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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
Revised: February 28, 2025

Novatech File: 123194
Ref: R-2024-120

February 28th, 2025

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

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

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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:

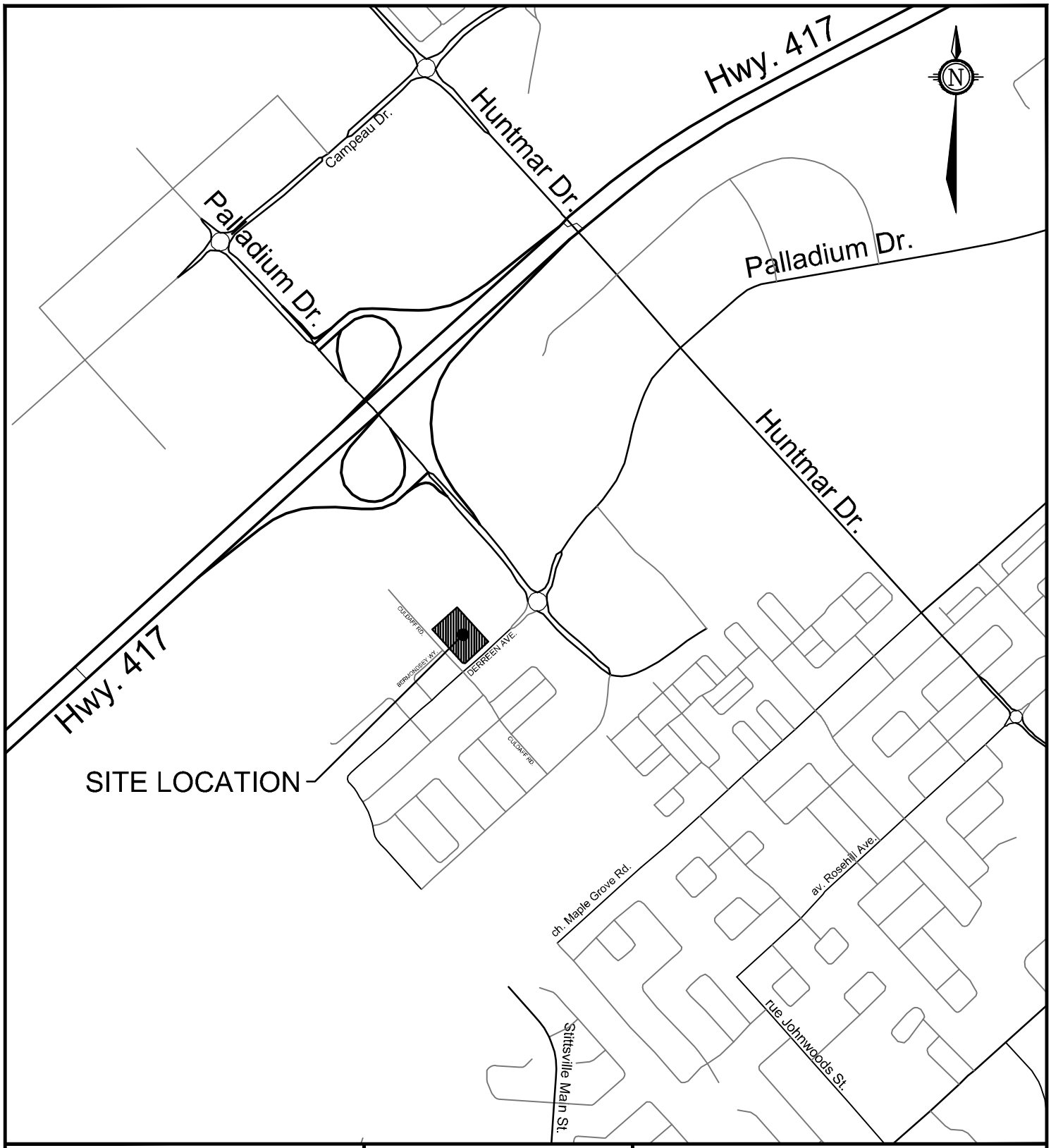
- 'Design Brief for 2325483 Ontario Ltd., 195 Huntmar Drive, City of Ottawa, Project No.: 12-624, prepared By DSEL dated July 2020, 2nd submission (Referenced as **DSEL Report**).

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	JOB	FIGURE
JUNE 2024	123194	FIGURE 2

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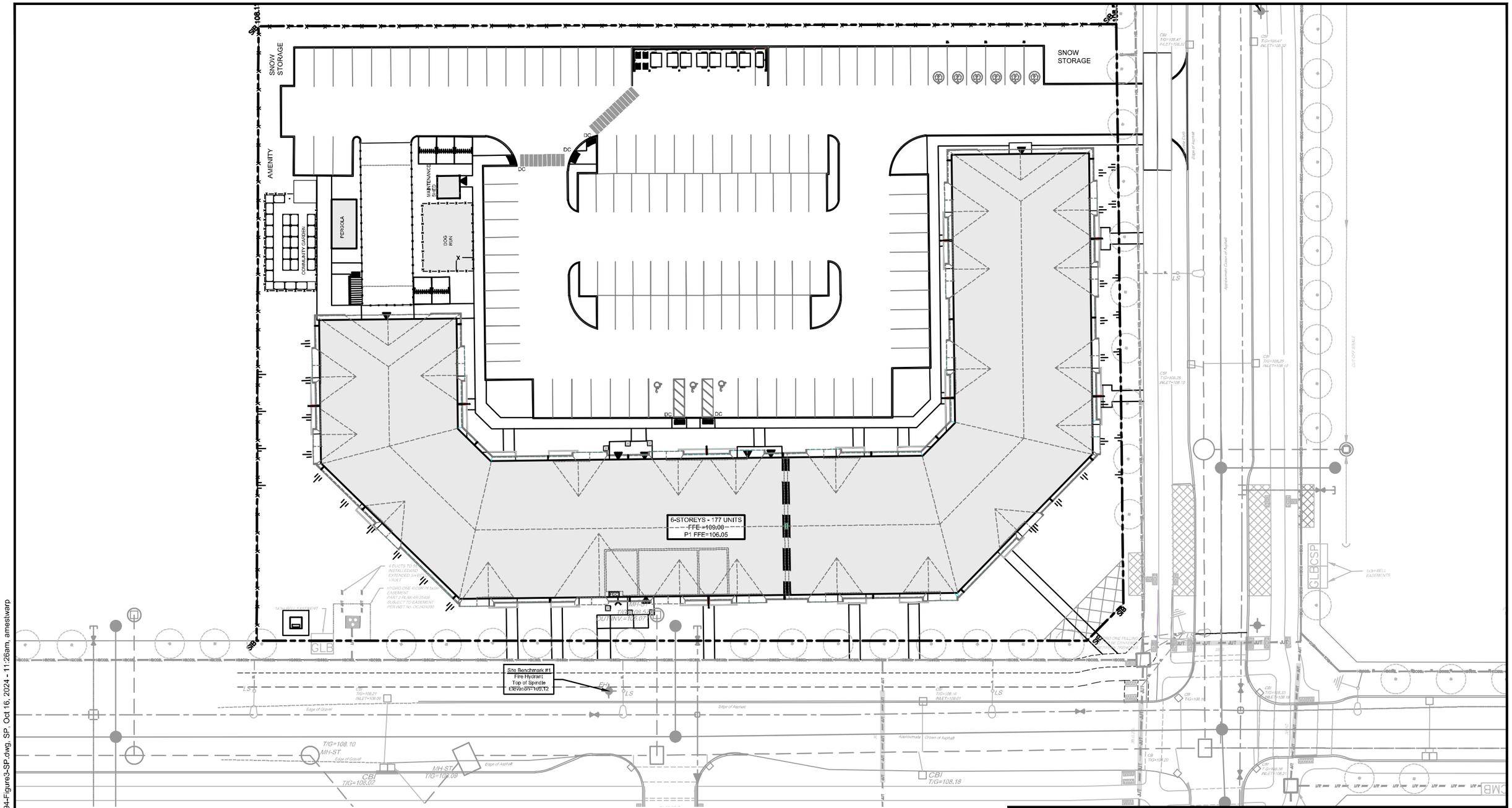

LEGEND

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CITY OF OTTAWA

425 CULDAFF ROAD

PROPOSED SITE PLAN

SCALE	DATE	JOB	FIGURE
1 : 500 (0, 5m, 10m, 20m)	FEBRUARY 2025	123194	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.

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,** with a peaking factor of 1.5 and an extraneous flow of **0.46 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 **0.78L/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 **3.70L/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 **27.02L/s** with a capacity ratio of approximately 79.5%. Further downstream the pipes within Derreen Avenue increase in size to 450mm in diameter and ultimately connect to sanitary sewers within Huntmar Drive. A review of all pipes upto the Huntmar Drive connection was performed and the highest pipe capacity utilization was 85.4%. Detailed sanitary flow calculations are provided in **Appendix C** for reference.

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 infiltration 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

As noted within the Comments to the Committee of Adjustment document that was prepared regarding the severance of Block 242, Plan 4M-1687, dated June 1, 2023:

> *"The existing plans show drainage from Part 3 (2765 Palladium Drive) towards Parts 1 and 2 (425 Culdaff Road). At the time of Site Plan and/or Building Permit, the applicant will be required to regrade Part 3 (2765 Palladium Drive) or provide adequate on-site storm structures to contain drainage within 2765 Palladium Drive and discharge overland flow towards the City's right-of-way. Separate water and sewer connections to the municipal services along Derreen Avenue will also be required."*

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) separate parcels. The subject site at 425 Culdaff Road (**0.97ha**), and the remaining portion to the northwest (**1.59ha**) retained by others.

Based on the proposed layout and grading for the subject site at 425 Culdaff Road, storm runoff from **0.62ha** of the site will be conveyed to Derreen Avenue, and runoff from the remaining **0.35ha** will be conveyed to Culdaff Road. Storm runoff from the severed parcel (**1.59ha**) will be directed to the Derreen Avenue sewer.

The capacity of the existing system downstream of the proposed connections up to the existing SWM pond was reviewed to assess the impacts. 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 flow at **85.2%** and **80.7%** capacity. The increase in utilization is still below the pipe capacity and the system will continue to function as designed.

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 0.15m 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 Stormwater Management Modeling

The City of Ottawa Sewer Design Guidelines (October 2012) requires hydrologic / hydraulic modeling for all dual drainage systems. The performance of the proposed storm drainage system was evaluated using the PCSWMM hydrologic / hydraulic model. The results of the analysis were used to:

- Determine the total runoff from the site (peak flow and runoff volume) for the design storm events.
- Size the required ICDs to ensure post development flow rates do not exceed the allowable release rates.
- Determine the required underground storage volumes.
- Calculate the storm sewer hydraulic grade line and ponding elevations for the 100-year storm event.

The post-development PCSWMM model schematic and output for the 100-year and stress-test events are provided in **Appendix E**.

Area A-01, A02, A06, A07

- Stormwater runoff from the above ground parking area will be conveyed to storm sewers within Derreen Avenue. These flows will be captured by catchbasins and conveyed by the proposed sewers to Derreen Avenue. Inflows to the minor system will be controlled by an inlet control device (ICD). The required storage volume will be provided by an oversized storm pipe and surface storage in the parking area. The surface storage will be limited to a maximum ponding depth of 0.30m prior to spilling overland to Derreen Avenue.

Area A-03, A-04:

- Stormwater runoff 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 runoff 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:

- Stormwater runoff 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 runoff from the proposed building roof facing the north-west will be captured by proposed downspouts and conveyed directly to proposed infiltration trench within the landscaped area. The infiltration trench design includes catchbasin and landscape drain inlets to capture surface water from the landscaped area. A proposed ICD will restrict the flows and promote infiltration prior to discharging to Culdaff Road. If the capacity of the infiltration system is exceeded, flows would be conveyed overland to Culdaff Road. Refer to the mechanical plans for details on the roof downspouts.

Area R-08-R10, A-10

- Stormwater runoff from the proposed building roof facing the south-east will be captured by proposed downspouts and conveyed directly to proposed infiltration trench within the landscaped area. The infiltration 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. Refer to the mechanical plans for details on the roof downspouts.

Area R-07a, R-07B:

- Stormwater runoff 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

- Stormwater runoff from this area will be captured by and existing catchbasin manhole (CBMH 85) and conveyed uncontrolled to the Culdaff Road sewer system.

Area D-01

- Stormwater runoff from a small portion of landscaping facing Culdaff Road will drain uncontrolled to the Culdaff Road right-of-way.

6.3.1 PCSWMM Model Parameters

Design Storms

The model uses the 3-hour Chicago Storm Distribution (10-minute time step) derived from the City of Ottawa IDF data presented in the City of Ottawa Sewer Design Guidelines (October 2012):

The 3-hour Chicago distribution generates the highest peak flows for both the minor and major systems and was determined to be the critical storm distribution for the design of the storm drainage system.

The proposed drainage system has also been stress tested using a 3-hour Chicago design storm that has a 20% higher intensity and total volume compared to the 100-year event.

Modelling Parameters

The hydrologic parameters for each subcatchment were developed based on the proposed land use and grading. Subcatchments were modeled using the standard SWMM5 runoff module with Horton's Equation for infiltration.

PCSWMM Model Schematic, Output Data and Modeling Files

The PCSWMM model schematic and output data for the 100-year and stress-test design events are provided in **Appendix E**. Digital versions of the PCSWMM modeling files have been provided with the submission package.

Impervious Values

Runoff coefficients for each subcatchment area were determined based on the proposed site plan. Refer to the Stormwater Management Plan (**Drawing 123194-SWM**) for details. Percent impervious values were calculated using the following formula:

$$\%imp = \frac{C - 0.2}{0.7}$$

Subcatchment Areas

For modeling purposes, the site has been divided into subcatchments based on the drainage areas tributary to each inlet of the existing and proposed storm sewer systems. The subcatchment areas are shown on the Stormwater Management Area Plan (**Drawing 123194-SWM**).

The site has been divided into twenty-two (22) drainage areas for the post-development condition. The hydrologic modeling parameters for each subcatchment were developed based on the Site Plan **(Figure 2**) and the Stormwater Management Plan specified above. Subcatchment parameters are provided in **Table 6.1**. The building roof is sloped and has no storage.

Table 6.1: Subcatchment Parameters

Area ID	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	Zero-Imperv. (%)	Flow Length (m)	Average Slope (%)
Outlet to Derreen Avenue						
A-01	0.140	0.75	79	25	60	0.5
A-02	0.069	0.81	87	25	30	0.5
A-03	0.030	0.77	81	25	17	0.5
A-04	0.020	0.61	59	25	16	0.5
A-06	0.112	0.81	87	25	37	0.5
A-07	0.107	0.80	86	25	32	0.5
R-01	0.017	0.90	100	100	10	0.5
R-02	0.071	0.90	100	100	9	0.5
R-03	0.048	0.90	100	100	9	0.5
Total	**0.614**	**0.86**	**-**	**-**	**-**	**-**

Area ID	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	Zero-Imperv. (%)	Flow Length (m)	Average Slope (%)
Outlet to Culdaff Road						
A-05	0.017	0.9	100	25	23	0.5
A-08	0.091	0.29	13	50	20	1.5
A-09	0.006	0.41	30	25	5	0.5
A-10	0.070	0.28	11	25	15	0.5
D-01	0.008	0.42	31	25	15	0.5
R-04	0.019	0.9	100	100	9	0.5
R-05	0.019	0.9	100	100	9	0.5
R-06	0.018	0.9	100	100	9	0.5
R-07A	0.009	0.9	100	100	11	0.5
R-07B	0.009	0.9	100	100	10	0.5
R-08	0.029	0.9	100	100	10	0.5
R-09	0.019	0.9	100	100	8	0.5
R-10	0.041	0.9	100	100	9	0.5
Total	**0.355**	**0.57**	**-**	**-**	**-**	**-**

Infiltration

Infiltration losses for all catchment areas were modeled using Horton's infiltration equation, which defines the infiltration capacity of soil over the duration of a precipitation event using a decay function that ranges from an initial maximum infiltration rate to a minimum rate as the storm progresses. The default values as specified in the Sewer Design Guidelines were used for all catchments.

Horton's Equation:
$f(t) = f_c + (f_o - f_c)e^{-k(t)}$

Initial infiltration rate: f_o = 76.2 mm/hr
Final infiltration rate: f_c = 13.2 mm/hr
Decay Coefficient: k = 4.14/hr

Depression Storage

The default values for depression storage provided in the Ottawa Sewer Design Guidelines were used for all catchments. Rooftops were assumed to provide no depression storage (zero-impervious parameter).

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

Subarea Routing

Subarea routing for all subcatchments is set to "outlet" for rooftops, "pervious" for areas with lower imperviousness percentage, and "impervious" for parking lots with higher imperviousness percentage.

Equivalent Width

The equivalent width parameter for all subcatchments is based on the measured flow length. Flow lengths were digitized in PCSWMM as described in Section 5.4.5.6 of the City of Ottawa Sewer Design Guidelines (October 2012).

Inlet Control Devices

Proposed inlet control devices (ICDs) are represented in the model as circular orifices. ICD information is indicated on the General Plan of Services (**Drawing 123194-GP**).

Storage Rating Curves (Surface Ponding)

The storage curves for ponding in the parking lot were calculated based on the Grading Plan (**Drawing 123194-GR**).

While there is some available surface storage in the swale above the infiltration trenches, this storage has not been accounted for in the PCSWMM model. The model uses surcharge depths above the grate elevations of the catchbasins and landscape drains in the swales to evaluate the HGL in the infiltration trench system and any ponding that may occur in the swales.

Minor System Conduits (Bend / Exit Losses)

The minor system network was created in Civil3D and imported into PCSWMM. The following exit losses have been inputted into the model. They represent the loss coefficient based on the bend angle, as per the Appendix 6-B in the City of Ottawa Sewer Design Guidelines (October 2012).

Bend Angle	Loss Coefficient
0	0.00
15	0.09
30	0.21
45	0.39
60	0.64
75	0.96
90	1.32

Downstream Boundary Conditions (Outfalls)

The 100-year Hydraulic Grade Line (HGL) elevations for the existing off-site storm sewer systems are indicated within the **JSFA Report** (refer to profiles provided in **Appendix D)**. The 100-year HGL at the proposed storm sewer outlets are as follows:

- Culdaff Road: 105.778 m
- Derreen Avenue: 106.032 m

These elevations have been used for both the 100-year and stress-test events. A 'normal' boundary condition is used for the 2-year and 5-year events.

6.3.2 Stormwater Quantity Control

Quantity control storage will be required to meet the allowable release rates for the site. The proposed building will have a pitched roof and will not provide any storage. As such, the required quantity control storage will be provided using a combination of surface and underground storage consisting of:

- Stormtech chambers below the parking area in front of the proposed building
- Clearstone infiltration trenches along the rear perimeter of the building.
- Surface storage in the parking lot.

These storage elements have been represented in the PCSWMM model as summarized in the following sections.

Groundwater Elevations

Based on the findings of the geotechnical investigation, the groundwater table is expected to be at an approximate depth between 2.5m and 3.5m below the ground surface. The elevations of the proposed underground storage systems will be above the groundwater table so this will not affect the available storage capacity.

Stormtech Chambers

Underground storage will be provided below the parking area using Stormtech DC-780 arch-type chambers installed upstream of the ICD on STMMH 203. The Stormtech chambers will provide 23.3m^3 of underground storage as summarized in **Table 6.2**. Refer to **Drawing 123194-GP** for the proposed layout.

Table 6.2: Underground Storage (Stormtech Chambers)

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

Infiltration Trenches

Infiltration trenches will be used to store runoff and promote infiltration from the rear yards and rear building rooftops. The infiltration system will consist of two separate trenches (North and South). Excess runoff that exceeds the infiltration capacity of the trenches will outlet to an existing 900mm storm pipe connecting to the existing 1650mm storm sewer on Culdaff Road. Inlet control devices (ICDs) will be installed at the downstream end of each trench to promote storage in the infiltration trenches and control flows to the Culdaff Road storm sewer.

The infiltration trenches will consist of 250mm perforated pipes surrounded by clearstone wrapped in geotextile. The rainwater leaders from the rear of the building will connect directly to the 250mm perforated pipe. A series of catchbasins and CBMH structures will collect surface runoff from the rearyard areas and direct it into the infiltration trenches. The layout of the infiltration trenches is shown on the General Plan of Services (**123194-GP**). The cross-section is shown on the Notes and Details (**123194-ND**).

The clearstone trenches will have dimensions of 1.25m wide x 0.85 m deep. The clearstone will have a porosity of approximately 30%. To promote infiltration, the 250mm perforated pipes will be installed 0.30m above the bottom of the clearstone. The infiltration storage below the bottom of the pipes is not accounted for in the model, so the active depth of the trenches is 0.55m. The infiltration trench sections are represented in the model using an equivalent width of 0.375m (1.25m width x 30% porosity) to accurately reflect the storage volume provided. The model does not account for storage below the perforated pipe and does not simulate infiltration from the trenches.

The proposed infiltration trenches will provide a total active storage volume of 39.9 m^3 above the invert of the 250mm perforated pipe as summarized in **Table 6.3**.

Table 6.3: Underground Storage (Infiltration Trenches)

MH to MH (U/S to D/S)	Trench Dimensions					Storage Volumes (m^3)		
	Pipe Dia. (mm)	Length (m)	Height (m)	Width (m)	Porosity	Perf. Pipe	Stone[(1)]	TOTAL
North Trench								
LD1001 - CB07	250	22.7	0.55	1.25	0.3	1.1	4.4	5.5
CB07 – CB06	250	28.1	0.55	1.25	0.3	1.4	5.4	6.8
CB06 – MH101	250	18.3	0.55	1.25	0.3	0.9	3.5	4.4
Total Length (North) =		**69.1**				**Total Storage (North) =**		**16.6**
South Trench								
CB09 – LD1002	250	20.9	0.55	1.25	0.3	1.1	4.0	5.1
LD1002 – CB08	250	24.8	0.55	1.25	0.3	1.1	4.8	5.9
CB08 – CBMH103	250	25.7	0.55	1.25	0.3	1.1	5.0	6.1
CBMH103 - CBMH102	250	26.3	0.55	1.25	0.3	1.1	5.1	6.2
Total Length (South) =		**97.7**				**Total Storage (South) =**		**23.2**
Total Length (North + South) = 166.8m						***Total Active Storage (North & South) = 39.9m³***		

[(1)] *Based on 30% porosity in the clear stone*

Surface Storage

Storage nodes in PCSWMM are used to simulate the available surface storage volume in the parking lot. The stage-storage curves are generated using Civil3D and then imported into PCSWMM. Storm events up to 5-year will be stored underground, ensuring there is no surface ponding within the parking area. Refer to **Section 6.4.2** for additional details.

6.3.3 Inlet Control Devices

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.

The ICDs have been sized to ensure that surface ponding under 100-year and stress test storm events are lower than 0.3m. Standard City of Ottawa ICD sizes (83, 94, 102, 108, 127, 152, 178mm) have been used. ICD sizes and design flows are provided in **Table 6.4**.

Table 6.4: Inlet Control Devices

Structure ID	ICD Data			5-year Event			100-year Event		
	Diameter (mm)	Invert (m)	C/L Elev (m)	Max HGL (m)	Head[1] (m)	Flow Rate (L/s)	Max HGL (m)	Head[1] (m)	Flow Rate (L/s)
Parking Lot Area (Pipes & Stormtech Chambers)									
CBMH207	152	105.97	106.05	107.96	1.91	**65.5**	108.42	2.37	**73.0**
MH203	94	106.02	106.07	106.95	0.88	**16.4**	107.81	1.74	**23.8**
Rearyard Area (Infiltration Trenches)									
MH101	83	106.43	106.47	106.83	0.36	**8.6**	108.17	1.70	**18.8**
CBMH102	83	106.38	106.42	107.01	0.59	**11.0**	107.48	1.06	**14.8**
Total Controlled Flow from ICDs =									**130.4**

[1] *ICD head is calculated as the difference between the maximum HGL and the centreline elevation of the orifice.*

6.4 PCSWMM Model Results

The results of the post-development PCSWMM model demonstrate that the overall stormwater management strategy for the subject site will conform to the stormwater management criteria outlined in this report.

6.4.1 Summary of Peak Flows

The PCSWMM model was used to evaluate the performance of the proposed storm servicing and stormwater management strategy and ensure that peak flows are controlled to the 100-year allowable release rate of **166.2 L/s**.

The proposed ICDs have a combined 100-year peak flow rate of **130.4 L/s** (see **Table 6.4**). However, there are additional uncontrolled areas such as CB1 and CB2 at the northeast entrance from Derreen Avenue and the underground parking entrance which must be accounted for in the SWM design. The PCSWMM model calculates the total peak flow (controlled and uncontrolled) at the two minor system outlets from the site.

Table 6.5 compares the minor system release rates to the allowable release rate of the downstream storm sewer systems and demonstrates that the total minor system release rate is less than the allowable release rate for all storms up to and including the 100-year event.

The allowable minor system release rate will be slightly exceeded during the stress test event due to the increased ponding depths which increases the head on the ICDs. The capacity of the infiltration trench will be exceeded during the stress test event and there will be some overland flow to Culdaff Road – refer to **Section 6.4.2** for details on the major drainage system.

Table 6.5: Peak Flow Comparison

Outlet	Peak Flow[1] (L/s)				Allowable Release Rate (L/s)
	2-year	5-year	100-year	Stress Test	
Derreen Avenue	72.1	89.6	116.9	125.5	
Culdaff Road	22.8	29.1	45.7	56.1	
TOTAL	**94.9**	**118.7**	**162.6**	**181.6**	**166.2**

[1] PCSWMM model results for a 3-hour Chicago storm distribution

6.4.2 Major System Summary

A summary of the modelled ponding depths during the 100-year storm and stress-test design events is provided below in **Table 6.6.** There is no surface ponding for the 5-year event. The model results indicate that ponding depths will not exceed 0.30m during either the 100-year or stress test events.

The proposed SWM design provides sufficient storage to contain all runoff for storms up to and including the 100-year event. During the stress-test event, the capacity of the north infiltration trench will be exceeded and there will be some overland flow to Culdaff Road at the spill point from CB06. There will be no overland flow to Derreen Avenue during the stress-test event.

Table 6.6: Major System Ponding Depths

Structure	T/G	Max. Static Ponding		100yr Event		Stress-Test Event	
		Elev.	Depth	Elev.	Depth	Elev.	Depth
	(m)	(m)	(m)	(m)	(m)	(m)	(m)
Parking Lot							
CB 01	108.40	108.50	0.10	107.27	0	107.28	0
CB 02	108.40	108.53	0.13	107.29	0	107.3	0
CB 03	108.30	108.58	0.28	108.47	0.17	108.51	0.21
CB 04	108.30	108.60	0.30	108.48	0.18	108.52	0.22
CB 05	108.30	108.60	0.30	108.51	0.21	108.54	0.24
CBMH 207	108.30	108.55	0.25	108.42	0.12	108.46	0.16
South Infiltration Trench							
CB 09	108.30	108.58	0.28	107.48	0	107.82	0
LD 1002	108.31	108.55	0.24	107.48	0	107.82	0
CB 08	108.27	108.54	0.27	107.48	0	107.82	0
CBMH 103	108.24	108.42	0.18	107.48	0	107.82	0
CBMH 102	108.25	108.41	0.16	107.48	0	107.82	0
North Infiltration Trench							
LD 1001	108.6	108.6	0.00	108.18	0	108.48	0
CB 07	108.28	108.45	0.17	107.75	0	108.47	0.19
CB 06	108.36	108.46	0.10	107.75	0	108.46	**0.10**
STMMH 101	108.70	108.70	0.00	107.75	0	108.46	0

6.5 Feedmill Creek SWM Study Requirements (5mm Rainfall Retention)

As per the Feedmill Creek Stormwater Management Study the proposed site has a 5mm retention requirement. Based on the total site area of 0.973 ha, the required retention volume is **48.7 m^3**.

The required retention volume will be provided by a combination of depression storage in the parking lot and landscaped areas, as well as subsurface infiltration storage using clearstone below the outlets of the stormtech chambers and the infiltration trench. The proposed design provides a total of **53m^3** of retention storage. Refer to **Table 6.7** for details.

Table 6.7: 5mm Retention (as per Feedmill Creek SWM Study)

Site Infiltration Requirement		
Total Site Area	0.973	ha
Retention Requirement	5	mm
Total Retention Volume Required	**48.7**	**m^3**
Depression Storage		
Depression storage on paved and landscaped areas as per City guidelines.		
Assume no depression storage on pitched roof or entrance ramp to parking		
Land Use	**Paved**	**Landscaped**
Area (ha)	0.478	0.239
Depression Storage (mm)	1.57	4.67
Depression Storage Vol (m^3)	7.5	11.2
Total Depression Storage Vol (m^3)	**18.7**	
Infiltration Storage		
Storage in clearstone layer below Stormtech chambers and infiltration trenches.		
Storage Location	**Stormtech**	**Trenches**
Length (m)	16	166.8
Width (m)	6.5	1.25
Depth (m)	0.5	0.3
Porosity	0.3	0.3
Infiltration Rate (mm/hr)	15	15
Drawdown Time (hrs)	33	20
Volume (m^3)	15.6	18.8
Total Infiltration Vol (m^3)	**34.4**	
Total Retention Volume (m^3) Depression + Infiltration Storage	**53.0**	

Drawdown Times for Infiltration

The Geotechnical report includes the results of infiltration testing at various depths for several test pits. Subsurface conditions consist primarily of fill material with infiltration rates varying between 15 and 97 mm/hr. For design purposes, an infiltration rate of 15mm/hr was applied to drawdown calculations for the infiltration trenches. The drawdown time for the infiltration trenches is approximately 20hrs. The drawdown time for the clearstone below the stormtech chambers is approximately 33hrs.

6.6 Water Quality Treatment

The downstream Pond 7 has been designed to provide an Enhanced level of stormwater quality treatment (80% TSS removal) for the subject site. Additional stormwater quality treatment measures are not required.

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 quantity control will be provided using a combination of underground and surface storage:
    - Underground storage will be provided using Stormtech chambers below the parking area and infiltration trenches along the rear perimeter of the proposed building. The design provides sufficient underground storage to ensure no surface ponding for storms up to and including the 5-year event.
    - Surface storage is provided in ponding areas above catchbasins in the parking lot and swales. The site provides sufficient storage to ensure no overland flow leaves the site for storms up to and including the 100-year event.
- Minor system flows will be controlled using inlet control devices (ICDs) installed downstream of the underground storage systems.
- The site has been designed to retain the first 5mm of rainfall using a combination of depression storage and infiltration storage.
- Existing Pond 7 will provide an enhanced level of water quality treatment for the site and no additional water quality treatment is required.

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

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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.

