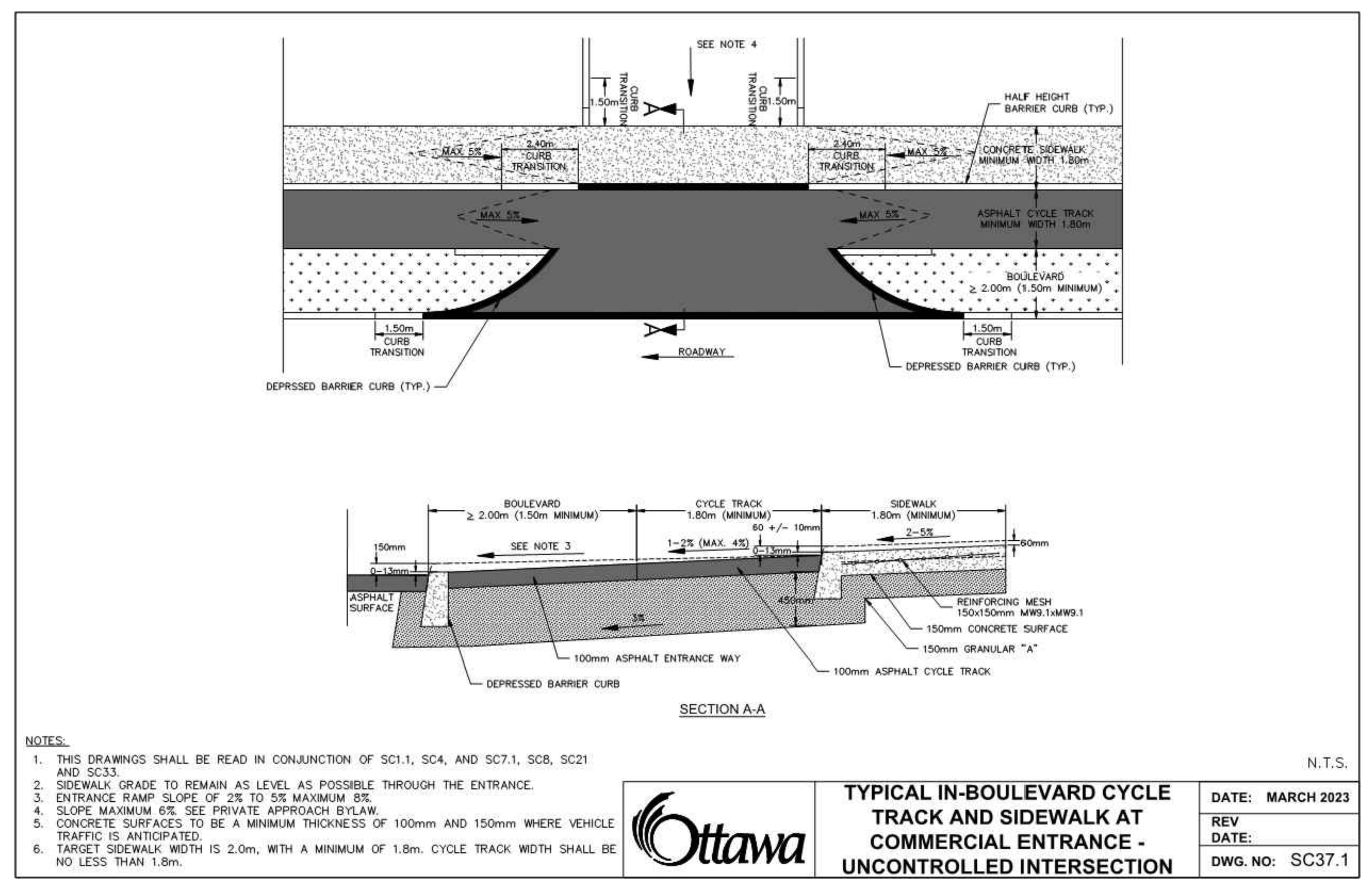
T = THICKNESS OF INSULATION (mm)
W = WIDTH OF INSULATION (mm)
W = D + 300 (1000 min.)
D = O.D OF PIPE (mm)

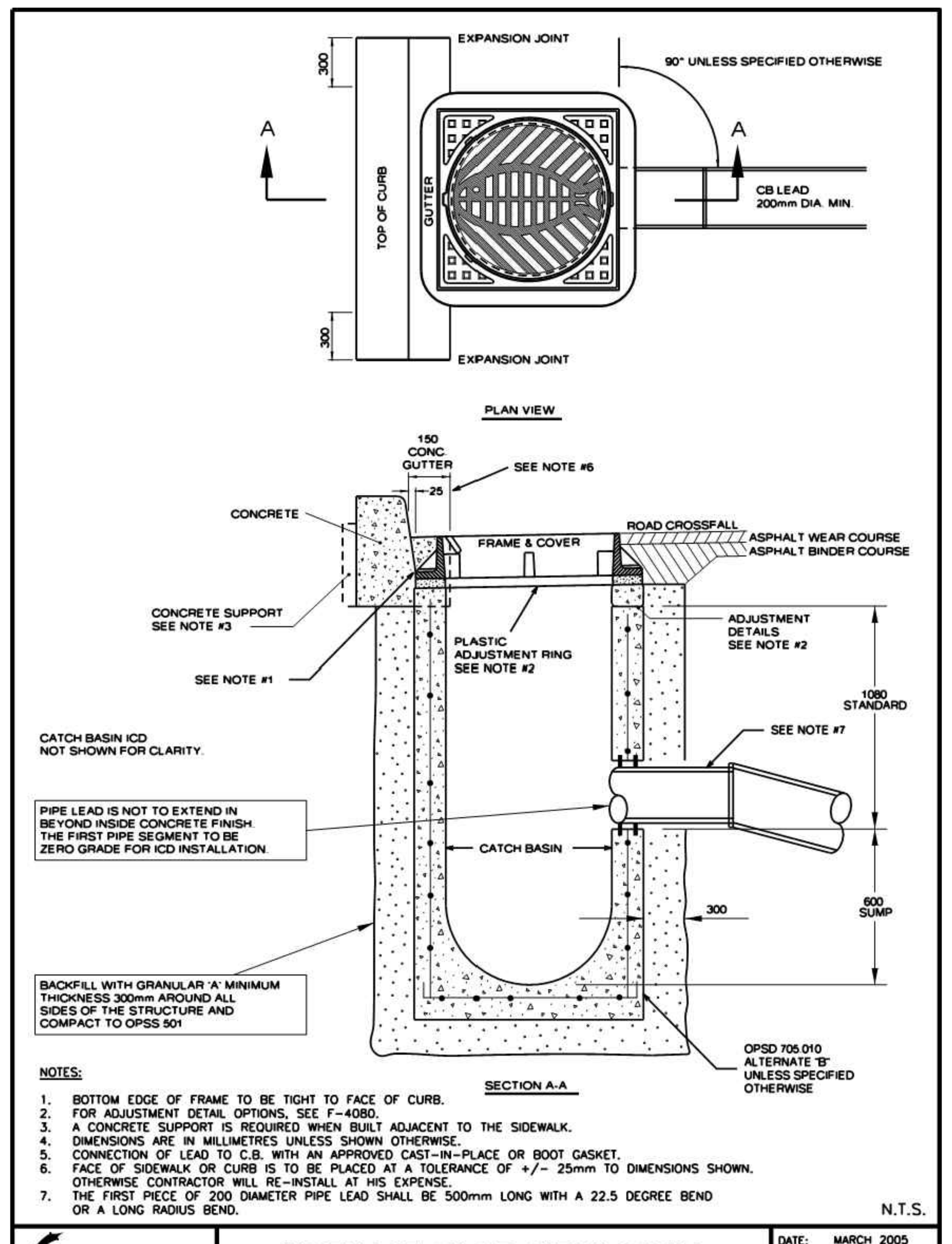
COVER SEWER / WATER (mm)	INSULATION THICKNESS (mm)
2000-1700 / 2400-2100	50
1700-1400 / 2100-1800	75
1400-1100 / 1800-1500	100



