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Site Servicing Report

East Ridge Orleans Subdivision

2983, 3053 and 3079 Navan Road & 2690 Pagé Road, Ottawa, Ontario

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Value through **service** and **commitment**

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1.0 Introduction

1.1 Background

In 2023, J.L. Richards & Associates Limited (JLR) was retained by 12714001 Canada Inc. (the Owner) to prepare a Site Servicing Report in support of a Plan of Subdivision Application for their subject properties sited at 2983, 3053 and 3079 Navan Road and 2690 Pagé Road herein referred to as the subject properties. The owner intends to purchase the following five (5) separate parcels of land, where each parcel will have its own developmental application. The following report only focuses on one of these parcels, which is the one under the Plan of Subdivision. The development approval process of these parcels is as follows:

- One (1) Plan of Subdivision.
- One (1) Residential Site Plan.
- Two (2) Mixed Use - Residential and Commercial Site Plans; and
- One (1) Commercial Site Plan.

This Site Servicing Report has been prepared to outline the design objectives and criteria, servicing constraints and detailed strategies for developing the subject lands with water, wastewater, storm, and stormwater management services in accordance with the following:

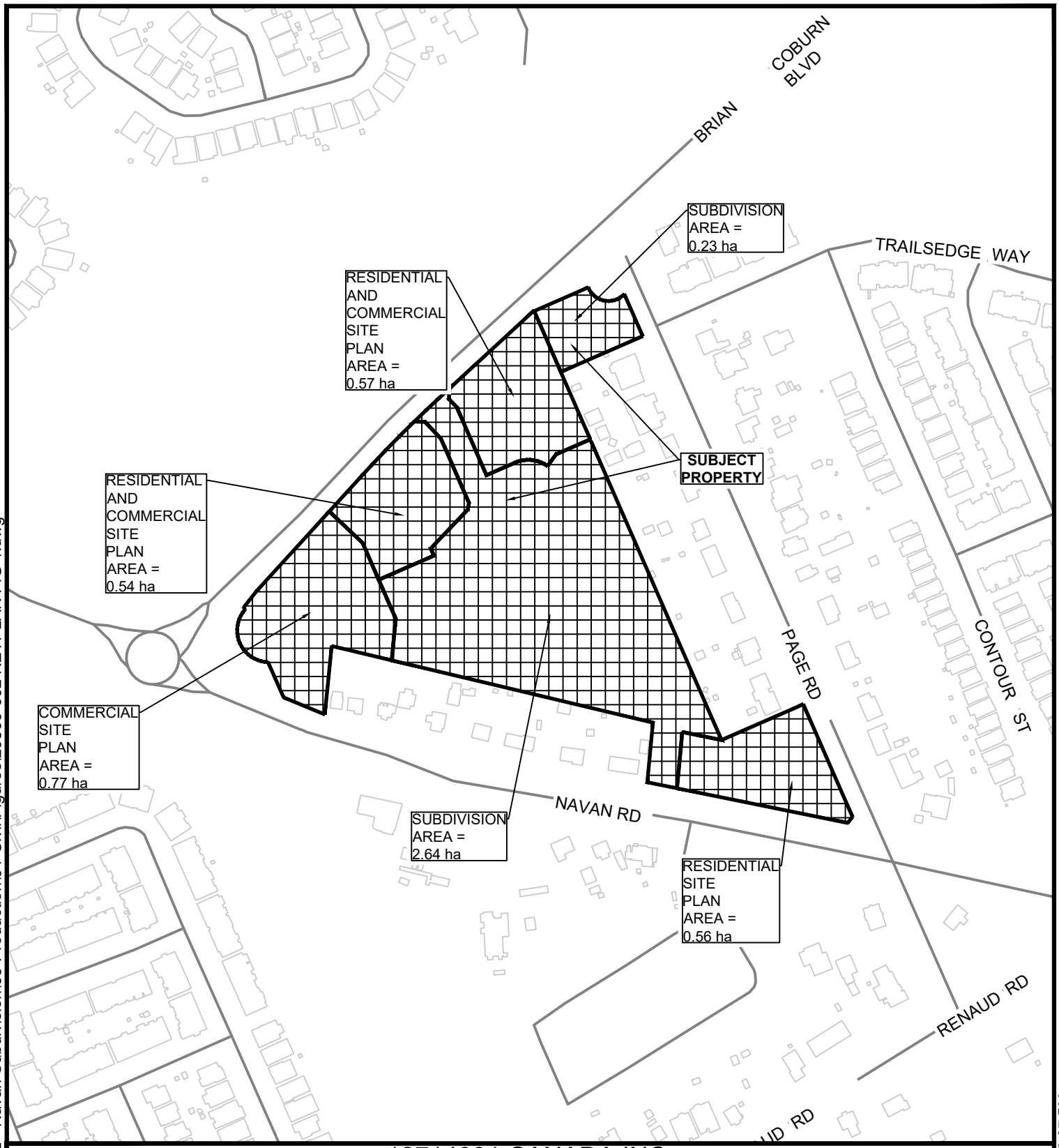
- The November 2009 Servicing Study Guidelines for Development Applications in the City of Ottawa (City);
- The Ottawa Sewer Design Guidelines (2012) and associated Technical Bulletins;
- The 2005 Gloucester East Urban Community (EUC) Infrastructure Servicing Study Update (ISSU) prepared by Stantec Consulting Ltd.;
- Response E-Mail (dated January 18, 2021) on servicing requirements;
- Updated Geotechnical Investigation Proposed Residential Development 2983, 3053 and 3079 Navan Road Ottawa, Ontario prepared by EXP (dated September, 2024);
- Geotechnical Investigation Navan Road Subdivision Off-Site Servicing Navan Road and Brian Coburn Boulevard Ottawa, Ontario prepared by EXP (dated September, 2024);
- Operation and Maintenance Manual East Ridge Orleans Subdivision prepared by JLR (dated August 27, 2024);
- Landslide Hazard and Risk Assessment Revision 1, Proposed Residential Development 2983, 3053 and 3079 Navan Road Ottawa, Ontario prepared by Paterson Group Inc. (dated July 4, 2024); and
- The Functional Servicing Report prepared by JLR (dated February 10, 2023).

A copy of the pre-consultation meeting notes is included in Appendix A.

1.2 Site Description and Proposed Development

The municipal addresses for the subject properties are 2983, 3053, and 3079 Navan Road & 2690 Page Road. The subject properties are located within the urban limits of the City of Ottawa. The total developmental area is ±5.31 ha and is bounded by Pagé Road, Brian Coburn Boulevard and Navan Road (refer to Figure 1 for the Location Plan). The area of the subdivision parcel is 2.87 ha. A review of Google Maps and GeoOttawa indicate that the existing area is entirely vegetated.

As described in Section 1.1, the Owner intends to subdivide the site into five (5) separate parcels each one of them being dealt with its own approval process. The subject parcels are depicted in Figure 1.



PROJECT:

12714001 CANADA INC.
2983, 3053, 3079 NAVAN ROAD
OTTAWA, ONTARIO

DRAWING:

LOCATION PLAN (DRAFT PLAN LEGAL PARCELS)

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DESIGN:	TB
DRAWN:	NQ
CHECKED:	TR
JLR #:	29899

DRAWING #:

FIGURE 1

File Location: P:\29000\29899-002 - Navan Subdivision\05-Production\01-Civil\Figures\29899-002 KEYPLAN FIG 1.dwg

PLOT DATE: February 15, 2024 1:19:37 PM

The Draft Plan of Subdivision and the proposed Concept Plan for the proposed development (prepared by PMA Architects) as well as the topographical survey for the properties (prepared by Stantec Geomatics Ltd.) are included in Appendix B.

1.3 Existing Infrastructure and Future Navan Road Widening

A review of existing services was completed along the frontages of the subject properties to identify existing sewers and watermains. Based on the review of the Drawings for Pagé Road, Navan Road and Brian Coburn Boulevard obtained from the City of Ottawa (Appendix C), the following infrastructure has been identified to exist within municipal right-of-way (R.O.W.):

Watermains:

- 305 mm diameter Ductile Iron watermain along Navan Road (circ. 1976)
- 305 mm diameter Ductile Iron watermain along Pagé Road (circ. 1974)

Sanitary Sewers:

- 250 mm diameter PVC sanitary sewer along Pagé Road (circ. 2005)
- 300 mm diameter PVC sanitary forcemain along Pagé Road (circ. 2005)
- 400 mm diameter PVC sanitary forcemain along Pagé Road (circ. 2007)

Storm Sewers:

- Short section of 750 mm diameter PVC storm sewer along Navan Road (circ. 2016)
- Short section of 525 mm diameter PVC storm sewer along Brian Cobourn Boulevard (circ. 2016)

Future Navan Road Widening

The City's Transportation Master Plan (2013) anticipates a future road widening of Navan Road, from Brian Coburn Boulevard to Mer Bleue Road, to four (4) lanes, therefore increasing the Right-of-Way to 37.5 meters. At the direction of the City, the servicing design and drawings have been revised to reflect this ultimate condition.

1.4 Existing Topography and Grading Plan

Based on the topography of the subject property (refer to Appendix B), there is a southeasterly slope from Brian Coburn Boulevard to the intersection of Navan Road and Pagé Road. The site topography indicates a 4-to-5-meter elevation drop from the center of the development to the entrance on Navan Road.

A Grading Plan (refer to Drawing G1) has been developed for the proposed site. Centre line of road grades from the local streets were designed to tie into existing Roads from the adjacent streets (Navan Road and Pagé Road). The road grades shown on Drawing G1 were developed to: i) convey the subdivision’s runoff to street catch basins, ii) contain flows up to the 1:100-year

via roadway sags, and iii) evacuate safely flows in excess of the 1:100-year storm via a major system flow route.

1.5 Pre-Consultation, Permits and Approvals

A pre-consultation meeting was held on January 18, 2021 (Appendix A) which summarized the planning process, servicing constraints and design criteria for the subject properties. From a storm perspective, the storm discharge criteria and allowable peak flow used for the preparation of this Report is presented in Section 4.1 (below). Also included at the end of Appendix A, the servicing checklist was prepared for this Application.

In terms of the Ministry of the Environment, Conservation and Parks (MECP) requirements, an Application for an Environmental Compliance Approval (ECA) is expected to be required for the sanitary, storm, and SWM works for the subdivision including works along Navan Road. However, an Application for an ECA is not anticipated for the individual site plan blocks.

2.0 Deviations from Standards and Guidelines

Municipal infrastructure is to be designed in accordance with municipal and provincial standards. More specifically, infrastructure proposed as part of East Ridge Orleans Subdivision must be designed in accordance with the 2012 Ottawa Sewer Design Guidelines (OSDG) and associated Technical Bulletins. The analyses described in the following sections for East Ridge Orleans Subdivision Water Servicing (Section 3.0), Wastewater Servicing (Section 4.0), Storm Servicing and Stormwater Management (Section 5.0) have shown that all systems were designed in accordance with regulatory requirements. However, there is one proposed deviation for the Storm Servicing and Stormwater Management (Section 5.0) which is consistent with the East Urban Community Infrastructure Servicing Study Update (EUC ISSU) (Stantec, 2005).

The EUC ISSU required a capture rate of 85 L/s/ha within the lands draining to Pond #3. The 85 L/s/ha capture rate is less than the 1:2-year design event and therefore there is ponding on the street in the 1:2 year event. The ponding is present only for the duration of the storm and the approach has been accepted by city review staff in previous correspondence. Further information on the approach is contained in Section 5.0.

3.0 Water Servicing

3.1 Water Supply Design Criteria

Any additions to the City of Ottawa water distribution system must be designed in accordance with the Ottawa Design Guidelines for Water Distribution (July 2010) and Technical Bulletins ISDTB-2014-02, ISTB-2018-02 and ISTB-2021-03. The Design Guidelines require that the proposed water distribution system will satisfy the pressure constraints for the peak hour demand, maximum day demand plus fire flow, and maximum pressure in the system.

Section 4.2.2 of the Design Guidelines require that all new development additions to the public water distribution system be designed such that the minimum and maximum water pressure, as well as the fire flow rates, conform to the following:

- Under maximum hourly demand conditions (peak hour), the pressures shall not be less than 276 kPa;
- During periods of maximum day and fire flow demand, the residual pressure at any point in the distribution system shall not be less than 140 kPa (20 psi);
- In accordance with the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi);
- The maximum pressure at any point in the distribution system in unoccupied areas shall not exceed 689 kPa (100 psi); and
- Feedermains, which have been provided primarily for the purpose of redundancy, shall meet, at a minimum, the basic day plus fire flow demand.

Table 3-1 summarizes the design criteria for water distribution systems, which will serve as the basis for the detailed design of the proposed on-site watermains.

Table 3-1: Water Design Criteria

Design Criteria	Design Value
Average demand	280 L/cap/day
Maximum demand	2.5 x Avg
Peak hour	2.2 x Max Day
Density Townhouse	2.7 ppu
Density 1 Bedroom Apt (used for basement apartment units)	1.4 ppu
Density Average Apt (used for Condo Units)	1.8 ppu
Commercial	
Average demand	28,000 L/gross ha/day
Maximum demand	1.5 x Avg
Peak hour	1.8 x Max Day
Fire Flow Requirements	
Municipal ROW / Private Site with Hydrants	FUS
Service Lateral Only	OBC & NFPA 13
Pressure/Flow	
Peak hour	>276 kPa (40 psi)
Maximum day plus fire flow	>140 kPa (20 psi)
Minimum hour (maximum HGL)	<552 kPa (80 psi)

3.2 Domestic Water Demands

The estimated domestic water demands presented in this section are based on the site layout and unit count shown in the Draft Plan (Appendix D1). The proposed subdivision consists of 67 row townhouse units. The developer is considering the option of converting the row townhouse units into duplex units, which would consist of row townhouse units with 1-bedroom apartments in the basements. The estimated water demands have been updated to include the potential addition of a 1-bedroom apartment to the basement of each townhouse unit within the proposed subdivision. As the adjacent condominium buildings (to be submitted as separate applications)

will be serviced from the subdivision, their water demands were also accounted for in the current design.

The residential consumption rate for average day demand was set in accordance with the City's Technical Bulletin ISTB-2021-03. The boundary conditions from the City are shown in Appendix D3. The water demand calculations can be found in Appendix D1. The water demand calculations account for the condominium and commercial buildings; however, their detailed design is not included in this report. Table 3-2 summarizes the theoretical water demand results based on the proposed site details, the potential 1-bedroom apartment units under consideration and the Design Guidelines.

Table 3-2: Theoretical Water Demands

Demand Scenario	Residential Water Demand (L/s)	Commercial Water Demand (L/s)	Total Water Demand (L/s)
Average Day	2.42	4.31	6.74
Maximum Day	6.06	4.46	10.53
Peak Hour	13.33	4.84	18.17

3.3 Proposed Watermain Sizing and Roughness

The overall watermain layout for the subject properties is shown in the Servicing Plan (Overall Servicing). Table 3-3 summarizes the watermain roughness coefficients presented in Section 4.2.12 of the Design Guidelines. The internal pipe diameters were modelled based on Section 4.3.5 of the Design Guidelines and are summarized in Table 3-4.

Table 3-3: Watermain Roughness Coefficients

Watermain Diameter	C-Factor
150 mm	100
200 to 250 mm	110
300 to 600 mm	120

Table 3-4: Watermain Internal Diameters

Nominal Diameter	Inside Diameter
150 mm	155 mm
200 mm	204 mm
300 mm	297 mm

3.4 Fire Flow Requirements

3.4.1 General

In terms of required fire flow (RFF), the Fire Underwriters Survey (FUS) method shall be used for any public or private site where watermains and fire hydrants are being designed. Hence, the required fire flow (RFF) for the site was calculated using the FUS (2020) method.

3.4.2 Required Fire Flow

The required fire flow (RFF) per the FUS (2020) was calculated based on the townhouse size, properties, exposure to adjacent units and Appendix I of TB-2018-02.

Based on the proposed layout for the subdivision, the critical RFF was calculated to be 217 L/s at TH Model 5 as presented in Appendix D1:

Critical Fire Area (TH Model 5): One (1) proposed block of seven (7) townhouse units adjacent to the backs of the existing properties on Navan Road.

It is also noted that the RFFs for the critical fire areas in the private site plans (Blocks 14, 15, 16, and 17) were calculated to ensure the proposed servicing can provide adequate fire protection to the future Site Plans. The highest RFF was found to be 250 L/s, belonging to Block 17. Thus, the 15,000 L/min (250 L/s) boundary conditions provided by the City (refer to Table 2-6 and 2-7) were used to account for the future site plan applications.

3.5 Water Servicing and Boundary Conditions

3.5.1 Water Servicing

The proposed water servicing for the Navan Road development will consist of a local 203 mm diameter watermain loop within the subdivision as illustrated in the Servicing Plan (Overall Servicing). The 203 mm diameter watermain loop for the subdivision will connect to the existing 305 mm diameter watermains at the two (2) proposed connection locations:

- the existing Pagé Road 305 mm diameter watermain which will be extended via a 203 mm diameter watermain through the cul-de-sac on Pagé Road and along Brian Coburn Boulevard; and
- the existing Navan Road 305 mm diameter watermain, located west of the intersection between Navan Road and Pagé Road.

The 150 mm diameter watermain for the townhouses in Block 1 will connect to the existing 305 mm diameter watermain on Pagé Road and extend along Stompin' Tom Lane.

3.5.2 Fire Protection

Fire protection to the subdivision is anticipated to be achieved by six (6) on-site hydrants and the existing hydrants on Pagé Road and Navan Road. As shown in the Servicing Plan, the on-site hydrants will be located along the 203 mm diameter watermain loop and along the 150 mm diameter watermain on Stompin' Tom Lane.

Hydrant spacing is in accordance with ISTB-2018-02, which states that the aggregated fire flow capacity of all fire hydrants within 150 m of a building shall not be less than the required fire flow of the building. Furthermore, ISTB-2018-02 highlights that the maximum capacity of fire flow for a hydrant is 95 L/s if the hydrant is within 75 m of a building. For hydrants located between 75 to 150 m from a structure, the hydrant flow capacity shall be assumed as 63 L/s.

Fire protection for the private site plans (Blocks 14, 15, 16, and 17) will be detailed as part of their respective Site Plan Applications. For the purposes of this report, it will be demonstrated that the proposed watermains are anticipated to have sufficient flow for fire protection of the subdivision while considering the future detailed design of the four (4) Site Plan blocks.

2.5.3 Boundary conditions

The performance of the proposed water distribution system for the subject properties was evaluated under various domestic demands and fire flow conditions using the hydraulic boundary conditions provided by the City (refer to Appendix D3 for a copy of the City correspondence). New boundary conditions were provided for the updated water demands generated by the additional basement apartment units being considered for the proposed subdivision. Tables 3-5 and 3-6 summarize the hydraulic boundary conditions received from the City that were used in the Hydraulic Network Analysis (HNA).

Table 3-5: Hydraulic Boundary Conditions at Connection-1 on Pagé Road

Demand Scenarios	Head (m)
Peak Hour	127.0
Maximum Day + Fire Flow #3 14,000 L/min (233 L/s)	124.9
Maximum Day + Fire Flow #4 15,000 L/min (250 L/s)	124.4
Maximum Pressure Check	130.7

Table 3-6: Hydraulic Boundary Conditions at Connection-2 on Navan Road

Demand Scenarios	Head (m)
Peak Hour	126.8
Maximum Day + Fire Flow #3 14,000 L/min (233 L/s)	122.7
Maximum Day + Fire Flow #4 15,000 L/min (250 L/s)	121.9
Maximum Pressure Check	130.7

3.6 Simulation Results

A HNA was carried out to assess the proposed water servicing. Boundary conditions were provided by the City (Appendix D3) and used in this analysis. Simulations were carried out under peak hour demand, maximum day demand plus fire flow, and maximum pressure conditions.

3.6.1 Peak Hour

The peak hour demand shown in Table 3-2 was distributed throughout the nodes within the site. Using the boundary conditions shown in Table 3-5 and Table 3-6, the simulation results found the minimum pressure on site to be 401 kPa (58.2 psi) as shown in Appendix D4. Based on the simulation results, the minimum pressure criterion of 276 kPa (40 psi) is anticipated to be met everywhere on this site.

3.6.2 Maximum Day Plus Fire Flow

To ensure adequate fire protection, the maximum day demand shown in Table 3-2 was analyzed simultaneously with the fire flow. The simulation was conducted using the boundary conditions presented in Table 3-5 and Table 3-6.

The fire flow simulation was carried out by allowing WaterCAD® to calculate the maximum fire flow that can be drawn from each node without allowing any part of the system to experience pressures less than 140 kPa (20 psi). Using the 15,000 L/min (250 L/s) boundary condition provided by the City (refer to Table 3-5 and 3-6), the system is expected to deliver a minimum of 13,000 (217 L/s) within the site, which is the highest duplex townhouse block requirement. This demonstrates that the fire flow requirements for all townhouse units within the subdivision can be met. Hydrant node H-12 is expected to deliver a minimum of 7,800 L/min (130 L/s), and the existing fire hydrants on Pagé Road will provide the required fire flow of 167 L/s for Block 1. It is noted that the boundary conditions used in this scenario are conservative for the subdivision itself but are simultaneously accounting for the future site plan applications. The results from this assessment show that the future site plan fire flow requirement (250 L/s max.) can be met with the proposed servicing.

3.6.3 Maximum HGL

The Design Guidelines require that a high-pressure check (maximum hydraulic grade elevation) be performed on the proposed system to ensure that the maximum pressure constraint of 552 kPa (80 psi) is not exceeded. Based on a zero (0 L/s) demand condition and corresponding boundary conditions (refer to Table 3-5 and Table 3-6), a maximum pressure of 471 kPa (68.3 psi) is expected (refer to Appendix D6 model output results). These values are below the maximum pressure constraint of 552 kPa (80 psi), therefore pressure reducing valves (PRVs) are not anticipated to be required.

3.7 Water Age Analysis

Water quality degradation is often a function of water age within distribution systems and can be exacerbated during initial phases of development given that watermains are commissioned in advance of full occupancy.

East Ridge Orleans Subdivision is a ±5.31 ha subdivision with 67 row townhouse units that will warrant the construction of local 150 mm diameter watermains (±74.0 m in length), mostly 200 mm diameter watermains (±726.0 m in length), and a section of 300 mm diameter watermain (±19 m in length). These watermains will provide supply to East Ridge Orleans Subdivision during partial and full occupancy.

It should be noted that the analysis below was completed solely for the Subdivision, as the Site Plans would be approved and constructed at a later date. This approach is conservative as the local watermains supporting the Site Plans would marginally increase the volume of the commissioned watermains while the population of the mid-rise buildings would substantially increase the overall demand. Furthermore, as discussed in section 3.2, the developer is considering converting the basement of each row townhouse unit into 1-bedroom apartment units. This would further increase the overall demand and thus reduce the water age for every townhouse that is constructed.

The water age analysis that follows was carried out under an assumed three (3) growth scenarios that reflect phasing of development as follows:

- Initial phase where only 17 townhouse units (plus 17 basement apartment units) would be occupied within six (6) months (±3 units/month);
- Second phase where 17 additional townhouse units (plus 17 basement apartment units) would be occupied within six (6) months, 34 units in total; and
- Full build-out of East Ridge Orleans Subdivision where all 67 townhouse units (plus 67 basement apartment units) are occupied.

List of assumptions used in the water age analysis is as follows:

- Domestic demand of 200 L/capita per day, reflecting a typical winter demand (excluding outside water usage); however, should occupancy be initiated during the summer period, the outside water usage could well be in the order of 1,049 L per single unit which would improve water age; and

- All 150, 200 mm, and 300 mm diameter watermains part of East Ridge Orleans Subdivision are commissioned on day one.

Based on the calculations shown in Appendix D7, the overall volume of the proposed 150 mm, 200 mm, and 300 mm diameter watermains is 26.44 m^3. Based on other water age analysis completed by JLR for subdivision located outside of the greenbelt, the City had indicated that a 3-day travelling time was expected from the Lemieux WTP to the given subdivisions. Therefore, the desktop calculations for the above-noted three (3) growth scenarios have maintained the 3-day travelling time. Results are as follows:

- An overall water age of 6.0 days was estimated (including the 3-day travelling time) once 17-unit are occupied based on a daily theoretical demand of 9.2 m^3;
- An overall water age of 4.5 days was estimated (including the 3-day travelling time) once 34-unit are occupied based on a daily theoretical demand of 18.4 m3; and
- An overall water age of 3.8 days was estimated (including the 3-day travelling time) under full build-out of East Ridge Orleans Subdivision (67 units) based on a daily theoretical demand of 36.2 m^3.

Based on the above calculations, once 17 row townhouse units (plus basement apartment units) are occupied, water age will be below the maximum 8-days per the Guidelines. The maximum water age design target of 8-days was applied in previous subdivisions that have similar components as East Ridge Orleans Subdivision. As noted above, it was assumed that the travel time from the Lemieux Water Treatment Plant to the East Ridge Orleans Subdivision is 3 days, as per the assumption from previous subdivisions. Given that chloramination is used, the City of Ottawa's web site states the following:

> "Chloramine is a more stable and persistent disinfectant. It preserves the quality of the purified water as it travels through the City's large and expanding water distribution system".

The above calculation will be updated once the occupancy plan is developed by the Client based on their sales.

3.8 Water Servicing Conclusions

Based on the water simulation results, the proposed subdivision can be serviced by the 203 mm diameter watermain loop and the 150 mm diameter watermain illustrated in the Servicing Plan. Simulation results under peak hour demand and maximum hydraulic grade line (HGL) show that the pressure requirements listed in the Design Guidelines were achieved. Furthermore, fire flow requirements can be met for the site, noting that water servicing and fire protection for the Site Plans (Blocks 14, 15, 16 and 17) will be detailed as part of their respective site plan applications.

4.0 Wastewater Servicing

4.1 Background

East Urban Community Infrastructure Servicing Study Update (EUC ISSU, Stantec 2005)

The subject properties are tributary to a proposed sanitary sewer that will be part of the Navan Road right-of-way (ROW). The proposed system is intended to flow in a southeasterly direction, bypassing Pagé Road, and ultimately discharging into the existing Renaud Road 600 mm diameter trunk sanitary sewer. From that point, wastewater flows will be conveyed in a southwesterly direction by the Renaud Road 600 mm diameter trunk sanitary sewer until discharging to the Forrest Valley Pump Station and pumped to the Forest Valley Trunk sewer.

The subject properties are part of two tributary areas denoted in the EUC ISSU as Area 13A and 13B. Appendix E1 contains a copy of the overall sanitary drainage plan from the EUC ISSU highlighting Area 13A and 13B.

Area 13A:
Based on the design sheet included in the EUC ISSU (Appendix E1), the subject properties are part of the 6.60 ha that forms Area 13A and tributary to the sewer reach identified as MH13A to MH13, spanning from Pagé Road to Renaud Road as per the EUC ISSU Design Sheet. A copy of this design sheet is attached to Appendix E1.

Area 13B:
Based on the design sheet included in the EUC ISSU (Appendix E1), the subject properties are also part of the 10.50 ha that forms Area 13B and tributary to the sewer reach identified as MH13B to MH13A, spanning from the subject properties' entrance to Pagé Road.

The following are key highlights from the approved Functional Servicing Report for this site dated February 2023:

- The existing Renaud Road trunk sanitary sewer at Navan Road has an invert of 77.17 m and obvert of 77.77 m.

- There are two (2) existing forcemains along Pagé Road (±157.6 m) with top of casing elevations of ±76.69 m that would need to be crossed to extend sanitary servicing along Navan Road. A contingency plan will be required for crossing the two existing forcemains.

- There is an existing 250 mm diameter sanitary sewer along Pagé Road that flows in a southerly direction from Navan Road to Renaud Road which was not part of the EUC ISSU Design. From the background documents provided the existing sanitary sewer has a south invert of 78.02 m at existing MH 10 at the Pagé and Navan Road intersection as shown in the Servicing Plan.

4.2 Proposed Sanitary Sewer System

The proposed sanitary sewers were agreed upon in the Functional Servicing Report for this site dated February 2023. Within the subject properties and along Navan Road were conceptually sized in accordance with the Ottawa Sewer Design Guidelines ((OSDG) - (October 2012)) and associated Technical Bulletins.

The proposed sanitary sewers have also been designed to accommodate any catchment areas identified within the EUC ISSU Report (Stantec, 2005) as well as the future Navan Road widening.

Key design parameters reflecting the revised sanitary parameters have been summarized in Table 4-1 below:

Table 4-1: Wastewater Servicing Design Criteria

Design Criteria	Design Value	Reference
Residential average flow	280 L per capita/day	ISTB-2018-01
Residential peaking factor	Harmon Formula x 0.8	City Section 4.4.1
Commercial average flow	28,000 L/gross ha/day	ISTB-2018-01
ICI peaking factor (1)	1.0/1.5	ISTB-2018-01
Infiltration Allowance 0.05 L/s/ha (dry I/I) 0.28 L/s/ha (wet I/I)	0.33 L/s/ha	ISTB-2018-01
Minimum velocity	0.6 m/s	OSDG Section 6.1.2.2
Maximum velocity	3.0 m/s	OSDG Section 6.1.2.2
Manning Roughness Coefficient	0.013	OSDG Section 6.1.8.2
Minimum allowable slopes	Varies	OSDG Table 6.2, Section 6.1.2.2

4.3 Theoretical Sanitary Peak Flow

Wastewater flows from the subdivision were estimated based on the draft plan and design criteria from Table 4-1. Although the adjacent site plans will be submitted as separate applications, they will still be serviced via the subdivision infrastructure therefore their domestic demands were also accounted for. Based on this design criteria, a total combined peak wastewater flow of 13.67 L/s (Navan) + 0.59 L/s (Pagé) = 14.26 L/s was estimated. Note that a peak design flow of 4 L/s was used for the future gas station site plan.

This peak wastewater flow of 14.26 L/s represents part of the overall flows allocated for Areas 13B and 13A, which are shown as 10.50 ha and 6.60 ha in the EUC ISSU sanitary design sheet (Appendix E1).

Therefore, when the areas included in Area 13A (6.60 ha) as shown in the EUC ISSU, are combined with the flows from Area 13B (10.50 ha) wastewater flows of 20.91 L/s were estimated to discharge southeasterly from existing MH 10 towards the Renaud Road 600 mm diameter trunk sanitary sewer. Although, the calculated peak flow of 20.91 L/s is greater that the allocated peak flow of 19.36 L/s (11.33 L/s from 13A + 8.03 L/s from 13B) as shown in the EUC ISSU design sheet, the flow from the EUC ISSU was based on 350 L/cap/day. Given the updated design parameters of 280 L/cap/day prescribed in ISTB 2018-03 from the previous 350 L/cap/day, and the existing 250 mm sanitary sewer system on Pagé Road currently has a free-flowing capacity of 29.0 L/s (250mm diameter sewer with an As-Constructed slope of 0.74%), it is expected that this sewer will have adequate capacity to accommodate the flows generated from the subject site. The total combined flows stated above of 20.91 L/s. Based on the existing design sheet information, there is sufficient capacity in the downstream pipe from Navan to Renaud.

4.4 Wastewater Servicing Conclusions

The subject properties will be serviced by a local sanitary system consisting of 200 mm diameter sewers discharging to two locations i) Navan Road and ii) Pagé Road (refer to Servicing Plan).

The Navan Road system will discharge into an off-site 200 mm diameter sewer that will be tributary to the existing 250 mm diameter sanitary sewer located along Pagé Road east of Navan Road. The Pagé Road system will be discharged into an existing 250 mm diameter sanitary sewer located along Pagé Road. Both systems merging at the Pagé and Navan intersection and ultimately tributary to the Renaud Road trunk sewer. The theoretical peak wastewater flows of 13.67 L/s and 0.59 L/s were calculated based on the design criteria described in the Ottawa Sewer Design Guidelines and associated Technical Bulletins as shown in the Design Sheet included in Appendix E.

5.0 Storm Servicing and Stormwater Management

5.1 Existing Conditions and Background

The subject property is bounded on three (3) frontages; Navan Road, Pagé Road and Brian Coburn Boulevard. As noted in Section 1.3, short sections of storm sewers are existing on Navan Road and Brian Coburn Boulevard. These storm sewers have limited capacities and were not sized for the subject properties.

There are no existing storm sewers fronting the properties that have capacity to accommodate the subject properties. However, storm servicing and stormwater management for the subject properties have been reviewed as part of the East Urban Community Infrastructure Servicing Study Update (EUC ISSU, Stantec 2005). A summary of the EUC ISSU that pertains with the properties follows:

East Urban Community Infrastructure Servicing Study Update (Stantec, 2005)

The subject properties are tributary to a proposed storm sewer system that will be part of the Navan Road right-of-way (ROW). The proposed storm sewer system is intended to flow in a southeasterly direction, past the Pagé Road intersection, and to ultimately connect to the existing Renaud Road 1350 mm diameter trunk storm sewer. From that point, the captured storm sewer flows will be conveyed in a southwesterly direction by the Renaud Road 1350 mm diameter trunk storm sewer, pass the Pagé Road intersection until discharging to an existing end-of-pipe facility referred to as Pond #3, which in turn outlets to Mud Creek. This facility was designed to provide an enhanced protection level (80% total suspended solids removal), erosion control as well as providing quantity storage for its serviced area.

The minor system flow allowance for the subject properties should be set based on the design criteria developed as part of the EUC ISSU. The subject properties are within the drainage area for Pond 3 which requires control in the minor system to 85 L/s/ha and to the 1:10 year event on arterial roads, including Navan Road.

Mud Creek Cumulative Impact Study (Stantec, May 2020)

Pond #3 in the East Urban Community discharges into Mud Creek and therefore the development contributes flows to Mud Creek. Historical land use alterations and land development within the Mud Creek watershed has led to erosion of stream bed and bank materials as evidenced by stream bank instabilities. The Mud Creek Cumulative Impact Study completed a cumulative

impacts assessment for upper Mud Creek whereby the potential impacts of foreseeable public and private developments were considered. The study recommended the implementation of a series of restoration measures in four locations and Pond #3 is upstream of two of these locations, Sites #12 and #13, which are approximately 475 m in length.

The implementation plan for the restoration includes establishing an approach to funding/cost sharing for the natural inventories, design, construction, and post-construction monitoring activities. The major funding partners will include the city, land developers and the National Capital Commission. As urbanization of lands tributary to some of the erosion works occur, the Draft Condition that will be formulated by the City should reference the mechanism that they have, or will, established to cost share the length of erosion works that the subject site will contribute while accounting the site's imperviousness.

5.2 Design Criteria

Storm and stormwater management servicing for the East Ridge Orleans Subdivision was developed in accordance with the 2012 Ottawa Sewer Design Guidelines (OSDG) and the subsequent Technical Bulletin PIEDTB-2016-01. These two documents are herein referred to as the Design Guidelines in this section. A summary of the key storm and stormwater management criteria follows:

- Control minor system flows to the allowable release rates of 85L/s/ha and adjoining rear yard flows from existing properties along Page Road and Navan Road controlled at 43 L/s/ha at the existing manhole at the intersection of Navan Road and Renaud Road;
- Proposed Storm sewers are designed to convey under free flow conditions the 1:2-year storm event and the 1:10-year peak flows on Navan Road as a minimum using the Rational Method and using the regressions derived from Intensity-Duration-Frequency (IDF) equations as per the Design Guidelines;
- Proposed ICDs throughout the site are designed to capture the 85 L/s/ha, per discussions with the city, as a deviation from the city of Ottawa sewer Design Guideline requiring the 1:2-year storm event to be captured.
- Provide a freeboard in the sewer network to the underside of footing (USF) of 300 mm during the 1:100-year storm where weeping tile connections are present;
- The runoff coefficients (C-factors) for the residential development were based on the maximum lot coverage permitted by the proposed zoning, as per the Design Guidelines. C-factors for non-residential land uses to be calculated based on the ratio of pervious and impervious surfaces depicted on proposed site plans;
- Minimum roadway profile grades at 0.5%;
- Roadway cross-fall of 3% was used for all streets;
- Minimum roadway slope of 0.1% from crest-to-crest for overland flow route;
- Minimum rear yard slope in the absence of perforated pipe system of 1.5% along with swale side slopes of 3 horizontal to 1 vertical;
- Maximum street ponding depth of 350 mm (static and dynamic) as per the Design Guidelines and maximum depth of rear yard flow to be 300 mm;
- Minimum vertical clearance of 0.15 m between the spill elevation on the street and the finished grade (garage elevation);
- Minimum vertical clearance of 0.30 m between the rear yard spill elevation and the ground elevation at the building in the rear yards;

- During the Climate Change event, the street ponding is not to reach the lowest building opening while the storm HGL must remain at or below the USF except for the HGLs on Stompin' Tom Lane that must remain below the surface since the foundation drain connections are downstream of the inline ICD;
- The product of the velocity and depth of major system flows on streets during the 1:100-year design storm event is not to exceed 0.60 m²/s; and,
- Major system flows, up to and including the 1:100-year design storm event, are contained within the site using the street sags and spillover pond facility.
- The stormwater management system on each of the individual Site Plans is to detain the 1:100-year flows while releasing at a maximum peak flow rate equivalent to 85 L/s/ha therefore underground or rooftop storage will be required within the site plan parcels.
- Peak flows estimated based on an inlet time of ten (10) minutes, as per the Technical Bulletin ISDTB-2012-4.
- Quality control will be accommodated by Pond #3 to meet an MECP Enhanced Level of Protection (80% TSS removal).
- Provide measures to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.
- Per the draft plan conditions, a 1.5 m black vinyl-coated chain link fence is required for the North and South boundaries of Block 13.

5.3 Proposed Stormwater Management Approach

5.3.1 Boundary Condition

It is proposed to incorporate storm sewers along Navan Road to create a connection point to the existing minor storm sewer system. The connection point will be located approximately 160 meters south-west of the intersection of Navan Road and Page Road. The boundary condition of the storm sewer on Navan Road is set as the 1:100-year HGL specified for the Trunk Storm Sewer on Renaud Road in the EUC ISSU. The elevation specified at MH603 is estimated from the report at 77.5 m. It should be noted that this elevation is below the outlet from the subject parcels and therefore does not have significant impact on the site servicing.

5.3.2 Groundwater Table

A geotechnical investigation has been done to determine the groundwater levels in the vicinity of the pond. BH-5 is located within the pond block and provides the groundwater level in the area of the pond. The geotechnical investigation recorded groundwater levels from August 2nd 2023 to August 7th 2024. Below are the readings of the GWL at BH-5 between these dates with the highest recorded reading being 81.28 m.

Table 5-1: Groundwater Elevations

Date	Water Elevation (m)
June 19th 2021	80.47
August 2nd 2023	80.53
September 21st 2023	80.47

Date	Water Elevation (m)
October 6th 2023	80.43
October 19th 2023	80.45
November 6th 2023	80.56
November 23rd 2023	80.79
December 19th 2023	81.18
January 29th 2024	81.25
February 22nd 2024	81.24
March 18th 2024	81.25
April 17th 2024	81.28
May 13th 2024	81.28
June 14th 2024	81.23
July 18th 2024	81.16
August 7th 2024	81.11

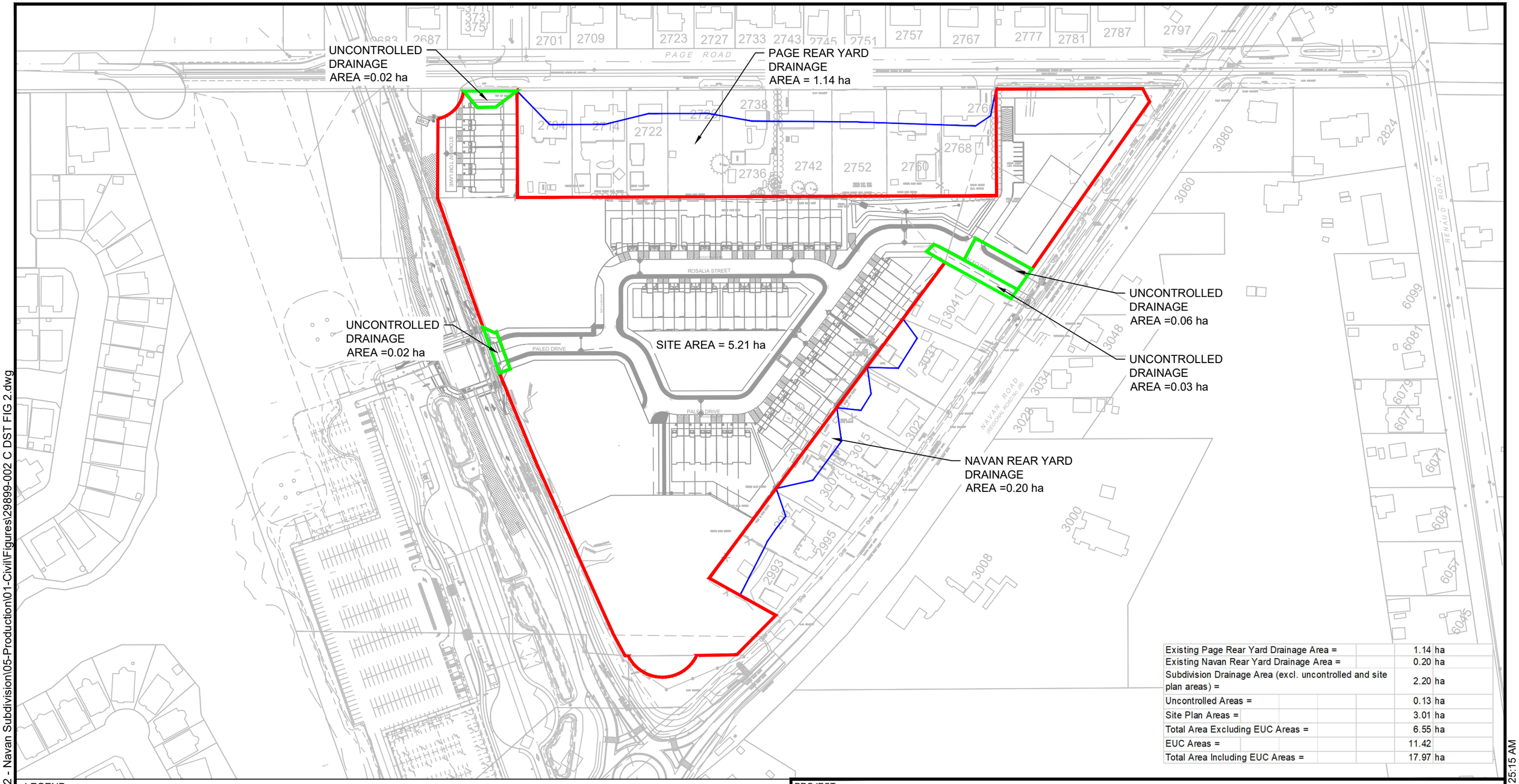
5.3.3 Allowable Release Rate

The method to determine the allowable peak flow is based on multiplying the total drainage area tributary to the proposed development by the controlled release rate of 85 L/s/ha (in accordance with the EUC ISSU). As shown in Figure 2, the total drainage area of the development consists of the following:

1) The internal tributary drainage area is 5.22 ha. Which is the total site area of 5.28 ha with a small area of 0.06 ha removed that will sheet flow uncontrolled to Navan Road. The internal tributary drainage area is 5.22 ha and can be accounted towards the allowable release rate at 85 L/s/ha.

2) In addition to the internal drainage area, the area from existing abutting properties on Navan Road (0.2 ha) and Pagé Road (1.14 ha) which currently drain towards the proposed development and will be captured via the proposed stormwater system within this new development. This external tributary drainage area of 1.34 ha drains to the internal development at a current rate with a C equivalent to 0.2, which translates to a pre-development flow of 43 L/s/ha.

The total allowable release rate from the site is therefore a combination of 5.22 ha at 85 L/s/ha (444 L/s) and 1.34 ha at 43 L/s/ha (58 L/s), for a total allowable release rate of 502 L/s.



Existing Page Rear Yard Drainage Area =	1.14	ha
Existing Navan Rear Yard Drainage Area =	0.20	ha
Subdivision Drainage Area (excl. uncontrolled and site plan areas) =	2.20	ha
Uncontrolled Areas =	0.13	ha
Site Plan Areas =	3.01	ha
Total Area Excluding EUC Areas =	6.55	ha
EUC Areas =	11.42	
Total Area Including EUC Areas =	17.97	ha

LEGEND:

CONTROLLED DRAINAGE AREA FOR SUBDIVISION + SITE PLAN (EXCLUDING UNCONTROLLED) = 5.21ha

UNCONTROLLED AREAS = 0.13ha

TOTAL SITE AREA (CONTROLLED DRAINAGE AREA FOR SUBDIVISION + UNCONTROLLED) = 5.34ha

REAR YARD DRAINAGE AREAS = 1.34ha

TOTAL SITE DRAINAGE AREAS (CONTROLLED DRAINAGE AREA FOR SUBDIVISION + REAR YARD DRAINAGE AREA) = 6.55ha

PROJECT:

2983, 3053 AND 3079 NAVAN RD & 2690 PAGE RD

DRAWING:

TOTAL DRAINAGE AREA BREAKDOWN

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DESIGN:	MM
DRAWN:	NQ
CHECKED:	TR
JLR #:	29899-002

DRAWING #: FIGURE 2

File Location: P:\29000\29899-002 - Navan Subdivision\05-Production\01-Civil\Figures\29899-002 C DST FIG 2.dwg

PLOT DATE: February 16, 2024 10:25:15 AM

5.4 Proposed Minor System Servicing

5.4.1 Runoff Coefficients (C-Factors)

Runoff coefficients (C-Factors) were calculated based on the weighted product between the percentages of the pervious and impervious areas. A sample runoff coefficient calculation based on zoning setbacks and maximum driveway widths was carried out. To better reflect the differences in impervious surfaces within the subdivision, the overall C-Factor was broken down by assigning a higher C-Factor to the front areas that includes the roadways and driveways and a lesser C-Factor to the rear yard areas. On this basis, C-Factors used in the Rational Method calculations have been summarized in Table 5-2: Design Runoff Coefficientsbelow (refer to Appendix G6 for the Runoff Coefficient calculations). Runoff coefficients for the remaining drainage areas were obtained from the EUC ISSU (Stantec, 2005). Refer to Appendix G5 for the EUC ISSU Storm Drainage Area Plan and Design Sheet.

Table 5-2: Design Runoff Coefficients

Scenario	Runoff Coefficient
Rear Yards – Townhouse Units Only	0.61
Front Yards and ROW	0.66
Residential and Commercial Site Plans (Blocks 14, 15 and 17)	0.77
Commercial Site Plan (Block 16)	0.90
Park Block (Block 7)	0.40
Spillover Pond Block (Block 13)	0.83
Abutting Properties on Navan Road and Pagé Road	0.30

5.4.2 Minor System Servicing

The proposed storm sewers of Navan were sized using the Rational Method based on the C-Factors presented in Table 5-1 above. The rainfall intensities used in the Rational Method was based on the rainfall regression equations presented in Section 5.4.2 of the OSDG along with an inlet time of ten (10) minutes at the upstream end of the system. The Rational Method Storm Sewer Design Sheet is included in Appendix ‘F’, while the Storm Drainage Plans included in the drawing set provide details associated with the storm drainage areas.

5.4.3 Inlet Control Devices

Storm servicing for Navan was developed to limit all flows transmitted to the storm sewers and meet the 0.35 m criterion as the maximum street ponding depth requirement. To achieve this criterion, servicing was developed using ICDs at inlets to the minor system.

The ICDs were selected based on the dynamic model head differential between the maximum HGL at the grate and the higher of the geodetic elevation of the centroid of the ICD or the downstream HGL, in each catch basin lead. Each ICD was sized to transmit the targeted peak flow of 85 L/s/ha for the internal proposed area and 43 L/s/ha for the adjacent existing areas, draining into the site, based on the calculated water level depth at the top of grate. When water rises above the top of grate in the roadway sag, flows transmitted to the storm sewers will marginally increase due to the increase in the hydraulic head. Based on the range of flows and hydraulic heads at each catch basin, the following types of ICDs are proposed:

- IPEX MHF Tempest Type A;
- IPEX MHF Tempest Type C;
- IPEX MHF Tempest Type D;
- Vortex ICD 65;
- Vortex ICD 80;
- Vortex ICD 95;
- Vortex ICD 100;
- Vortex ICD 105;

Note that for Stompin' Tom Lane the street catchbasins interconnected ICD was sized to control to the 1:2 year storm event rather than the allowable 85 L/s/ha as additional underground storage is provided.

Comprehensive ICD Tables referred to as the Catch Basin Table were prepared and are included in Appendix 'G2'. The Catch Basin Tables show specific information including top of grate elevation, pipe size and invert, the restricted capture rate and ICD type. The information shown on the Catch Basin Tables was extracted and shown on Drawing D1. In addition, ICD curves have been included in Appendix G8 for the ICDs listed above.

5.4.4 Water Quality

The subject properties are contained within the catchment of Pond #3 in the East Urban Community, which provides water quality control for the receiving runoff. The Certificate of Approval (C of A) was issued for the pond in 2001 and is attached in Appendix G7. The C of A were amended for various subdivision developments in 2011 and following the EUC Stormwater Management Facility #3 Design Brief Update (Stantec 2005). The latest sizing information for the pond is reported in the 2005 Design Brief. The Pond is reported to have been sized to provide 70% TSS removal water quality treatment for 180.66 ha of land at a weighted percentage imperviousness of 45.3% (see extract in Appendix G7).

The level of imperviousness of the proposed development is increased from that in the 2005 Design Brief Update. The combined catchments going to the downstream end of Navan Road had an average imperviousness of 40% in 2005 (see extract in Appendix G7) across 17.97 ha. The average imperviousness with the development across the 17.97 ha is 57%. 17.97 ha is 10% of the total area to the pond. A 17% increase in imperviousness across 10% of the area, increases

the overall imperviousness by 1.7%, therefore the development increases the weighted percentage of imperviousness of the overall catchment to the pond from 45.3% to 47.0%. The sizing implications of such a change are compared in Table 5-3 below.

Table 5-3: Water Quality Volumes Comparison

Parameter	Value from 2005 Design Brief	Value incorporating new developments
Total Contributing Area (ha)	180.66 ha	180.66 ha
Imperviousness of Contributing Area (%)	45.3%	47.0%
Unit Area Storage Volume Requirements as per Table 3.2 of the MOE SWMPD	100.3 m³/ha	102.0 m³/ha
Required Total Water Quality Volume	18,113 m³	18,440 m³
Required Permanent Pool Volume	10,887 m³	11,210 m³
Permanent Pool Volume Provided (Total above sediment)	18,986 m³	18,986 m³
Required Extended Detention Volume (40m³/ha)	7,226 m³	7,226 m³
Extended Detention Volume Provided	22,873 m³	22,873 m³

From the analysis summarized in Table 5-3, the pond facility still has sufficient permanent pool volume capacity to provide water quality treatment for the level of development proposed. The increase in volume required, 1,323 m³, is 4% of the residual capacity of the pond, therefore, water quality control is provided.

In May 2020, Stantec prepared a Mud Creek Cumulative Impact Study, which included water quality modelling for the Mud Creek subwatershed, which encompasses the proposed development site. The proposed site development was included in the future modelling as being 100% commercial, at 100% imperviousness, with no Low Impact Development (LID) or other water quality controls applicable to the site. Pond #3 was identified in the report as providing 80% TSS removal and no recommendations were made to require additional water quality controls on the development area. Given that the weighted average imperviousness for the Site is less than what it had been assumed (100%), Pond #3 will provide the required water quality treatment for the site. Extracts from the 2020 draft report are included in Appendix G7.

5.5 Changes in Stormwater Management Approach

The following changes in stormwater management approach have been incorporated into the design since February 2023:

- As a result of additional survey, grading changes have led to some of the site area being considered as uncontrolled and part of the Navan Road existing rear yard drainage area being redirected away from the site. This has reduced to the total area from 7.15 ha to 6.55 ha. Consequently, the allowable release rate from the site has reduced from 530 L/s to 502 L/s.

- The grading changes have resulted in the need for rear-yard storage for Block 9 to prevent rear yard uncontrolled site flow discharging directly off site. Storage has been provided by using a 900 mm pipe located along the rear of the properties.
- The grading changes have resulted in the redirection of Block 11 rear-yard flows between Block 11 and Block 12 from the original overland flow route between Block 10 and Block 11.
- Updated survey points along existing rear-yard areas for properties fronting Page Road have identified that a portion of flows tributary the rear-yard swale along Blocks 2,3 and 4 needed to be redirected to Block 14. As a result, the swale cross-section area has been reduced.
- New information on the existing infrastructure present at the intersection of Navan Road and Page Road has created a need to transition to a double barrel configuration of smaller size from a single barrel configuration.
- The minor system connection for Stompin' Tom Lane storm sewers has been redirected into the subdivision rather than into the Page Road sewers, which has triggered the requirement for storage and controlled release of flows from Stompin' Tom Lane.