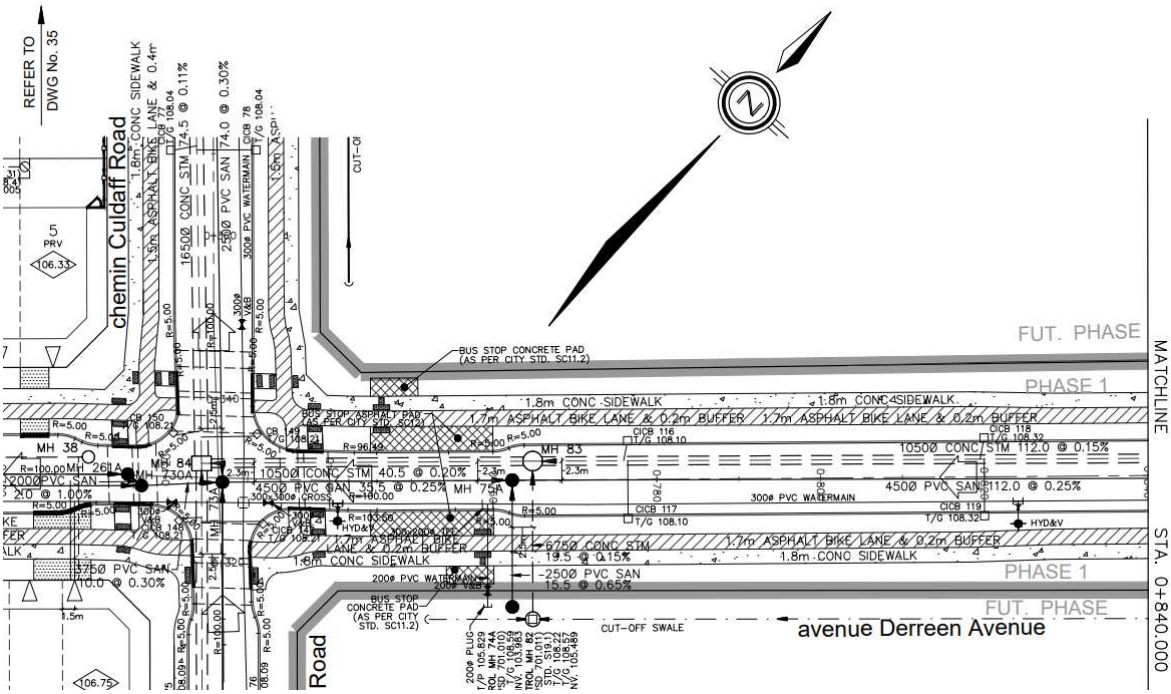
    d. If an RMA is required to support the proposed development, the functional plan and/or RMA plans must be submitted with the formal submission to deem complete. Request base mapping asap if RMA is required. Contact Engineering Services.

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	PART BLOCK 242, PLAN 4M1687, PART 1 AND 2 ON 4R35406; SUBJECT TO AN EASEMENT IN GROSS OVER PART 4, 4R34110 AS IN OC2424260; CITY OF OTTAWA		
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	93
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	
		%
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

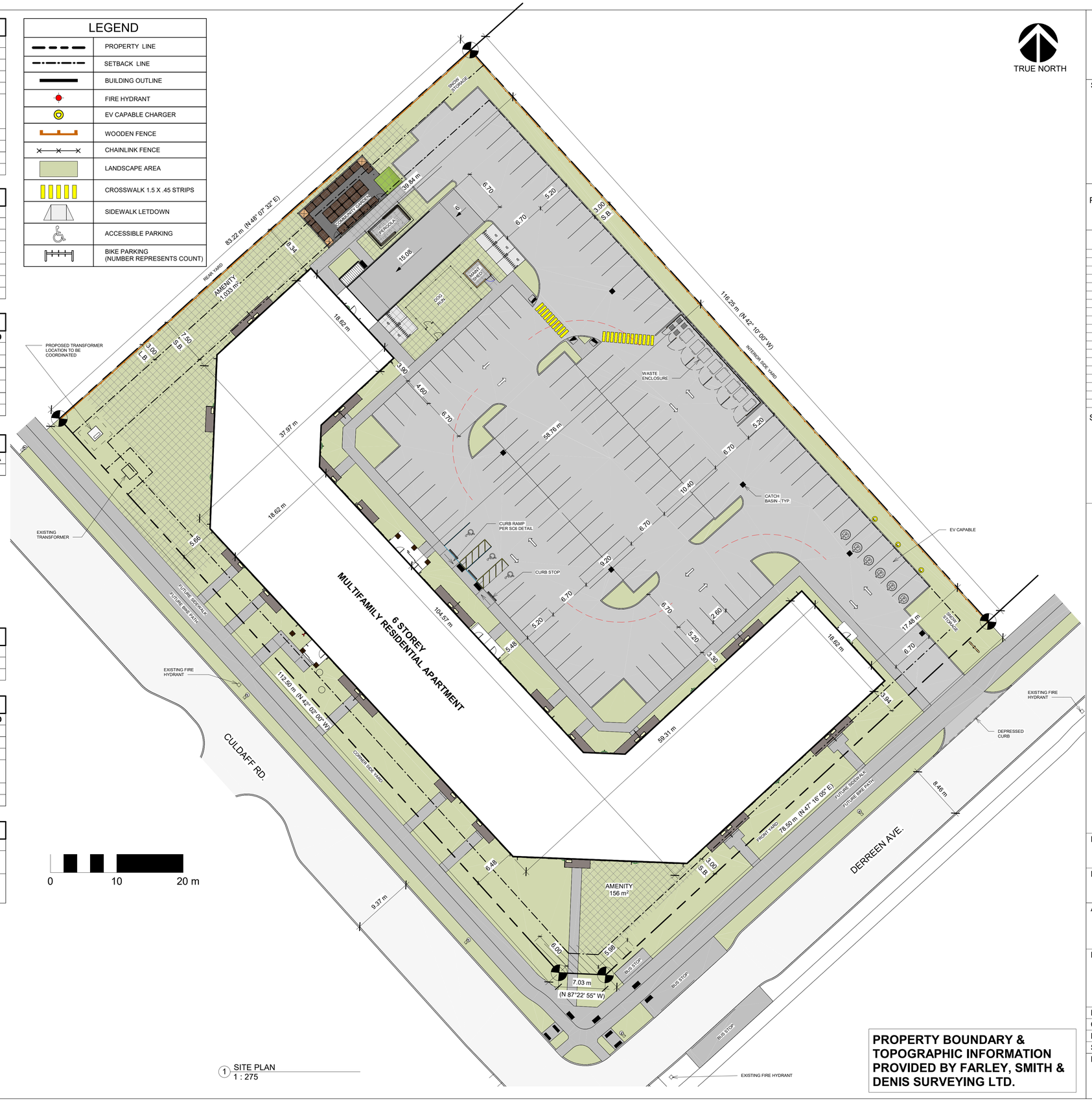
	RATE	UNITS/AREA	REQUIRED	PROPOSED
APARTMENT BUILDING	0.5 / UNIT	177	89	108
TOTAL BICYCLE			**89**	**108**
OTHER BICYCLE PROVISIONS				
MAX BIKE STALLS IN LANDSCAPED AREA	50%	-	45	40
MIN HORIZONTAL BIKE STALL	50%	-	45	48
MIN SECURED BIKE STALLS	25%	-	22	68

AMENITY

	RATE	REQUIRED	
TOTAL AMENITY SPACE	6m^2 / DU	**1062** m^2	**1331.35 m^2**
COMMUNITY AMENITY AREA (50% MIN OF TOTAL)		**531 m^2**	**1331.35 m^2**

LEGEND

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

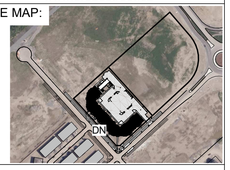


1 SITE PLAN
1 : 275

PROPERTY BOUNDARY & TOPOGRAPHIC INFORMATION PROVIDED BY FARLEY, SMITH & DENIS SURVEYING LTD.

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
A	ISSUED FOR D.P.	OCT 15, 2024
B	RE-ISSUED FOR D.P.	___ __, 2025

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

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CONTRACTORS SHALL REMAIN FAMILIAR WITH, SHALL REFER TO, AND SHALL PERFORM IN ACCORDANCE WITH LOCAL LAWS, REGULATIONS AND BUILDING CODES. CONTRACTORS SHALL MAINTAIN GOOD INDUSTRY BUILDING AND SAFETY PRACTICES CONSISTENT WITH THE CONTRACT INTENT AND THE REQUIREMENTS OF JURISDICTIONAL AUTHORITIES.

ADDITIONAL CLAIMS AND COSTS RELATED TO NON-MATERIAL CHANGES WILL NOT BE ACCEPTED BY SEYMOUR PACIFIC DEVELOPMENTS LTD. NON-MATERIAL CHANGES ARE DEEMED TO BE PLAN CHANGES OR SPECIFICATION ADJUSTMENTS THAT DO NOT SUBSTANTIALLY AFFECT THE VALUE, TIME,
COST AND QUALITY OF CONSTRUCTION.

CONTRACTORS SHALL MAKE EVERY REASONABLE EFFORT TO MAINTAIN SCHEDULE TARGETS AND PROVIDE GOOD EFFICIENCY, PROGRESS, WORKMANSHIP AND QUALITY TOWARD DEFICIENCY-FREE RESULTS.

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:	___ __, 2025
SCALE:	As indicated
DRAWING #: A1.00	REV #: B

01/13/2025 11:36:42 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)

CAUTION: External Email

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

The information contained in this email message is confidential and is for exclusive use of the addressee.

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)

CAUTION: External Email

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,

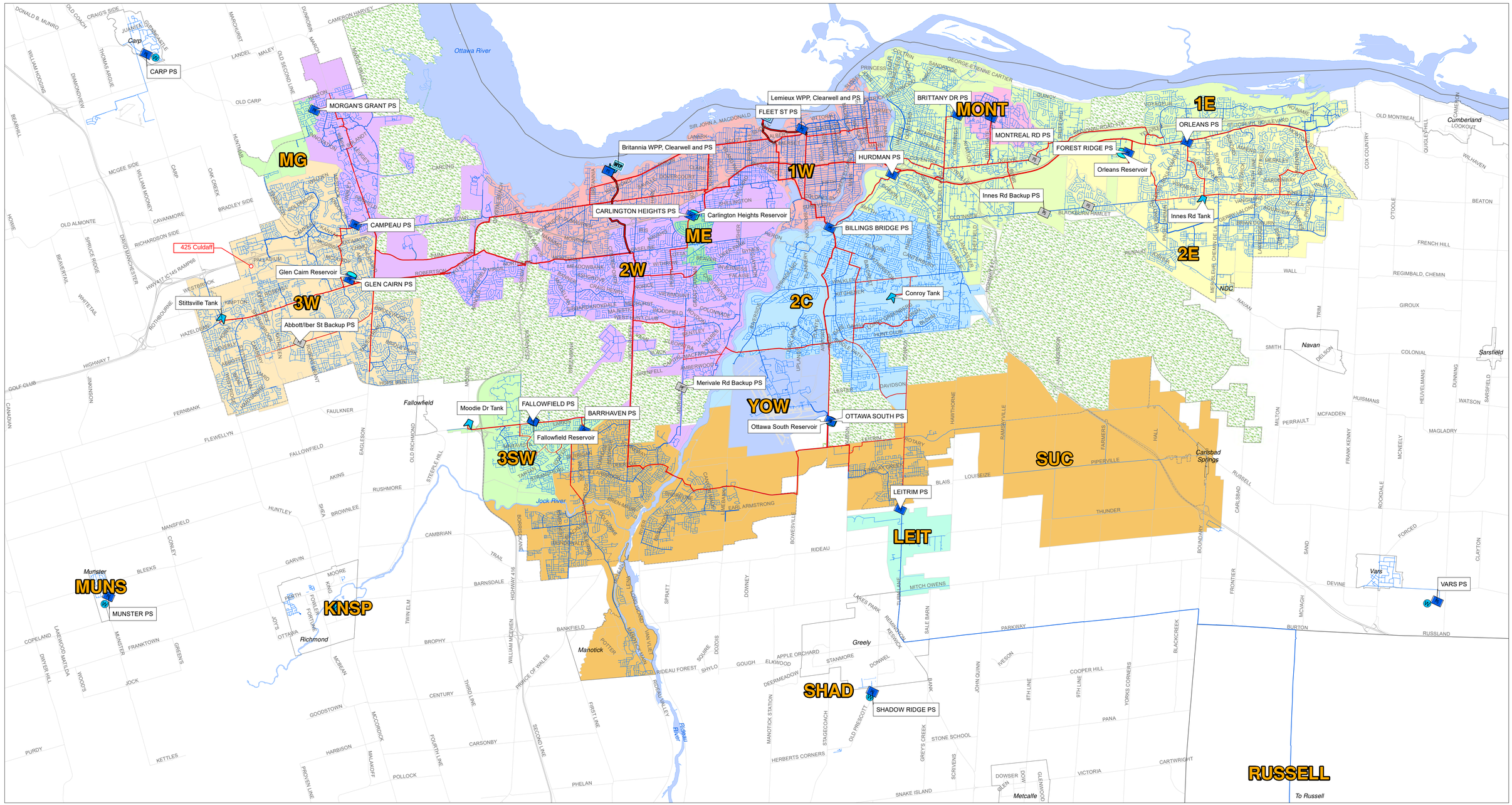
Curtis Ferguson, B.A.Sc., E.I.T. | Land Development

NOVATECH

Engineers, Planners & Landscape Architects

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

The information contained in this email message is confidential and is for exclusive use of the addressee.



Legend

- Water Purification Plant
- Well
- Clearwell
- Elevated Tank
- Reservoir
- Pump Station (Active)
- Pump Station (Backup)

Backbone Watermain Diameter

- 152 mm - 305 mm
- 406 mm - 508 mm
- 610 mm - 914 mm
- 1067 mm - 1372 mm
- 1524 mm - 1981 mm
- 2550 mm

Distribution Watermain Diameter

- ≤ 102 mm
- 152 mm - 305 mm
- 356 mm - 508 mm
- 610 mm - 914 mm
- 1372 mm

Pressure Zones

- 1E
- 1W
- 2C
- 2E
- 2W
- 3SW
- 3W
- EMR
- LEIT
- ME
- MG
- MONT
- SHADOW RIDGE
- SUC
- YOW
- Greenbelt

Infrastructure Master Plan - Figure 1-1

Water Distribution System Backbone Infrastructure

Notes

1. Coordinate System: NAD 1983 CSRS MTM 9

2. Data Sources: Original shapefiles provided by the City of Ottawa; hydraulic model exports.

N

0 — 5 Kilometers

(At original document size of 24x36)

1:70,000

Ottawa

Water Demand Design Sheet

NOVATECH
Engineers, Planners & Landscape Architects

Boundary Condition Request

Novatech Project #: 123194
Project Name: 425 Culdaff Road
Date: 8/6/2024
Revised: 1/28/2025
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	54.7
Apartments (1-BR)	48		67.20	0.22	0.78	1.20	18.8
Apartments (3-BR)	36		111.60	0.36	1.30	1.99	31.2
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**	**104.7**

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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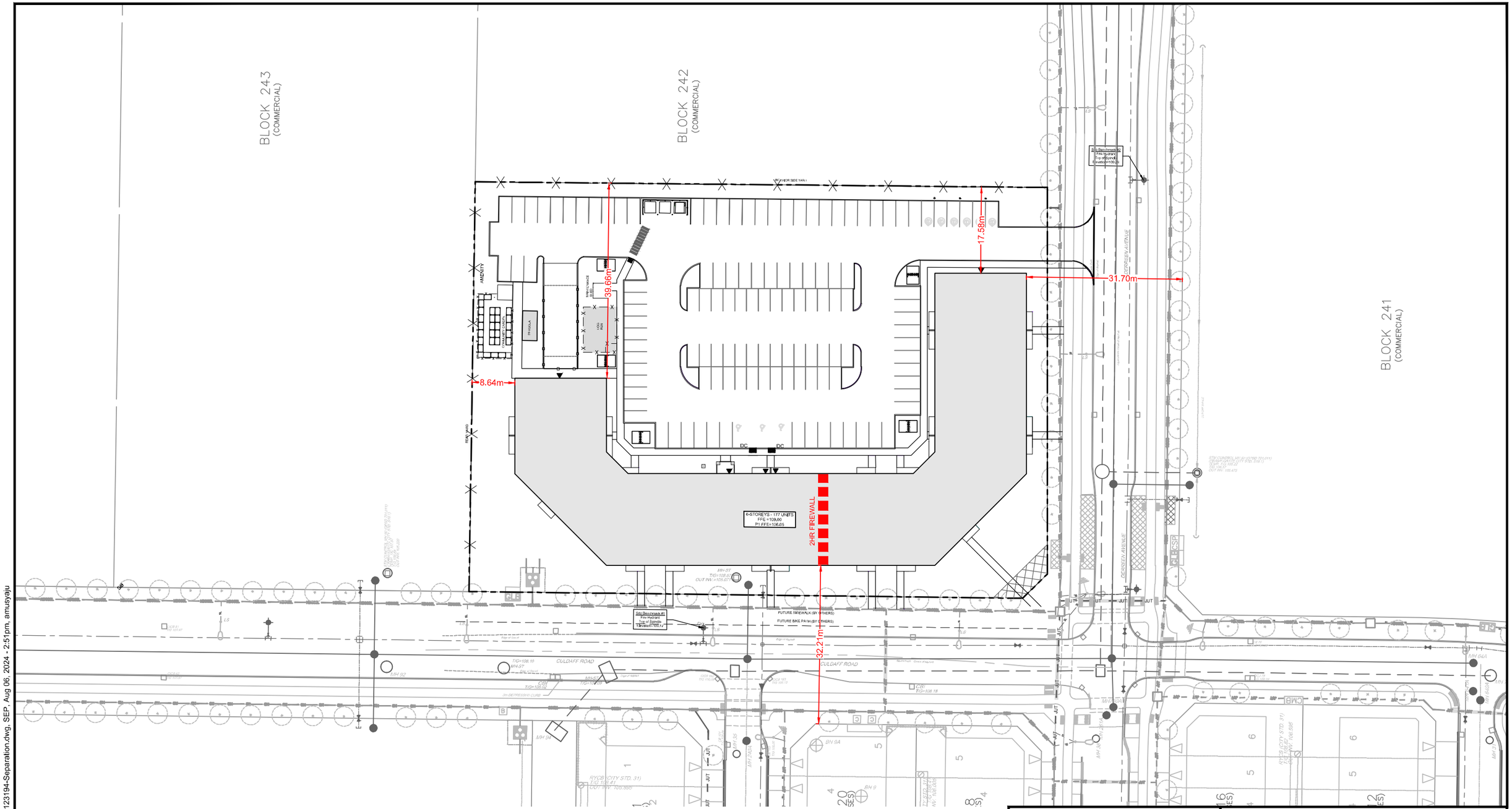
Design Parameters

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	280						> 50 m³/day

Residential Peaking Factors	Pop.	Max Day (x Avg Day)	Peak Hour (x Avg Day)
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



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	DATE	JOB	FIGURE
1 : 750 (0, 10, 20, 30)	JULY 2024	123194	FUS

SHT11X17.DWG - 279mmX432mm

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FUS - Fire Flow Calculations

NOVATECH
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 (m²)	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

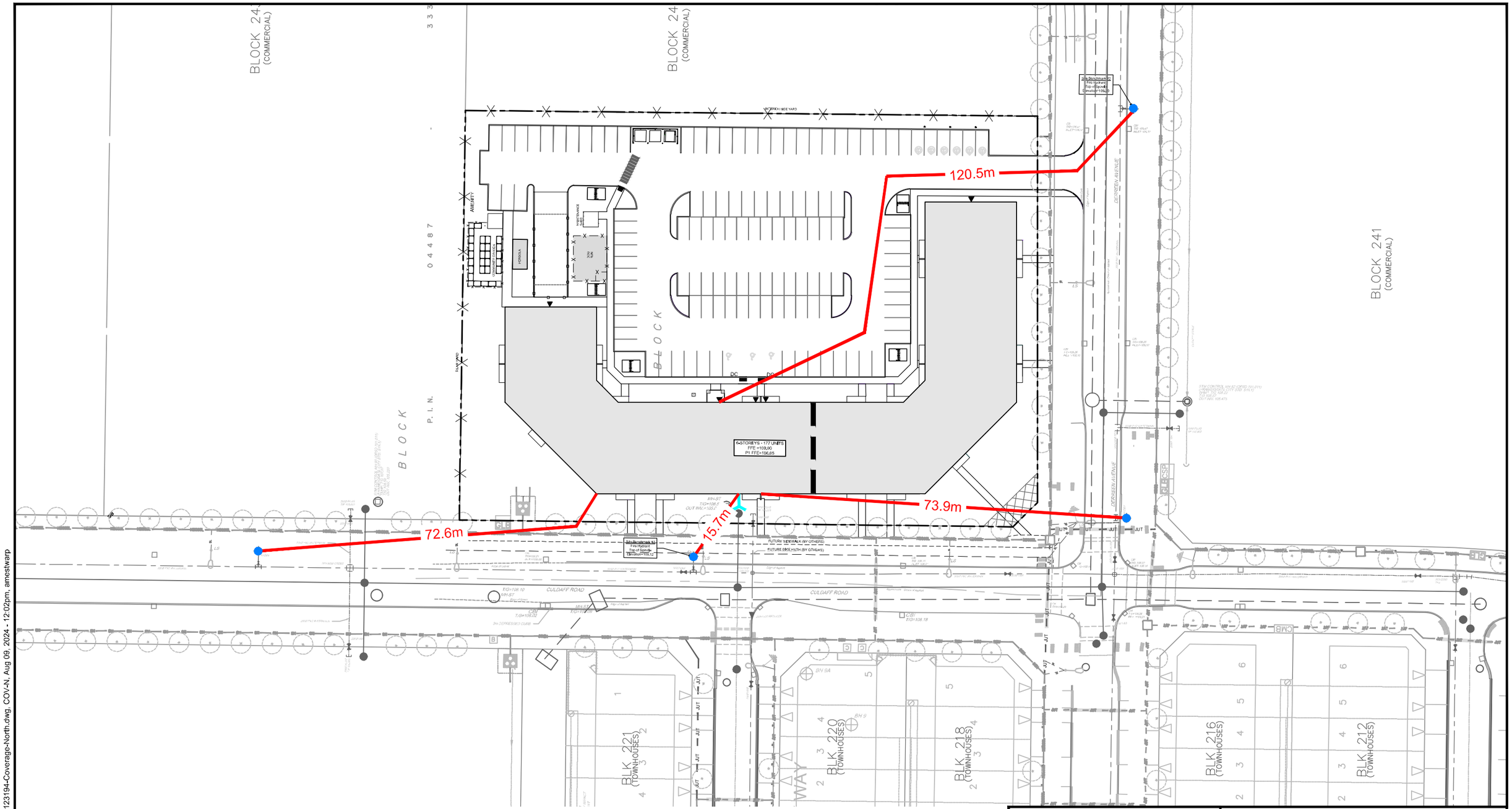
NOVATECH
Engineers, Planners & Landscape Architects

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%	-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)	8322.18	100%		
				Cumulative Total	**-50%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	2Hr Firewall		0%	3,825
		East Side	10.1 - 20 m		15%	
		South Side	2Hr Firewall		0%	
		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

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

COVERAGE PLAN (NORTH)

SCALE	DATE	JOB	FIGURE
1 : 750	JULY 2024	123194	COV-N

SHT11X17.DWG - 279mmX432mm

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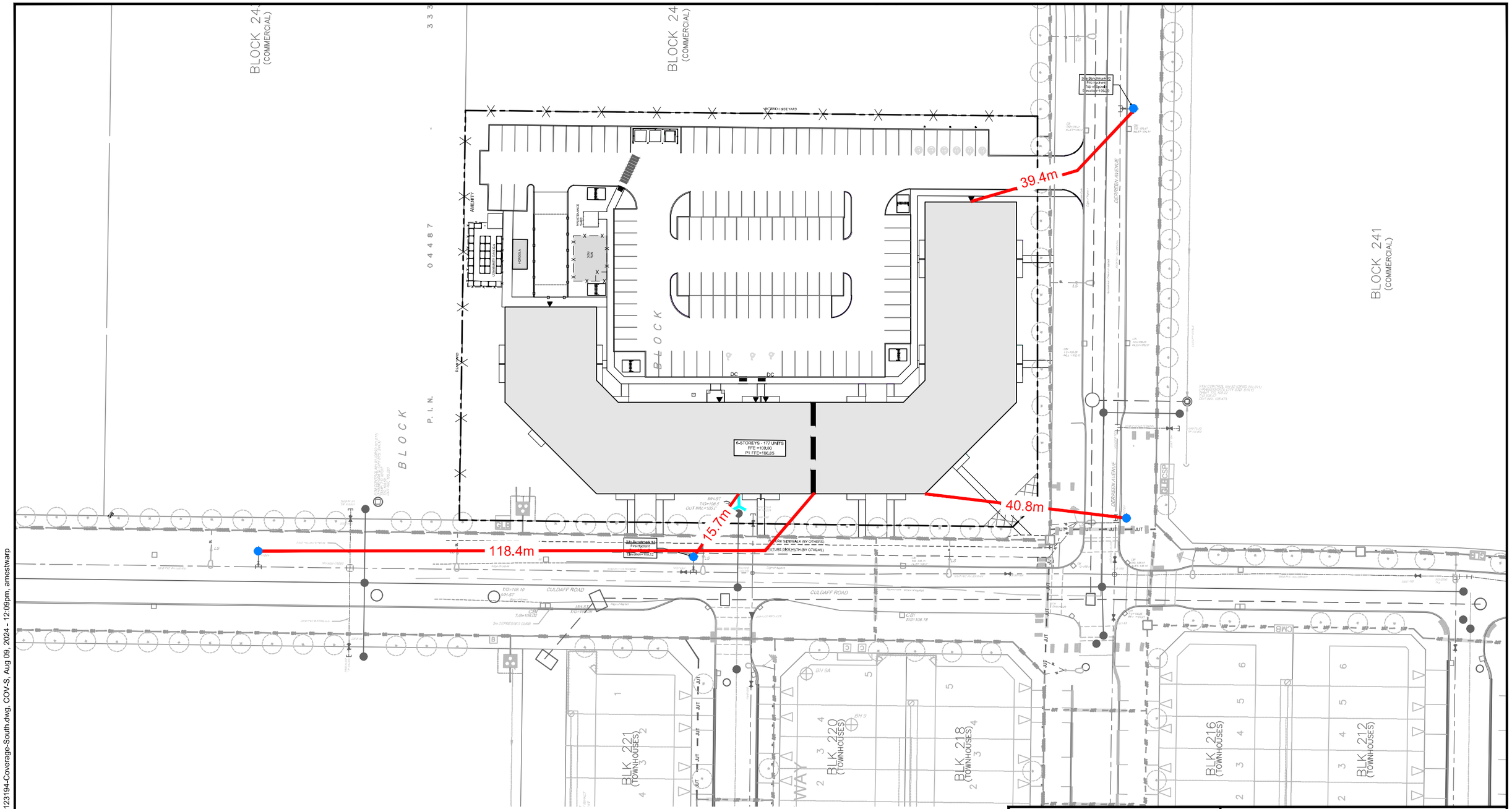

LEGEND

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

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

COVERAGE PLAN (SOUTH)

SCALE	DATE	JOB	FIGURE
1 : 750	JULY 2024	123194	COV-S

SHT11X17.DWG - 279mmX432mm

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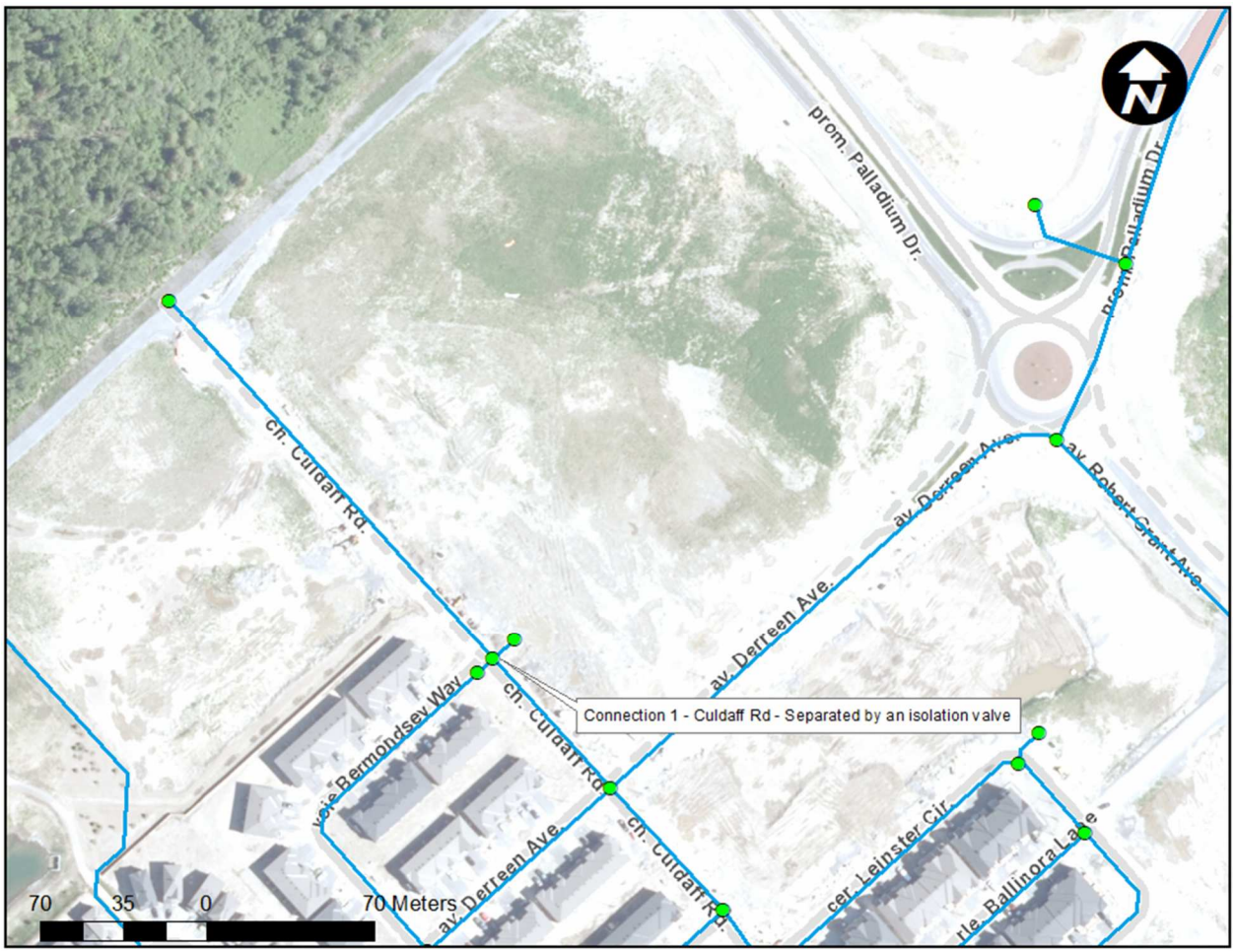
Boundary Conditions

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

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

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

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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