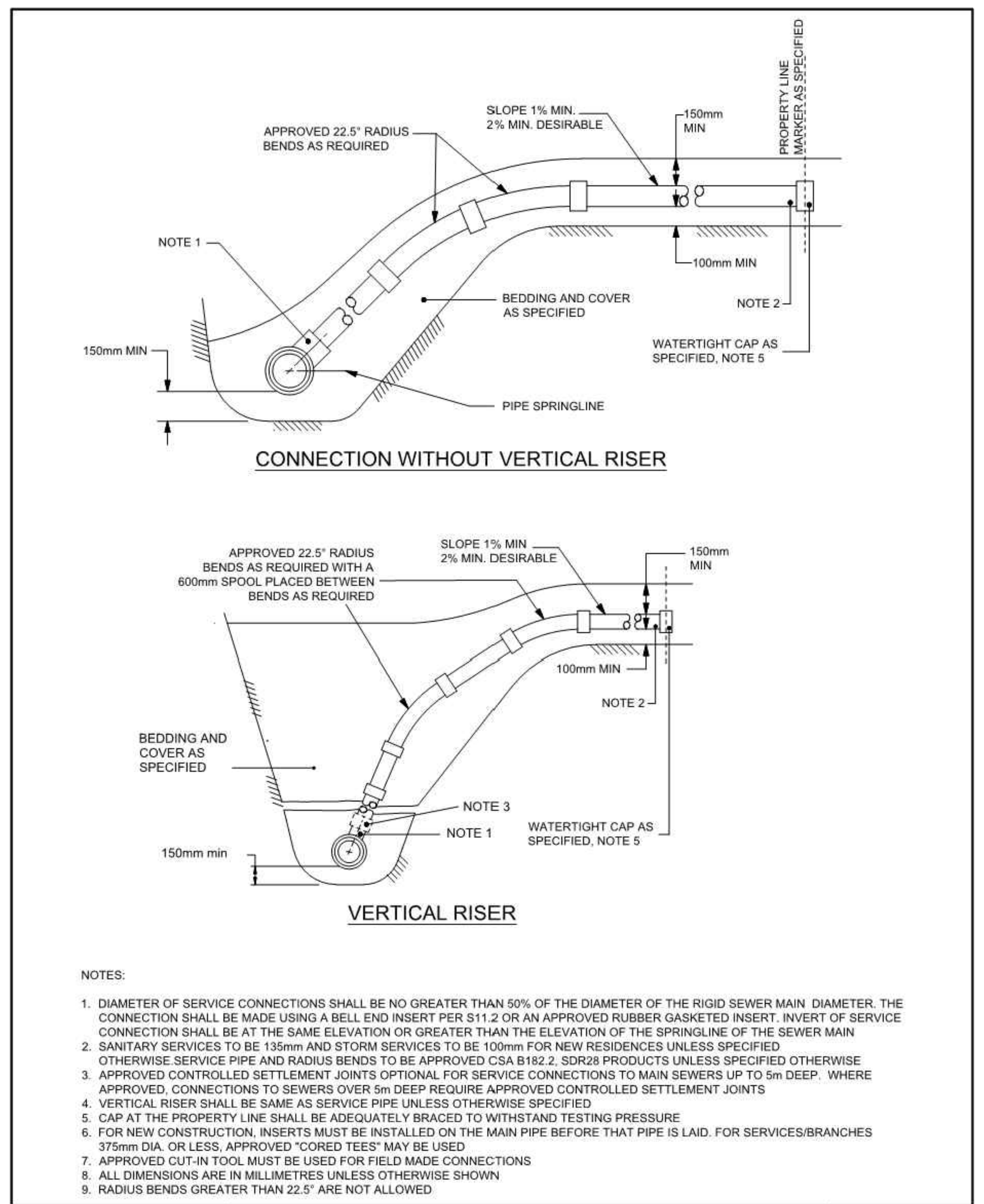
INSULATION DETAIL FOR SHALLOW SEWERS & WATERMAIN
N.T.S



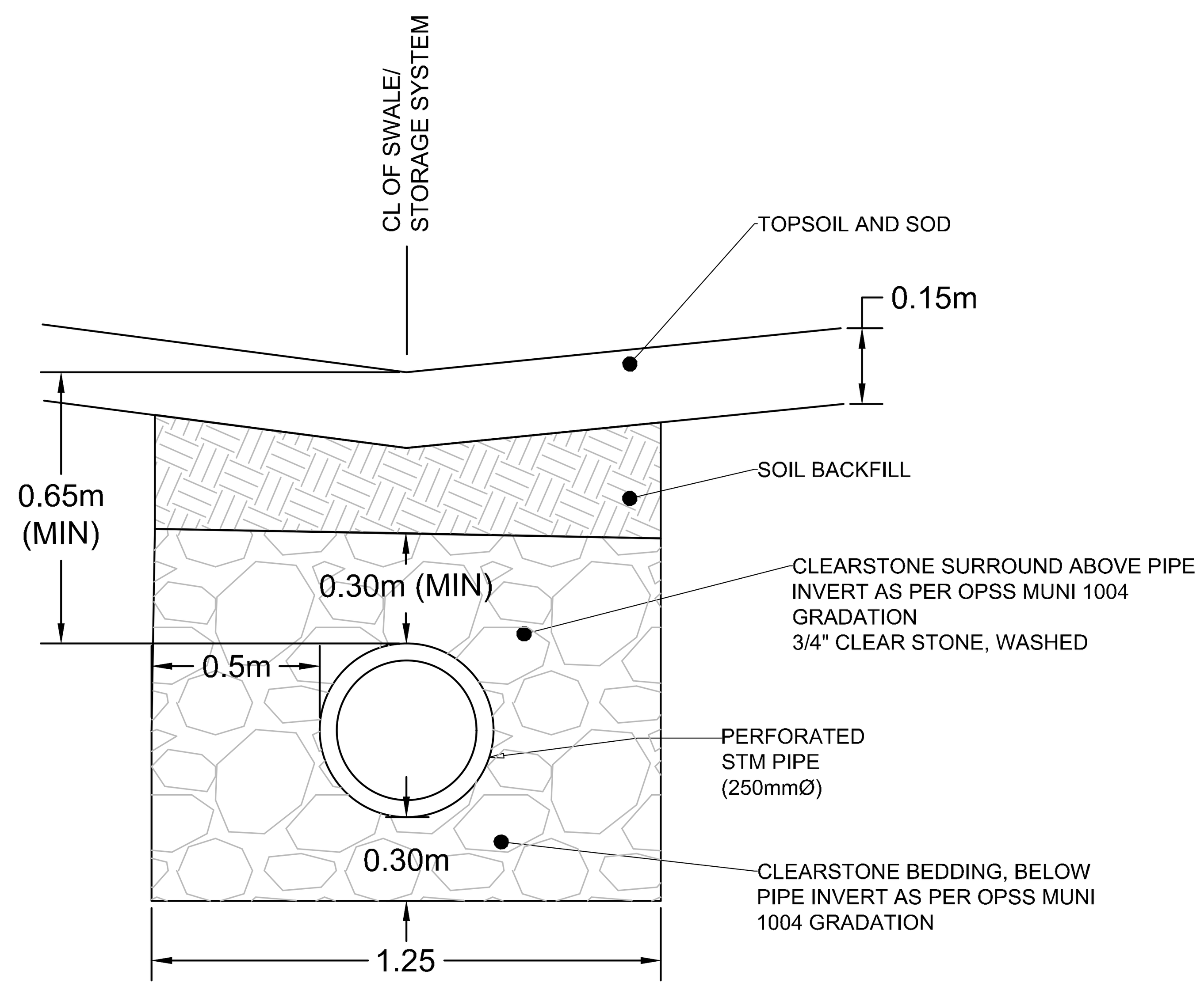




INSTALLATION OF CATCH BASIN WITH CURB AND GUTTER
DATE: MARCH 2005 | REV. DATE: MARCH 2019 | DWG. No.: S1



TITLE: SEWER SERVICE CONNECTIONS FOR RIGID MAIN SEWER PIPE (MODIFIED OPSD-1006.010)
DATE: MAR 2006 | REV: MAR 2024 | DWG No: S11



EXFILTRATION TRENCH DETAIL
N.T.S

NOTE:
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No.	REVISION	DATE	BY