5.6 Stormwater Management Modelling Approach

5.6.1 Dual Drainage Model

The analysis of both major and minor drainage systems was carried out to demonstrate their compliance with respect to the design criteria described in Section 5.2. The performance of the major overland system and minor storm sewer system was analyzed with PCSWMM. This software is a dynamic model which allows both hydrologic and hydraulic components to be simulated in the same platform and allows the simulation of the interaction between the major and minor systems. The PCSWMM software platform was used to:

- Generate the surface runoff hydrograph for each sub-area under various recurrences.
- Subdivide each inflow hydrograph into its minor and major system components based on the proposed inlet capture rates and roadway sag storage.
- Assess cascading, if any, and carry out dynamic routing of storm flows to determine flow depths along the roadways. As previously stated, the maximum major overland flow depths along the subdivision's roadways are to be limited to 350 mm or less, as per Technical Bulletin PIEDTB-2016-01.
- Demonstrate that the HGL along the storm sewers during the 1:100-year event without sedimentation is 300 mm below the basement's USFs.

5.6.2 Integration of the Proposed Pond

To evaluate the design of the proposed spillover pond Stormwater Management Facility, a storage node was implemented to act as the pond. The PCSWMM model requires a stage-area curve to represent storage. The curve was created from the contour lines resulting from the CAD grading.

The pond will detain runoff from up to the 1:100-year event and will have a controlled release to the downstream sewer segment exiting the site. The pond's-controlled rate will be such to achieve the overall allowable release rate for the site when combined with the minor system flows.

5.6.3 Simulation of Street Segments

Flow directed to a street segment is split at the major system node representing the low point in the street sag; flows are broken down into minor and major system components using an outlet rating curve representing the ICD capture and assigning the minor system flow directly into the minor conduit while maintaining the major system flows on the surface conduit. Flow through the outlet link is calculated based on the HGL above the elevation of the ICD and its rated capacity under various water surface elevations. The ICD rating curves are those provided by the manufacturer.

The storage in roadway sag is included in the model as being inherent within the major system conduits. The dynamic capability of PCSWMM means that the static and any dynamic flow is calculated in the model to provide one depth value at each sag location. The low points and high points in the street conduits are taken from the Civil 3D surface.

The subdivision's grading was developed with roadway static storage depths to maximize detention and attenuation of major overland flows while those of lesser volume sags were designed to maximize the conveyance capability of the dynamic section of the cross-section during events where cascading occurs.

5.6.4 Adjoining Existing Areas

Abutting Properties on Navan Road and Pagé Road have their backyards sloping towards the subject site. The design of minor and major systems must therefore account for these flows.

The flows from the rear-yards along Page Road will drain into a proposed rear-yard swale leading to the downstream pond. The flows coming from these parcels were calculated based off the parameters in section 5.3.3. The resulting solution consists of designing a swale in three sections to account for the flows coming the rear yards of the existing parcels as well as the rear yards of the proposed series of townhomes backing onto the proposed swale.

The flows generated from the rear yards of existing lands along Navan Road will drain into rear yard catch basins strategically placed in low points to drain surrounding grassed areas. The flows collected in the structures will be redirected into the proposed minor system via ICDs to control the inflow rate of water from existing lands.

5.7 Modelling Parameters

5.7.1 Hydrological Parameters

The following parameters were used in the hydrologic component of PCSWMM:

- **Areas and Imperviousness**: Catchment ID and drainage areas used by PCSWMM match those shown on either Drawing DST or Figure G1 (Appendix G1). C-Factors reported in Section 5.4.1 were used to estimate PCSWMM's imperviousness.

- **Catchment Width**: The catchment width is approximately twice the length of the street segment through the subcatchment, in accordance with the OSDG for most catchments where there is an even split on the road. In some cases, the catchment width is the length of the road section if the catchment is all to one side of the road.

- **Manning's Roughness Coefficient**: Manning's Roughness Coefficients of 0.013 and 0.25 were used for the impervious and pervious surfaces, respectively which are consistent with the OSDG.

- **Horton Infiltration Parameters**: The Modified Horton method used in PCSWMM is compatible for both events where rainfall intensity exceeds the infiltration capacity and where the rainfall intensity is below the infiltration capacity.

  The parameters used for this method are 76.2, 13.2, 4.14 and 7 representing the Maximum Infiltration Rate (mm/hr), Minimum Infiltration Rate (mm/hr), Decay Constant (1/hr) and Drying Time (days) respectively.

- Initial Abstraction: Initial Abstraction of 4.67 mm and 1.57 mm was used for the pervious and impervious surfaces respectively, consistent with the OSDG.

5.7.2 Simulation of Storm Distributions

The City of Ottawa requires that the performance of the minor and major systems be investigated under the 3-hour Chicago design storm. As such, 1:2-year, 1:5-year, 1:10-year, 1:25-year, 1:50-year, and 1:100-year 3-hour Chicago storms were evaluated. In addition, the standard 24-hour SCS and the 12-hour SCS storms were also evaluated to determine which storm is critical. The 12-hour SCS storm was found to be critical for the minor system HGL while the Chicago 3-hour storm was critical for the major overland flow system.

The climate change stress test event, which consists of the 100-year event plus 20%, was run for all three storm distributions. As per the requirements of the Ottawa Sewer Design Guidelines, historical storms were also assessed, including the July 1, 1979, storm, the August 4, 1988, storm and the August 8, 1996 storm.

5.7.3 Simulation of Park and Amenity Blocks

For the blocks 7 and 14 to 17 reserved for amenities, future residential and commercial, the model includes storage nodes for each connection into the subdivision minor system with an outlet link to restrict flow to the minor system to 85 L/s/ha. If the flows exceed 85 L/s/ha, then the storage node will detain the runoff over and above the release rate for the block. The allowable release rates in the 1:100-year event for the blocks are shown in Table 5-4.

Table 5-4: Park and Amenity Block Release Rates and Storage

Block	Area (ha)	Imperviousness (%)	Runoff Coefficient	Allowable release rate (m^3/s)	1:100-year Storage Requirement (m^3)
Block 7	0.20	28.57	0.4	0.017	33
Block 14+ 0.16ha subdivision parcel	0.72	60.00	0.62	0.049	170
Block 15	0.51	70.83	0.70	0.044	158
Block 16	0.82	94.6	0.86	0.068	296
Block 17	0.56	81.43	0.77	0.048	189

5.8 Storm Servicing Strategy

The proposed storm servicing strategy within the subject properties consists of a conventional storm sewer system on the municipal right-of-way (ROW). The storm sewers will be designed with capacity for the 1:2-year event but will only convey the capture of a peak flow rate of 85 L/s/ha. The proposed sewers have been designed to accommodate any catchment areas identified within the EUC ISSU Report (Stantec, 2005) as well as the future Navan Road widening. Refer to Drawing FDST for the Storm Drainage Plan and Appendix F for the Storm Design Sheets.

The storm sewer system will connect to new public sewers on Navan Road (refer to Drawing FSTM for Stormwater Servicing), which are to be designed to convey the 1:10 year event from Navan Road as well as the 1:2-year event from the remainder of the catchment area.

Major overland flow on the ROW within the subject properties, more than the 85 L/s/ha minor system capture, will be directed via a series of sags to a spillover pond facility. The pond facility will detain runoff from up to the 1:100-year event. The pond will have a controlled release into the downstream storm sewer system.

Blocks 14, 15 and 17, and the gas station block (Block 16) will detain on site the 1:100-year event and will discharge at a maximum allowable flow rate equivalent to 85 L/s/ha, plus 43 L/s/ha from external catchments, into the storm sewers in the ROW.

The 2690 Pagé Road parcel, which is directly on Pagé Road, will discharge into the site's conventional storm sewer network with capture at a maximum of 85 L/s/ha, plus 43 L/s/ha from external catchments. Major overland flow will be detained in the street sag in up to the 1:100-year event.

Flows from Stompin' Tom lane are being controlled in the minor system along the easement using a Vortex ICD 95. The ICD will be located at the upstream end of the 527-526 pipe. This will allow for weeping tile, foundation drain, connections along Stompin' Tom Lane to be connected downstream of the ICD.

Additional storage will be provided in the rear yards of Blocks 8 and 9 to ensure capture of the rear yard runoff and prevent spill to Navan Road. The additional storage will be achieved using a 900 mm pipe between CB101A and CB103B, and an ICD at the downstream end to control flows out of the rear yard system and into the minor system.

5.9 Simulation Results

This section presents the results of the simulation of the East Ridge Orleans Subdivision. The modelling includes servicing the future site plans, at a conceptual level.

The performance of the following systems was assessed under the build-out condition:

- The major overland system under extreme storm events (i.e., 1:100 year and climate change events) as per the OSDG; and
- The major overland system during the 1:2-year storm event and determine whether surface ponding is to occur.
- Appendices G3 and G4 provide Storm HGL analyses and Street Ponding Analyses respectively for a range of historical storms and interim conditions.

Note that when assessing reported results and areas there may be minor differences in results presented due to:

- Rounding in GIS areas – if ten catchments are rounded up by 0.001 or up to 0.004, this can have a difference across the ten catchments of between 0.01 and 0.04 ha.

- Reporting timestep verses calculation time step – the SWMM engine provides graphing of the results using the reporting timestep set by the modeler, which is different from the simulation calculation timestep. Results in the report below are extracted from PCSWMM in a way that extracts the result from the calculation timestep and may differ from results graphed in PCSWMM.

5.9.1 Low Point Ponding Analysis

The results at each of the low points, as generated by a 3-hour Chicago storm distribution, are presented below. Due to the capture rate of 85 L/s/ha being less than the 1:2-year rainfall event, there is ponding in the street sags in the 1:2-year event of up to 90 mm depth. The street ponding lasts for 21 minutes at the deepest location in the 1:2-year event and for 1.76 hours in the 1:100-year event. Table 5-5 shows the street ponding depths at the locations where the catchbasin manhole structures were utilized to convey the surface flow into storm sewer.

Low points correspond to Area IDs from the ponding plan Drawing SWM1.

Table 5-5: Low Point Ponding Depths

Ponding Area ID	Top of Grate (m)	Maximum Static Depth	1:2-year Depth (mm)	1:5-year Depth (mm)	1:100-year Depth (mm)	Climate Change Depth (mm)
1A	85.37	90	60	100	180	210
1B	85.37	90	60	100	180	210
2	84.58	290	40	90	190	240
3	83.87	250	60	110	240	280
4	82.3	150	10	60	130	160
5	84.82	250	90	150	230	250
6	83.85	140	70	130	240	280
7	85.21	240	-	40	160	210

The simulation results compiled in Table 5-4 shows that:

- There is 150 mm ponding in Ponding Area ID 4 and therefore no dynamic flow will occur in events up to and including the 1:100-year event from Ponding Area ID 4, which would spill to Navan Road, therefore all flows are detained on site;
- No ponding occurs on Stompin' Tom Lane (Low Point 7) in 1:2-year event;
- Maximum ponding depth of 240 mm during the 1:100-year event; and,
- In the climate change event, the peak ponding depth is below 280 mm.

5.9.2 Major System Flow

The major system overland flow route simulation results for the 3-hour Chicago storms are summarized in Table 5-6 below showing the values for Velocity x Depth where overland flow is present. All other storms as well as the velocity and depth used to calculate the values below are included in Appendix G4. The depth was obtained by multiplying the depth capacity ratio output from PCSWMM with the transect depth.

Table 5-6: Major System Overland Flow Routes Analysis – Velocity x Depth (3hr Chicago)

Street Segment ID	U/S ID	D/S ID	1:2 year	1:5 year	1:10 year	1:25 year	1:50 year	1:100 year	Climate Change
HP1-LP6	HP1	LP6							
HP1-MP8	HP1	MP8							
HP10-MP10	HP10	LP5							
HP12-LP7	HP12	LP7							
HP13-LP1	HP13	LP1					0.018	0.02	0.03
HP13-LP2	HP13	LP2					0.004	0.01	0.03
HP14-LP3	HP14	LP3							0.00
HP3-LP5	HP3	LP5							0.00
HP4-HP2	HP4	MajorNavanRd							0.00
HP4-LP1	HP4	LP1							0.00

Street Segment ID	U/S ID	D/S ID	1:2 year	1:5 year	1:10 year	1:25 year	1:50 year	1:100 year	Climate Change
HP6-LP2	HP14	LP2							0.00
HP6-LP3	HP6	LP3							0.01
HP6-MP6	HP6	LP1							0.02
HP7-LP2	HP7	LP2				0.003	0.003	0.00	0.01
HP7-LP4	HP7	LP4				0.002	0.006	0.01	0.01
HP8-LP6	HP8	LP6							
HP8-MP7	HP8	LP3							
HP9-LP5	HP9	LP5							
HP9-MP8	HP3	MP8							0.00
HP9-MP9	HP9	LP6							
MP7_2-LP7	HP11	LP7							
MP8-LP4	MP8	LP4		0.003	0.004	0.006	0.008	0.01	0.01
RYSW1-Swale_1	CB104C	CB104B					0.049	0.08	0.11
RYSW1-Swale_2	CB104B	CB104A					0.073	0.13	0.20
RYSW1-Swale_3	CB104A	CB104					0.092	0.17	0.26
RY34	CB104	POND						0.05	0.15

Cascading flow only occurs through the street network in the events greater than the 1:2 year. In rainfall events where cascading flow does occur the velocity x depth of each of these major overland flow routes are under the allowable maximum of 0.6 m^2/s and meeting design criteria for the events up to the 1:100-year design storm event.

5.9.3 Storm Sewer HGL Analysis

The storm sewer HGL under the ultimate servicing scenario is shown at each of the manhole nodes in Table 5-7. Where there is no Underside of Footing (USF) associated with the manhole a dash is shown in the table.

Table 5-7: HGL Analysis (3hr Chicago)

MH ID	USF Elevation (m)	Obvert Elevation (m)	1:100-year Event Max HGL (m)	Critical Freeboard (1:100-yr HGL or obvert) (m)	Climate Change Max HGL (m)	Climate Change Freeboard (m)
500	-	-	77.51	-	77.51	-
500A	-	-	77.6	-	77.6	-
501	-	-	77.79	-	77.79	-
501A	-	-	77.7	-	77.71	-
502	-	-	77.87	-	77.88	-
503	-	-	78.39	-	78.39	-
503A	-	-	77.97	-	77.97	-

MH ID	USF Elevation (m)	Obvert Elevation (m)	1:100-year Event Max HGL (m)	Critical Freeboard (1:100-yr HGL or obvert) (m)	Climate Change Max HGL (m)	Climate Change Freeboard (m)
504	-	-	78.75	-	78.76	-
CBMH2	-	-	79.53	-	79.54	-
508	81.33	79.98	79.61	1.35	79.62	1.35
509	81.33	80.02	79.71	1.31	79.72	1.31
510	81.87	80.37	79.8	1.50	79.81	1.50
511	-	-	80.27	-	80.28	-
512	-	-	80.92	-	80.93	-
514	83.16	81.35	81.07	1.81	81.08	1.81
516	-	-	83.53	-	83.53	-
517	-	-	83.7	-	83.7	-
522	-	-	80.21	-	80.22	-
524	83.77	81.55	80.75	2.22	80.76	2.22
525	-	-	81.18	-	81.18	-
526	-	-	81.46	-	81.47	-
*527	85.826	82.06	85.13	0.70	85.26	0.566
*528	85.306	82.38	85.13	0.18	85.26	0.046

The simulation results compiled in Table 5-7 shows that:

- *The HGLs at MH 527 and MH 528 tributary to Stompin' Tom Lane are controlled by the downstream inline ICD. The HGL at these manholes must only remain below the road surface elevation because of the weeping tile connection being downstream of the inline ICD. For this reason the freeboard at MH 527 and MH 528 is compared to the manhole TG elevation.
- All other nodes achieve HGLs with at least 300 mm freeboard to the underside of footing or pipe obvert, whichever is more critical, in the 1:100-year event with the smallest freeboard being 1.31m; and,
- All nodes maintain a clearance to the underside of footing in the climate change stress test event.

5.9.4 Spillover Pond Operation

The spillover pond was sized to contain major overland flow while releasing flows at a controlled rate to the minor system storage. Pond side slopes will be 3:1 and have been simulated using a stage-storage curve developed from the proposed grading surface. The pond has been sized to meet the OSDG requirements.

At the bottom of the pond there is a subdrain system with three inlets into the subdrain system which would allow the majority of water in the pond to drain. At the end of storm, the subdrain system will facilitate infiltration of the water held at the bottom of the pond into the subdrain system and enable drying of the soil.

A geotechnical report entitled "Geotechnical Investigation of the Proposed Residential Development 2983, 3053, and 3079 Navan Road Ottawa, Ontario" was prepared by EXP. The borehole data provided in this report specifies that the groundwater table at the proposed spillover pond block (Block 13) is at an elevation of 80.46 meters. As shown in the Pond Drawing (Drawing POND), the bottom of the pond at an elevation of 81.32 is 0.04 metres above the groundwater table per the most critical groundwater readings recorded on April 17th, 2024, and May 13th 2024 and as shown in Table 5-1above. The 0.04 metre difference between the bottom of the pond and the groundwater table represents the most critical point in the pond. Every other point elevation in the pond will provide greater clearance to the groundwater table. A cross-section of the pond is also included in the Pond Drawing (Drawing POND).

The operation of the spillover pond is provided in Table 5-8 for the 3-hour Chicago storm distribution and Table 5-9 for the 12-hour SCS storm distribution.

Table 5-8: Spillover Pond Operation (3-hour Chicago Storm)

Event	Max HGL (m)	Max Depth (m)	Total Inflow (L/s)	Peak Release Rate (L/s)	Max Storage Volume (m3)
1:2 year	81.53	0.21	80	5	45
1:5 year	81.68	0.36	173	5	128
1:10 year	81.78	0.46	240	5	194
1:25 year	81.91	0.59	333	6	282
1:50 year	82.01	0.69	412	6	357
1:100 year	82.12	0.8	510	6	452

Table 5-9: Spillover Pond Operation (12-hour SCS Storm)

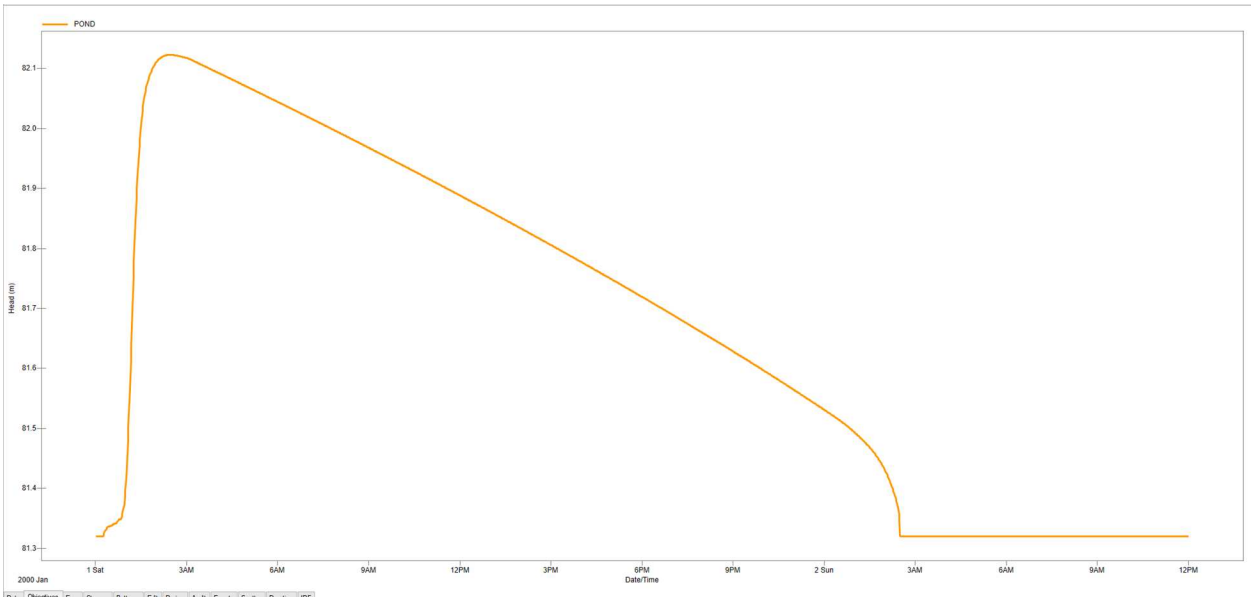
Event	Max HGL (m)	Max Depth (m)	Total Inflow (L/s)	Peak Release Rate (L/s)	Max Storage Volume (m3)
1:2 year	81.55	0.23	110	5	53
1:5 year	81.71	0.39	224	5	146
1:10 year	81.82	0.5	300	5	219
1:25 year	81.95	0.63	404	6	311
1:50 year	82.03	0.71	475	6	376
1:100 year	82.11	0.79	550	6	444

The modelling results show that the pond contains flow in up to the 1:100-year event. The frequent event flows are from the immediate catchment runoff, rear yard swale and overflow from the street. The maximum water level in the pond is 82.12 m, which provides at least 300 mm freeboard to the surrounding area. Maximum pond depth is 800 mm which is less than 1.5m.

5.9.5 Draw-down Time

The draw-down time for the pond to drop from its Max HGL of 82.12m to 81.32m is approximately 27 hours per the Figure 3 shown below.

Figure 3: Draw-Down Time



5.9.6 Allowable Release Rate

The allowable release rate for the site is calculated as per Section 5.3.3. The stormwater management system was design to control to the allowable release rate and the results are shown in Table 5-10 below for the critical 3-hour Chicago event:

Table 5-10: Comparison of Release Rates and Allowable

Node	Allowable Release Rate (L/s)	1:100-year 3-hour Chicago Release Rate (L/s)
MH503	502	502

5.9.7 Capture Rates

The capture rates for each of the ICDs contributing directly to the downstream outlet on Navan Road are shown in Table 5-11 below.

Table 5-11: Sum of ICD Capture Rates

ICD Location	Allowable Capture Rate (l/s)	Peak Capture Rate (l/s)	1:2 year Ponding Depth at low point (mm)	1:2 year Ponding Time of Peak (hh:mm)
CB02	27	11	40	1:12
CB03		23		
CB04	25	13	60	1:13
CB05		13		
CB06	15	12	10	1:11
CB07		12		
CB09	26	12	90	1:13
CB10		12		
CB100	14	47	0	1:13
CB102	8	8	0	1:19
CB103	26	59	0	1:16
CB11	26	13	70	1:13
CB12		13		
CBMH517A	13	12	60	1:14
Pond Outlet	-	6	-	1:42
Park	17	17	-	1:14
BLOCK 15	44	33	-	1:22
BLOCK 15_RY		10	-	1:04
BLOCK 16	68	68	-	1:14
BLOCK 14	49	14	-	1:34
BLOCK 14_RY		46	-	1:10
BLOCK 17	48	48	-	1:19
Stompin' Tom Control ICD	22	14	-	1:35
SUM	-	516	-	-

- The sum of all the ICDs peak capture rates is greater than the release rate from the site, however, the time of the peak release rates varies across the ICDs which means that the total dynamic peak flow is smaller.

- All capture rates compared with the allowable capture rate is provided in the ICD Tables in the drawings. ICDs have been sized to meet the allowable flow however in two low point locations the allowable exceeds the ICD maximum flow by up to 2 L/s. In such cases the model has been tested using the next largest ICD size, however, the larger ICD size resulted in significant flows unable to be mitigated in the rest of the system. Ponding in the impacted low points during the 1:2-year event occurs for only 21 minutes and is a maximum of 90 mm ponding depth.
- The ICD downstream of Stompin' Tom Lane is overcontrolling flows from upstream in order for the site to achieve the 85 L/s/ha. Overcontrolling this ICD does not result in any additional major system ponding as opposed to overcontrolling other ICDs which would increase surface ponding depths and volumes.
- The release rate from Block 14 is higher than the prorated allowable release rate. This is due to surface storage limitations and existing rear yards along Page road draining into Block 14. The difference between the peak capture rate and the allowable capture rate is compensated for elsewhere in the site to achieve the allowable 85 L/s/ha at the outlet of the site.

5.10 Storm and Stormwater Management Conclusions

The release rate from the site is dictated by the East Urban Community Infrastructure Servicing Study Update (EUC ISSU, Stantec 2005). The site contributes to the Navan Road storm system, which, under the 2005 EUC ISSU, has quality control provided by a downstream stormwater management pond, Pond #3. The 2005 EUC ISSU sized the downstream pond and storm sewer system to accept a flow of 85 L/s/ha from the site, including external rear yards areas at 43 L/s/ha, which has been provided for through ICDs and a spillover pond on site to capture the major system flows. A spill-over pond operation and maintenance manual has been provided under a separate cover called East Ridge Orleans Subdivision Spill-over Pond Operation and Maintenance Manual.

The stormwater servicing and management concept is proposed to provide stormwater servicing for the Navan development, as shown on the Servicing Plan (Drawing S1 and S2).

6.0 Erosion and Sediment Control

Erosion and sediment control measures, as outlined in the Ontario Ministry of Natural Resources (MNR) Guidelines on Erosion and Sediment Control for Urban Construction Sites, will be implemented to trap sediment on site. The following erosion and sediment control measures could be implemented during construction:

- Supply and installation of a silt fence barrier, as per OPSD 219.110.
- Supply and installation of siltsack or sentinel CB inserts between the frame and cover of catch basins and maintenance holes adjacent to the project area during construction, to prevent sediment from entering the sewer system.

- Stockpiling of material during construction is to be located along flat areas away from drainage paths. For material placed on sloped areas, stockpiles are to be enclosed with a silt fence to protect watercourses.
- All catch basins are to be equipped with sumps, inspected frequently, and cleaned as required.
- Temporary ICDs are to be placed blocking part of the sewer pipe in the connecting storm maintenance holes to eliminate construction debris from entering the existing storm sewer system. The ICDs are to be removed after the proposed storm sewers have been fully cleaned.
- A mud mat is to be built at each of the site entranceways to prevent the transport of sediment onto paved surfaces. The mud mat shall be:
  - Minimum of 20 m in length for the full width of the entrance way (10 m wide minimum).
  - Minimum of 400 mm thick underlain with a geotextile (or graded aggregate filter); and
  - Constructed with 50 mm diameter clear stone for the first 10 m (extending from the paved street) and the remainder of the length with 150 mm diameter clear stone.

The proposed removal and reinstatement measures as well as the erosion control measures shall conform to the following documents:

- "Guidelines on Erosion and Sediment Control for Urban Construction Sites" published by Ontario Ministries of Natural Resources, Environment, Municipal Affairs, and Transportation & Communication, Association of Construction Authorities of Ontario and Urban Development Institute, Ontario, May 1987."MTO Drainage Manual", Chapter F: "Erosion of Materials and Sediment Control", Ministry of Transportation & Communications, 1985.

"Erosion and Sediment Control" Training Manual by Ministry of Environment, Spring 1998.

- Applicable Regulations and Guidelines of the Ministry of Natural Resources.

This report has been prepared by J.L. Richards & Associates Limited for 12714001 CANADA INC.'s exclusive use. Its discussions and conclusions are summary in nature and cannot properly be used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report is based on information, drawings, data, or reports provided by the named client, its agents, and certain other suppliers or third parties, as applicable, and relies upon the accuracy and completeness of such information. Any inaccuracy or omissions in information provided, or changes to applications, designs, or materials may have a significant impact on the accuracy, reliability, findings, or conclusions of this report.

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J.L. RICHARDS & ASSOCIATES LIMITED

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Appendix A

Pre-consultation Meeting
Notes and Detailed Design
Report Checklist

Guy Forget

From: Curry, William <William.Curry@ottawa.ca>
Sent: Monday, January 18, 2021 10:53 AM
To: Gabrielle Snow
Cc: Belan, Steve; Tim F. Chadder; Baird, Natasha; Lucie Dalrymple; Guy Forget
Subject: Re: Navan Road - Second Pre-Application

Gabrielle,

1. Site Plans for this file are to be a C of .5. Subdivision is to be calculated as per the SDG. Your permitted with a 5-year pipe design and store up to the 100-year for both subdivision and Site Plan.
2. If you discharge to a pipe that discharges to a City SWM facility, then no additional quality controls are required. However, you are required to confirm with the Conservation Authority.
3. No, but the City does confirm it is the responsibility of the proponent to demonstrate the site is serviceable for water, storm and sanitary and that the receiving sewers have capacity. The Functional Servicing Report provides the ultimate servicing solution for watermain storm and sanitary.
4. Unknown currently. Who owns 2973...apparently the City. Depends if they sell it or what? More ideal if it was within a City Block or City ROW but not an easement.
5. No. No occupancy unless it is serviced properly.
6. You may discharge to the **ditch and not the 750mm Ø storm** along Navan Road if that is to be your determined outlet. Quality Controls are provided by the Conservation Authority. 5-year Pre to post with a tc of 20 minutes Pre and a tc of 10 minutes with a 0.5 C, store up to the 100-year.
7. You are permitted to use infiltration designs anywhere within the city but they must demonstrate functionality and have supporting documentation.
8. You must demonstrate, not assume the 750 mm Ø storm pipe was designed to include your entire site. The road-side ditch primarily runs towards Page Road. This will require further investigation. The City will not support any municipal owned infrastructure within the proposed Gas Station parcel. 2973 is City Owned.

Any info you may require is available from the Info Centre "ISD Information Centre / Centre Information" informationcentre@ottawa.ca

The City reserves the right to change any decisions provided herein should new information warrant it.

thanks

Will Curry, C.E.T.

Planning, Infrastructure and Economic Development /
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William.Curry@Ottawa.ca

From: Gabrielle Snow <gsnow@jlrichards.ca>
Sent: Friday, January 15, 2021 3:51 PM
To: Belan, Steve <Steve.Belan@ottawa.ca>; Curry, William <William.Curry@ottawa.ca>
Cc: Tim F. Chadder <tchadder@jlrichards.ca>; Lucie Dalrymple <ldalrymple@jlrichards.ca>; Guy Forget <gforget@jlrichards.ca>
Subject: RE: Navan Road - Second Pre-Application

Hi Steve and Will,

Leading up to the second pre-application meeting for 2983, 3053 and 3079 Navan Road, I wanted to forward you some questions regarding servicing:

Question 1: The City to confirm that the quantity control criterion from the EUC ISU prevails; The 1:100 year post-development peak flows for the overall subdivision be limited to the 1:5 year peak flows calculated based on a C-Factor of 0.60.
Question 2: The City to confirm that the quality control criterion from the EUC ISU prevails; Given that 2983 Navan Road is tributary to Pond #3 which was sized to meet the enhanced protection level, there is no be any additional water quality control requirements for the subdivision.
Question 3: The City to confirm that the ultimate servicing solution for storm & sanitary hinges on proposed storm and sanitary sewers along Navan Road, from 3053 Navan Road to Renaud Road.

Question 4: Given that water servicing to support the subdivision requires looping, can an easement be granted within 2973 Navan Road to facilitate water servicing as this future watermain connection would be the supply for both the subdivision and future gas station? The second watermain connection would be within 3053 Navan Road.
Question 5: To support the gas station under interim condition, would the City entertain that wastewater flows be captured by a holding tank assuming that the car wash would not be commissioned.
Question 6: Given that the lands for the future gas station currently sheet flows to the open ditch system & CB/DICB and 750 mm diameter storm sewer along Navan Road, its is assumed that storm servicing for the gas station can be developed to maintain the same drainage pattern. As such, the City to confirm the quantity control criterion for the gas station. The 1:100 year post-development peak flows from the gas station be limited to pre-development levels (C-Factor of 0.20). Prior to outlet into the 750 mm diameter storm sewer, a proposed OGS would be sized to achieve the enhanced protection level (TSS 80%).
Question 7: To minimize runoff volume discharged to the 750 mm diameter storm sewer, rooftop flows from the building and car wash could be captured and infiltrated. Although infiltration for this type of usage is generally not recommended, the City to confirm whether infiltration of the rooftop flows would be permitted.
Question 8: In support of servicing for the overall subdivision and gas station, would the City be favorable of an easement within the 2973 Navan Road to facilitate water and storm servicing (connection to the existing 750 mm diameter storm sewer)? As alternate, would the City entertain selling the eastern part of 2973 Navan Road?

Also, would it be possible to get information on the following for Brian Coburn Blvd:

- Built infrastructure for lanes (i.e. turning lanes, bike lanes etc.);
- Traffic signals;

- Infrastructure underground.

Thanks in advance and have a great weekend,

Gabrielle Snow
Intern Planner

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Direct: 343-803-3913

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From: Gabrielle Snow
Sent: Friday, January 15, 2021 10:53 AM
To: 'Belan, Steve' <Steve.Belan@ottawa.ca>
Cc: 'Sauve, Diane' <Diane.Sauve@ottawa.ca>; Tim F. Chadder (tchadder@jlrichards.ca) <tchadder@jlrichards.ca>
Subject: RE: Navan Road - Second Pre-Application

Hi Steve,

Please find the revised concept plan attached. Note that the only changes made were removing a row of townhouses and replacing them with another 3-storey condo building along the southeast corner.

Can you please confirm that the meeting on the 18th is still on? If it is, can Raad and Carmine be sent invites? Their emails are:
rakrawi@groupeheafey.com
carmine@zayoungroup.com

Should you have any questions, please feel free to reach out.

Thanks again,

From: Belan, Steve <Steve.Belan@ottawa.ca>
Sent: Thursday, January 14, 2021 4:38 PM
To: Gabrielle Snow <gsnow@jlrichards.ca>
Subject: RE: Navan Road - Second Pre-Application

Thank you

From: Gabrielle Snow <gsnow@jlrichards.ca>
Sent: January 14, 2021 4:02 PM
To: Belan, Steve <Steve.Belan@ottawa.ca>

Cc: Tim F. Chadder <tchadder@jlrichards.ca>
Subject: RE: Navan Road - Second Pre-Application

Hi Steve,

Quick update, the client might provide us with an updated concept plan tomorrow that would include minor changes only however there is a chance that the concept plan I provided earlier will be the final draft to be discussed at the pre-consult meeting. If we receive an updated concept plan from them, I will be sure to promptly send it your way.

Thanks,

Gabrielle

Gabrielle Snow
Intern Planner

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From: Gabrielle Snow
Sent: Thursday, January 14, 2021 3:30 PM
To: Belan, Steve <Steve.Belan@ottawa.ca>
Cc: Tim F. Chadder (tchadder@jlrichards.ca) <tchadder@jlrichards.ca>
Subject: RE: Navan Road - Second Pre-Application

Hi Steve,

My apologies for the wait on receiving the concept plan—we only just received it from the client. Please find the concept plan attached to this email.

Should you have any questions, please feel free to reach out.

Additionally, would it be possible to get Raad and Carmine added to the zoom meeting? They have not received invites. Their emails are:
rakrawi@groupeheafey.com
carmine@zayoungroup.com

Thanks,

From: Belan, Steve <Steve.Belan@ottawa.ca>
Sent: Thursday, January 7, 2021 12:49 PM
To: Gabrielle Snow <gsnow@jlrichards.ca>
Subject: RE: Navan Road - Second Pre-Application

Gabrielle,

I have asked the Admin Assistant to set up a Zoom Call for the 18th some time between 11 and 3. You should receive an email some time. If you haven't by Monday, remind me again please.

Steve

From: Gabrielle Snow <gsnow@jlrichards.ca>
Sent: January 07, 2021 11:46 AM
To: Belan, Steve <Steve.Belan@ottawa.ca>
Cc: Tim F. Chadder <tchadder@jlrichards.ca>
Subject: RE: Navan Road - Second Pre-Application

Hi Steve,

I have gotten word from our client that we should be getting the concept plan by next Friday, Jan 15th. Once we receive it, I will share it with you.

Would it be possible to set up a meeting for the week of Jan 18th? Tim and I have the most availability on the 19th and 20th.

Thanks in advance,

Gabrielle

Gabrielle Snow
Intern Planner

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From: Belan, Steve <Steve.Belan@ottawa.ca>
Sent: Monday, December 14, 2020 2:39 PM

To: Gabrielle Snow <gsnow@jlrichards.ca>
Subject: RE: Navan Road - Second Pre-Application

Gabrielle,

I am reluctant to set up a meeting until I know that your group has prepared some kind of concept plan. This will is my last week before the Christmas Holidays and therefore very busy. If you have some material to share I will make a meeting for Thursday afternoon.

Regarding the parkland dedication, There is no plan for a park in the secondary plan. However, it will be up to the parks planner to make this call. I would imagine it will also depend on the number of units that you are proposing. I have spoken with them any they have indicated that they will get back to me.

Steve Belan

From: Gabrielle Snow <gsnow@jlrichards.ca>
Sent: December 07, 2020 3:30 PM
To: Belan, Steve <Steve.Belan@ottawa.ca>
Cc: Tim F. Chadder <tchadder@jlrichards.ca>; Lucie Dalrymple <ldalrymple@jlrichards.ca>
Subject: Navan Road - Second Pre-Application

Hi Steve,

I hope this email finds you well.

I am reaching out to request a second pre-application meeting as it relates to the proposed Navan Road development. As mentioned during the last meeting, the client was able to acquire abutting properties (2983 Navan Road, 3053 Navan Road) in addition to 3079 Navan road. Since a number of additional development plans and considerations have changed as a result, we are looking to have a second meeting.

We are aiming to get you the site plan, pre-application meeting form and additional materials by early next week. With this in mind, do you think it would be possible to schedule the pre-application meeting end of week next week or sometime early the week after?

Also, would you be able to confirm that cash in lieu of parkland would be accepted for this development?

Thanks in advance,

Gabrielle

Gabrielle Snow
Intern Planner

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J.L. Richards & Associates Limited is proactively doing our part to protect the wellbeing of our staff and communities while improving our communication technology. ***We are pleased to announce that we have implemented direct phone lines for all of our staff, allowing you to connect with us regardless of whether we are working remotely or in the office.*** *We are dedicated to delivering quality services to you through value and commitment, as always. Please reach out to us if you have any questions about your project.*

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From:	Curry, William
To:	Gabrielle Snow
Cc:	Belan, Steve; Tim F. Chadder; Lucie Dalrymple; Guy Forget
Subject:	Navan Road Site
Date:	Tuesday, January 19, 2021 11:10:35 AM

Gabrielle,

I have already provided my Submission list to Steve for distribution.

I can offer these other items at this time.

I reviewed the report prepared by IBI and they followed the parameters of the Stantec EUC to demonstrate the site was serviceable for zoning purposes only. Historically I can tell you IBI tends to take their own liberties in what they deem we the City should accept.

There were several documents submitted for zoning and I don't know if Taggart is making those available to the applicant.

I will require a FSR for this file for Draft Plan of Subdivision, regardless of what was submitted.

Info only
I looked at the existing topographical plan of survey and it will require more existing elevations to be considered acceptable.
The Storm and Sanitary **pipe(s)** Outlets are as per the EUC and are to be on Navan Road and connected to Renaud Road. Design to City Standards may be another issue if you read IBI's report.
This site is lower than all the surrounding roads. Preloading would be ideal for this site. Note that the attempts to sometimes retain trees and preload areas is a conflict and some trees can't be saved.

The watermain option out to Page; you should consider or attempt to go through the City owned parcel between the proposed Townhouses and Brian Coburn. Also the easement location within that private parcel is critical as we accept nothing else within the easement other than asphalt and curbs. Maybe it is best to go in a straight line and loose some trees.
It is hard to believe you need a Dry Pond for this site with all the green spaces. I know this is just concept currently. Private Bio-swales could be considered

elsewhere...etc. Water table here is a concern.

Let me know if I can assist further.

Thanks

Will Curry, C.E.T.

Planning, Infrastructure and Economic Development /
Planification, d'infrastructure et de développement économique
City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 16214
110 Laurier Ave., 4th Fl East;
Ottawa ON K1P 1J1

William.Curry@Ottawa.ca

From: Belan, Steve <Steve.Belan@ottawa.ca>
Sent: Friday, April 23, 2021 2:15 PM
To: Tim F. Chadder <tchadder@jlrichards.ca>; Gabrielle Snow <gsnow@jlrichards.ca>
Cc: Curry, William <William.Curry@ottawa.ca>; Young, Mark <Mark.Young@ottawa.ca>; Castro, Phil <phil.castro@ottawa.ca>; Giampa, Mike <Mike.Giampa@ottawa.ca>
Subject: Pre-con Follow-up - 3079 Navan Road

CC: Will Curry, Mark Young, Phil Castro, Mike Giampa

Hello Gabrielle,

I apologize for the delay on getting these out. Please refer to the below and/or attached notes, regarding the Pre-Application Consultation (pre-con) Meeting held on January 18, and March 25, for the property at 3079 Navan Road for ZBLA and subdivision in order to allow the development of in fill subdivision with low-rise apartments, town house unit and a commercial block at the corner of Brian Coburn and Navan. I have also attached the required Plans & Study List for application submission. During the Covid-19 pandemic the City will not be requiring any paper copies as listed in the attached list.

Below or attached, are staff's preliminary comments based on the information available at the time of pre-con meeting:

Planning

- A severance application may be required depending on how the owner wishes to proceed with the creating the commercial block at the intersection
- We need to discuss the order of applications. There are pros and cons to moving forward with a severance of the commercial blocks to address ownership issues.
- We support the move to low-rise buildings along Brain Coburn Blvd.
- Lynda Mongeon would be able to facilitate the transfer of surplus City lands as needed
- Contributions to the Mud Creek restoration will need to be determine.
- The Applicant must now provide a proposed strategy for public consultation as directed by Bill 73

Urban Design

1. PRUD appreciates and supports the desire to retain trees on-site. The arrangement and viability of this should be reviewed in depth by our Planning Forester.
2. The size and locations of the commercial block is supported. It would be worth exploring the possibility of obtaining additional city lands at the intersection of Brian Coburn and Navan Road to complete the block and allow for possible built form at this gateway location.

3. The current drive through configuration/location adjacent to this community entrance is a significant concern. Please re-consider the layout of the commercial site.
4. Please review the proposal in conjunction with the EUC Phase 1 CDP.
5. PRUD would support the inclusion of a park block to serve the new residents. Consider a location that allows for tree retention, and connectivity to the community to the east.
6. Access to Page Road should be discouraged. If this is planned to become a cul-de sac at Navan Road this should also be considered.
7. 18.0 m public r.o.w as proposed is supported.
8. Please ensure that rear yards with a minimum depth of 7.5 m for townhomes are provided abutting existing residential uses.
9. The 3 townhomes on Page Road should be re-considered. This typology is not common on Page Road.
10. A design brief will be required in support of your applications. Please see attached terms of reference.

Engineering

The attached “Pre-application consultation servicing memo” summarizes engineering design considerations as per our discussion. [Ensure the memo addresses all relevant engineering issues.]

Required for both Site Plan and Subdivision:

Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:

Location of service connections (MAP)

Type of development and the amount of fire flow required (as per FUS).

Average daily demand: ___ l/s.

Maximum daily demand: ___l/s.

Maximum hourly daily demand: ___ l/s.

Subdivision Draft Plan requirements

Functional Servicing Report

4 M plan

4 R Plan

Detailed Subdivision Design

Cover Page

Road Cross Sections

Site Plan

Topographical Plan of Survey Plan with a published Bench Mark

Grading & Drainage Plan

General Plan of Services

Plan and profile Plans

CUP

SWM Plan

Erosion & Sediment Control Plan

Landscape Plans and TCR

Design Brief and Stormwater Management Report

Geotechnical Report

Transportation Noise Study

TIA

Site Plan Requirements

Site Plan

Topographical Plan of Survey Plan with a published Bench Mark

Grading & Drainage Plan

General Plan of Services

Erosion & Sediment Control Plan

Design Brief and Stormwater Management Report

Geotechnical Report

Lighting Plan and or and Memo

Stationary Noise Study

TIA

Design Criteria

Storm Pre to post, C of .5, Pre tc 20; post tc 10

5-year pipe minimum and store up to 100-year on site. No 2-year ponding on site.

Permissible ponding of 350mm for 100-year

At 100-year ponding elevation you must spill to City ROW

100-year Spill elevation must be 300mm lower than any building opening

Minimum Drawing and File Requirements- All Plans

Plans are to be submitted on standard **A1 size** (594mm x 841mm) sheets, utilizing an appropriate Metric scale (1:200, 1:250, 1:300, 1:400, or 1:500).

With all submitted hard copies provide individual PDF of the DWGs and for reports please provide one PDF file of the reports. **All PDF documents are to be unlocked and flattened.**

1. Site Plans for this file are to be a C of .5. Subdivision is to be calculated as per the SDG. Your permitted with a 5-year pipe design and store up to the 100-year for both subdivision and Site Plan.
2. If you discharge to a pipe that discharges to a City SWM facility, then no additional quality controls are required. However, you are required to confirm with the Conservation Authority.
3. No, but the City does confirm it is the responsibility of the proponent to demonstrate the site is serviceable for water, storm and sanitary and that the receiving sewers have capacity. The Functional Servicing Report provides the ultimate servicing solution for watermain storm and sanitary.
4. Unknown currently. Who owns 2973...apparently the City. Depends if they sell it or what? More ideal if it was within a City Block or City ROW but not an easement.
5. No. No occupancy unless it is serviced properly.
6. You may discharge to the **ditch and not the 750mm Ø storm** along Navan Road if that is to be your determined outlet. Quality Controls are provided by the Conservation Authority. 5-year Pre to post with a tc of 20 minutes Pre and a tc of 10 minutes with a 0.5 C, store up to the 100-year.
7. You are permitted to use infiltration designs anywhere within the city but they must demonstrate functionality and have supporting documentation.
8. You must demonstrate, not assume the 750 mm Ø storm pipe was designed to include your entire site. The road-side ditch primarily runs towards Page Road. This will require further investigation. The City will not support any municipal owned infrastructure within the proposed Gas Station parcel. 2973 is City Owned.

Any info you may require is available from the Info Centre "ISD Information Centre / Centre Information" informationcentre@ottawa.ca

The City reserves the right to change any decisions provided herein should new information warrant it.

Feel free to contact the Infrastructure Project Manager, Will Curry, at Will.Curry@ottawa.ca for follow-up questions.

Transportation

A TIA is warranted, please proceed to scoping.

The application will not be deemed complete until the submission of the draft step 2-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).

Although a full review of the TIA Strategy report (Step 4) is not required prior to an application, it is strongly recommended.

Synchro files are required at Step 4.

ROW protection on Navan is 44.5m.

Corner sight triangle: 5m x 5m

A stationary Noise Impact Study is required if there is noise sensitive use within 100m.

Clear throat requirements on Navan as per TAC guidelines

On site plan:

Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.

Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions).

Show all curb radii measurements; ensure that all curb radii are reduced as much as possible

Show lane/aisle widths.

As built plans for Brian Coburn should be available through our Drawing Center; the applicant should contact: ISD Information Centre / Centre Information informationcentre@ottawa.ca.

There may be a fee.

A Noise Study will be required for traffic noise impacts and any newly created stationary noise sources.

Feel free to contact the Transportation Project Manager, Mike Giampa, at Mike.Giampa@ottawa.ca, for follow-up questions.

Environmental

- Environmental impact statements shall be submitted to identify any Species at risk
- A TCR will be required for these applications.
- A permit is required prior to any tree removal on site which can be made available at site plan approval. Please contact the planner associated with the file or Mark Richardson (mark.richardson@ottawa.ca) when the permit is required or for additional information.
- There may be adjacent or co-owned trees on or near the property line. Please ensure that all trees with a Critical Root Zone extending from adjoining sites onto the development site are addressed in the TCR.
- Please identify any City-owned trees – Forestry Services will need to provide permission for their removal.
- Please be aware of the City's Bird-Safe Design Guidelines

Parkland

- These lands have not been consider for any previous Parkland dedication /Cash-in-lieu of parkland
- Parkland requirements would be based on proposed unit counts.
- It would be preferred that the park is located in the interior of the site. However, we will consider a location with frontage on Brian Coburn and Page next to, but not including the pedestrian/service access to Page Road.

Conservation Authority

- The Conservation Authority will make comments concerning:
  - Stormwater runoff quality criteria
  - Area specific stormwater runoff criteria

Other

- [Insert other concerns or notes]
- You are encouraged to contact the Ward Councillor, Councillor Dudas, at Laura.Dudas@ottawa.ca about the proposal.