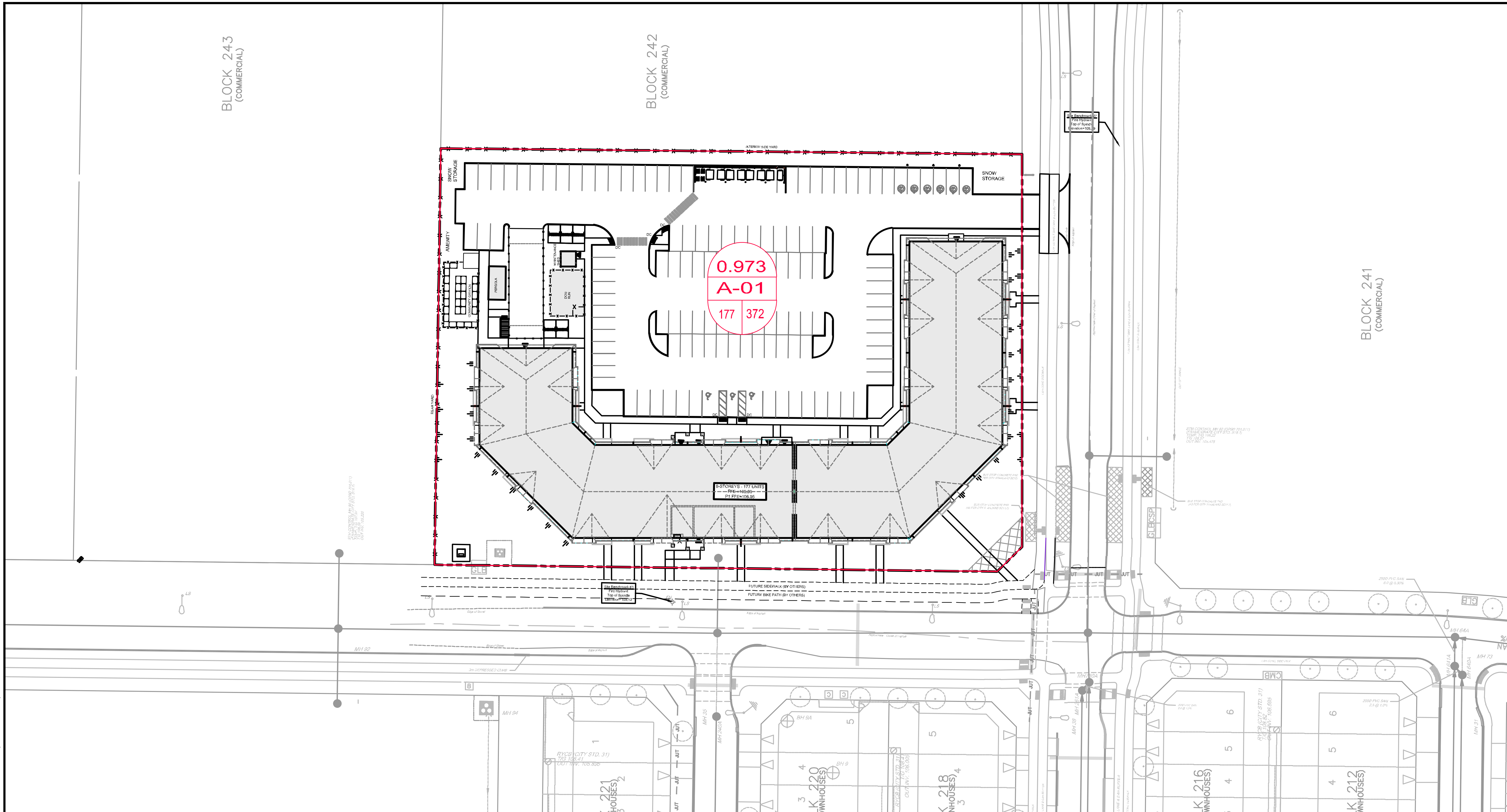
Low Pressure Test = Min. HGL - Finished Floor Elevation x 1.42197 PSI/m > 40 PSI

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



M:\2023\123194\CAD\Civil\123194-SAN.dwg, SAN, Oct 15, 2024 - 8:17pm, amestwarp

LEGEND

PROPERTY LINE

PROPOSED SANITARY SEWER AND MANHOLE

SAN MH — *EXISTING SANITARY MANHOLE & SEWER*

SANITARY SEWER DRAINAGE AREA BOUNDARY

0.47 — DRAINAGE AREA (ha)

20A-19A — SAN SEWER PIPE RUN

71 | 128 — NO. UNITS/POPULATION

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

SANITARY DRAINAGE AREA PLAN

SCALE	DATE	JOB	FIGURE
1 : 750 (0 10 20 30)	FEBRUARY 2025	123194	SAN

SHT11X17.DWG - 279mmX432mm

SANITARY SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

ovatech Project #: 123194
Project Name: 425 Culdaff Road
Date: 6/13/2024
Revised: 02/05/2025 (Anthony Mestwarp)
Input By: Anjush Musyaju
Reviewed By: Anthony Mestwarp P.Eng.
rawing 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 an
MOE - Design Guidelines for Sewage Works (2008

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.)	Commercial / Institutional Area (ha.)	Cumulative Commercial / Institutional Area (ha.)	Park Area	Cumlativ Park area	Average Design Commercial / Institutional Flow (L/s)	Commercial / Institutional Peaking Factor	Cumulative ICI Area (ha.)	Peak Design ICI Flow Q (ici) (L/s)	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	425 Culdaff Road	BLDG	Ex. 71A	48	93	36	0.374	0.374	1.21	3.43	4.16	0.973	0.973	0.000	0.000			0.00	1.00	0.000	0.00	0.973	0.32	4.48	3.0	200 PVC	0.203	0.013	1.00	34.2	1.06	13.1%
Culdaff rd	425 Culdaff Road	71A	72a				0.000	0.374	1.21	3.43	4.16	0.000	0.973	0.000	0.000			0.00	1.00	0.000	0.00	0.973	0.32	4.48	15.0	250 PVC	0.254	0.013	0.65	50.0	0.99	9.0%
DownStream Analysis																																
Culdaff rd		70A	72A				0.000	0.000	0.00	3.80	0.00	0.190	0.630	27.300	27.300			8.85	1.50	27.300	13.27	27.930	9.22	22.49	76.0	250 PVC	0.254	0.013	0.30	34.0	0.67	66.2%
Culdaff rd		72A	73A				0.000	0.374	1.21	3.43	4.16	0.160	1.763	0.000	27.300			8.85	1.50	27.300	13.27	29.063	9.59	27.02	76.0	250 PVC	0.254	0.013	0.30	34.0	0.67	79.5%
Derreen Ave		730A	73A				0.000	5.586	18.10	2.76	49.96		82.890	0.000	0.000			0.00	1.00	0.000	0.00	82.890	27.35	77.32	10.0	375 PVC	0.381	0.013	0.30	100.2	0.88	77.2%
Culdaff Road		64A	73A				0.000	1.447	4.69	3.15	14.78	0.110	12.630	0.000	1.670	0.530	0.530	0.60	1.00	2.200	0.60	14.830	4.89	20.28	10.0	375 PVC	0.381	0.013	0.30	100.2	0.88	20.2%
Derreen Avenue		73A	75A				0.000	7.407	24.00	2.67	64.00	0.090	97.373	0.000	28.970		0.530	9.45	1.50	29.500	14.17	126.343	41.69	119.86	35.5	450 PVC	0.457	0.013	0.25	148.7	0.91	80.6%
	Block 241	74A	75A				0.000	0.000	0.00	3.80	0.00	0.000	0.000	1.060	1.060		0.000	0.34	1.50	1.060	0.52	1.060	0.35	0.87	15.5	250 PVC	0.254	0.013	0.65	50.0	0.99	1.7%
Derreen Avenue		75A	77A				0.000	7.407	24.00	2.67	64.00	0.310	97.683	0.000	30.030		0.530	9.79	1.50	30.560	14.68	127.713	42.15	120.83	112.0	450 PVC	0.457	0.013	0.25	148.7	0.91	81.2%
	2765 Palladium Road		77A				0.000	0.000	0.00	3.80	0.00		0.000	1.594	1.594		0.000	0.52	1.50	1.594	0.77	1.594	0.53	1.30	20.0	200 PVC	0.203	0.013	1.00	34.2	1.06	3.8%
	Block 240		77A				0.000	0.000	0.00	3.80	0.00		0.000	0.640	0.640		0.000	0.21	1.50	0.640	0.31	0.640	0.21	0.52	16.0	250 PVC	0.254	0.013	0.65	50.0	0.99	1.0%
Derreen Avenue		77A	78A				0.000	7.407	24.00	2.67	64.00	0.200	97.883	0.000	32.264		0.530	10.51	1.50	32.794	15.77	130.147	42.95	122.72	72.0	450 PVC	0.457	0.013	0.25	148.7	0.91	82.5%
Derreen Avenue		78A	200A				0.000	7.407	24.00	2.67	64.00	0.140	98.023	0.000	32.264		0.530	10.51	1.50	32.794	15.77	130.287	42.99	122.77	26.5	450 PVC	0.457	0.013	0.25	148.7	0.91	82.6%
	Commercial	251A	200A				0.000	0.000	0.00	3.80	0.00		0.000	1.350	1.350		0.000	0.44	1.50	1.350	0.66	1.350	0.45	1.10	90.5	250 PVC	0.254	0.013	0.65	50.0	0.99	2.2%
Robert Grant Ave		200A	201A				0.000	7.407	24.00	2.67	64.00	2.190	100.213	0.000	33.614		0.530	10.95	1.50	34.144	16.43	133.827	44.16	124.59	67.0	450 PVC	0.457	0.013	0.25	148.7	0.91	83.8%
Robert Grant Ave		201A	202A				0.000	7.407	24.00	2.67	64.00	0.260	100.473	0.000	34.964		0.530	11.39	1.50	35.494	17.08	135.437	44.69	125.78	70.0	450 PVC	0.457	0.013	0.25	148.7	0.91	84.6%
Robert Grant Ave		202A	203A				0.000	7.407	24.00	2.67	64.00	0.230	100.703	0.000	34.964		0.530	11.39	1.50	35.494	17.08	135.667	44.77	125.85	63.5	450 PVC	0.457	0.013	0.25	148.7	0.91	84.6%
Robert Grant Ave		203A	204A				0.000	7.407	24.00	2.67	64.00	0.430	101.133	0.000	34.964		0.530	11.39	1.50	35.494	17.08	136.097	44.91	126.00	83.5	450 PVC	0.457	0.013	0.25	148.7	0.91	84.7%
	Stittsville Main Street	2000A	204A				0.000	0.028	0.09	3.69	0.33	1.010	1.010		0.000		0.000	0.00	1.00	0.000	0.00	1.010	0.33	0.67	100.0	250 PVC	0.254	0.013	0.65	50.0	0.99	1.3%
Robert Grant Ave		204A	205A				0.000	7.435	24.10	2.66	64.21	0.690	102.833	0.000	34.964		0.530	11.39	1.50	35.494	17.08	137.797	45.47	126.77	110.0	450 PVC	0.457	0.013	0.25	148.7	0.91	85.2%
Robert Grant Ave		205A	206A				0.000	7.435	24.10	2.66	64.21	0.590	103.423	0.000	34.964		0.530	11.39	1.50	35.494	17.08	138.387	45.67	126.96	114.5	450 PVC	0.457	0.013	0.25	148.7	0.91	85.4%
Robert Grant Ave		206A	207A				0.000	7.435	24.10	2.66	64.21	0.160	103.583	7.460	42.424		0.530	13.81	1.50	42.954	20.71	146.007	48.18	133.10	37.0	450 PVC	0.457	0.013	0.30	162.9	0.99	81.7%
Robert Grant Ave		207A	208A				0.000	7.435	24.10	2.66	64.21	0.860	104.443		42.424		0.530	13.81	1.50	42.954	20.71	146.867	48.47	133.39	43.5	450 PVC	0.457	0.013	0.30	162.9	0.99	81.9%
Robert Grant Ave		208A	209A				0.000	7.435	24.10	2.66	64.21	0.340	104.783		42.424		0.530	13.81	1.50	42.954	20.71	147.207	48.58	133.50	90.5	450 PVC	0.457	0.013	0.30	162.9	0.99	81.9%
Robert Grant Ave		209A	210A				0.000	7.435	24.10	2.66	64.21	0.380	105.163		42.424		0.530	13.81	1.50	42.954	20.71	147.587	48.70	133.63	101.5	450 PVC	0.457	0.013	0.30	162.9	0.99	82.0%
Robert Grant Ave		210A	211A				0.000	7.435	24.10	2.66	64.21	0.270	105.433		42.424		0.530	13.81	1.50	42.954	20.71	147.857	48.79	133.71	73.0	450 PVC	0.457	0.013	0.30	162.9	0.99	82.1%
Robert Grant Ave		211A	217A				0.000	7.435	24.10	2.66	64.21	0.380	105.813		42.424		0.530	13.81	1.50	42.954	20.71	148.237	48.92	133.84	110.0	450 PVC	0.457	0.013	0.30	162.9	0.99	82.2%
Robert Grant Ave		217A	Huntmar				0.000	7.435	24.10	2.66	64.21	0.000	105.813	5.060	47.484		0.530	15.45	1.50	48.014	23.17	153.297	50.59	137.97	110.0	450 PVC	0.457	0.013	0.30	162.9	0.99	84.7%
Totals				**48**	**93**	**36**	**0.374**	**0.374**	**1.21**	**3.43**	**4.16**	**0.973**	**0.973**		**0.000**	**0.000**		**0.00**	**1.00**	**0.000**	**0.00**	**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 = 9300 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 Apartment	2-Bed Apartmen	3-Bed Apartment	Single	Townhome
P = Residential Population =	1.4	2.1	3.1	**3.4**	**2.7**

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 / Indust	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			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.

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. 1 of 5

624_San3.xlsx

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			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.

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

LICENSED PROFESSIONAL ENGINEER W. LIU 100167932 20-07-09 PROVINCE OF ONTARIO

624_San3.xlsx

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.

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. 3 of 5

624_San3.xlsx

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LICENSED PROFESSIONAL ENGINEER W. LIU 100167932 20-07-09 PROVINCE OF ONTARIO

Ottawa

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			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. 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												

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
20-07-09
PROVINCE OF ONTARIO

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

REVIEWED BY DEVELOPMENT REVIEW BRANCH

Signed

Date Sep 25 2020

Plan Number 18059

MARK-UPS BY NOVATECH
PREPARED BY ANTHONY
MESTWARP
DATE FEBRUARY 05, 2024

block 256& 243
A=3.32ha

425 Culdaff Road
A=0.973ha
population = 374

2765
Palladium
A=1.594ha

A=21.99Ha
COMMERCIAL

A=73.25Ha
POP=4900
RESIDENTIAL

REFER TO
DWG No. 90

REFER TO
DWG No. 89

KEY PLAN
SCALE 1:10000

LEGEND

SANITARY DRAINAGE BOUNDARY
SANITARY SUB-DRAINAGE BOUNDARY
SANITARY DRAINAGE BOUNDARY (OTHER PHASES)
UPSTREAM MH TO DOWNSTREAM MH — 43A - 44A
AREA IN HECTARES — 0.78
POPULATION — 61
UPSTREAM MH TO DOWNSTREAM MH — 43A-44A
AREA IN OTHER PHASES IN HECTARES — 0.78
POPULATION — 61
EXTERNAL AREA IN HECTARES — A=53.63
EXTERNAL POPULATION — 107
DENSITY (PERSONS/HECTARE) — POP=6739
EXTERNAL LAND USE — RESIDENTIAL
MAINTENANCE HOLE — MH202A
CAP

TOPOGRAPHIC INFORMATION
CITY OF OTTAWA 1K MAPPING, RECEIVED ON OCTOBER 4, 2016. FEEDMILL CREEK TOPOGRAPHIC SURVEY (JULY 25, 2019) AND PALLADIUM DRIVE TOPOGRAPHIC SURVEY (JUNE 23, 2020) PROVIDED BY STANTEC (PROJECT No. 161613545-111)

LEGAL INFORMATION
M-PLAN PROVIDED BY STANTEC GEOMATICS LTD., PROJECT No. 16-16-135-45 (195 HUNTMAR ROAD), RECEIVED ON MAY 21, 2020.
3rd SUBMISSION 20-07-09

ELEVATION NOTE
ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM THE CAN-NET VRS NETWORK MONITOR: OTTAWA
ELEVATION = 98.205m

No.	BY	DATE	DESCRIPTION
3	W.L.	20-07-09	3rd SUBMISSION
2	W.L.	20-04-03	2nd SUBMISSION
1	W.L.	19-12-23	1st SUBMISSION

Ottawa CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEER W. LU 100167932 PROVINCE OF ONTARIO

© DSEL

SANITARY DRAINAGE PLAN

2325483 ONTARIO LTD.

195 HUNTMAR DRIVE

DSEL
david schaeffer engineering ltd
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

DRAWN BY: R.A./A.K.	CHECKED BY: W.L.	SHEET NO.	
DESIGNED BY: W.L.	CHECKED BY: C.M.	88	
SCALE: 1:1000	DATE: DECEMBER 2019		

CITY PLAN No. 18059

CITY FILE No. D07-16-16-0011

MARK-UPS BY NOVATECH
PREPARED BY ANTHONY MESTWARP
DATE FEBRUARY 05, 2024

block 256& 243
A=3.32ha

425 Culdaff Road
A=0.973ha
population = 374

2765 Palladium
A=1.594ha

REFER TO DWG No. 88

A=21.99Ha
COMMERCIAL

BLOCK 255

65A - 67A
0.07 0

BLOCK 256

66A - 67A
1.59

69A - 70A
1.60

BLOCK 243

67A - 70A
0.25 0

70A - 71A
0.19 0

71A 72A
2.70

73A - 75A
0.09 0

72A - 73A
0.16 0

chemin Culdaff Road

avenue Derreen Avenue

Avenue Derreen Avenue

75A - 77A
0.31 0

77A - 78A
0.20 0

78A - 200A
0.14 0

200A - 201A
1.93 0

200A - 201A
0.26 0

201A - 202A
0.26 0

64A - 73A
0.11 0

63A - 64A
0.03 0

74A - 75A
1.06

BLOCK 241

76A - 77A
0.64

BLOCK 240

62A - 63A
0.01 0

61A - 62A
0.45 49

59A - 63A

cercle Leinster Circle

avenue Robert Grant Avenue

BLOCK 254

A=0.66Ha
COMMERCIAL

A=0.69Ha
COMMERCIAL

PALLADIUM DRIVE

AUTOPARK

PALLADIUM AUTO PARK

PALLADIUM AUTO PARK

BLOCK 253

BLOCK 247

206A - 207A
1.55

REFER TO DWG No. 91

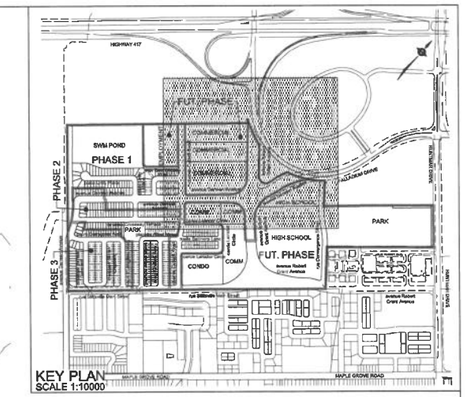
REFER TO DWG No. 92

REVIEWED BY DEVELOPMENT REVIEW BRANCH

Signed

Date Sep 25 2020

Plan Number 18059



LEGEND

SANITARY DRAINAGE BOUNDARY
SANITARY SUB-DRAINAGE BOUNDARY
SANITARY DRAINAGE BOUNDARY (OTHER PHASES)
UPSTREAM MH TO DOWNSTREAM MH — 43A - 44A
AREA IN HECTARES — 0.78
POPULATION — 61
UPSTREAM MH TO DOWNSTREAM MH — 43A - 44A
AREA IN OTHER PHASES IN HECTARES — 0.78
POPULATION — 61
EXTERNAL AREA IN HECTARES — A=53.63
EXTERNAL POPULATION — 107
DENSITY (PERSONS/HECTARE) — PD=5739
EXTERNAL LAND USE — RESIDENTIAL
MAINTENANCE HOLE — MH202A
CAP

TOPOGRAPHIC INFORMATION
CITY OF OTTAWA 1K MAPPING, RECEIVED ON OCTOBER 4, 2016. FEEDMILL CREEK TOPOGRAPHIC SURVEY (JULY 26, 2019) AND PALLADIUM DRIVE TOPOGRAPHIC SURVEY (JUNE 23, 2020) PROVIDED BY STANTEC (PROJECT No. 161613545-111)

LEGAL INFORMATION
M-PLAN PROVIDED BY STANTEC GEOMATICS LTD., PROJECT No. 16-16-135-45 (195 HUNTMAR ROAD), RECEIVED ON MAY 21, 2020.
3rd SUBMISSION 20-07-09

ELEVATION NOTE
ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM THE CAN-NET VRS NETWORK MONUMENT: OTTAWA

ELEVATION = 95.205m

No.	BY	DATE	DESCRIPTION
3	W.L.	20-07-09	3rd SUBMISSION
2	W.L.	20-04-01	2nd SUBMISSION
1	W.L.	19-12-23	1st SUBMISSION

Ottawa CITY OF OTTAWA

PROJECT No. 12-624

PROFESSIONAL ENGINEER
LICENSED
W. LIU
100167932
2020-09-09
PROVINCE OF ONTARIO

© DSEL

SANITARY DRAINAGE PLAN

2325483 ONTARIO LTD.

195 HUNTMAR DRIVE

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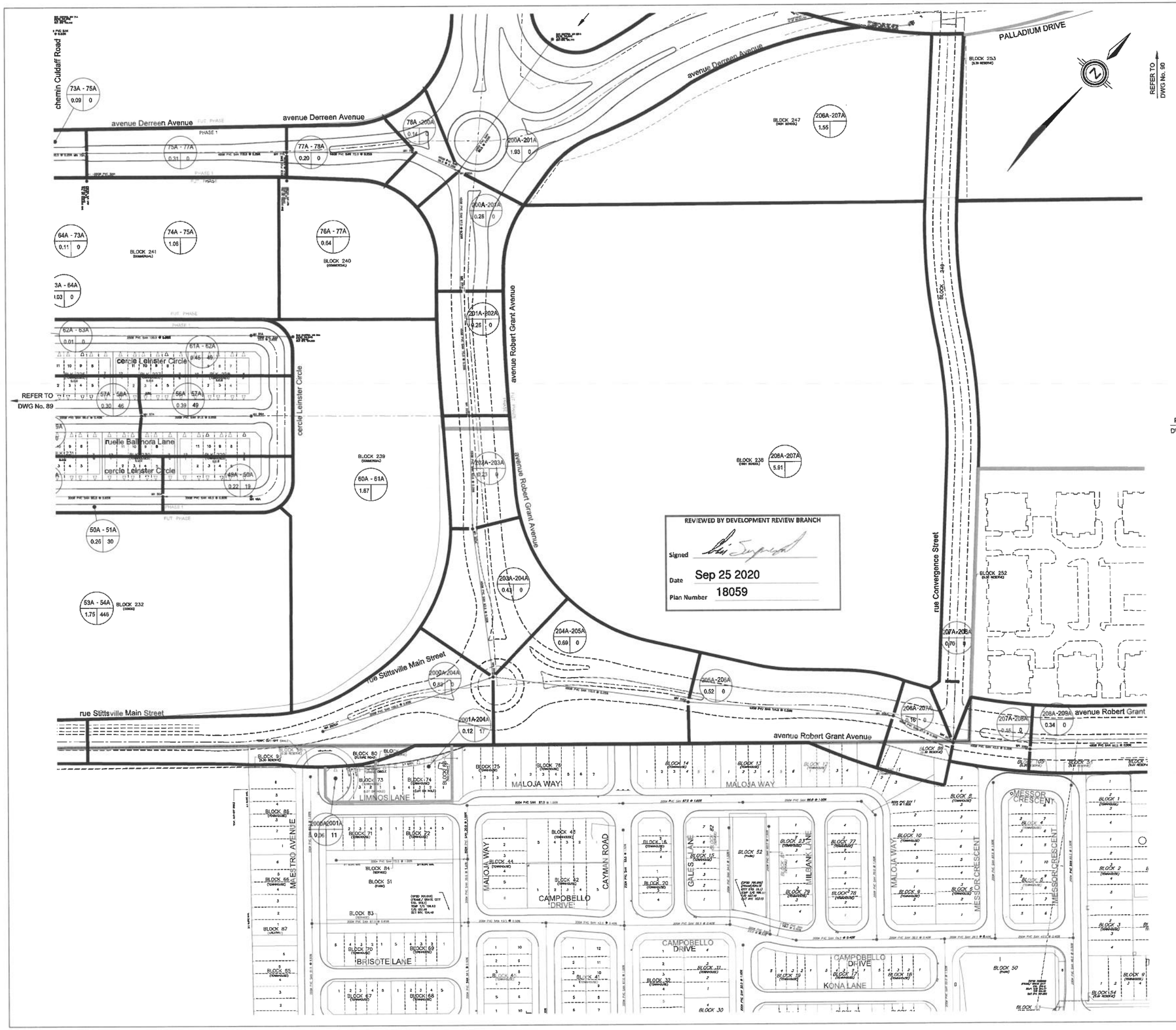
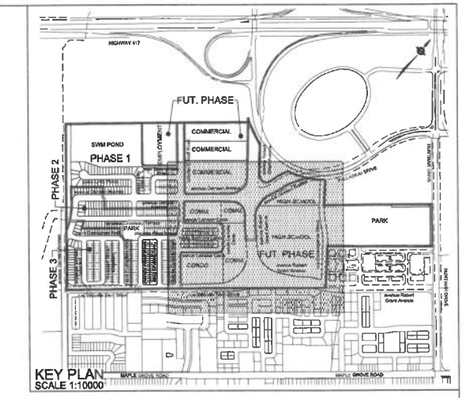
DRAWN BY: R.A./A.K.	CHECKED BY: W.L.	SHEET NO.	
DESIGNED BY: W.L.	CHECKED BY: C.M.	90	
SCALE: 1:1000	DATE: DECEMBER 2019		

CITY PLAN No. 18059

CITY FILE No. D07-16-16-0011





LEGEND

- SANITARY DRAINAGE BOUNDARY
- SANITARY SUB-DRAINAGE BOUNDARY
- SANITARY DRAINAGE BOUNDARY (OTHER PHASES)
- UPSTREAM MH TO DOWNSTREAM MH — 43A - 44A
- AREA IN HECTARES — 0.78
- POPULATION — 61
- UPSTREAM MH TO DOWNSTREAM MH — 43A - 44A
- AREA IN OTHER PHASES IN HECTARES — 0.78
- POPULATION — 61
- EXTERNAL AREA IN HECTARES — A=53.63
- EXTERNAL POPULATION — POP=5733
- DENSITY (PERSONS/HECTARE) — 107
- EXTERNAL LAND USE — RESIDENTIAL
- MAINTENANCE HOLE — MH202A
- CAP

TOPOGRAPHIC INFORMATION
CITY OF OTTAWA 1K MAPPING, RECEIVED ON OCTOBER 4, 2016. FEEDMILL CREEK TOPOGRAPHIC SURVEY (JULY 25, 2019) AND PALLADIUM DRIVE TOPOGRAPHIC SURVEY (JUNE 23, 2020) PROVIDED BY STANTEC (PROJECT No. 161613545-111)

LEGAL INFORMATION
M-PLAN PROVIDED BY STANTEC GEOMATICS LTD., PROJECT No. 16-16-135-45 (195 HUNTMAR ROAD), RECEIVED ON MAY 21, 2020.
3rd SUBMISSION 20-07-09

ELEVATION NOTE
ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM THE CAN-NET VRS NETWORK MONUMENT: OTTAWA

ELEVATION = 95.205m

No.	BY	DATE	DESCRIPTION
3	W.L.	20-07-09	3rd SUBMISSION
2	W.L.	20-04-03	2nd SUBMISSION
1	W.L.	19-12-23	1st SUBMISSION

Ottawa CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEER W. LIU 100167932 PROVINCE OF ONTARIO

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SANITARY DRAINAGE PLAN

2325483 ONTARIO LTD.

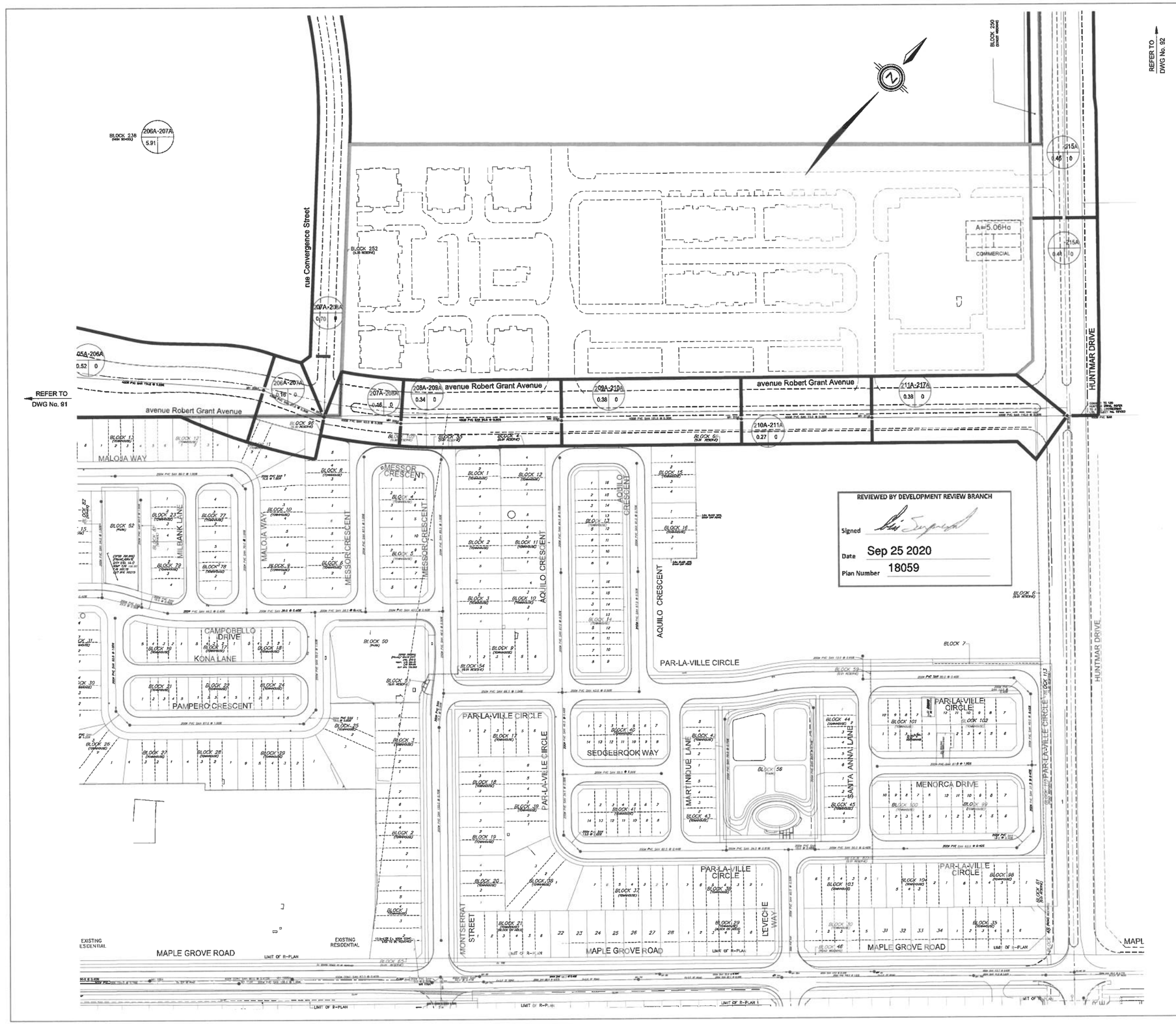
195 HUNTMAR DRIVE

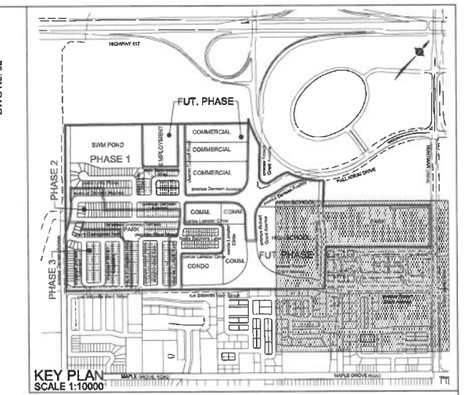
DSEL
david schaeffer engineering ltd
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