1.	ISSUED FOR SITEPLAN APPLICATION	OCT/17/24	ARM

SCALE: AS SHOWN

DESIGN: ARM | CHECKED: GJM | DRAWN: MF/ARM | CHECKED: ARM | APPROVED: GJM

FOR REVIEW ONLY

ISSUED FOR REVIEW

ISSUED FOR REVIEW

NOVATECH
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Telephone (613) 254-9643
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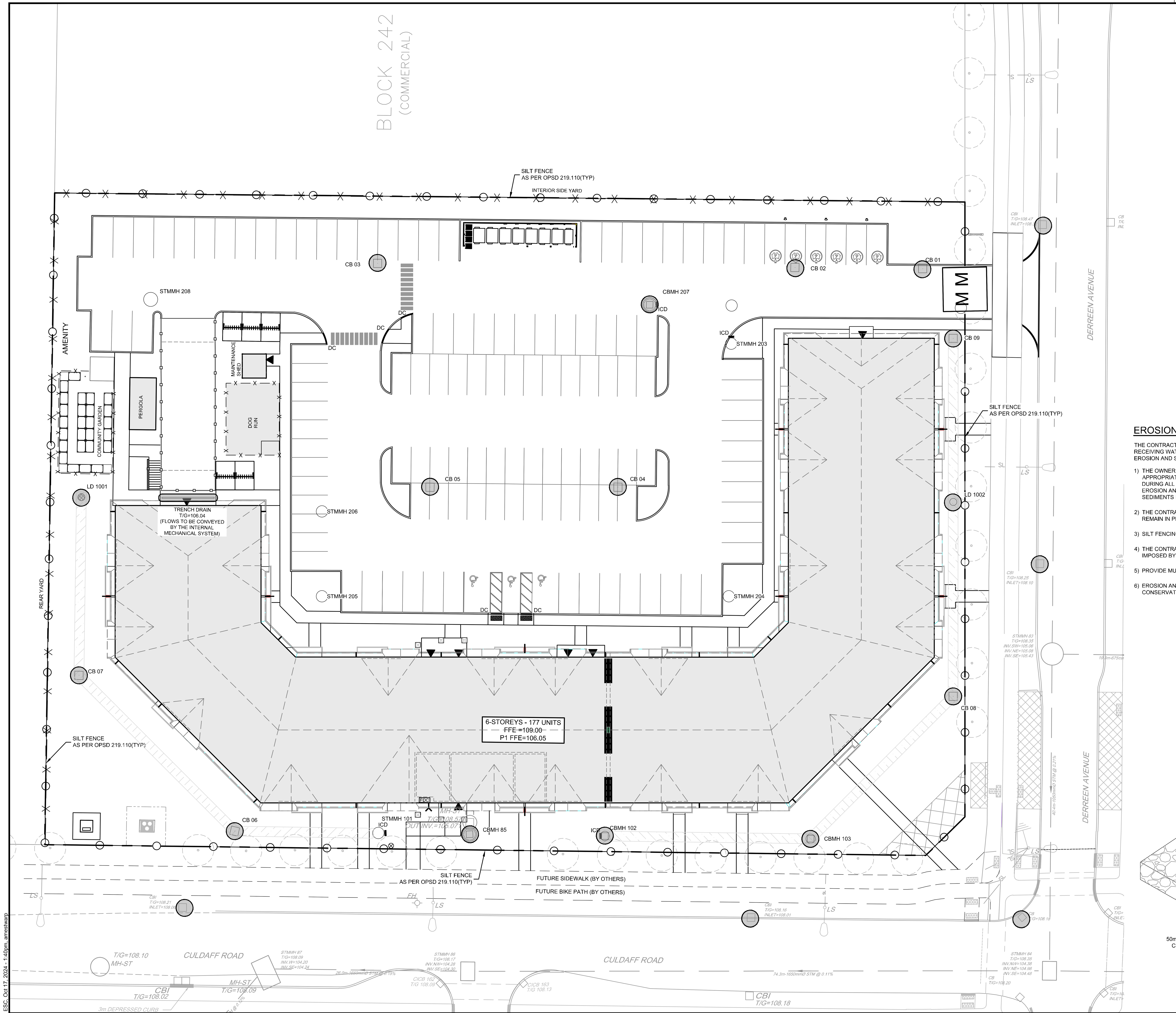
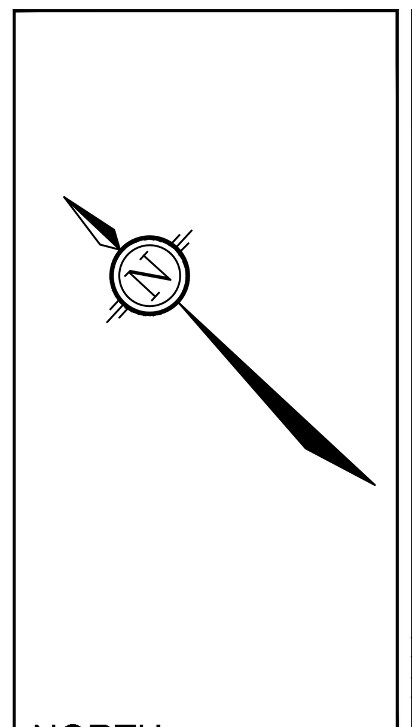
Website www.novatech-eng.com