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

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

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

Regards,
Steve Belan

Steve Belan, MCIP, RPP
Planner Planning Services, Development Review Services
Planning, Infrastructure and Economic Development
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12714001 Canada Inc – 2983, 3053 and 3079 Navan Road & 2690 Pagé Road SITE SERVICING REPORT CHECKLIST	
REFERENCED STUDIES AND REPORTS	**REFERENCE**
Functional Servicing Report for 12714001 Canada Inc, 2983, 3053 and 3079 Navan Road & 2690 Pagé Road (J.L. Richards & Associates Limited, February 10, 2023)	Functional Servicing Report

4.1	GENERAL CONTENT	REFERENCE
☐	Executive Summary (for larger reports only).	N/A
☒	Date and revision number of the report.	Site Servicing Report
☒	Location map and plan showing municipal address, boundary, and layout of proposed development.	Site Servicing Report (Figure 1 & 2) All Drawings
☒	Plan showing the site and location of all existing services.	Overall Servicing (OS)
☒	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Site Servicing Report (Section 1)
☒	Summary of Pre-consultation Meetings with City and other approval agencies.	Site Servicing Report (Appendix 'A')
☒	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Reference made to Stantec 2005 EUC ISSU
☒	Statement of objectives and servicing criteria.	Site Servicing Report (Section 1.0, 2.0, 3.0, 4.0, 5.0)
☒	Identification of existing and proposed infrastructure available in the immediate area.	Site Servicing Report (Section 1.0, 2.0, 3.0, 4.0) Overall Servicing (OS)
☐	Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	N/A
☒	Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Grading Plan

☐	Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A
☐	Proposed phasing of the development, if applicable.	N/A
☒	Reference to geotechnical studies and recommendations concerning servicing.	Site Servicing Report and Drawings
☒	All preliminary and formal site plan submissions should have the following information: ▪ Metric scale ▪ North arrow (including construction North) ▪ Key plan ▪ Name and contact information of applicant and property owner ▪ Property limits, including bearings and dimensions ▪ Existing and proposed structures and parking areas ▪ Easements, road widening and rights-of-way ▪ Adjacent street names	All Drawings

4.2	SITE SERVICING REPORT: WATER	REFERENCE
☐	Confirm consistency with Master Servicing Study, if available.	N/A
☒	Availability of public infrastructure to service proposed development.	Site Servicing Report (Section 1.0, 2.0) Overall Servicing (OS)
☒	Identification of system constraints.	Site Servicing Report (Section 2.0)
☒	Identify boundary conditions.	Site Servicing Report (Section 2.0, Appendix 'D3')
☒	Confirmation of adequate domestic supply and pressure.	Site Servicing Report (Section 2.0)
☒	Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Site Servicing Report (Section 2.0, Appendix 'D1' & 'D5')
☒	Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Site Servicing Report (Section 2.0)
☐	Definition of phasing constraints. Hydraulic modelling is required to confirm servicing for all defined phases of the project, including the ultimate design.	N/A
☒	Address reliability requirements, such as appropriate location of shutoff valves.	Site Servicing Report (Section 2.0)
☐	Check on the necessity of a pressure zone boundary modification.	N/A

☒	Reference to water supply analysis to show that major infrastructure can deliver sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	Site Servicing Report (Section 2.0, Appendix D1 to D6)
☒	Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants), including special metering provisions.	Site Servicing Report (Section 2.0) Overall Servicing (OS)
☐	Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
☒	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Site Servicing Report (Section 2.0)
☒	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	Site Servicing Report (Appendix 'D2')

4.3	**SITE SERVICING REPORT: WASTEWATER**	**REFERENCE**
☒	Summary of proposed design criteria (Note: Wet weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Site Servicing Report (Section 3.0, Appendix 'E1' & 'E2')
☐	Confirm consistency with Master Servicing Study and/or justifications for deviations.	Stantec 2005 EUC ISSU
☐	Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the Guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A
☒	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Site Servicing Report (Section 1.0, 3.0) Overall Servicing (OS)
☒	Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable.)	Site Servicing Report (Section 3.0, Appendix 'E1' & 'E2')
☒	Calculations related to dry weather and wet weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Site Servicing Report (Appendix 'E1', 'E2')
☒	Description of proposed sewer network, including sewers, pumping stations and forcemains.	Site Servicing Report (Section 3.0) Overall Servicing (OS)

☐	Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A
☐	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐	Special considerations, such as contamination, corrosive environment, etc.	N/A

4.4	**SITE SERVICING REPORT: STORMWATER**	**REFERENCE**
☒	Description of drainage outlets and downstream constraints, including legality of outlets (i.e., municipal drain, right-of-way, watercourse, or private property).	Site Servicing Report (Section 1.0, 4.0)
☒	Analysis of available capacity in existing public infrastructure.	Site Servicing Report (Section 4.0)
☒	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Drawings OS, DST, SWM
☒	Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Site Servicing Report (Section 4.0)
☒	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Site Servicing Report (Section 4.0)
☒	Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Site Servicing Report (Section 4.0) DST, SMW
☐	Setback from private sewage disposal systems.	N/A
☐	Watercourse and hazard lands setbacks.	N/A

☒	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Site Servicing Report (Appendix 'A')
☐	Confirm consistency with subwatershed and Master Servicing Study, if applicable study exists.	Stantec 2005 EUC ISSU
☒	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:2 year return period) and major events (1:100 year return period).	Site Servicing Report (Section 4.0)
☐	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A
☒	Calculate pre- and post-development peak flow rates, including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Site Servicing Report (Section 4.0)
☒	Any proposed diversion of drainage catchment areas from one outlet to another.	Site Servicing Report (Section 4.0)
☒	Proposed minor and major systems, including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Drawings OS, DST, SMW
☐	If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	Quantity control proposed per Site Servicing Report (Section 4.0)
☐	Identification of potential impacts to receiving watercourses.	N/A
☐	Identification of municipal drains and related approval requirements.	N/A
☒	Description of how the conveyance and storage capacity will be achieved for the development.	Site Servicing Report (Section 4.0)
☒	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Site Servicing Report (Section 4.0) Drawings OS, DST, SMW
☒	Inclusion of hydraulic analysis, including hydraulic grade line elevations.	Site Servicing Report (Section 4.0)
☒	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Site Servicing Report (Section 5.0)
☐	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A

☐	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5	APPROVAL AND PERMIT REQUIREMENTS	REFERENCE
The Site Servicing Report shall provide a list of applicable permits and regulatory approvals necessary for the proposed development, as well as the relevant issues affecting such approval. The approval and permitting shall include but not be limited to the following:		
☐	Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams, as defined in the Act.	N/A
☐	Application for Environmental Compliance Approval (ECA) under the Ontario Water Resources Act.	Ongoing
☐	Changes to Municipal Drains.	N/A
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation, etc.).	N/A

4.6	CONCLUSION CHECKLIST	REFERENCE
☒	Clearly stated conclusions and recommendations.	Site Servicing Report (Section 2.7, 3.6, 4.7)
☒	Comments received from review agencies, including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	Comment Response Letter to City of Ottawa
☒	All draft and final reports shall be signed and stamped by a Professional Engineer registered in Ontario.	Site Servicing Report All Drawings

Appendix B

Concept Plan, Draft Plan of Subdivision and Topographical Survey

LOTS AREAS

LOT NUMBER	AREAS (M2)	LOT NUMBER	AREAS (M2)
B01-1	394	B06-4	154
B01-2	184	B06-5	163
B01-3	184	B06-6	154
B01-4	189	B06-7	369
B01-5	189	B07	2,002
B01-6	184	B08-1	525
B01-7	184	B08-2	174
B01-8	299	B08-3	184
B02-1	281	B08-4	174
B02-2	176	B08-5	184
B02-3	184	B08-6	174
B02-4	184	B08-7	234
B02-5	174	B09-1	234
B02-6	233	B09-2	174
B03-1	250	B09-3	184
B03-2	182	B09-4	184
B03-3	182	B09-5	174
B03-4	182	B09-6	234
B03-5	182	B10-1	234
B03-6	182	B10-2	174
B03-7	250	B10-3	184
B04-1	233	B10-4	184
B04-2	174	B10-5	174
B04-3	184	B10-6	487
B04-4	174	B11-1	748
B04-5	184	B11-2	286
B04-6	174	B11-3	265
B04-7	278	B11-4	246
B05-1	368	B11-5	242
B05-2	154	B11-6	242
B05-3	163	B11-7	321
B05-4	163	B12	240
B05-5	154	B13	1,232
B05-6	206	B14	5,728
B06-1	206	B16	7,811
B06-2	154	B17	5,312
B06-3	163		

SITE PLAN LEGEND

- EXISTING BUILDING
- NEW BUILDING
- NEW BUILDING WITH COMMERCIAL SPACE AT-GRADE
- GRASS
- ASPHALT
- LOT LINE
- SETBACKS
- NEW TREE
- FIREWALL
- SIDEWALK

SITE INFORMATION & DEVELOPMENT STATISTICS

LOTS		PIN
		04756 - 0303
		04756 - 0315
		04756 - 0316
		04756 - 1337
ZONING		GM[2546] H(14.5)
SITE AREA		
TOTAL SITE AREA:		~53,441.14 m² (5.34ha)
TOTAL DEVELOPABLE AREA:		~45,956.28 m² (4.59ha)
NET SITE AREA:		~38,956.28 m² (3.89ha)
UNITS		
TOWNHOUSES:		
MAIN UNIT:		67 UNITS
BASEMENT UNIT:		67 UNITS
TOTAL NUMBER OF UNITS:		134 UNITS
BLOCK 01:		
1 X RESIDENTIAL APARTMENT BUILDING		48 UNITS
1 X MIXED USE BUILDING		
RESIDENTIAL:		36 UNITS
COMMERCIAL SPACES:		~899 m²
BLOCK 02:		
1 X RESIDENTIAL APARTMENT BUILDING		47 UNITS
1 X MIXED USE BUILDING		
RESIDENTIAL:		36 UNITS
COMMERCIAL SPACES:		~899 m²
BLOCK 03:		
2 X RESIDENTIAL APARTMENT BUILDING		96 UNITS
TOTAL NUMBER OF UNITS:		397 UNITS
TOTAL COMMERCIAL SPACES:		~1,798 m²

	REQUIRED	PROVIDED
MAXIMUM DENSITY	NO MAX.	102 units/net ha
MINIMUM LOT WIDTH	NO MIN.	5.8 m
MINIMUM LOT AREA	NO MIN.	174 m²
MAXIMUM BUILDING HEIGHT	14.5 m	14.5 m
SETBACKS		
MINIMUM FRONT YARD:	3 m	3 m
MINIMUM CORNER SIDE YARD:	3 m	3 m
MINIMUM INTERIOR SIDE YARD:		
NON-RESIDENTIAL OR MIXED-USE:	5 m	5 m
LOW-RISE RESIDENTIAL :	1.2 m	1.2 m
MID-RISE RESIDENTIAL :	3 m	3 m
MINIMIM REAR YARD:		
ABUTTING A STREET:	3 m	3 m
FROM A RESIDENTIAL ZONE:	7.5 m	7.5 m
FOR A RESIDENTIAL BUILDING:	7.5 m	7.5 m
PARKING RATES		
R9 - TOWNHOUSES:	1 p/main unit = 67	67 (GARAGES)
VISITOR:	0	67 DRIVE AISLES
BLOCK 14:		
R12 - APARTEMENTS	1.0 p/unit = 84	84 (UNDERGROUND)
VISITOR:	0.2 p/unit = 17	18 (UNDERGROUND)
N79 - RETAIL STORE:	3.4 p/100 m² GFA = 30.6	32 (EXTERIOR)
		TOTAL: 134
BLOCK 15:		
R12 - APARTEMENTS	1.0 p/unit = 83	83 (UNDERGROUND)
VISITOR:	0.2 p/unit = 16.6	16 (UNDERGROUND)
N79 - RETAIL STORE:	3.4 p/100 m² GFA = 30.6	32 (EXTERIOR)
		TOTAL: 131
BLOCK 17:		
R12 - APARTEMENTS	1.0 p/unit = 96	96 (UNDERGROUND)
VISITOR:	0.2 p/unit = 19.2	19 (15 EXT. + 4 UND.)
		TOTAL: 115
GROSS FLOOR AREA		
TOWNHOUSE A:		267 m²
TOWNHOUSE B:		239 m²
TOWNHOUSE C:		232 m²
TOWNHOUSE C (CORNER UNIT):		236 m²
TOWNHOUSE D:		225 m²
TOTAL MODEL 01 (ABBBBBBA)		1,968 m²
TOTAL MODEL 02 (ABBBBBA)		1,729 m²
TOTAL MODEL 03 (ABBBBA)		1,490 m²
TOTAL MODEL 04 (CDCDCDC)		1,611 m²
TOTAL MODEL 05 (CDCCDC)		1,386 m²
MIXED USE BUILDING (TOTAL OF 2 BUILDINGS):		TOTAL: 3,926 m²
RESIDENTIAL:		3,027 m²
COMMERCIAL:		899 m²
RESIDENTIAL APARTMENT BUILDING (TOTAL OF 4 BUILDINGS) :		TOTAL: 3,927 m²
RESIDENTIAL:		3,927 m²

NOTE

1. ASSUMES TYPICAL RESIDENTIAL FLOOR HEIGHT OF 3m.
2. THE BASE PLAN (LOT LINES, EXISTING ROADS AND SURROUNDING AREAS) IS BASED ON THE TOPOGRAPHICAL PLAN OF SURVEY, SURVEYED STANTEC GEOMATICS LTD.
3. DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0,3048.

20 0 20 40m

1 2983, NAVAN ROAD - SITE PLAN
1 : 550

PROJECT

NAVAN ROAD DEVELOPMENT

2983, Navan Road, Orleans, ON K1C 7G4

OWNER

GROUPE Heafey GROUP
768, BOUL. SAINT-JOSEPH, SUITE 100
GATINEAU, QC J8Y 4B8

ARCHITECTURAL

PMA ARCHITECTES
(418) 651-8959
INFO@PMAARCHITECTES.COM
3070, CHEMIN DES QUATRE-BOURGEOIS QUÉBEC (QC) G1W 2K4
PMAARCHITECTES.COM

L'Atelier architectes
53, BOUL. SAINT-RAYMOND, GATINEAU, QC J8Y 1R8

CIVIL ENGINEERS / PLANNER

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
1565 CARLING AVENUE, SUITE 700, OTTAWA, ON K1Z 8R1

MECHANICAL & ELECTRICAL ENGINEERS

Q|M&E ENGINEERING
9 GURDWARA ROAD, UNIT 200, OTTAWA, ON K2E 7X6

SURVEYOR

Stantec
1331 CLYDE AVENUE, SUITE 400, OTTAWA, ON K2C 3G4

ARCHITECT SEAL

REVISIONS

12	FOR CITY REVIEW	2024-08-20
11	FOR CITY REVIEW	2024-07-17
10	FOR CITY REVIEW	2024-03-25
9	FOR CITY REVIEW	2024-03-04
8	FOR CITY REVIEW	2022-11-28
7	FOR COORDINATION	2022-11-08
6	FOR COORDINATION	2022-11-01
5	FOR COORDINATION	2022-04-14
4	FOR COORDINATION	2021-11-03
3	FOR COORDINATION	2021-06-30
2	FOR COORDINATION	2021-06-28
1	FOR COORDINATION	2021-06-18
NO	DESCRIPTION	DATE

NOTE

DO NOT USE FOR CONSTRUCTION

DATE	DESIGNED
2024-08-20	P.POMERLEAU
	DRAWN
	P.POMERLEAU
PROJECT No	CHECKED
20054	P.MARTIN

SHEET TITLE

GLOBAL SITE PLAN

SHEET No

A100

Autodesk Docs://NAVAN ROAD/20054_DEV-NAVAN_SITE_PLAN_R24.rvt

June 3, 2023

PLAN 4M-

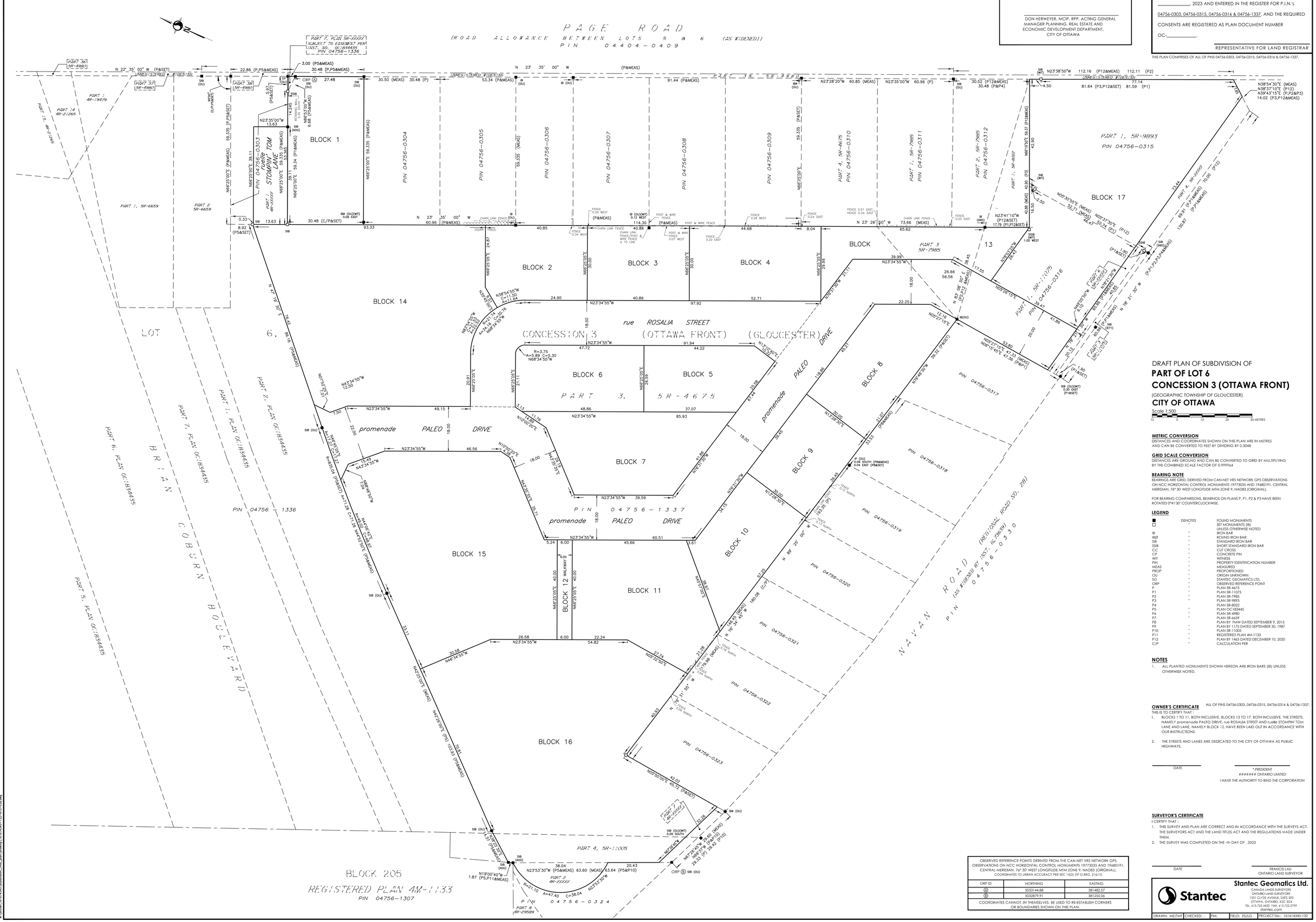
I HEREBY CERTIFY THAT THIS PLAN 4M-_____ IS REGISTERED IN THE LAND REGISTRY OFFICE FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON (No.4) AT_____ O'CLOCK ON THE_____ DAY OF _____, 2023 AND ENTERED IN THE REGISTER FOR P.I.N.'s 04756-0303, 04756-0315, 04756-0316 & 04756-1337, AND THE REQUIRED CONSENTS ARE REGISTERED AS PLAN DOCUMENT NUMBER OC-_____.

_____
REPRESENTATIVE FOR LAND REGISTRAR

THIS PLAN COMPRISES OF ALL OF PINS 04756-0303, 04756-0315, 04756-0316 & 04756-1337.

APPROVED UNDER SECTION 51 OF THE PLANNING ACT BY THE CITY OF OTTAWA THIS ____ DAY OF _____, 20___

_____
DON HERWEYER, MCIP, RPP, ACTING GENERAL MANAGER PLANNING, REAL ESTATE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA



DRAFT PLAN OF SUBDIVISION OF

PART OF LOT 6
CONCESSION 3 (OTTAWA FRONT)

(GEOGRAPHIC TOWNSHIP OF GLOUCESTER)

CITY OF OTTAWA

Scale 1:500

10 0 10 20 30 METRES

METRIC CONVERSION
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

GRID SCALE CONVERSION
DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999964

BEARING NOTE
BEARINGS ARE GRID, DERIVED FROM CAN-NET VRS NETWORK GPS OBSERVATIONS ON NCC HORIZONTAL CONTROL MONUMENTS 19773035 AND 19680191, CENTRAL MERIDIAN, 76° 30' WEST LONGITUDE MTM ZONE 9, NAD83 (ORIGINAL).

FOR BEARING COMPARISONS, BEARINGS ON PLANS P, P1, P2 & P3 HAVE BEEN ROTATED 0°41'30" COUNTERCLOCKWISE.

LEGEND

	DENOTES	
■		FOUND MONUMENTS
□	"	SET MONUMENTS (IB) UNLESS OTHERWISE NOTED
IB	"	IRON BAR
IBØ	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
ORP	"	OBSERVED REFERENCE POINT
P	"	PLAN SR-4675
P1	"	PLAN SR-11075
P2	"	PLAN SR-7985
P3	"	PLAN SR-9893
P4	"	PLAN SR-8022
P5	"	PLAN OC1834345
P6	"	PLAN SR-4980
P7	"	PLAN SR-6659
P8	"	PLAN BY PMW DATED SEPTEMBER 9, 2015
P9	"	PLAN BY 1175 DATED SEPTEMBER 30, 1987
P10	"	PLAN SR-1005
P11	"	REGISTERED PLAN 4M-1133
P12	"	PLAN BY 1465 DATED DECEMBER 10, 2020
C/P	"	CALCULATION PER

NOTES
1. ALL PLANTED MONUMENTS SHOWN HEREON ARE IRON BARS (IB) UNLESS OTHERWISE NOTED.

OWNER'S CERTIFICATE ALL OF PINS 04756-0303, 04756-0315, 04756-0316 & 04756-1337.

THIS IS TO CERTIFY THAT:
1. BLOCKS 1 TO 11, BOTH INCLUSIVE, BLOCKS 13 TO 17, BOTH INCLUSIVE, THE STREETS, NAMELY promenade PALEO DRIVE, rue ROSALIA STREET AND ruelle STOMPIN' TOM LANE AND LANE, NAMELY BLOCK 12, HAVE BEEN LAID OUT IN ACCORDANCE WITH OUR INSTRUCTIONS.
2. THE STREETS AND LANES ARE DEDICATED TO THE CITY OF OTTAWA AS PUBLIC HIGHWAYS.

_____ DATE

_____ * PRESIDENT
####### ONTARIO LIMITED
I HAVE THE AUTHORITY TO BIND THE CORPORATION

SURVEYOR'S CERTIFICATE
I CERTIFY THAT:
1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE -th DAY OF .2023

_____ DATE

_____ FRANCIS LAU
ONTARIO LAND SURVEYOR

OBSERVED REFERENCE POINTS DERIVED FROM THE CAN-NET VRS NETWORK GPS OBSERVATIONS ON NCC HORIZONTAL CONTROL MONUMENTS 19773035 AND 19680191, CENTRAL MERIDIAN, 76° 30' WEST LONGITUDE MTM ZONE 9, NAD83 (ORIGINAL), COORDINATES TO URBAN ACCURACY PER SEC 14(2) OF O.REG. 216/10

ORP ID	NORTHING	EASTING
A	5033144.88	381482.57
B	5032879.91	381255.06

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

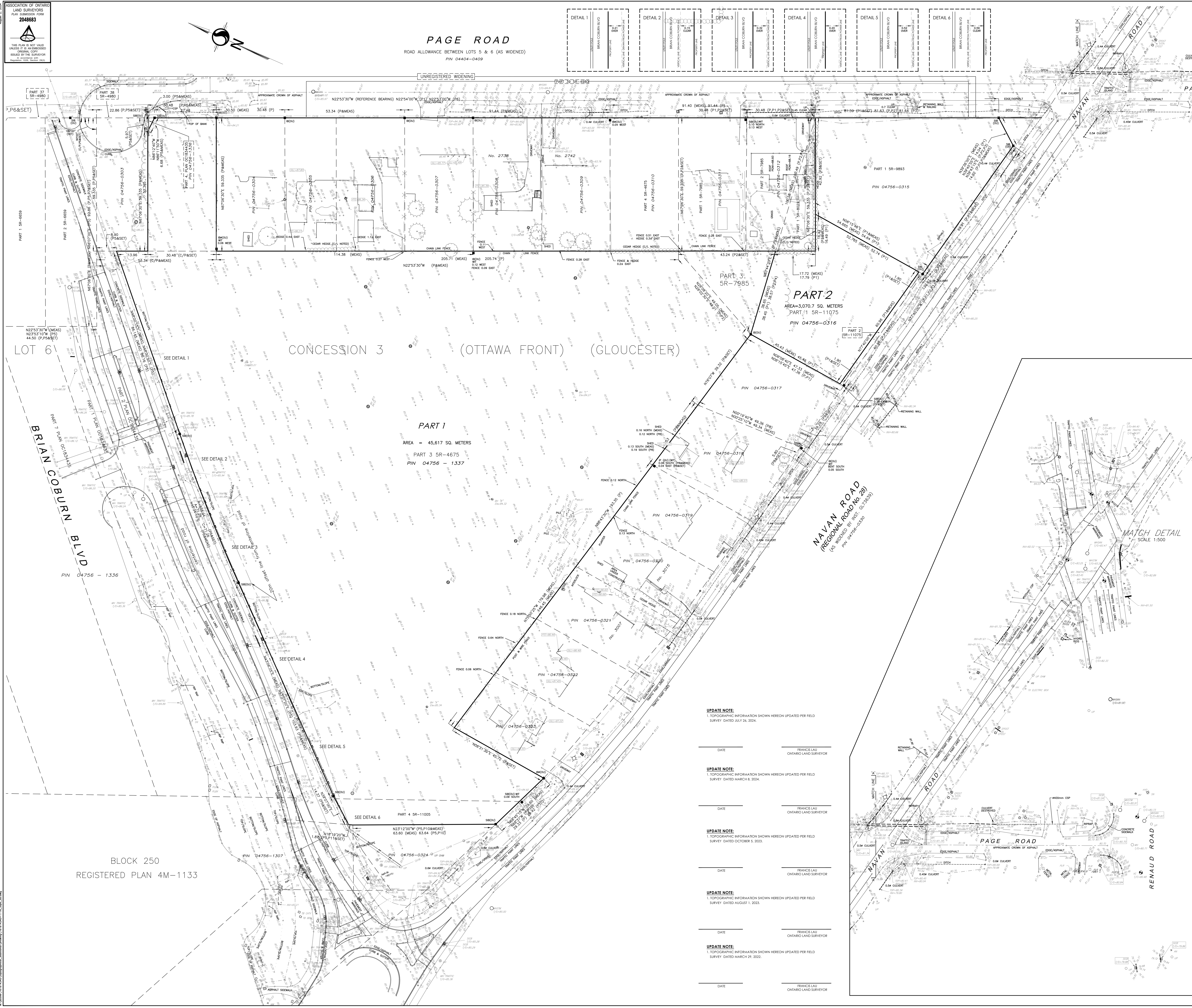
Stantec Geomatics Ltd.
CANADA LANDS SURVEYORS
ONTARIO LAND SURVEYORS
1331 CLYDE AVENUE, SUITE 300
OTTAWA, ONTARIO, K2C 3G4
TEL. 613.722.4420 FAX. 613.722.2799
stantec.com

DRAWN: ME/TMT	CHECKED: -	PM:	FIELD: ES/JG	PROJECT No.: 161614345-132

August 2, 2024

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2048683

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR
In accordance with Regulation 1026, Section 29(3)



UPDATE NOTE:
1. TOPOGRAPHIC INFORMATION SHOWN HEREON UPDATED PER FIELD SURVEY DATED JULY 26, 2024.

DATE

FRANCIS LAU
ONTARIO LAND SURVEYOR

UPDATE NOTE:
1. TOPOGRAPHIC INFORMATION SHOWN HEREON UPDATED PER FIELD SURVEY DATED MARCH 8, 2024.

DATE

FRANCIS LAU
ONTARIO LAND SURVEYOR

UPDATE NOTE:
1. TOPOGRAPHIC INFORMATION SHOWN HEREON UPDATED PER FIELD SURVEY DATED OCTOBER 5, 2023.

DATE

FRANCIS LAU
ONTARIO LAND SURVEYOR

UPDATE NOTE:
1. TOPOGRAPHIC INFORMATION SHOWN HEREON UPDATED PER FIELD SURVEY DATED AUGUST 1, 2023.

DATE

FRANCIS LAU
ONTARIO LAND SURVEYOR

UPDATE NOTE:
1. TOPOGRAPHIC INFORMATION SHOWN HEREON UPDATED PER FIELD SURVEY DATED MARCH 29, 2022.

DATE

FRANCIS LAU
ONTARIO LAND SURVEYOR

TOPOGRAPHIC SKETCH OF
PART OF LOT 6
CONCESSION 3 (OTTAWA FRONT)
(GEOGRAPHIC TOWNSHIP OF GLOUCESTER)
CITY OF OTTAWA

Scale 1:500
10 0 10 20 30 METRES

METRIC CONVERSION
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

GRID SCALE CONVERSION
DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999964

BEARING NOTE
BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE WESTERLY LIMIT OF PAGE ROAD, AS SHOWN ON PLAN 5R-4980, HAVING A BEARING OF N22°53'30"W.

A BEARING ROTATION CLOCKWISE OF 0°41'20" HAVE BEEN APPLIED TO BEARINGS SHOWN ON P5, P6, AND P7.

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

LEGEND (IF APPLICABLE)

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBØ	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
ORP	"	OBSERVED REFERENCE POINT
P	"	PLAN 5R-4675
P1	"	PLAN 5R-11075
P2	"	PLAN 5R-7985
P3	"	PLAN 5R-9893
P4		PLAN 5R-8022
P5	"	PLAN OC183445
P6	"	PLAN 5R-4980
P7	"	PLAN 5R-6659
P8		PLAN BY FMW DATED SEPTEMBER 9, 2015
P9	"	PLAN BY 1175 DATED SEPTEMBER 30, 1987
P10	"	PLAN 5R-11005
P11	"	REGISTERED PLAN 4M-1133
C/P	"	CALCULATION PER
ACU	"	AIR CONDITIONING UNIT
AN	"	ANCHOR
AP	"	AIR PUMP
ANT	"	ANTENNA
BH	"	BOREHOLE
BIB	"	HOSE BIB
BKR	"	BIKE RACK
BENCH	"	BENCH
BOL	"	BOLLARD
BOUL	"	BOULDER
CB	"	CATCH BASIN
DCB	"	DOUBLE CB
DICB	"	DITCH CB
CBMH	"	CB MANHOLE
DCBMH	"	DOUBLE CB MANHOLE
CBSI	"	SIDE INLET CB
CHM	"	CHIMNEY
CSV	"	VALVE CURB STOP
DRN	"	DRAIN
EPOST	"	ELECTRICAL OUTLET
FP	"	FLAG POLE
FL	"	FLOOD LIGHT
FTF	"	FUEL TANK FILLER CAP
GC	"	GARBAGE CAN
GFL	"	PIPE FLANGE (GAS)
GFP	"	GAS FUEL PUMP
GP	"	POLE GUYWIRE
GSR	"	GAS SERVICE REGULATOR
GV	"	GAS VALVE
HIC	"	HICKENBOTTOM
HDS	"	HEADSTONE
HLS	"	LIGHT STANDARD HYDRO
HM	"	HYDRO METER
HTN	"	HYDRO TRANSFORMER
HW	"	HAND WELL
HYD	"	FIRE HYDRANT
JBX	"	JUNCTION BOX
MB	"	MAILBOX
MP	"	MONITORING PIN
MH	"	MAINTENANCE HOLE UNIDENTIFIED
MHBELL	"	MAINTENANCE HOLE BELL
MHF	"	MAINTENANCE HOLE FIBRE OPTIC
MHH	"	MAINTENANCE HOLE HYDRO
MHI	"	MAINTENANCE HOLE INVERT
MHSAN	"	MAINTENANCE HOLE SANITARY
MHSTM	"	MAINTENANCE HOLE STORM
MHT	"	MAINTENANCE HOLE TRAFFIC
MW	"	MONITORING WELL
NPB	"	NEWS PAPER BOX
OLP	"	LIGHT STANDARD ORNAMENTAL
OW	"	OBSERVATION WELL
PKM	"	PARKING METER
PLBX	"	PULL BOX
PLQ	"	PLAQUE
PLR	"	PILLAR
PZ	"	PIEZIOMETER
RLC	"	RED LIGHT CAMERA
RWSL	"	RAILWAY SIGNAL LIGHT
RWSS	"	RAILWAY SWITCH STAND
SAT	"	SATELLITE DISH
SCLP	"	SCULPTURE
SCP	"	SUMP/CATCH PIT
SCV	"	SPRINKLER CONTROL VALVE
SH	"	SPRINKLER HEAD
SIA	"	SIAMESE CONNECTION
SN	"	SIGN
SPAN	"	SOLAR PANEL
SPT	"	SEPTIC TANK LID
TBL	"	TABLE
TB BELL	"	TERMINAL BOX - BELL
TB CATV	"	TERMINAL BOX - CABLE
TCB	"	TRAFFIC CONTROL BOX
TPIT	"	TEST PIT
TSL	"	TRAFFIC SIGNAL LIGHT
UMB	"	MARKER BELL UNDERGROUND
UMC	"	MARKER CABLE UNDERGROUND
—— G ——	"	NATURAL GAS LOCATE
UMO	"	MARKER OIL UNDERGROUND
UP	"	UTILITY POLE
VB	"	VALVE BOX
VC	"	VALVE CHAMBER
WV	"	WATER VALVE
_cm	"	TREE CONIFEROUS Ø _centimetres
_cm	"	TREE DECIDUOUS Ø _centimetres

SURVEYOR'S CERTIFICATE
I CERTIFY THAT :
1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 14th DAY OF DECEMBER, 2020.

DATE

FRANCIS LAU
ONTARIO LAND SURVEYOR

SRO COORDS: X= 381388 Y= 5032979

Stantec
Stantec Geomatics Ltd.
CANADA LANDS SURVEYORS
ONTARIO LAND SURVEYORS
1331 CLYDE AVENUE, SUITE 400
OTTAWA, ONTARIO, K2C 3G4
TEL. 613.722.4420 FAX. 613.722.2799
stantec.com

DRAWN: ME	CHECKED: KJ	PM: AB	FIELD: CA\SJ	PROJECT No.: 161614345-111A

Appendix C

Background Drawings –
Existing Infrastructure

AS-BUILT DRAWING
THIS DRAWING HAS BEEN REVISED TO INCORPORATE CHANGES INDICATED ON THE CONTRACTOR'S MARKED UP DRAWINGS. CONTRACTOR'S DRAWINGS WERE NOT VERIFIED ON SITE BY THE ENGINEER. THE ENGINEER DOES NOT TAKE RESPONSIBILITY FOR INFORMATION ON THIS DRAWING THAT IS IN CONFLICT WITH EXISTING CONDITION DUE TO INACCURATE OR MISSING INFORMATION ON THE MARKED UP DRAWINGS PROVIDED.

Vinley CONSULTING ENGINEERS PLANNERS

NO.	REVISIONS	BY	DATE
6	AS – CONSTRUCTED	GTP	FEB/2007
5	REVISED WATERMAIN	GTP	DEC 7/05
4	ISSUED FOR TENDER	GTP	JUN 9/05

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage

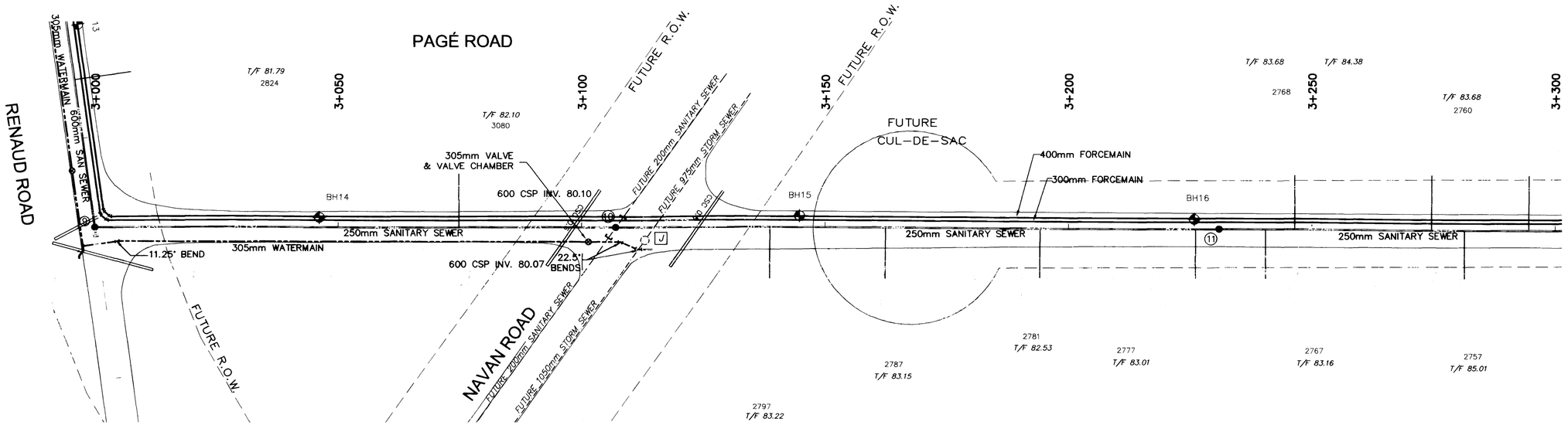
FOREST VALLEY SANITARY SERVICING

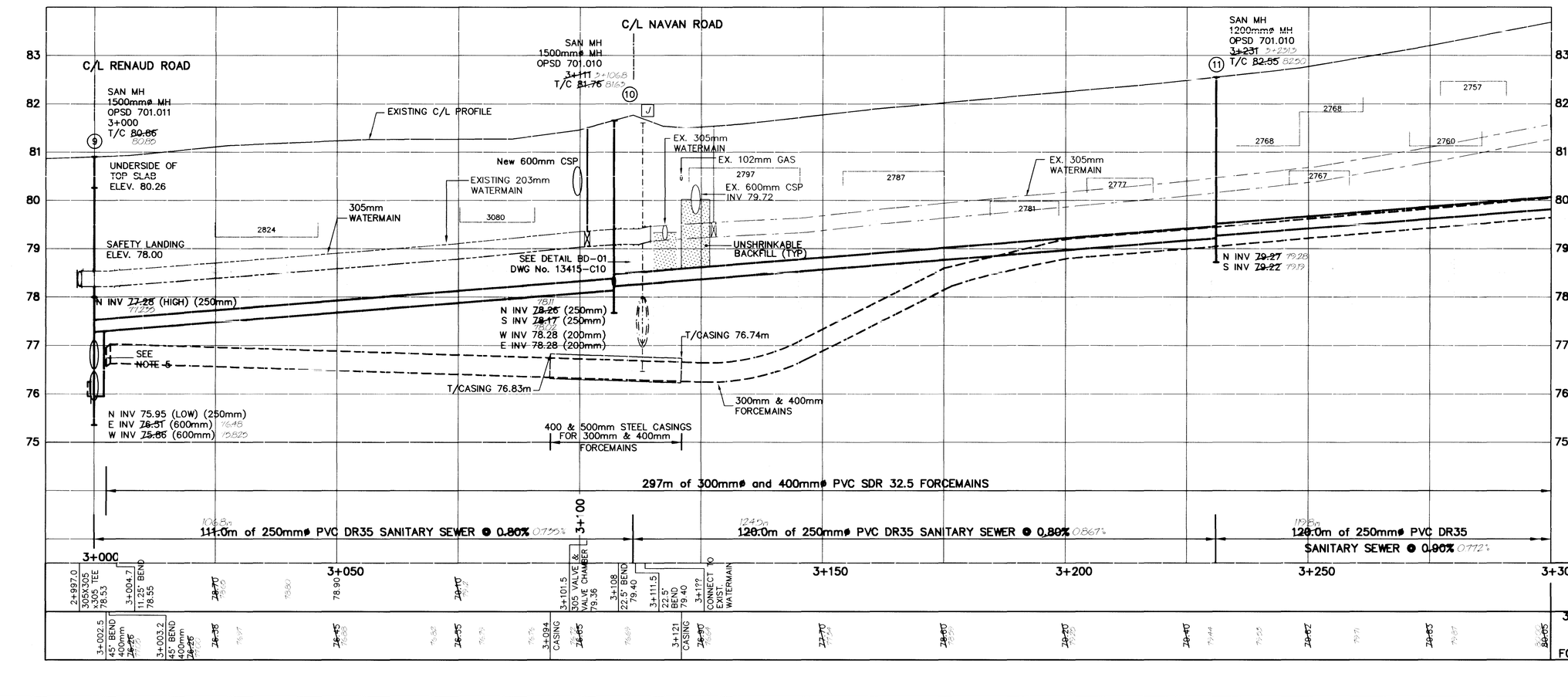
DUAL FORCEMAIN & SANITARY SEWER STA 3+000 – STA 3+300 PAGÉ ROAD

W. NEWELL, P.ENG.		W. CLOUTHIER, P.ENG.	
Director Infrastructure Services		Manager Construction Services-Development	
Dwn: AVH	Chkd: GTP	Des: GTP	Chkd: JM

Ottawa

CONTRACT NO. ISB05-2011
DWG. NO. 13415-C6
SHEET 8 OF –
DATE MARCH 2005
SCALE Hor 0m 5 10m, Vert 0m 1m





NOTES:

1. *T/F 85.79* – TOP OF FOUNDATION ELEVATION
2. ALL SANITARY SERVICE LATERALS SHALL CROSS BELOW THE EXISTING WATERMAIN, EXISTING STORM SEWER PIPE AND EXISTING DITCH ELEVATION.
3. ALL SANITARY SERVICE LATERAL INVERTS SHALL BE A 3.0m MINIMUM BELOW THE TOP OF FOUNDATION ELEVATION AT THE PROPERTY LINE.
4. ALL SANITARY SERVICE LATERALS SHALL BE INSTALLED AS PER OPSD 1006.020.
5. 250mm DROP STRUCTURE AS PER OPSD 1003.020
6. FUTURE STORM MANHOLE:
   J STA 3+112.9
   W INV 77.05 (975mm)
   E INV 76.97 (1050mm)
7. CONTRACTOR TO CONFIRM ELEVATION AND LOCATION OF EXISTING 305mm WATERMAIN PRIOR TO CROSSING NAVAN ROAD.
8. RECONNECT WATER SERVICES TO NEW 305mm WATERMAIN

AS-BUILT DRAWING
THIS DRAWING HAS BEEN REVISED TO INCORPORATE CHANGES INDICATED ON THE CONTRACTOR'S MARKED UP DRAWINGS. CONTRACTOR'S DRAWINGS WERE NOT VERIFIED ON SITE BY THE ENGINEER. THE ENGINEER DOES NOT TAKE RESPONSIBILITY FOR INFORMATION ON THIS DRAWING THAT IS IN CONFLICT WITH EXISTING CONDITION DUE TO INACCURATE OR MISSING INFORMATION ON THE MARKED UP DRAWINGS PROVIDED.

Vinley CONSULTING ENGINEERS PLANNERS

NO.	REVISIONS	BY	DATE
5	AS – CONSTRUCTED	GTP	FEB/2007
4	ISSUED FOR TENDER	GTP	JUN 9/05
3	ISSUED TO CITY FOR REVIEW	GTP	05/03/23
2	ISSUED TO CITY FOR REVIEW	GTP	05/03/18
1	ISSUED FOR UTILITY CIRCULATION	GTP	05/03/15

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage

FOREST VALLEY SANITARY SERVICING

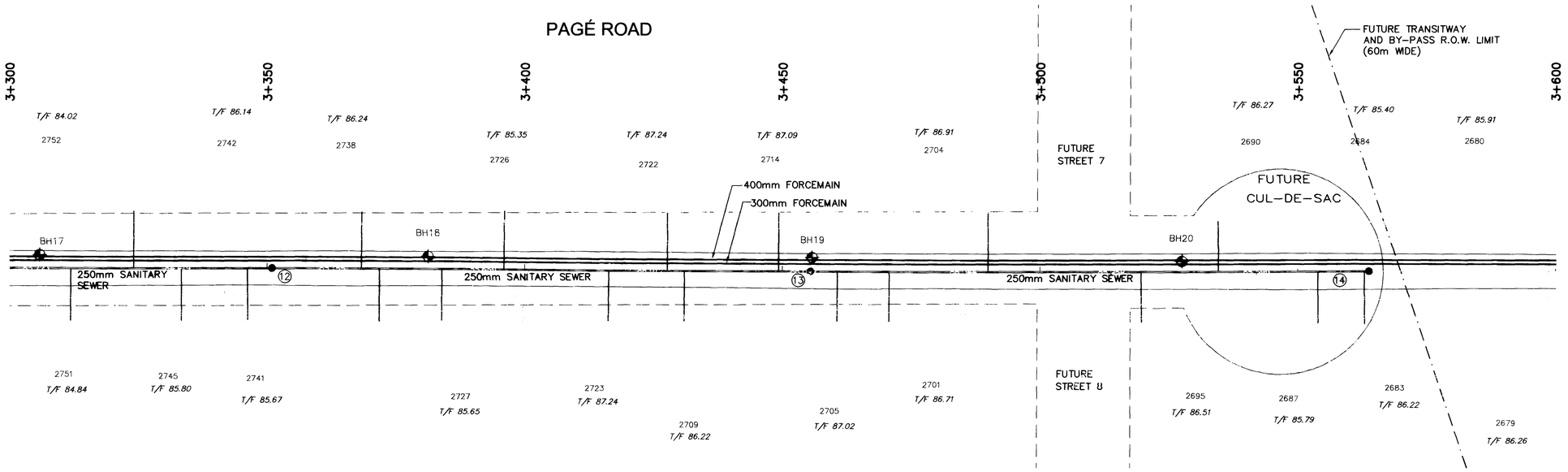
DUAL FORCEMAIN & SANITARY SEWER STA 3+300 – STA 3+600 PAGÉ ROAD

W. NEWELL, P.ENG.	W. CLOUTHIER, P.ENG.
Director Infrastructure Services	Manager Construction Services–Development

Dwn: AVH | Chkd: GTP | Des: GTP | Chkd: JM

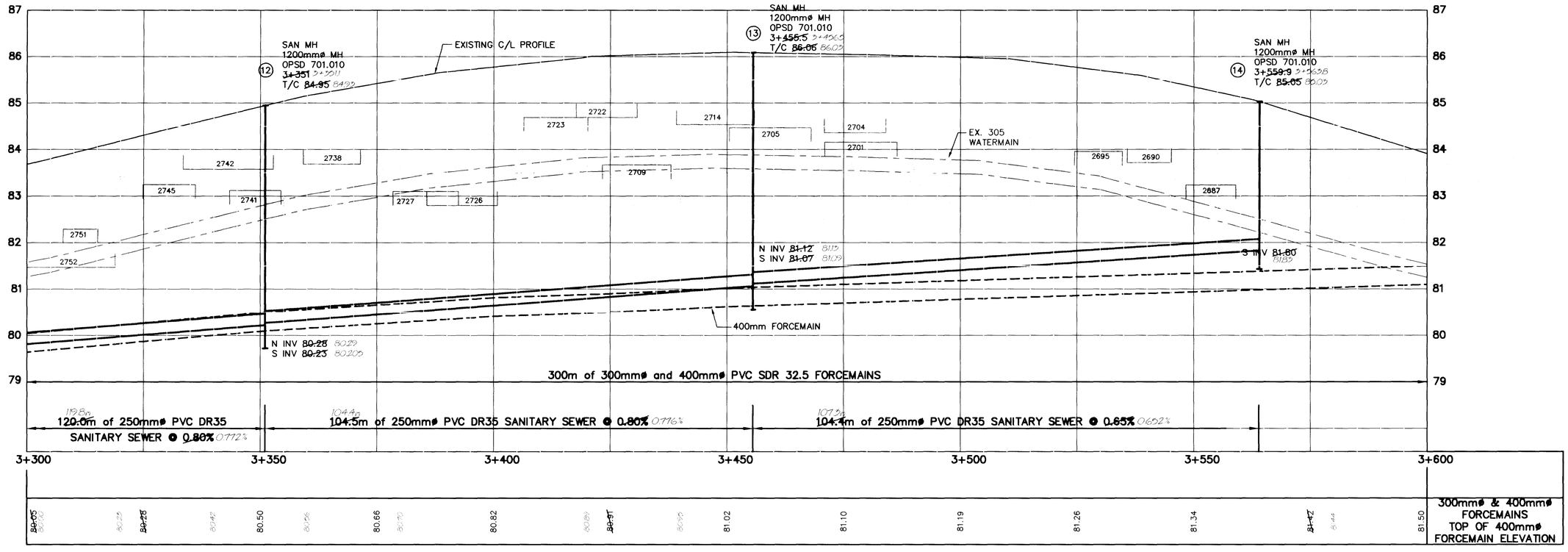
Ottawa
CONTRACT NO. ISB05-2011
DWG. NO. 13415-C7
SHEET 9 OF –
DATE MARCH 2005
SCALE Hor 0m 5 10m; Vert 0m 1m

PAGÉ ROAD

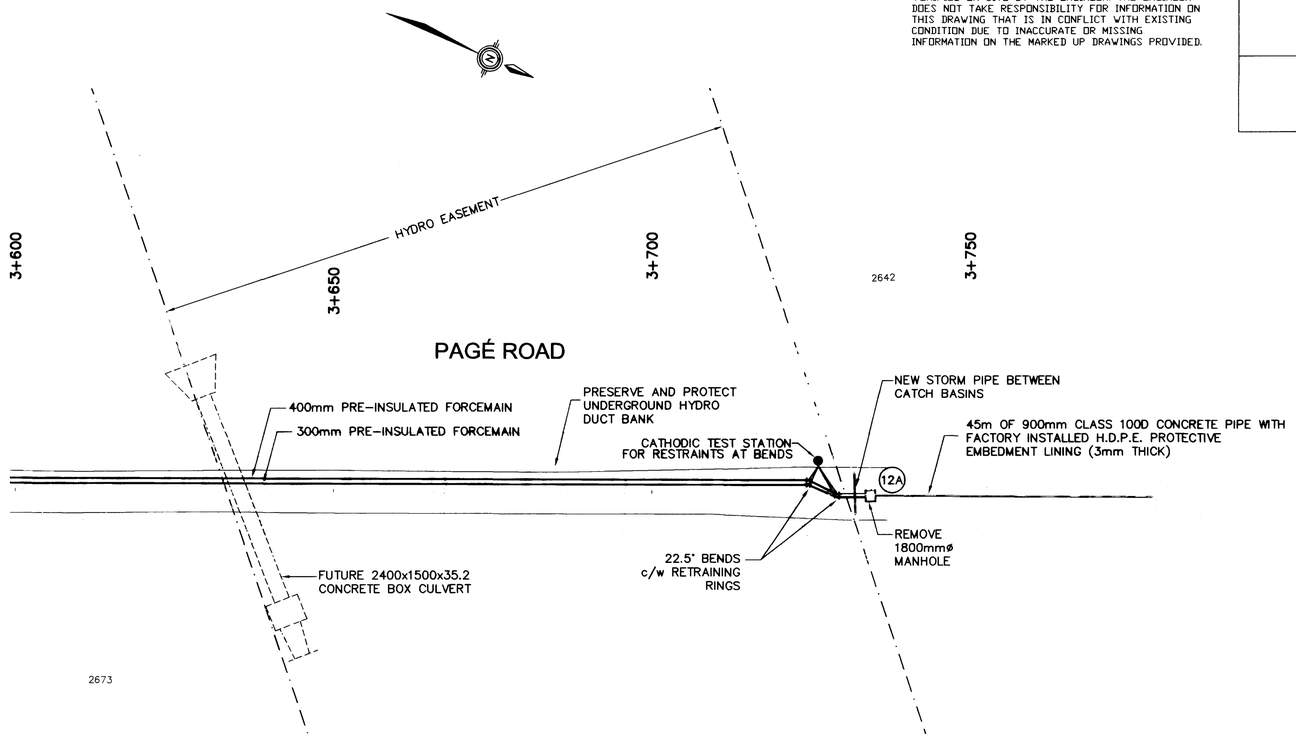


NOTES:

1. *T/F 85.79* – TOP OF FOUNDATION ELEVATION
2. ALL SANITARY SERVICE LATERALS SHALL CROSS BELOW THE EXISTING WATERMAIN, EXISTING STORM SEWER PIPE AND EXISTING DITCH ELEVATION.
3. ALL SANITARY SERVICE LATERAL INVERTS SHALL BE A 3.0m MINIMUM BELOW THE TOP OF FOUNDATION ELEVATION AT THE PROPERTY LINE.
4. ALL SANITARY SERVICE LATERALS SHALL BE INSTALLED AS PER OPSD 1006.020.



AS-BUILT DRAWING
THIS DRAWING HAS BEEN REVISED TO INCORPORATE CHANGES INDICATED ON THE CONTRACTOR'S MARKED UP DRAWINGS. CONTRACTOR'S DRAWINGS WERE NOT VERIFIED ON SITE BY THE ENGINEER. THE ENGINEER DOES NOT TAKE RESPONSIBILITY FOR INFORMATION ON THIS DRAWING THAT IS IN CONFLICT WITH EXISTING CONDITION DUE TO INACCURATE OR MISSING INFORMATION ON THE MARKED UP DRAWINGS PROVIDED.