DRAWN BY: R.A./A.K.	CHECKED BY: W.L.	SHEET NO.	
DESIGNED BY: W.L.	CHECKED BY: C.M.	91	
SCALE: 1:1000	DATE: DECEMBER 2019		

CITY PLAN No. 18059

CITY FILE No. D07-16-16-0011





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- EXTERNAL POPULATION — POP=5739
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- EXTERNAL LAND USE — RESIDENTIAL
- MAINTENANCE HOLE — MH202A
- CAP

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LEGAL INFORMATION
M-PLAN PROVIDED BY STANTEC GEOMATICS LTD., PROJECT No. 16-16-135-45 (195 HUNTMAR ROAD), RECEIVED ON MAY 21, 2020.
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1	W.L.	19-12-23	1st SUBMISSION

Ottawa CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEER — W. LIU — 100167932 — 12-07-04 — PROVINCE OF ONTARIO

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SANITARY DRAINAGE PLAN

2325483 ONTARIO LTD.

195 HUNTMAR DRIVE

DSEL david schaeffer engineering ltd
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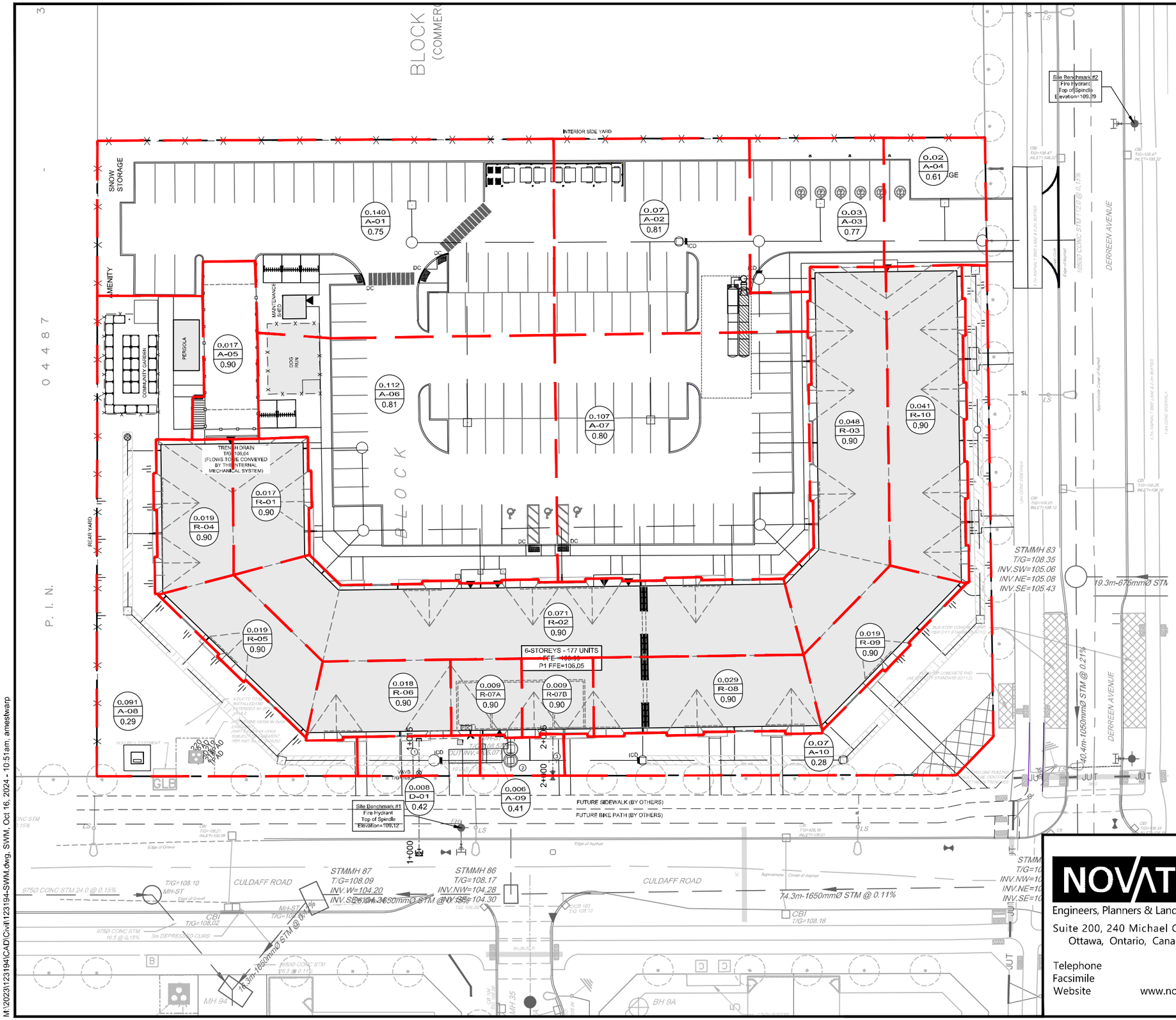
DRAWN BY: R.A./A.K.	CHECKED BY: W.L.	SHEET NO.
DESIGNED BY: W.L.	CHECKED BY: C.M.	93
SCALE: 1:1000	DATE: DECEMBER 2019	

CITY PLAN No. 18059

CITY FILE No. D07-16-16-0011

Appendix D
Storm Servicing



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	DATE	JOB	FIGURE
1 : 500	FEBRUARY 2025	123194	SWM

M:\2023\123194\CAD\Civil\123194-SWM.dwg, SWM, Oct 16, 2024 - 10:51am, 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)

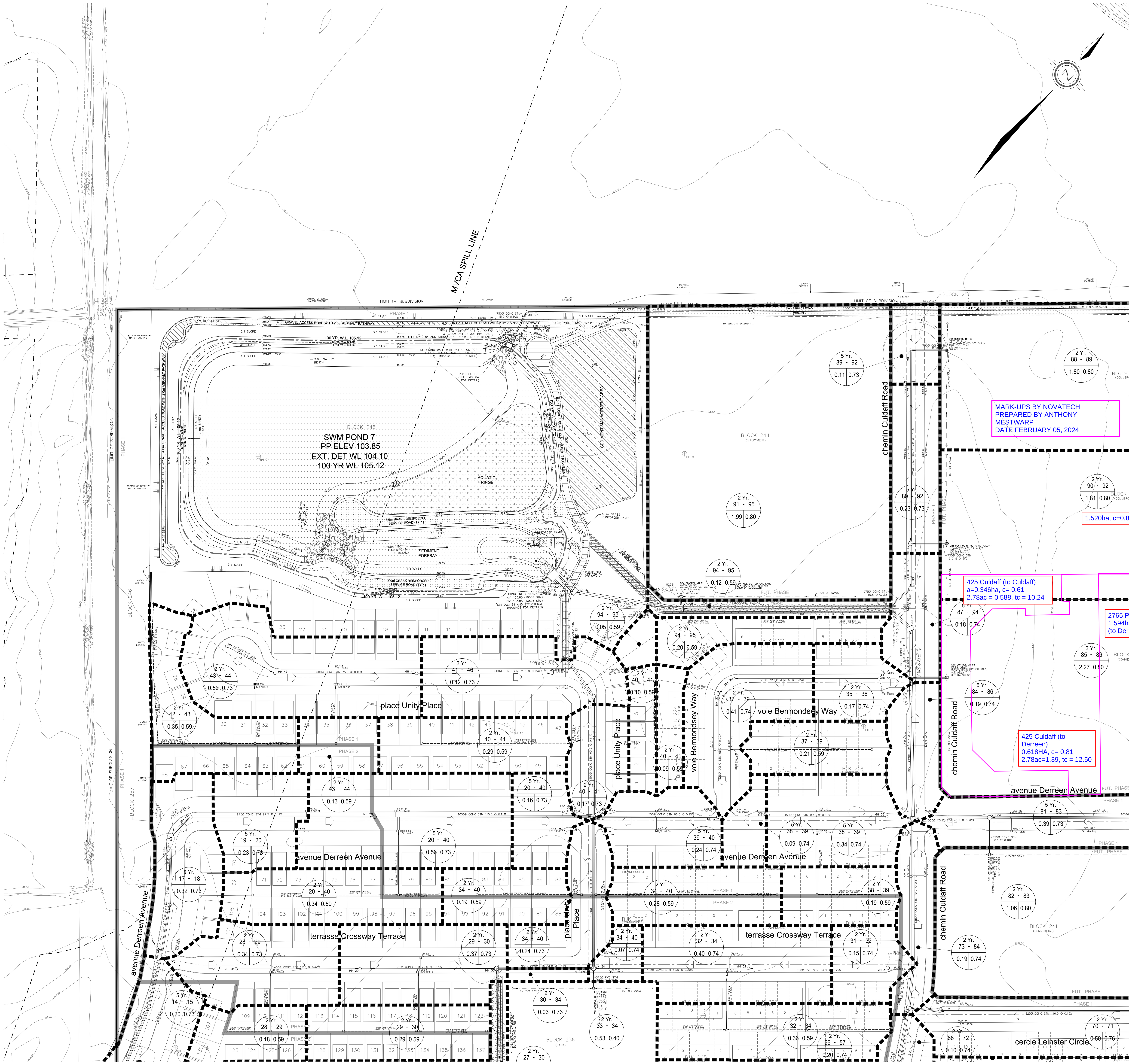
Rainfall intensity is based on City of Ottawa IDF data presented in the City of Ottawa - Sewer Design Guidelines

Capacity Equation

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

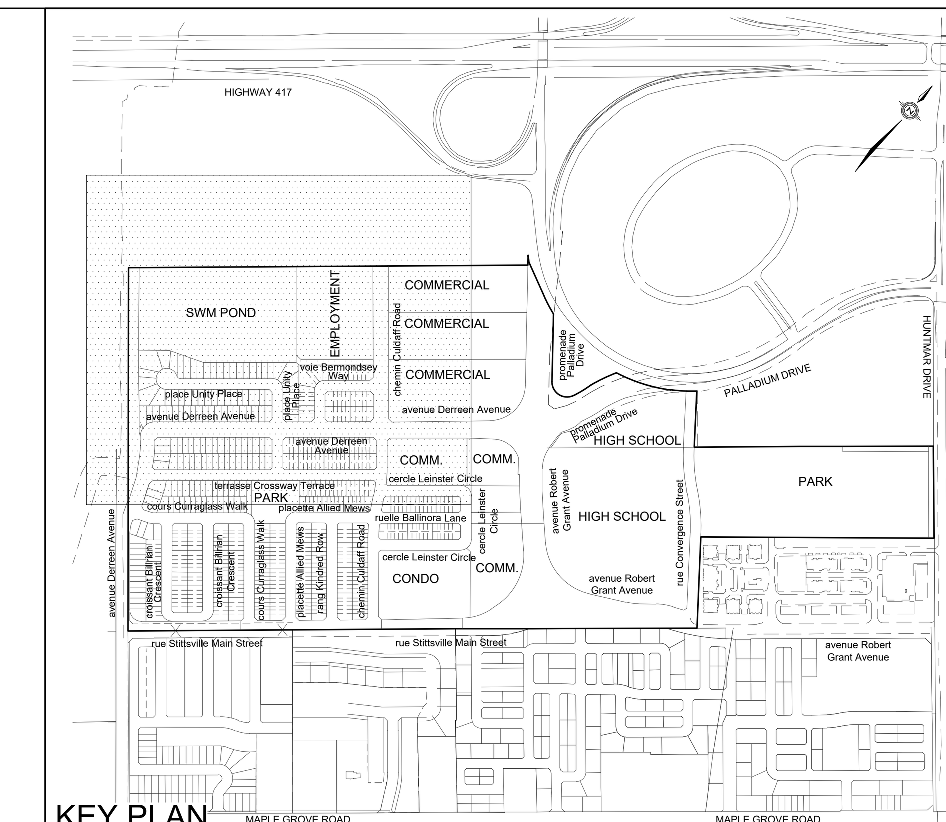
Definitions

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



REFER TO DWG No. 96

REFER TO DWG No. 97



KEY PLAN
SCALE 1:10000

LEGEND

STORM DRAINAGE BOUNDARY
SUB-DRAINAGE BOUNDARY
STORM DRAINAGE BOUNDARY (OTHER PHASES)
STORM FREQUENCY — 2Yr
UPSTREAM MH TO DOWNSTREAM MH — 43 - 44
AREA IN HECTARES — 0.37
RUNOFF COEFFICIENT — 0.51
EXTERNAL 2.78AC = — 2.78AC=14.40
EXTERNAL TIME OF CONCENTRATION — TC=14.5 MIN
EXTERNAL BLENDED RUNOFF COEFFICIENT — C= 0.70
EXTERNAL STORM FREQUENCY — 2YR
UPSTREAM MH TO DOWNSTREAM MH — 21-23
AREA IN OTHER PHASES IN HECTARES — 0.28
RUNOFF COEFFICIENT — 0.78
STREET CATCHBASIN & LEAD
STREET CATCHBASIN WITH CLOSED LID & LEAD
MAINTENANCE HOLE — MH202 — 375mmØ ST
CURB INLET CATCHBASIN & LEAD
CATCHBASIN/ MAINTENANCE HOLE — CBMH201
INTERCONNECTED CATCH BASIN & LEADS
CAP
OVERLAND FLOW DIRECTION
EXTERNAL OVERLAND FLOW DIRECTION
EMERGENCY OVERLAND FLOW DIRECTION

TOPOGRAPHIC INFORMATION

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9	W.L.	21-05-20	REVISED AS PER MPLAN CHANGE
8	W.L.	21-04-20	REVISED AS PER MPLAN CHANGE
7	W.L.	21-04-08	REVISED AS PER NEW N/S ARTERIAL ROAD DESIGN
6	W.L.	21-03-18	REVISED AS PER CITY COMMENTS
5	W.L.	21-03-05	REVISED AS PER CITY COMMENTS
4	W.L.	20-11-09	4th SUBMISSION
3	W.L.	20-07-09	3rd SUBMISSION
2	W.L.	20-04-03	2nd SUBMISSION
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Ottawa CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
21-05-20
PROVINCE OF ONTARIO

© DSEL

STORM DRAINAGE PLAN

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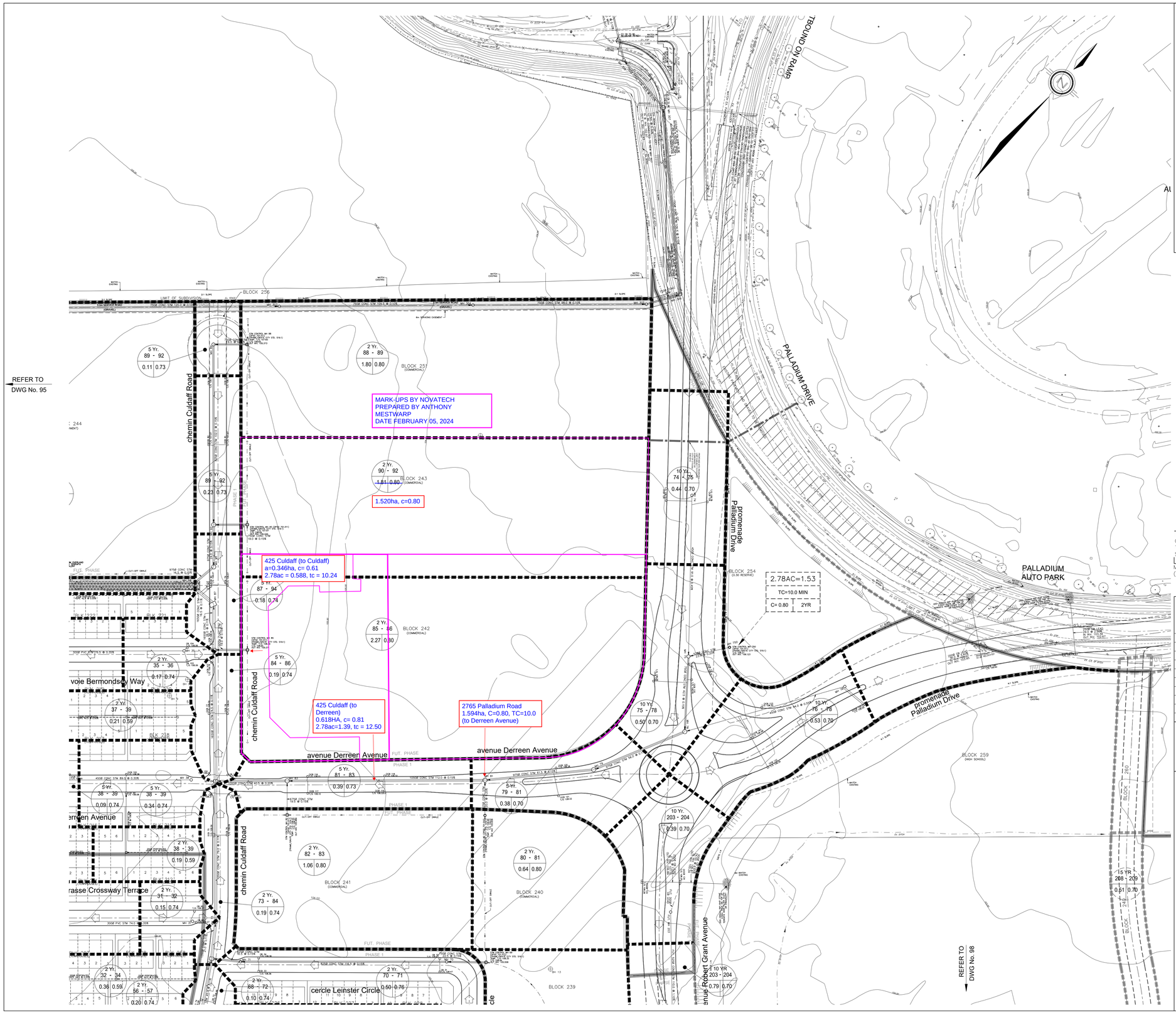

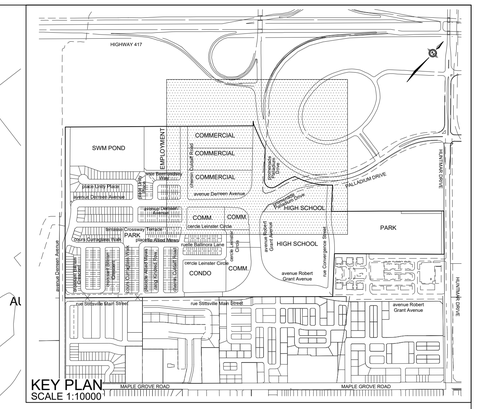

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1	W.L.	19-12-23	1st SUBMISSION

Ottawa CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEER W. LIU 100167932 2-05-2021 PROVINCE OF ONTARIO

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STORM DRAINAGE PLAN

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CITY FILE No. D07-16-16-0011 CITY PLAN No. 18059

STORM SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 123194
Project Name: 425 Culdaff Road
Date: 6/26/2024
Revised 2/5/2025
Input By: Anthony Mestwarp
Reviewed By: Greg Macdonald
Drawing Reference: 123194-SWM, drawings 95,96

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								
		From MH	To MH	Area	Weighted Runoff Coefficient C	Indivi. 2.78 AC	Accum. 2.78 AC	Time of Conc. Tc (min.)	Rain Intensity (mm/hr) I 2-yr	5-yr	10-yr	100-yr	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
		79	81			0.00	1.53	12.79	67.53				103.32	473.1	61.5	975 CONC	0.9906	0.013	0.15	905.5	1.17	0.87	52.2%
				0.38	0.70	0.74	0.74	12.79		91.45			67.63										
						0.00	2.82	12.79			107.14		302.13										
						0.00	0.00	12.79					0.00										
2765 Palladium Road	**Remaing parcel of Block 242**		81	1.59	0.80	3.55	3.55	10.00	76.81				272.28	272.3	10.0	600 CONC	0.6096	0.013	0.30	350.8	1.20	0.14	77.6%
						0.00	0.00	10.00					0.00										
						0.00	0.00	10.00					0.00										
						0.00	0.00	10.00					0.00										
Block 240		80	81	0.64	0.80	1.42	1.42	10.00	76.81				109.32	109.3	20.0	525 CONC	0.5334	0.013	0.20	200.6	0.90	0.37	54.5%
						0.00	0.00	10.00					0.00										
						0.00	0.00	10.00					0.00										
						0.00	0.00	10.00					0.00										
425 Culdaff	**Refer to site design sheet for calculation details**		81-83	0.62	0.81	1.39	1.39	12.50	68.38				95.15	95.2	10.0	450 PVC	0.4572	0.013	1.00	297.4	1.81	0.09	32.0%
						0.00	0.00	12.50					0.00										
						0.00	0.00	12.50					0.00										
						0.00	0.00	12.50					0.00										
Derreen Avenue		81	83			0.00	7.89	13.66	65.12				513.77	939.9	112.0	1050 CONC	1.0668	0.013	0.15	1103.3	1.23	1.51	85.2%
				0.39	0.73	0.79	1.53	13.66		88.14			134.94										
						0.00	2.82	13.66			103.25		291.16										
						0.00	0.00	13.66					0.00										
Block 241		82	83	1.06	0.80	2.36	2.36	10.00	76.81				181.06	181.1	19.5	675 CONC	0.6858	0.013	0.15	339.6	0.92	0.35	53.3%
						0.00	0.00	10.00					0.00										
						0.00	0.00	10.00					0.00										
						0.00	0.00	10.00					0.00										
Derreen Avenue		83	84			0.00	10.25	15.17	61.36				628.77	1029.9	40.5	1050 CONC	1.0668	0.013	0.20	1274.0	1.43	0.47	80.8%
						0.00	1.53	15.17		83.00			127.06										
						0.00	2.82	15.17			97.19		274.08										
						0.00	0.00	15.17					0.00										
Culdaff Road		73	84	0.19	0.74	0.39	18.14	16.58	58.27				1057.08	1168.9	79.0	1350 CONC	1.3716	0.013	0.11	1846.8	1.25	1.05	63.3%
						0.00	1.42	16.58		78.78			111.86										
						0.00	0.00	16.58					0.00										
						0.00	0.00	16.58					0.00										
Culdaff Road		84	86		0.00	0.00	28.39	17.63	56.18				1594.76	2099.0	74.5	1650 CONC	1.6764	0.013	0.11	3153.6	1.43	0.87	66.6%
				0.19	0.74	0.39	3.34	17.63		75.91			253.69										
						0.00	2.82	17.63			88.86		250.60										
						0.00	0.00	17.63					0.00										
425 Culdaff	**Refer to site design sheet for calculation details**	85	86	0.35	0.61	0.59	0.59	10.24	75.90				44.53	44.5	17.3	900 CONC	0.9144	0.013	0.15	731.4	1.11	0.26	6.1%
						0.00	0.00	10.24					0.00										
						0.00	0.00	10.24					0.00										
						0.00	0.00	10.24					0.00										
Culdaff Road		86	87		0.00	0.00	28.97	18.50	54.57				1581.18	2070.9	26.0	1650 CONC	1.6764	0.013	0.11	3153.6	1.43	0.30	65.7%
						0.00	3.34	18.50		73.72			246.36										
						0.00	2.82	18.50			86.29		243.33										
						0.00	0.00	18.50					0.00										

STORM SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

Location				Demand											Design Capacity								
				Area		Flow									Proposed Sewer Pipe Sizing / Design								
		From MH	To MH	Area	Weighted Runoff Coefficient C	Indivi. 2.78 AC	Accum. 2.78 AC	Time of Conc. Tc (min.)	Rain Intensity (mm/hr) I 2-yr	5-yr	10-yr	100-yr	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
Culdaff Road		87	94		0.00	0.00	28.97	18.81	54.04				1565.63	2077.5	16.5	1650 CONC	1.6764	0.013	0.11	3153.6	1.43	0.19	65.9%
				0.18	0.74	0.37	3.71	18.81		72.99			270.93										
						0.00	2.82	18.81			85.42		240.90										
						0.00	0.00	18.81					0.00										
Culdaff Road		93	94		0.00	0.00	7.38	12.30	68.97				509.28	573.7	16.5	975 CONC	0.9906	0.013	0.15	905.5	1.17	0.23	63.4%
						0.00	0.69	12.30		93.43			64.47										
						0.00	0.00	12.30					0.00										
						0.00	0.00	12.30					0.00										
Block 235		94	95	0.37	0.59	0.61	36.96	19.00	53.70				1985.03	2543.7	109.0	1650 CONC	1.6764	0.013	0.15	3682.6	1.67	1.09	69.1%
						0.00	4.40	19.00		72.53			319.28										
						0.00	2.82	19.00			84.89		239.38										
						0.00	0.00	19.00					0.00										
Block 244		91	95	1.99	0.80	4.43	4.43	10.00	76.81				339.92	339.9	6.5	825 CONC	0.8382	0.013	0.15	580.0	1.05	0.10	58.6%
						0.00	0.00	10.00					0.00										
						0.00	0.00	10.00					0.00										
						0.00	0.00	10.00					0.00										
Block 235		95	96			0.00	41.39	20.09	51.89				2147.82	2687.4	57.0	1650 CONC	1.6764	0.013	0.15	3682.6	1.67	0.57	73.0%
						0.00	4.40	20.09		70.06			308.41										
						0.00	2.82	20.09			81.99		231.20										
						0.00	0.00	20.09					0.00										
Block 235		96	HW			0.00	41.39	20.66	51.00				2110.86	2641.1	12.5	1650 CONC	1.6764	0.013	0.15	3682.6	1.67	0.12	71.7%
						0.00	4.40	20.66		68.84			303.05										
						0.00	2.82	20.66			80.56		227.17										
						0.00	0.00	20.66					0.00										
Totals				**15.90**											**172.0**								

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

Ottawa

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
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				5 YEAR				10 YEAR				100 YEAR				FLOW						SEWER DATA											
Location	From Node	To Node	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc. (min)	Intensity 2 Year (mm/h)	Intensity 5 Year (mm/h)	Intensity 10 Year (mm/h)	Intensity 100 Year (mm/h)	Peak Flow Q (l/s)	DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	INV UPS	OBV UPS	T/G UPS	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min.)	RATIO 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

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 2 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

Ottawa

LOCATION			AREA (Ha) 2 YEAR				5 YEAR				10 YEAR				100 YEAR				FLOW Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	SEWER DATA 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 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

Ottawa

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
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					16.65																	

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 4 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				5 YEAR				10 YEAR				100 YEAR				FLOW						SEWER DATA											
Location	From Node	To Node	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc. (min)	Intensity 2 Year (mm/h)	Intensity 5 Year (mm/h)	Intensity 10 Year (mm/h)	Intensity 100 Year (mm/h)	Peak Flow Q (l/s)	DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	INV UPS	OBV UPS	T/G UPS	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min.)	RATIO 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

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
20-07-09
PROVINCE OF ONTARIO

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

This document is presented in the language it was provided.
Ce document est présenté dans la langue dans laquelle il a été fourni.

Committee of Adjustment
Received | Reçu le

2023-06-05

City of Ottawa | Ville d'Ottawa
Comité de dérogation

Consent
COMMENTS TO THE COMMITTEE OF ADJUSTMENT
Panel 3

Site Address: 2765 Palladium Drive
Legal Description: Block 242, Plan 4M-1687

No.: D08-01-23/B-00118 & D08-01-23/B-00119
Date: June 1, 2023 Hearing Date: June 6, 2023
Planner: Luke Teeft

Official Plan Designation: Mixed Industrial, Minor Corridor
Zoning: GM[2654] – General Mixed Use, Exception 2654

DEPARTMENT COMMENTS

The Planning, Real Estate, and Economic Development Department has **No Concerns** with the application as submitted subject to the following requested conditions.

DISCUSSION AND RATIONALE

The subject property is designated as Mixed Industrial and Minor Corridor in Schedule B5 of the Official Plan. Mixed Industrial areas are clusters of economic activity that are less impactful and provide a broader range of non-residential uses than Industrial areas. Minor Corridors are intended to provide a mix of residential and non-residential uses that are compatible with a dense mixed-use urban environment.

The subject site is zoned GM[2654] – General Mixed Use, Exception 2654. The purpose of the General Mixed-Use Zone is to permit a range of residential and non-residential uses in the General Urban Area and other specific areas identified in the Official Plan (By-law 2013-58).

The applicant proposes to sever the property at 2765 Palladium Drive into two separate parcels. The severed parcel identified as Part 1 and 2 in the attached 4M plan will have 119.53 metres of frontage on Culdaff Road, a depth of 78.5 metres and an area of 9730.18 square metres. This parcel will be known municipally as 425 Culdaff Road. The retained parcel identified as Part 3 in the attached 4M plan will

have 148.33 metres of frontage on Palladium Drive, a depth of 85.23 metres and an area of 15,940.04 square metres. This parcel will continue to be known municipally as 2765 Palladium Road.

Staff have determined that lot creation at this location poses no risk to nearby properties or complications for the future use of the lands. The severance provides an opportunity for increased density and diversity of uses on the subject property. Staff have no concerns with the proposal subject to the following conditions.

ADDITIONAL COMMENTS:

Building Code Services:

No comments.

Civil Engineering:

- Staff have reviewed the Grading and Servicing design submitted as part of the Subdivision application including the subject land. The existing plans show drainage from Part 3 (2765 Palladium Drive) towards Parts 1 and 2 (425 Culdaff Road). At the time of Site Plan and/or Building Permit, the applicant will be required to regrade Part 3 (2765 Palladium Drive) or provide adequate on-site storm structures to contain drainage within 2765 Palladium Drive and discharge overland flow towards the City's right-of-way. Separate water and sewer connections to the municipal services along Derreen Avenue will also be required.

- The only engineering condition imposed is the Noise study. As the vacant land will be about 155 metres from an arterial road (Palladium Drive), this condition is included in anticipation of residential development that would go directly to building permit instead of a site plan.

CONDITIONS:

If approved, the Planning, Real Estate and Economic Development Department requests that the Committee of Adjustment impose the following condition(s) on the application(s):

1. That the Owner(s) provide plans, drawings or reports as may be required to demonstrate, to the satisfaction of the **Manager, Right-of-Way, Heritage, and Urban Design Department or his/her designate** that a private approach that conforms with the Private Approach By-law (2003-447) can

reasonably be established on both the retained and severed parcels, to be confirmed in writing from the Department to the Committee.