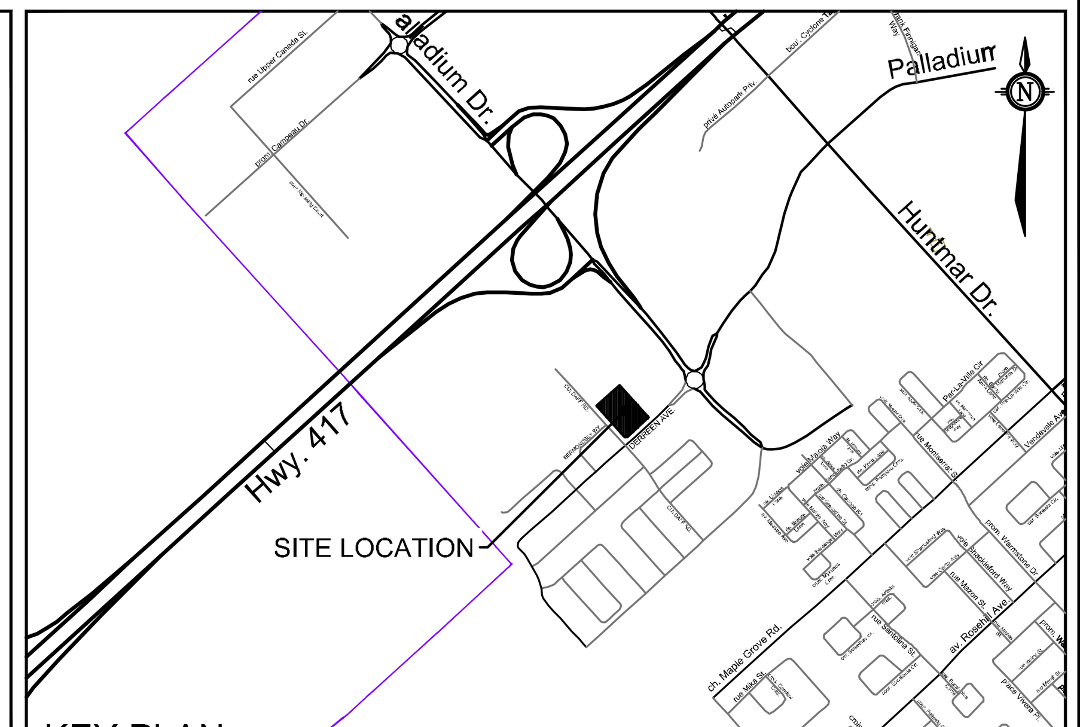
LOCATION
CITY OF OTTAWA
425 CULDAFF ROAD

DRAWING NAME
NOTES AND DETAILS

PROJECT No. 123194
REV: REV#1
DRAWING No. 123194-ND







LEGEND

PROPERTY LINE	SWALE c/w SUBDRAIN AND DIRECTION OF FLOW
PROPOSED CURB	TERRACING 3:1 SLOPE MAX (UNLESS OTHERWISE INDICATED)
PROPOSED DEPRESSED CURB (DC)	PROPOSED FIREWALL
PROPOSED FOUNDATION WALL C/W RAILING	
PROPOSED CAP	PROPOSED ROOF LIMITS
PROPOSED STORM SEWER AND MANHOLE	PROPOSED TRANSFORMER
PROPOSED CATCHBASIN MANHOLE	PROPOSED FILTER BAGS AT CATCHBASINS, CATCHBASIN MANHOLES AND TRENCHDRAINS
PROPOSED CATCHBASIN	PROPOSED MUD MAT (M M)
PROPOSED LANDSCAPE DRAIN	
PROPOSED TRENCH DRAIN	LIGHT DUTY SILT FENCE (OPSD 219.110)
PROPOSED BUILDING ENTRANCE	EXISTING STORM MANHOLE (STM MH)
	EXISTING CATCHBASIN (CB 1)
	EXISTING LIGHT STANDARD (LS)
	EXISTING FENCE

EROSION AND SEDIMENT CONTROL NOTES:

THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

1) THE OWNER AGREES TO PREPARE AND IMPLEMENT AN EROSION AND SEDIMENT CONTROL PLAN TO THE SATISFACTION OF THE CITY OF OTTAWA, APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL SUCH AS BUT NOT LIMITED TO INSTALLING FILTER CLOTHS ACROSS MANHOLE/CATCHBASIN LIDS TO PREVENT SEDIMENTS FROM ENTERING STRUCTURES AND INSTALL AND MAINTAIN A LIGHT DUTY SILT FENCE BARRIER AS REQUIRED.