NO.	REVISIONS	BY	DATE
5	AS – CONSTRUCTED	GTP	FEB/2007
4	ISSUED FOR TENDER	GTP	JUN 9/05
3	ISSUED TO CITY FOR REVIEW	GTP	05/03/23
2	ISSUED TO CITY FOR REVIEW	GTP	05/03/18
1	ISSUED FOR UTILITY CIRCULATION	GTP	05/03/15

Vinley CONSULTING ENGINEERS PLANNERS

NOTE:
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The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage

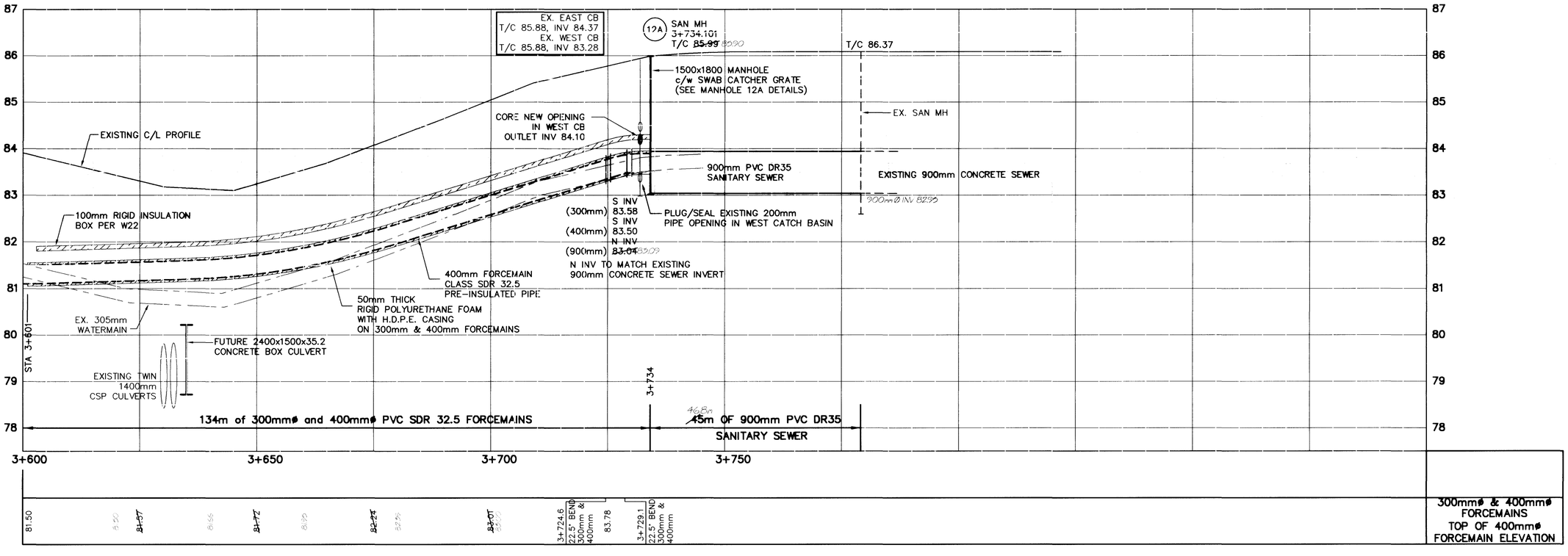
FOREST VALLEY SANITARY SERVICING

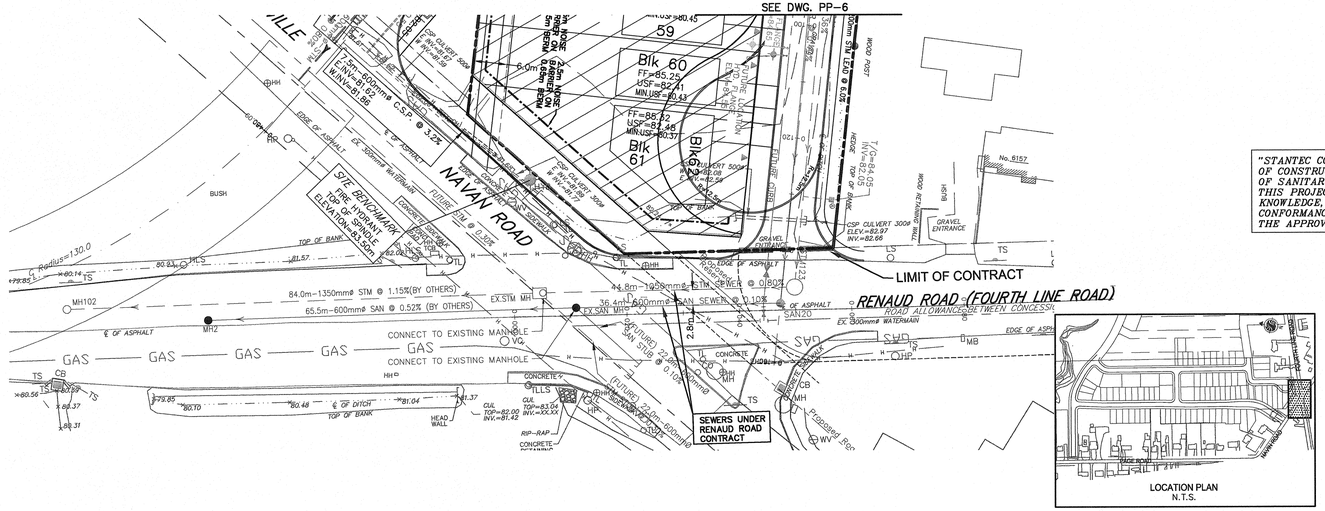
DUAL FORCEMAIN STA 3+600 – STA 3+900 PAGÉ ROAD

W. NEWELL, P.ENG.	W. CLOUTHIER, P.ENG.
Director Infrastructure Services	Manager Construction Services-Development

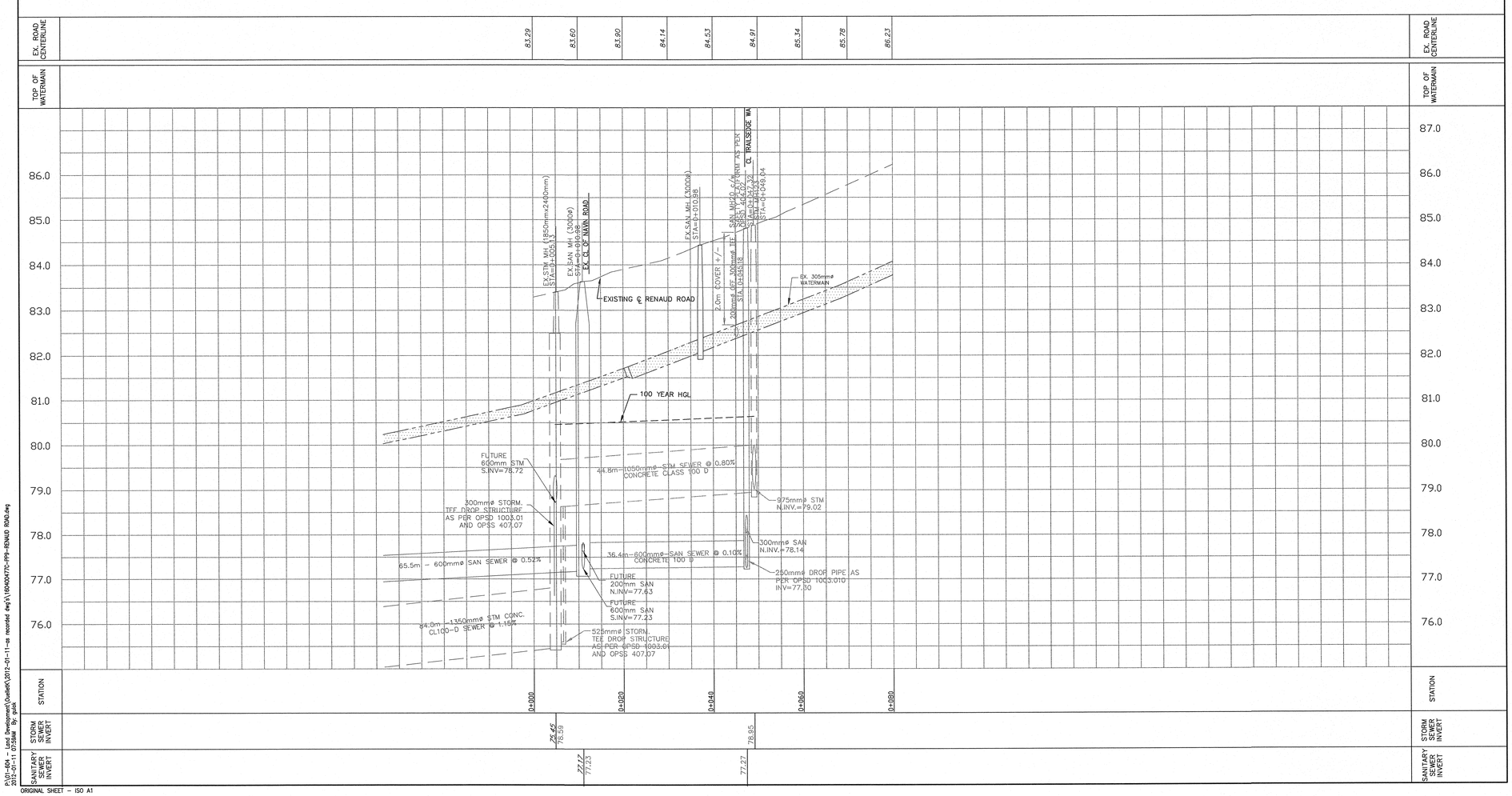
Dwn: AVH | Chkd: GTP | Des: GTP | Chkd: JM

Ottawa
CONTRACT NO. ISB05-2011
DWG. NO. 13415-C8
SHEET 10 OF –
DATE MARCH 2005
SCALE Hor 0m 5 10m, Vert 0m 1m





"STANTEC CONSULTING LTD. UNDERTOOK A GENERAL REVIEW OF CONSTRUCTION ACTIVITIES DURING THE INSTALLATION OF SANITARY AND STORM SEWERS AND WATERMAIN FOR THIS PROJECT. IN OUR OPINION AND TO THE BEST OF OUR KNOWLEDGE, THE WORK HAS BEEN COMPLETED IN GENERAL CONFORMANCE WITH THE CITY OF OTTAWA STANDARDS AND THE APPROVED DESIGN AND DRAWINGS."



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2012-01-11 07:58AM By: gadek

ORIGINAL SHEET – ISO A1

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www.stantec.com

Stantec

Notes

1 ALL MATERIALS AND CONSTRUCTION METHODS TO BE IN ACCORDANCE WITH OPS AND CITY OF OTTAWA STANDARD SPECIFICATIONS AND DRAWINGS AND OPSD SUPPLEMENT, ONTARIO PROVINCIAL STANDARDS WILL APPLY WHERE NO CITY STANDARDS ARE AVAILABLE.
2 THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AND BEAR COST OF SAME INCLUDING WATER PERMIT AND ASSOCIATED COSTS.
3 SERVICE AND UTILITY LOCATIONS ARE APPROXIMATE. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING SERVICES AND UTILITIES PRIOR TO ANY CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING LOCATES FROM ALL UTILITY COMPANIES TO LOCATE EXISTING UTILITIES PRIOR TO EXCAVATION. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTION AND REINSTATEMENT.
4 ALL DISTURBED AREAS SHALL BE REINSTATED TO EQUAL OR BETTER CONDITION TO THE SATISFACTION OF THE ENGINEER & THE CITY. PAVEMENT REINSTATEMENT FOR SERVICE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH OPSD 509.010 AND OPSS 310.
5 SANITARY SEWERS TO BE PVC SDR35 INSTALLED AS PER CITY OF OTTAWA STANDARD S6 AND S7.
6 STORM SEWERS 375mm DIA. OR SMALLER SHALL BE PVC SDR 35. STORM SEWERS LARGER THAN 375mm DIA. SHALL BE CONCRETE CSA A 257 CLASS 100 D.
7 THE CONTRACTOR SHALL CONSTRUCT WATERMAIN,WATER SERVICES,CONNECTIONS & APPURTENANCES AS PER CITY OF OTTAWA SPECIFICATIONS & SHALL CO-ORDINATE AND PAY ALL RELATED COSTS INCLUDING THE COST OF CONNECTION,INSPECTION & DISINFECTION BY CITY PERSONNEL.SERVICE CONNECTIONS SHALL BE INSTALLED A MINIMUM OF 2400mm FROM ANY CATCHBASIN, MANHOLE, OR OBJECT THAT MAY CONTRIBUTE TO FREEZING. THERMAL INSULATION SHALL BE INSTALLED ON ALL PROPOSED CB'S ON THE W/M STREET SIDE WHERE 2400mm SEPARATION CANNOT BE ACHIEVED.(AS PER CITY OF OTTAWA W22 & W23)CATHODIC PROTECTION AS PER CITY OF OTTAWA W40 AND W42). WATERMAIN PIPE MATERIAL SHALL BE PVC CL150 DR18. DEFLECTION OF WATERMAIN PIPE IS NOT TO EXCEED 1/2 OF THAT SPECIFIED BY THE MANUFACTURER.
8 STREET LIGHTING TO CITY OF OTTAWA STANDARDS.
9 STORM AND SANITARY MANHOLES SHALL BE 1200mm DIAMETER IN ACCORDANCE WITH OPSD-701.01 (UNLESS OTHERWISE NOTED) c/w FRAME AND COVER AS PER CITY OF OTTAWA S24 AND S25. ALL STORM MANHOLES WITH SEWERS 900mm DIA SEWERS AND OVER IN SIZE SHALL BE BENCHED. ALL OTHERS SHALL BE COMPLETED WITH 300mm SUMPS AS PER CITY STANDARDS.
10 CATCH BASINS SHALL BE IN ACCORDANCE WITH CITY STANDARDS c/w FRAME AND GRATE AS PER S20 AND S21 FOR REAR YARDS AND S3 FOR STREET CB'S. PROVIDE 150mm ADJUSTED SPACERS. ALL CATCH BASINS SHALL HAVE SUMPS (600mm DEEP). CATCH BASIN LEADS SHALL BE 200mm DIA.(MIN) PVC SDR 35 AT 1.0% OR. ALL STREET CB'S WILL BE INSTALLED WITH 'IPEX' INLET CONTROL DEVICE (ICD)
11 EXCESS EXCAVATED MATERIAL SHALL BE REMOVED FROM THE SITE.
12 THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE PROTECTION FOR RECEIVING STORM SEWERS OR DRAINAGE DURING CONSTRUCTION ACTIVITIES. (ie. FILTER CLOTH ON CATCH BASINS, STRAW BALE CHECK DAMS AND SEDIMENT CONTROLS AROUND ALL DISTURBED AREAS). DEWATERING SHALL BE PUMPED INTO SEDIMENT TRAPS. (SEE EROSION CONTROL PLAN).
13 GRANULAR "A" SHALL BE PLACED TO A MINIMUM THICKNESS OF 300 mm AROUND ALL STRUCTURES WITHIN PAVEMENT AREA
14 SEWER TRENCH SHALL CONSIST OF A CLASS "B" BEDDING AS PER CITY OF OTTAWA STANDARDS S6 AND S7. COMPACTION SHALL BE A MINIMUM OF 98% STANDARD PROCTOR DENSITY.
15 ALL GRANULAR FOR ROADS SHALL BE COMPACTED TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY.
16 ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR, REVIEW WITH ARCHITECT AND THE CITY OF OTTAWA PRIOR TO TREE CUTTING.
17 CONTRACTOR SHALL PERFORM LEAKAGE TESTING, IN THE PRESENCE OF THE CONSULTANT, FOR SANITARY SEWERS IN ACCORDANCE WITH OPSS 410 AND OPSS 407. CONTRACTOR SHALL PERFORM VIDEO INSPECTION OF ALL STORM AND SANITARY SEWERS. A COPY OF THE VIDEO AND INSPECTION REPORT SHALL BE SUBMITTED TO THE CONSULTANT FOR REVIEW.
18 ASPHALT WEAR COURSE SHALL NOT BE PLACED UNTIL THE VIDEO INSPECTION OF SEWERS & NECESSARY REPAIRS HAVE BEEN CARRIED OUT TO THE SATISFACTION OF THE CONSULTANT.
19 SUB-EXCAVATE SOFT AREAS & FILL WITH GRANULAR 'B' COMPACTED IN 0.15m LAYERS.
20 FOR ALL LANDSCAPING FEATURES (ie. TREES, WALKWAYS, PARK DETAILS, NOISE BARRIERS, FENCES etc.) REFER TO LANDSCAPE ARCHITECT PLAN
21 CONCRETE CURBS SHALL BE CONSTRUCTED AS PER CITY STANDARD SC1.1(BARRIER) AND SC1.3(MOUNTABLE) AS NOTE ON DWGS.
22 ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
23 CLAY SEALS TO BE INSTALLED AS PER CITY STANDARD DRAWING S8. THE SEALS SHOULD BE AT LEAST 1.5m LONG (IN THE TRENCH DIRECTION) AND SHOULD EXTEND FROM TRENCH WALL TO TRENCH WALL. GENERALLY, THE SEALS SHOULD EXTEND FROM FROST LINE AND FULLY PENETRATE THE BEDDING, SUBBEDDING AND COVER MATERIAL. THE BARRIERS SHOULD CONSIST OF RELATIVELY DRY AND COMPACTABLE BROWN SILTY CLAY PLACED IN MAXIMUM 225mm THICK LOOSE LAYERS COMPACTED TO A MINIMUM OF 95% OF THE MATERIAL'S SPMDD. THE CLAY SEALS SHOULD BE PLACED AT THE SITE BOUNDARIES AND AT STRATEGIC LOCATIONS AT NO MORE THAN 60m INTERVALS IN THE SERVICE TRENCHES.

5	*AS RECORDED*	*GBU*	*CT*	*11.12.12*
4	MINOR LOT LINE REVISION	MJS	TJW	11.02.17
3	REVISED AS PER NEW SITE PLAN	MJS	TJW	11.01.12
2	REVISED AS PER CITY COMMENTS	MJS	TJW	10.06.22
1	ISSUED TO CITY FOR APPROVAL	MJS	TJW	10.04.20
Revision		By	Appd.	YY.MM.DD
File Name: 160400477		DCT	TJW	MJS	08.10.28
		Dwn.	Chkd.	Dsgn.	YY.MM.DD

Seal

RECORD DRAWING
DATE DEC.12/11

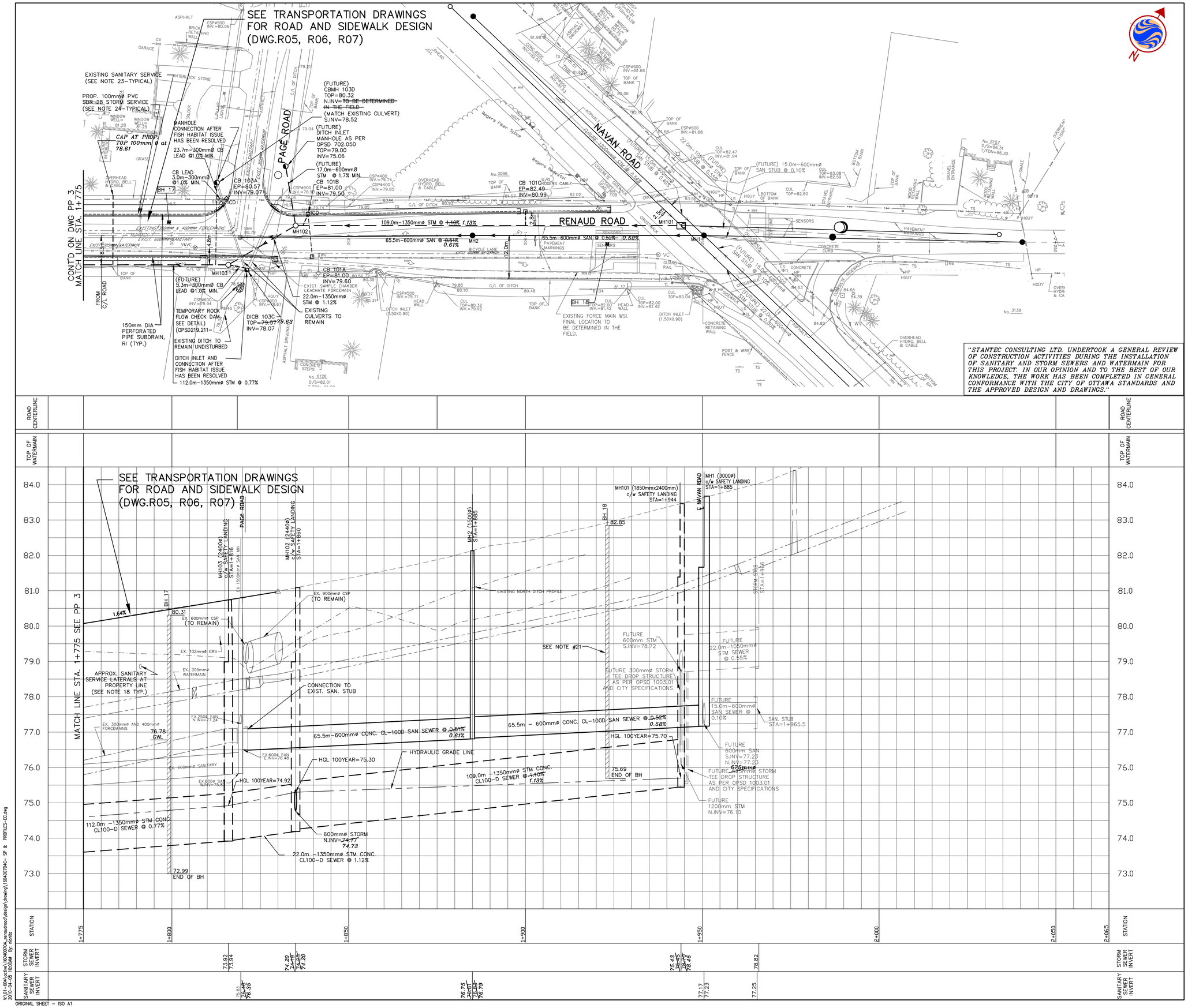
Client/Project
RICHCRAFT HOMES

PAGE ROAD DEVELOPMENT

Ottawa ON Canada

Title
RENAUD ROAD
STA. 0+000 TO STA. 0+080

Project No. 160400477
Scale 1:500H 0 5 15 25m; 1:50V 0 0.5 1.5 2.5m
Drawing No. PP-9
Sheet 12 of 18
Revision 5



ROAD CENTERLINE | TOP OF WATERMAIN | STATION | STORM SEWER INVERT | SANITARY SEWER INVERT

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2010-04-05 10:00AM by: nicolla

ORIGINAL SHEET - ISO A1

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Stantec

Notes

1. ALL MATERIALS AND CONSTRUCTION METHODS TO BE IN ACCORDANCE WITH OPS AND CITY OF OTTAWA STANDARD SPECIFICATIONS AND DRAWINGS AND OPSD SUPPLEMENT, ONTARIO PROVINCIAL STANDARDS WILL APPLY WHERE NO CITY STANDARDS ARE AVAILABLE.
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5. STORM SEWERS 375mm DIA. OR SMALLER SHALL BE PVC SDR 35. STORM SEWERS LARGER THAN 375mm DIA. SHALL BE CONCRETE CSA A 257 CLASS 100 D.
6. STORM MANHOLES SIZE SHALL BE AS INDICATED ON THE PROFILES IN ACCORDANCE WITH OPSD c/w FRAME AND COVER AS PER CITY OF OTTAWA S24.1 AND S25.
7. STREET CBs SHALL BE CURB INLET TYPE AS PER CITY STANDARD S3. FRAME AND COVER AS PER CITY STANDARD S22 AND S23, AND PROVIDED WITH 150mmø SPACERS. ALL CBs SHALL HAVE 600mmø SUMPS. CB LEADS SHALL BE 200mmø (MIN.) PVC SDR35 AT 1.0% MIN. ALL STREET CBs WILL BE INTERCONNECTED WITH ICDs. SEE SCHEDULE ON DWG. OSD-1.
8. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE PROTECTION FOR RECEIVING STORM SEWERS OR DRAINAGE DURING CONSTRUCTION ACTIVITIES. (ie: FILTER CLOTH ON CATCH BASINS, STRAW BALE CHECK DAMS AND SEDIMENT CONTROLS AROUND ALL DISTURBED AREAS). DEWATERING SHALL BE PUMPED INTO SEDIMENT TRAPS. (SEE EROSION CONTROL PLAN).
9. GRANULAR "A" SHALL BE PLACED TO A MINIMUM THICKNESS OF 300 mm AROUND ALL STRUCTURES WITHIN PAVEMENT AREA
10. SEWER TRENCH SHALL CONSIST OF A CLASS "B" BEDDING AS PER CITY OF OTTAWA STANDARDS S6 AND S7. COMPACTION SHALL BE A MINIMUM OF 98% STANDARD PROCTOR DENSITY.
11. ALL GRANULAR FOR ROADS SHALL BE COMPACTED TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY.
12. ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR. REVIEWED BY THE CITY OF OTTAWA PRIOR TO TREE CUTTING.
13. CONTRACTOR SHALL PERFORM VIDEO INSPECTION OF ALL STORM SEWERS. A COPY OF THE VIDEO AND INSPECTION REPORT SHALL BE SUBMITTED TO THE CONSULTANT FOR REVIEW.
14. ASPHALT WEAR COURSE SHALL NOT BE PLACED UNTIL THE VIDEO INSPECTION OF SEWERS & NECESSARY REPAIRS HAVE BEEN CARRIED OUT TO THE SATISFACTION OF THE CONSULTANT.
15. SUB-EXCAVATE SOFT AREAS & FILL WITH GRANULAR 'B' COMPACTED IN 0.15m LAYERS.
16. CONCRETE CURBS SHALL BE CONSTRUCTED AS PER CITY STANDARD SC1.1
17. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
18. RECONNECT EXISTING SANITARY SERVICE LATERALS FROM EXISTING RESIDENTAL UNITS AS REQUIRED AS PER CITY STANDARD S11.
19. STORM SERVICE LATERALS TO BE INSTALL FOR THE EXISTING RESIDENTS ALONG RENAUD ROAD TO PROPERTY LINE AS REQUIRED AS PER CITY STANDARD S11. CONNECTION LOCATION AND INV. TO BE DETERMINED IN FIELD. (INVERT AT PROPERTY LINE SHALL BE A MINIMUM OF 3.0m BELOW TOP OF FOUNDATION WALL.)
20. 150mmø SUBDRAIN TO BE INSTALLED 300mm BELOW SUBGRADE LEVEL CONTINUOUS ALONG BOTH SIDES OF PAVEMENT, CONNECTED TO CATCHBASINS.
21. REFER TO GEOTECHNICAL REPORT BY PATERSONGROUP DATED NOVEMBER 17, 2008 FOR TEST PIT INFORMATION AND GEOTECHNICAL RECOMMENDATIONS.

7	*AS RECORDED*	*GBU*	*GT*	*11.12.12*
6	*AS RECORDED*	*CTL*	*PM*	*11.03.25*
5	ISSUED FOR CONSTRUCTION	NI	TJW	10.04.01
4	ISSUED FOR TENDER	NI	TJW	09.04.17
3	ADD FRONT YARD GRADING	NI	TJW	09.02.25
2	REVISED AS PER CITY COMMENTS/ ADD BOREHOLES INFORMATION	NI	TJW	08.12.01
1	REVISED STORM SEWER ALIGNMENT AS PER CITY COMMENTS	NI	TJW	08.10.17
0	1ST SUBMISSION	NI	TJW	08.08.12
Revision		By	Appd.	YY.MM.DD
File Name: 160400704C-SP&PP		NI	PM	TJW	08.07.10
		Dwn.	Chkd.	Dsgn.	YY.MM.DD

Seal

RECORD DRAWING
DATE DEC. 12/11

Client/Project

CLARIDGE HOMES (CARSON) INC.

RENAUD ROAD IMPROVEMENTS

Ottawa ON Canada

Title

RENAUD ROAD
STA. 1+775 TO STA. 1+966

Project No. 160400704

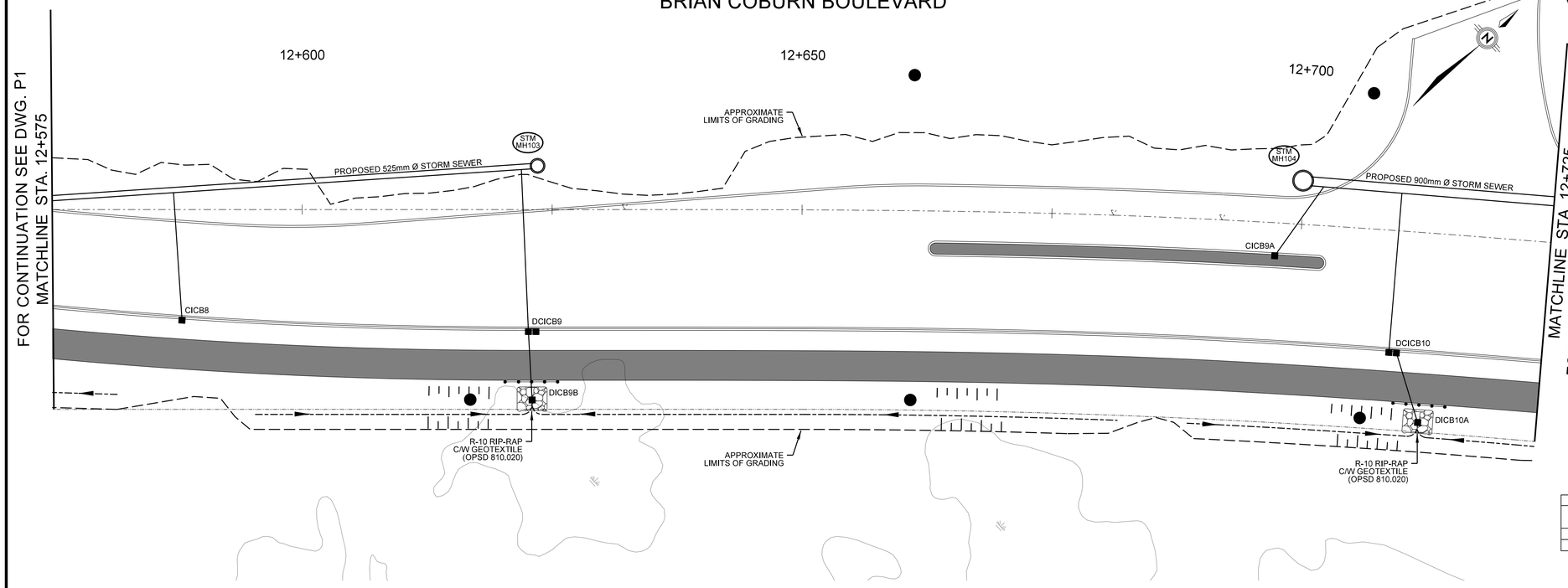
Scale 1:500H 0 5 15 25m
1:50V 0 0.5 1.5 2.5m

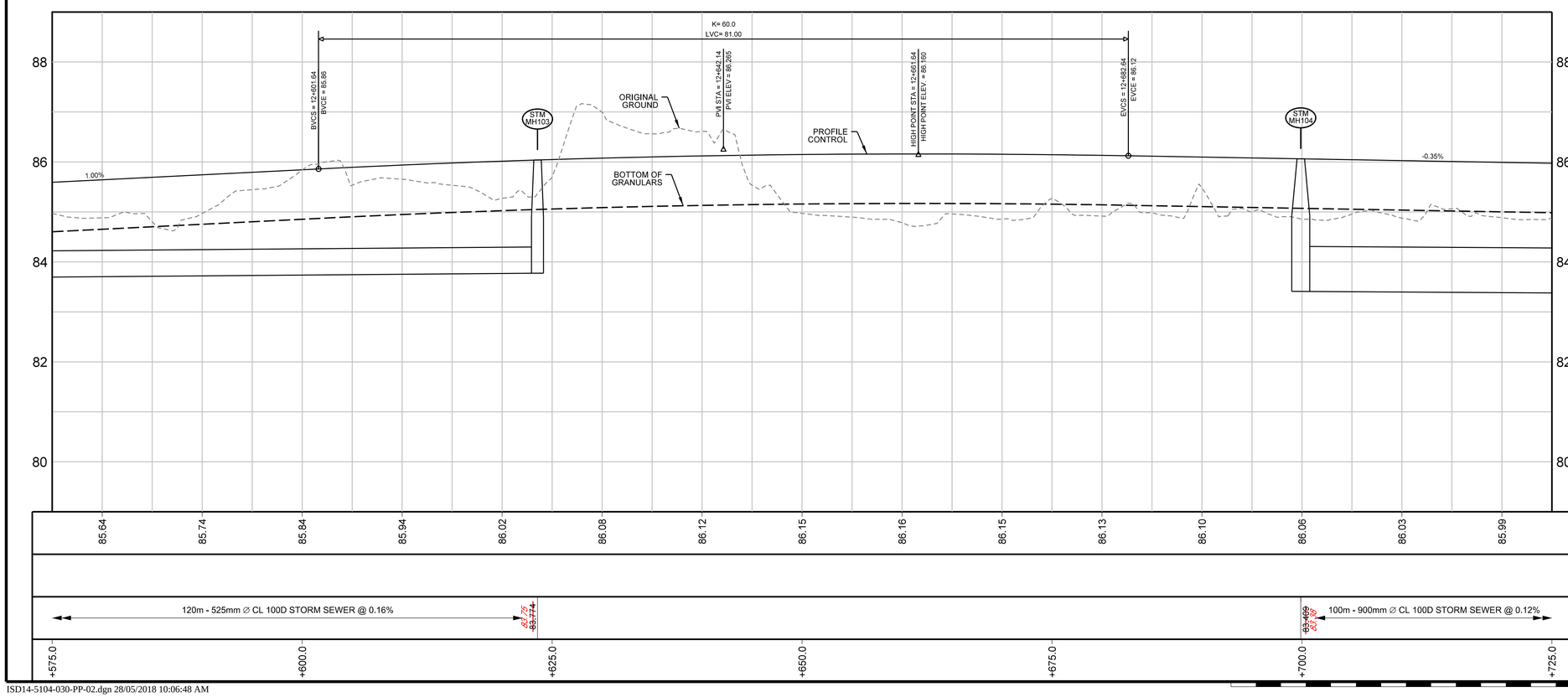
Drawing No. PP-4

Sheet 6 of 12

Revision 7

BRIAN COBURN BOULEVARD





BRIAN COBURN BOULEVARD
NEW ROAD CONSTRUCTION

GRADING & DRAINAGE
STA. 12+575 TO STA. 12+725

W. R. Newell, P.Eng.	J. Mojsej, P.Eng.
General Manager	Project Manager
Infrastructure Services Department	Design & Construction - Municipal East

Robinson Consultants

AS-BUILT

RECORD INFORMATION PROVIDED BY CITY OF OTTAWA

ALL NUMERICAL VALUES THAT ARE NOT STROKED OUT AND REPLACED IN ITALICS ON AS-BUILT DRAWINGS ARE CONSIDERED TO BE DESIGN VALUES ONLY AND NOT MEASURED IN THE FIELD.

Ottawa

Contract No.	Dwg. No.
ISD14-5104	P2

Sheet _ of _

Asset No. _____

Asset Group ___

Des.	Chk'd.
C.T.	R.C.
Dwn.	Chk'd.
C.T.	D.R.
Utility Circ. No.	Index No.
_____	___

Const. Inspector _____

Scale: HORIZONTAL
0m 5 10

NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

REVISIONS

No.	Description	By	Date (dd/mm/yy)
1	ISSUED FOR PRELIMINARY DESIGN CIRCULATION	R.C.	31,10,14
2	ISSUED FOR TENDER	R.C.	05,06,15
3	ISSUED FOR CONSTRUCTION	R.C.	01,03,16
4	ISSUED FOR SCM NO. 62	R.C.	29,03,17
5	ISSUED FOR SCM No. 67	R.C.	03,05,17
4	*AS BUILT*	*R.C.*	*30.03.18*

STORM MANHOLE DATA

No.	Station	Offset (m)	Type		Elevations		Grate to Invert
			Structure	Cover	Grate	Low Inv.	
STM MH103	12+623.54	4.38 L	701.010	S24.1 / S25	86.00	83.77	2.23
STM MH104	12+699.88	4.37 L	701.012	S24.1 / S25	86.03	83.41	2.62

CATCH BASIN DATA

No.	Station	Offset (m)	Type		Elevations		Grate to Invert	ICD (L/s)
			Structure	Grate	Grate	Low Inv.		
CICB8	12+588.00	10.76 R	705.010	S22 / S23	85.73	84.13	1.60	25
DCICB9	12+623.00	11.90 R	705.020	S22 / S23 (2)	86.00	84.22	1.78	30
DCICB10	12+709.99	11.90 R	705.020	S22 / S23 (2)	85.99	84.09	1.90	30
CICB9A	12+697.5	3.00 R	705.010	S22 / S23	86.21	84.31	1.90	10
DICB9B	12+623	19.05 R	705.030 2:1	403.010 (A)	85.00	84.30	0.70	N/A
DICB10A	12+713	19.00 R	705.030 2:1	403.010 (A)	85.00	84.18	0.82	N/A

CATCH BASIN LEAD DATA

Structure to Structure	Dia.	Type	Length	Invert Elevations	
				Upstream	Downstream
CICB8 TO MAIN	200mm	PVC	13.0	84.13	84.00
DCICB9 TO MAIN	250mm	PVC	16.5	84.22	84.06
DCICB10 TO MAIN	250mm	PVC	16.2	84.09	83.93
CICB9A TO MAIN	200mm	PVC	8.2	84.31	84.23
DICB9B TO DCICB9	200mm	PVC	6.6	84.30	84.22
DICB10A TO DCICB10	200mm	PVC	7.0	84.18	84.09

BRIAN COBURN BOULEVARD NEW ROAD CONSTRUCTION

GRADING & DRAINAGE STA. 12+725 TO STA. 12+875

W. R. Newell, P.Eng. *General Manager Infrastructure Services Department*	J. Mojsej, P.Eng. *Project Manager Design & Construction - Municipal East*

Robinson Consultants

AS-BUILT

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Ottawa

Contract No.	Dwg. No.
ISD14-5104	P3

Sheet _ of _

Asset No. _____

Asset Group ___

Des.	Chk'd.
C.T.	R.C.
Dwn.	Chk'd.
C.T.	D.R.
Utility Circ. No. ____	Index No. ___
Const. Inspector _____	

Scale: HORIZONTAL 0m 5 10

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REVISIONS

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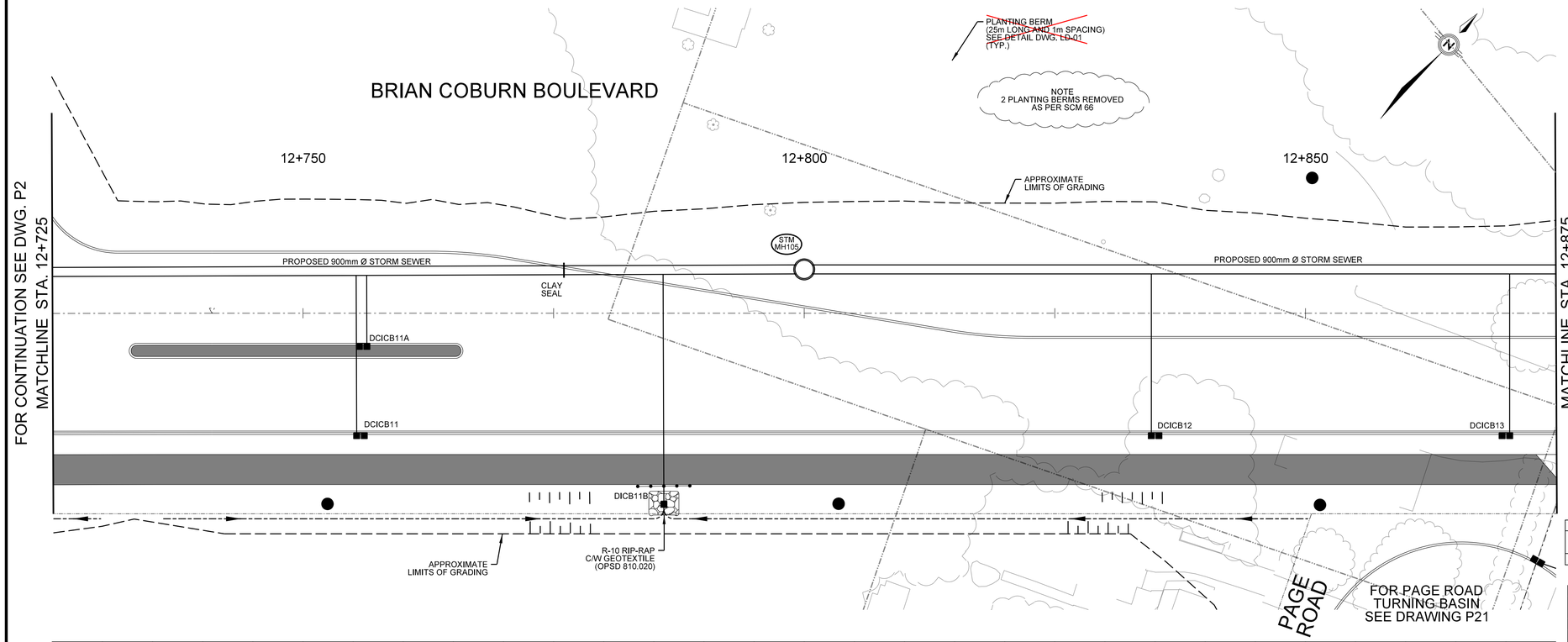
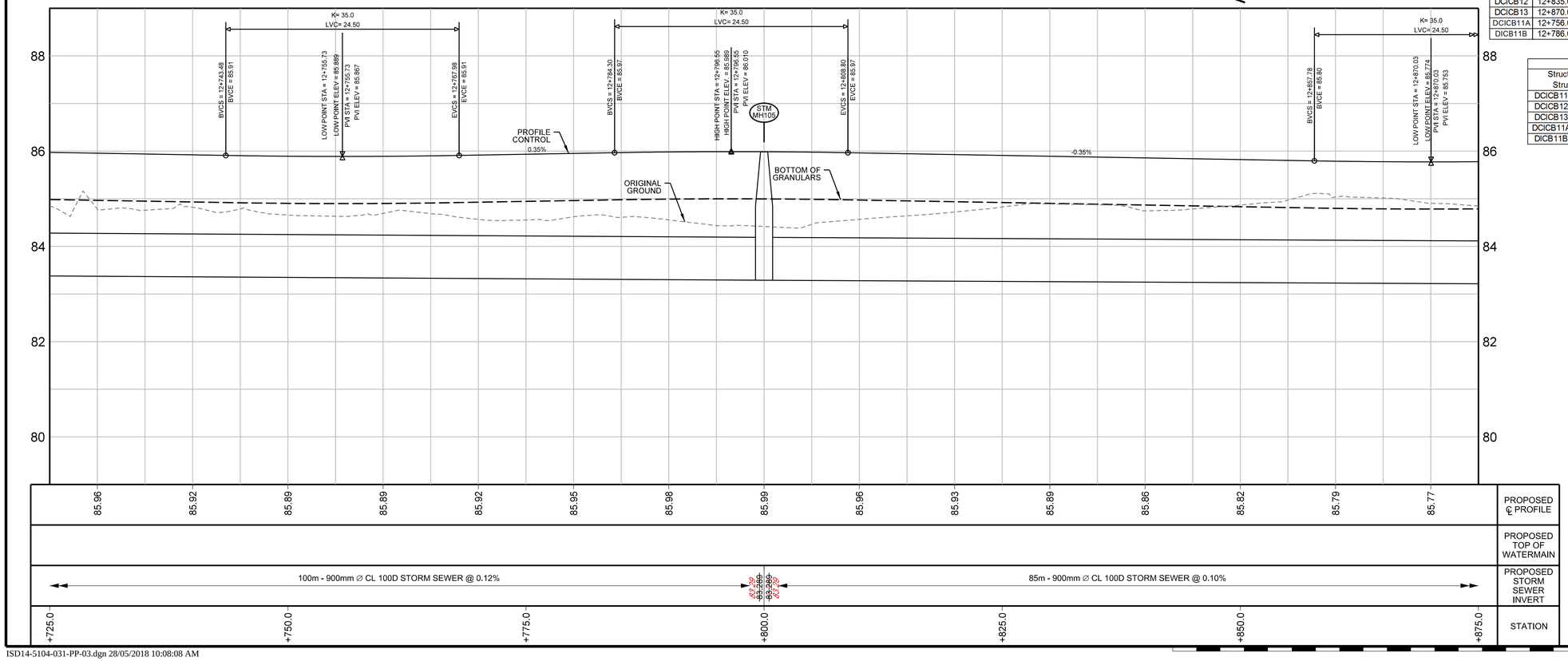
1	ISSUED FOR PRELIMINARY DESIGN CIRCULATION	R.C.	31.10.14
2	ISSUED FOR TENDER	R.C.	05.06.15
3	ISSUED FOR SCM NO. 62	R.C.	29.03.17
4	ISSUED FOR SCM NO. 67	R.C.	03.05.17
5	*AS BUILT*	*R.C.*	*30.03.18*



STORM MANHOLE DATA							
No.	Station	Offset (m)	Type		Elevations		Grate to Invert
			Structure	Cover	Grate	Low Inv.	
STM MH105	12+800.00	4.38 L	701.012	S24.1 / S25	85.95	83.29	2.66

CATCH BASIN DATA								
No.	Station	Offset (m)	Type		Elevations		Grate to Invert	ICD (L/s)
			Structure	Grate	Grate	Low Inv.		
DCICB11	12+755.73	11.90 R	705.020	S22 / S23 (2)	85.83	83.93	1.90	40
DCICB12	12+835.00	11.90 R	705.020	S22 / S23 (2)	85.84	83.94	1.90	25
DCICB13	12+870.03	11.90 R	705.020	S22 / S23 (2)	85.72	83.82	1.90	35
DCICB11A	12+756.00	3.00 R	705.020	S22 / S23 (2)	86.03	84.13	1.90	15
DICB11B	12+786.00	19.05 R	705.030 2:1	403.010 (A)	84.70	84.01	0.69	10

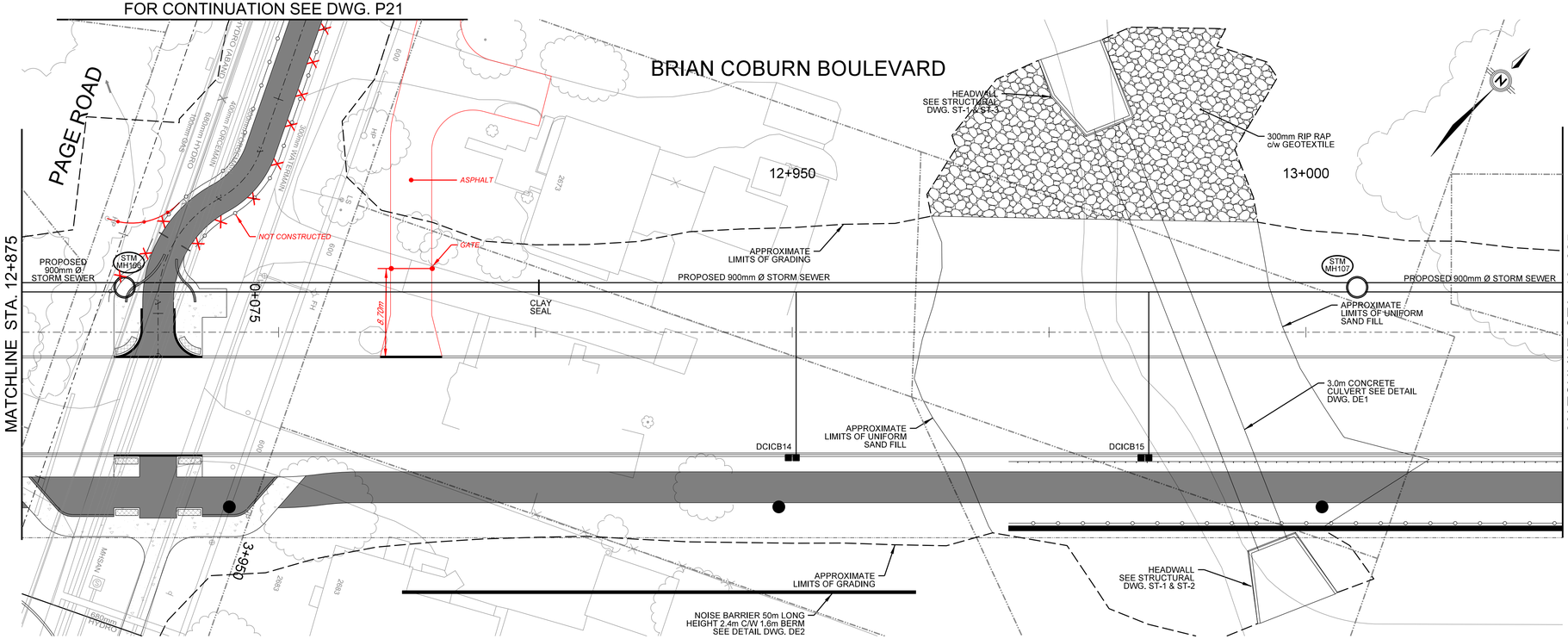
CATCH BASIN LEAD DATA					
Structure to Structure	Dia.	Type	Length	Invert Elevations	
				Upstream	Downstream
DCICB11 TO MAIN	250mm	PVC	16.2	83.93	83.77
DCICB12 TO MAIN	250mm	PVC	16.4	83.94	83.78
DCICB13 TO MAIN	250mm	PVC	16.4	83.82	83.65
DCICB11A TO MAIN	250mm	PVC	7.7	84.13	84.05
DICB11B TO MAIN	200mm	PVC	22.9	84.01	83.76



FOR CONTINUATION SEE DWG. P21

FOR CONTINUATION SEE DWG. P3
MATCHLINE STA. 12+875

MATCHLINE STA. 13+025
FOR CONTINUATION SEE DWG. P5



BRIAN COBURN BOULEVARD
NEW ROAD CONSTRUCTION

GRADING & DRAINAGE
STA. 12+875 TO STA. 13+025

W. R. Newell, P.Eng.	J. Mojsej, P.Eng.
General Manager	*Project Manager*
Infrastructure Services Department	*Design & Construction - Municipal East*

Robinson Consultants

AS-BUILT

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Ottawa

Contract No.	Dwg. No.
ISD14-5104	P4

Sheet _ of _

Asset No. _____

Asset Group ___

Des. C.T.	Chk'd. R.C.
Dwn. C.T.	Chk'd. D.R.
Utility Circ. No. _____	Index No. ____
Const. Inspector _____	

Scale: HORIZONTAL
0m 5 10

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2	ISSUED FOR TENDER	R.C.	05.06.15
3	ISSUED FOR ADDENDUM NO. 1	R.C.	15.01.16
4	ISSUED FOR CONSTRUCTION	R.C.	01.03.16
5	*AS BUILT*	*R.C.*	*30.03.18*

STORM MANHOLE DATA

No.	Station	Offset (m)	Type		Elevations		Grate to Invert
	12+882.6		Structure	Cover	Grate	Low Inv.	
STM MH106	~~12+885.00~~	4.38 L	701.012	S24.1 / S25	85.77	83.20	2.56
STM MH107	13+005.00	4.38 L	701.012	S24.1 / S25	85.67	83.08	2.59

CATCH BASIN DATA

No.	Station	Offset (m)	Type		Elevations		Grate to Invert	ICD (L/s)
			Structure	Grate	Grate	Low Inv.		
DCICB14	12+950.00	11.90 R	705.020	S22 / S23 (2)	85.72	83.87	1.85	25
DCICB15	12+984.33	11.90 R	705.020	S22 / S23 (2)	85.60	83.70	1.90	35

CATCH BASIN LEAD DATA

Structure to Structure	Dia.	Type	Length	Invert Elevations	
				Upstream	Downstream
DCICB14 TO MAIN	250mm	PVC	16.4	83.87	83.71
DCICB15 TO MAIN	250mm	PVC	16.4	83.72	83.55

BRIAN COBURN BOULEVARD NEW ROAD CONSTRUCTION

GRADING & DRAINAGE PAGE ROAD - SOUTH TURNING BASIN

W. R. Newell, P.Eng. — General Manager, Infrastructure Services Department

J. Mojsej, P.Eng. — Project Manager, Design & Construction - Municipal East

Robinson Consultants

AS-BUILT

RECORD INFORMATION PROVIDED BY CITY OF OTTAWA

ALL NUMERICAL VALUES THAT ARE NOT STROKED OUT AND REPLACED IN ITALICS ON AS-BUILT DRAWINGS ARE CONSIDERED TO BE DESIGN VALUES ONLY AND NOT MEASURED IN THE FIELD.