2. That the Owner(s) provide evidence (payment receipt) to the Committee that payment has been made to the City of Ottawa of cash-in-lieu of the conveyance of land for park or other public recreational purposes, plus applicable appraisal costs. The value of the land otherwise required to be conveyed shall be determined by the City of Ottawa in accordance with the provisions of By-Law No. 2009-95, as amended. Information regarding the appraisal process can be obtained by contacting the Planner.

3. That the Owner(s) prepare a noise attenuation study in compliance with the City of Ottawa Environmental Noise Control Guidelines to the satisfaction of the **General Manager, Planning, Infrastructure and Economic Development Department**, **or his/her designate**. The Owner(s) shall also enter into an agreement with the City that requires the Owner to implement any noise control attenuation measures recommended in the approved study. The Agreement will also deal with any covenants/notices recommended in the approved study, that shall be registered on the land title and bind future owners on subsequent transfers, warning purchasers and/or tenants of expected noise levels due to the existing source of environmental noise. The Agreement shall be to the satisfaction of the **General Manager, Planning, Infrastructure and Economic Development Department, or his/her designate**. The Committee requires a copy of the Agreement and written confirmation from **City Legal Services** that it has been registered on title.;

   <u>or</u>

   Design the dwelling units with the provision for adding central air conditioning at the occupant's discretion and enter into an Agreement with the City, at the expense of the Owner, which is to be registered on title to deal with the covenants/ notices that shall run with the land and bind future owners on subsequent transfers, warning purchasers and/or tenants of expected noise levels due to the existing source of environmental noise. The following two conditions will be included in the above-noted Agreement:

   i) "The Purchaser/Lessee for himself, his heirs, executors, administrators, successors and assigns, acknowledges being advised that this dwelling unit has been fitted with a forced air heating system and the ducting, etc. was sized to accommodate central air conditioning. Installation of central air conditioning by the Purchaser/Lessee will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within

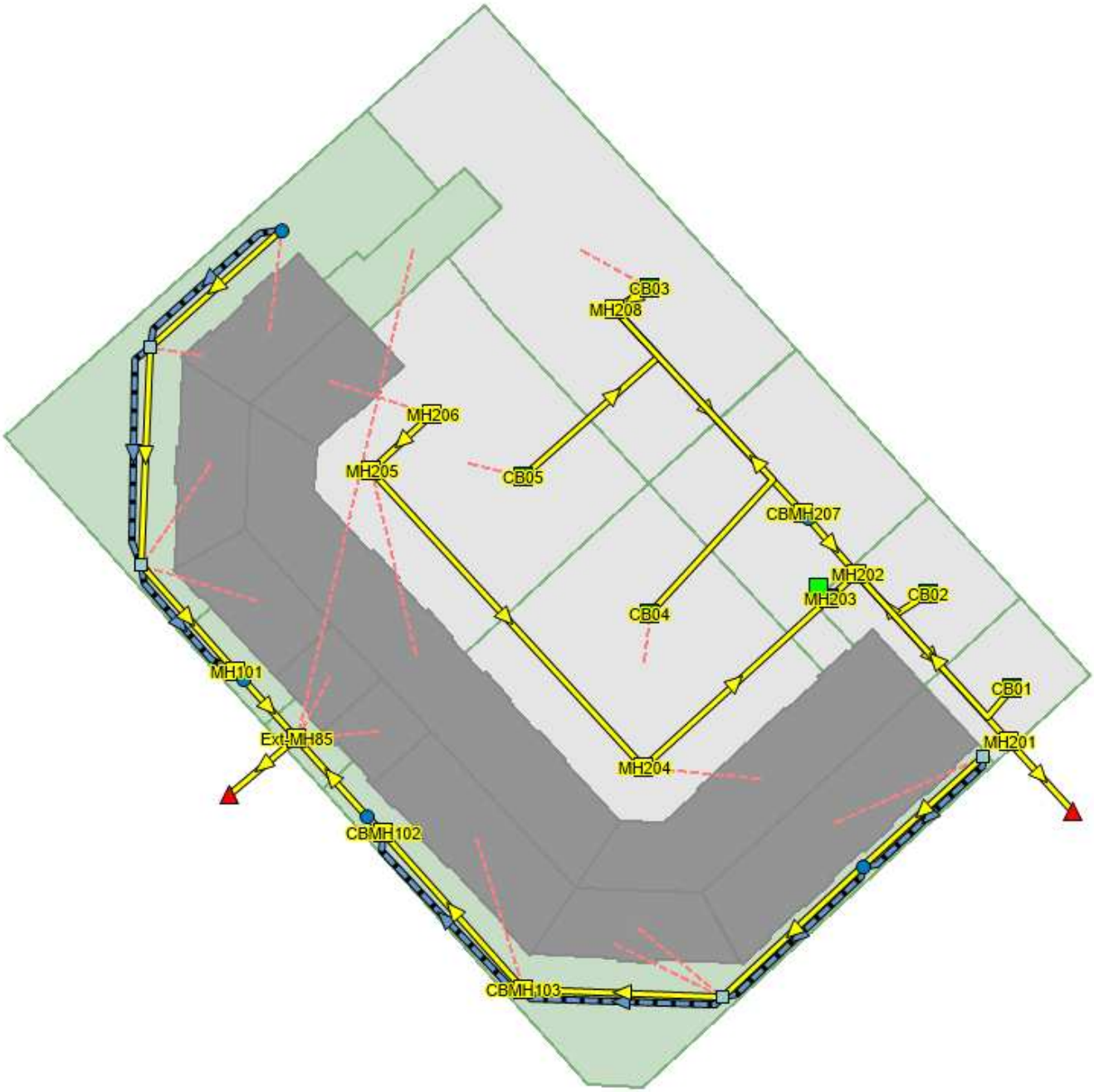
the City of Ottawa's and the Ministry of the Environment and Climate Change's noise criteria;" and

ii) "The Purchaser/Lessee for himself, his heirs, executors, administrators, successors and assigns acknowledges being advised that noise levels due to increasing roadway traffic may be of concern, occasionally interfering with some activities of the dwelling occupants as the outdoor sound level exceeds the City of Ottawa's and the Ministry of the Environment and Climate Change's noise criteria.

Luke Teeft
Planner I, Development Review, PRED Dept.

Lisa Stern, MCIP, RPP
Planner III, Development Review, PRED Dept.

Appendix E
PCSWMM Modeling



Post Development PCSWMM Model Schematic
425 Culdaff Road

425 Culdaff Road
Novatech Project 123194

Stage Storage Calculations
for Catchbasins

CB 01		
Elevation	**Area**	**Volume**
108.40	0.36	0.000
108.45	10.917	0.282
108.50	31.269	1.337

CB 02		
Elevation	**Area**	**Volume**
108.40	0.36	0.000
108.45	22.937	0.582
108.50	73.18	2.985
108.53	110.102	5.735

CBMH 207		
Elevation	**Area**	**Volume**
108.30	0.36	0.000
108.35	18.117	0.462
108.40	56.939	2.338
108.45	119.467	6.748
108.50	208.114	14.938
108.55	306.912	27.814

CB 03		
Elevation	**Area**	**Volume**
108.30	0.36	0.000
108.35	19.895	0.506
108.40	63.364	2.588
108.45	132.65	7.488
108.50	226.048	16.456
108.55	356.749	31.026
108.58	491.177	43.744

CB 04		
Elevation	**Area**	**Volume**
108.30	0.36	0.000
108.35	20.097	0.511
108.40	57.201	2.444
108.45	106.825	6.545
108.50	190.746	13.984
108.55	316.567	26.667
108.60	477.005	46.506

CB 05		
Elevation	**Area**	**Volume**
108.30	0.36	0.000
108.35	19.862	0.506
108.40	55.773	2.396
108.45	104.055	6.392
108.50	189.671	13.735
108.55	319.613	26.467
108.60	480.076	46.460

PCSWMM Model Results **100-year Event**

425 Culdaff Road

Novatech Project 123194 February 28, 2025

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)
------------------------------------------------------------

Created by Vahid Mehdipour | Novatech Stormwater Management Team
October 10, 2024
425 CULDAFF ROAD

*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 22
Number of nodes ........... 30
Number of links ........... 35
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                  Data       Recording
Name                 Data Source                  Type       Interval
-----------------------------------------------------------------------
RG                   C3hr-100yr                   INTENSITY   10 min.


********************
Subcatchment Summary
********************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------------------
A-01                        0.14     23.33     79.00    0.5000 RG                   CB03
A-02                        0.07     23.00     87.00    0.5000 RG                   CBMH207
A-03                        0.03     17.84     81.00    0.5000 RG                   CB02
A-04                        0.02     12.46     59.00    0.5000 RG                   CB01
A-05                        0.02      7.39    100.00    0.5000 RG                   Ext-MH85
A-06                        0.11     30.38     87.00    0.5000 RG                   CB05
A-07                        0.11     32.99     86.00    0.5000 RG                   CB04
A-08                        0.09     45.50     13.00    1.5000 RG                   CB07
A-09                        0.01     10.97     30.00    0.5000 RG                   Ext-MH85
A-10                        0.07     46.67     11.00    0.5000 RG                   CB08
D-01                        0.01      5.22     31.00    0.5000 RG                   MH101
R-01                        0.02     16.48    100.00    0.5000 RG                   MH206
R-02                        0.07     76.12    100.00    0.5000 RG                   MH205
R-03                        0.05     53.61    100.00    0.5000 RG                   MH204
R-04                        0.02     20.42    100.00    0.5000 RG                   LD1001
R-05                        0.02     21.55    100.00    0.5000 RG                   CB06
R-06                        0.02     18.98    100.00    0.5000 RG                   CB06
R-07A                       0.01      8.48    100.00    0.5000 RG                   Ext-MH85
R-07B                       0.01      9.04    100.00    0.5000 RG                   Ext-MH85
R-08                        0.03     28.97    100.00    0.5000 RG                   CBMH103
R-09                        0.02     24.24    100.00    0.5000 RG                   CB08
R-10                        0.04     44.20    100.00    0.5000 RG                   CB09


************
Node Summary
************
                                         Invert      Max.    Ponded    External
Name                 Type                 Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------
CB06                 JUNCTION            106.02      2.34       0.0
CB07                 JUNCTION            106.46      1.82       0.0
CB08                 JUNCTION            106.70      1.57       0.0
CB09                 JUNCTION            107.00      1.30       0.0
Dummy-CBMH102        JUNCTION            106.38      1.87       0.0
Dummy-CBMH207        JUNCTION            105.67      2.63       0.0
Dummy-MH101          JUNCTION            106.12      2.58       0.0
J1                   JUNCTION            106.01      2.71       0.0
LD1001               JUNCTION            106.72      1.88       0.0
LD1002               JUNCTION            106.89      1.43       0.0
CuldaffRoad-Outfall  OUTFALL             104.28      0.90       0.0
DerreenAve-Outfall   OUTFALL             105.15      1.05       0.0
```

CB01	STORAGE	106.90	1.60	0.0
CB02	STORAGE	106.90	1.63	0.0
CB03	STORAGE	106.80	1.78	0.0
CB04	STORAGE	106.80	1.80	0.0
CB05	STORAGE	106.80	1.80	0.0
CBMH102	STORAGE	106.38	1.87	0.0
CBMH103	STORAGE	106.51	1.73	0.0
CBMH207	STORAGE	105.67	2.88	0.0
Ext-MH85	STORAGE	106.04	2.79	0.0
MH101	STORAGE	105.93	2.77	0.0
MH201	STORAGE	105.57	2.96	0.0
MH202	STORAGE	105.64	2.90	0.0
MH203	STORAGE	105.72	3.03	0.0
MH204	STORAGE	105.95	2.83	0.0
MH205	STORAGE	106.17	2.69	0.0
MH206	STORAGE	106.35	2.25	0.0
MH208	STORAGE	105.98	2.84	0.0
StormTechDC-780	STORAGE	105.17	3.57	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	CB09	LD1002	CONDUIT	20.9	0.5268	0.0350
C2	LD1002	CB08	CONDUIT	24.8	0.7662	0.0350
C3	CB08	CBMH103	CONDUIT	25.7	0.7382	0.0350
C4	CBMH103	CBMH102	CONDUIT	26.3	0.4943	0.0350
C5	Ext-MH85	CuldaffRoad-Outfall	CONDUIT	19.0	10.2107	0.0130
C6	LD1001	CB07	CONDUIT	22.7	0.4837	0.0350
C7	CB07	CB06	CONDUIT	28.1	1.4582	0.0350
C8	CB06	MH101	CONDUIT	18.3	0.4910	0.0350
C9	CBMH103	CBMH102	CONDUIT	26.3	0.4943	0.0130
CB03Pipe	CB03	MH208	CONDUIT	5.4	0.9120	0.0130
STM-1_(2)_(STM)	MH202	MH201	CONDUIT	29.3	0.2016	0.0130
STM-1_(STM)_2	Dummy-CBMH207	MH202	CONDUIT	10.5	0.1905	0.0130
STM-11_(STM)	CB07	CB06	CONDUIT	28.1	0.4979	0.0130
STM-12_(1)_(STM)_2	Dummy-MH101	Ext-MH85	CONDUIT	11.7	0.5128	0.0130
STM-12_(STM)	CB06	MH101	CONDUIT	18.3	0.4910	0.0130
STM-13_(STM)	LD1001	CB07	CONDUIT	22.7	0.4838	0.0130
STM-14_(STM)	CB09	LD1002	CONDUIT	20.9	0.4979	0.0130
STM-15_(STM)	LD1002	CB08	CONDUIT	24.8	0.5000	0.0130
STM-16_(STM)	CB08	CBMH103	CONDUIT	25.7	0.5013	0.0130
STM-18_(STM)_3	Dummy-CBMH102	Ext-MH85	CONDUIT	17.3	0.9827	0.0130
STM-19_(STM)	MH208	CBMH207	CONDUIT	35.0	0.3629	0.0130
STM-2_(STM)	MH201	DerreenAve-Outfall	CONDUIT	12.1	0.9997	0.0130
STM-22_(STM)	MH205	MH204	CONDUIT	52.0	0.3003	0.0130
STM-23_(STM)	MH204	MH203	CONDUIT	32.2	0.3102	0.0130
STM-24_(STM)_2	J1	MH202	CONDUIT	4.9	0.2653	0.0130
STM-25_(STM)	MH206	MH205	CONDUIT	10.8	0.4984	0.0130
STM-6_(STM)	CB02	MH202	CONDUIT	4.9	1.0205	0.0130
STM-61_(STM)	StormTechDC-780	MH203	CONDUIT	5.0	0.4000	0.0130
STM-7_(STM)	CB01	MH202	CONDUIT	4.9	1.0205	0.0130
STM-8_(STM)	CB05	MH208	CONDUIT	31.6	0.7601	0.0130
STM-9_(STM)	CB04	MH208	CONDUIT	53.5	0.4298	0.0130
STM-1_(STM)_1	CBMH207	Dummy-CBMH207	ORIFICE			
STM-12_(1)_(STM)_1	MH101	Dummy-MH101	ORIFICE			
STM-18_(STM)_1	CBMH102	Dummy-CBMH102	ORIFICE			
STM-24_(STM)_1	MH203	J1	ORIFICE			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	RECT_OPEN	0.55	0.21	0.14	0.38	1	115.24
C2	RECT_OPEN	0.55	0.21	0.14	0.38	1	138.97
C3	RECT_OPEN	0.55	0.21	0.14	0.38	1	136.41
C4	RECT_OPEN	0.55	0.21	0.14	0.38	1	111.62
C5	CIRCULAR	0.90	0.64	0.23	0.90	1	5785.05
C6	RECT_OPEN	0.55	0.21	0.14	0.38	1	110.42
C7	RECT_OPEN	0.55	0.21	0.14	0.38	1	191.72

C8	RECT_OPEN	0.55	0.21	0.14	0.38	1	111.24
C9	CIRCULAR	0.25	0.05	0.06	0.25	1	41.81
CB03Pipe	CIRCULAR	0.20	0.03	0.05	0.20	1	31.32
STM-1_(2)_(STM)	CIRCULAR	0.45	0.16	0.11	0.45	1	128.03
STM-1_(STM)_2	CIRCULAR	0.45	0.16	0.11	0.45	1	124.44
STM-11_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	41.96
STM-12_(1)_(STM)_2	CIRCULAR	0.25	0.05	0.06	0.25	1	42.59
STM-12_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	41.67
STM-13_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	41.37
STM-14_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	41.96
STM-15_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	42.05
STM-16_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	42.11
STM-18_(STM)_3	CIRCULAR	0.25	0.05	0.06	0.25	1	58.95
STM-19_(STM)	CIRCULAR	0.45	0.16	0.11	0.45	1	171.75
STM-2_(STM)	CIRCULAR	0.45	0.16	0.11	0.45	1	285.08
STM-22_(STM)	CIRCULAR	0.38	0.11	0.09	0.38	1	96.08
STM-23_(STM)	CIRCULAR	0.38	0.11	0.09	0.38	1	97.65
STM-24_(STM)_2	CIRCULAR	0.38	0.11	0.09	0.38	1	90.31
STM-25_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	41.99
STM-6_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1	33.13
STM-61_(STM)	CIRCULAR	0.38	0.11	0.09	0.38	1	110.90
STM-7_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1	33.13
STM-8_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1	28.60
STM-9_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	38.99

```
****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 10/15/2024 00:00:00
Ending Date .............. 10/23/2024 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 8
Head Tolerance ........... 0.001500 m
```

********** Runoff Quantity Continuity **********	Volume hectare-m	Depth mm
Initial LID Storage	0.001	0.526
Total Precipitation	0.069	71.667
Evaporation Loss	0.000	0.000
Infiltration Loss	0.011	11.211
Surface Runoff	0.059	60.523
Final Storage	0.001	0.526
Continuity Error (%)	-0.093	

********** Flow Routing Continuity **********	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.059	0.587
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.004	0.037
External Outflow	0.063	0.625

```
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.004         0.041
Final Stored Volume ......         0.004         0.041
Continuity Error (%) .....        -0.195


*************************
Highest Continuity Errors
*************************
Node CB07 (-1.14%)


***************************
Time-Step Critical Elements
***************************
None


********************************
Highest Flow Instability Indexes
********************************
Link STM-1_(STM)_1 (146)
Link STM-24_(STM)_1 (118)
Link STM-18_(STM)_1 (3)


**********************************
Most Frequent Nonconverging Nodes
**********************************
Node CuldaffRoad-Outfall (0.01%)
Node DerreenAve-Outfall (0.01%)
Node LD1001 (0.00%)
Node CB07 (0.00%)
Node MH201 (0.00%)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.92 sec
Average Time Step           :     2.00 sec
Maximum Time Step           :     2.00 sec
% of Time in Steady State   :     0.00
Average Iterations per Step :     2.00
% of Steps Not Converging   :     0.01
Time Step Frequencies       :
    2.000 -  1.516 sec      :    99.99 %
    1.516 -  1.149 sec      :     0.01 %
    1.149 -  0.871 sec      :     0.00 %
    0.871 -  0.660 sec      :     0.00 %
    0.660 -  0.500 sec      :     0.00 %


***************************
Subcatchment Runoff Summary
***************************
```

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
A-01	71.67	0.00	0.00	9.63	62.07	5.42	62.07	0.09	58.83	0.866
A-02	71.67	0.00	0.00	5.76	65.97	3.56	65.97	0.05	32.57	0.920
A-03	71.67	0.00	0.00	8.39	63.35	5.24	63.35	0.02	14.07	0.884
A-04	71.67	0.00	0.00	18.38	53.36	11.03	53.36	0.01	8.08	0.745
A-05	71.67	0.00	0.00	0.00	71.73	0.00	71.73	0.01	8.43	1.001
A-06	71.67	0.00	0.00	5.78	65.94	3.54	65.94	0.07	52.34	0.920
A-07	71.67	0.00	0.00	6.22	65.50	3.82	65.50	0.07	49.99	0.914
A-08	71.67	0.00	0.00	41.12	9.33	30.60	30.60	0.03	26.60	0.427
A-09	71.67	0.00	0.00	34.30	21.53	37.47	37.47	0.00	2.60	0.523
A-10	71.67	0.00	0.00	42.29	7.89	29.42	29.42	0.02	17.17	0.411
D-01	71.67	0.00	0.00	34.65	22.25	37.10	37.10	0.00	2.72	0.518

R-01	71.67	0.00	0.00	0.00	71.76	0.00	71.76	0.01	8.43	1.001
R-02	71.67	0.00	0.00	0.00	71.76	0.00	71.76	0.05	35.22	1.001
R-03	71.67	0.00	0.00	0.00	71.77	0.00	71.77	0.03	23.81	1.001
R-04	71.67	0.00	0.00	0.00	71.76	0.00	71.76	0.01	9.42	1.001
R-05	71.67	0.00	0.00	0.00	71.77	0.00	71.77	0.01	9.42	1.001
R-06	71.67	0.00	0.00	0.00	71.76	0.00	71.76	0.01	8.93	1.001
R-07A	71.67	0.00	0.00	0.00	71.76	0.00	71.76	0.01	4.46	1.001
R-07B	71.67	0.00	0.00	0.00	71.76	0.00	71.76	0.01	4.46	1.001
R-08	71.67	0.00	0.00	0.00	71.76	0.00	71.76	0.02	14.38	1.001
R-09	71.67	0.00	0.00	0.00	71.77	0.00	71.77	0.01	9.42	1.001
R-10	71.67	0.00	0.00	0.00	71.76	0.00	71.76	0.03	20.34	1.001

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
CB06	JUNCTION	0.42	2.15	108.17	0 01:21	2.15
CB07	JUNCTION	0.01	1.72	108.18	0 01:21	1.72
CB08	JUNCTION	0.00	0.78	107.48	0 01:23	0.78
CB09	JUNCTION	0.00	0.48	107.48	0 01:23	0.48
Dummy-CBMH102	JUNCTION	0.00	0.09	106.47	0 01:23	0.09
Dummy-CBMH207	JUNCTION	0.36	0.57	106.25	0 01:10	0.57
Dummy-MH101	JUNCTION	0.30	0.42	106.54	0 01:21	0.42
J1	JUNCTION	0.02	0.22	106.23	0 01:10	0.22
LD1001	JUNCTION	0.00	1.46	108.18	0 01:21	1.46
LD1002	JUNCTION	0.00	0.59	107.48	0 01:23	0.59
CuldaffRoad-Outfall	OUTFALL	1.50	1.50	105.78	0 00:00	1.50
DerreenAve-Outfall	OUTFALL	0.88	0.88	106.03	0 00:00	0.88
CB01	STORAGE	0.30	0.37	107.27	0 01:10	0.37
CB02	STORAGE	0.30	0.39	107.29	0 01:10	0.39
CB03	STORAGE	0.29	1.67	108.47	0 01:14	1.67
CB04	STORAGE	0.31	1.68	108.48	0 01:15	1.68
CB05	STORAGE	0.31	1.71	108.51	0 01:20	1.71
CBMH102	STORAGE	0.01	1.10	107.48	0 01:23	1.10
CBMH103	STORAGE	0.01	0.97	107.48	0 01:23	0.97
CBMH207	STORAGE	0.37	2.75	108.42	0 01:14	2.75
Ext-MH85	STORAGE	0.17	0.23	106.27	0 01:10	0.23
MH101	STORAGE	0.51	2.24	108.17	0 01:21	2.24
MH201	STORAGE	0.46	0.52	106.09	0 01:10	0.52
MH202	STORAGE	0.39	0.59	106.23	0 01:10	0.59
MH203	STORAGE	0.32	2.10	107.81	0 01:12	2.09
MH204	STORAGE	0.31	1.87	107.81	0 01:12	1.87
MH205	STORAGE	0.30	1.65	107.82	0 01:12	1.65
MH206	STORAGE	0.30	1.47	107.82	0 01:11	1.47
MH208	STORAGE	0.31	2.46	108.43	0 01:14	2.46
StormTechDC-780	STORAGE	1.01	2.64	107.81	0 01:12	2.64

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
CB06	JUNCTION	18.35	34.07	0 01:12	0.0266	0.0772	-0.616
CB07	JUNCTION	26.60	28.54	0 01:09	0.0278	0.0423	-1.129
CB08	JUNCTION	26.60	34.85	0 01:10	0.0342	0.0637	-0.005
CB09	JUNCTION	20.34	20.34	0 01:10	0.0294	0.0294	-0.038
Dummy-CBMH102	JUNCTION	0.00	14.80	0 01:23	0	0.0848	-0.118
Dummy-CBMH207	JUNCTION	0.00	72.99	0 01:15	0	0.294	-0.154
Dummy-MH101	JUNCTION	0.00	18.84	0 01:21	0	0.0719	-0.005
J1	JUNCTION	0.00	23.80	0 01:12	0	0.111	-0.037
LD1001	JUNCTION	9.42	17.19	0 01:11	0.0136	0.0143	0.601
LD1002	JUNCTION	0.00	20.69	0 01:05	0	0.0294	0.023
CuldaffRoad-Outfall	OUTFALL	0.00	45.74	0 01:10	0	0.184	0.000

DerreenAve-Outfall	OUTFALL	0.00	116.93	0	01:10	0	0.479	0.000
CB01	STORAGE	8.08	8.08	0	01:10	0.0107	0.0107	-0.000
CB02	STORAGE	14.07	14.07	0	01:10	0.019	0.019	-0.000
CB03	STORAGE	58.83	58.83	0	01:10	0.0869	0.0869	0.036
CB04	STORAGE	49.99	49.99	0	01:10	0.0701	0.0701	0.999
CB05	STORAGE	52.34	52.34	0	01:10	0.0739	0.0739	0.661
CBMH102	STORAGE	0.00	22.88	0	01:05	0	0.0849	0.118
CBMH103	STORAGE	14.38	37.19	0	01:04	0.0208	0.0845	0.004
CBMH207	STORAGE	32.57	90.48	0	01:05	0.0455	0.286	0.129
Ext-MH85	STORAGE	19.96	45.84	0	01:10	0.0274	0.184	0.001
MH101	STORAGE	2.72	36.23	0	01:12	0.00297	0.081	0.038
MH201	STORAGE	0.00	116.88	0	01:10	0	0.454	-0.070
MH202	STORAGE	0.00	117.30	0	01:10	0	0.43	-0.016
MH203	STORAGE	0.00	34.42	0	01:09	0	0.108	-0.106
MH204	STORAGE	23.81	61.16	0	01:02	0.0345	0.0977	-0.049
MH205	STORAGE	35.22	50.18	0	01:04	0.051	0.0637	0.271
MH206	STORAGE	8.43	20.31	0	01:03	0.0122	0.0128	0.429
MH208	STORAGE	0.00	108.61	0	01:04	0	0.23	-0.516
StormTechDC-780	STORAGE	0.00	4.69	0	01:02	0	0.0256	0.008

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
CB06	JUNCTION	1.07	1.375	0.185
CB07	JUNCTION	0.49	0.816	0.108
LD1001	JUNCTION	0.40	0.706	0.424
CBMH102	STORAGE	0.95	0.346	0.777
CBMH103	STORAGE	0.62	0.156	0.763
MH206	STORAGE	0.67	0.917	0.782

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
CB01	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	8.06
CB02	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	14.05
CB03	0.000	0.0	0.0	0.0	0.010	24.0	0 01:14	45.76
CB04	0.000	0.0	0.0	0.0	0.011	23.2	0 01:15	32.84
CB05	0.000	0.1	0.0	0.0	0.015	32.4	0 01:20	37.76
CBMH102	0.000	0.4	0.0	0.0	0.001	58.5	0 01:23	14.80
CBMH103	0.000	0.3	0.0	0.0	0.001	55.9	0 01:23	22.88
CBMH207	0.000	1.4	0.0	0.0	0.006	21.0	0 01:14	72.99
Ext-MH85	0.000	6.1	0.0	0.0	0.000	8.1	0 01:10	45.74
MH101	0.001	18.3	0.0	0.0	0.003	81.0	0 01:21	18.84
MH201	0.001	15.6	0.0	0.0	0.001	17.6	0 01:10	116.93
MH202	0.000	13.6	0.0	0.0	0.001	20.5	0 01:10	116.88
MH203	0.000	10.7	0.0	0.0	0.002	69.2	0 01:12	25.58
MH204	0.000	10.9	0.0	0.0	0.002	65.9	0 01:12	34.42
MH205	0.000	11.3	0.0	0.0	0.002	61.4	0 01:12	38.42
MH206	0.000	13.5	0.0	0.0	0.002	65.2	0 01:11	15.11
MH208	0.000	10.9	0.0	0.0	0.003	86.5	0 01:14	65.85
StormTechDC-780	0.023	99.6	0.0	0.0	0.023	100.0	0 00:52	2.84

PCSWMM Model Results **100-year Event**

425 Culdaff Road

Novatech Project 123194 February 28, 2025

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
CuldaffRoad-Outfall	2.36	11.33	45.74	0.184
DerreenAve-Outfall	64.76	1.07	116.93	0.479
System	33.56	12.39	162.18	0.662

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	20.69	0	01:05	0.42	0.18	0.93
C2	CONDUIT	20.06	0	01:04	0.38	0.14	1.00
C3	CONDUIT	22.84	0	01:04	0.28	0.17	1.00
C4	CONDUIT	22.88	0	01:05	0.18	0.20	1.00
C5	CONDUIT	45.74	0	01:10	0.13	0.01	0.53
C6	CONDUIT	10.58	0	01:03	0.33	0.10	1.00
C7	CONDUIT	21.52	0	01:12	0.10	0.11	1.00
C8	CONDUIT	25.72	0	01:12	0.12	0.23	1.00
C9	CONDUIT	6.19	0	01:09	0.13	0.15	1.00
CB03Pipe	CONDUIT	45.76	0	01:05	1.46	1.46	1.00
STM-1_(2)_(STM)	CONDUIT	116.88	0	01:10	1.19	0.91	0.59
STM-1_(STM)_2	CONDUIT	73.09	0	01:11	0.80	0.59	0.62
STM-11_(STM)	CONDUIT	5.91	0	01:12	0.12	0.14	1.00
STM-12_(1)_(STM)_2	CONDUIT	18.84	0	01:21	0.88	0.44	0.45
STM-12_(STM)	CONDUIT	8.34	0	01:12	0.17	0.20	1.00
STM-13_(STM)	CONDUIT	2.56	0	01:11	0.06	0.06	1.00
STM-14_(STM)	CONDUIT	0.00	0	00:00	0.00	0.00	0.16
STM-15_(STM)	CONDUIT	0.78	0	01:32	0.04	0.02	0.61
STM-16_(STM)	CONDUIT	5.12	0	01:12	0.12	0.12	1.00
STM-18_(STM)_3	CONDUIT	14.80	0	01:23	1.00	0.25	0.34
STM-19_(STM)	CONDUIT	65.85	0	01:34	0.71	0.38	1.00
STM-2_(STM)	CONDUIT	116.93	0	01:10	1.28	0.41	0.56
STM-22_(STM)	CONDUIT	38.42	0	01:02	0.64	0.40	1.00
STM-23_(STM)	CONDUIT	34.42	0	01:09	0.62	0.35	1.00
STM-24_(STM)_2	CONDUIT	23.85	0	01:12	0.70	0.26	0.61
STM-25_(STM)	CONDUIT	15.11	0	01:04	0.68	0.36	1.00
STM-6_(STM)	CONDUIT	14.05	0	01:10	1.01	0.42	0.45
STM-61_(STM)	CONDUIT	4.69	0	01:02	0.29	0.04	1.00
STM-7_(STM)	CONDUIT	8.06	0	01:10	0.87	0.24	0.34
STM-8_(STM)	CONDUIT	37.76	0	01:04	1.20	1.32	1.00
STM-9_(STM)	CONDUIT	32.84	0	01:02	0.88	0.84	1.00
STM-1_(STM)_1	ORIFICE	72.99	0	01:15			1.00
STM-12_(1)_(STM)_1	ORIFICE	18.84	0	01:21			1.00
STM-18_(STM)_1	ORIFICE	14.80	0	01:23			1.00
STM-24_(STM)_1	ORIFICE	23.80	0	01:12			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.92	0.02	0.00	0.06	0.00	0.00	0.00	0.05	0.00
C2	1.00	0.90	0.02	0.00	0.08	0.00	0.00	0.00	0.65	0.00
C3	1.00	0.84	0.06	0.00	0.09	0.00	0.00	0.00	0.13	0.00
C4	1.00	0.00	0.85	0.00	0.15	0.00	0.00	0.00	0.99	0.00
C5	1.00	0.00	0.93	0.00	0.07	0.00	0.00	0.00	1.00	0.00

C6	1.00	0.93	0.00	0.00	0.01	0.00	0.00	0.07	0.00	0.00
C7	1.00	0.00	0.93	0.00	0.07	0.00	0.00	0.00	0.99	0.00
C8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C9	1.00	0.99	0.00	0.00	0.01	0.00	0.00	0.00	0.99	0.00
CB03Pipe	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-1_(2)_(STM)	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.01	0.00	0.00
STM-1_(STM)_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-11_(STM)	1.00	0.99	0.00	0.00	0.01	0.00	0.00	0.00	0.99	0.00
STM-12_(1)_(STM)_2	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-12_(STM)	1.00	0.87	0.12	0.00	0.01	0.00	0.00	0.00	0.99	0.00
STM-13_(STM)	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STM-14_(STM)	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STM-15_(STM)	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.99	0.00
STM-16_(STM)	1.00	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.99	0.00
STM-18_(STM)_3	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
STM-19_(STM)	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
STM-2_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-22_(STM)	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
STM-23_(STM)	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
STM-24_(STM)_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-25_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-6_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-61_(STM)	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
STM-7_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-8_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-9_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full Both Ends	Hours Full Upstream	Hours Full Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C1	0.01	0.01	0.28	0.01	0.01
C2	0.28	0.28	0.75	0.01	0.01
C3	0.75	0.75	1.08	0.01	0.01
C4	1.08	1.08	1.27	0.01	0.01
C5	0.01	0.01	191.99	0.01	0.01
C6	0.59	0.59	0.70	0.01	0.01
C7	0.84	0.84	1.46	0.01	0.01
C8	1.53	1.53	2.21	0.01	0.01
C9	0.73	0.73	0.95	0.01	0.01
CB03Pipe	0.71	0.71	0.71	0.07	0.05
STM-11_(STM)	0.90	0.90	1.07	0.01	0.01
STM-12_(STM)	1.12	1.12	1.29	0.01	0.01
STM-13_(STM)	0.40	0.40	0.49	0.01	0.01
STM-16_(STM)	0.24	0.24	0.62	0.01	0.01
STM-19_(STM)	0.81	0.81	0.84	0.01	0.01
STM-22_(STM)	0.71	0.71	0.84	0.01	0.01
STM-23_(STM)	0.89	0.89	1.00	0.01	0.01
STM-25_(STM)	0.67	0.67	0.71	0.01	0.01
STM-61_(STM)	0.97	0.97	1.00	0.01	0.01
STM-8_(STM)	0.71	0.71	0.75	0.11	0.10
STM-9_(STM)	0.69	0.69	0.74	0.01	0.01

Analysis begun on: Fri Feb 28 09:17:08 2025
Analysis ended on: Fri Feb 28 09:17:16 2025
Total elapsed time: 00:00:08

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)
------------------------------------------------------------

Created by Vahid Mehdipour | Novatech Stormwater Management Team
October 10, 2024
425 CULDAFF ROAD

*************
Element Count
*************
Number of rain gages ...... 1
Number of subcatchments ... 22
Number of nodes ........... 30
Number of links ........... 35
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                  Data       Recording
Name                 Data Source                  Type       Interval
-------------------------------------------------------------------
RG                   C3hr-100yr+20%               INTENSITY   10 min.


********************
Subcatchment Summary
********************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
-----------------------------------------------------------------------------------------------
A-01                        0.14     23.33     79.00    0.5000 RG                   CB03
A-02                        0.07     23.00     87.00    0.5000 RG                   CBMH207
A-03                        0.03     17.84     81.00    0.5000 RG                   CB02
A-04                        0.02     12.46     59.00    0.5000 RG                   CB01
A-05                        0.02      7.39    100.00    0.5000 RG                   Ext-MH85
A-06                        0.11     30.38     87.00    0.5000 RG                   CB05
A-07                        0.11     32.99     86.00    0.5000 RG                   CB04
A-08                        0.09     45.50     13.00    1.5000 RG                   CB07
A-09                        0.01     10.97     30.00    0.5000 RG                   Ext-MH85
A-10                        0.07     46.67     11.00    0.5000 RG                   CB08
D-01                        0.01      5.22     31.00    0.5000 RG                   MH101
R-01                        0.02     16.48    100.00    0.5000 RG                   MH206
R-02                        0.07     76.12    100.00    0.5000 RG                   MH205
R-03                        0.05     53.61    100.00    0.5000 RG                   MH204
R-04                        0.02     20.42    100.00    0.5000 RG                   LD1001
R-05                        0.02     21.55    100.00    0.5000 RG                   CB06
R-06                        0.02     18.98    100.00    0.5000 RG                   CB06
R-07A                       0.01      8.48    100.00    0.5000 RG                   Ext-MH85
R-07B                       0.01      9.04    100.00    0.5000 RG                   Ext-MH85
R-08                        0.03     28.97    100.00    0.5000 RG                   CBMH103
R-09                        0.02     24.24    100.00    0.5000 RG                   CB08
R-10                        0.04     44.20    100.00    0.5000 RG                   CB09


************
Node Summary
************
                                         Invert      Max.    Ponded    External
Name                 Type                 Elev.     Depth      Area    Inflow
-----------------------------------------------------------------------------
CB06                 JUNCTION            106.02      2.34       0.0
CB07                 JUNCTION            106.46      1.82       0.0
CB08                 JUNCTION            106.70      1.57       0.0
CB09                 JUNCTION            107.00      1.30       0.0
Dummy-CBMH102        JUNCTION            106.38      1.87       0.0
Dummy-CBMH207        JUNCTION            105.67      2.63       0.0
Dummy-MH101          JUNCTION            106.12      2.58       0.0
J1                   JUNCTION            106.01      2.71       0.0
LD1001               JUNCTION            106.72      1.88       0.0
LD1002               JUNCTION            106.89      1.43       0.0
CuldaffRoad-Outfall  OUTFALL             104.28      0.90       0.0
DerreenAve-Outfall   OUTFALL             105.15      1.05       0.0
CB01                 STORAGE             106.90      1.60       0.0
CB02                 STORAGE             106.90      1.63       0.0
CB03                 STORAGE             106.80      1.78       0.0
```