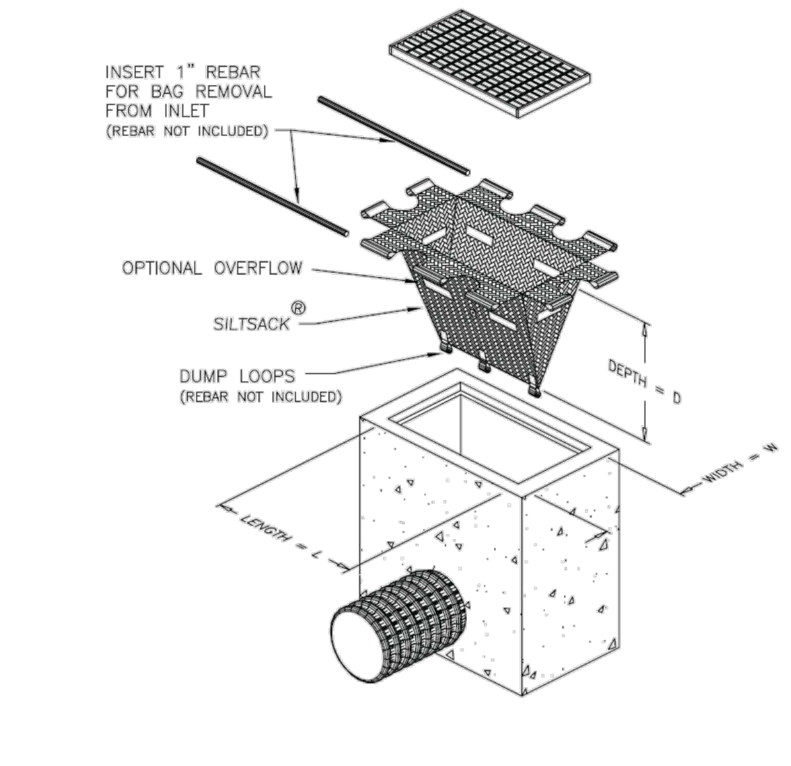
2) THE CONTRACTOR SHALL PLACE FILTER BAGS UNDER THE CATCHBASIN AND MANHOLE GRATES FOR THE DURATION OF CONSTRUCTION AND WILL REMAIN IN PLACE DURING ALL PHASES OF CONSTRUCTION.

3) SILT FENCING FOR ENTIRE PERIMETER OF SITE, SHALL BE UTILIZED TO CONTROL EROSION FROM THE SITE DURING CONSTRUCTION.

4) THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

5) PROVIDE MUD MATS AT ALL CONSTRUCTION ACCESS POINTS TO MINIMIZE SEDIMENT TRANSPORT OFFSITE.

6) EROSION AND SEDIMENT CONTROL MEASURES MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE CITY OF OTTAWA SITE INSPECTOR OR CONSERVATION AUTHORITY.



FILTER BAG DETAL
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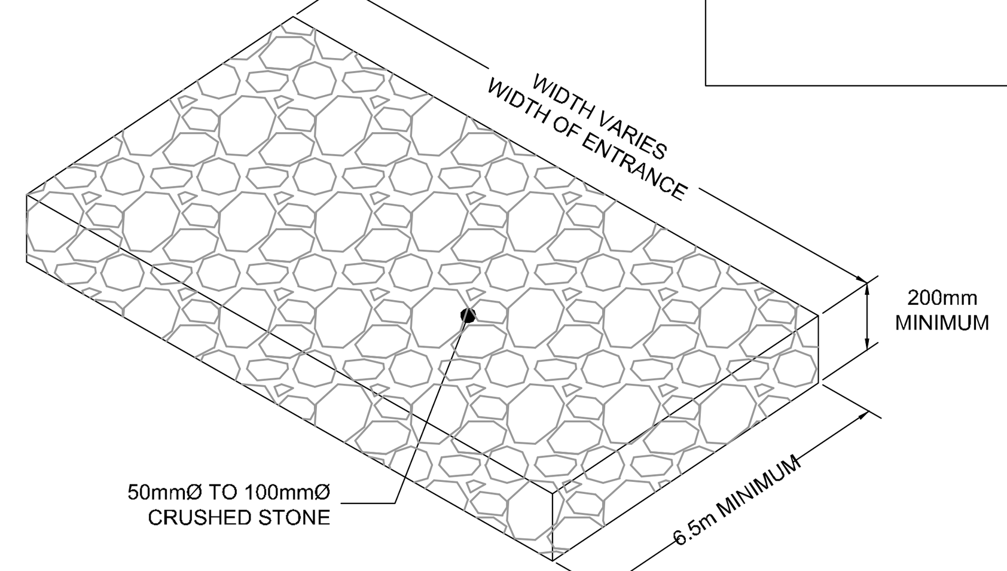

MUD MAT DETAIL
NOT TO SCALE

REFER TO 123194-ND FOR ADDITIONAL NOTES & DETAILS

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SCALE 1:250

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CHECKED	GJM
DRAWN	MF/ARM
CHECKED	ARM
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ISSUED FOR REVIEW

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LOCATION
CITY OF OTTAWA
425 CULDAFF ROAD