Ottawa

Contract No.	Dwg. No.
ISD14-5104	P21

Sheet _ of _

Asset No. _____

Asset Group ___

Des.	Chk'd.
C.T.	R.C.
Dwn.	Chk'd.
C.T.	D.R.
Utility Circ. No. ____	Index No. ____

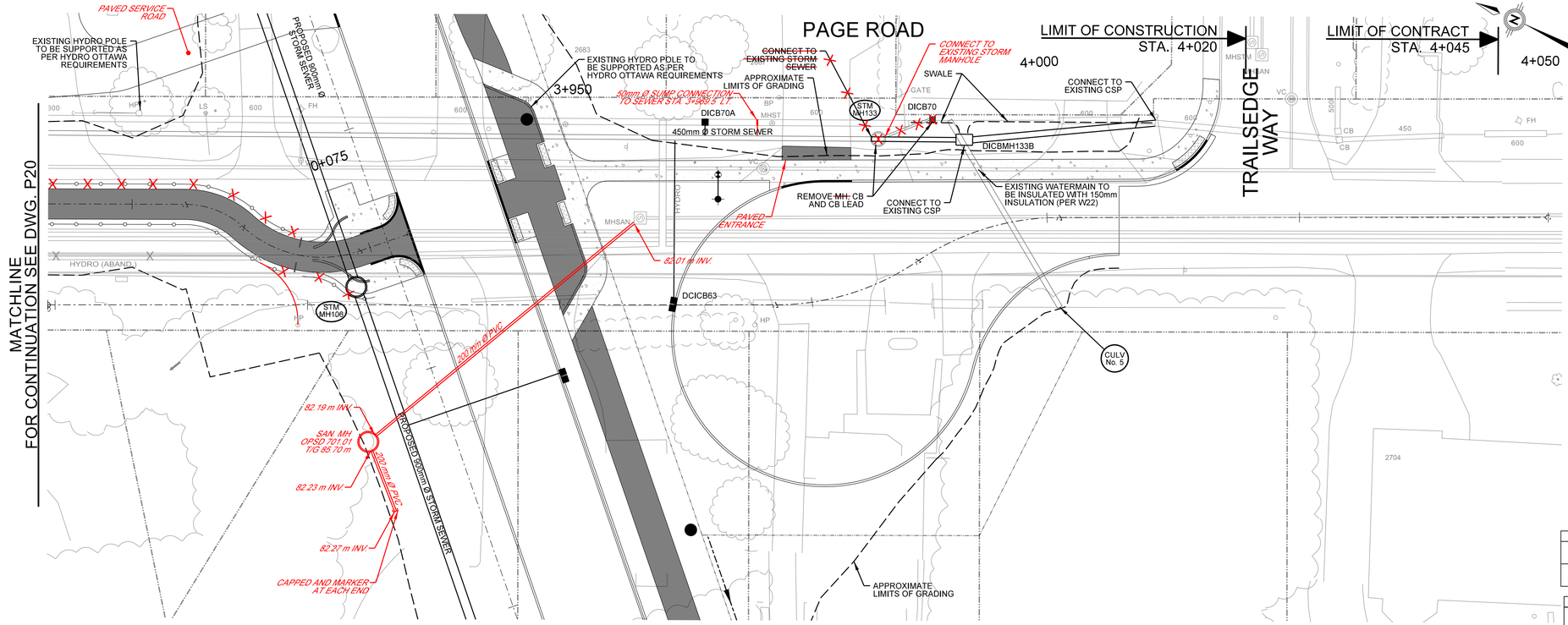
Const. Inspector _____

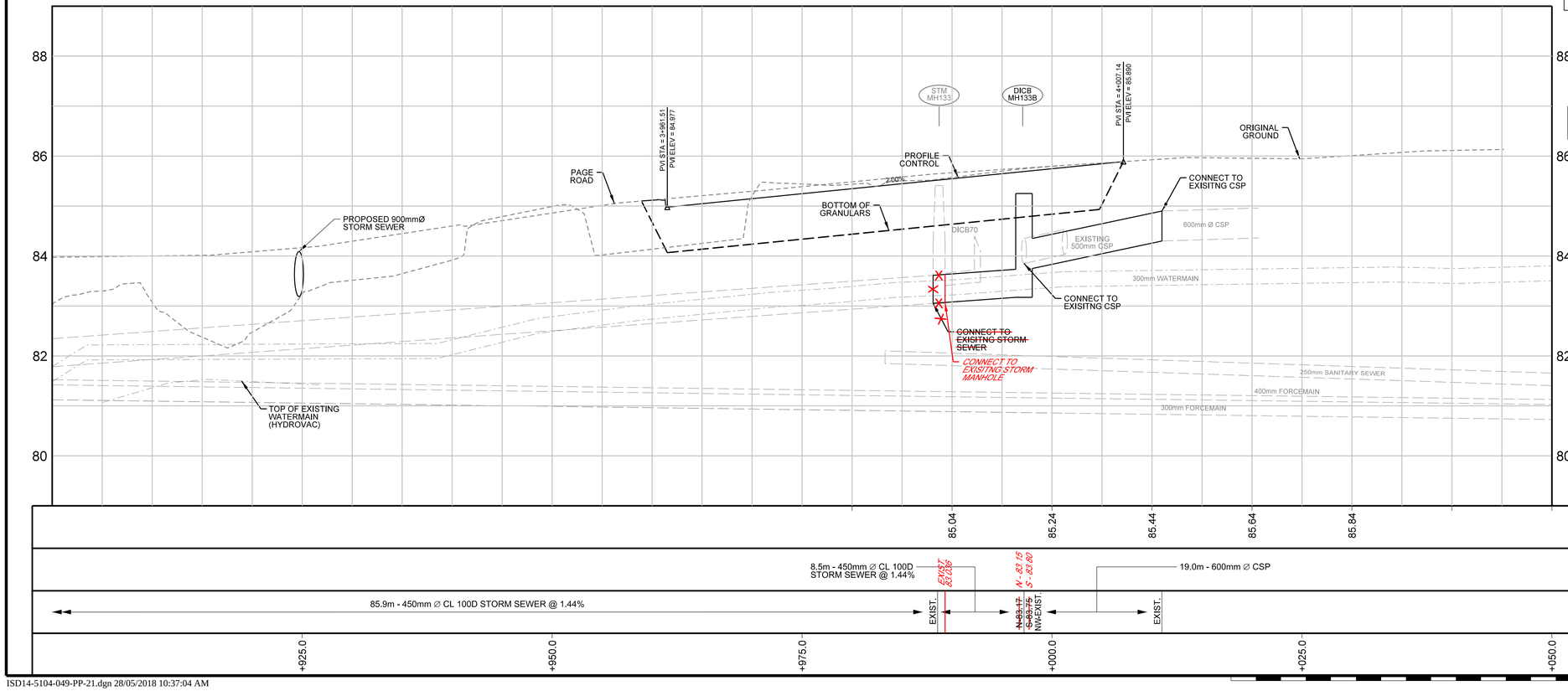
Scale: HORIZONTAL 0m 5 10

NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

REVISIONS

No.	Description	By	Date (dd/mm/yy)
1	ISSUED FOR PRELIMINARY DESIGN CIRCULATION	R.C.	31.10.14
2	ISSUED FOR TENDER	R.C.	05.06.15
3	ISSUED FOR CONSTRUCTION	R.C.	01.03.16
4	REVISED STORM SEWER, PROFILE & CULVERT STATIONS SCM NO. 33	R.C.	14.07.16
5	REVISED STORM SEWER CONFIGURATION SCM NO. 49	R.C.	13.10.16
6	AS BUILT	R.C.	30.03.18





STORM MANHOLE DATA

No.	Station	Offset (m)	Type		Elevations		Grate to Invert
			Structure	Cover	Grate	Low Inv.	
DICBMH133B	3+994.3	9.56 L	702.040	403.010 (B-4:1)	~~85.25~~ 85.23	~~83.17~~ 83.15	2.08

CATCH BASIN DATA

No.	Station	Offset (m)	Type		Elevations		Grate to Invert	ICD (L/s)
			Structure	Grate	Grate	Low Inv.		
DCICB63	3+961.51	0	705.020	S22 / S23 (2)	85.12	83.58	1.54	N/A
DICB70A	3+964.00	18.50 L	705.030	403.010 (A-HOR)	85.25	83.55	1.70	N/A

CATCH BASIN LEAD DATA

Structure to Structure	Dia.	Type	Length	Invert Elevations	
				Upstream	Downstream
DCICB63 TO MAIN	250mm	PVC	17.7	83.58	83.42
DICB70A TO MAIN	200mm	PVC	1.5	83.55	82.90
DICBMH 133B TO STMH 133				83.15	83.036

Culvert	Size (mm)	Length (m)	Downstream			Upstream		
			Station	Offset (m)	Invert	Station	Offset (m)	Invert
5	500	21.5	3+993.62	11.29 L	~~84.08~~ 83.85	4+0001.28	8.90 R	~~84.09~~ 84.03

Appendix D1

Water Demands and FUS Calculations

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : NAVAN ROAD DEVELOPMENT PROJECT
LOCATION : CITY OF OTTAWA
DEVELOPER : 12714001 Canada Inc.

NODE	RESIDENTIAL UNITS			POP'N	NON-RESIDENTIAL COMM	AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			PEAK HOUR DEMAND (l/s)		
	Townhouses (TH)	Apartments	Condo Units (CU)		(ha.)	Res.	Non-res.	Total	Res.	Non-res.	Total	Res.	Non-res.	Total
J-1	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J-2	8	8	0	33	0.00	0.11	0.00	0.11	0.27	0.00	0.27	0.58	0.00	0.58
J-4	0	0	84	151	0.09	0.49	0.03	0.52	1.23	0.05	1.27	2.70	0.08	2.78
J-5	0	0	36	65	0.09	0.21	0.03	0.24	0.53	0.05	0.57	1.16	0.08	1.24
J-6	0	0	47	85	0.00	0.27	0.00	0.27	0.69	0.00	0.69	1.51	0.00	1.51
J-7	13	13	0	53	0.00	0.17	4.00	4.17	0.43	4.00	4.43	0.95	4.00	4.95
J-8	26	26	0	107	0.00	0.35	0.00	0.35	0.86	0.00	0.86	1.90	0.00	1.90
J-9	20	20	0	82	0.00	0.27	0.00	0.27	0.66	0.00	0.66	1.46	0.00	1.46
J-10	0	0	96	173	0.00	0.56	0.00	0.56	1.40	0.00	1.40	3.08	0.00	3.08
J-11	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J-12	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J-13	0	0	0	0	0.39	0.00	0.12	0.12	0.00	0.19	0.19	0.00	0.34	0.34
J-14	0	0	0	0	0.39	0.00	0.12	0.12	0.00	0.19	0.19	0.00	0.34	0.34
J-15	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J-16	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS	67	67	263	748	0.96	**2.42**	**4.31**	**6.74**	**6.06**	**4.46**	**10.53**	**13.33**	**4.84**	**18.17**

ASSUMPTIONS

RESIDENTIAL DENSITIES

- Townhouse (TH) 2.7 p / p / u
- Condo Units (CU) 1.8 p / p / u
- Apartments (1 Bedroom) 1.4 p / p / u
- p / p / u

AVG. DAILY DEMAND

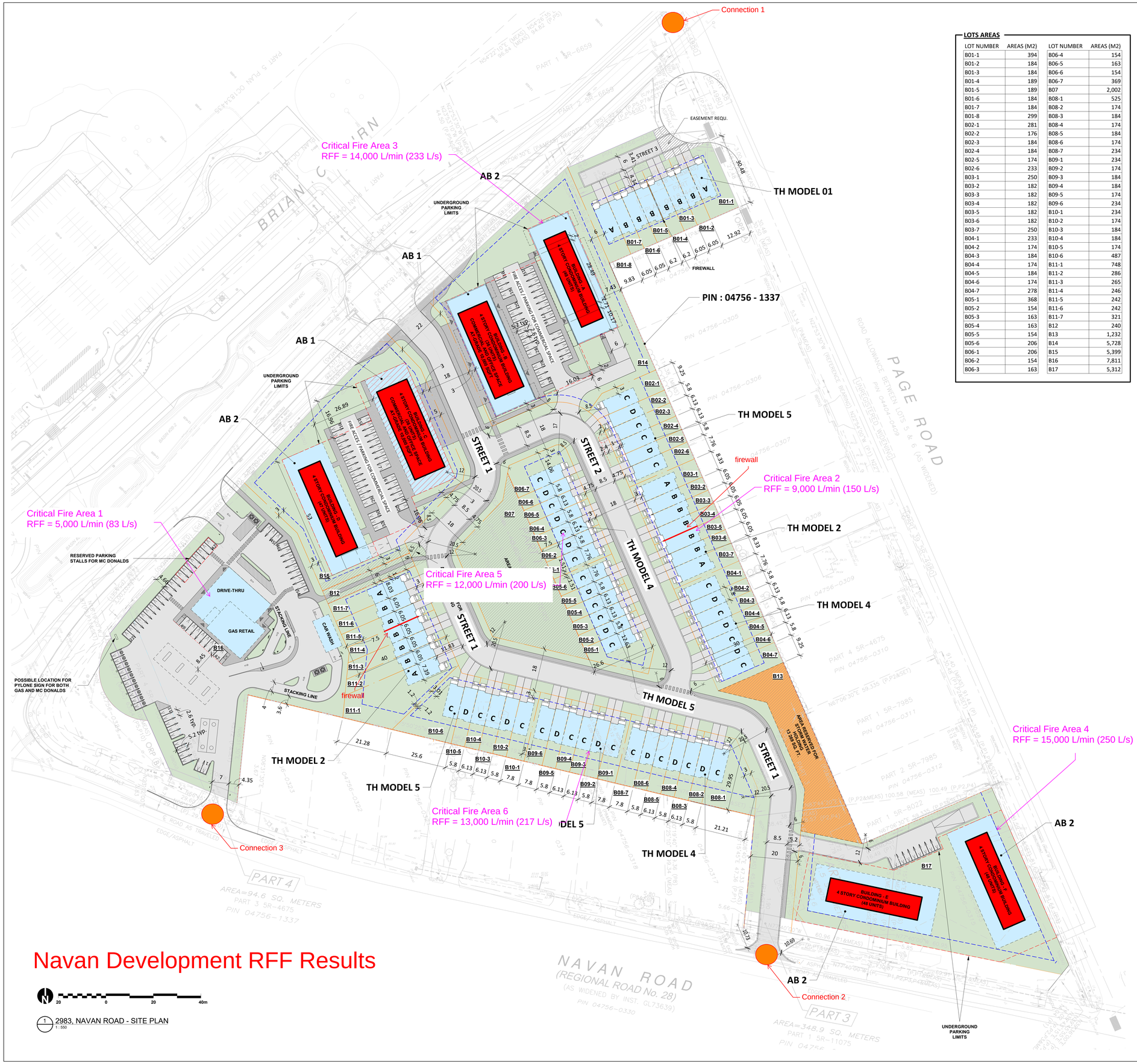
- Residential 280 l / cap / day
- Institutional 28,000 l / ha / day
- Commercial 28,000 l / ha / day

MAX. DAILY DEMAND

- Residential 700 l / cap / day
- Institutional 42,000 l / ha / day
- Commercial 42,000 l / ha / day

MAX. HOURLY DEMAND

- Residential 1,540 l / cap / day
- Institutional 75,600 l / ha / day
- Commercial 75,600 l / ha / day



LOTS AREAS

LOT NUMBER	AREAS (M2)	LOT NUMBER	AREAS (M2)
B01-1	394	B06-4	154
B01-2	184	B06-5	163
B01-3	184	B06-6	154
B01-4	189	B06-7	369
B01-5	189	B07	2,002
B01-6	184	B08-1	525
B01-7	184	B08-2	174
B01-8	299	B08-3	184
B02-1	281	B08-4	174
B02-2	176	B08-5	184
B02-3	184	B08-6	174
B02-4	184	B08-7	234
B02-5	174	B09-1	234
B02-6	233	B09-2	174
B03-1	250	B09-3	184
B03-2	182	B09-4	184
B03-3	182	B09-5	174
B03-4	182	B09-6	234
B03-5	182	B10-1	234
B03-6	182	B10-2	174
B03-7	250	B10-3	184
B04-1	233	B10-4	184
B04-2	174	B10-5	174
B04-3	184	B10-6	487
B04-4	174	B11-1	748
B04-5	184	B11-2	286
B04-6	174	B11-3	265
B04-7	278	B11-4	246
B05-1	368	B11-5	242
B05-2	154	B11-6	242
B05-3	163	B11-7	321
B05-4	163	B12	240
B05-5	154	B13	1,232
B05-6	206	B14	5,728
B06-1	206	B15	5,399
B06-2	154	B16	7,811
B06-3	163	B17	5,312

SITE PLAN LEGEND

- EXISTING BUILDING
- NEW BUILDING
- NEW BUILDING WITH COMMERCIAL SPACE AT-GRADE
- GRASS
- ASPHALT
- LOT LINE
- SETBACKS
- NEW TREE
- FIREWALL
- SIDEWALK

SITE INFORMATION & DEVELOPMENT STATISTICS

LOTS		PIN
		04756 - 0303
		04756 - 0315
		04756 - 0316
		04756 - 1337
ZONING		GM[2546] H(14.5)
SITE AREA		
TOTAL SITE AREA:		~53,441.14 m² (5.34ha)
TOTAL DEVELOPABLE AREA:		~45,956.28 m² (4.59ha)
NET SITE AREA:		~38,956.28 m² (3.89ha)
UNITS		
TOWNHOUSES:		67 UNITS
BLOCK 01:		
1 X RESIDENTIAL APARTMENT BUILDING		48 UNITS
1 X MIXED USE BUILDING		
RESIDENTIAL:		36 UNITS
COMMERCIAL SPACES:		~929 m²
BLOCK 02:		
1 X RESIDENTIAL APARTMENT BUILDING		47 UNITS
1 X MIXED USE BUILDING		
RESIDENTIAL:		36 UNITS
COMMERCIAL SPACES:		~929 m²
BLOCK 03:		
2 X RESIDENTIAL APARTMENT BUILDING		96 UNITS
TOTAL NUMBER OF UNITS:		330 UNITS
TOTAL COMMERCIAL SPACES:		~1,858 m²

	REQUIRED	PROVIDED
MAXIMUM DENSITY	NO MAX.	84.8 units/net ha
MINIMUM LOT WIDTH	NO MIN.	5.8 m
MINIMUM LOT AREA	NO MIN.	174 m²
MAXIMUM BUILDING HEIGHT	14.5 m	14.5 m
SETBACKS		
MINIMUM FRONT YARD:	3 m	3 m
MINIMUM CORNER SIDE YARD:	3 m	3 m
MINIMUM INTERIOR SIDE YARD:		
NON-RESIDENTIAL OR MIXED-USE:	5 m	5 m
LOW-RISE RESIDENTIAL :	1.2 m	1.2 m
MID-RISE RESIDENTIAL :	3 m	3 m
MINIMIM REAR YARD:		
ABUTTING A STREET:	3 m	3 m
FROM A RESIDENTIAL ZONE:	7.5 m	7.5 m
FOR A RESIDENTIAL BUILDING:	7.5 m	7.5 m
PARKING RATES		
R9 - TOWNHOUSES:	1 p/unit = 67	67 (GARAGES)
VISITOR:	0	67 DRIVE AISLES
BLOCK 14:		
R12 - APARTEMENTS	1.2 p/unit = 101	101 (UNDERGROUND)
VISITOR:	0.2 p/unit = 17	17 (UNDERGROUND)
N79 - RETAIL STORE:	3.4 p/100 m² GFA = 32	32 (EXTERIOR)
		TOTAL: 150
BLOCK 15:		
R12 - APARTEMENTS	1.2 p/unit = 100	100 (UNDERGROUND)
VISITOR:	0.2 p/unit = 17	17 (UNDERGROUND)
N79 - RETAIL STORE:	3.4 p/100 m² GFA = 32	32 (EXTERIOR)
		TOTAL: 150
BLOCK 18:		
R12 - APARTEMENTS	1.2 p/unit = 116	145 (UNDERGROUND)
VISITOR:	0.2 p/unit = 17	17 (8 EXT. + 12 UND.)
		TOTAL: 162
GROSS FLOOR AREA		
TOWNHOUSE A:		267 m²
TOWNHOUSE B:		239 m²
TOWNHOUSE C:		232 m²
TOWNHOUSE C (CORNER UNIT):		236 m²
TOWNHOUSE D:		225 m²
TOTAL MODEL 01 (ABBBBBBA)		1,968 m²
TOTAL MODEL 02 (ABBBBBA)		1,729 m²
TOTAL MODEL 03 (ABBBBA)		1,490 m²
TOTAL MODEL 04 (CDCDCDC)		1,611 m²
TOTAL MODEL 05 (CDCCDC)		1,386 m²
MIXED USE BUILDING (TOTAL OF 2 BUILDINGS):		TOTAL: 4,130 m²
RESIDENTIAL:		3,201 m²
COMMERCIAL:		929 m²
RESIDENTIAL APARTMENT BUILDING (TOTAL OF 4 BUILDINGS) :		TOTAL: 4,130 m²
RESIDENTIAL:		4,130 m²

NOTE

1. ASSUMES TYPICAL RESIDENTIAL FLOOR HEIGHT OF 3m.
2. THE BASE PLAN (LOT LINES, EXISTING ROADS AND SURROUNDING AREAS) IS BASED ON THE TOPOGRAPHICAL PLAN OF SURVEY, SURVEYED STANTEC GEOMATICS LTD.
3. DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0,3048.

Navan Development RFF Results

N 20 0 20 40m

1 2983, NAVAN ROAD - SITE PLAN
1 : 550

BIM 360://NAVAN/20054_DEV-NAVAN_SITE_PLAN_R21.rvt

PROJECT

NAVAN ROAD DEVELOPMENT

2983, Navan Road, Orleans, ON K1C 7G4

OWNER

GROUPE Heafey GROUP
768, BOUL. SAINT-JOSEPH, SUITE 100
GATINEAU, QC J8Y 4B8

ARCHITECTURAL

PMA ARCHITECTES
(418) 651-8954
INFO@PMAARCHITECTES.COM
3070, CHEMIN DES QUATRE-BOURGEOIS QUÉBEC (QC) G1W 2K4
PMAARCHITECTES.COM

LAPALME RHEAULT ARCHITECTES | ASSOCIÉS
53, BOUL. SAINT-RAYMOND, GATINEAU, QC J8Y 1R8

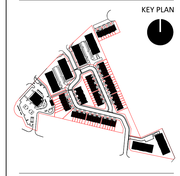
ENGINEERS / PLANNER

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
1565 CARLING AVENUE, SUITE 700, OTTAWA, ON K1Z 8R1

SURVEYOR

Stantec
1331 CLYDE AVENUE, SUITE 400, OTTAWA, ON K2C 3G4

KEY PLAN



ARCHITECT SEAL

REVISIONS

NO	DESCRIPTION	DATE
8	FOR CITY REVIEW	2022-11-28
7	FOR COORDINATION	2022-11-08
6	FOR COORDINATION	2022-11-01
5	FOR COORDINATION	2022-06-14
4	FOR COORDINATION	2021-11-01
3	FOR COORDINATION	2021-08-30
2	FOR COORDINATION	2021-08-26
1	FOR COORDINATION	2021-08-18

NOTE

IT IS THE RESPONSIBILITY OF THE APPROPRIATE CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON THE SITE AND TO REPORT ALL ERRORS AND/OR OMISSIONS TO THE ARCHITECT. ALL CONTRACTORS MUST COMPLY WITH ALL PERTINENT CODES AND BY-LAWS. DO NOT SCALE DRAWINGS.

DO NOT USE FOR CONSTRUCTION

DATE 2023-08-29	DESIGNED PP
	DRAWN PP
PROJECT No 20054	CHECKED PM

SHEET TITLE

SITE PLAN

SHEET No

A100

FUS Fire Flow Calculations

NAVAN ROAD DEVELOPMENT PROJECT - Commercial Building
(JLR 29899-002)

Step	Parameter	Value		Note
A	Type of Construction	Non-combustible		
	Coefficient (C)	0.8		
B	Ground Floor Area	686	m^2	Commercial area consisting of a Gas Retail and Drive Thru
C	Height in storeys	1	storeys	Basements are excluded.
	Total Floor Area	686	m^2	
D	Fire Flow Formula	$F=220C\sqrt{A}$		
	Fire Flow	4610	L/min	
	Rounded Fire Flow	5000	L/min	Flow rounded to nearest 1000 L/min.
E	Occupancy Class	Combustible		
	Occupancy Charge	0%		
	Occupancy Increase or Decrease	0		
	Fire Flow	5000	L/min	No rounding applied.
F	Sprinkler Protection	None		
	Sprinkler Credit	0%		
	Decrease for Sprinkler	0	L/min	
G	*North Side Exposure*			
	Exposing Wall:	Non-combustible		Gas Retail/Drive Thru
	Exposed Wall:	Wood Frame		4 Storey Condo Unit
	Length of Exposed Wall:	32.2	m	
	Height of Exposed Wall:	4	storeys	
	Length-Height Factor	128.6	m-storeys	
	Separation Distance	38.96	m	
	North Side Exposure Charge	5%		
	East Side Exposure			
	Exposing Wall:	Non-combustible		Gas Retail/Drive Thru
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	46	m	
	East Side Exposure Charge	0%		
	South Side Exposure			
	Exposing Wall:	Non-combustible		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	46	m	Over 45 m to next structure
	South Side Exposure Charge	0%		
	West Side Exposure			
	Exposing Wall:	Non-combustible		Gas Retail/Drive Thru
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	46	m	Over 200 m to next structure
	West Side Exposure Charge	0%		
	Total Exposure Charge	5%		The total exposure charge is below the maximum value of 75%.
	Increase for Exposures	250	L/min	
H	Fire Flow	5250	L/min	
	Rounded Fire Flow	5000	L/min	Flow rounded to nearest 1000 L/min.
City Cap	**Required Fire Flow (RFF)**	**5000**	**L/min**	
		83	**L/s**	

Fire Underwriters Survey (FUS) Fire Flow Calculations
In accordance with City of Ottawa Technical Bulletin ISTB-2018-02 dated March 21, 2018

FUS Fire Flow Calculations

NAVAN ROAD DEVELOPMENT PROJECT - Duplex Townhouse
(JLR 29899-002)

Step	Parameter	Value		Note
A	Type of Construction	Wood Frame		
	Coefficient (C)	1.5		
B	Ground Floor Area	282.27	m^2	Includes 3 TH units in Block 3 (east of firewall)
C	Height in storeys	2	storeys	Basements are excluded.
	Total Floor Area	564.54	m^2	
D	Fire Flow Formula	$F=220C\sqrt{A}$		
	Fire Flow	7841	L/min	
	Rounded Fire Flow	8000	L/min	Flow rounded to nearest 1000 L/min.
E	Occupancy Class	Limited Combustible		Residential buildings have a limited combustible occupancy.
	Occupancy Charge	-15%		
	Occupancy Increase or Decrease	-1200		
	Fire Flow	6800	L/min	No rounding applied.
F	Sprinkler Protection	None		
	Sprinkler Credit	0%		
	Decrease for Sprinkler	0	L/min	
G	*North Side Exposure*			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		Shed/Garage on existing property fronting Page Rd.
	Length of Exposed Wall:	3.2	m	
	Height of Exposed Wall:	1	storeys	
	Length-Height Factor	3.2	m-storeys	
	Separation Distance	12.4	m	
	North Side Exposure Charge	10%		
	East Side Exposure			TH Block 4
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	14.2	m	
	Height of Exposed Wall:	2	storeys	
	Length-Height Factor	28.4	m-storeys	
	Separation Distance	3.01	m	
	East Side Exposure Charge	21%		
	South Side Exposure			TH blocks 6 and 5
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	19.2	m	
	Height of Exposed Wall:	2	storeys	
	Length-Height Factor	38.4	m-storeys	
	Separation Distance	27	m	
	South Side Exposure Charge	4%		
	West Side Exposure			
	Exposing Wall:	Wood Frame		Firewall
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	14.8	m	
	Height of Exposed Wall:	2	storeys	
	Length-Height Factor	29.6	m-storeys	
	Separation Distance	3.01	m	
	West Side Exposure Charge	0%		
	Total Exposure Charge	35%		The total exposure charge is below the maximum value of 75%.
	Increase for Exposures	2380	L/min	
H	Fire Flow	9180	L/min	
	Rounded Fire Flow	9000	L/min	Flow rounded to nearest 1000 L/min.
City Cap	**Required Fire Flow (RFF)**	**9000**	**L/min**	The City of Ottawa's cap does not apply since duplex townhouse units are being considered.
		150	**L/s**	

Fire Underwriters Survey (FUS) Fire Flow Calculations
In accordance with City of Ottawa Technical Bulletin ISTB-2018-02 dated March 21, 2018

FUS Fire Flow Calculations

NAVAN ROAD DEVELOPMENT PROJECT - Duplex Townhouse
(JLR 29899-002)

Step	Parameter	Value		Note
A	Type of Construction	Wood Frame		
	Coefficient (C)	1.5		
B	Ground Floor Area	588	m^2	Includes 7 units of Row TH
C	Height in storeys	2	storeys	Basements are excluded.
	Total Floor Area	1176	m^2	
D	Fire Flow Formula	$F=220C\sqrt{A}$		
	Fire Flow	11317	L/min	
	Rounded Fire Flow	11000	L/min	Flow rounded to nearest 1000 L/min.
E	Occupancy Class	Limited Combustible		Residential buildings have a limited combustible occupancy.
	Occupancy Charge	-15%		
	Occupancy Increase or Decrease	-1650		
	Fire Flow	9350	L/min	No rounding applied.
F	Sprinkler Protection	None		
	Sprinkler Credit	0%		
	Decrease for Sprinkler	0	L/min	
G	*North Side Exposure*			TH Blocks 2 and 3
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	39.2	m	
	Height of Exposed Wall:	2	storeys	
	Length-Height Factor	78.4	m-storeys	
	Separation Distance	27	m	
	North Side Exposure Charge	6%		
	East Side Exposure			TH Block 5
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	14.2	m	
	Height of Exposed Wall:	2	storeys	
	Length-Height Factor	28.4	m-storeys	
	Separation Distance	3.01	m	
	East Side Exposure Charge	21%		
	South Side Exposure			TH Block 11
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	40.9	m	
	Height of Exposed Wall:	2	storeys	
	Length-Height Factor	81.7	m-storeys	
	Separation Distance	65	m	
	South Side Exposure Charge	0%		
	West Side Exposure			Building B (Block 14)
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	14.1	m	
	Height of Exposed Wall:	4	storeys	
	Length-Height Factor	56.4	m-storeys	
	Separation Distance	29	m	
	West Side Exposure Charge	4%		
	Total Exposure Charge	31%		The total exposure charge is below the maximum value of 75%.
	Increase for Exposures	2899	L/min	
H	Fire Flow	12249	L/min	
	Rounded Fire Flow	12000	L/min	Flow rounded to nearest 1000 L/min.
City Cap	**Required Fire Flow (RFF)**	**12000**	**L/min**	The City of Ottawa's cap does not apply since duplex townhouse units are being considered.
		200	**L/s**	

Fire Underwriters Survey (FUS) Fire Flow Calculations
In accordance with City of Ottawa Technical Bulletin ISTB-2018-02 dated March 21, 2018

FUS Fire Flow Calculations

NAVAN ROAD DEVELOPMENT PROJECT - Row Townhouse
(JLR 29899-002)

Step	Parameter	Value		Note
A	Type of Construction	Wood Frame		
	Coefficient (C)	1.5		
B	Ground Floor Area	506	m^2	Includes 7 units of Row TH
C	Height in storeys	2	storeys	Basements are excluded.
	Total Floor Area	1012	m^2	
D	Fire Flow Formula	$F=220C\sqrt{A}$		
	Fire Flow	10498	L/min	
	Rounded Fire Flow	10000	L/min	Flow rounded to nearest 1000 L/min.
E	Occupancy Class	Limited Combustible		Residential buildings have a limited combustible occupancy.
	Occupancy Charge	-15%		
	Occupancy Increase or Decrease	-1500		
	Fire Flow	8500	L/min	No rounding applied.
F	Sprinkler Protection	None		
	Sprinkler Credit	0%		
	Decrease for Sprinkler	0	L/min	
G	*North Side Exposure*			TH Block 5
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	36.5	m	
	Height of Exposed Wall:	2	storeys	
	Length-Height Factor	73.0	m-storeys	
	Separation Distance	27	m	
	North Side Exposure Charge	6%		
	East Side Exposure			TH Block 8
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	14.2	m	
	Height of Exposed Wall:	2	storeys	
	Length-Height Factor	28.4	m-storeys	
	Separation Distance	3.1	m	
	East Side Exposure Charge	16%		
	South Side Exposure			Existing Shed at 3021 Navan Road
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	2.9	m	
	Height of Exposed Wall:	2	storeys	
	Length-Height Factor	5.9	m-storeys	
	Separation Distance	17.51	m	
	South Side Exposure Charge	10%		
	West Side Exposure			Building B (Block 14)
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	14.2	m	
	Height of Exposed Wall:	2	storeys	
	Length-Height Factor	28.4	m-storeys	
	Separation Distance	3.1	m	
	West Side Exposure Charge	16%		
	Total Exposure Charge	48%		The total exposure charge is below the maximum value of 75%.
	Increase for Exposures	4080	L/min	
H	Fire Flow	12580	L/min	
	Rounded Fire Flow	13000	L/min	Flow rounded to nearest 1000 L/min.
City Cap	**Required Fire Flow (RFF)**	**13000**	**L/min**	The City of Ottawa's cap does not apply since duplex townhouse units are being considered.
		217	**L/s**	

Fire Underwriters Survey (FUS) Fire Flow Calculations
In accordance with City of Ottawa Technical Bulletin ISTB-2018-02 dated March 21, 2018

FUS Fire Flow Calculations

NAVAN ROAD DEVELOPMENT PROJECT - Commercial Building

(JLR 29899-002)

Step	Parameter	Value		Note
A	Type of Construction	Wood Frame		Building A (4 Story Mixed Use Condominium Building)
	Coefficient (C)	1.5		
B	Ground Floor Area	929	m^2	
C	Height in storeys	4	storeys	Basements are excluded.
	Total Floor Area	3716	m^2	
D	Fire Flow Formula	$F=220C\sqrt{A}$		
	Fire Flow	20116	L/min	
	Rounded Fire Flow	20000	L/min	Flow rounded to nearest 1000 L/min.
E	Occupancy Class	Limited Combustible		Residential buildings have a limited combustible occupancy.
	Occupancy Charge	-15%		
	Occupancy Increase or Decrease	-3000		
	Fire Flow	17000	L/min	No rounding applied.
F	Sprinkler Protection	Automatic Fully Supervised		
	Sprinkler Credit	-50%		
	Decrease for Sprinkler	-8500	L/min	
G	*North Side Exposure*			
	Exposing Wall:	Wood Frame		Building A
	Exposed Wall:	Wood Frame		Townhomes
	Length of Exposed Wall:	15.1	m	
	Height of Exposed Wall:	2	storeys	
	Length-Height Factor	30.1	m-storeys	
	Separation Distance	10.41	m	
	North Side Exposure Charge	12%		
	East Side Exposure			
	Exposing Wall:	Wood Frame		Building A
	Exposed Wall:	Wood Frame		Townhomes
	Length of Exposed Wall:	14.4	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	25.84	m	
	East Side Exposure Charge	8%		
	South Side Exposure			
	Exposing Wall:	Wood Frame		Building A
	Exposed Wall:	Wood Frame		Building B
	Length of Exposed Wall:	39.2	m	
	Height of Exposed Wall:	4	storeys	
	Length-Height Factor	156.8	m-storeys	
	Separation Distance	25.25	m	
	South Side Exposure Charge	10%		
	West Side Exposure			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	50	m	
	West Side Exposure Charge	0%		
	Total Exposure Charge	30%		The total exposure charge is below the maximum value of 75%.
	Increase for Exposures	5100	L/min	
H	Fire Flow	13600	L/min	
	Rounded Fire Flow	14000	L/min	Flow rounded to nearest 1000 L/min.
City Cap	**Required Fire Flow (RFF)**	**14000**	**L/min**	
		233	**L/s**	

Fire Underwriters Survey (FUS) Fire Flow Calculations

In accordance with City of Ottawa Technical Bulletin ISTB-2018-02 dated March 21, 2018

FUS Fire Flow Calculations

NAVAN ROAD DEVELOPMENT PROJECT - Commercial Building

(JLR 29899-002)

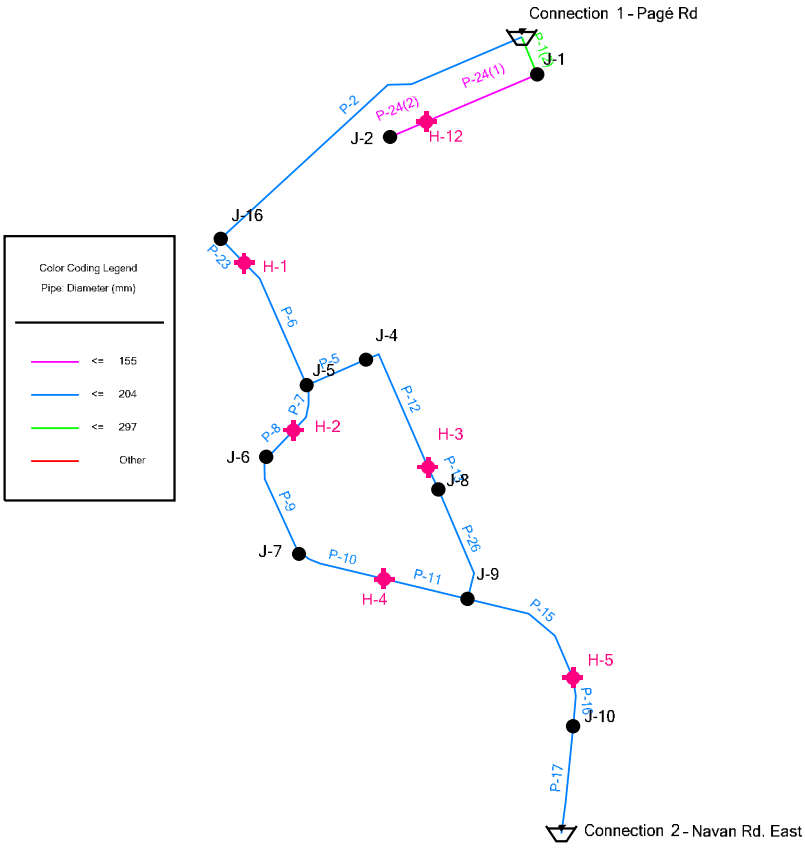
Step	Parameter	Value		Note
A	Type of Construction	Wood Frame		Building F (4 Story Mixed Use Condominium Building)
	Coefficient (C)	1.5		
B	Ground Floor Area	1067.84	m^2	
C	Height in storeys	4	storeys	Basements are excluded.
	Total Floor Area	4271.36	m^2	
D	Fire Flow Formula	$F=220C\sqrt{A}$		
	Fire Flow	21567	L/min	
	Rounded Fire Flow	22000	L/min	Flow rounded to nearest 1000 L/min.
E	Occupancy Class	Limited Combustible		Residential buildings have a limited combustible occupancy.
	Occupancy Charge	-15%		
	Occupancy Increase or Decrease	-3300		
	Fire Flow	18700	L/min	No rounding applied.
F	Sprinkler Protection	Automatic Fully Supervised		
	Sprinkler Credit	-50%		
	Decrease for Sprinkler	-9350	L/min	
G	*North Side Exposure*			
	Exposing Wall:	Wood Frame		Building F
	Exposed Wall:	Wood Frame		Existing One Storey House
	Length of Exposed Wall:	8.4	m	
	Height of Exposed Wall:	1	storeys	
	Length-Height Factor	8.4	m-storeys	
	Separation Distance	15.03	m	
	North Side Exposure Charge	12%		
	East Side Exposure			
	Exposing Wall:	Wood Frame		Building F
	Exposed Wall:	Wood Frame		Existing One Storey House
	Length of Exposed Wall:	40.9	m	
	Height of Exposed Wall:	1	storeys	
	Length-Height Factor	40.9	m-storeys	
	Separation Distance	40.14561369	m	
	East Side Exposure Charge	5%		
	South Side Exposure			
	Exposing Wall:	Wood Frame		Building F
	Exposed Wall:	Non-combustible		Navan Road R.O.W
	Length of Exposed Wall:		m	
	Height of Exposed Wall:		storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance		m	
	South Side Exposure Charge	0%		
	West Side Exposure			
	Exposing Wall:	Wood Frame		Building F
	Exposed Wall:	Wood Frame		Building E
	Length of Exposed Wall:	56.0	m	
	Height of Exposed Wall:	4	storeys	
	Length-Height Factor	223.8	m-storeys	
	Separation Distance	14.76	m	
	West Side Exposure Charge	15%		
	Total Exposure Charge	32%		The total exposure charge is below the maximum value of 75%.
	Increase for Exposures	5984	L/min	
H	Fire Flow	15334	L/min	
	Rounded Fire Flow	15000	L/min	Flow rounded to nearest 1000 L/min.
City Cap	**Required Fire Flow (RFF)**	**15000**	**L/min**	
		250	**L/s**	

Fire Underwriters Survey (FUS) Fire Flow Calculations
In accordance with City of Ottawa Technical Bulletin ISTB-2018-02 dated March 21, 2018

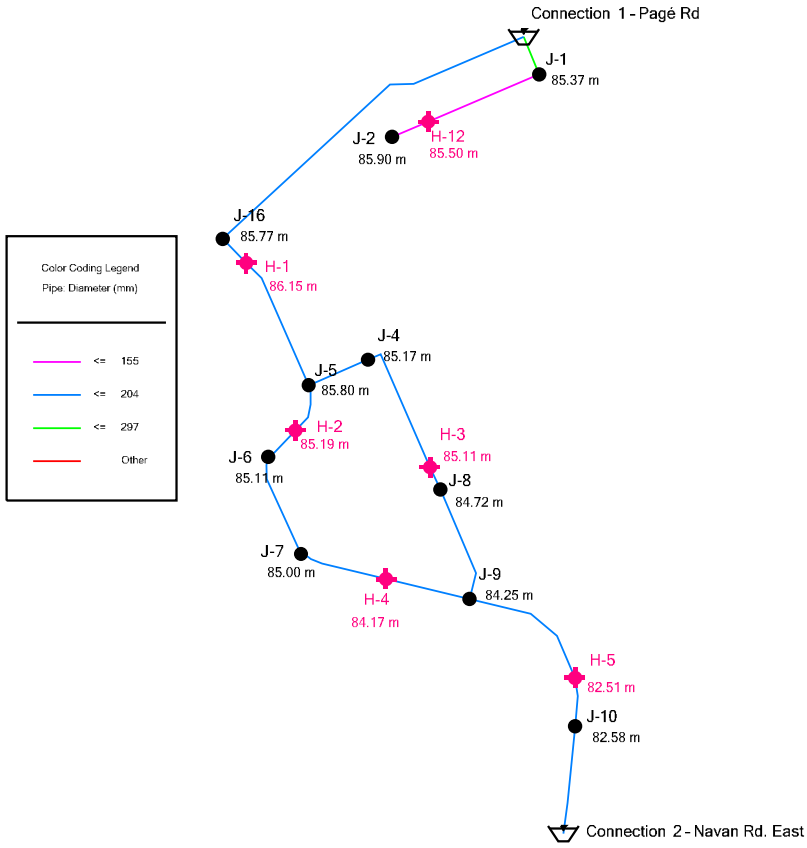
Appendix D2

WaterCAD Schematics

2983, 3053, and 3079 Navan Road and 2690 Page Road
Model Schematic



2983, 3053, and 3079 Navan Road and 2690 Page Road
Model Schematic
Elevation Model



Appendix D3

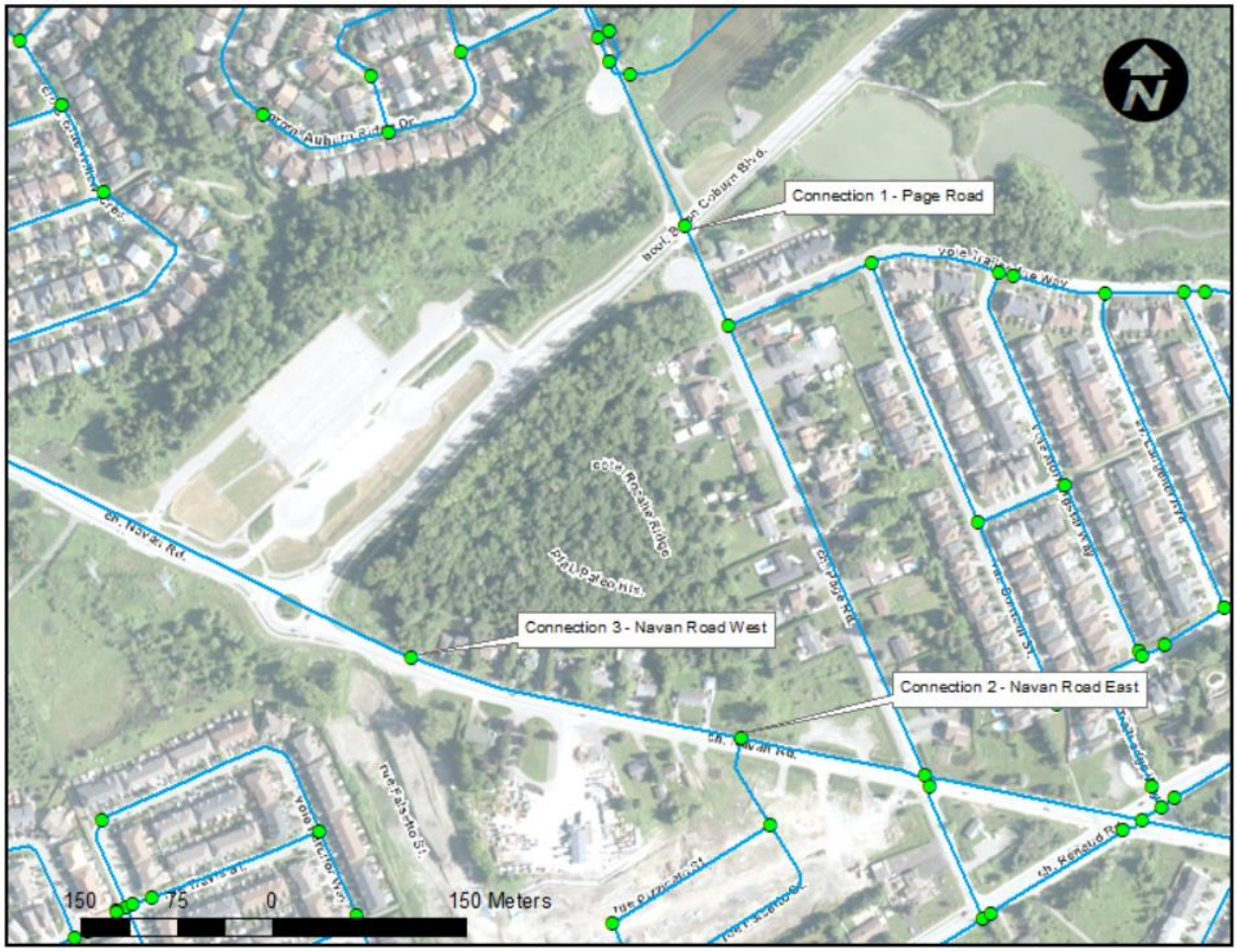
City Correspondence –
Boundary Conditions

Boundary Conditions
Navan Subdivision

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	404	6.74
Maximum Daily Demand	632	10.53
Peak Hour	1,090	18.17
Fire Flow Demand #1	6,000	100.00
Fire Flow Demand #2	10,000	166.67
Fire Flow Demand #3	14,000	233.33
Fire Flow Demand #4	15,000	250.00

Location



Results

Connection 1 - Page Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.7	64.0
Peak Hour	127.0	58.6
Max Day plus Fire Flow #1	128.2	60.4
Max Day plus Fire Flow #2	126.8	58.3
Max Day plus Fire Flow #3	124.9	55.7
Max Day plus Fire Flow #4	124.4	55.0
[1] Ground Elevation =	85.7	m

Connection 2 - Navan Road East

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.7	71.4
Peak Hour	126.8	65.9
Max Day plus Fire Flow #1	127.7	67.1
Max Day plus Fire Flow #2	125.5	64.1
Max Day plus Fire Flow #3	122.7	60.1
Max Day plus Fire Flow #4	121.9	58.9
[1] Ground Elevation =	80.5	m

Connection 3 - Navan Road West

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.7	69.3
Peak Hour	126.8	63.8
Max Day plus Fire Flow #1	127.3	64.5
Max Day plus Fire Flow #2	124.6	60.6
Max Day plus Fire Flow #3	120.9	55.3
Max Day plus Fire Flow #4	119.8	53.8
[1] Ground Elevation =	81.9	m

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.

William Rugamba

From: Mahad Musse
Sent: July 15, 2024 1:21 PM
To: William Rugamba
Subject: FW: Navan Subdivision - Boundary Condition Request
Attachments: NavanSubdivision_Boundary Condition(4july2024).docx

Mahad Musse, B.Eng., EIT
Civil Engineering Graduate
Ottawa, ON
Work: 343-633-1501

From: Polyak, Alex <alex.polyak@ottawa.ca>
Sent: Monday, July 15, 2024 10:12 AM
To: Mahad Musse <mmusse@jlrichards.ca>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; Carmine Zayoun <carmine@zayoungroup.com>; Armstrong, Justin <justin.armstrong@ottawa.ca>; Tatyana Roumie <troumie@jlrichards.ca>
Subject: RE: Navan Subdivision - Boundary Condition Request

Good morning Mahad,

Please find the boundary conditions attached.

Regards,

Oleksandr (Alex) Polyak, B.Eng., C.E.T., P.Eng.
Project Manager, Infrastructure Approvals, Development Review East Branch | Gestionnaire de projet, Direction de l'examen des projets d'aménagement – Est.
Planning, Development and Building Services Department (PDBS) | Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB

City of Ottawa | Ville d'Ottawa
110 Laurier Ave., 4th Fl East, Ottawa ON K1P 1J1
Email: alex.polyak@ottawa.ca
Cell : 613-857-4380
www.Ottawa.ca

From: Mahad Musse <mmusse@jlrichards.ca>
Sent: July 12, 2024 1:31 PM
To: Polyak, Alex <alex.polyak@ottawa.ca>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; Carmine Zayoun <carmine@zayoungroup.com>; Armstrong, Justin <justin.armstrong@ottawa.ca>; Tatyana Roumie <troumie@jlrichards.ca>
Subject: RE: Navan Subdivision - Boundary Condition Request

Hi Alex,

Just wondering if you have a status update for the boundary conditions for Navan.

Thanks
Mahad

Mahad Musse, B.Eng., EIT
Civil Engineering Graduate

1000-343 Preston Street
Ottawa, ON, K1S 1N4

Work: 343-633-1501
mmusse@jlrichards.ca

From: Mahad Musse <mmusse@jlrichards.ca>
Sent: Wednesday, July 3, 2024 11:02 AM
To: Polyak, Alex <alex.polyak@ottawa.ca>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; Carmine Zayoun <carmine@zayoungroup.com>; Armstrong, Justin <justin.armstrong@ottawa.ca>; Tatyana Roumie <troumie@jlrichards.ca>
Subject: RE: Navan Subdivision - Boundary Condition Request

Good morning Alex,

As we discussed last week our Client is looking into the option of converting the row townhouse units into duplex units (townhouse units with apartments in the basement). As a result, this will increase the total demand on the site and we will therefore require new water boundary conditions. We'd like to note that the footprint of the blocks will not change and neither will their layout or any of the offsets.

As a summary:

- Domestic demands were calculated based on a daily consumption rate of 280 L/cap/day with peaking factors consistent with City of Ottawa Guidelines
- Required Fire Flow (RFF) was calculated in accordance to the Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection and the City of Ottawa FUS protocol (Bulletin ISDTB-2014-02 & Bulletin ISDTB-2018-02), which considers material, expose distance & height. We have attached the calculation spreadsheet and the figure.

We request boundary conditions under high pressure, peak hour, and maximum day + fire flow conditions (for each of the below fire flows). Domestic demand and fire flow calculations are attached. Please provide the boundary conditions at the proposed connection locations as shown in the attached figure.

Average Day Demand: 6.74 L/s
Maximum Day Demand: 10.53 L/s
Peak Hour Demand: 18.17 L/s
Required Fire Flow (per FUS): 6,000 L/min (100 L/s)
Required Fire Flow (per FUS): 10,000 L/min (167 L/s)
Required Fire Flow (per FUS): 14,000 L/min (233 L/s)
Required Fire Flow (per FUS): 15,000 L/min (250 L/s)

For your reference, the previous boundary condition received from the City is attached and below is the email chain.

If you have any questions or comments please let us know.

Thanks
Mahad

Mahad Musse, B.Eng., EIT
Civil Engineering Graduate

1000-343 Preston Street
Ottawa, ON, K1S 1N4

Work: 343-633-1501
mmusse@jlrichards.ca

From: Polyak, Alex <alex.polyak@ottawa.ca>
Sent: Thursday, August 17, 2023 3:01 PM
To: William Rugamba <wrugamba@jlrichards.ca>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; Carmine Zayoun <carmine@zayoungroup.com>; Shahira Jalal <sjalal@jlrichards.ca>
Subject: RE: Navan Subdivision - Boundary Condition Request

Hello William,

Sorry that I missed your call, I was in a meeting. The boundary conditions are attached.

Regards,

Oleksandr (Alex) Polyak, B.Eng., P.Eng
Project Manager, Infrastructure Approvals, Development Review East Branch | Gestionnaire de projet, Direction de l'examen des projets d'aménagement – Est.
Planning, Real Estate and Economic Development Department | Direction générale de la planification, des biens immobiliers et du développement économique

City of Ottawa | Ville d'Ottawa
110 Laurier Ave., 4th Fl East, Ottawa ON K1P 1J1
Email: alex.polyak@ottawa.ca
Cell : 613-857-4380
www.Ottawa.ca

From: William Rugamba <wrugamba@jlrichards.ca>
Sent: August 15, 2023 9:26 AM
To: Polyak, Alex <alex.polyak@ottawa.ca>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; Carmine Zayoun <carmine@zayoungroup.com>; Shahira Jalal <sjalal@jlrichards.ca>
Subject: RE: Navan Subdivision - Boundary Condition Request

Good morning Alex,

Just wanted to follow up on the status of this boundary request. Please let me know if you need anything else from us.

Thanks,
William

William Rugamba, M.Eng.
Civil Engineering Intern

J.L. Richards & Associates Limited
1000-343 Preston Street, Ottawa, ON K1S 1N4
Direct: 343-804-4374

From: Tatyana Roumie
Sent: Tuesday, July 25, 2023 3:53 PM
To: 'alex.polyak@ottawa.ca' <alex.polyak@ottawa.ca>
Cc: Karla Ferrey <kferrey@jlrichards.ca>; Raad Akrawi <rakrawi@groupeheafey.com>; carmine@zayoungroup.com; Shahira Jalal <sjalal@jlrichards.ca>
Subject: Navan Subdivision - Boundary Condition Request

Hello Alex.

To support our upcoming detailed design for the site, we are requesting updated boundary conditions for the 3079 Navan Road Development.

As a brief history, we received boundary conditions from the City in July 2021 (attached, but with incorrect connection locations) and again in April 2022 (also attached) in support of the functional servicing design. We understand from the April 2022 boundary conditions that the maximum available fire flow for the site is 250 L/s.

We are currently requesting updated boundary conditions for this site as we are commencing the detailed servicing design and this request will accommodate the recent site plan changes and proposed connection points. This request is also applicable to the upcoming site plan designs which will be submitted as separate applications.

We request boundary conditions under high pressure, peak hour, and maximum day + fire flow conditions (for each of the below fire flows). Domestic demand and fire flow calculations are attached. Please provide the boundary conditions at the proposed connection locations as shown in the attached figure.