CB04	STORAGE	106.80	1.80	0.0
CB05	STORAGE	106.80	1.80	0.0
CBMH102	STORAGE	106.38	1.87	0.0
CBMH103	STORAGE	106.51	1.73	0.0
CBMH207	STORAGE	105.67	2.88	0.0
Ext-MH85	STORAGE	106.04	2.79	0.0
MH101	STORAGE	105.93	2.77	0.0
MH201	STORAGE	105.57	2.96	0.0
MH202	STORAGE	105.64	2.90	0.0
MH203	STORAGE	105.72	3.03	0.0
MH204	STORAGE	105.95	2.83	0.0
MH205	STORAGE	106.17	2.69	0.0
MH206	STORAGE	106.35	2.25	0.0
MH208	STORAGE	105.98	2.84	0.0
StormTechDC-780	STORAGE	105.17	3.57	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	CB09	LD1002	CONDUIT	20.9	0.5268	0.0350
C2	LD1002	CB08	CONDUIT	24.8	0.7662	0.0350
C3	CB08	CBMH103	CONDUIT	25.7	0.7382	0.0350
C4	CBMH103	CBMH102	CONDUIT	26.3	0.4943	0.0350
C5	Ext-MH85	CuldaffRoad-Outfall	CONDUIT	19.0	10.2107	0.0130
C6	LD1001	CB07	CONDUIT	22.7	0.4837	0.0350
C7	CB07	CB06	CONDUIT	28.1	1.4582	0.0350
C8	CB06	MH101	CONDUIT	18.3	0.4910	0.0350
C9	CBMH103	CBMH102	CONDUIT	26.3	0.4943	0.0130
CB03Pipe	CB03	MH208	CONDUIT	5.4	0.9120	0.0130
STM-1_(2)_(STM)	MH202	MH201	CONDUIT	29.3	0.2016	0.0130
STM-1_(STM)_2	Dummy-CBMH207	MH202	CONDUIT	10.5	0.1905	0.0130
STM-11_(STM)	CB07	CB06	CONDUIT	28.1	0.4979	0.0130
STM-12_(1)_(STM)_2	Dummy-MH101	Ext-MH85	CONDUIT	11.7	0.5128	0.0130
STM-12_(STM)	CB06	MH101	CONDUIT	18.3	0.4910	0.0130
STM-13_(STM)	LD1001	CB07	CONDUIT	22.7	0.4838	0.0130
STM-14_(STM)	CB09	LD1002	CONDUIT	20.9	0.4979	0.0130
STM-15_(STM)	LD1002	CB08	CONDUIT	24.8	0.5000	0.0130
STM-16_(STM)	CB08	CBMH103	CONDUIT	25.7	0.5013	0.0130
STM-18_(STM)_3	Dummy-CBMH102	Ext-MH85	CONDUIT	17.3	0.9827	0.0130
STM-19_(STM)	MH208	CBMH207	CONDUIT	35.0	0.3629	0.0130
STM-2_(STM)	MH201	DerreenAve-Outfall	CONDUIT	12.1	0.9997	0.0130
STM-22_(STM)	MH205	MH204	CONDUIT	52.0	0.3003	0.0130
STM-23_(STM)	MH204	MH203	CONDUIT	32.2	0.3102	0.0130
STM-24_(STM)_2	J1	MH202	CONDUIT	4.9	0.2653	0.0130
STM-25_(STM)	MH206	MH205	CONDUIT	10.8	0.4984	0.0130
STM-6_(STM)	CB02	MH202	CONDUIT	4.9	1.0205	0.0130
STM-61_(STM)	StormTechDC-780	MH203	CONDUIT	5.0	0.4000	0.0130
STM-7_(STM)	CB01	MH202	CONDUIT	4.9	1.0205	0.0130
STM-8_(STM)	CB05	MH208	CONDUIT	31.6	0.7601	0.0130
STM-9_(STM)	CB04	MH208	CONDUIT	53.5	0.4298	0.0130
STM-1_(STM)_1	CBMH207	Dummy-CBMH207	ORIFICE			
STM-12_(1)_(STM)_1	MH101	Dummy-MH101	ORIFICE			
STM-18_(STM)_1	CBMH102	Dummy-CBMH102	ORIFICE			
STM-24_(STM)_1	MH203	J1	ORIFICE			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	RECT_OPEN	0.55	0.21	0.14	0.38	1	115.24
C2	RECT_OPEN	0.55	0.21	0.14	0.38	1	138.97
C3	RECT_OPEN	0.55	0.21	0.14	0.38	1	136.41
C4	RECT_OPEN	0.55	0.21	0.14	0.38	1	111.62
C5	CIRCULAR	0.90	0.64	0.23	0.90	1	5785.05
C6	RECT_OPEN	0.55	0.21	0.14	0.38	1	110.42
C7	RECT_OPEN	0.55	0.21	0.14	0.38	1	191.72
C8	RECT_OPEN	0.55	0.21	0.14	0.38	1	111.24
C9	CIRCULAR	0.25	0.05	0.06	0.25	1	41.81
CB03Pipe	CIRCULAR	0.20	0.03	0.05	0.20	1	31.32
STM-1_(2)_(STM)	CIRCULAR	0.45	0.16	0.11	0.45	1	128.03
STM-1_(STM)_2	CIRCULAR	0.45	0.16	0.11	0.45	1	124.44

```
STM-11_(STM)      CIRCULAR            0.25     0.05     0.06     0.25        1    41.96
STM-12_(1)_(STM)_2 CIRCULAR             0.25     0.05     0.06     0.25        1    42.59
STM-12_(STM)      CIRCULAR            0.25     0.05     0.06     0.25        1    41.67
STM-13_(STM)      CIRCULAR            0.25     0.05     0.06     0.25        1    41.37
STM-14_(STM)      CIRCULAR            0.25     0.05     0.06     0.25        1    41.96
STM-15_(STM)      CIRCULAR            0.25     0.05     0.06     0.25        1    42.05
STM-16_(STM)      CIRCULAR            0.25     0.05     0.06     0.25        1    42.11
STM-18_(STM)_3    CIRCULAR            0.25     0.05     0.06     0.25        1    58.95
STM-19_(STM)      CIRCULAR            0.45     0.16     0.11     0.45        1   171.75
STM-2_(STM)       CIRCULAR            0.45     0.16     0.11     0.45        1   285.08
STM-22_(STM)      CIRCULAR            0.38     0.11     0.09     0.38        1    96.08
STM-23_(STM)      CIRCULAR            0.38     0.11     0.09     0.38        1    97.65
STM-24_(STM)_2    CIRCULAR            0.38     0.11     0.09     0.38        1    90.31
STM-25_(STM)      CIRCULAR            0.25     0.05     0.06     0.25        1    41.99
STM-6_(STM)       CIRCULAR            0.20     0.03     0.05     0.20        1    33.13
STM-61_(STM)      CIRCULAR            0.38     0.11     0.09     0.38        1   110.90
STM-7_(STM)       CIRCULAR            0.20     0.03     0.05     0.20        1    33.13
STM-8_(STM)       CIRCULAR            0.20     0.03     0.05     0.20        1    28.60
STM-9_(STM)       CIRCULAR            0.25     0.05     0.06     0.25        1    38.99


****************
Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 10/15/2024 00:00:00
Ending Date .............. 10/23/2024 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 2.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 8
Head Tolerance ........... 0.001500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Initial LID Storage ......         0.001         0.526
Total Precipitation ......         0.083        86.000
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.011        11.755
Surface Runoff ...........         0.072        74.330
Final Storage ............         0.001         0.526
Continuity Error (%) .....        -0.099


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.072         0.720
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.004         0.036
External Outflow .........         0.075         0.749
Flooding Loss ............         0.001         0.009
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.004         0.041
Final Stored Volume ......         0.004         0.041
Continuity Error (%) .....        -0.291
```

PCSWMM Model Results **Stress Test Event**

425 Culdaff Road

Novatech Project 123194 February 28, 2025

```
*************************
Highest Continuity Errors
*************************
Node CB07 (-1.40%)
Node CB06 (-1.01%)


***************************
Time-Step Critical Elements
***************************
None


********************************
Highest Flow Instability Indexes
********************************
Link STM-1_(STM)_1 (147)
Link STM-24_(STM)_1 (118)
Link STM-18_(STM)_1 (3)


**********************************
Most Frequent Nonconverging Nodes
**********************************
Node CuldaffRoad-Outfall (0.02%)
Node DerreenAve-Outfall (0.02%)
Node LD1001 (0.02%)
Node CB07 (0.02%)
Node CB06 (0.00%)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.62 sec
Average Time Step           :     2.00 sec
Maximum Time Step           :     2.00 sec
% of Time in Steady State   :     0.00
Average Iterations per Step :     2.00
% of Steps Not Converging   :     0.02
Time Step Frequencies       :
    2.000 -  1.516 sec      :    99.99 %
    1.516 -  1.149 sec      :     0.01 %
    1.149 -  0.871 sec      :     0.00 %
    0.871 -  0.660 sec      :     0.00 %
    0.660 -  0.500 sec      :     0.00 %


***************************
Subcatchment Runoff Summary
***************************
```

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
A-01	86.00	0.00	0.00	10.12	75.93	7.95	75.93	0.11	72.72	0.883
A-02	86.00	0.00	0.00	6.08	80.00	5.11	80.00	0.06	39.72	0.930
A-03	86.00	0.00	0.00	8.86	77.24	7.50	77.24	0.02	17.20	0.898
A-04	86.00	0.00	0.00	19.36	66.73	15.93	66.73	0.01	10.28	0.776
A-05	86.00	0.00	0.00	0.00	86.08	0.00	86.08	0.01	10.12	1.001
A-06	86.00	0.00	0.00	6.10	79.97	5.09	79.97	0.09	63.94	0.930
A-07	86.00	0.00	0.00	6.56	79.51	5.49	79.51	0.09	61.11	0.925
A-08	86.00	0.00	0.00	43.04	11.19	43.03	43.03	0.04	37.31	0.500
A-09	86.00	0.00	0.00	35.88	25.83	50.23	50.23	0.00	3.25	0.584
A-10	86.00	0.00	0.00	44.22	9.47	41.83	41.83	0.03	24.91	0.486
D-01	86.00	0.00	0.00	36.13	26.70	49.96	49.96	0.00	3.63	0.581
R-01	86.00	0.00	0.00	0.00	86.12	0.00	86.12	0.01	10.12	1.001
R-02	86.00	0.00	0.00	0.00	86.12	0.00	86.12	0.06	42.26	1.001
R-03	86.00	0.00	0.00	0.00	86.12	0.00	86.12	0.04	28.57	1.001
R-04	86.00	0.00	0.00	0.00	86.12	0.00	86.12	0.02	11.31	1.001
R-05	86.00	0.00	0.00	0.00	86.12	0.00	86.12	0.02	11.31	1.001
R-06	86.00	0.00	0.00	0.00	86.12	0.00	86.12	0.02	10.71	1.001
R-07A	86.00	0.00	0.00	0.00	86.12	0.00	86.12	0.01	5.36	1.001
R-07B	86.00	0.00	0.00	0.00	86.12	0.00	86.12	0.01	5.36	1.001

R-08	86.00	0.00	0.00	0.00	86.12	0.00	86.12	0.02	17.26	1.001
R-09	86.00	0.00	0.00	0.00	86.13	0.00	86.13	0.02	11.31	1.002
R-10	86.00	0.00	0.00	0.00	86.12	0.00	86.12	0.04	24.40	1.001

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
CB06	JUNCTION	0.42	2.44	108.46	0 01:10	2.44
CB07	JUNCTION	0.01	2.01	108.47	0 01:10	2.01
CB08	JUNCTION	0.01	1.12	107.82	0 01:25	1.12
CB09	JUNCTION	0.00	0.82	107.82	0 01:24	0.82
Dummy-CBMH102	JUNCTION	0.00	0.09	106.47	0 01:24	0.09
Dummy-CBMH207	JUNCTION	0.36	0.59	106.26	0 01:10	0.58
Dummy-MH101	JUNCTION	0.30	0.42	106.54	0 01:10	0.42
J1	JUNCTION	0.02	0.23	106.25	0 01:10	0.23
LD1001	JUNCTION	0.01	1.76	108.48	0 01:10	1.75
LD1002	JUNCTION	0.00	0.93	107.82	0 01:24	0.93
CuldaffRoad-Outfall	OUTFALL	1.50	1.50	105.78	0 00:00	1.50
DerreenAve-Outfall	OUTFALL	0.88	0.88	106.03	0 00:00	0.88
CB01	STORAGE	0.30	0.38	107.28	0 01:10	0.38
CB02	STORAGE	0.30	0.40	107.30	0 01:10	0.40
CB03	STORAGE	0.29	1.71	108.51	0 01:17	1.71
CB04	STORAGE	0.31	1.72	108.52	0 01:20	1.72
CB05	STORAGE	0.31	1.74	108.54	0 01:21	1.74
CBMH102	STORAGE	0.01	1.44	107.82	0 01:24	1.44
CBMH103	STORAGE	0.01	1.31	107.82	0 01:24	1.31
CBMH207	STORAGE	0.37	2.79	108.46	0 01:20	2.79
Ext-MH85	STORAGE	0.17	0.23	106.27	0 01:10	0.23
MH101	STORAGE	0.51	2.57	108.50	0 01:10	2.55
MH201	STORAGE	0.46	0.53	106.10	0 01:10	0.53
MH202	STORAGE	0.39	0.61	106.25	0 01:10	0.61
MH203	STORAGE	0.33	2.54	108.25	0 01:12	2.53
MH204	STORAGE	0.31	2.31	108.26	0 01:12	2.31
MH205	STORAGE	0.31	2.10	108.26	0 01:13	2.09
MH206	STORAGE	0.31	1.91	108.26	0 01:13	1.91
MH208	STORAGE	0.31	2.50	108.47	0 01:20	2.50
StormTechDC-780	STORAGE	1.01	3.08	108.25	0 01:12	3.08

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
CB06	JUNCTION	22.02	73.08	0 01:09	0.0319	0.0976	-0.999
CB07	JUNCTION	37.31	48.87	0 01:09	0.0392	0.057	-1.382
CB08	JUNCTION	36.22	42.78	0 01:09	0.0457	0.0815	0.006
CB09	JUNCTION	24.40	24.40	0 01:10	0.0353	0.0353	-0.032
Dummy-CBMH102	JUNCTION	0.00	17.07	0 01:24	0	0.106	-0.092
Dummy-CBMH207	JUNCTION	0.00	73.59	0 01:22	0	0.354	-0.122
Dummy-MH101	JUNCTION	0.00	20.57	0 01:10	0	0.084	-0.005
J1	JUNCTION	0.00	26.84	0 01:12	0	0.13	-0.023
LD1001	JUNCTION	11.31	37.32	0 01:08	0.0164	0.0172	-0.701
LD1002	JUNCTION	0.00	24.65	0 01:04	0	0.0359	0.067
CuldaffRoad-Outfall	OUTFALL	0.00	56.16	0 01:10	0	0.223	0.000
DerreenAve-Outfall	OUTFALL	0.00	125.52	0 01:10	0	0.562	0.000
CB01	STORAGE	10.28	10.28	0 01:10	0.0133	0.0133	-0.000
CB02	STORAGE	17.20	17.20	0 01:10	0.0232	0.0232	-0.000
CB03	STORAGE	72.72	72.72	0 01:10	0.106	0.106	0.050
CB04	STORAGE	61.11	61.11	0 01:10	0.0851	0.0851	0.721
CB05	STORAGE	63.94	63.94	0 01:10	0.0896	0.0896	0.530
CBMH102	STORAGE	0.00	26.07	0 01:04	0	0.106	0.092
CBMH103	STORAGE	17.26	43.82	0 01:03	0.025	0.106	0.005
CBMH207	STORAGE	39.72	96.37	0 01:04	0.0552	0.346	0.112
Ext-MH85	STORAGE	24.08	56.36	0 01:10	0.0332	0.223	0.001

MH101	STORAGE	3.63	76.99	0	01:09	0.004	0.0933	0.088
MH201	STORAGE	0.00	125.48	0	01:10	0	0.539	-0.091
MH202	STORAGE	0.00	125.93	0	01:10	0	0.516	0.005
MH203	STORAGE	0.00	39.88	0	01:10	0	0.128	-0.053
MH204	STORAGE	28.57	68.08	0	01:03	0.0413	0.117	-0.135
MH205	STORAGE	42.26	57.92	0	01:03	0.0612	0.0763	0.290
MH206	STORAGE	10.12	23.85	0	01:03	0.0146	0.0152	0.356
MH208	STORAGE	0.00	118.54	0	01:03	0	0.28	-0.406
StormTechDC-780	STORAGE	0.00	5.26	0	01:03	0	0.0258	-0.004

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
CB06	JUNCTION	1.20	1.660	0.000
CB07	JUNCTION	0.62	1.113	0.000
CB08	JUNCTION	0.69	0.307	0.448
CB09	JUNCTION	0.26	0.070	0.480
LD1001	JUNCTION	0.55	1.005	0.125
LD1002	JUNCTION	0.44	0.174	0.495
CBMH102	STORAGE	1.30	0.687	0.436
CBMH103	STORAGE	1.01	0.498	0.421
MH206	STORAGE	0.85	1.358	0.341

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate LPS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 ltr	Maximum Ponded Depth Meters
CB06	0.19	61.28	0 01:11	0.009	0.100

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
CB01	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	10.26
CB02	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	17.19
CB03	0.000	0.1	0.0	0.0	0.019	43.8	0 01:17	51.34
CB04	0.000	0.1	0.0	0.0	0.019	40.6	0 01:20	33.82
CB05	0.000	0.2	0.0	0.0	0.025	53.4	0 01:21	41.18
CBMH102	0.000	0.6	0.0	0.0	0.002	76.7	0 01:24	17.07
CBMH103	0.000	0.5	0.0	0.0	0.001	75.6	0 01:24	26.07
CBMH207	0.000	1.4	0.0	0.0	0.010	34.2	0 01:20	73.59
Ext-MH85	0.000	6.1	0.0	0.0	0.000	8.3	0 01:10	56.16
MH101	0.001	18.4	0.0	0.0	0.003	92.6	0 01:10	34.54
MH201	0.001	15.6	0.0	0.0	0.001	17.9	0 01:10	125.52
MH202	0.000	13.6	0.0	0.0	0.001	20.9	0 01:10	125.48
MH203	0.000	10.8	0.0	0.0	0.003	83.7	0 01:12	29.12
MH204	0.000	11.0	0.0	0.0	0.003	81.5	0 01:12	39.88
MH205	0.000	11.4	0.0	0.0	0.002	77.9	0 01:13	42.72
MH206	0.000	13.6	0.0	0.0	0.002	84.8	0 01:13	16.14
MH208	0.000	11.0	0.0	0.0	0.003	87.9	0 01:20	66.41
StormTechDC-780	0.023	99.6	0.0	0.0	0.023	100.0	0 00:48	0.88

****
Outfall Loading Summary

****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
CuldaffRoad-Outfall	2.37	13.73	56.16	0.223
DerreenAve-Outfall	66.00	1.23	125.52	0.562
System	34.18	14.96	181.29	0.785

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	24.65	0 01:04	0.44	0.21	1.00
C2	CONDUIT	23.26	0 01:03	0.37	0.17	1.00
C3	CONDUIT	26.68	0 01:03	0.25	0.20	1.00
C4	CONDUIT	26.07	0 01:04	0.17	0.23	1.00
C5	CONDUIT	56.16	0 01:10	0.16	0.01	0.53
C6	CONDUIT	20.39	0 01:08	0.34	0.18	1.00
C7	CONDUIT	40.79	0 01:09	0.20	0.21	1.00
C8	CONDUIT	56.36	0 01:09	0.27	0.51	1.00
C9	CONDUIT	6.52	0 01:07	0.13	0.16	1.00
CB03Pipe	CONDUIT	51.34	0 01:04	1.63	1.64	1.00
STM-1_(2)_(STM)	CONDUIT	125.48	0 01:10	1.22	0.98	0.62
STM-1_(STM)_2	CONDUIT	73.66	0 01:21	0.80	0.59	0.65
STM-11_(STM)	CONDUIT	12.34	0 01:10	0.25	0.29	1.00
STM-12_(1)_(STM)_2	CONDUIT	20.57	0 01:11	0.90	0.48	0.47
STM-12_(STM)	CONDUIT	18.55	0 01:10	0.38	0.45	1.00
STM-13_(STM)	CONDUIT	5.74	0 01:08	0.13	0.14	1.00
STM-14_(STM)	CONDUIT	1.15	0 01:20	0.03	0.03	1.00
STM-15_(STM)	CONDUIT	1.92	0 01:11	0.05	0.05	1.00
STM-16_(STM)	CONDUIT	6.95	0 01:09	0.15	0.17	1.00
STM-18_(STM)_3	CONDUIT	17.07	0 01:25	1.04	0.29	0.37
STM-19_(STM)	CONDUIT	66.41	0 01:46	0.70	0.39	1.00
STM-2_(STM)	CONDUIT	125.52	0 01:10	1.35	0.44	0.57
STM-22_(STM)	CONDUIT	39.70	0 01:03	0.63	0.41	1.00
STM-23_(STM)	CONDUIT	39.88	0 01:10	0.56	0.41	1.00
STM-24_(STM)_2	CONDUIT	26.89	0 01:12	0.69	0.30	0.64
STM-25_(STM)	CONDUIT	16.14	0 01:03	0.71	0.38	1.00
STM-6_(STM)	CONDUIT	17.19	0 01:10	1.07	0.52	0.51
STM-61_(STM)	CONDUIT	5.26	0 01:03	0.29	0.05	1.00
STM-7_(STM)	CONDUIT	10.26	0 01:10	0.93	0.31	0.38
STM-8_(STM)	CONDUIT	41.18	0 01:03	1.31	1.44	1.00
STM-9_(STM)	CONDUIT	33.82	0 01:04	0.82	0.87	1.00
STM-1_(STM)_1	ORIFICE	73.59	0 01:22			1.00
STM-12_(1)_(STM)_1	ORIFICE	20.57	0 01:10			1.00
STM-18_(STM)_1	ORIFICE	17.07	0 01:24			1.00
STM-24_(STM)_1	ORIFICE	26.84	0 01:12			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.92	0.02	0.00	0.06	0.00	0.00	0.00	0.05	0.00
C2	1.00	0.90	0.02	0.00	0.08	0.00	0.00	0.00	0.77	0.00
C3	1.00	0.85	0.06	0.00	0.09	0.00	0.00	0.00	0.12	0.00
C4	1.00	0.00	0.85	0.00	0.15	0.00	0.00	0.00	0.99	0.00
C5	1.00	0.00	0.93	0.00	0.07	0.00	0.00	0.00	1.00	0.00
C6	1.00	0.93	0.00	0.00	0.01	0.00	0.00	0.07	0.00	0.00
C7	1.00	0.00	0.93	0.00	0.07	0.00	0.00	0.00	0.98	0.00
C8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C9	1.00	0.99	0.00	0.00	0.01	0.00	0.00	0.00	0.99	0.00