DRAWING NAME
EROSION AND SEDIMENT CONTROL PLAN

PROJECT No. 123194
REV REV#1
DRAWING No. 123194-ESC

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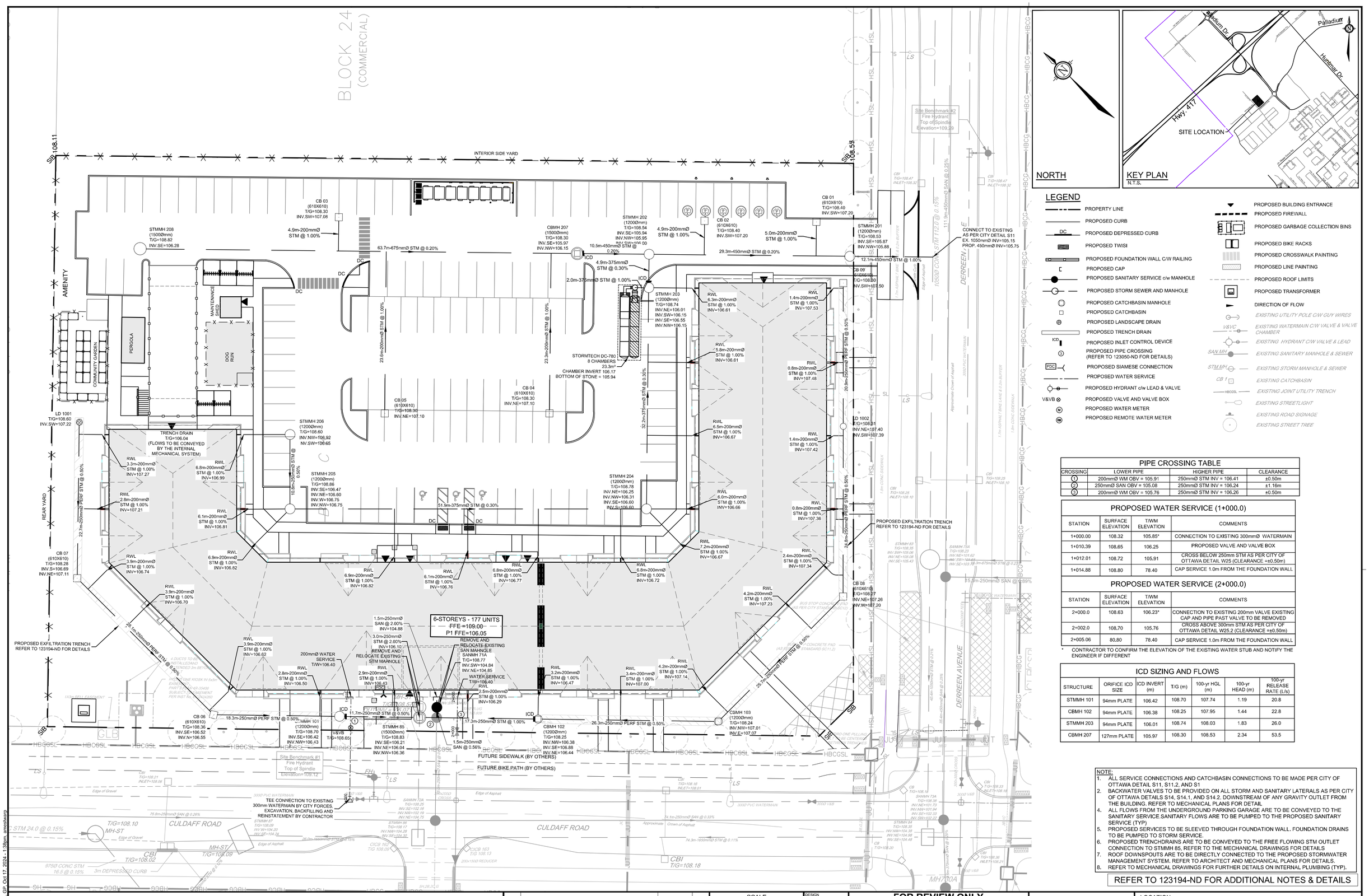

LEGEND

- PROPERTY LINE
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TWISI
- PROPOSED FOUNDATION WALL C/W RAILING
- PROPOSED CAP
- PROPOSED SANITARY SERVICE c/w MANHOLE
- PROPOSED STORM SEWER AND MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED LANDSCAPE DRAIN
- PROPOSED TRENCH DRAIN
- PROPOSED INLET CONTROL DEVICE
- PROPOSED PIPE CROSSING (REFER TO 123050-ND FOR DETAILS)
- PROPOSED SIAMESE CONNECTION
- PROPOSED WATER SERVICE
- PROPOSED HYDRANT c/w LEAD & VALVE
- PROPOSED VALVE AND VALVE BOX
- PROPOSED WATER METER
- PROPOSED REMOTE WATER METER
- PROPOSED BUILDING ENTRANCE
- PROPOSED FIREWALL
- PROPOSED GARBAGE COLLECTION BINS
- PROPOSED BIKE RACKS
- PROPOSED CROSSWALK PAINTING
- PROPOSED LINE PAINTING
- PROPOSED ROOF LIMITS
- PROPOSED TRANSFORMER
- DIRECTION OF FLOW
- EXISTING UTILITY POLE C/W GUY WIRES
- EXISTING WATERMAIN C/W VALVE & VALVE CHAMBER
- EXISTING HYDRANT C/W VALVE & LEAD
- EXISTING SANITARY MANHOLE & SEWER
- EXISTING STORM MANHOLE & SEWER
- EXISTING CATCHBASIN
- EXISTING JOINT UTILITY TRENCH
- EXISTING STREETLIGHT
- EXISTING ROAD SIGNAGE
- EXISTING STREET TREE

PIPE CROSSING TABLE

CROSSING	LOWER PIPE	HIGHER PIPE	CLEARANCE
1	200mmØ WM OBV = 105.91	250mmØ STM INV = 106.41	±0.50m
2	250mmØ SAN OBV = 105.08	250mmØ STM INV = 106.24	±1.16m
3	200mmØ WM OBV = 105.76	250mmØ STM INV = 106.26	±0.50m

PROPOSED WATER SERVICE (1+000.0)

STATION	SURFACE ELEVATION	T/WM ELEVATION	COMMENTS
1+000.00	108.32	105.85*	CONNECTION TO EXISTING 300mmØ WATERMAIN
1+010.39	108.65	106.25	PROPOSED VALVE AND VALVE BOX
1+012.01	108.72	105.91	CROSS BELOW 250mm STM AS PER CITY OF OTTAWA DETAIL W25 (CLEARANCE =±0.50m)
1+014.88	108.80	78.40	CAP SERVICE 1.0m FROM THE FOUNDATION WALL

PROPOSED WATER SERVICE (2+000.0)

STATION	SURFACE ELEVATION	T/WM ELEVATION	COMMENTS
2+000.0	108.63	106.23*	CONNECTION TO EXISTING 200mm VALVE EXISTING CAP AND PIPE PAST VALVE TO BE REMOVED
2+002.0	108.70	105.76	CROSS ABOVE 300mm STM AS PER CITY OF OTTAWA DETAIL W25.2 (CLEARANCE =±0.50m)
2+005.06	80.80	78.40	CAP SERVICE 1.0m FROM THE FOUNDATION WALL