Average Day Demand: 6.44 L/s
Maximum Day Demand: 9.77 L/s
Peak Hour Demand: 16.50 L/s
Required Fire Flow (per FUS): 6,000 L/min (100 L/s)
Required Fire Flow (per FUS): 10,000 L/min (167 L/s)
Required Fire Flow (per FUS): 14,000 L/min (233 L/s)
Required Fire Flow (per FUS): 15,000 L/min (250 L/s)

Thanks,
Tatyana

'

'
'

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

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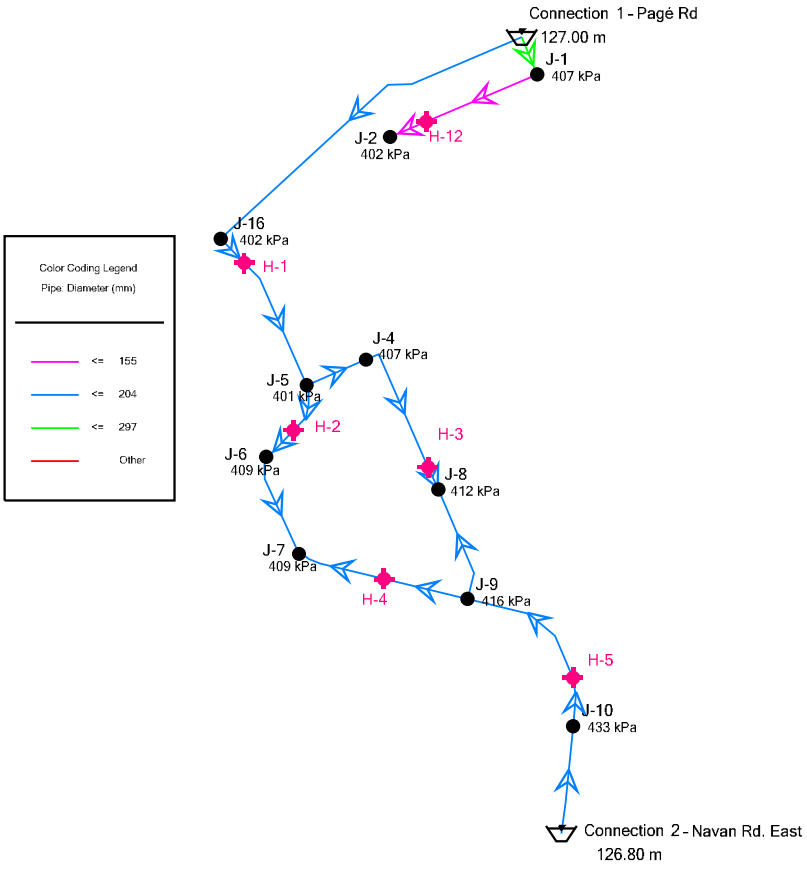
'

Appendix D4

Simulation Results – Peak Hour

2983, 3053, and 3079 Navan Road and 2690 Page Road
Peak Hour Demand



2983, 3053, and 3079 Navan Road and 2690 Page Road
Peak Hour Demand
Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-5	85.80	1	126.78	401
J-16	85.77	0	126.85	402
J-2	85.90	1	127.00	402
J-4	85.17	3	126.77	407
J-1	85.37	0	127.00	407
J-6	85.03	2	126.77	409
J-7	85.00	5	126.77	409
J-8	84.72	2	126.77	412
J-9	84.25	1	126.77	416
J-10	82.58	3	126.78	433

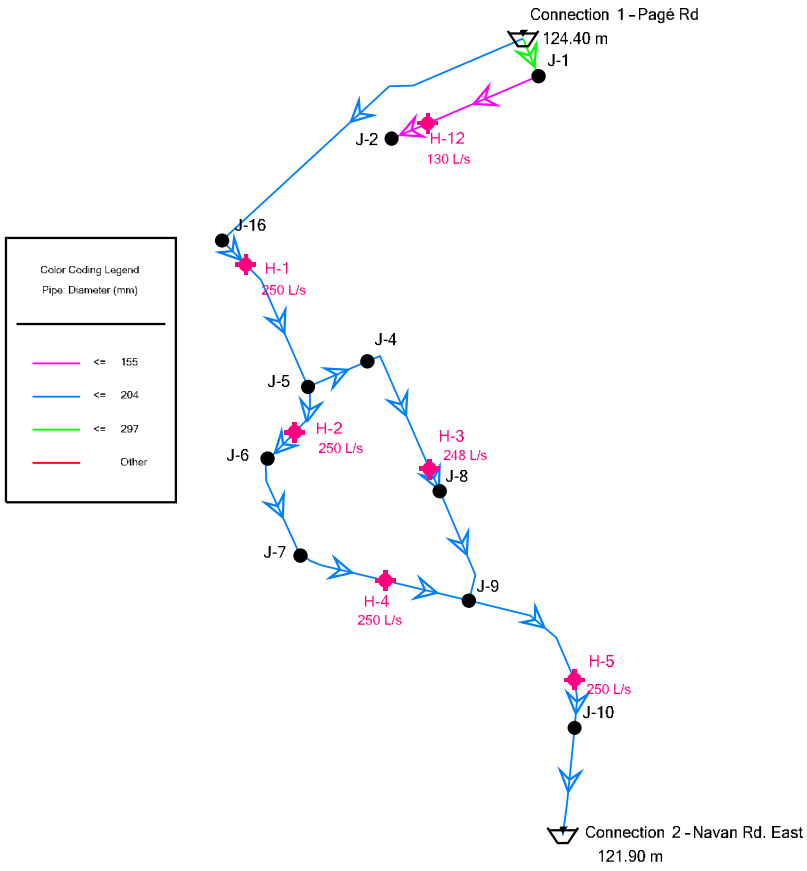
2983, 3053, and 3079 Navan Road and 2690 Page Road
Peak Hour Demand
Pipe Table

Label	Length (Scaled) (m)	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)
P-1(2)	19	297	PVC	120.0	-1	0.01
P-2	173	204	PVC	110.0	10	0.32
P-5	31	204	PVC	110.0	-5	0.14
P-6	64	204	PVC	110.0	-10	0.32
P-7	24	204	PVC	110.0	5	0.14
P-8	18	204	PVC	110.0	5	0.14
P-9	49	204	PVC	110.0	3	0.09
P-10	41	204	PVC	110.0	-2	0.06
P-11	40	204	PVC	110.0	-2	0.06
P-12	64	204	PVC	110.0	2	0.06
P-13	11	204	PVC	110.0	2	0.06
P-15	67	204	PVC	110.0	-3	0.10
P-16	23	204	PVC	110.0	-3	0.10
P-17	50	204	PVC	110.0	-7	0.20
P-23	16	204	PVC	110.0	10	0.32
P-24(1)	56	155	PVC	100.0	1	0.03
P-24(2)	18	155	PVC	100.0	1	0.03
P-26	55	204	PVC	110.0	0	0.00

Appendix D5

Simulation Results – Maximum Day + Fire Flow

2983, 3053, and 3079 Navan Road and 2690 Page Road
Max Day + Fire Flow Requirement



2983, 3053, and 3079 Navan Road and 2690 Page Road

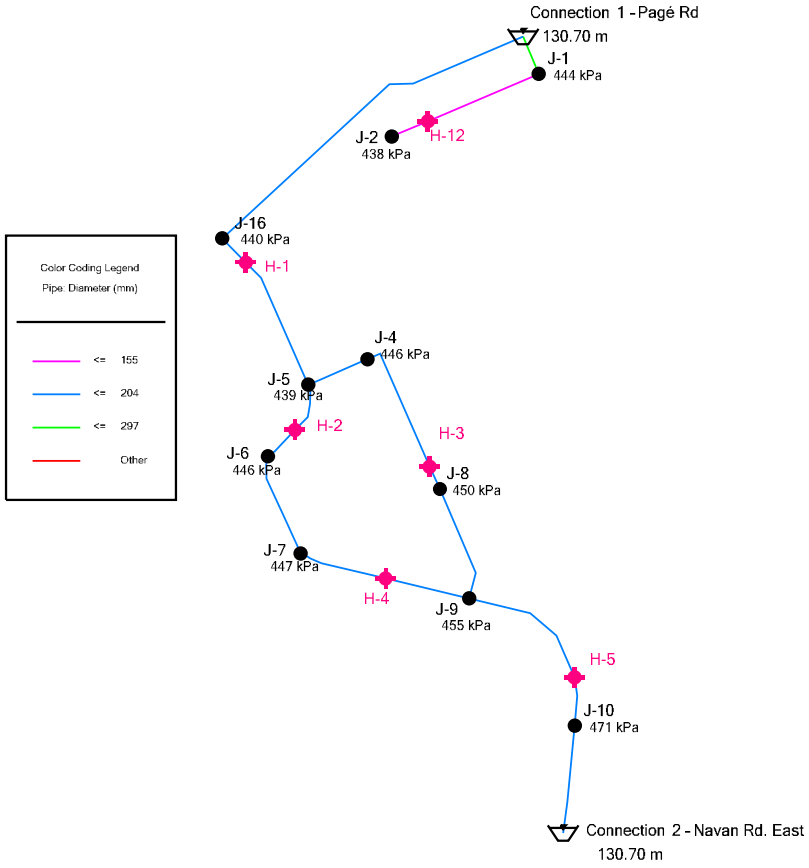
Max Day + Fire Flow Requirement

Label	Satisfies Fire Flow Constraints?	Fire Flow (Available) (L/s)	Flow (Total Available) (L/s)	Pressure (Residual Lower Limit) (kPa)	Pressure (Calculated Residual) (kPa)	Pressure (Calculated System Lower Limit) (kPa)	Junction w/ Minimum Pressure (System)
H-12	True	130	130	140	144	140	J-2
H-3	True	248	248	140	140	155	J-8
H-1	True	250	250	140	172	193	J-16
H-2	True	250	250	140	153	161	J-6
H-4	True	250	250	140	156	166	J-7
H-5	True	250	250	140	269	273	H-3

Appendix D6

Simulation Results – Maximum HGL

2983, 3053, and 3079 Navan Road and 2690 Page Road
Maximum Pressure Analysis



2983, 3053, and 3079 Navan Road and 2690 Page Road
Maximum Pressure Analysis
Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-2	85.90	0	130.70	438
J-5	85.80	0	130.70	439
J-16	85.77	0	130.70	440
J-1	85.37	0	130.70	444
J-4	85.17	0	130.70	446
J-6	85.11	0	130.70	446
J-7	85.00	0	130.70	447
J-8	84.72	0	130.70	450
J-9	84.25	0	130.70	455
J-10	82.58	0	130.70	471

2983, 3053, and 3079 Navan Road and 2690 Page Road
Maximum Pressure Analysis
Pipe Table

Label	Length (Scaled) (m)	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)
P-1(2)	19	297	PVC	120.0	0	0.00
P-2	173	204	PVC	110.0	0	0.00
P-5	31	204	PVC	110.0	0	0.00
P-6	64	204	PVC	110.0	0	0.00
P-7	24	204	PVC	110.0	0	0.00
P-8	18	204	PVC	110.0	0	0.00
P-9	49	204	PVC	110.0	0	0.00
P-10	41	204	PVC	110.0	0	0.00
P-11	40	204	PVC	110.0	0	0.00
P-12	64	204	PVC	110.0	0	0.00
P-13	11	204	PVC	110.0	0	0.00
P-15	67	204	PVC	110.0	0	0.00
P-16	23	204	PVC	110.0	0	0.00
P-17	50	204	PVC	110.0	0	0.00
P-23	16	204	PVC	110.0	0	0.00
P-24(1)	56	155	PVC	100.0	0	0.00
P-24(2)	18	155	PVC	100.0	0	0.00
P-26	55	204	PVC	110.0	0	0.00

Appendix D7

Water Age Analysis

Navan Subdivision - Water Age Analysis

Watermain Label	Length (m)	Watermain Diameter (mm)	Area of Watermain (m^2)	Volume of watermain (m^3)
P-1(2)	19.00	297	0.0693	1.32
P-2	173.00	204	0.0327	5.65
P-5	31.00	204	0.0327	1.01
P-6	64.00	204	0.0327	2.09
P-7	24.00	204	0.0327	0.78
P-8	18.00	204	0.0327	0.59
P-9	49.00	204	0.0327	1.60
P-10	41.00	204	0.0327	1.34
P-11	40.00	204	0.0327	1.31
P-12	64.00	204	0.0327	2.09
P-13	11.00	204	0.0327	0.36
P-15	67.00	204	0.0327	2.19
P-16	23.00	204	0.0327	0.75
P-17	50.00	204	0.0327	1.63
P-23	16.00	204	0.0327	0.52
P-24(1)	56.00	155	0.0189	1.06
P-24(2)	18.00	155	0.0189	0.34
P-26	55.00	204	0.0327	1.80
Volume of Watermains in Navan Subdivision =				26.44

Cummulative Avg Demand	THEORETICAL POPULATIONS (Residential)			Theoretical Demand (m^3/day)
	UNIT TYPES		POP'N	
	TH	Apartment		
Phase 1 (25%/6 months)	17	17	69.7	13.9
Phase 2 (25%/6 months)	34	34	139.4	27.9
Phase 3 (50%/6 months)	67	67	274.7	54.9

AVG. DAILY DEMAND		
- Residential	200 L/cap/day	
DENSITIES		
TH Units	2.7	ppu
1-Bedroom Apartment	1.4	ppu

Volume of Commissioned Mains =	26.44	**m^3**
Design Criteria = Water Age to be limited to 8 days (total)		
Time to travel to Navan Subdivision =	3	days
Water Age Maximum within Navan Subdivision =	5	days

Water Age Calculation - Target 5 days within Navan Subdivision

Volume of Commissioned Watermains =	26.44	m^3
Design Criteria = Water Age to be limited to 8 days (total)		
Time to travel to Navan Subdivision =	3	days
Water Age Maximum within Navan Subdivision =	5	days
Therefore, occupants in Navan Sub. to draw =	5.29	m^3/day (26.44 m^3 in 5 days)
TH: Daily demand per unit of:	0.54	m^3/day/unit (at 2.7 ppu and daily demand of 200 L/cap):
Apartment: Daily demand per unit of:	0.28	m^3/day/unit (at 1.4 ppu and daily demand of 200 L/cap):

Cummulative Number of Occupancies & Avg Day demand per three (3) phases noted above:

				Water Age (days)		
	TH	Apartment	Avg	Internal	From WTP	Total
Phase 1	17	17	13.9	1.9	3.0	4.9
Phase 2	34	34	27.9	0.9	3.0	3.9
Phase 3	67	67	54.9	0.5	3.0	3.5

Overall water age in Navan Subdivision would be less than 8 days once 17 units are occupied

Appendix E1

Wastewater – EUC ISSU
Design Excerpts

SANITARY SEWER CALCULATION SHEET

LOCATION		RESIDENTIAL AREA AND POPULATION						COMM		INDUST			INST		C+I+I	PEAK FLOW				PIPE														
FROM M.H.	TO M.H.	AREA (ha)	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (L/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FACTOR (per MOE)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (L/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (L/s)	TOTAL FLOW (L/s)	LENGTH (m)	DIAMETER NOM (mm)	DIAMETER ACT (mm)	SLOPE (%)	CAP. (FULL) (L/s)	Q/Qcap (%)	VEL. (FULL) (m/s)	Upstream OG (m)	Downstream OG (m)	Upstream Invert (m)	Upstream Obvert (m)	Downstream Invert (m)	Downstream Obvert (m)	Drop Structure (m)	US Frost Depth (m)	DS Frost Depth (m)
1	2	3.25	66	3.25	66	4.00	0.91		0.00		0.00			0.00	0.00	3.25	3.25	0.91	1.81	250	200	203.2	0.32	19.35	9.4%	0.60	88.25	88.00	84.83	85.03	84.03	84.23			3.22	3.77
2	3	5.20	181	8.45	247	4.00	3.84		0.00		0.00			0.00	0.00	5.20	8.45	2.37	6.21	320	200	203.2	0.32	19.35	32.1%	0.60	88.00	87.80	84.03	84.23	83.00	83.21			3.77	4.39
3	4	19.75	995	28.20	1232	3.74	18.66		0.00		0.00			0.00	0.00	19.75	28.20	7.90	26.56	320	250	254.0	0.24	30.39	87.4%	0.60	87.60	87.50	82.95	83.21	82.18	82.44			4.39	5.06
4A	4	19.80	979	19.80	979	3.81	15.10		0.00		0.00			0.00	0.00	19.80	19.80	5.54	20.64	365	250	254.0	0.24	30.39	67.9%	0.60	88.00	87.50	83.83	84.08	82.95	83.20			3.92	4.30
4	5	7.10	185	55.10	2396	3.62	34.19		0.00		0.00		3.10	3.10	2.69	10.20	58.20	16.30	53.18	310	375	381.0	0.14	58.43	77.7%	0.60	87.50	87.80	82.06	82.44	81.62	82.00			5.06	5.60
5A	5	7.90	362	7.90	362	4.00	5.87		0.00		0.00			0.00	0.00	7.90	7.90	2.21	8.08	320	200	203.2	0.65	27.56	29.3%	0.85	87.40	87.80	84.05	84.25	81.97	82.17			3.15	5.43
5	6	2.40	170	65.40	2928	3.45	40.94		0.00		0.00			0.00	0.00	2.40	68.50	19.18	62.81	295	375	381.0	0.14	58.43	91.8%	0.60	87.50	87.50	81.62	82.00	81.21	81.59			5.80	5.91
6	7	15.90	787	81.30	3715	3.36	50.60		0.00		0.00			3.10	2.69	15.90	84.40	23.63	76.92	115	450	457.2	0.11	98.64	78.0%	0.60	87.50	87.50	81.13	81.59	81.01	81.46			5.91	6.04
7	8	6.80	353	88.10	4068	3.33	54.83		0.00		0.00			3.10	2.69	6.80	91.20	25.54	83.09	235	450	457.2	0.11	98.64	84.2%	0.60	87.50	86.90	81.01	81.46	80.75	81.21			6.04	5.69
8A	8	11.85	826	11.85	826	3.85	12.89		0.00		0.00			0.00	0.00	11.85	11.85	3.32	18.21	150	200	203.2	0.50	24.19	67.0%	0.75	86.50	86.90	81.45	81.85	80.70	80.90			4.85	6.00
8	9	2.60	128	102.55	5022	3.24	65.98		0.00		0.00		2.20	5.30	4.60	4.80	107.85	30.20	100.78	170	525	533.4	0.10	141.87	71.0%	0.63	86.90	87.00	80.37	80.90	80.20	80.73			6.00	6.27
9A	9	6.45	300	6.45	300	4.00	6.86		0.00		0.00			0.00	0.00	6.45	6.45	1.53	8.38	65	200	203.2	0.32	19.35	33.0%	0.60	87.00	87.00	81.42	81.62	81.14	81.35			5.38	5.65
9	10	2.70	0	110.70	5322	3.22	69.42		0.00		0.00			5.30	4.60	2.70	116.00	32.48	104.59	275	525	533.4	0.10	141.87	73.1%	0.63	87.00	87.00	80.20	80.73	79.92	80.46			6.27	6.56
10A	10	14.80	731	14.80	731	3.68	11.50		0.00		0.00		0.60	0.60	0.52	15.40	15.40	4.31	16.34	270	200	203.2	0.32	19.35	84.4%	0.60	87.50	87.00	83.56	83.76	82.69	82.90			3.74	4.10
10	11	4.30	117	129.80	6170	3.16	78.96		0.00		0.00		2.40	8.30	7.20	6.70	138.10	38.67	124.84	405	525	533.4	0.10	141.87	88.0%	0.63	87.00	85.50	79.92	80.46	79.52	80.05			6.55	6.45
11A	11	8.00	393	8.00	393	4.00	8.36		0.00		0.00			0.00	0.00	8.00	8.00	2.24	8.69	95	200	203.2	0.32	19.35	44.4%	0.60	86.00	85.50	80.42	80.62	80.11	80.32			5.38	5.18
11B	11	5.90	352	5.90	352	4.00	6.70		0.00		0.00			0.00	0.00	5.90	5.90	1.65	7.36	90	200	203.2	0.32	19.35	38.0%	0.60	86.00	85.50	81.69	81.89	81.40	81.60			4.11	3.90
11	12	1.90	18	145.60	6931	3.11	87.34		0.00		0.00			8.30	7.20	1.90	153.90	43.09	137.83	230	600	609.6	0.100	202.65	68.0%	0.69	85.50	83.90	79.44	80.05	79.21	79.82			6.45	4.08
25D	25C	7.40	48	7.40	48	4.00	0.78		0.00		0.00			0.00	0.00	7.40	7.40	2.07	2.85	420	200	203.2	0.32	19.35	14.7%	0.60	86.30	86.00	83.02	83.22	81.67	81.88			3.08	4.12
LOCAL PS 2	25C	4.55	22	4.55	22	4.00	0.36		0.00		0.00			0.00	0.00	4.55	4.55	1.27	1.64	300		0.0		0.00	#DIV/0!	#DIV/0!	82.00	86.00		79.50		83.30			2.80	2.70
25G	25E	7.40	496	7.40	496	3.98	7.99		0.00		0.00			0.00	0.00	7.40	7.40	2.07	10.06	230	200	203.2	0.32	19.35	52.0%	0.60	81.50	81.00	78.80	79.00	78.06	78.26			2.90	2.74
25F	25E	4.60	272	4.60	272	4.00	4.41		0.00		0.00			0.00	0.00	4.60	4.60	1.29	5.70	120	200	203.2	2.50	54.10	10.5%	1.67	84.00	81.00	81.30	81.50	78.30	78.50			2.50	2.50
25E	LOCAL PS 1	0.00	0	12.00	768	3.87	12.04		0.00		0.00			0.00	0.00	0.00	12.00	3.36	15.40	70	200	203.2	0.32	19.35	79.6%	0.60	81.00	81.00	78.06	78.26	77.84	78.04			2.74	2.96
LOCAL PS 1	25C	0.00	0	12.00	768	3.87	12.04		0.00		0.00			0.00	0.00	0.00	12.00	3.36	15.40	340		0.0		0.00	#DIV/0!	#DIV/0!	81.00	86.00		78.50		83.50			2.50	2.50
25C	25B	7.00	51	30.95	890	3.83	13.81		0.00		0.00			0.00	0.00	7.00	30.95	8.67	22.48	460	300	304.8	0.19	43.97	51.1%	0.60	86.00	86.50	81.57	81.88	80.70	81.00			4.12	5.60
25B	25A	11.80	337	42.75	1226	3.74	18.59		0.00		0.00			0.00	0.00	11.80	42.75	11.97	30.56	295	375	381.0	0.14	58.43	44.7%	0.60	86.50	86.50	80.62	81.00	80.21	80.59			5.60	5.91
25A	25	17.00	845	59.75	2071	3.57	29.99		0.00		0.00			0.00	0.00	17.00	59.75	16.73	46.72	405	375	381.0	0.14	58.43	68.3%	0.60	86.50	86.50	80.21	80.59	79.84	80.02			5.91	6.48
20	21	8.75	505	8.75	505	3.97	8.13		0.00		0.00			0.00	0.00																			
21	22	7.00	160	15.75	665	3.91	10.53		0.00	1.00	1.00	6.50	2.55	2.55	2.21	11.30	11.30	3.16	13.51	320	200	203.2	0.32	19.35	69.8%	0.60	87.00	86.80	83.91	84.11	82.88	83.09			2.89	3.71
22	23	7.30	440	23.05	1106	3.77	16.69		0.00		1.00	6.50	8.30	10.85	12.05	18.30	27.60	7.73	30.31	335	300	304.8	0.19	43.97	68.9%	0.60	86.80	87.00	82.78	83.09	82.14	82.45			3.71	4.55
23B	23A	15.70	565	15.70	565	3.95	9.03		0.00		0.00			10.85	12.05	7.30	34.90	9.77	36.71	275	300	304.8	0.19	43.97	88.0%	0.60	87.00	86.50	82.14	82.45	81.62	81.93			4.55	4.57
23A	23	9.40	584	25.10	1149	3.76	17.50		0.00		0.00			0.00	0.00	15.70	15.70	4.40	13.43	325	250	254.0	0.45	41.38	32.4%	0.82	86.80	86.00	82.52	82.77	81.07	81.32			4.03	4.68
23	24	2.60	120	50.75	2374	3.53	33.92		0.00		1.00	6.50	3.30	14.15	14.92	5.90	65.90	18.45	67.29	315	375	381.0	0.22	65.79	78.4%	0.75	86.50	86.50	80.35	80.73	79.66	80.04			4.66	5.77
24A	24	25.10	544	25.10	544	3.96	8.72		0.00		0.00			0.00	0.00	25.10	25.10	7.03	18.74	235	200	203.2	0.32	19.35	81.3%	0.60	86.00	86.50	83.00	83.20	82.24	82.45			2.80	4.05
24	25	0.80	0	76.65	2918	3.45	40.82		0.00		1.00	6.50		14.15	14.92	0.80	91.80	25.70	81.44	235	450	457.2	0.11	98.64	82.6%	0.60	86.50	86.50	79.58	80.04	79.33	79.78			6.46	6.72
LANDFILL PS	25	0.00	0	0.00	0	4.00	0.00		0.00	10.40	10.40	4.20		0.00	17.69	10.40	10.40	2.91		120		0.0		0.00	#VALUE!	#DIV/0!	80.00	86.50	77.50	77.80		84.00			2.50	2.50
25	26	8.30	99	144.70	5089	3.24	66.75		0.00		11.40	4.15		14.15	31.45	8.30	170.25	47.87	148.87	380	600	609.6	0.10	202.55	72.0%	0.89	86.50	86.50	79.17	79.78	78.79	79.40			6.72	7.10
26A	26	6.90	360	6.90	360	4.00	5.83		0.00		0.00		1.30	1.30	1.13	8.20	8.20	2.30	9.26	175	200	203.2	0.32	19.35	47.6%	0.60	86.00	86.50	81.00	81.20	80.44	80.64			4.80	5.86
26	12	2.80	6	154.40	5455	3.21	70.93		0.00		11.40	4.15		15.45	32.58	2.80	181.25	50.75	154.26	720	600	609.6	0.10	202.55	76.2%	0.89	86.50	83.90	78.79	79.40	78.07	78.68			7.10	5.22
12	13	0.60	32	300.60	12418	2.86	143.91	0.90	0.90		11.40	4.15		23.75	40.58	1.50	336.85	94.26	276.74	60	600	609.6	0.30	350.83	78.5%	1.20	83.90	82.50	78.07	78.68	77.89	78.50			5.22	4.00
13C	13	5.60	353	5.60	353	4.00	5.71		0.00		0.00			0.00	0.00	5.60	5.90	1.57	7.28	150	200	203.2	0.66	27.79	26.2%	0.86	83.50	82.50	80.80	81.00	79.81	80.01			2.50	2.49
13B	13A	10.50	314	10.50	314	4.00	5.09		0.00		0.00			0.00	0.00	10.50	10.50	2.94	8.03	160	200	203.2	0.32	19.35	41.5%	0.60	81.50	81.50	78.80	79.00	78.28	78.49			2.50	3.01
13A	13	6.60	90	17.10	404	4.00	6.54		0.00		0.00			0.00	0.00	6.60	17.10	4.79	11.33	100	200	203.2	0.32	19.35	58.6%	0.60	81.50	82.50	78.28	78.49	77.96	78.17			3.01	4.33
13	14	0.26	0	323.56	13175	2.83	151.30	0.54	1.44		11.40	4.15		23.75	41.03	0.60	360.15	100.84	293.17	100	600	609.6	0.40	405.10	72.4%	1.39	82.50	80.80	78.91	77.52	76.51	77.12	0.65	4.99	3.68
14	15	1.40	18	324.96	13191	2.83	151.46		1.44		11.40	4.15		23.75	41.03	1.40	361.55	101.23	293.72	150	600	609.6	0.40	405.10	72.5%	1.39	80.80	79.40	78.88	76.47	75.26	76.07	0.65	4.33	2.53
15	16	1.70	53	326.66	13244	2.83	151.97		1.44		11.40	4.15		23.75	41.03	1.70	363.25	101.71	294.71	150	600	609.6	0.60	496.14	59.4%	1.70	79.40	77.00	74.78	75.37	73.86	74.47	0.50	3.03	2.53
16	17	2.30	32	328.96	13276	2.83	152.28		1.44		11.40	4.15		23.75	41.03	2.30	365.55	102.35	295.67	250	600	609.6	0.60	496.14	59.6%	1.70	77.00	76.00	73.86	74.47	72.96	73.57			2.53	3.03
17	18	0.30	0	329.26	13276	2.83	152.28		1.44		11.40	4.15		23.75	41.03	0.30	365.85	102.44	295.75	100	600	609.6	0.80	572.90	51.6%	1.96	76.00	73.00	70.66	71.27	69.86	70.47	1.70	4.73	2.53
30	31	4.80	252	4.80	252	4.00	4.08		0.00		0.00			0.00	0.00	4.80	4.80	1.34	8.43	150	200	203.2	2.50	54.10	10.0%	1.67	83.50	79.00	80.26	80.46	78.51	78.71			3.04	2.29
31	32	1.40	34	6.20	286	4.00	4.83	1.30	1.30		0.00			0.00	1.13	2.70	7.50	2.10	7.86	205	200	203.2	3.90	67.57	11.6%	2.08	79.00	71.00	76.30	76.50	69.30	69.51	0.21	2.50	2.50
32A	32	5.50	336	5.50	336	4.00	5.44		0.00		0.00			0.00	0.00	5.50	5.50	1.54	6.88	80	300	304.8	0.19	43.97	15.6%	0.60	70.50	71.00	66.24	66.54	66.08	66.39			3.96	4.61
32	33	4.05	38	15.75	659	3.91	10.44		1.30		0.00			0.00	1.13	4.05	17.05	4.77	16.35	160	300	304.8	0.19	43.97	37.2%	0.60	71.00	70.80	66.08	66.39	65.78	66.08			4.81	4.72
33A	33	4.00	252	4.00	252	4.00	4.06		0.00		0.00			0.00	0.00	4.00	4.00	1.12	5.20	85	200	203.2	0.32	19.35	26.9%	0.60	70.50	70.60	66.07	66.27	65.79	66.00			4.23	4.80
33	34	0.90	42	20.65	953	3.81	14.73		1.30		0.00		2.80	2.80	3.56	3.70	24.75	6.93	25.22	185	300	304.8	0.19	43.97	57.3%	0.60	70.60	70.50	65.69	66.00	65.34	65.65			4.80	4.85
34A	34	3.70	176	3.70	176	4.00	2.86		0.00		0.00			0.00	0.00	3.70	3.70	1.04	3.89	80	200	203.2	2.00	48.38	8.0%	1.49	71.50	70.50	66.80	69.00	67.20	67.40			2.50	3.10
34	35	3.80	227	28.15	1357	3.71	20.39		1.30		0.00			2.80	3.56	3.80	32.25	9.03	32.98	160	300	304.8	0.19	43.97	75.0%	0.60	70.50	71.00	65.34	65.65	65.04	65.34			4.85	5.66
35C	35B	7.30	445	7.30	445	4.00	7.21		0.00		0.00			0.00	0.00	7.30	7.30	2.04	9.29	160	200	203.2	1.90	47.16	19.6%	1.45	75.00	72.00	72.30	72.50	69.26	69.46			2.50	2.54
35B	35A	0.96	50	8.26	495	3.98	7.98		0.00		0.00			0.00	0.00	0.96	8.26	2.31	10.30	65	200	203.2	0.32	19.35	53.2%	0.60	72.00	72.00	69.26	69.46	68.98	69.19			2.54	2.81
35A	35	2.70	134	10.96	630	3.92	10.01		0.00		0.00			0.00	0.00	2.70	10.96	3.07	13.07	70	200	203.2	2.50	54.10	24.2%	1.67	72.00	71.00	67.99	68.20	66.24	66.45	0.99	3.80	4.55
35	36	0.73	42	39.84	2029	3.58	29.43		1.30		0.00			2.80	3.56	0.73	43.94	12.30	45.29	110	375	381.0	0.14	58.43	68.2%	0.60	71.00	72.00	64.96	65.34	64.81	65.19			5.66	6.81
36	37	9.80	538	49.64	2568	3.50	36.38		1.30		0.00			2.80	3.56	9.80	53.74	15.05	54.98	165	375	381.0	0.14	58.43	80.3%	0.60	72.00	78.00	64.81	65.19	64.58	64.96			6.81	11.04
37	38	3.40	193	53.04	2759	3.47	38.82		1.30		0.00			2.80	3.56	3.40	57.14	16.00	58.38	95	375	381.0	0.14	58.43	85.3%	0.60	76.00	78.00	64.58	64.96	64.44	64.82			11.04	11.18

LOCATION		RESIDENTIAL AREA AND POPULATION						COMM		INDUST			INST		C+I+I	PEAK FLOW				PIPE														
FROM M.H.	TO M.H.	AREA (ha)	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (L/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FACTOR (per MOE)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (L/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (L/s)	TOTAL FLOW (L/s)	LENGTH (m)	DIAMETER NOM (mm)	DIAMETER ACT (mm)	SLOPE (%)	CAP. (FULL) (L/s)	Q/Qcap (%)	VEL. (FULL) (m/s)	Upstream OG (m)	Downstream OG (m)	Upstream Invert (m)	Upstream Obvert (m)	Downstream Invert (m)	Downstream Obvert (m)	Drop Structure (m)	US Frost Depth (m)	DS Frost Depth (m)
38A	38	3.00	174	3.00	174	4.00	2.92		0.00		0.00			0.00	0.00	3.00	3.00	0.84	3.86	160	200	203.2	0.32	19.35	19.9%	0.60	72.00	76.00	68.60	68.79	67.99	68.19		3.30	7.61
38	39	3.40	182	59.44	3116	3.43	43.27		1.30		0.00			2.80	3.56	3.40	63.54	17.79	64.92	170	375	381.0	0.22	85.79	75.3%	0.75	76.00	72.00	64.44	64.82	64.07	64.45		11.16	7.55
39	18	6.20	341	65.64	3457	3.39	47.46		1.30		0.00			2.80	3.56	6.20	69.74	19.53	70.55	105	375	381.0	0.22	85.79	82.2%	0.75	72.00	73.00	64.07	64.45	63.84	64.22		7.56	8.78
50	51	8.20	555	8.20	555	3.95	8.88		0.00		0.00			0.00	0.00	8.20	8.20	2.30	11.17	60	200	203.2	0.50	24.19	46.2%	0.76	74.00	74.00	69.00	69.29	68.70	68.90		4.80	5.10
51	52	4.10	235	12.30	790	3.86	12.36		0.00		0.00			0.00	0.00	4.10	12.30	3.44	15.81	140	200	203.2	0.67	28.00	56.4%	0.86	74.00	72.80	68.65	68.75	67.81	67.81	0.15	5.25	4.99
52	18	4.70	174	17.00	964	3.81	14.68		0.00		0.00			0.00	0.00	4.70	17.00	4.78	19.64	70	250	254.0	0.32	35.09	56.0%	0.69	72.80	73.00	67.56	67.81	67.33	67.59		4.99	5.41
18	19	0.00	0	411.90	17696	2.71	193.96		2.74		11.40			26.55	25.43	0.00	432.69	126.73	346.13	110	600	609.6	0.50	452.92	76.4%	1.55	73.00	71.50	63.61	64.22	63.06	63.67		8.78	7.83
19	19A	0.00	0	411.90	17696	2.71	193.96		2.74		11.40	4.15		26.55	44.59	0.00	432.69	126.73	368.30	25	600	609.6	0.50	452.92	80.7%	1.55	71.50	71.00	63.06	63.67	62.93	63.54		7.83	7.46
19A	19B	0.40	0	412.30	17696	2.71	193.96		2.74		11.40	4.15		26.55	44.59	0.40	432.09	126.84	368.41	51	600	609.6	0.50	452.92	80.7%	1.55	71.00	71.00	62.87	63.48	62.62	63.23	0.06	7.62	7.77
50	19B	5.90	326	5.90	326	4.00	5.26		0.00		0.00			0.00	0.00	5.90	5.90	1.65	8.83	120	200	203.2	0.32	19.35	35.8%	0.60	71.00	71.00	68.30	68.50	67.91	68.12		2.50	2.88
19B	FVPS	0.00	0	418.20	18022	2.70	196.97		2.74		11.40	4.15		26.55	44.59	0.00	438.89	128.49	370.65	24	600	609.6	0.50	452.92	81.7%	1.55	71.00	71.50	62.66	63.17	62.44	63.05	0.06	7.83	8.45

DESIGN PARAMETERS

Residential Flow =	350 Lpcd	Industrial Peak Factor =	as per MOE Graph	Low Density (LD)/Existing =	3.2 ppu
Commerical/Institutional Flow =	50000 L/ha/d	Extraneous Flow =	0.28 L/s/ha	Low/Medium Density (LMD) =	3.2 ppu
Industrial Flow =	35000 L/ha/d	Minimum Velocity =	0.76 m/s	Medium Density (MD) =	2.4 ppu
Maximum Residential Peak Factor =	4.00	Mannings n =	0.013	High Density (HD) =	1.9 ppu
Minimum Residential Peak Factor =	2.00	Harmon Peak Factor =	1+14/(4+(P/1000)^1/2)*K, where K= 1	MUC =	1.9 ppu
Commerical/Institutional Peak Factor =	1.50			GUA =	3.1 ppu

(Telephone Conversation with Selma Hassan Sept. 10/2004 - Based on development applications - 361 Singles @ 3.2pers/unit and 184 Singles @ 3 pers/unit)

Designed: B.D	PROJECT:	Gloucester EUC Infrastructure Servicing Study Update	
Checked: F.W	LOCATION:	City of Ottawa	
Dwg. Reference: SAN	File Ref.: 1634-00493	Date: Mar-05	Sheet No.

N

12a — SANITARY SEWER AND MANHOLE

12 — SANITARY TRUNK SEWER AND MANHOLE

SANITARY FORCEMAIN

SANITARY CATCHMENT AREA

71.50 / 67.33 — ORIGINAL GROUND / OBVERT

3.25 / 56 / 2 — AREA (ha) / POPULATION / MANHOLE No.

3.25 / 56 / 2 / 3.2 INST — AREA (ha) / POPULATION / MANHOLE No. / INST (INSTUTIONAL) ha / IND (INDUSTRIAL) ha / COM (COMMERCIAL) ha

* EQUIVALENT AREA (17.7 l/s ALLOWABLE PEAK FLOW UNDER C of O SEWER USE AGREEMENT)

PROPOSED SITE,
2983-3053-3079 Navan Road and
2690 Pagé Road

HYDRO CORRIDOR
PROPOSED TRANSITWAY
PROPOSED BLACKBURN BY-PASS EXTENSION

MER BLEUE ROAD
FOURTH LINE ROAD
PAGE ROAD
NAVAN ROAD
WALL ROAD
SAPHIR AVE.
GRAND PRE
ABANDONED C.P.R. RIGHT OF WAY

SANITARY TRUNK No.1
SANITARY TRUNK No.2
SANITARY TRUNK No.3
SANITARY TRUNK No.4

WSI LANDFILL

FOREST VALLEY PUMPING STATION

LOCAL PUMP STA. No.1

LOCAL PUMP STA. No.2

SCHOOL
PARK
INSTIT.
COMMERCIAL
INSTITUTIONAL
ESCARPMENT
FIRE HALL

REVISION No.2 MARCH, 2005

CITY OF OTTAWA
GLOUCESTER EUC INFRASTRUCTURE SERVICING STUDY UPDATE

SANITARY SEWER SYSTEM

Scale 0 40 120 200m

Dwg. No. SAN

Dwn By E.C. Date 04.10.29 Revision 2

Appendix E2

JLR Sanitary Design Sheet

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

2983, 3053 and 3079 Navan Road and 2690 Page Road
CONCEPTUAL SANITARY SEWER DESIGN SHEET
JLR NO. 29899-002

DESIGNED BY: TR
CHECKED BY: KF
Date: August 23, 2024

Street Name	MH No.		Residential							Commercial/Institutional					Park/Roads			Infiltration			Peak Design Flow L/s	Pipe Data										Upstream Geometry				Downstream Geometry					Self-Cleansing Velocities			
	From	To	Multiples	Apartments	Area (ha)	Pop.	Cum. Pop.	Cum. Area (ha)	Peaking Factor	Residential Flow (L/s)	Area (ha)	Cum. Area (ha)	Peaking Factor	Inst. Flow (L/s)	Plug Flow (L/s)	Area (ha)	Cum. Area (ha)	Plug Flow (L/s)	Area (ha)	Cum. Area (ha)	Peak Extr. Flow L/s		Dia	Type	Actual Diameter	Slope	Q Full (L/s)	V Full	Length	Residual Capacity	% Full	TG From	Obvert	Invert	Cover	TG TO	Drop	Obvert	Invert	Cover	Qp/Qf Ratio	Flow Depth (mm)	Actual Velocity (m/s)	Flow Depth to Diameter Ratio (d/D)
OUTLET TO PAGE (CUL-DU-SAC @ Brian Coburn)																																										
STOMPIN' TOM LANE	24	23A	8	8	0.25	36	36	0.25	3.67	0.43		0.00	1.50	0.00			0.00		0.25	0.25	0.08	**0.59**	200	Circular	203.20	2.00%	48.39	1.49	54.95	47.80	1%	85.698	83.493	83.290	2.205	85.346		82.394	82.191	2.952	0.01	15.65	0.51	0.08
STOMPIN' TOM LANE	23A	23				0	36	0.25	3.67	0.43		0.00	1.50	0.00			0.00		0.00	0.25	0.08	**0.59**	200	Circular	203.20	2.00%	48.39	1.49	11.18	47.80	1%	85.346	82.394	82.191	2.952	85.350	0.300	82.170	81.967	3.179	0.01	15.65	0.51	0.08
Page Road (2690 to Navan Road)	23	EX10			5.94	81	117	6.19	3.58	1.36		0.00	1.50	0.00			0.00		5.94	6.19	2.04	3.40																					
OUTLET TO PAGE @ NAVAN																																										
Site Plan - BLOCK 15	SAN STUB 15	13		83	0.45	149	149	0.45	3.55	1.72	0.09	0.09	1.50	0.05			0.00		0.54	0.54	0.18	1.94	250	Circular	254.00	1.50%	75.98	1.50	13.47	74.04	3%	85.000	82.366	82.112	2.634	85.065	0.259	82.164	81.910	2.901	0.03	27.94	0.64	0.11
PALEO DRIVE	13	12			0.14	0	149	0.59	3.55	1.72		0.09	1.50	0.05			0.00		0.14	0.68	0.22	1.99	200	Circular	203.20	1.20%	37.48	1.16	5.15	35.50	5%	85.065	81.905	81.702	3.160	84.982		81.843	81.640	3.138	0.05	31.70	0.61	0.16
Easement - BLOCK 12	SAN STUB 16	21			0.04	0	0	0.04	3.80	0.00	0.77	0.77	1.50	0.37	3.60		0.00		0.81	0.81	0.27	4.24	200	Circular	203.20	0.65%	27.59	0.85	38.75	23.34	15%	85.350	82.574	82.370	2.776	85.041		82.322	82.118	2.719	0.15	53.85	0.62	0.27
Easement- BLOCK 12	21	12				0	0	0.00	3.80	0.00		0.77	1.50	0.37	3.60		0.00		0.00	0.81	0.27	4.24	200	Circular	203.20	0.60%	26.50	0.82	13.09	22.26	16%	85.041	82.322	82.118	2.719	84.982	0.400	82.243	82.040	2.738	0.16	54.86	0.60	0.27
PALEO DRIVE	12	11	6	6	0.23	27	176	0.82	3.53	2.02		0.86	1.50	0.42	3.60		0.00		0.23	1.72	0.57	6.60	200	Circular	203.20	0.50%	24.19	0.75	37.41	17.59	27%	84.982	81.843	81.640	3.138	84.909		81.656	81.453	3.253	0.27	72.34	0.63	0.36
PALEO DRIVE	11	10	3	3	0.16	14	190	0.98	3.52	2.17		0.86	1.50	0.42	3.60		0.00		0.16	1.88	0.62	6.81	200	Circular	203.20	0.50%	24.19	0.75	10.53	17.38	28%	84.909	81.656	81.453	3.253	84.935		81.603	81.400	3.332	0.28	73.56	0.64	0.36
PALEO DRIVE	10	09	12	12	0.39	54	244	1.37	3.49	2.76		0.86	1.50	0.42	3.60	0.20	0.20		0.59	2.47	0.82	7.60	200	Circular	203.20	0.55%	25.40	0.78	81.88	17.80	30%	84.935	81.603	81.400	3.332	84.248	0.321	81.152	80.949	3.096	0.30	76.00	0.68	0.37
Site Plan - BLOCK 14	SAN STUB 14	17		84	0.48	151	151	0.48	3.55	1.74	0.09	0.09	1.50	0.05			0.00		0.57	0.57	0.19	1.97	200	Circular	203.20	1.50%	41.91	1.29	8.26	39.94	5%	84.600	82.437	82.234	2.163	84.945	0.060	82.313	82.110	2.632	0.05	29.87	0.66	0.15
ROSALIA STREET	17	16	31	31	0.95	140	291	1.43	3.47	3.27		0.09	1.50	0.05			0.00		0.95	1.52	0.50	3.82	200	Circular	203.20	0.86%	31.79	0.98	111.68	27.97	12%	84.945	82.253	82.050	2.692	84.030	0.201	81.289	81.086	2.741	0.12	47.35	0.66	0.23
ROSALIA STREET	16	09	2	2	0.07	9	300	1.50	3.46	3.37		0.09	1.50	0.05			0.00		0.07	1.59	0.52	3.94	200	Circular	203.20	0.66%	27.80	0.86	16.49	23.86	14%	84.030	81.088	80.885	2.942	84.248	0.148	80.979	80.776	3.269	0.14	51.61	0.61	0.25
PALEO DRIVE	09	08	5	5	0.15	23	567	3.01	3.36	6.17		0.96	1.50	0.46	3.60		0.20		0.15	4.21	1.39	11.62	200	Circular	203.20	0.35%	20.24	0.62	25.46	8.62	57%	84.248	80.831	80.628	3.417	83.267	0.100	80.742	80.539	2.525	0.57	110.34	0.65	0.54
PALEO DRIVE	08	07			0.25	0	567	3.26	3.67	6.75		0.96	1.50	0.46	3.60		0.20		0.25	4.46	1.47	12.29	200	Circular	203.20	0.35%	20.24	0.62	14.54	7.96	61%	83.267	80.642	80.439	2.625	82.688		80.591	80.388	2.097	0.61	114.20	0.65	0.56
PALEO DRIVE	07	06				0	567	3.26	3.36	6.17		0.96	1.50	0.46	3.60		0.20		0.00	4.46	1.47	11.70	200	Circular	203.20	0.35%	20.10	0.62	19.95	8.39	58%	82.688	80.591	80.388	2.097	82.496	0.300	80.522	80.319	1.974	0.58	111.35	0.64	0.55
PALEO DRIVE	06	03				0	567	3.26	3.36	6.17		0.96	1.50	0.46	3.60		0.20		0.00	4.46	1.47	11.70	200	Circular	203.20	0.36%	20.39	0.63	22.88	8.68	57%	82.496	80.222	80.019	2.274	82.456	0.404	80.141	79.938	2.315	0.57	110.34	0.65	0.54
Site Plan - BLOCK 17	SAN STUB 17	03		96	0.56	173	173	0.56	3.54	1.98		0.00	1.50	0.00			0.00		0.56	0.56	0.18	2.17	200	Circular	203.20	1.50%	41.91	1.29	10.30	39.74	5%	82.800	79.952	79.749	2.848	82.456	0.060	79.797	79.594	2.659	0.05	31.29	0.68	0.15
PALEO DRIVE	03	02			0.07	0	740	3.89	3.30	7.92		0.96	1.50	0.46	3.60		0.20		0.07	5.09	1.68	**13.67**	200	Circular	203.20	0.33%	19.75	0.61	57.98	6.08	69%	82.456	79.737	79.534	2.719	81.831	0.070	79.544	79.341	2.287	0.69	124.16	0.66	0.61
NAVAN ROAD	02	01				0	740	3.89	3.30	7.92		0.96	1.50	0.46	3.60		0.20		0.00	5.09	1.68	13.67	200	Circular	203.20	0.35%	20.24	0.62	114.96	6.57	68%	81.831	79.474	79.271	2.357	81.523		79.072	78.868	2.451	0.68	122.12	0.67	0.60
NAVAN ROAD	01	EX10			5.82	174	914	9.71	3.26	9.66		0.96	1.50	0.46	3.60		0.20		5.82	10.91	3.60	17.32	200	Circular	203.20	0.55%	25.38	0.78	45.18	8.05	68%	81.523	79.072	78.868	2.451	81.585		78.823	78.620	2.761	0.68	123.14	0.84	0.61
																				10.67																						
Page Road (Navan to Renaud)	EX10	Renaud					1031	15.90	3.23	10.80		0.96	1.50	0.46	4.00		0.20		0.00	17.10	5.64	20.91	250	Circular	254.00	0.74%	53.19	1.05	106.80	32.28	39%												0.39	110.49	0.99	0.44
			67	330	5.34	776				0.96										16.86																						
																				17.10																						
																				ok																						

Design Parameters

Single Family Population	3.4	Cap/Unit
Semi-Detached/Townhouse Population	2.7	Cap/Unit
Apartments Population	1.8	Cap/Unit
Residential Flows	280	L/Cap/Day
Infiltration Flows	0.33	L/s/ha
Correction Factor	0.8	-
Commercial Peak Factor	1.5	-
Institutional/Commercial Average Flow	28000	L/gross ha/d
Manning Coefficient	0.013	

PER EUC Area 13A: 6.60
Area 13B: 10.50
Total: 17.10

Subdivision Area = 3.86 ha
Site Plans Areas = 1.48 ha
Subdivision + Site Plan Areas = 5.34 ha
EUC Areas = 11.76 ha
Total Area = 17.10 ha

Note: 5.34 ha is total draft plan area + additional flows on stompin' tom lane

Sanitary Inv Ex MH 13 Page Rd	81.13
Sanitary Inv Ex MH 14 Page Rd	81.83
Sanitary Inv at Ex MH 10 Page @ Navan	78.620