CB03Pipe	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
STM-1_(2)_(STM)	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.01	0.00	0.00
STM-1_(STM)_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-11_(STM)	1.00	0.99	0.00	0.00	0.01	0.00	0.00	0.00	0.99	0.00
STM-12_(1)_(STM)_2	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-12_(STM)	1.00	0.87	0.12	0.00	0.01	0.00	0.00	0.00	0.00	0.00
STM-13_(STM)	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.99	0.00
STM-14_(STM)	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STM-15_(STM)	1.00	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.99	0.00
STM-16_(STM)	1.00	0.99	0.00	0.00	0.01	0.00	0.00	0.00	0.99	0.00
STM-18_(STM)_3	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
STM-19_(STM)	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
STM-2_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-22_(STM)	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
STM-23_(STM)	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
STM-24_(STM)_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-25_(STM)	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
STM-6_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-61_(STM)	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
STM-7_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-8_(STM)	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00
STM-9_(STM)	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full Both Ends	Hours Full Upstream	Hours Full Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C1	0.62	0.62	0.82	0.01	0.01
C2	0.82	0.82	1.12	0.01	0.01
C3	1.12	1.12	1.42	0.01	0.01
C4	1.42	1.42	1.60	0.01	0.01
C5	0.01	0.01	191.99	0.01	0.01
C6	0.72	0.72	0.83	0.01	0.01
C7	0.97	0.97	1.60	0.01	0.01
C8	1.70	1.70	2.46	0.01	0.01
C9	1.10	1.10	1.30	0.01	0.01
CB03Pipe	0.93	0.93	0.94	0.06	0.05
STM-11_(STM)	1.03	1.03	1.20	0.01	0.01
STM-12_(STM)	1.25	1.25	1.43	0.01	0.01
STM-13_(STM)	0.55	0.55	0.62	0.01	0.01
STM-14_(STM)	0.26	0.26	0.44	0.01	0.01
STM-15_(STM)	0.46	0.46	0.69	0.01	0.01
STM-16_(STM)	0.80	0.80	1.01	0.01	0.01
STM-19_(STM)	1.04	1.04	1.09	0.01	0.01
STM-22_(STM)	0.89	0.89	1.01	0.01	0.01
STM-23_(STM)	1.07	1.07	1.17	0.01	0.01
STM-25_(STM)	0.85	0.85	0.88	0.01	0.01
STM-61_(STM)	1.15	1.15	1.17	0.01	0.01
STM-8_(STM)	0.93	0.93	0.97	0.13	0.12
STM-9_(STM)	0.92	0.92	0.96	0.01	0.01

Analysis begun on: Fri Feb 28 09:23:09 2025
Analysis ended on: Fri Feb 28 09:23:17 2025
Total elapsed time: 00:00:08

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

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123194 - PRELIMINARY

OTTAWA, ON, CANADA

DC-780 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH DC-780.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 50 mm (2").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.
10. MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE. DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
11. ADS DOES NOT DESIGN OR PROVIDE MEMBRANE LINER SYSTEMS. TO MINIMIZE THE LEAKAGE POTENTIAL OF LINER SYSTEMS, THE MEMBRANE LINER SYSTEM SHOULD BE DESIGNED BY A KNOWLEDGEABLE GEOTEXTILE PROFESSIONAL AND INSTALLED BY A QUALIFIED CONTRACTOR.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE DC-780 CHAMBER SYSTEM

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

NOTES FOR CONSTRUCTION EQUIPMENT

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

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

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

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PROPOSED LAYOUT

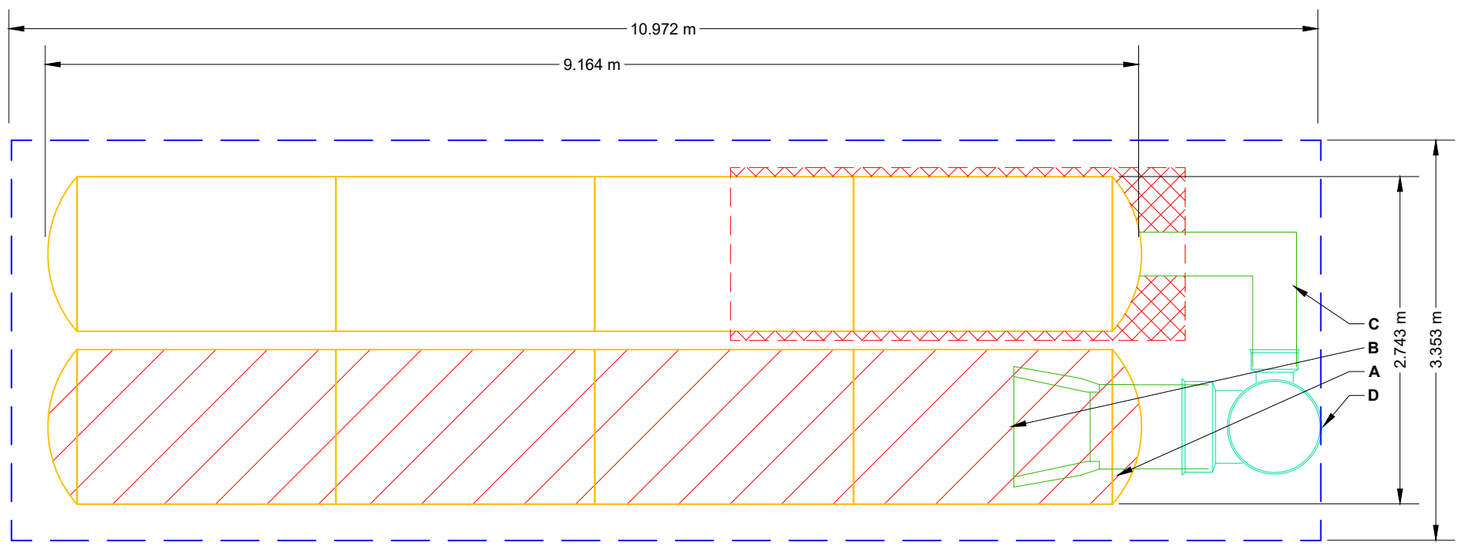
8	STORMTECH DC-780 CHAMBERS
4	STORMTECH DC-780 END CAPS
152	STONE ABOVE (mm)
229	STONE BELOW (mm)
40	STONE VOID
23.3	INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 107.083 (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)
36.8	SYSTEM AREA (m²)
28.6	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS:

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	110.588
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	107.540
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	107.388
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	107.388
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	107.388
TOP OF STONE:	107.083
TOP OF DC-780 CHAMBER:	106.931
300 mm x 300 mm TOP MANIFOLD INVERT:	106.486
600 mm ISOLATOR ROW PLUS INVERT:	106.171
BOTTOM OF DC-780 CHAMBER:	106.169
BOTTOM OF STONE:	105.940

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED EZ END CAP	A	600 mm BOTTOM PREFABRICATED EZ END CAP, PART#: SC740ECEZ / TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	3 mm	
FLAMP	B	INSTALL FLAMP ON 600 mm ACCESS PIPE / PART#: SC74024RAMP		
MANIFOLD	C	300 mm x 300 mm TOP MANIFOLD, ADS N-12	318 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	D	750 mm DIAMETER (610 mm SUMP MIN)		65 L/s IN



ISOLATOR ROW PLUS (SEE DETAIL)

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

BED LIMITS

NOTES

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

123194 - PRELIMINARY

OTTAWA, ON, CANADA

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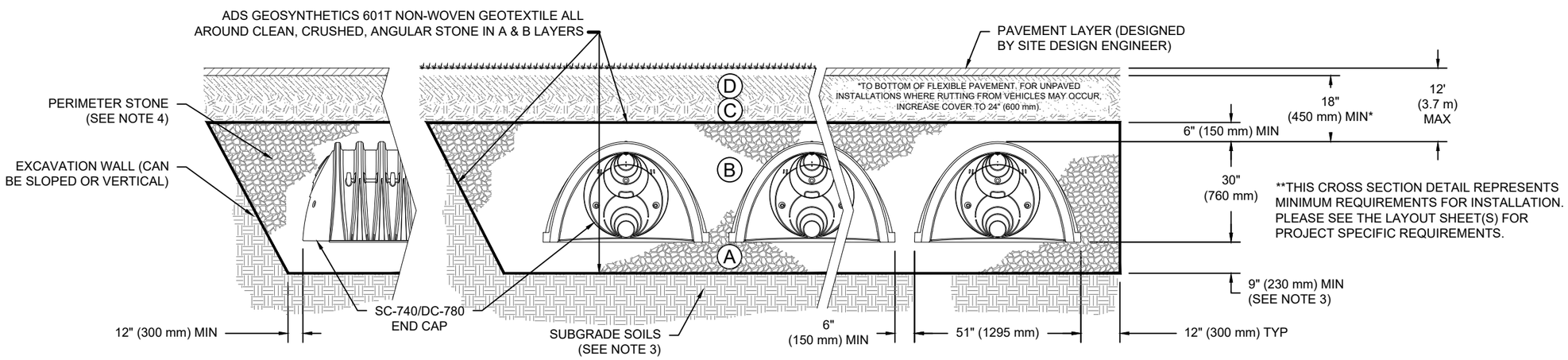
SCALE = 1 : 50

ACCEPTABLE FILL MATERIALS: STORMTECH DC-780 CHAMBER SYSTEMS

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

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. DC-780 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS. REFERENCE STORMTECH DESIGN MANUAL FOR BEARING CAPACITY GUIDANCE.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

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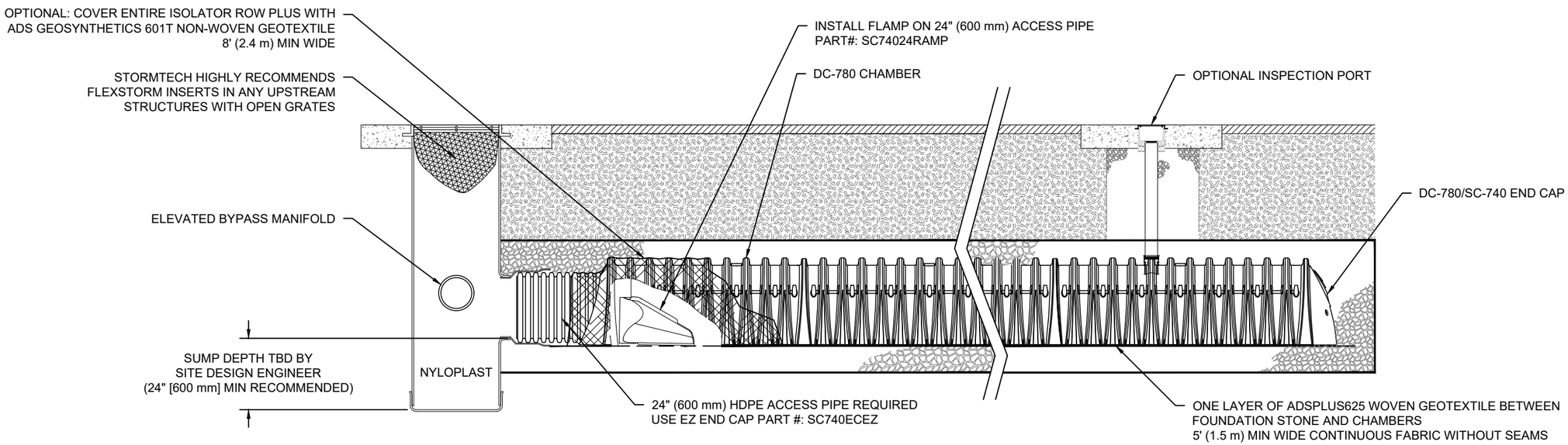

DC-780 ISOLATOR ROW PLUS DETAIL

NTS

INSPECTION & MAINTENANCE

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

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

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

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

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

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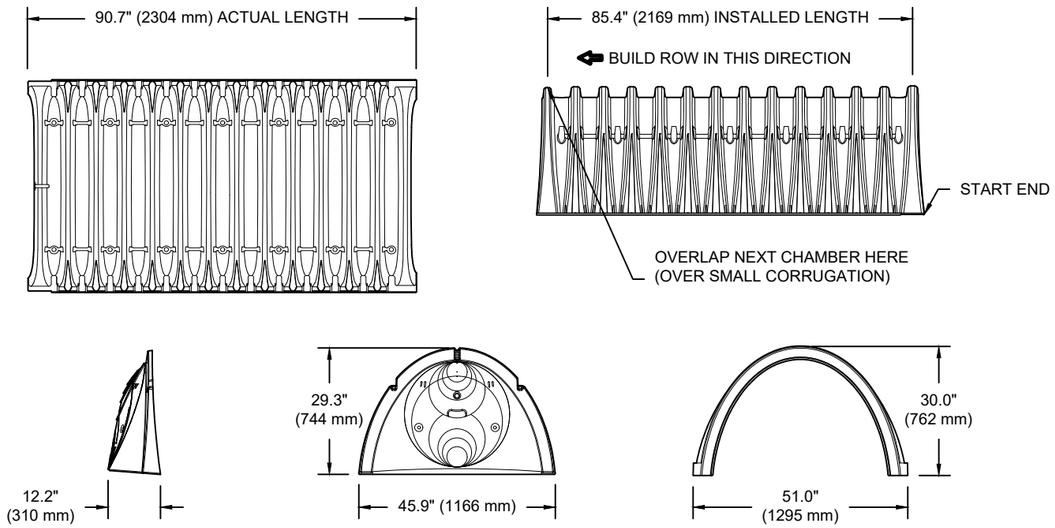
DC-780 TECHNICAL SPECIFICATION

NTS

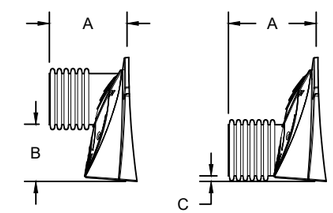


NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	46.2 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	78.4 CUBIC FEET	(2.20 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

NOMINAL END CAP SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	45.9" X 29.3" X 9.6"	(1166 mm X 744 mm X 244 mm)
END CAP STORAGE	2.6 CUBIC FEET	(0.07 m³)
MINIMUM INSTALLED STORAGE**	14.4 CUBIC FEET	(0.40 m³)
WEIGHT	11.7 lbs.	(5.3 kg)



* ASSUMES 6" (152 mm) STONE ABOVE, 9" (229 mm) BELOW, AND 6" (152 mm) BETWEEN CHAMBERS

**ASSUMES 6" (152 mm) STONE ABOVE, 9" (229 mm) BELOW END CAPS, 6" (152 mm) BETWEEN ROWS, 12" (305 mm) BEYOND END CAPS

PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE-CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T /SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740ECEZ*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-800-821-6710.

* FOR THE SC740ECEZ THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

123194 - PRELIMINARY
OTTAWA, ON, CANADA
DATE: 10/11/2024 | DRAWN: U
PROJECT #: | CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

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HILLIARD, OH 43026
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NYLOPLAST DRAIN BASIN

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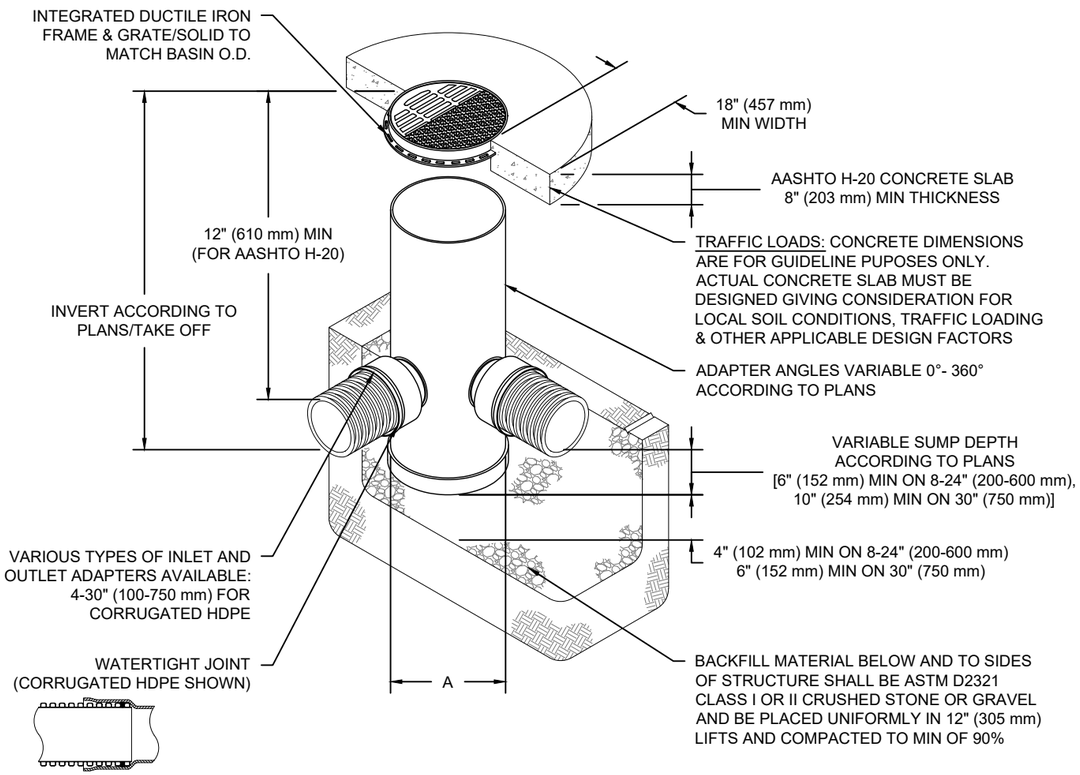

NOTES

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

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

123194 - PRELIMINARY

OTTAWA, ON, CANADA

DATE: 10/11/2024 | DRAWN: U

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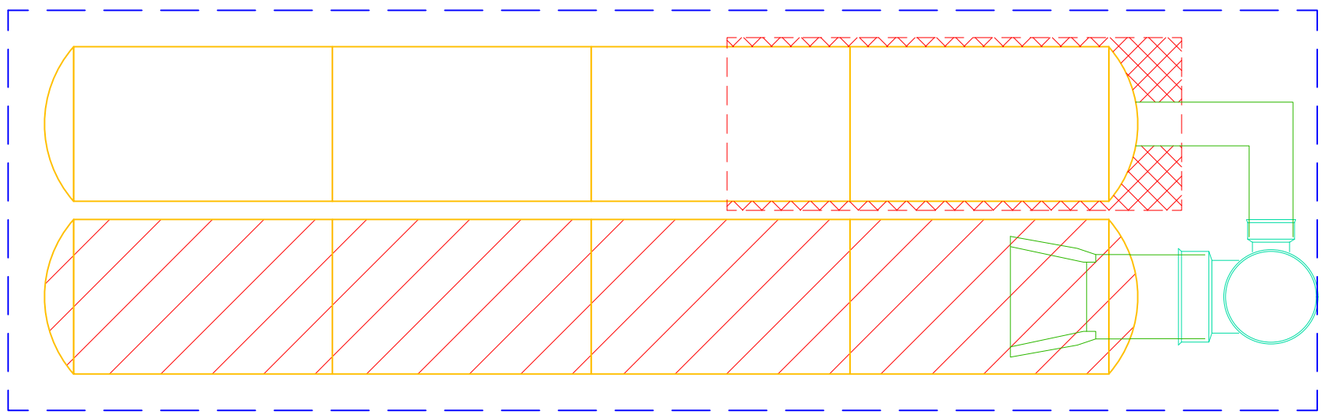
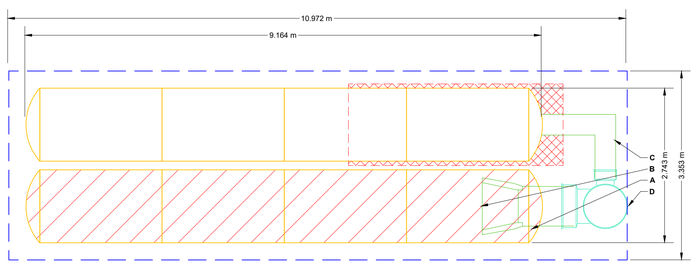


PROPOSED LAYOUT	
8	STORMTECH DC-780 CHAMBERS
4	STORMTECH DC-780 END CAPS
152	STONE ABOVE (mm)
229	STONE BELOW (mm)
40	STONE VOID
23.3	INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 107.083 (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)
36.8	SYSTEM AREA (m²)
28.6	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS:	
MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	110.585
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	107.540
MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	107.388
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	107.388
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	107.388
TOP OF STONE:	107.083
TOP OF DC-780 CHAMBER:	106.931
300 mm x 300 mm TOP MANIFOLD INVERT:	106.486
600 mm ISOLATOR ROW PLUS INVERT:	106.171
BOTTOM OF DC-780 CHAMBER:	106.169
BOTTOM OF STONE:	105.940

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED EZ END CAP	A	600 mm BOTTOM PREFABRICATED EZ END CAP, PART#: SC740ECEZ / TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	3 mm	
FLAMP	B	INSTALL FLAMP ON 600 mm ACCESS PIPE / PART#: SC74024RAMP		
MANIFOLD	C	300 mm x 300 mm TOP MANIFOLD, ADS N-12	318 mm	
NYLOPLAST (INLET W/ ISO PLUS ROW)	D	750 mm DIAMETER (610 mm SUMP MIN)		65 L/s IN



ISOLATOR ROW PLUS (SEE DETAIL)

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

BED LIMITS

NOTES

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

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DC-780 TECHNICAL SPECIFICATION

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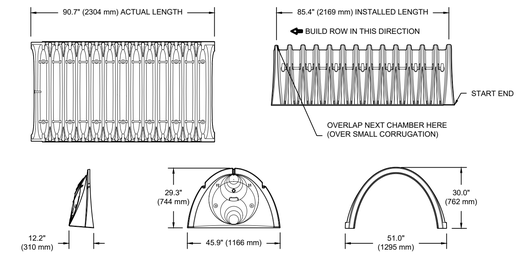


NOMINAL CHAMBER SPECIFICATIONS

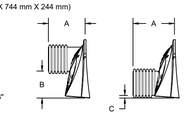
SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	46.2 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	78.4 CUBIC FEET	(2.20 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

NOMINAL END CAP SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	45.9" X 29.3" X 9.6"	(1166 mm X 744 mm X 244 mm)
END CAP STORAGE	2.6 CUBIC FEET	(0.07 m³)
MINIMUM INSTALLED STORAGE**	14.4 CUBIC FEET	(0.40 m³)
WEIGHT	11.7 lbs.	(5.3 kg)

* ASSUMES 6" (152 mm) STONE ABOVE, 9" (229 mm) BELOW, AND 6" (152 mm) BETWEEN CHAMBERS
**ASSUMES 6" (152 mm) STONE ABOVE, 9" (229 mm) BELOW END CAPS, 6" (152 mm) BETWEEN ROWS, 12" (305 mm) BEYOND END CAPS

PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE-CORED END CAPS END WITH "PC"



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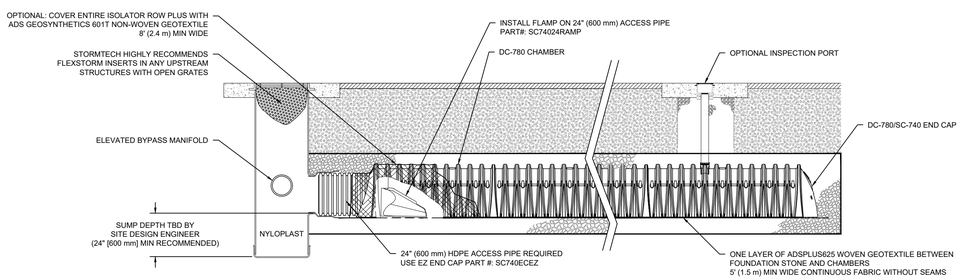
NOTE: ALL DIMENSIONS ARE NOMINAL

2 DC-780 TECHNICAL SPECIFICATION



DC-780 ISOLATOR ROW PLUS DETAIL

NTS

3 DC-780 ISOLATOR ROW PLUS DETAIL

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INSPECTION & MAINTENANCE

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

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

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

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

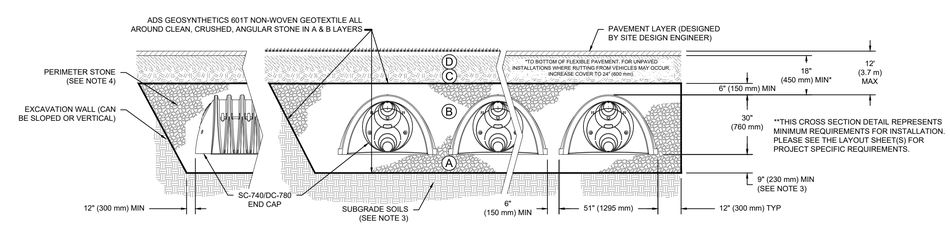
NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

ACCEPTABLE FILL MATERIALS: STORMTECH DC-780 CHAMBER SYSTEMS

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

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. DC-780 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS. REFERENCE STORMTECH DESIGN MANUAL FOR BEARING CAPACITY GUIDANCE.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

1 DC-780 CROSS SECTION DETAIL

DATE: 10/11/2024
PROJECT #:
NOT TO SCALE
DRAWN: U
CHECKED: N/A
REV:

123194 - PRELIMINARY

OTTAWA, ON, CANADA

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SHEET
1 OF 1

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 FEBRUARY 28, 2025).
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.)

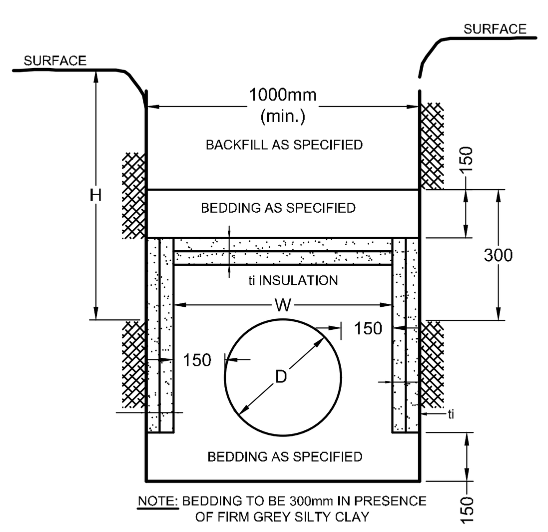
NOTE:
- MINIMUM PERFORMANCE GRADED (PG) 58-34 ASPHALT CEMENT.

SEWER & WATERMAIN INSULATION NOTES:

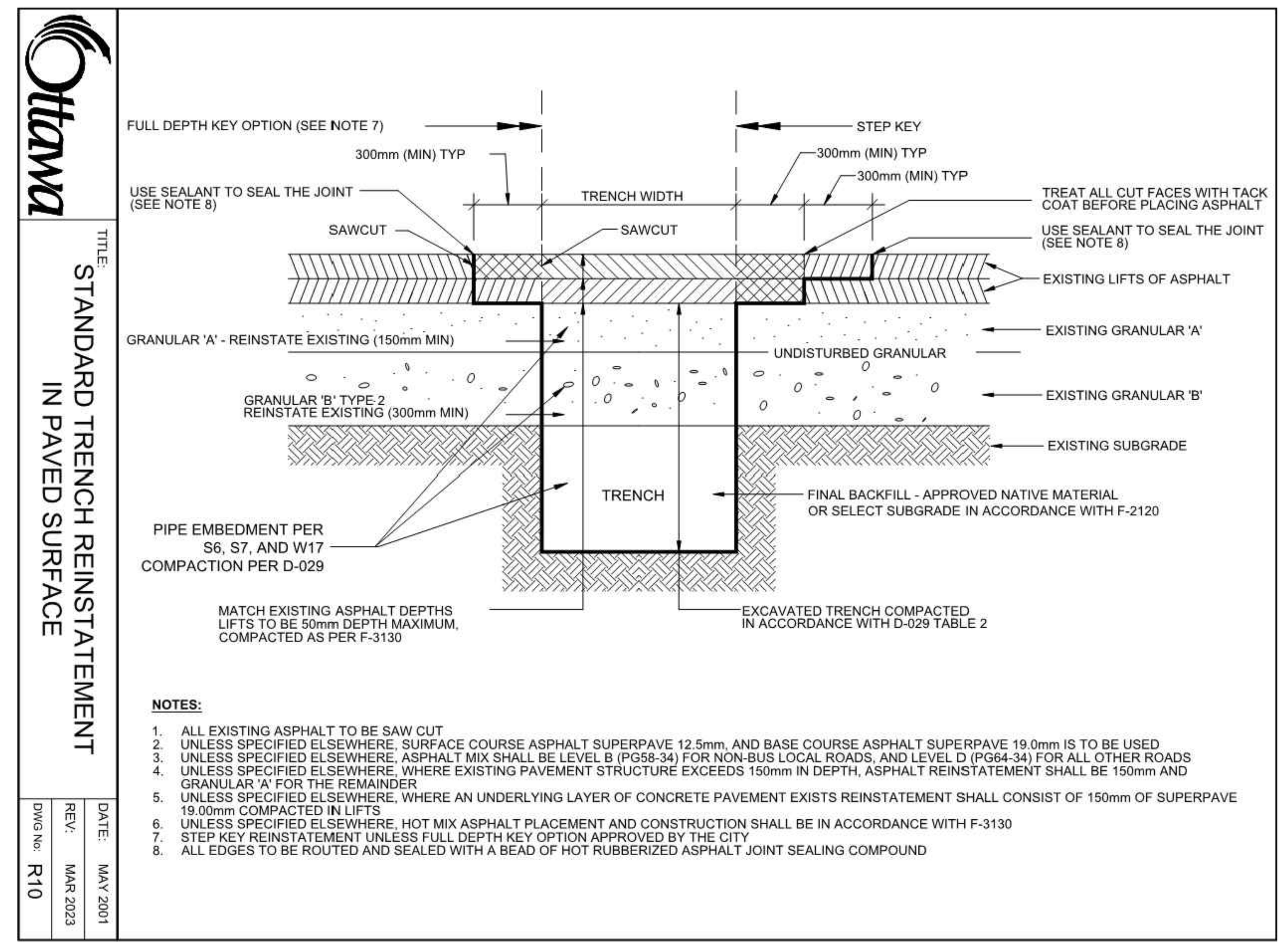
1. INSULATE ALL SEWER PIPES THAT HAVE LESS THAN 2.0m COVER AND ALL WATERMAIN WITH LESS THAN 2.4m OF COVER WITH EXPANDED POLYSTYRENE INSULATION AS PER OPSD 1109.030.
2. THE THICKNESS OF INSULATION SHALL BE THE EQUIVALENT OF 25mm FOR EVERY 300mm REDUCTION IN THE REQUIRED DEPTH OF COVER WITH 50mm MINIMUM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