* CONTRACTOR TO CONFIRM THE ELEVATION OF THE EXISTING WATER STUB AND NOTIFY THE ENGINEER IF DIFFERENT

ICD SIZING AND FLOWS

STRUCTURE	ORIFICE ICD SIZE	ICD INVERT (m)	T/G (m)	100-yr HGL (m)	100-yr HEAD (m)	100-yr RELEASE RATE (L/s)
STMMH 101	94mm PLATE	106.42	108.70	107.74	1.19	20.8
CBMH 102	94mm PLATE	106.38	108.25	107.95	1.44	22.8
STMMH 203	94mm PLATE	106.01	108.74	108.03	1.83	26.0
CBMH 207	127mm PLATE	105.97	108.30	108.53	2.34	53.5

NOTE:
1. ALL SERVICE CONNECTIONS AND CATCHBASIN CONNECTIONS TO BE MADE PER CITY OF OTTAWA DETAIL S11, S11.2, AND S1
2. BACKWATER VALVES TO BE PROVIDED ON ALL STORM AND SANITARY LATERALS AS PER CITY OF OTTAWA DETAILS S14, S14.1, AND S14.2. DOWNSTREAM OF ANY GRAVITY OUTLET FROM THE BUILDING. REFER TO MECHANICAL PLANS FOR DETAIL
4. ALL FLOWS FROM THE UNDERGROUND PARKING GARAGE ARE TO BE CONVEYED TO THE SANITARY SERVICE.SANITARY FLOWS ARE TO BE PUMPED TO THE PROPOSED SANITARY SERVICE (TYP)
5. PROPOSED SERVICES TO BE SLEEVED THROUGH FOUNDATION WALL. FOUNDATION DRAINS TO BE PUMPED TO STORM SERVICE.
6. PROPOSED TRENCHDRAINS ARE TO BE CONVEYED TO THE FREE FLOWING STM OUTLET CONNECTION TO STMMH 85, REFER TO THE MECHANICAL DRAWINGS FOR DETAILS
7. ROOF DOWNSPOUTS ARE TO BE DIRECTLY CONNECTED TO THE PROPOSED STORMWATER MANAGEMENT SYSTEM. REFER TO ARCHITECT AND MECHANICAL PLANS FOR DETAILS.
8. REFER TO MECHANICAL DRAWINGS FOR FURTHER DETAILS ON INTERNAL PLUMBING (TYP).

REFER TO 123194-ND FOR ADDITIONAL NOTES & DETAILS

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SCALE 1:250 (1:250 0 2 4 6 8 10)

DESIGN ARM
CHECKED GJM
DRAWN MF/ARM
CHECKED ARM
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LOCATION
CITY OF OTTAWA
425 CULDAFF ROAD

DRAWING NAME
GENERAL PLAN OF SERVICES

PROJECT No. 123194
REV REV#1
DRAWING No. 123194-GP

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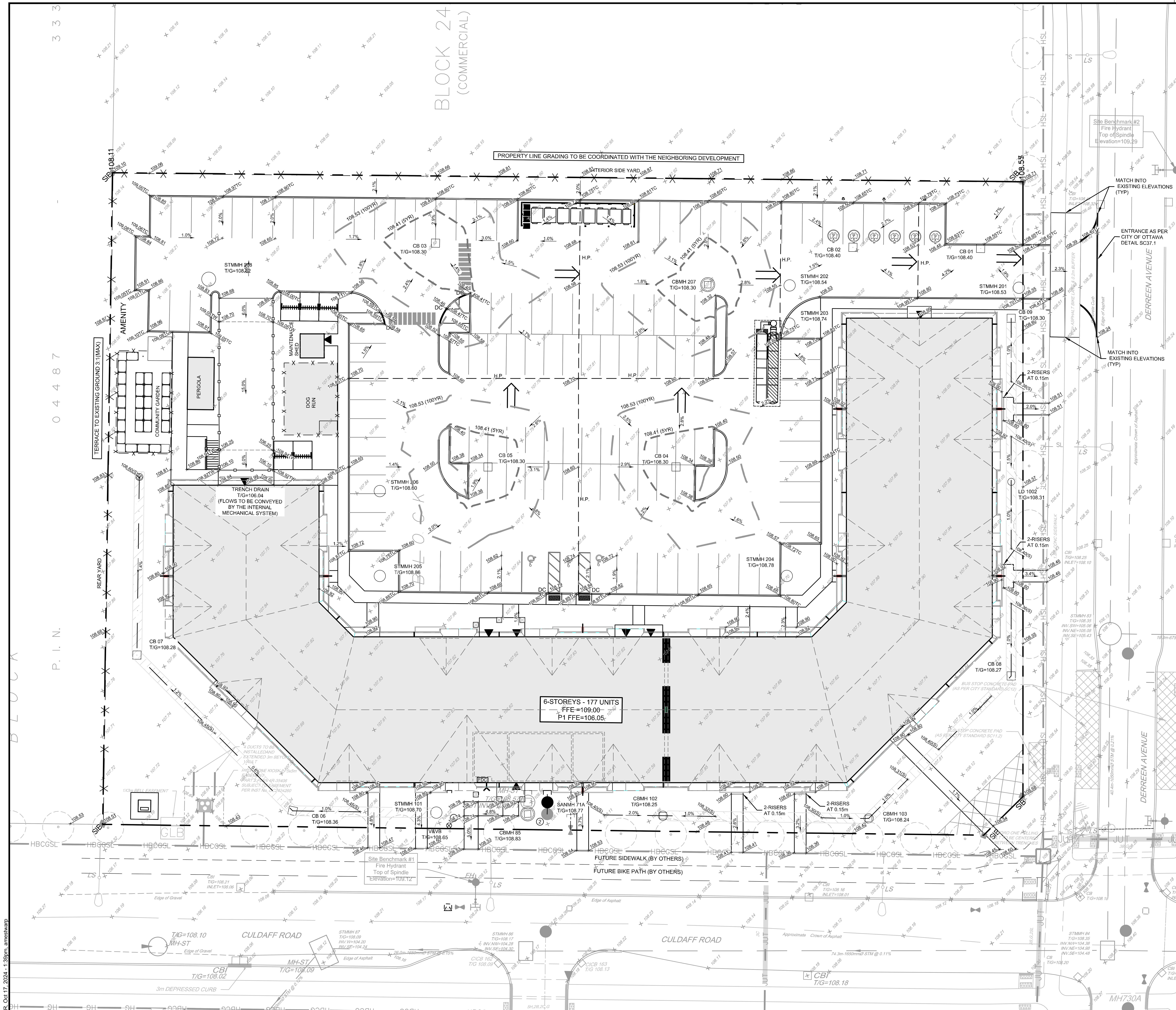

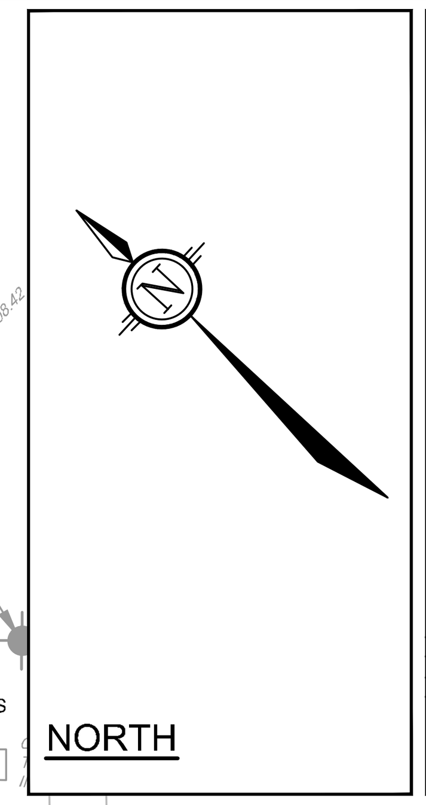

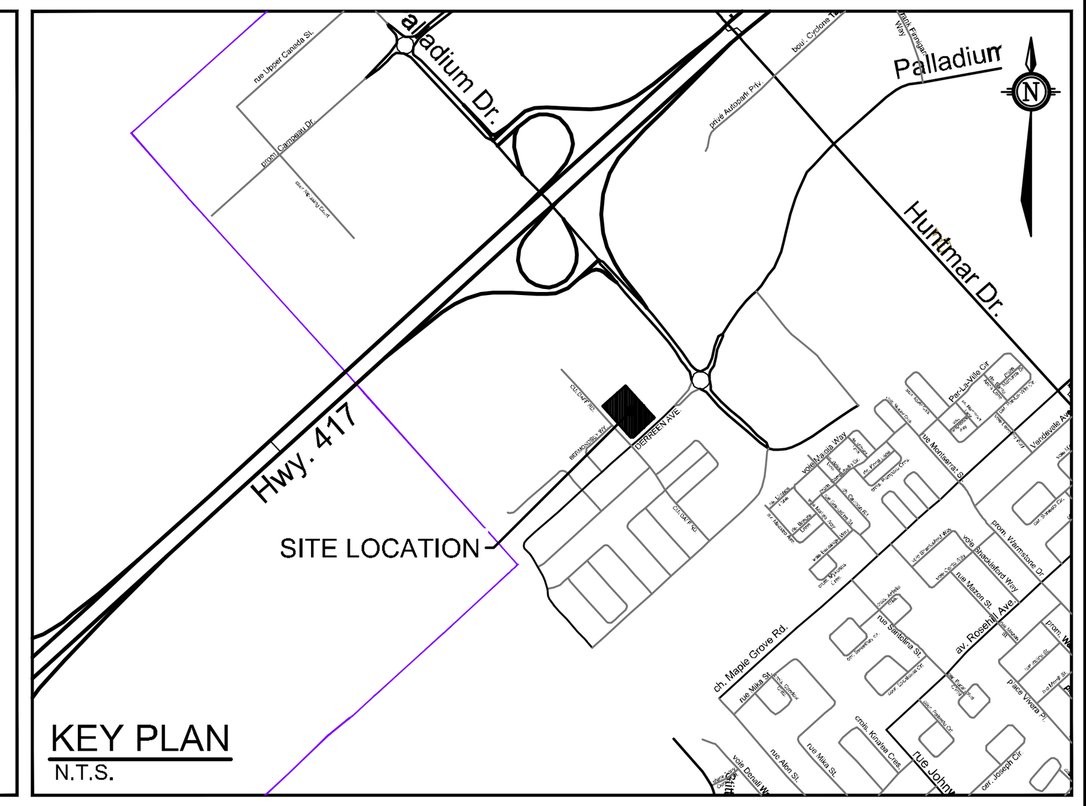

LEGEND

PROPERTY LINE	SAN MH PROPOSED SANITARY MANHOLE
PROPOSED BARRIER CURB	STM MH PROPOSED STORM MANHOLE
DC PROPOSED DEPRESSED CURB	PROPOSED HYDRANT & VALVE
PROPOSED TACTILE WALKING SURFACE INDICATOR (TWSI)	PROPOSED VALVE AND VALVE BOX
V&VB PROPOSED VALVE AND VALVE BOX	EXISTING VALVE & VALVE BOX
FIRE DEPARTMENT SIAMESE CONNECTION	EXISTING VALVE & LEAD
PROPOSED BUILDING ENTRANCE	SAN MH EXISTING SANITARY MANHOLE
H.P. PROPOSED HIGH POINT	STM MH EXISTING STORM MANHOLE
SWALE c/w SUBDRAIN AND DIRECTION OF FLOW	CB EXISTING CATCHBASIN
TERRACING 3:1 SLOPE MAX (UNLESS OTHERWISE INDICATED)	EXISTING DITCH CENTERLINE
PROPOSED FOUNDATION WALL C/W RAILING	EXISTING UTILITY POLE
2.0% SLOPE AND DIRECTION	EXISTING UTILITY POLE ANCHORS
DIRECTION OF MAJOR OVERLAND FLOW	EXISTING STREETLIGHT
PROPOSED LANDSCAPE DRAIN	EXISTING ROAD SIGNAGE
PROPOSED CATCHBASIN MANHOLE	EXISTING CULVERT
PROPOSED CATCHBASIN	BOS EXISTING DITCH/ BOTTOM OF SLOPE
PROPOSED AREA DRAIN	
PROPOSED ROOF DRAINS	
PROPOSED TRENCH DRAIN	
100-YR+20% PONDING	
100-YR PONDING	
5-YR PONDING	
PROPOSED FIREWALL	
PROPOSED BIKE RACKS	
PROPOSED CROSSWALK PAINTING	
PROPOSED LINE PAINTING	
PROPOSED ROOF LIMITS	
PROPOSED TRANSFORMER	

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DRAWING NAME
GRADING PLAN

PROJECT No. 123194
REV REV#1
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