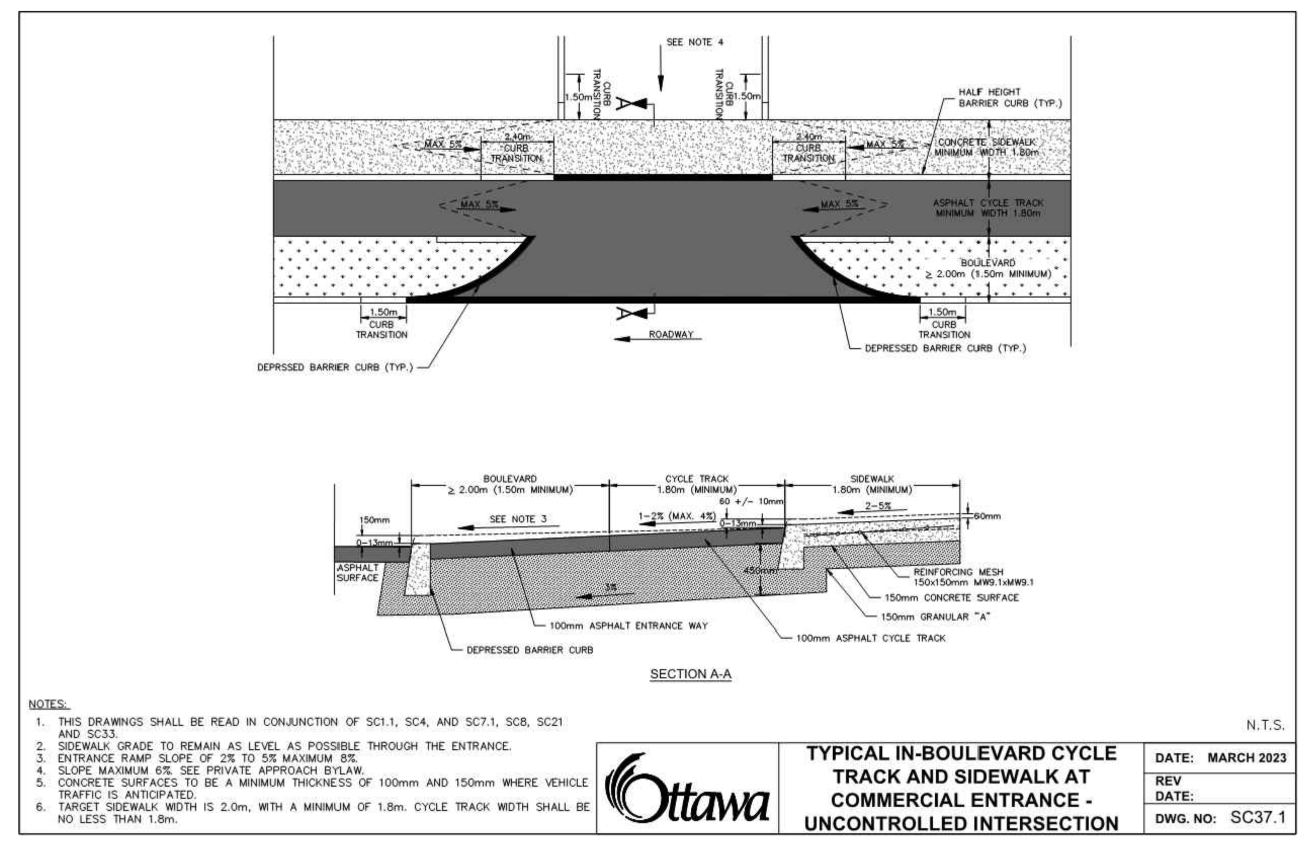
COVER SEWER / WATER (mm)	INSULATION THICKNESS (mm)
2000-1700 / 2400-2100	50
1700-1400 / 2100-1800	75
1400-1100 / 1800-1500	100

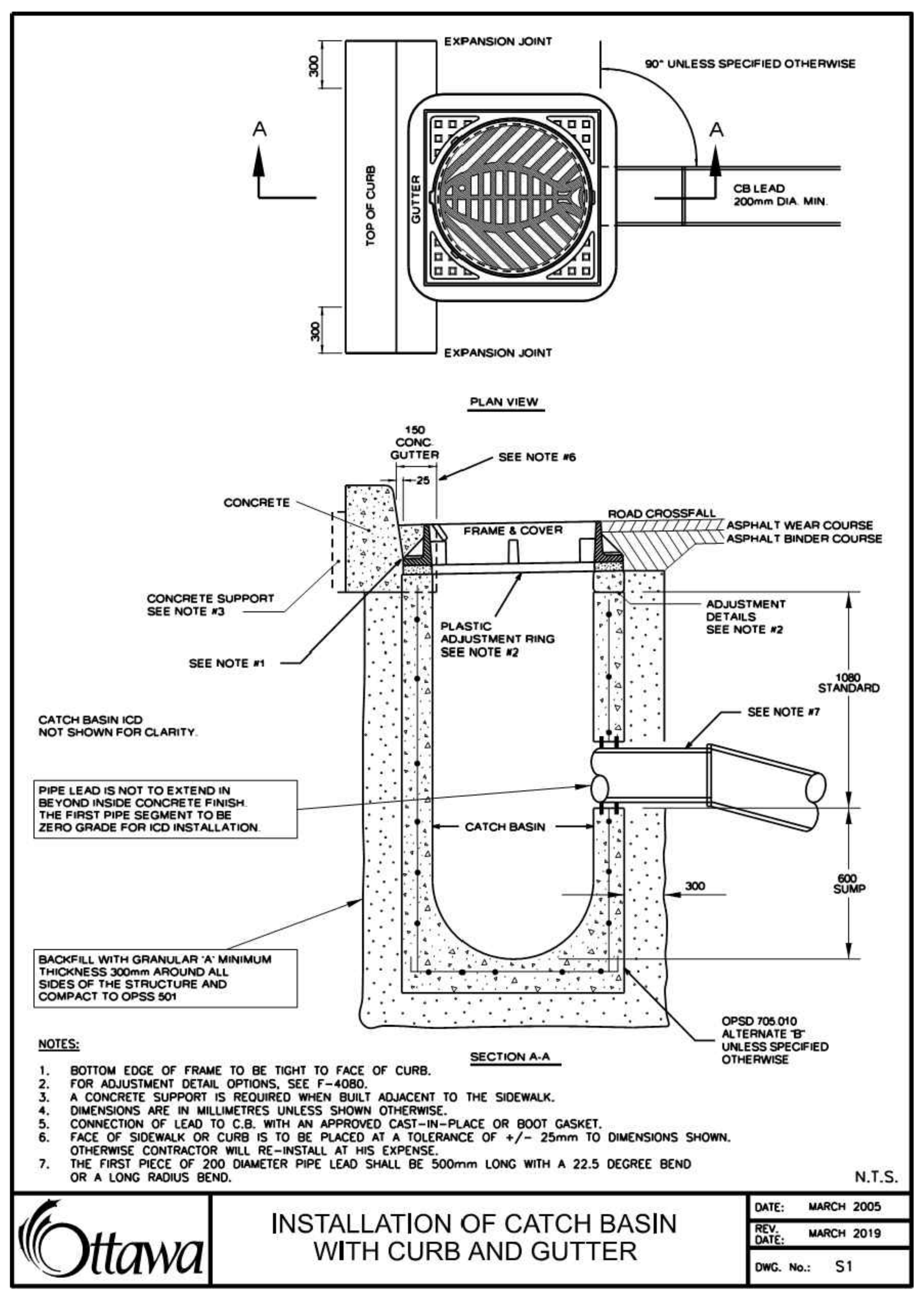
T = THICKNESS OF INSULATION (mm)
W = WIDTH OF INSULATION (mm)
W = D + 300 (1000 min.)
D = O.D OF PIPE (mm)

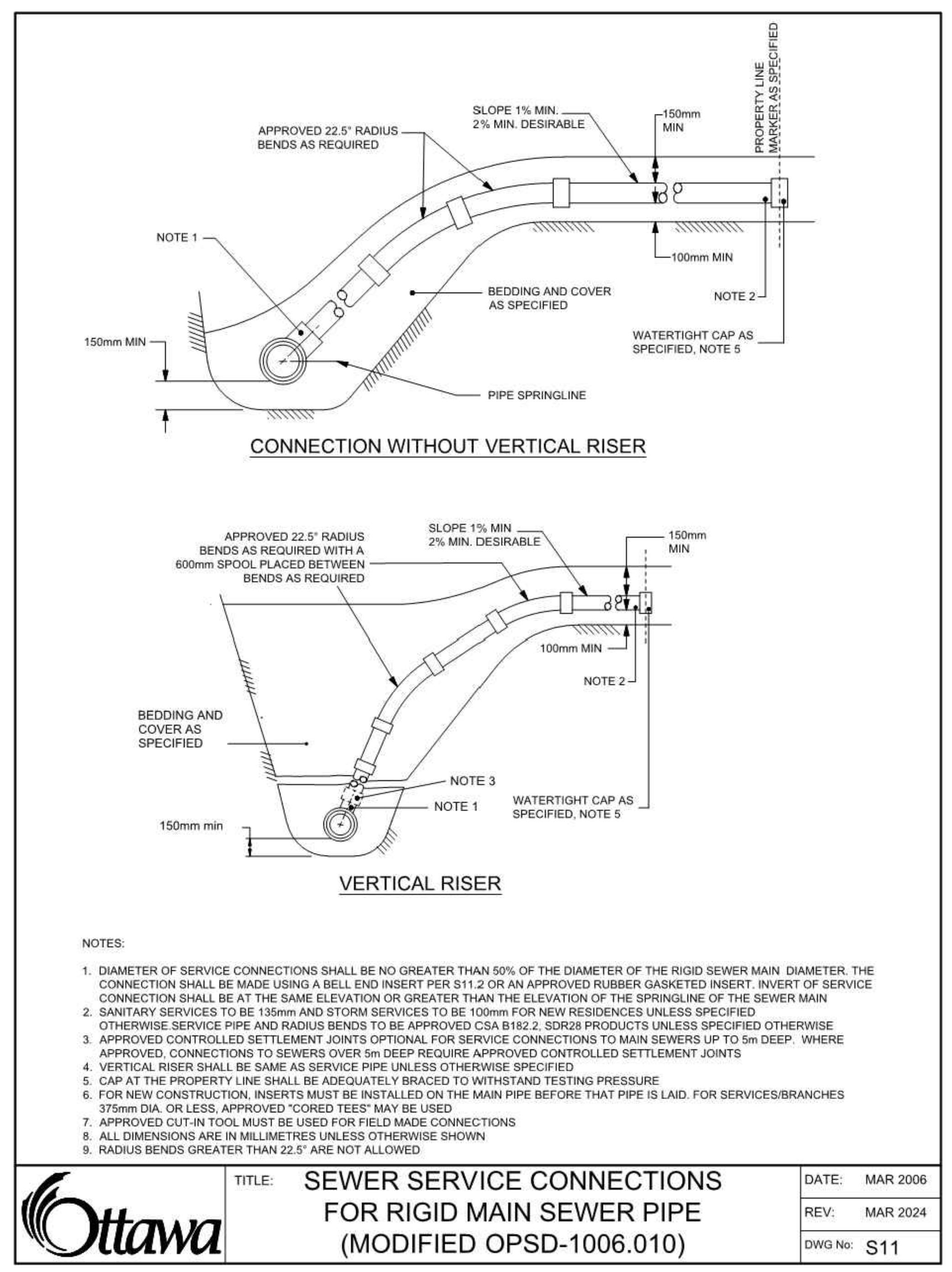


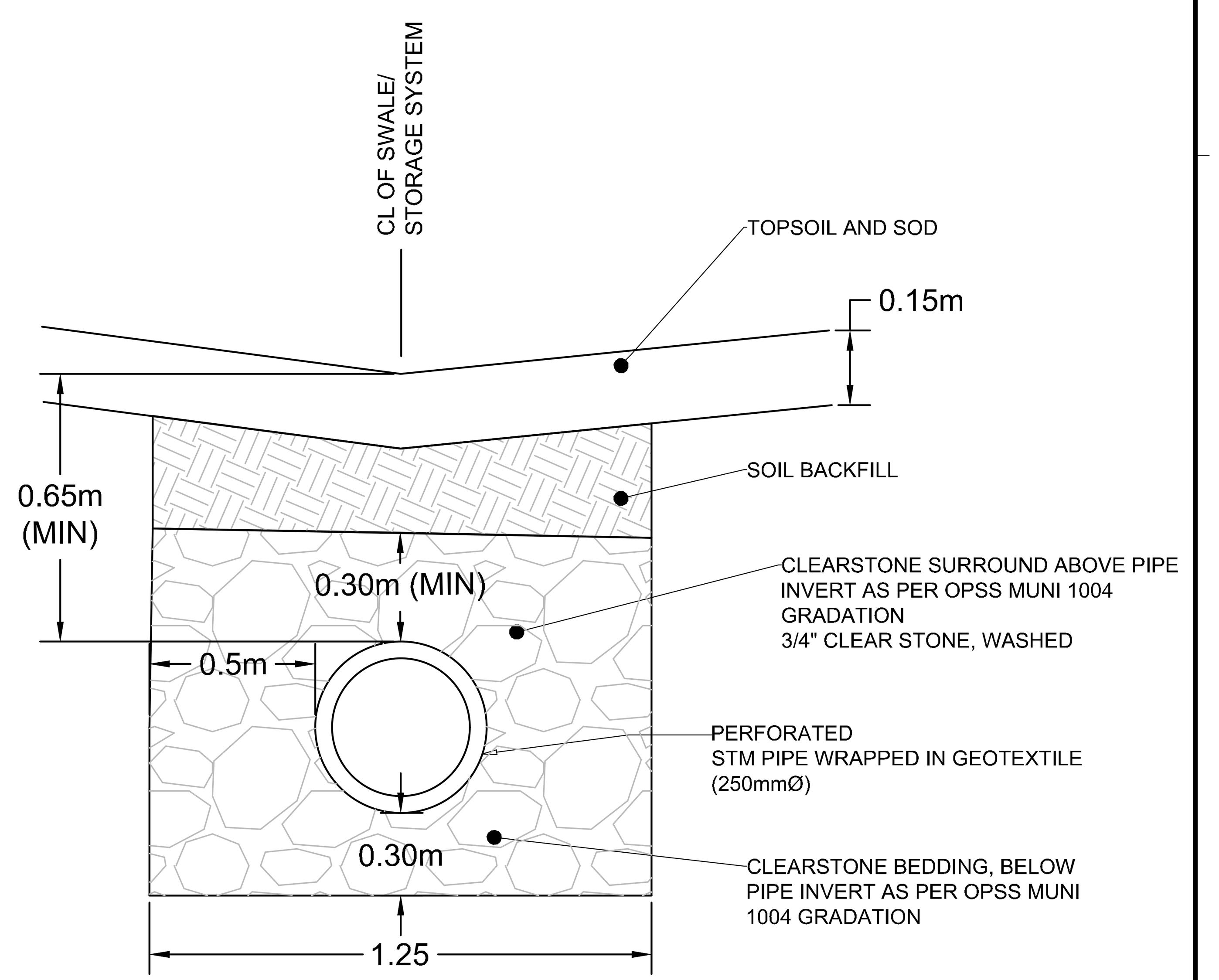
INSULATION DETAIL FOR SHALLOW SEWERS & WATERMAIN
N.T.S











EXFILTRATION TRENCH DETAIL
N.T.S

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
2.	REVISED PER CITY COMMENTS	FEB 28/2025	ARM
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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LOCATION
CITY OF OTTAWA
425 CULDAFF ROAD

DRAWING NAME
NOTES AND DETAILS

PROJECT No. 123194
REV REV#2
DRAWING No. 123194-ND

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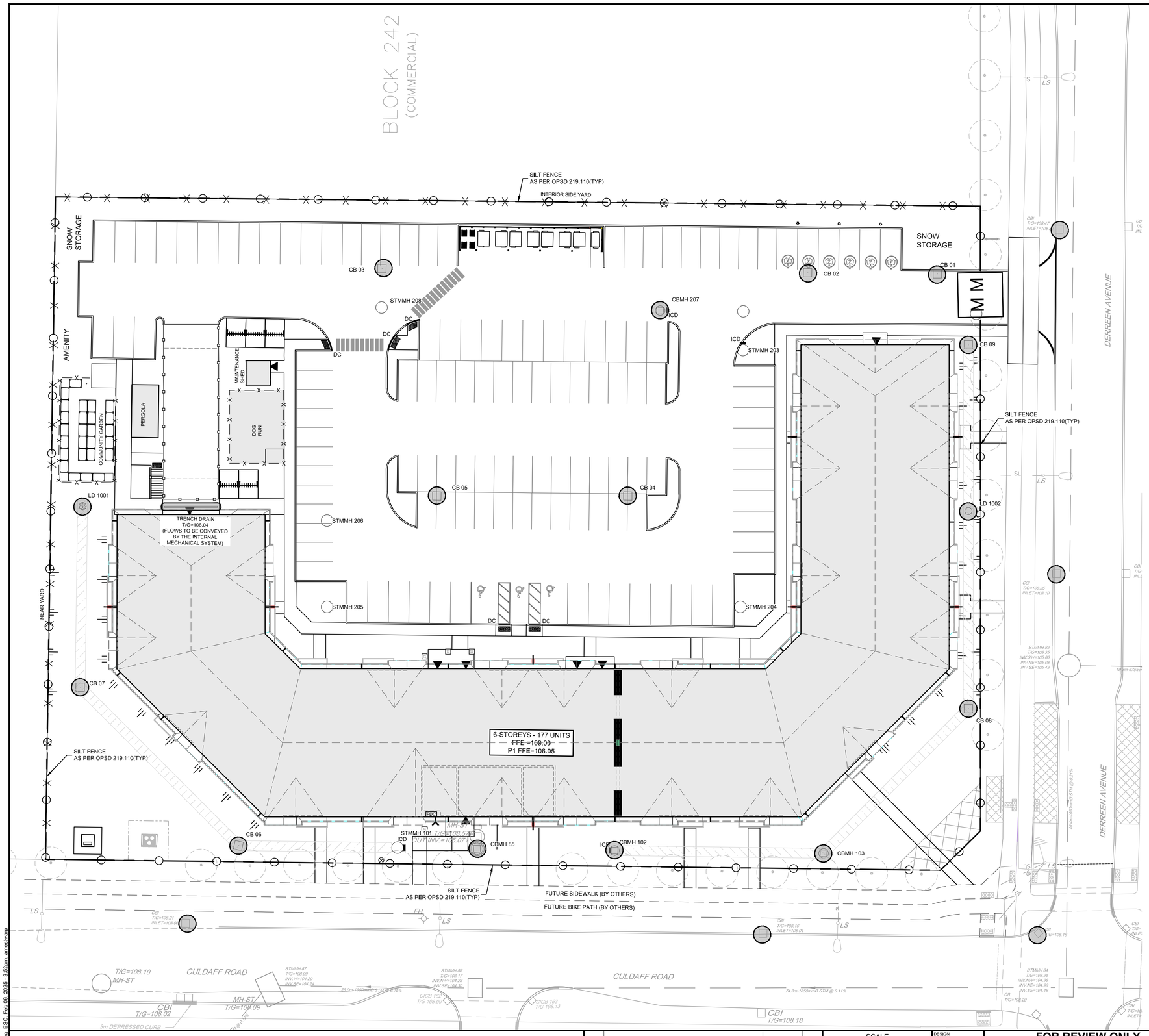
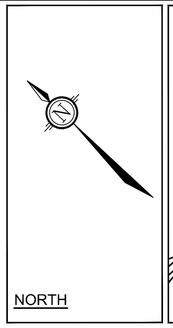
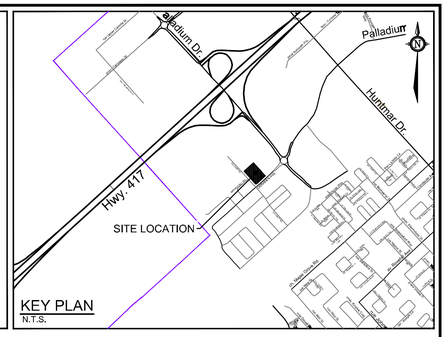






LEGEND

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

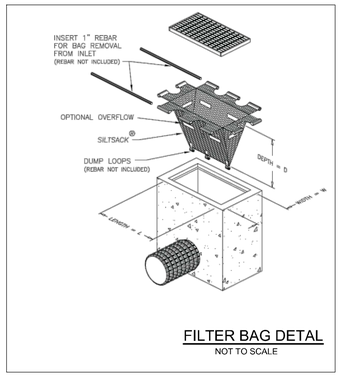
2) THE CONTRACTOR SHALL PLACE FILTER BAGS UNDER THE CATCHBASIN AND MANHOLE GRATES FOR THE DURATION OF CONSTRUCTION AND WILL REMAIN IN PLACE DURING ALL PHASES OF CONSTRUCTION.

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 DETAIL
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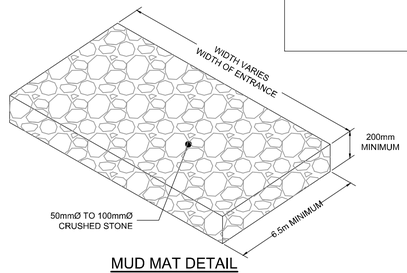

MUD MAT DETAIL
NOT TO SCALE

REFER TO 123194-ND FOR ADDITIONAL NOTES & DETAILS

NOTE:
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NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
2.	REVISED PER CITY COMMENTS	FEB 28/2025	ARM
1.	ISSUED FOR SITEPLAN APPLICATION	OCT/17/24	ARM

SCALE 1:250

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

FOR REVIEW ONLY

ISSUED FOR REVIEW

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#2
DRAWING No. 123194-ESC

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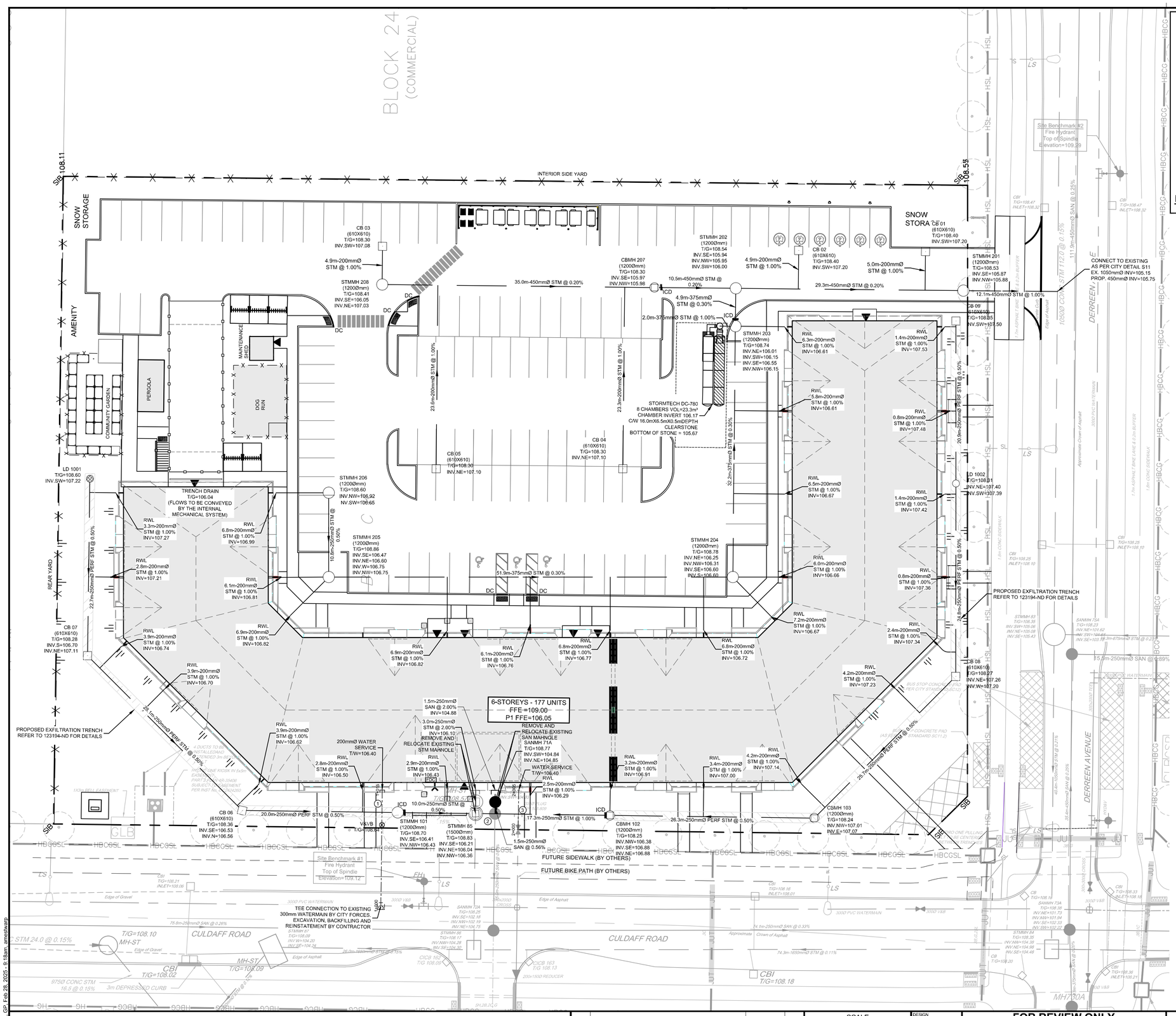

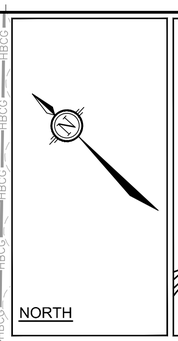

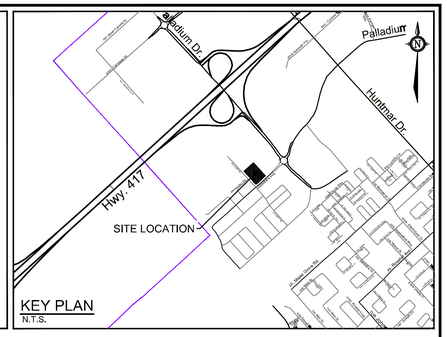

KEY PLAN
N.T.S.

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
- RAIN WATER LEADER CONNECTION LOCATION
- 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 VM OBV = 105.93	250mmØ STM INV = 106.43	±0.50m
2	250mmØ SAN OBV = 105.08	250mmØ STM INV = 106.24	±1.16m
3	200mmØ VM 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	108.64	106.24	PROPOSED VALVE AND VALVE BOX
1+012.01	108.70	105.93	CROSS BELOW 250mm STM AS PER CITY OF OTTAWA DETAIL W25 (CLEARANCE =±0.50m)
1+014.88	108.90	106.40	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	108.80	106.40	CAP SERVICE 1.0m FROM THE FOUNDATION WALL

* CONTRACTOR TO CONFIRM THE ELEVATION OF THE EXISTING WATER STUB/MAIN 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	83mm PLATE	106.43	108.70	108.17	1.70	18.8
CBMH 102	83mm PLATE	106.38	108.25	107.48	1.06	14.8
STMMH 203	94mm PLATE	106.02	108.74	107.81	1.74	23.8
CBMH 207	152mm PLATE	105.97	108.30	108.42	2.37	73.0

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

NOTE:
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NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
2.	REVISED PER CITY COMMENTS	FEB 28/2025	ARM
1.	ISSUED FOR SITEPLAN APPLICATION	OCT/17/24	ARM

SCALE 1:250

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

FOR REVIEW ONLY

ISSUED FOR REVIEW

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LOCATION
CITY OF OTTAWA
425 CULDAFF ROAD

DRAWING NAME
GENERAL PLAN OF SERVICES

PROJECT No. 123194
REV REV#2
DRAWING No. 123194-GP

PLAN41.DWG - 841mmx594mm

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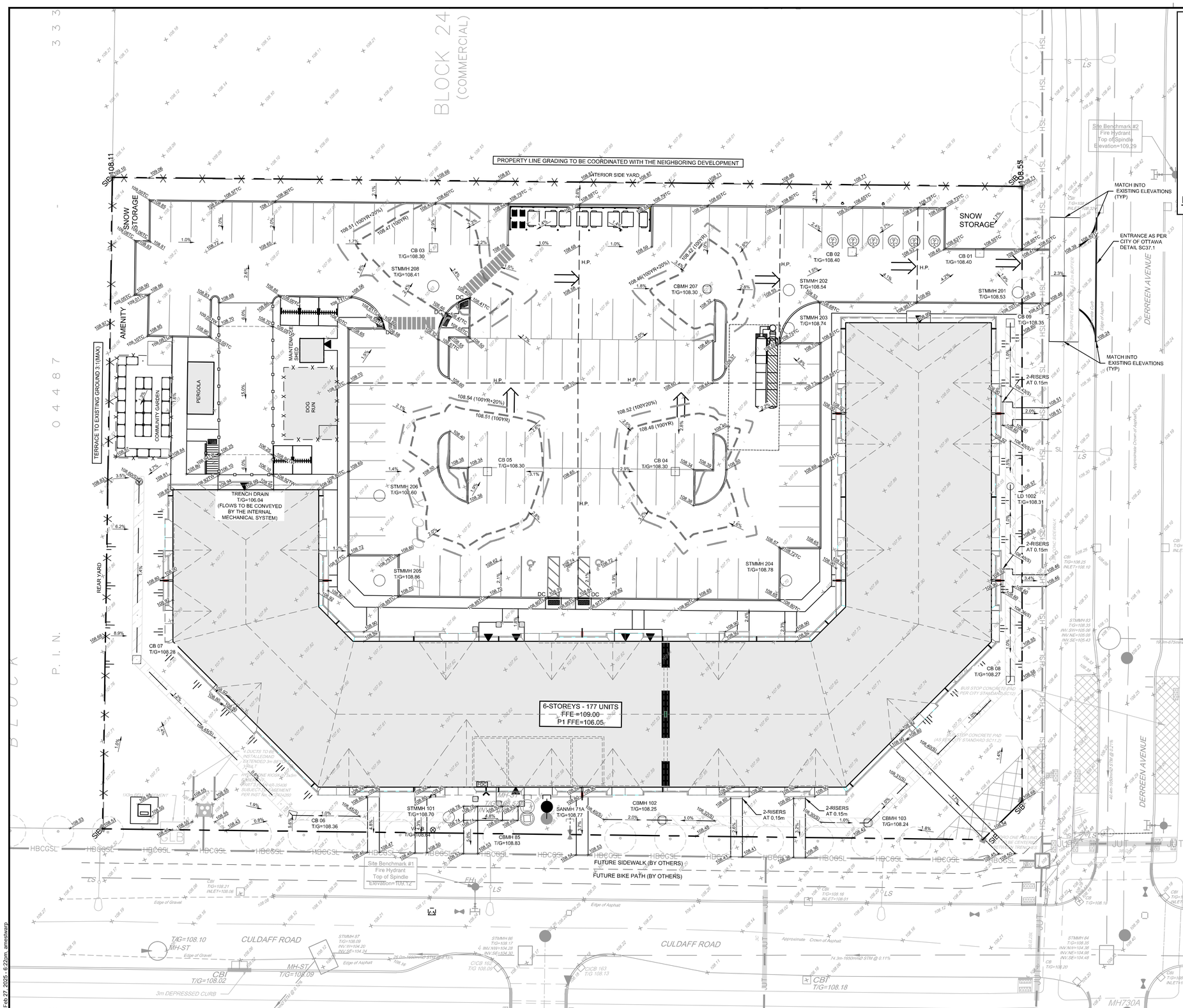

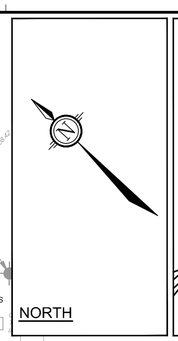

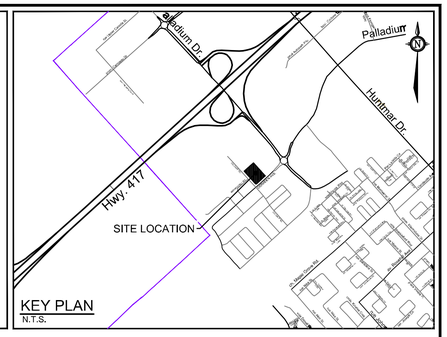

LEGEND

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

REFER TO 123194-ND FOR ADDITIONAL NOTES & DETAILS

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DRAWING NAME
GRADING PLAN

PROJECT No. 123194
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PLAN41.DWG - 84 trans/594mm