Appendix F1

Storm – EUC ISSU Design Excerpts

STORM SEWER CALCULATION SHEET (RATIONAL METHOD) - POND 3

Manning's 0.013 **Return Frequency** = 5 years

		AREA (Ha)							FLOW					SEWER DATA																	
From Node	To Node	R= 0.3	R= 0.5	R= 0.55	R= 0.6	R= 0.75	R= 0.79	R= 0.82	Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc.	Rainfall Intensity	Peak Flow Q (l/s)	DIA. (m) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (m/m)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min.)	RATIO Q/Q full	Upstream OG	Downstream OG	Upstream Invert	Upstream Obvert	Downstream Invert	Downstream Obvert	Drop Structure	US Frost Depth	DS Frost Depth
601A	601	0.00	4.45	0.00	0.00	0.00	1.50	0.00	9.48	9.48	21.00	68.13	645.86	0.76	750	CONC	0.0035	90	687.1	1.5	1.00	0.94	86.00	85.50	81.27	82.03	80.95	81.71		3.97	3.79
601	602	0.00	4.91	0.00	0.00	0.00	1.80	0.00	10.78	20.26	22.00	66.15	1340.16	0.91	900	CONC	0.0055	220	1400.6	2.1	1.72	0.96	85.50	83.90	80.80	81.71	79.59	80.50		3.79	3.40
602	603	0.00	0.66	3.50	0.00	0.97	1.43	1.75	15.42	35.68	23.71	63.03	2248.78	0.99	975	CONC	0.01	70	2338.0	3.0	0.38	0.96	83.90	82.50	79.51	80.50	78.81	79.80	2.26	3.40	2.70
603B	603A	0.00	4.42	3.47	0.00	0.00	1.24	1.80	18.28	18.28	22.00	66.15	1208.89	0.99	975	CONC	0.003	150	1280.5	1.7	1.50	0.94	81.50	81.50	77.50	78.49	77.05	78.04		3.01	3.46
603A	603	0.00	5.58	0.00	0.00	0.00	1.08	0.38	10.99	29.27	23.50	63.39	1855.51	1.07	1050	CONC	0.0045	110	1911.0	2.1	0.86	0.97	81.50	82.50	76.97	78.04	76.48	77.54		3.46	4.96
603	604	0.00	0.66	0.00	0.00	0.00	0.28	0.00	1.53	66.48	25.96	59.41	3949.46	1.37	1350	CONC	0.006	100	4313.1	2.9	0.57	0.92	82.50	80.80	76.17	77.54	75.57	76.94	0.52	4.96	3.86
604	605	0.00	1.03	0.00	0.00	0.00	0.52	0.00	2.57	69.06	26.53	58.56	4043.75	1.37	1350	CONC	0.006	150	4313.1	2.9	0.86	0.94	80.80	78.40	75.05	76.42	74.15	75.52	0.40	4.38	2.88
605	606	0.00	0.89	0.41	0.00	0.00	0.39	0.00	2.72	71.78	27.39	57.33	4115.22	1.37	1350	CONC	0.006	150	4313.1	2.9	0.86	0.95	78.40	77.00	73.75	75.12	72.85	74.22	0.40	3.28	2.78
606	607	0.00	1.66	0.00	0.00	0.00	0.74	0.00	3.93	75.71	28.24	56.17	4252.25	1.37	1350	CONC	0.006	250	4313.1	2.9	1.43	0.99	77.00	76.00	72.45	73.82	70.95	72.32	1.60	3.18	3.68
607	608	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.55	76.26	29.67	54.33	4143.26	1.37	1350	CONC	0.006	90	4313.1	2.9	0.51	0.96	76.00	73.00	69.35	70.72	68.81	70.18	1.10	5.28	2.82
608E	608D	0.41	3.79	0.00	0.00	0.00	1.58	0.00	9.08	9.08	20.00	70.25	637.88	0.91	900	CONC	0.0013	170	680.9	1.0	2.73	0.94	71.00	71.00	68.59	69.50	68.36	69.28		1.50	1.72
608D	608	0.00	0.00	0.00	0.00	0.00	0.39	0.00	0.86	9.94	22.73	64.77	643.62	0.91	900	CONC	0.0013	150	680.9	1.0	2.41	0.95	71.00	73.00	68.36	69.28	68.17	69.08		1.72	3.92
608C	608B	0.00	2.57	3.82	0.00	0.00	1.80	0.00	13.37	13.37	19.00	72.53	969.39	0.84	825	CONC	0.005	60	1058.9	1.9	0.52	0.92	74.00	74.00	69.50	70.33	69.20	70.03		3.67	3.97
608B	608A	0.00	3.12	0.00	0.00	0.00	0.96	0.00	6.45	19.81	19.52	71.32	1412.95	0.99	975	CONC	0.005	120	1653.2	2.1	0.93	0.85	74.00	72.80	69.04	70.03	68.44	69.43		3.97	3.37
608A	608	1.26	2.29	0.00	0.00	0.00	1.25	0.00	6.98	26.79	20.45	69.27	1855.82	1.07	1050	CONC	0.005	70	2014.4	2.3	0.52	0.92	72.80	73.00	68.37	69.43	68.02	69.08		3.37	3.92
608	609	0.00	2.60	0.00	0.00	0.00	1.11	0.00	6.05	119.04	30.18	53.70	6392.78	1.98	1950	CONC	0.002	290	6638.9	2.2	2.24	0.96	73.00	76.00	67.10	69.08	66.52	68.50	0.46	3.92	7.50
700	701	16.26	2.78	0.00	0.00	1.39	4.09	0.00	29.31	29.31	25.00	60.90	1784.60	0.91	900	CONC	0.0095	170	1840.8	2.8	1.01	0.97	86.00	86.50	81.53	82.45	79.92	80.83	1.33	3.56	5.67
701A	701	0.00	6.89	0.00	0.00	0.00	0.00	1.29	12.52	12.52	15.00	83.56	1045.95	0.84	825	CONC	0.005	330	1058.9	1.9	2.87	0.99	86.50	86.50	82.96	83.80	81.31	82.15	2.65	2.70	4.35
701	702	0.00	1.56	0.00	0.00	0.00	0.46	1.30	6.14	47.97	26.01	59.33	2845.74	0.99	975	CONC	0.023	210	3545.7	4.6	0.76	0.80	86.50	79.00	78.51	79.50	73.68	74.67		7.00	4.33
702A	702	0.00	0.00	0.00	0.00	3.11	1.67	0.00	10.15	10.15	20.00	70.25	713.19	0.61	600	CONC	0.02	150	905.9	3.1	0.81	0.79	83.50	79.00	78.89	79.50	75.89	76.50	1.83	4.00	2.50
702	703	0.00	0.00	0.36	0.00	0.00	0.54	0.00	1.74	59.85	26.77	58.21	3483.92	1.07	1050	CONC	0.024	210	4413.3	4.9	0.71	0.79	79.00	71.00	73.60	74.67	68.56	69.63		4.33	1.37
703	704	5.02	0.00	0.41	0.00	0.00	0.41	0.00	5.71	65.57	27.48	57.20	3750.72	1.83	1800	CONC	0.0012	160	4154.1	1.6	1.69	0.90	71.00	70.80	67.80	69.63	67.61	69.44		1.37	1.36
704	705	0.99	0.00	0.55	0.00	3.19	0.45	0.00	9.31	74.87	29.17	54.96	4115.38	1.83	1800	CONC	0.0013	180	4323.7	1.6	1.82	0.95	70.80	70.50	67.61	69.44	67.38	69.20		1.36	1.30
705A	705	0.00	0.00	2.06	0.00	0.00	1.74	0.00	6.97	6.97	23.00	64.29	448.15	0.69	675	CONC	0.003	80	480.3	1.3	1.03	0.93	71.50	70.50	68.76	69.44	68.52	69.20		2.06	1.30
705	706	0.00	0.00	0.92	0.00	0.00	0.44	0.00	2.37	84.22	30.99	52.75	4442.71	1.98	1950	CONC	0.001	160	4694.4	1.5	1.75	0.95	70.50	71.00	67.22	69.20	67.06	69.04		1.30	1.96
706C	706B	0.00	0.00	5.20	0.00	0.00	2.00	0.00	12.34	12.34	21.00	68.13	840.94	0.69	675	CONC	0.012	155	960.6	2.6	0.99	0.88	75.00	72.00	71.13	71.81	69.27	69.95		3.19	2.05
706B	706A	0.00	0.00	0.64	0.00	0.00	0.22	0.00	1.46	13.80	21.99	66.16	913.32	0.76	750	CONC	0.007	80	971.7	2.1	0.63	0.94	72.00	72.00	69.19	69.95	68.63	69.39		2.05	2.61
706A	706	0.00	0.00	1.74	0.00	0.00	1.16	0.00	5.21	19.01	22.62	64.98	1235.49	0.91	900	CONC	0.005	70	1335.4	2.0	0.57	0.93	72.00	71.00	68.48	69.39	68.13	69.04		2.61	1.96
706	707	0.00	0.00	0.50	0.00	0.00	0.21	0.00	1.23	104.46	32.74	50.81	5307.00	1.98	1950	CONC	0.0015	100	5749.5	1.9	0.89	0.92	71.00	72.00	67.06	69.04	66.91	68.89		1.96	3.11
707	708	0.00	0.00	2.66	0.00	0.00	1.20	0.00	6.70	111.16	33.63	49.87	5543.80	1.98	1950	CONC	0.0015	175	5749.5	1.9	1.56	0.96	72.00	76.00	66.91	68.89	66.65	68.63		3.11	7.37
708	609	0.00	0.00	1.38	0.00	0.00	0.67	0.00	3.58	114.74	35.20	48.33	5545.19	1.98	1950	CONC	0.0015	85	5749.5	1.9	0.76	0.96	76.00	76.00	66.65	68.63	66.52	68.50	0.46	7.37	7.50
609	610	0.00	3.00	0.00	0.00	0.00	1.21	0.00	6.83	240.60	35.96	47.62	11456.50	1.52	1500 x 4200	CONC	0.002	160	14595.0	2.3	1.15	0.78	76.00	72.00	66.52	68.04	66.20	67.72		7.96	4.28
610	Outlet	0.00	3.98	0.00	0.00	0.00	0.96	0.00	7.64	248.25	37.11	46.58	11563.06	1.52	1500 x 4200	CONC	0.002	100	14595.0	2.3	0.72	0.79	72.00	70.00	66.20	67.72	66.00	67.52		4.28	2.48
800	801	0.00	0.00	2.51	0.00	0.00	0.73	0.00	5.44	5.44	18.00	74.97	407.91	0.84	825	CONC	0.001	140	473.6	0.9	2.72	0.86	70.00	70.00	67.60	68.44	67.46	68.30		1.56	1.70
801	802	0.00	0.00	1.02	0.00	0.00	0.34	0.00	2.31	7.75	20.72	68.71	532.33	0.91	900	CONC	0.001	80	597.2	0.9	1.47	0.89	70.00	70.00	67.38	68.30	67.30	68.22		1.70	1.78
802	803	0.00	0.00	2.06	0.00	0.00	0.77	0.00	4.84	12.59	22.19	65.79	828.22	1.07	1050	CONC	0.001	195	900.9	1.0	3.22	0.92	70.00	70.00	67.15	68.22	66.96	68.02		1.78	1.98
803	804	0.00	0.00	1.60	0.00	0.00	0.75	0.00	4.09	16.68	25.41	60.25	1005.07	1.07	1050	CONC	0.0013	80	1027.1	1.1	1.16	0.98	70.00	70.00	66.96	68.02	66.85	67.92		1.98	2.08
804	805	0.00	0.00	2.76	0.00	0.00	0.83	0.00	6.04	22.72	26.57	58.50	1329.38	1.22	1200	CONC	0.0012	285	1409.0	1.2	3.94	0.94	70.00	70.00	66.70	67.92	66.36	67.58		2.08	2.42
805	806	0.00	0.00	1.51	0.00	0.00	0.70	0.00	3.85	26.57	30.51	53.32	1416.74	1.22	1200	CONC	0.0013	80	1466.5	1.3	1.06	0.97	70.00	70.00	66.36	67.58	66.26	67.47		2.42	2.53
806	807	0.86	0.00	1.24	0.00	0.00	0.41	0.00	3.51	30.08	31.57	52.09	1567.14	1.22	1200	CONC	0.0017	70	1677.0	1.4	0.81	0.93	70.00	70.00	66.26	67.47	66.14	67.36		2.53	2.64
807	Outlet	0.00	0.00	0.86	0.00	0.00	0.34	0.00	2.06	32.15	32.38	51.19	1645.68	1.22	1200	CONC	0.0017	80	1677.0	1.4	0.93	0.98	70.00	70.00	66.14	67.36	66.00	67.22		2.64	2.78

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 IDF Curve
2) Min Velocity = 0.80 m/sec

Designed: B.D

Checked: F.W

Dwg. : STM / STM P1

PROJECT: Gloucester EUC Infrastructure Servicing Study Update

LOCATION: Stormwater Management Pond 3

File Ref. 1634-00493

Date: March-05

Sheet No. 1 of 1

N

- STORM SEWER AND MANHOLE
- STORM TRUNK SEWER AND MANHOLE
- STORM CATCHMENT AREA (POND #1)
- STORM CATCHMENT AREA (POND #2)
- STORM CATCHMENT AREA (POND #3)
- 30m CREEK BUFFER
- ORIGINAL GROUND / OBVERT
- AREA (ha) / RUNOFF COEFFICIENT / MANHOLE No.
- AREAS OF INSUFFICIENT COVER (LESS THAN 2.0m)

1. "PONDS 1 AND 3 EAST URBAN COMMUNITY DESIGN BRIEF" (STANTEC CONSULTING, APRIL 2001)
2. "CITY OF GLOUCESTER EAST URBAN COMMUNITY MASTER DRAINAGE PLAN" (GORE & STORRIE, 1992)
3. WATER LEVEL TO BE CONFIRMED AS PART OF THE REDESIGN OF POND 3.

PROPOSED SITE,
2983-3053-3079 Navan Road and
2690 Pagé Road

HYDRO CORRIDOR
PROPOSED TRANSITWAY
PROPOSED BLACKBURN BY-PASS EXTENSION
MER BLEUE ROAD
FOURTH LINE ROAD
PAGE ROAD
NAVAN ROAD
WALL ROAD
SAPHIR AVE.
GRAND PRE
ABANDONED C.P.R. RIGHT OF WAY
STORM TRUNK SEWER No.1
STORM TRUNK SEWER No.2
STORM TRUNK SEWER No.3
STORM TRUNK SEWER No.4
STORM TRUNK SEWER No.5
STORM TRUNK SEWER No.6

POND 1
100 YR. WL=87.00m
NWL=80.10m

POND 2
100 YR. WL=80.00m
(2)

POND 3
100 YR. WL=68.50m
NWL=67.00m
(3)

WSI LANDFILL

SCHOOL
PARK
INSTIT.
INSTITUTIONAL
COMMERCIAL
ESCARPMENT
FIRE HALL

REVISION No.2 MARCH, 2005

CITY OF OTTAWA
GLOUCESTER EUC INFRASTRUCTURE
SERVICING STUDY UPDATE

STORM SEWER SYSTEM

Scale: 0 40 120 200m
Dwg. No.: STM
Own By: E.C.
Date: 04.10.29
Revision: 2

Appendix F2

Sample Functional Runoff Coefficients

2022-12-01
Our File: 29899-000

Runoff Coefficient
2983, 3053, and 3079 Navan Road & 2690 Page Road

The proposed development is comprised of four (4) subject properties under (1) Draft Plan of Subdivision and four (4) Site Plan Applications. In total there are 67 row townhouse units, six (6) condominium units and a gas station and retail establishment.

1. ROW TOWNHOUSE BLOCK:

An average run-off coefficient was calculated for front yard and rear yard of the smallest block (Block 4) which contains five (5) townhouse units. The runoff coefficients are based on zoning setbacks and a maximum driveway width of 50% of the area of the front yard as stated in Section 107 (2) in the City of Ottawa Zoning By-Laws. Since this scenario has the highest ratio of house area to greenspace, the resulting run-off coefficient would be the highest of any scenario for a townhouse block.

Unit Information

Unit Width	5.80	m
Block Depth	29.9	m
Unit Area	97	m^2
Total Number of Units	5	units
Number of Interior Units	4	units
Number of End Units	1	units
Corner Unit Width	6.25	m
Min. Corner Yard Setback	3	m
Min. Rear Yard Setback	7.5	m
Min. Front Yard Setback	3	m

Block Area

Total Block Area = (5.80 x 4 + 9.25 x 1) x 29.9 = 970.26 m^2 **(A_T)**
Zoning Footprint (Internal Unit) = (29.9 - 7.5 – 3) m x 5.80m = 112.52 m^2 **(B_T)**
Zoning Footprint (End Unit) = (29.9 - 7.5 - 3) x 6.25 = 121.25 m^2 **(C_T)**
Unit Driveway Area (50% of Front Yard Area) = 8.7 m^2 **(D_T)**

Assuming each lot has a highpoint at the centre, the unit and lot areas could be divided equally between the front and rear yards.

Rear Area:

Block Rear Area = $\frac{AT}{2} = \frac{970.26}{2}$ = 485.13 m^2 **(E_T)**

By: MM

Number of Internal Units: 4
Number of End Units: 1
Rear Impervious (House) Footprint: $\frac{4(BT)+1(CT)}{2} = \frac{4(112.52)+1(121.25)}{2}$ = 285.67 m^2 **(F_T)**

Front Area:
Block Front Area = Block Rear Area = 485.13 m^2 **(G_T)**
Number of Internal Units: 4
Number of End Units: 1
Front Impervious (House/Driveway) Footprint: $F_T + 6D_T = 285.67 + 5(8.7)$ = 329.17 m^2 **(I_T)**

Using a run-off coefficient of 0.2 for grassed areas and 0.9 for impervious areas (houses and driveways) the following weighted averages are calculated:

Run-off Coefficient:
Rear Coefficient = $\frac{0.2(E_T-F_T)+0.9F_T}{E_T} = \frac{0.2(485.13-285.67)+0.9(285.67)}{485.13}$ = **0.61** **(C_{RT})**
Front Coefficient = $\frac{0.2(G_T-I_T)+0.9(I_T)}{G_T} = \frac{0.2(485.13-329.17)+0.9(329.17)}{485.13}$ = **0.67** **(C_{FT})**

Summary: The rear yard runoff coefficient used for design is **0.61**

2. 18m ROW Road

A similar approach was used for the ROWs, a weighted average was calculated using the total 18m ROW Road.

Asphalt Road and Sidewalk (C=0.9)
There is approximately 585 m of 8.5 m asphalt road and 630 m of 1.8 m sidewalk. These lengths were measured directly from the Concept Plan in Appendix B1 of the Functional Servicing Report.
The total area of asphalt road is 585 x 8.5 = 4972.50 m^2 **(J_T)**
The total area of sidewalk is 630 x 1.8 = 1134.00 m^2 **(K_T)**

Driveways (C=0.9)
Within the boulevard there are 27 units which have driveways that do not overlap with sidewalks. For these cases the driveways have a width of 4.75 m within the boulevard span a distance of 2.9 m (50% of unit width).

The total area of driveways not fronting sidewalks can be taken as 27 x 4.75 x 2.9 = 371.93 m^2 **(L_T)**

By: MM

Within the boulevard there are 42 units which have driveways that do overlap sidewalks. For these cases the sidewalk width must be subtracted from the driveway boulevard width since it was already considered in **(K_T).** Hence, these driveways span 4.75m - 1.8m = 2.95m within the boulevard and span a distance of 2.9m (50% of unit width).

The total area of driveways fronting sidewalks can be taken as 42 x 2.95 x 2.9 = 359.31 m^2 **(M_T)**

Grassed Area (C=0.2)

The total area of grass is equal to the total ROW Area subtracted by area of asphalt road, sidewalks, and driveways. I.e., Grassed Area = (18 x 585m – (4972.50 + 1134.00 + 371.93 + 359.31 = 3692.26 m^2 **(N_T)**

Table 1 summarizes the total areas within the 18m ROW and their respective c-factors.

Table 1: ROW C-factor breakdown

Description	**Area (m^2)**	**C-Factor**
Asphalt Road	4972.50	0.9
Sidewalk	1134.00	0.9
Driveways not fronting sidewalk (26 units)	371.93	0.9
Driveways fronting sidewalk (41 units)	359.31	0.9
Grass boulevard not fronting sidewalk	3692.26	0.2

3. FRONT YARD AND ROW C-FACTOR

The front yard and ROWs of the subdivision were grouped into one weighted front yard runoff coefficient. The weighted average is derived from the results front yard co-efficient calculated for the ROW townhouse block and from the results in Table 1 for the 18 m ROW.

$$= \frac{(J_T\ x\ 0.9)+(K_T\ x\ 0.9)+(L_T\ x\ 0.9)+(M_T\ x\ 0.9)+(N_T\ x\ 0.2)+\ (69\ x\ 97)\ x\ C_{FT}\ )}{(J_T)+(K_T)+(L_T)+(M_T)+(N_T)+(69\ x(97))}$$

$$= \frac{(4972.50\ x\ 0.9)+(1134x0.9)+(371.93x0.9)+(359.31x0.9)+(3692.26x0.2)+((67\ x(97)\ x\ \mathbf{0.67})}{(\ 4972.50)+(1134)+(371.93)+(359.3)+(3692.26)+(67\ x(97)\ )}$$

= 0.66

By: MM

4. Residential and Commercial Site Plans (Block 14, 15 and 17)

A runoff coefficient was calculated for the residential site plans on Blocks 14, 15 and 17. Block 14 was used for the sample calculations since this block generates the highest ratio of impervious surfaces to grass.

A minimum zoned amenity space of 10% was assumed for the residential site plans. This is more conservative than the City of Ottawa By-Law requirement of 6m^2 per dwelling unit for low-rise apartment dwellings.

Block 14 Information

Total Block Area	0.575	ha
Zoning Limit Area	0.494	ha
Zoning Amenity Area (10% Zoning Limit Area)	0.049	ha **(O_T)**
Zoning Impervious Area (90% Zoning Limit Area)	0.445	ha **(P_T)**

The remaining area of the site plan (outside of the zoning area) is 0.069 ha of grass **(Q_T)** and 0.012 ha of impervious surfaces **(R_T)**.

Given that these are private site plans, a run-off coefficient of 0.25 was used for grassed areas and 0.9 for impervious areas. The following weighted averages are calculated:

$$= \frac{(\mathbf{0.25}\ (O_T+Q_T))+\mathbf{0.9}(P_T+R_T)}{(O_T+Q_T)+(P_T+R_T\ )}$$

$$= \frac{(\mathbf{0.25}\ (0.049+0.0688))+\mathbf{0.9}(0.445+0.0123)}{(0.049+0.0688\ )+(0.455+0.012\ )}$$

$$= \mathbf{0.77}$$

5. Commercial Site Plan (Gas Bar on Block 16)

Since there is minimal grass and amenity space within the industrial site plan a C-factor of **0.9** was assumed for all of Block 16.

6. Dry Pond (Block 13)

A C-factor of 0.83 was assumed for the Dry Pond because the water surface from large storm events would be considered 90% impermeable.

7. Park (Block 7)

A C-factor of 0.40 was assumed for the park given that this area is mainly grassed with minimal infrastructure.

8. **Abutting Existing Units on Navan and Page that drain into 3079 Navan Road**

The C-factor breakdowns based on actual impervious cover within the existing catchment areas are summarized in Table 2 and Table 3. A weighted average was calculated for impervious (C=0.9) and grassed (C=0.2).

Table 2: Existing Units on Navan Road C-factor breakdown

Description	**Area (m^2)**	**C-Factor**
Impervious	0.169	0.9
Grassed	0.971	0.2
Total	1.14	0.3

Table 3: Existing Units on Page Road C-factor breakdown

Description	**Area (m^2)**	**C-Factor**
Impervious	0.096	0.9
Grassed	0.598	0.2
Total	0.694	0.3

Table 4 below presents a summary of run-off coefficients to be used for functional design.

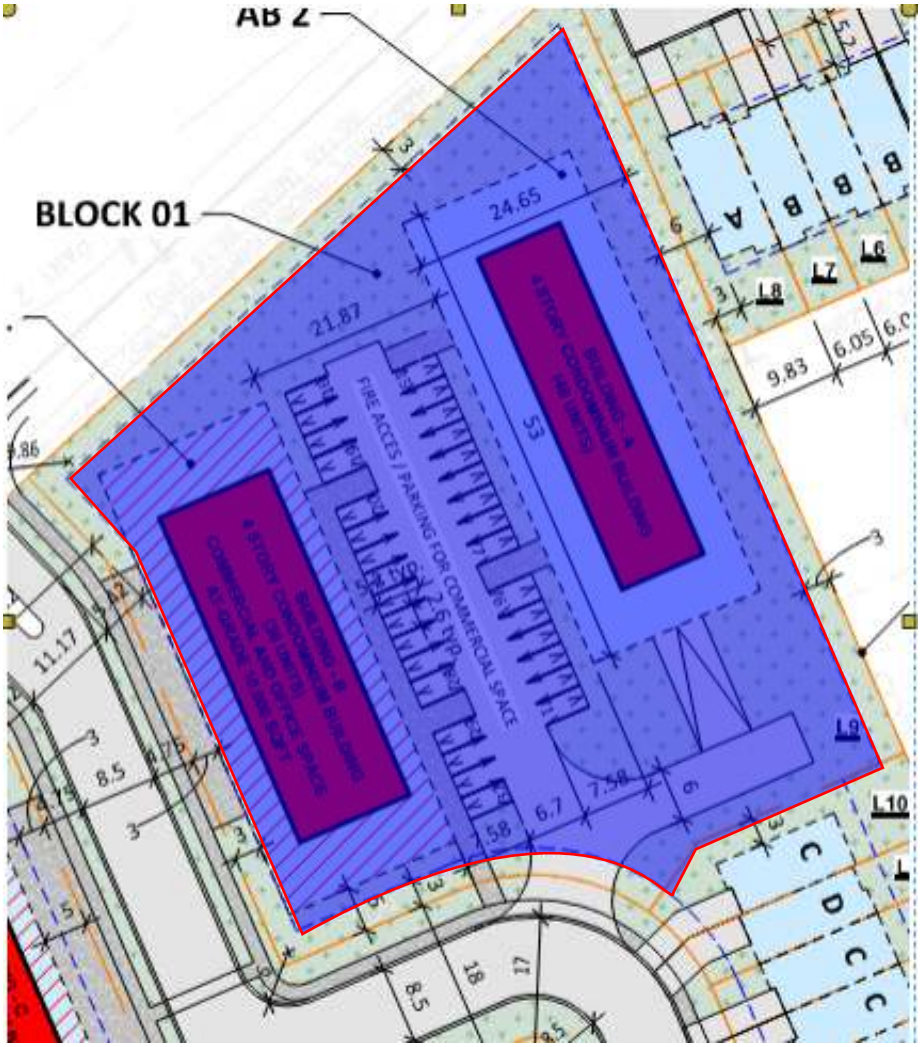
Table 4: Functional Design Run-off Coefficients

Scenario	**Runoff Coefficient (C)**
Rear Yards – Townhouse Units Only	**0.61**
Front Yards and ROW	**0.66**
Residential Site Plan	**0.77**
Industrial Site Plan (Gas Bar)	**0.90**
Abutting Properties on Navan and Page	**0.30**
Park	**0.40**
Dry Pond	**0.83**

SAMPLE C-FACTOR CALCULATION FIGURES

BLOCK 4

BLOCK 14



C-FACTOR CALCULATED BASED ON ZONING SET BACKS AND MAXIMUM DRIVEWAY WIDTH OF 50% AREA OF FRONT YARD

ALL AREAS MEASURED DIRECTLY FROM CONCEPT PLAN IN APPENDIX B1 OF THE FUNCTIONAL SERVICING REPORT

LEGEND

ZONING AREA FOR INTERIOR RESIDENTIAL UNIT

ZONING AREA FOR CORNER RESIDENTIAL UNIT

ZONING AREA FOR SITE PLAN (10% AREA FOR AMENITY SPACE ASSUMED)

PROPERTY LINE (ORANGE LINE IN CONCEPT PLAN)

Appendix F

Storm Design Sheet

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

STORM DESIGN SHEET

NAVAN SUBDIVISION

JLR NO. 29899-002

Prepared By: TR
Checked By: MM

Location	From MH	To MH	C-Factor (1:2 Yr) 0.30	0.40	0.50	0.55	0.61	0.66	0.77	0.79	0.83	0.90	C- 0.82	Total Area (ha) 1:2 Year	1:10 Year	Total Area (ha)	Cum. Total Area (ha)	Inlet Time (min.)	In Pipe Flow Time (min)	Total Time
Paleo Drive	517	516						0.15						0.150	0.00	0.15	0.15	**10.00**	0.11	**10.11**
Paleo Drive	516	514												0.000	0.00	0.00	0.15	**10.11**	0.36	**10.47**
Res/Comm. Site Plan - Block 15	STM STUB 15	514							0.51					0.510	0.00	0.51	0.51	**10.00**	0.20	**10.20**
Gas Station Site Plan - Block 16	STM STUB 16	514	0.05									0.77		0.820	0.00	0.82	0.82	**10.00**	0.83	**10.83**
Paleo Drive	514	512					0.04	0.28						0.320	0.00	0.32	1.80	**10.83**	0.55	**11.39**
Paleo Drive	512	511	0.04				0.14							0.180	0.00	0.18	1.98	**11.39**	0.11	**11.50**
Paleo Drive	511	510	0.06	0.20			0.19	0.29						0.740	0.00	0.74	2.72	**11.50**	0.95	**12.45**
Stompin' Tom Lane (Storage Pipe)	528	527						0.14						0.140	0.00	0.14	0.14	**10.00**	0.54	**10.54**
Res/Comm. Site Plan - Block 14 (Storage Pipe)	527	526	0.06				0.08							0.140	0.00	0.14	0.28	**10.54**	1.80	**12.34**
Res/Comm. Site Plan - Block 14	526	525	0.16											0.160	0.00	0.16	0.44	**12.34**	0.65	**12.99**
Res/Comm. Site Plan - Block 14	525	524							0.55					0.550	0.00	0.55	0.99	**12.99**	0.21	**13.21**
Rosalia Street	524	522						0.62						0.620	0.00	0.62	1.61	**13.21**	1.86	**15.06**
Rosalia Street	522	510												0.000	0.00	0.00	1.61	**15.06**	0.29	**15.36**
Paleo Drive	510	509												0.000	0.00	0.00	4.33	**15.36**	0.28	**15.64**
Paleo Drive	509	508												0.000	0.00	0.00	4.33	**15.64**	0.21	**15.85**
Paleo Drive	508	507	0.92				0.21	0.18			0.13			1.440	0.00	1.44	5.77	**15.85**	0.21	**16.06**
Paleo Drive	507	504	0.05				0.17							0.220	0.00	0.22	5.99	**16.06**	0.25	**16.31**
Res. Site Plan - Block 17	STM STUB 17	504							0.56					0.560	0.00	0.56	0.56	**10.00**	0.24	**10.24**
Paleo Drive	504	503												0.000	0.00	0.00	6.55	**16.31**	0.67	**16.98**
NAVAN	503	503A			0.83	3.47		0.09					1.75	4.390	1.75	6.14	12.69	**16.98**	1.02	**18.00**
NAVAN	503A	502												0.000	0.00	0.00	12.69	**18.00**	0.26	**18.27**
NAVAN	502	501			3.58		0.02			1.10			0.58	4.700	0.58	5.28	17.97	**18.27**	0.15	**18.42**
NAVAN	501	501A												0.000	0.00	0.00	17.97	**18.42**	0.14	**18.56**
NAVAN	501A	500A												0.000	0.00	0.00	17.97	**18.56**	0.86	**19.42**
NAVAN	500A	500												0.000	0.00	0.00	17.97	**19.42**	0.15	**19.58**
NAVAN	500	EXMH101												0.000	0.00	0.00	17.97	**19.58**	0.05	**19.62**
														15.64	**2.33**	**17.97**				
Renaud at Navan	EXMH101																			
Sanitary Crossing - Page @ Navan - (min INV +/- 77.11, max OBV +/- 77.97)																				

Peak Flow Estimation (Rational Method)

Location	From MH	To MH	1:2 Year Storm 2.78AR	Add. 2.78AR	Cum. 2.78AR	1:5 Yr Intensity (mm/hr)	Peak Flow (L/s)	Controlled Flow (85 L/s/ha)	1:10 Year Storm 2.78AR	Add. 2.78AR	Cum. 2.78AR	1:10 Yr Intensity (mm/hr)	Peak Flow (L/s)	Plug Flow (L/s)	Total Peak Flow (L/s)
Paleo Drive	517	516	0.28		0.28	76.81	21.14	12.75	0.00		0.00	122.14	0.00		**21.14**
Paleo Drive	516	514	0.00		0.28	76.37	21.02	12.75	0.00		0.00	121.44	0.00		**21.02**
Res/Comm. Site Plan - Block 15	STM STUB 15	514	1.09		1.09	76.81	83.85	43.35	0.00		0.00	122.14	0.00		**83.85**
Gas Station Site Plan - Block 16	STM STUB 16	514	1.97		1.97	76.81	151.17	69.70	0.00		0.00	122.14	0.00		**151.17**
Paleo Drive	514	512	0.58		3.92	73.75	288.84	153.00	0.00		0.00	117.19	0.00		**288.84**
Paleo Drive	512	511	0.27		4.19	71.87	300.94	168.30	0.00		0.00	114.15	0.00		**300.94**
Paleo Drive	511	510	1.13		5.31	71.49	379.94	231.20	0.00		0.00	113.55	0.00		**379.94**
Stompin' Tom Lane (Storage Pipe)	528	527	0.26		0.26	76.81	19.73	11.90	0.00		0.00	122.14	0.00		**19.73**
Res/Comm. Site Plan - Block 14 (Storage Pipe)	527	526	0.19		0.44	74.78	33.10	23.80	0.00		0.00	118.86	0.00		**33.10**
Res/Comm. Site Plan - Block 14	526	525	0.13		0.58	68.85	39.66	37.40	0.00		0.00	109.27	0.00		**39.66**
Res/Comm. Site Plan - Block 14	525	524	1.18		1.75	66.95	117.38	84.15	0.00		0.00	106.20	0.00		**117.38**
Rosalia Street	524	522	1.14		2.89	66.36	191.83	136.85	0.00		0.00	105.25	0.00		**191.83**
Rosalia Street	522	510	0.00		2.89	61.62	178.13	136.85	0.00		0.00	97.61	0.00		**178.13**
Paleo Drive	510	509	0.00		8.21	60.94	500.03	368.05	0.00		0.00	96.52	0.00		**500.03**
Paleo Drive	509	508	0.00		8.21	60.30	494.76	368.05	0.00		0.00	95.49	0.00		**494.76**
Paleo Drive	508	507	1.75		9.96	59.83	595.87	490.45	0.00		0.00	94.74	0.00		**595.87**
Paleo Drive	507	504	0.33		10.29	59.38	610.98	509.15	0.00		0.00	94.02	0.00		**610.98**
Res. Site Plan - Block 17	STM STUB 17	504	1.20		1.20	76.81	92.07	47.60	0.00		0.00	122.14	0.00		**92.07**
Paleo Drive	504	503	0.00		11.49	58.84	675.91	556.75	0.00		0.00	93.14	0.00		**675.91**
NAVAN	503	503A	6.62		18.11	57.46	1040.69	929.90	3.99		3.99	90.92	362.71		**1403.40**
NAVAN	503A	502	0.00		18.11	55.48	1004.90	880.60	0.00		0.00	87.75	0.00		**1004.90**
NAVAN	502	501	7.43		25.54	55.00	1404.51	1329.40	1.32		1.32	86.97	114.99		**1519.49**
NAVAN	501	501A	0.00		25.54	54.72	1397.34	1329.40	0.00		0.00	86.52	0.00		**1397.34**
NAVAN	501A	500A	0.00		25.54	54.46	1390.85	1329.40	0.00		0.00	86.11	0.00		**1390.85**
NAVAN	500A	500	0.00		25.54	52.98	1352.89	1329.40	0.00		0.00	83.72	0.00		**1352.89**
NAVAN	500	EXMH101	0.00		25.54	52.72	1346.45	1329.40	0.00		0.00	83.32	0.00		**1346.45**

Sewer Data

Location	From MH	To MH	Type	CAD Dia.	Nominal Dia. (mm)	Actual Dia. (mm)	Slope	Length (m)	Q Full (L/s)	V Full (m/s)	Residual Capacity (L/s)	% Full
Paleo Drive	517	516	PVC	0.250	250	254.00	1.50%	10.83	81.07	1.60	**59.93**	**26%**
Paleo Drive	516	514	PVC	0.250	250	254.00	1.50%	34.15	81.07	1.60	**60.05**	**26%**
Res/Comm. Site Plan - Block 15	STM STUB 15	514	CONCRETE	0.450	450	457.20	0.25%	10.63	148.72	0.91	**64.87**	**56%**
Gas Station Site Plan - Block 16	STM STUB 16	514	CONCRETE	0.525	525	533.40	0.25%	50.21	224.33	1.00	**73.16**	**67%**
Paleo Drive	514	512	CONCRETE	0.600	600	609.60	0.35%	42.98	378.96	1.30	**90.12**	**76%**
Paleo Drive	512	511	CONCRETE	0.600	600	609.60	0.35%	8.79	378.96	1.30	**78.02**	**79%**
Paleo Drive	511	510	CONCRETE	0.750	750	762.00	0.35%	85.66	687.10	1.51	**307.16**	**55%**
Stompin' Tom Lane (Storage Pipe)	528	527	CONCRETE	0.675	675	685.80	0.55%	57.39	650.35	1.76	**630.62**	**3%**
Res/Comm. Site Plan - Block 14 (Storage Pipe)	527	526	PVC	0.300	300	304.80	0.36%	89.06	60.19	0.82	**27.10**	**55%**
Res/Comm. Site Plan - Block 14	526	525	PVC	0.300	300	304.80	0.30%	29.56	55.26	0.76	**15.60**	**72%**
Res/Comm. Site Plan - Block 14	525	524	CONCRETE	0.450	450	457.20	0.25%	11.53	148.72	0.91	**31.33**	**79%**
Rosalia Street	524	522	CONCRETE	0.525	525	533.40	0.25%	111.92	224.33	1.00	**32.50**	**86%**
Rosalia Street	522	510	CONCRETE	0.525	525	533.40	0.25%	17.59	224.33	1.00	**46.20**	**79%**
Paleo Drive	510	509	CONCRETE	0.750	750	762.00	0.25%	21.70	580.71	1.27	**80.68**	**86%**
Paleo Drive	509	508	CONCRETE	0.750	750	762.00	0.25%	16.02	580.71	1.27	**85.95**	**85%**
Paleo Drive	508	507	CONCRETE	0.825	825	838.20	0.25%	16.81	748.75	1.36	**152.88**	**80%**
Paleo Drive	507	504	CONCRETE	0.825	825	838.20	0.25%	20.73	748.75	1.36	**137.77**	**82%**
Res. Site Plan - Block 17	STM STUB 17	504	PVC	0.375	375	381.00	0.35%	13.94	108.21	0.95	**16.14**	**85%**
Paleo Drive	504	503	CONCRETE	0.900	900	914.40	0.25%	57.74	944.29	1.44	**268.38**	**72%**
NAVAN	503	503A	CONCRETE	1.050	1050	1066.80	0.38%	120.00	1746.85	1.95	**343.45**	**80%**
NAVAN	503A	502	CONCRETE	1.050	1050	1066.80	0.38%	30.96	1746.85	1.95	**741.95**	**58%**
NAVAN	502	501	PVC	0.675	675	685.80	1.53%	27.30	2169.41	2.94	**649.92**	**70%**
NAVAN	501	501A	CONCRETE	1.200	1200	1219.20	0.30%	16.25	2227.75	1.91	**830.41**	**63%**
NAVAN	501A	500A	CONCRETE	1.200	1200	1219.20	0.30%	98.53	2227.75	1.91	**836.90**	**62%**
NAVAN	500A	500	CONCRETE	1.200	1200	1219.20	0.30%	17.34	2227.75	1.91	**874.86**	**61%**
NAVAN	500	EXMH101	CONCRETE	1.200	1200	1219.20	0.30%	5.49	2227.75	1.91	**881.30**	**60%**
Renaud at Navan	EXMH101		CONCRETE		1350	1371.60						
Sanitary Crossing - Page @ Navan - (min INV +/- 77.11, max OBV +/- 77.97)			CONCRETE		675	710.00						

Location	From MH	To MH	Upstream Geometry TG From	Obvert	Invert	Cover	Downstream Geometry TG To	Drop	Obvert	Invert	Cover
Paleo Drive	517	516	85.725	83.879	83.625	1.85	85.511		83.716	83.462	1.79
Paleo Drive	516	514	85.511	83.716	83.462	1.79	84.931	1.850	83.204	82.950	1.73
Res/Comm. Site Plan - Block 15	STM STUB 15	514	84.800	81.381	80.923	3.42	84.931		81.354	80.897	3.58
Gas Station Site Plan - Block 16	STM STUB 16	514	85.610	81.479	80.946	4.13	84.931		81.354	80.821	3.58
Paleo Drive	514	512	84.931	81.354	80.744	3.58	84.879		81.204	80.594	3.68
Paleo Drive	512	511	84.879	81.204	80.594	3.68	84.899	0.499	81.173	80.563	3.73
Paleo Drive	511	510	84.899	80.674	79.912	4.23	84.121	0.300	80.374	79.612	3.75
Stompin' Tom Lane (Storage Pipe)	528	527	85.306	82.530	81.844	2.78	85.826	0.381	82.214	81.528	3.61
Res/Comm. Site Plan - Block 14 (Storage Pipe)	527	526	85.826	81.833	81.528	3.99	85.682		81.516	81.211	4.17
Res/Comm. Site Plan - Block 14	526	525	85.682	81.516	81.211	4.17	85.745		81.427	81.122	4.32
Res/Comm. Site Plan - Block 14	525	524	85.745	81.427	80.970	4.32	84.903	0.400	81.398	80.941	3.50
Rosalia Street	524	522	84.903	80.998	80.465	3.90	83.977	0.834	80.719	80.185	3.26
Rosalia Street	522	510	83.977	80.418	79.885	3.56	84.121	0.300	80.374	79.841	3.75
Paleo Drive	510	509	84.121	80.074	79.312	4.05	83.286		80.020	79.258	3.27
Paleo Drive	509	508	83.286	80.020	79.258	3.27	82.583		79.980	79.218	2.60
Paleo Drive	508	507	82.583	79.980	79.141	2.60	82.443		79.938	79.099	2.51
Paleo Drive	507	504	82.443	79.938	79.099	2.51	82.457	0.798	79.886	79.048	2.57
Res. Site Plan - Block 17	STM STUB 17	504	82.370	79.137	78.756	3.23	82.457		79.088	78.707	3.37
Paleo Drive	504	503	82.457	79.088	78.173	3.37	81.850	0.073	78.943	78.029	2.91
NAVAN	503	503A	81.850	78.870	77.804	2.98	81.366		78.419	77.352	2.95
NAVAN	503A	502	81.366	78.419	77.352	2.95	81.628		78.303	77.236	3.33
NAVAN	502	501	81.628	77.922	77.236	3.71	81.840		77.504	76.818	4.34
NAVAN	501	501A	81.840	78.037	76.818	3.80	81.933		77.989	76.769	3.94
NAVAN	501A	500A	81.933	77.989	76.769	3.94	82.933		77.693	76.474	5.24
NAVAN	500A	500	82.933	77.693	76.474	5.24	83.201	0.305	77.641	76.422	5.56
NAVAN	500	EXMH101	83.201	77.336	76.117	5.86	83.237	0.518	77.320	76.100	5.92
Renaud at Navan	EXMH101		83.237	76.802	75.430	6.44					
Sanitary Crossing - Page @ Navan - (min INV +/- 77.11, max OBV +/- 77.97)			81.519	77.838	77.128	3.68					

Actual Velocities Calculations

From MH	To MH	Angle	Depth (m)	Flow Depth to Diameter Ratio	Area	Wetted Perimeter	Flow (L/s)	Design Peak Flow (L/s)	Velocity (m/s)
517	516	149.605	0.09371	0.374827987	0.016446339	0.326386815	21.138	21.138	1.28527
516	514	149.342	0.09343	0.373704268	0.016379651	0.325813583	21.020	21.020	1.28329
STM STUB 15	514	191.809	0.25212	0.560259089	0.089918976	0.753232888	83.848	83.848	0.93248
STM STUB 16	514	207.363	0.32978	0.628155044	0.140527347	0.950032034	151.171	151.171	1.07574
514	512	220.631	0.41062	0.684371494	0.202586271	1.155220331	288.845	288.844	1.42579
512	511	225.762	0.42331	0.70551775	0.209552563	1.182084474	300.940	300.940	1.43611
511	510	190.298	0.41519	0.553590282	0.246099993	1.245496412	379.940	379.940	1.54384
528	527	96.9848	0.11565	0.171338717	0.039874399	0.571287923	38.562	19.729	0.96708
527	526	117.623	0.07348	0.244929576	0.013127531	0.307936347	7.353	32.700	0.5601
526	525	144.145	0.10549	0.351632266	0.021713395	0.377371615	13.635	40.201	0.62795
525	524	227.587	0.32083	0.712948625	0.119233197	0.893732394	119.734	119.733	1.0042
524	522	239.602	0.39925	0.760469121	0.17379417	1.097732394	195.623	195.623	1.1256
522	510	228.136	0.37547	0.71517396	0.162841432	1.045203894	181.343	181.343	1.11362
510	509	240.449	0.57279	0.763723131	0.356241971	1.573737212	508.917	508.917	1.42857
509	508	238.616	0.5675	0.756669307	0.35285197	1.561740046	503.433	503.433	1.42675
508	507	228.348	0.59073	0.716031381	0.402642876	1.643988946	606.216	606.216	1.50559
507	504	231.86	0.60236	0.730135685	0.411202359	1.669274216	621.490	621.490	1.5114
STM STUB 17	504	235.594	0.27934	0.744900848	0.086782238	0.770979532	92.069	92.069	1.06092
504	503	215.352	0.59602	0.662247519	0.439142559	1.691373359	687.400	687.400	1.56532
503	503A	229.549	0.75692	0.72087748	0.657001068	2.103355032	1426.655	1426.655	2.17147
503A	502	194.674	0.60152	0.572875675	0.503157954	1.783796764	1020.769	1020.769	2.02873
502	501	212.864	0.4399	0.651700594	0.242495969	1.253871046	771.628	771.628	3.18202
501	501A	202.076	0.72632	0.605263168	0.702493055	2.116138513	1419.029	1419.029	2.01999
501A	500A	201.649	0.72408	0.603401155	0.699901868	2.111658773	1412.310	1412.310	2.01787
500A	500	199.159	0.71105	0.59254039	0.684752309	2.085590772	1373.052	1373.052	2.00518
500	EXMH101	198.739	0.70884	0.590700805	0.682180589	2.081185195	1366.393	1366.393	2.00298

Design Parameters (Per OSDG)	
Manning's Coefficient =	0.013
1:2 Year Intensity =	732.951 / (Tc + 6.199)^0.810
1:5 Year Intensity =	998.071 / (Tc + 6.053)^0.814
1:10 Year Intensity =	1174.184 / (Tc + 6.014)^0.816

Note: Tc is the time of concentration in minutes

Legend

75.43 Existing (As-Built Information)

Existing Page Rear Yard Drainage Area =	1.14	ha
Existing Navan Rear Yard Drainage Area =	0.20	ha
Subdivision Drainage Area (excl. uncontrolled and site plan areas) =	2.20	ha
Uncontrolled Areas =	0.13	ha
Site Plan Areas =	3.01	ha
Total Area Excluding EUC Areas =	6.55	ha
EUC Areas =	11.42	
Total Area Including EUC Areas =	17.97	ha

Appendix G1

Modelling Schematics

Legend

Junctions
- Low Points
- High Points
- Outfalls

Storages
- On-Site Storage
- Manholes
- Rear Yard Manholes
- Rear Yard Catchbasin
- POND

Conduits
- Storm Sewers
- Street
- Overland Flow Paths
- Rear Yard Storm

- Pond Orifice
- Outlets
- Subcatchments

N

150 m

PROJECT:

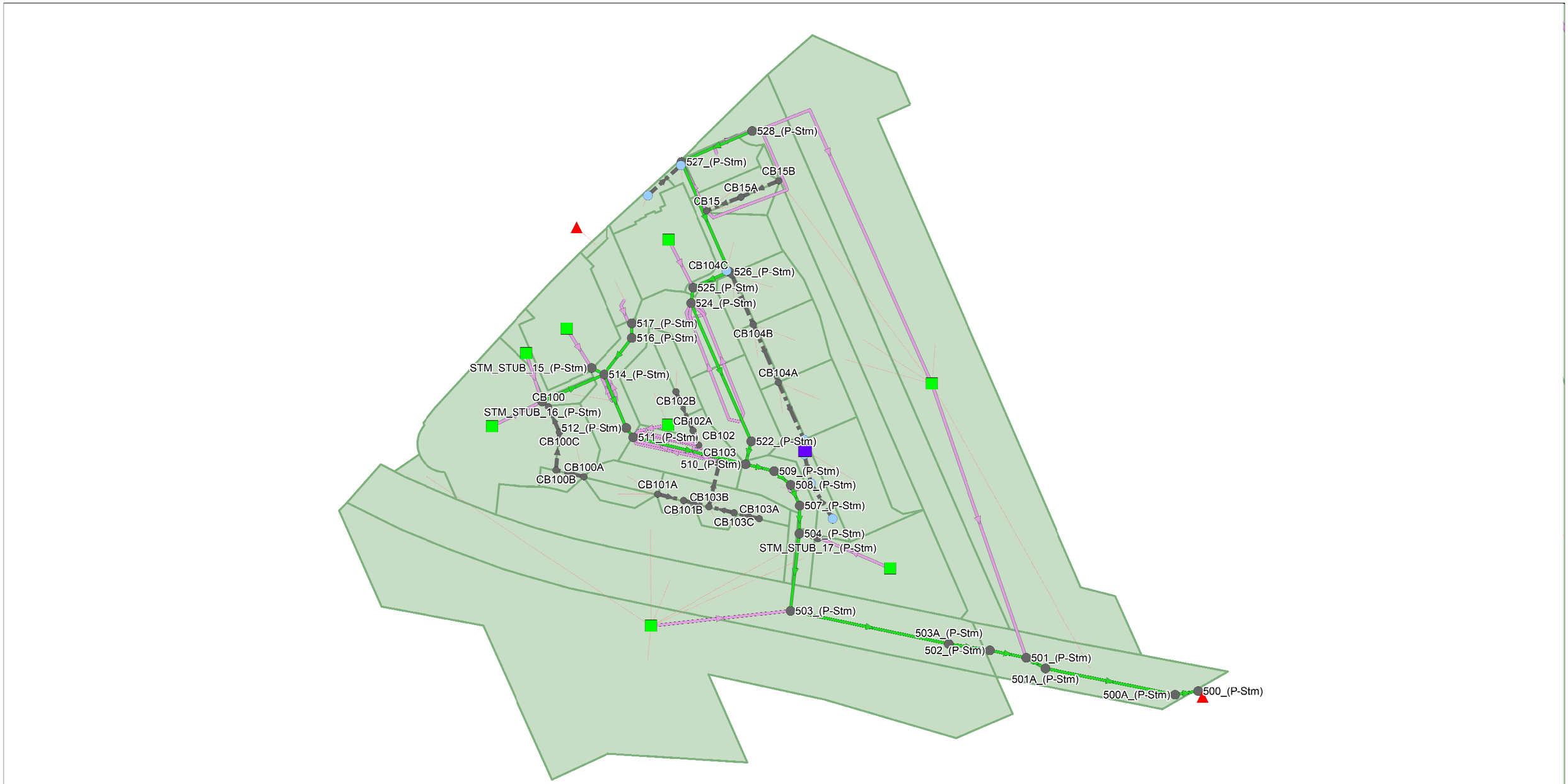
EAST RIDGE ORLEANS SUBDIVISION
Ottawa, ON

DRAWING:

Overall System Model Schematic

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DESIGN:	ML	JLR NO.:	29899-002
DRAWN:	ML	DRAWING NO.:	Figure 3
CHECKED:	BP		



Legend

Storages
- Storage
- Manholes
- Rear Yard Manholes
- Rear Yard Catchbasin
- POND
- POND
- Manholes

Conduits
- Storm Sewers
- Rear Yard Storm

Pond Orifice
- Outlets
- Subcatchments

N

150 m

PROJECT:

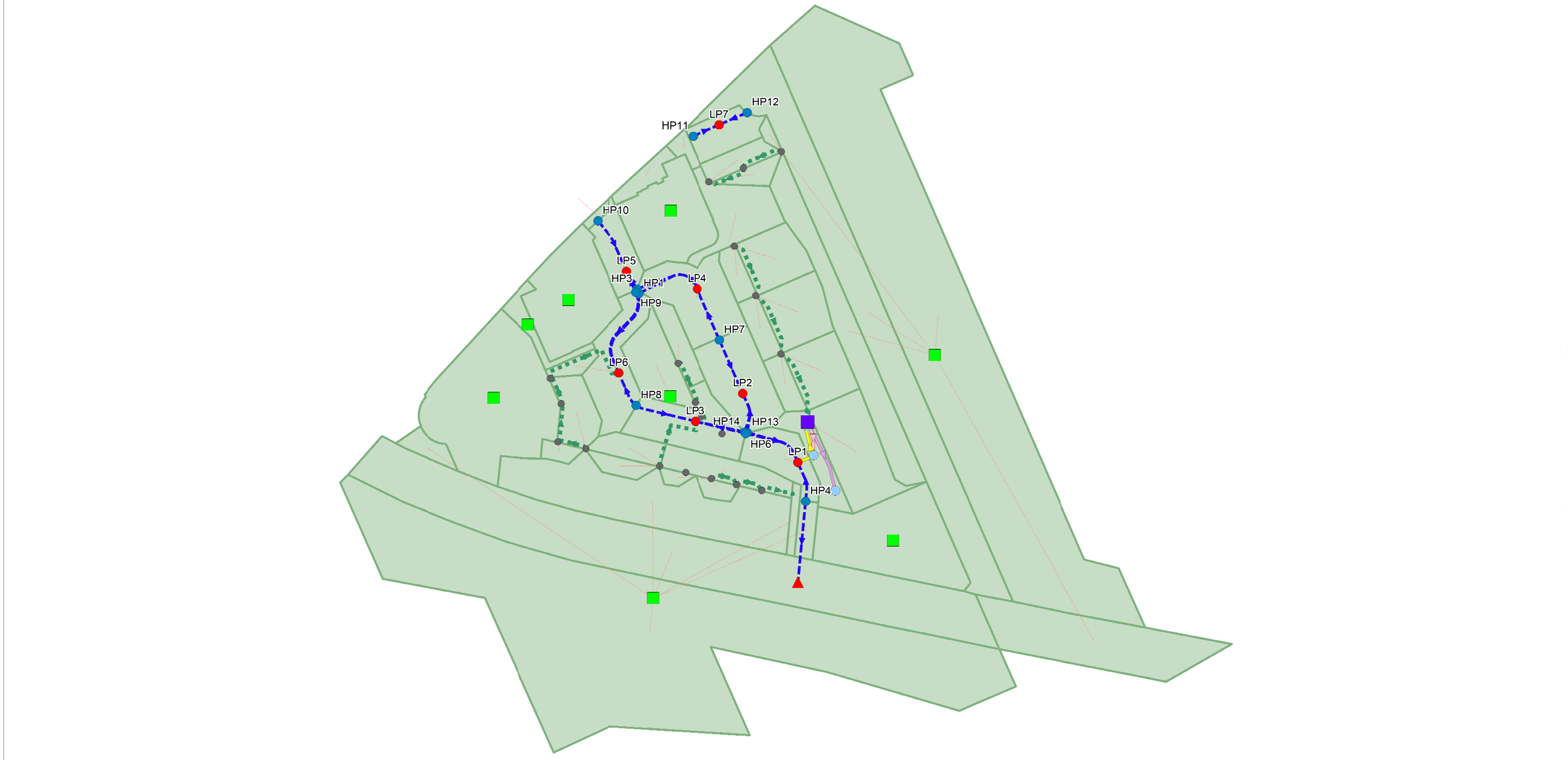
EAST RIDGE ORLEANS SUBDIVISION
Ottawa, ON

DRAWING:

Minor System Model Schematic

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DESIGN:	ML	JLR NO.:	29899-002
DRAWN:	ML	DRAWING NO.:	Figure 2
CHECKED:	BP		



Legend

Junctions
- Low Points
- High Points

Storages
- Storage
- Rear Yard Manholes
- POND
- POND

Conduits
- Street
- Overland Flow Paths
- Pond Orifice

Subcatchments

N

150 m

PROJECT:

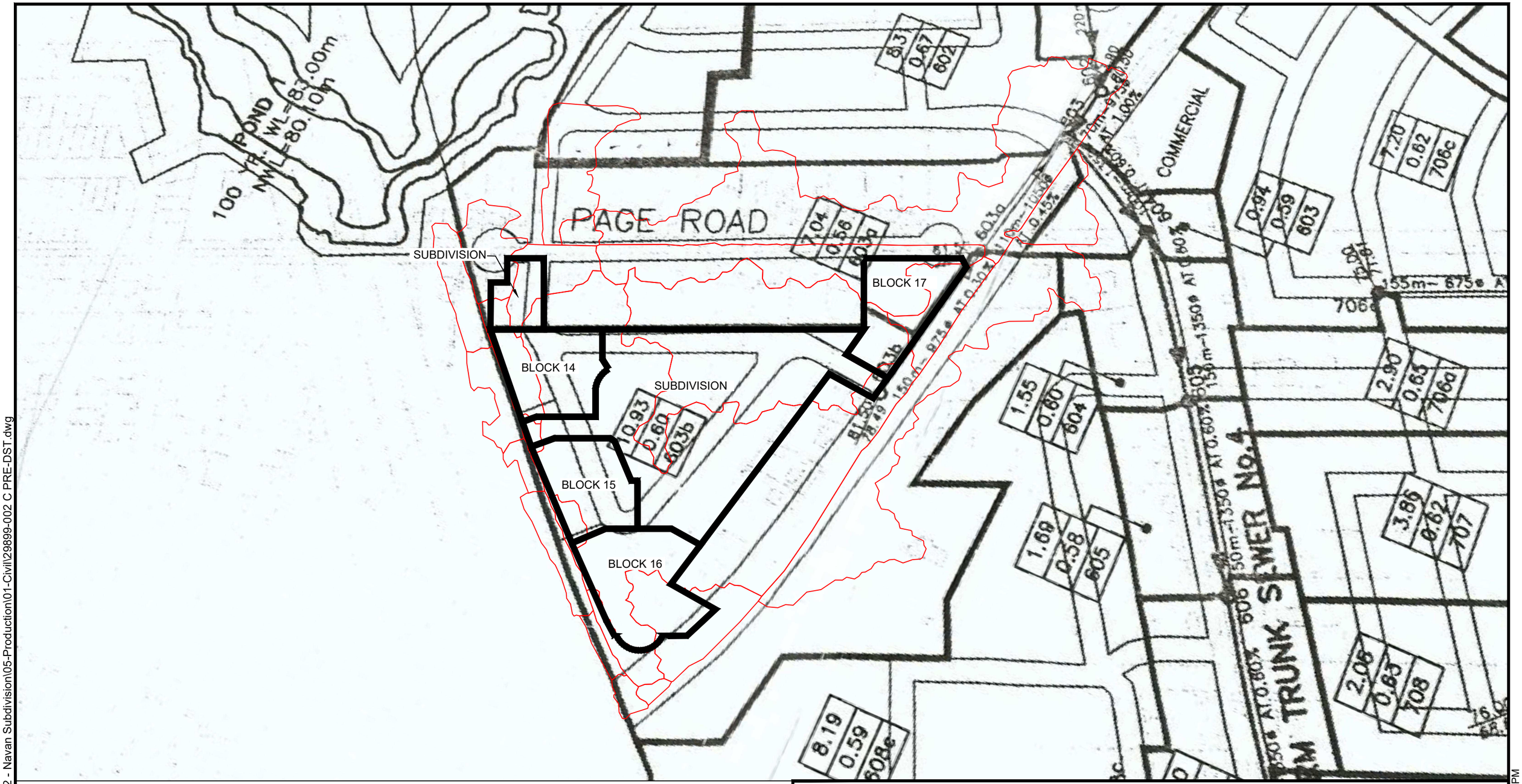
EAST RIDGE ORLEANS SUBDIVISION
Ottawa, ON

DRAWING:

Major System Model Schematic

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DESIGN:	ML	JLR NO.:	29899-002
DRAWN:	ML	DRAWING NO.:	Figure 1
CHECKED:	BP		



LEGEND:

PRE-DEVELOPMENT DRAINAGE AREAS

NAVAN SITE PLAN AND SUBDIVISION BOUNDARY

NOTE:
UNDERLYING CATCHMENT DELINEATION FROM GLOUCESTER EUC INFRASTRUCTURE SERVICING UPDATE 2005 WHICH INFORMED THE ALLOWABLE RELEASE RATES FROM THE SITE AND NO PRE-DEVELOPMENT MODELLING WAS REQUIRED

PROJECT:

2983, 3053 AND 3079 NAVAN RD & 2690 PAGE RD

DRAWING:

PRE-DEVELOPMENT DRAINAGE PLAN

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ENGINEERS · ARCHITECTS · PLANNERS

DESIGN:	BP
DRAWN:	KC
CHECKED:	BP
JLR #:	29899-002

DRAWING #: FIGURE

PLOT DATE: July 26, 2024 2:27:18 PM

File Location: P:\29000\29899-002 - Navan Subdivision\05-Production\01-Civil\29899-002 C PRE-DST.dwg

Modeling Parameters

Subcatchment ID	Outlet	Area (ha)	Width (m)	Flow Length (m)	Slope (%)	Imperv. (%)	N Imperv	N Perv	Dstore Imperv (mm)	Dstore Perv (mm)	Percent Routed (%)	Curve Number	Drying Time (days)
502-501_(1)	St_502-501	3.1344	486.497	64.428	2	42.857	0.013	0.25	1.57	4.67	100	80	7
502-501_(2)	St_502-501	1.0991	433.194	25.372	2	84.286	0.013	0.25	1.57	4.67	100	80	7
502-501_(3)	St_502-501	0.0180	20.17	8.924	2	58.571	0.013	0.25	1.57	4.67	100	80	7
502-501_(4)	St_502-501	0.4403	259.076	16.995	2	42.857	0.013	0.25	1.57	4.67	100	80	7
502-501_(5)	St_502-501	0.5784	163.778	35.316	2	88.571	0.013	0.25	1.57	4.67	100	80	7
503-502_(1)	St_503-502	3.4656	451.432	76.769	2	50	0.013	0.25	1.57	4.67	100	80	7
503-502_(2)	St_503-502	1.7457	462.094	37.778	2	88.571	0.013	0.25	1.57	4.67	100	80	7
503-502_(3)	St_503-502	0.7659	217.123	35.275	2	42.857	0.013	0.25	1.57	4.67	100	80	7
503-502_(4)	St_503-502	0.0579	36.811	15.729	2	42.857	0.013	0.25	1.57	4.67	100	80	7
503-502_(5)	St_503-502	0.0573	41.658	13.755	2	65.714	0.013	0.25	1.57	4.67	100	80	7
507-504_(1)	St_503-502	0.0334	54.019	6.183	0.5	14.286	0.013	0.25	1.57	4.67	100	80	7
507--504_(1)	CB103B	0.0218	17.28	12.616	1	14.286	0.013	0.25	1.57	4.67	80	80	7
507--504_(2)	CB103B	0.0300	21.188	14.159	1	14.286	0.013	0.25	1.57	4.67	80	80	7
507--504_(3)	CB103B	0.1679	91.2	18.41	2	58.571	0.013	0.25	1.57	4.67	80	80	7
508-507_(1)	LP1	0.1754	160.022	10.961	2	65.714	0.013	0.25	1.57	4.67	20	80	7
511-510_(1)	2	0.0562	43.482	12.925	1	14.286	0.013	0.25	1.57	4.67	80	80	7
511--510_(2)	2	0.0886	45.569	19.443	2	58.571	0.013	0.25	1.57	4.67	80	80	7
511--510_(3)	LP3	0.2914	167.712	17.375	2	65.714	0.013	0.25	1.57	4.67	20	80	7
511-510_(4)	PARK_STM_(P-Stm)	0.2002	44.74	44.747	2	28.571	0.013	0.25	1.57	4.67	100	80	7
511--510_(5)	CB102B	0.1000	68.639	14.569	2	58.571	0.013	0.25	1.57	4.67	80	80	7
512-511_(1)	CB100B	0.0363	26.31	13.797	1	14.286	0.013	0.25	1.57	4.67	80	80	7
512--511_(2)	CB100A	0.1410	53.381	26.414	2	58.571	0.013	0.25	1.57	4.67	80	80	7
513--512_(1)	LP6	0.0400	13.12	30.488	2	58.571	0.013	0.25	1.57	4.67	100	80	7
513--512_(2)	LP6	0.2800	194.728	14.379	2	65.714	0.013	0.25	1.57	4.67	20	80	7
517--516_(1)	LP5	0.1516	133.627	11.345	2	65.714	0.013	0.25	1.57	4.67	20	80	7
524-522_(1)	LP4	0.3100	188.679	16.43	2	65.714	0.013	0.25	1.57	4.67	20	80	7
524-522_(2)	LP2	0.3100	151.449	20.469	2	65.714	0.013	0.25	1.57	4.67	20	80	7
527-526_(1)	CB15	0.0849	50.581	16.785	2	58.571	0.013	0.25	1.57	4.67	80	80	7
527-526_(2)	CB15	0.0582	48.351	12.037	2	14.286	0.013	0.25	1.57	4.67	80	80	7
528-527_(1)	LP7	0.1425	43.093	33.068	2	65.714	0.013	0.25	1.57	4.67	20	80	7
BLK14_RY_2	St_L3	0.2276	76.279	29.838	2	12.064	0.013	0.25	1.57	4.67	90.384	80	7
BLK15_RY	BLOCK15_RY	0.0761	10.74	70.857	2	9.895	0.013	0.25	1.57	4.67	100	80	7
Block14	St_525-524	0.3761	58.258	64.558	2	66.388	0.013	0.25	1.57	4.67	100	80	7
GasBar	St_520-519	0.8249	164.871	50.033	2	94.6	0.013	0.25	1.57	4.67	100	80	7
L1_2	St_L1	0.0681	15.82	43.047	2	10.19	0.013	0.25	1.57	4.67	100	80	7
L1_3	St_L2	0.0324	77.605	4.175	2	8.81	0.013	0.25	1.57	4.67	100	80	7
POND_(1)	POND	0.1324	192.386	6.882	2	90	0.013	0.25	1.57	4.67	100	80	7
STUB15-514_(1)	St_515-514	0.4376	103.645	42.221	2	81.429	0.013	0.25	1.57	4.67	100	80	7
STUB17-504_(1)	St_506-505	0.5609	126.215	44.44	2	81.429	0.013	0.25	1.57	4.67	100	80	7
TO_POND_(1)	CB104C	0.1800	79.1	22.756	2	14.286	0.013	0.25	1.57	4.67	80	80	7
TO_POND_(2)	CB104B	0.2069	37.617	55.002	2	14.286	0.013	0.25	1.57	4.67	80	80	7
TO_POND_(3)	CB104A	0.1949	56.769	34.332	2	14.286	0.013	0.25	1.57	4.67	80	80	7
TO_POND_(4)	POND	0.3393	80.609	42.092	2	14.286	0.013	0.25	1.57	4.67	80	80	7
TO_POND_(5)_1	CB104A	0.0697	43.427	16.05	2	58.571	0.013	0.25	1.57	4.67	80	80	7
TO_POND_(5)_3	CB104B	0.0800	49.844	16.05	2	58.571	0.013	0.25	1.57	4.67	80	80	7
TO_POND_(5)_4	CB104C	0.0640	39.875	16.05	2	58.571	0.013	0.25	1.57	4.67	80	80	7
UNCONTROLLED	BrianCoburn	0.0153	13.659	11.201	0.5	65.714	0.013	0.25	1.57	4.67	20	80	7

Appendix G2

CB Tables

STREET CATCHBASINS

Street Name	CB ID Number	T/G	Inlet		Outlet		Rational Method Capture Rate (85 L/s/ha)	Max Depth (100 yr) (m) (Excel)	1:100 Yr Restricted Capture Rate (L/s)	ICD TYPE
			Pipe Dia. (mm)	Invert	Pipe Dia. (mm)	Invert				
PALEO DRIVE	CB01	85.37	-	-	200	84.07	-	-	-	NO ICD
	CBMH517A	85.37	200	84.00	250	83.94	13.00	1.61	12.00	Vortex_ICD_105
	CB02	84.58	-	-	200	83.18	11.00	1.59	11.00	Vortex_ICD_100
	CB03	84.58	-	-	200	83.18	16.00	1.59	23.00	MHF_IPEX_TYPE_A
	CB04	83.87	-	-	200	82.47	12.50	1.64	13.00	Vortex_ICD_105
	CB05	83.87	-	-	200	82.47	12.50	1.64	13.00	Vortex_ICD_105
	CB06	82.3	-	-	200	80.90	7.50	1.54	12.00	Vortex_ICD_105
	CB07	82.3	-	-	200	80.90	7.50	1.54	12.00	Vortex_ICD_105
ROSALIA STREET	CB09	84.82	-	-	200	83.42	13.00	1.63	12.00	Vortex_ICD_105
	CB10	84.82	-	-	200	83.42	13.00	1.63	12.00	Vortex_ICD_105
	CB11	83.85	-	-	200	82.45	13.00	1.64	13.00	Vortex_ICD_105
	CB12	83.85	-	-	200	82.45	13.00	1.64	13.00	Vortex_ICD_105
STOMPIN' TOM LANE	CB13	85.21	-	-	200	83.81	-	-	-	NO ICD
	CB14	85.21	200	83.76	250	83.70	20.00*	1.67	23.00	MHF_IPEX_TYPE_A
EASEMENT	STOMP_TOM_ICD	85.68	675	81.53	300	81.53	22.00	3.89	14.00	Vortex_ICD_95

*The Rational Method Capture Rate along Stompin' Tom Lane is based on the 2-yr Flows

REAR YARD CATCH BASIN TABLE

Street Name	CB ID Number	T/G	Inlet					Outlet				Drop (m)	1:100 Yr Restricted Capture Rate (L/s)	ICD TYPE
			Pipe Dia. (mm)	Pipe Length (m)	Slope	Invert	Cover	Pipe Dia. (mm)	Pipe Length (m)	Invert	COVER (m)			
BLOCK 1	CB15B	85.33	-	-	-	-	-	250	30.41	83.880	1.20		-	NO ICD
	CB15A	85.78	250	30.41	0.5%	83.728	1.80	250	27.48	83.728	1.80		-	NO ICD
	CB15	85.50	250	27.48	0.5%	83.591	1.66	250	40.83	83.591	1.66		14.00	Vortex_ICD_105
BLOCK 11	CB100A	86.08	-	-	-	-	-	250	20.91	84.330	1.50		-	NO ICD
	CB100B	85.70	250	20.91	1.0%	84.118	1.33	250	27.56	84.118	1.33		-	NO ICD
	CB100C	85.53	250	27.56	0.8%	83.885	1.40	250	21.46	83.885	1.40		-	NO ICD
	CB100	85.30	250	21.46	1.2%	83.627	1.42	250	5.50	83.627	1.42		47.00	MHF_IPEX_TYPE_C
BLOCK 2, 3, 4	CB104C	85.50	-	-	-	-	-	250	40.46	83.650	1.60		-	NO ICD
	CB104B	85.10	250	40.46	1.0%	83.226	1.62	250	46.92	83.226	1.62		-	NO ICD
	CB104A	84.00	250	46.92	2.0%	82.288	1.46	250	46.44	82.288	1.46		-	NO ICD
	CB104	82.70	250	46.44	1.5%	81.587	0.86	250	10.05	81.587	0.86		-	NO ICD
POND	CB08A	81.44	-	-	-	-		250	23.18	79.940	1.25		-	NO ICD
	CB08B	81.46	-	-	-	-		250	29.52	79.960	1.25		-	NO ICD
	CBMH08	81.32	250 250	23.18 29.52	0.9% 0.8%	79.728 79.728	1.34 1.34	250	14.99	79.558	1.51	0.17	6.00	Vortex_ICD_65
BLOCK 5	CB102B	84.62	-	-	-	-		250	31.60	82.970	1.40		-	NO ICD
	CB102A	84.38	250	31.60	1.0%	82.654	1.48	250	11.77	82.654	1.48		-	NO ICD
	CB102	83.89	250	11.77	2.0%	82.419	1.22	250	4.51	82.419	1.22		8.00	Vortex_ICD_80
BLOCK 8 & 9	CB101A	85.15	-	-	-	-		900	19.61	81.490	2.76		-	NO ICD
	CB101B	83.86	900	19.61	1.0%	81.294	1.67	900	19.48	81.294	1.67		-	NO ICD
	CB103A	81.90	-	-	-	-		300	17.39	80.650	0.95		-	NO ICD
	CB103C	82.08	300	17.39	0.5%	80.563	1.21	300	20.77	80.563	1.21		-	NO ICD
	CB103B	82.25	900 300	19.48 20.77	1.0% 0.5%	81.099 80.459	0.25 1.49	250	33.45	80.399	1.60	0.06	-	NO ICD
	CB103	84.01	250	33.45	1.0%	80.057	3.70	250	1.60	80.057	3.70		59.00	MHF_IPEX_TYPE_D

Appendix G3

HGL Analysis

NAVAN SUBDIVISION HGL ANALYSIS

MH ID	USF Elevation (m)	1:2 Year Event (12 hr SCS)		1:5 Year Event (12 hr SCS)		1:10 Year Event (12 hr SCS)		1:25 Year Event (12 hr SCS)		1:50 Year Event (12 hr SCS)		1:100 Year Event (12 hr SCS)		1:100 Year Event (24 hr SCS)		1:100 Year Event (3hr Chicago)		Climate Change Event (12 hr SCS)		Historical Storm July 1979		Historical Storm August 1988		Historical Storm August 1996		4 Hour Storm (25MM)	
		Max HGL (m)	Freeboard (m)	Max HGL (m)	Freeboard (m)	Max HGL (m)	Freeboard (m)	Max HGL (m)	Freeboard (m)	Max HGL (m)	Freeboard (m)	Max HGL (m)	Freeboard (m)	Max HGL (m)	Freeboard (m)	Max HGL (m)	Freeboard (m)	Max HGL (m)	Freeboard (m)	Max HGL (m)	Freeboard (m)	Max HGL (m)	Freeboard (m)	Max HGL (m)	Freeboard (m)	Max HGL (m)	Freeboard (m)
500	-	77.51	-	77.51	-	77.51	-	77.51	-	77.51	-	77.51	-	77.51	-	77.51	-	77.51	-	77.56	-	77.56	-	77.56	-	77.51	-
500A	-	77.56	-	77.58	-	77.59	-	77.59	-	77.59	-	77.60	-	77.59	-	77.60	-	77.60	-	77.60	-	77.60	-	77.59	-	77.54	-
501	-	77.69	-	77.75	-	77.76	-	77.78	-	77.78	-	77.79	-	77.79	-	77.79	-	77.79	-	77.79	-	77.79	-	77.77	-	77.63	-
501A	-	77.63	-	77.67	-	77.69	-	77.70	-	77.70	-	77.70	-	77.70	-	77.70	-	77.71	-	77.70	-	77.70	-	77.69	-	77.58	-
502	-	77.72	-	77.81	-	77.83	-	77.86	-	77.87	-	77.87	-	77.87	-	77.88	-	77.88	-	77.88	-	77.87	-	77.84	-	77.62	-
503	-	78.31	-	78.35	-	78.36	-	78.38	-	78.38	-	78.39	-	78.38	-	78.39	-	78.39	-	78.39	-	78.38	-	78.37	-	78.24	-
503A	-	77.86	-	77.91	-	77.93	-	77.95	-	77.96	-	77.97	-	77.97	-	77.97	-	77.97	-	77.97	-	77.97	-	77.94	-	77.79	-
504	-	78.61	-	78.68	-	78.71	-	78.73	-	78.74	-	78.75	-	78.75	-	78.75	-	78.76	-	78.75	-	78.75	-	78.71	-	78.52	-
507	-	79.44	-	79.48	-	79.50	-	79.52	-	79.53	-	79.53	-	79.53	-	79.53	-	79.54	-	79.53	-	79.53	-	79.51	-	79.38	-
508	81.33	79.51	1.82	79.56	1.77	79.58	1.75	79.60	1.73	79.61	1.72	79.61	1.72	79.61	1.72	79.62	1.71	79.62	1.71	79.61	1.72	79.61	1.72	79.58	1.75	79.44	1.89
509	81.33	79.61	1.72	79.65	1.68	79.67	1.66	79.69	1.64	79.70	1.63	79.71	1.62	79.71	1.62	79.71	1.62	79.72	1.61	79.71	1.62	79.71	1.62	79.68	1.65	79.54	1.79
510	81.87	79.69	2.18	79.74	2.13	79.76	2.11	79.78	2.09	79.79	2.08	79.80	2.07	79.80	2.07	79.80	2.07	79.81	2.06	79.80	2.07	79.80	2.07	79.77	2.10	79.61	2.26
511	82.94	80.20	2.74	80.23	2.71	80.25	2.69	80.26	2.68	80.27	2.67	80.27	2.67	80.27	2.67	80.27	2.67	80.28	2.66	80.27	2.67	80.27	2.67	80.25	2.69	80.14	2.80
512	83.16	80.86	2.30	80.89	2.27	80.90	2.26	80.91	2.25	80.92	2.24	80.92	2.24	80.92	2.24	80.93	2.23	80.93	2.23	80.92	2.24	80.92	2.24	80.91	2.25	80.81	2.35
514	83.16	81.01	2.15	81.04	2.12	81.05	2.11	81.06	2.10	81.07	2.09	81.07	2.09	81.07	2.09	81.07	2.09	81.08	2.08	81.07	2.09	81.06	2.10	81.05	2.11	80.95	2.21
516	-	83.53	-	83.53	-	83.53	-	83.53	-	83.53	-	83.53	-	83.53	-	83.53	-	83.53	-	83.53	-	83.53	-	83.53	-	83.53	-
517	-	83.70	-	83.70	-	83.70	-	83.70	-	83.70	-	83.70	-	83.70	-	83.70	-	83.70	-	83.70	-	83.70	-	83.70	-	83.69	-
522	82.03	80.12	1.91	80.15	1.88	80.17	1.86	80.20	1.83	80.21	1.82	80.21	1.82	80.21	1.82	80.21	1.82	80.22	1.81	80.22	1.81	80.22	1.81	80.17	1.86	80.08	1.95
524	83.77	80.67	3.10	80.70	3.07	80.72	3.05	80.74	3.03	80.75	3.02	80.75	3.02	80.75	3.02	80.75	3.02	80.76	3.01	80.76	3.01	80.75	3.02	80.72	3.05	80.64	3.13
525	-	81.07	-	81.11	-	81.14	-	81.16	-	81.17	-	81.18	-	81.17	-	81.17	-	81.18	-	81.18	-	81.18	-	81.14	-	81.05	-
526	-	81.30	-	81.36	-	81.39	-	81.43	-	81.45	-	81.46	-	81.46	-	81.46	-	81.47	-	81.47	-	81.47	-	81.39	-	81.28	-
527*	85.83	82.30	3.53	83.33	2.50	83.96	1.87	84.58	1.25	84.90	0.93	85.13	0.70	84.90	0.93	85.11	0.72	85.26	0.57	85.26	0.57	85.11	0.72	84.14	1.69	81.97	3.86
528*	85.31	82.30	3.01	83.33	1.98	83.96	1.35	84.58	0.73	84.90	0.41	85.13	0.18	84.90	0.41	85.11	0.20	85.26	0.05	85.26	0.05	85.11	0.20	84.14	1.17	81.97	3.34
***Manholes located along Stompin' Tom Lane. Freeboard calculated from road surface rather than USF**																											

Appendix G4

Street Ponding Areas

Street Segment ID	U/S ID	D/S ID	24-hour SCS Velocity x Depth (m²/s)			
			1:2 year	1:5 year	1:100 year	Climate Change
HP1-LP6	HP1	LP6	0	0	0	0
HP1-MP8	HP1	MP8	0	0	0	0
HP10-MP10	HP10	LP5	0	0	0	0
HP12-LP7	HP12	LP7	0	0	0	0
HP13-LP1	HP13	LP1	0	0	0.016	0.023
HP13-LP2	HP13	LP2	0	0	0.005	0.018
HP14-LP3	HP14	LP3	0	0	0	0
HP3-LP5	HP3	LP5	0	0	0	0.002
HP4-HP2	HP4	MajorNavanRd	0	0	0	0
HP4-LP1	HP4	LP1	0	0	0	0
HP6-LP2	HP14	LP2	0	0	0	0
HP6-LP3	HP6	LP3	0	0	0	0
HP6-MP6	HP6	LP1	0	0	0	0
HP7-LP2	HP7	LP2	0	0	0.004	0.007
HP7-LP4	HP7	LP4	0	0	0.006	0.008
HP8-LP6	HP8	LP6	0	0	0	0
HP8-MP7	HP8	LP3	0	0	0	0
HP9-LP5	HP9	LP5	0	0	0	0
HP9-MP8	HP3	MP8	0	0	0	0.001
HP9-MP9	HP9	LP6	0	0	0	0
MP7_2-LP7	HP11	LP7	0	0	0	0
MP8-LP4	MP8	LP4	0	0	0.005	0.007
RYSW1-Swale_1	CB104C	CB104B	0	0	0.063	0.084
RYSW1-Swale_2	CB104B	CB104A	0	0	0.105	0.148
RYSW1-Swale_3	CB104A	CB104	0	0	0.139	0.212
RY34	CB104	POND	0	0	0.012	0.097

Street Segment ID	U/S ID	D/S ID	12-hour SCS Velocity x Depth (m²/s)			
			1:2 year	1:5 year	1:100 year	Climate Change
HP1-LP6	HP1	LP6	0	0	0	0
HP1-MP8	HP1	MP8	0	0	0	0
HP10-MP10	HP10	LP5	0	0	0	0
HP12-LP7	HP12	LP7	0	0	0	0
HP13-LP1	HP13	LP1	0	0	0.078	0.026
HP13-LP2	HP13	LP2	0	0	0.024	0.022
HP14-LP3	HP14	LP3	0	0	0	0
HP3-LP5	HP3	LP5	0	0	0	0.003
HP4-HP2	HP4	MajorNavanRd	0	0	0	0
HP4-LP1	HP4	LP1	0	0	0	0
HP6-LP2	HP14	LP2	0	0	0	0
HP6-LP3	HP6	LP3	0	0	0	0.005
HP6-MP6	HP6	LP1	0	0	0	0.006
HP7-LP2	HP7	LP2	0	0	0.018	0.008
HP7-LP4	HP7	LP4	0	0	0.025	0.009
HP8-LP6	HP8	LP6	0	0	0	0
HP8-MP7	HP8	LP3	0	0	0	0
HP9-LP5	HP9	LP5	0	0	0	0
HP9-MP8	HP3	MP8	0	0	0	0.001
HP9-MP9	HP9	LP6	0	0	0	0
MP7_2-LP7	HP11	LP7	0	0	0	0
MP8-LP4	MP8	LP4	0	0.009	0.039	0.007
RYSW1-Swale_1	CB104C	CB104B	0	0	0.143	0.084
RYSW1-Swale_2	CB104B	CB104A	0	0	0.292	0.146
RYSW1-Swale_3	CB104A	CB104	0	0	0.444	0.215
RY34	CB104	POND	0	0	0.065	0.101

Street Segment ID	U/S ID	D/S ID	Transect Depth	Velocity (m/s)						
				1:2 year	1:5 year	1:10 year	1:25 year	1:50 year	1:100 year	Climate Change
HP1-LP6	HP1	LP6	0.17							
HP1-MP8	HP1	MP8	0.17							
HP10-MP10	HP10	LP5	0.175							
HP12-LP7	HP12	LP7	0.23							
HP13-LP1	HP13	LP1	0.17					0.260	0.260	0.310
HP13-LP2	HP13	LP2	0.17					0.040	0.110	0.270
HP14-LP3	HP14	LP3	0.17							0.040
HP3-LP5	HP3	LP5	0.17							0.040
HP4-HP2	HP4	MajorNavanRd	0.175							0.160
HP4-LP1	HP4	LP1	0.175							0.020
HP6-LP2	HP14	LP2	0.17							0.030
HP6-LP3	HP6	LP3	0.17							0.080
HP6-MP6	HP6	LP1	0.17							0.230
HP7-LP2	HP7	LP2	0.175				0.030	0.030	0.040	0.110
HP7-LP4	HP7	LP4	0.175				0.020	0.060	0.080	0.120
HP8-LP6	HP8	LP6	0.175							
HP8-MP7	HP8	LP3	0.175							
HP9-LP5	HP9	LP5	0.17							
HP9-MP8	HP3	MP8	0.17							0.050
HP9-MP9	HP9	LP6	0.17							
MP7_2-LP7	HP11	LP7	0.175							
MP8-LP4	MP8	LP4	0.175		0.040	0.040	0.050	0.060	0.060	0.080
RYSW1-Swale_1	CB104C	CB104B	0.3					0.410	0.500	0.560
RYSW1-Swale_2	CB104B	CB104A	0.3					0.610	0.750	0.890
RYSW1-Swale_3	CB104A	CB104	0.3					0.730	0.920	1.090
RY34	CB104	POND	0.3						0.810	1.210

STREET PONDING TABLE

Ponding Area ID	Top of Grate (m)	Maximum Static Depth (m)	1:2 year		1:5 year Depth		1:10 year		1:25 year		1:50 year		1:100 year		Climate Change		Lowest Opening Grade (m)
			Total Ponding Depth (m)	Max. HGL (m)	Total Ponding Depth (m)	Max. HGL (m)	Total Ponding Depth (m)	Max. HGL (m)	Total Ponding Depth (m)	Max. HGL (m)	Total Ponding Depth (m)	Max. HGL (m)	Total Ponding Depth (m)	Max. HGL (m)	Total Ponding Depth (m)	Max. HGL (m)	
1A	85.37	0.09	0.06	85.43	0.1	85.47	0.12	85.49	0.15	85.52	0.17	85.54	0.18	85.55	0.21	85.58	-
1B	85.37	0.09	0.06	85.43	0.10	85.47	0.12	85.49	0.15	85.52	0.17	85.54	0.18	85.55	0.21	85.58	-
2	84.58	0.29	0.04	84.62	0.09	84.67	0.12	84.70	0.15	84.73	0.17	84.75	0.19	84.77	0.24	84.82	85.24
3	83.87	0.25	0.06	83.93	0.11	83.98	0.14	84.01	0.18	84.05	0.21	84.08	0.24	84.11	0.28	84.15	84.55
4	82.30	0.15	0.01	82.31	0.06	82.36	0.09	82.39	0.12	82.42	0.12	82.42	0.13	82.43	0.16	82.46	83.80
5	84.82	0.25	0.09	84.91	0.15	84.97	0.18	85.00	0.21	85.03	0.22	85.04	0.23	85.05	0.25	85.07	85.18
6	83.85	0.14	0.07	83.92	0.13	83.98	0.16	84.01	0.19	84.04	0.22	84.07	0.24	84.09	0.28	84.13	84.32
7	85.21	0.24	0	-	0.04	85.25	0.08	85.29	0.11	85.32	0.14	85.35	0.16	85.37	0.21	85.42	85.92

Appendix G5

Historical References

STORM SEWER CALCULATION SHEET (RATIONAL METHOD) - POND 3

Manning's 0.013 **Return Frequency** = 5 years

		AREA (Ha)							FLOW					SEWER DATA																	
From Node	To Node	R= 0.3	R= 0.5	R= 0.55	R= 0.6	R= 0.75	R= 0.79	R= 0.82	Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc.	Rainfall Intensity	Peak Flow Q (l/s)	DIA. (m) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (m/m)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min.)	RATIO Q/Q full	Upstream OG	Downstream OG	Upstream Invert	Upstream Obvert	Downstream Invert	Downstream Obvert	Drop Structure	US Frost Depth	DS Frost Depth
601A	601	0.00	4.45	0.00	0.00	0.00	1.50	0.00	9.48	9.48	21.00	68.13	645.86	0.76	750	CONC	0.0035	90	687.1	1.5	1.00	0.94	86.00	85.50	81.27	82.03	80.95	81.71		3.97	3.79
601	602	0.00	4.91	0.00	0.00	0.00	1.80	0.00	10.78	20.26	22.00	66.15	1340.16	0.91	900	CONC	0.0055	220	1400.6	2.1	1.72	0.96	85.50	83.90	80.80	81.71	79.59	80.50		3.79	3.40
602	603	0.00	0.66	3.50	0.00	0.97	1.43	1.75	15.42	35.68	23.71	63.03	2248.78	0.99	975	CONC	0.01	70	2338.0	3.0	0.38	0.96	83.90	82.50	79.51	80.50	78.81	79.80	2.26	3.40	2.70
603B	603A	0.00	4.42	3.47	0.00	0.00	1.24	1.80	18.28	18.28	22.00	66.15	1208.89	0.99	975	CONC	0.003	150	1280.5	1.7	1.50	0.94	81.50	81.50	77.50	78.49	77.05	78.04		3.01	3.46
603A	603	0.00	5.58	0.00	0.00	0.00	1.08	0.38	10.99	29.27	23.50	63.39	1855.51	1.07	1050	CONC	0.0045	110	1911.0	2.1	0.86	0.97	81.50	82.50	76.97	78.04	76.48	77.54		3.46	4.96
603	604	0.00	0.66	0.00	0.00	0.00	0.28	0.00	1.53	66.48	25.96	59.41	3949.46	1.37	1350	CONC	0.006	100	4313.1	2.9	0.57	0.92	82.50	80.80	76.17	77.54	75.57	76.94	0.52	4.96	3.86
604	605	0.00	1.03	0.00	0.00	0.00	0.52	0.00	2.57	69.06	26.53	58.56	4043.75	1.37	1350	CONC	0.006	150	4313.1	2.9	0.86	0.94	80.80	78.40	75.05	76.42	74.15	75.52	0.40	4.38	2.88
605	606	0.00	0.89	0.41	0.00	0.00	0.39	0.00	2.72	71.78	27.39	57.33	4115.22	1.37	1350	CONC	0.006	150	4313.1	2.9	0.86	0.95	78.40	77.00	73.75	75.12	72.85	74.22	0.40	3.28	2.78
606	607	0.00	1.66	0.00	0.00	0.00	0.74	0.00	3.93	75.71	28.24	56.17	4252.25	1.37	1350	CONC	0.006	250	4313.1	2.9	1.43	0.99	77.00	76.00	72.45	73.82	70.95	72.32	1.60	3.18	3.68
607	608	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.55	76.26	29.67	54.33	4143.26	1.37	1350	CONC	0.006	90	4313.1	2.9	0.51	0.96	76.00	73.00	69.35	70.72	68.81	70.18	1.10	5.28	2.82
608E	608D	0.41	3.79	0.00	0.00	0.00	1.58	0.00	9.08	9.08	20.00	70.25	637.88	0.91	900	CONC	0.0013	170	680.9	1.0	2.73	0.94	71.00	71.00	68.59	69.50	68.36	69.28		1.50	1.72
608D	608	0.00	0.00	0.00	0.00	0.00	0.39	0.00	0.86	9.94	22.73	64.77	643.62	0.91	900	CONC	0.0013	150	680.9	1.0	2.41	0.95	71.00	73.00	68.36	69.28	68.17	69.08		1.72	3.92
608C	608B	0.00	2.57	3.82	0.00	0.00	1.80	0.00	13.37	13.37	19.00	72.53	969.39	0.84	825	CONC	0.005	60	1058.9	1.9	0.52	0.92	74.00	74.00	69.50	70.33	69.20	70.03		3.67	3.97
608B	608A	0.00	3.12	0.00	0.00	0.00	0.96	0.00	6.45	19.81	19.52	71.32	1412.95	0.99	975	CONC	0.005	120	1653.2	2.1	0.93	0.85	74.00	72.80	69.04	70.03	68.44	69.43		3.97	3.37
608A	608	1.26	2.29	0.00	0.00	0.00	1.25	0.00	6.98	26.79	20.45	69.27	1855.82	1.07	1050	CONC	0.005	70	2014.4	2.3	0.52	0.92	72.80	73.00	68.37	69.43	68.02	69.08		3.37	3.92
608	609	0.00	2.60	0.00	0.00	0.00	1.11	0.00	6.05	119.04	30.18	53.70	6392.78	1.98	1950	CONC	0.002	290	6638.9	2.2	2.24	0.96	73.00	76.00	67.10	69.08	66.52	68.50	0.46	3.92	7.50
700	701	16.26	2.78	0.00	0.00	1.39	4.09	0.00	29.31	29.31	25.00	60.90	1784.60	0.91	900	CONC	0.0095	170	1840.8	2.8	1.01	0.97	86.00	86.50	81.53	82.45	79.92	80.83	1.33	3.56	5.67
701A	701	0.00	6.89	0.00	0.00	0.00	0.00	1.29	12.52	12.52	15.00	83.56	1045.95	0.84	825	CONC	0.005	330	1058.9	1.9	2.87	0.99	86.50	86.50	82.96	83.80	81.31	82.15	2.65	2.70	4.35
701	702	0.00	1.56	0.00	0.00	0.00	0.46	1.30	6.14	47.97	26.01	59.33	2845.74	0.99	975	CONC	0.023	210	3545.7	4.6	0.76	0.80	86.50	79.00	78.51	79.50	73.68	74.67		7.00	4.33
702A	702	0.00	0.00	0.00	0.00	3.11	1.67	0.00	10.15	10.15	20.00	70.25	713.19	0.61	600	CONC	0.02	150	905.9	3.1	0.81	0.79	83.50	79.00	78.89	79.50	75.89	76.50	1.83	4.00	2.50
702	703	0.00	0.00	0.36	0.00	0.00	0.54	0.00	1.74	59.85	26.77	58.21	3483.92	1.07	1050	CONC	0.024	210	4413.3	4.9	0.71	0.79	79.00	71.00	73.60	74.67	68.56	69.63		4.33	1.37
703	704	5.02	0.00	0.41	0.00	0.00	0.41	0.00	5.71	65.57	27.48	57.20	3750.72	1.83	1800	CONC	0.0012	160	4154.1	1.6	1.69	0.90	71.00	70.80	67.80	69.63	67.61	69.44		1.37	1.36
704	705	0.99	0.00	0.55	0.00	3.19	0.45	0.00	9.31	74.87	29.17	54.96	4115.38	1.83	1800	CONC	0.0013	180	4323.7	1.6	1.82	0.95	70.80	70.50	67.61	69.44	67.38	69.20		1.36	1.30
705A	705	0.00	0.00	2.06	0.00	0.00	1.74	0.00	6.97	6.97	23.00	64.29	448.15	0.69	675	CONC	0.003	80	480.3	1.3	1.03	0.93	71.50	70.50	68.76	69.44	68.52	69.20		2.06	1.30
705	706	0.00	0.00	0.92	0.00	0.00	0.44	0.00	2.37	84.22	30.99	52.75	4442.71	1.98	1950	CONC	0.001	160	4694.4	1.5	1.75	0.95	70.50	71.00	67.22	69.20	67.06	69.04		1.30	1.96
706C	706B	0.00	0.00	5.20	0.00	0.00	2.00	0.00	12.34	12.34	21.00	68.13	840.94	0.69	675	CONC	0.012	155	960.6	2.6	0.99	0.88	75.00	72.00	71.13	71.81	69.27	69.95		3.19	2.05
706B	706A	0.00	0.00	0.64	0.00	0.00	0.22	0.00	1.46	13.80	21.99	66.16	913.32	0.76	750	CONC	0.007	80	971.7	2.1	0.63	0.94	72.00	72.00	69.19	69.95	68.63	69.39		2.05	2.61
706A	706	0.00	0.00	1.74	0.00	0.00	1.16	0.00	5.21	19.01	22.62	64.98	1235.49	0.91	900	CONC	0.005	70	1335.4	2.0	0.57	0.93	72.00	71.00	68.48	69.39	68.13	69.04		2.61	1.96
706	707	0.00	0.00	0.50	0.00	0.00	0.21	0.00	1.23	104.46	32.74	50.81	5307.00	1.98	1950	CONC	0.0015	100	5749.5	1.9	0.89	0.92	71.00	72.00	67.06	69.04	66.91	68.89		1.96	3.11
707	708	0.00	0.00	2.66	0.00	0.00	1.20	0.00	6.70	111.16	33.63	49.87	5543.80	1.98	1950	CONC	0.0015	175	5749.5	1.9	1.56	0.96	72.00	76.00	66.91	68.89	66.65	68.63		3.11	7.37
708	609	0.00	0.00	1.38	0.00	0.00	0.67	0.00	3.58	114.74	35.20	48.33	5545.19	1.98	1950	CONC	0.0015	85	5749.5	1.9	0.76	0.96	76.00	76.00	66.65	68.63	66.52	68.50	0.46	7.37	7.50
609	610	0.00	3.00	0.00	0.00	0.00	1.21	0.00	6.83	240.60	35.96	47.62	11456.50	1.52	1500 x 4200	CONC	0.002	160	14595.0	2.3	1.15	0.78	76.00	72.00	66.52	68.04	66.20	67.72		7.96	4.28
610	Outlet	0.00	3.98	0.00	0.00	0.00	0.96	0.00	7.64	248.25	37.11	46.58	11563.06	1.52	1500 x 4200	CONC	0.002	100	14595.0	2.3	0.72	0.79	72.00	70.00	66.20	67.72	66.00	67.52		4.28	2.48
800	801	0.00	0.00	2.51	0.00	0.00	0.73	0.00	5.44	5.44	18.00	74.97	407.91	0.84	825	CONC	0.001	140	473.6	0.9	2.72	0.86	70.00	70.00	67.60	68.44	67.46	68.30		1.56	1.70
801	802	0.00	0.00	1.02	0.00	0.00	0.34	0.00	2.31	7.75	20.72	68.71	532.33	0.91	900	CONC	0.001	80	597.2	0.9	1.47	0.89	70.00	70.00	67.38	68.30	67.30	68.22		1.70	1.78
802	803	0.00	0.00	2.06	0.00	0.00	0.77	0.00	4.84	12.59	22.19	65.79	828.22	1.07	1050	CONC	0.001	195	900.9	1.0	3.22	0.92	70.00	70.00	67.15	68.22	66.96	68.02		1.78	1.98
803	804	0.00	0.00	1.60	0.00	0.00	0.75	0.00	4.09	16.68	25.41	60.25	1005.07	1.07	1050	CONC	0.0013	80	1027.1	1.1	1.16	0.98	70.00	70.00	66.96	68.02	66.85	67.92		1.98	2.08
804	805	0.00	0.00	2.76	0.00	0.00	0.83	0.00	6.04	22.72	26.57	58.50	1329.38	1.22	1200	CONC	0.0012	285	1409.0	1.2	3.94	0.94	70.00	70.00	66.70	67.92	66.36	67.58		2.08	2.42
805	806	0.00	0.00	1.51	0.00	0.00	0.70	0.00	3.85	26.57	30.51	53.32	1416.74	1.22	1200	CONC	0.0013	80	1466.5	1.3	1.06	0.97	70.00	70.00	66.36	67.58	66.26	67.47		2.42	2.53
806	807	0.86	0.00	1.24	0.00	0.00	0.41	0.00	3.51	30.08	31.57	52.09	1567.14	1.22	1200	CONC	0.0017	70	1677.0	1.4	0.81	0.93	70.00	70.00	66.26	67.47	66.14	67.36		2.53	2.64
807	Outlet	0.00	0.00	0.86	0.00	0.00	0.34	0.00	2.06	32.15	32.38	51.19	1645.68	1.22	1200	CONC	0.0017	80	1677.0	1.4	0.93	0.98	70.00	70.00	66.14	67.36	66.00	67.22		2.64	2.78

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 IDF Curve
2) Min Velocity = 0.80 m/sec

Designed: B.D

Checked: F.W

Dwg. : STM / STM P1

PROJECT: Gloucester EUC Infrastructure Servicing Study Update

LOCATION: Stormwater Management Pond 3

File Ref. 1634-00493

Date: March-05

Sheet No. 1 of 1

N

- STORM SEWER AND MANHOLE
- STORM TRUNK SEWER AND MANHOLE
- STORM CATCHMENT AREA (POND #1)
- STORM CATCHMENT AREA (POND #2)
- STORM CATCHMENT AREA (POND #3)
- 30m CREEK BUFFER
- ORIGINAL GROUND / OBVERT
- AREA (ha) / RUNOFF COEFFICIENT / MANHOLE No.
- AREAS OF INSUFFICIENT COVER (LESS THAN 2.0m)

1. "PONDS 1 AND 3 EAST URBAN COMMUNITY DESIGN BRIEF" (STANTEC CONSULTING, APRIL 2001)
2. "CITY OF GLOUCESTER EAST URBAN COMMUNITY MASTER DRAINAGE PLAN" (GORE & STORRIE, 1992)
3. WATER LEVEL TO BE CONFIRMED AS PART OF THE REDESIGN OF POND 3.

PROPOSED SITE,
2983-3053-3079 Navan Road and
2690 Pagé Road

HYDRO CORRIDOR
PROPOSED TRANSITWAY
PROPOSED BLACKBURN BY-PASS EXTENSION
MER BLEUE ROAD
FOURTH LINE ROAD
PAGE ROAD
NAVAN ROAD
WALL ROAD
SAPHIR AVE.
GRAND PRE
ABANDONED C.P.R. RIGHT OF WAY
STORM TRUNK SEWER No.1
STORM TRUNK SEWER No.2
STORM TRUNK SEWER No.3
STORM TRUNK SEWER No.4
STORM TRUNK SEWER No.5
STORM TRUNK SEWER No.6

POND 1
100 YR. WL=87.00m
NWL=80.10m

POND 2
100 YR. WL=80.00m
(2)

POND 3
100 YR. WL=68.50m
NWL=67.00m
(3)

WSI LANDFILL

SCHOOL
PARK
INSTIT.
INSTITUTIONAL
COMMERCIAL
ESCARPMENT
FIRE HALL

REVISION No.2 MARCH, 2005

CITY OF OTTAWA
GLOUCESTER EUC INFRASTRUCTURE
SERVICING STUDY UPDATE

STORM SEWER SYSTEM

Scale: 0 40 120 200m
Dwg. No.: STM
Own By: E.C.
Date: 04.10.29
Revision: 2

Appendix G6

Runoff Coefficients

2022-12-01
Our File: 29899-000

Runoff Coefficient
2983, 3053, and 3079 Navan Road & 2690 Page Road

The proposed development is comprised of four (4) subject properties under (1) Draft Plan of Subdivision and four (4) Site Plan Applications. In total there are 67 row townhouse units, six (6) condominium units and a gas station and retail establishment.

1. ROW TOWNHOUSE BLOCK:

An average run-off coefficient was calculated for front yard and rear yard of the smallest block (Block 4) which contains five (5) townhouse units. The runoff coefficients are based on zoning setbacks and a maximum driveway width of 50% of the area of the front yard as stated in Section 107 (2) in the City of Ottawa Zoning By-Laws. Since this scenario has the highest ratio of house area to greenspace, the resulting run-off coefficient would be the highest of any scenario for a townhouse block.

Unit Information

Unit Width	5.80	m
Block Depth	29.9	m
Unit Area	97	m^2
Total Number of Units	5	units
Number of Interior Units	4	units
Number of End Units	1	units
Corner Unit Width	6.25	m
Min. Corner Yard Setback	3	m
Min. Rear Yard Setback	7.5	m
Min. Front Yard Setback	3	m

Block Area

Total Block Area = (5.80 x 4 + 9.25 x 1) x 29.9 = 970.26 m^2 **(A_T)**
Zoning Footprint (Internal Unit) = (29.9 - 7.5 – 3) m x 5.80m = 112.52 m^2 **(B_T)**
Zoning Footprint (End Unit) = (29.9 - 7.5 - 3) x 6.25 = 121.25 m^2 **(C_T)**
Unit Driveway Area (50% of Front Yard Area) = 8.7 m^2 **(D_T)**

Assuming each lot has a highpoint at the centre, the unit and lot areas could be divided equally between the front and rear yards.

Rear Area:

Block Rear Area = $\frac{AT}{2} = \frac{970.26}{2}$ = 485.13 m^2 **(E_T)**

By: MM

Number of Internal Units: 4
Number of End Units: 1
Rear Impervious (House) Footprint: $\frac{4(BT)+1(CT)}{2} = \frac{4(112.52)+1(121.25)}{2}$ = 285.67 m^2 **(F_T)**

Front Area:
Block Front Area = Block Rear Area = 485.13 m^2 **(G_T)**
Number of Internal Units: 4
Number of End Units: 1
Front Impervious (House/Driveway) Footprint: $F_T + 6D_T = 285.67 + 5(8.7)$ = 329.17 m^2 **(I_T)**

Using a run-off coefficient of 0.2 for grassed areas and 0.9 for impervious areas (houses and driveways) the following weighted averages are calculated:

Run-off Coefficient:
Rear Coefficient = $\frac{0.2(E_T-F_T)+0.9F_T}{E_T} = \frac{0.2(485.13-285.67)+0.9(285.67)}{485.13}$ = **0.61** **(C_{RT})**
Front Coefficient = $\frac{0.2(G_T-I_T)+0.9(I_T)}{G_T} = \frac{0.2(485.13-329.17)+0.9(329.17)}{485.13}$ = **0.67** **(C_{FT})**

Summary: The rear yard runoff coefficient used for design is **0.61**

2. 18m ROW Road

A similar approach was used for the ROWs, a weighted average was calculated using the total 18m ROW Road.

Asphalt Road and Sidewalk (C=0.9)
There is approximately 585 m of 8.5 m asphalt road and 630 m of 1.8 m sidewalk. These lengths were measured directly from the Concept Plan in Appendix B1 of the Functional Servicing Report.
The total area of asphalt road is 585 x 8.5 = 4972.50 m^2 **(J_T)**
The total area of sidewalk is 630 x 1.8 = 1134.00 m^2 **(K_T)**

Driveways (C=0.9)
Within the boulevard there are 27 units which have driveways that do not overlap with sidewalks. For these cases the driveways have a width of 4.75 m within the boulevard span a distance of 2.9 m (50% of unit width).

The total area of driveways not fronting sidewalks can be taken as 27 x 4.75 x 2.9 = 371.93 m^2 **(L_T)**

By: MM

Within the boulevard there are 42 units which have driveways that do overlap sidewalks. For these cases the sidewalk width must be subtracted from the driveway boulevard width since it was already considered in **(K_T).** Hence, these driveways span 4.75m - 1.8m = 2.95m within the boulevard and span a distance of 2.9m (50% of unit width).

The total area of driveways fronting sidewalks can be taken as 42 x 2.95 x 2.9 = 359.31 m^2 **(M_T)**

Grassed Area (C=0.2)

The total area of grass is equal to the total ROW Area subtracted by area of asphalt road, sidewalks, and driveways. I.e., Grassed Area = (18 x 585m – (4972.50 + 1134.00 + 371.93 + 359.31 = 3692.26 m^2 **(N_T)**

Table 1 summarizes the total areas within the 18m ROW and their respective c-factors.

Table 1: ROW C-factor breakdown

Description	**Area (m^2)**	**C-Factor**
Asphalt Road	4972.50	0.9
Sidewalk	1134.00	0.9
Driveways not fronting sidewalk (26 units)	371.93	0.9
Driveways fronting sidewalk (41 units)	359.31	0.9
Grass boulevard not fronting sidewalk	3692.26	0.2

3. FRONT YARD AND ROW C-FACTOR

The front yard and ROWs of the subdivision were grouped into one weighted front yard runoff coefficient. The weighted average is derived from the results front yard co-efficient calculated for the ROW townhouse block and from the results in Table 1 for the 18 m ROW.

$$= \frac{(J_T\ x\ 0.9)+(K_T\ x\ 0.9)+(L_T\ x\ 0.9)+(M_T\ x\ 0.9)+(N_T\ x\ 0.2)+\ (69\ x\ 97)\ x\ C_{FT}\ )}{(J_T)+(K_T)+(L_T)+(M_T)+(N_T)+(69\ x(97))}$$

$$= \frac{(4972.50\ x\ 0.9)+(1134x0.9)+(371.93x0.9)+(359.31x0.9)+(3692.26x0.2)+((67\ x(97)\ x\ \mathbf{0.67})}{(\ 4972.50)+(1134)+(371.93)+(359.3)+(3692.26)+(67\ x(97)\ )}$$

= 0.66

By: MM

4. Residential and Commercial Site Plans (Block 14, 15 and 17)

A runoff coefficient was calculated for the residential site plans on Blocks 14, 15 and 17. Block 14 was used for the sample calculations since this block generates the highest ratio of impervious surfaces to grass.

A minimum zoned amenity space of 10% was assumed for the residential site plans. This is more conservative than the City of Ottawa By-Law requirement of 6m^2 per dwelling unit for low-rise apartment dwellings.

Block 14 Information

Total Block Area	0.575	ha
Zoning Limit Area	0.494	ha
Zoning Amenity Area (10% Zoning Limit Area)	0.049	ha **(O_T)**
Zoning Impervious Area (90% Zoning Limit Area)	0.445	ha **(P_T)**

The remaining area of the site plan (outside of the zoning area) is 0.069 ha of grass **(Q_T)** and 0.012 ha of impervious surfaces **(R_T)**.

Given that these are private site plans, a run-off coefficient of 0.25 was used for grassed areas and 0.9 for impervious areas. The following weighted averages are calculated:

$$= \frac{(\mathbf{0.25}\ (O_T+Q_T))+\mathbf{0.9}(P_T+R_T)}{(O_T+Q_T)+(P_T+R_T\ )}$$

$$= \frac{(\mathbf{0.25}\ (0.049+0.0688))+\mathbf{0.9}(0.445+0.0123)}{(0.049+0.0688\ )+(0.455+0.012\ )}$$

$$= \mathbf{0.77}$$

5. Commercial Site Plan (Gas Bar on Block 16)

Since there is minimal grass and amenity space within the industrial site plan a C-factor of **0.9** was assumed for all of Block 16.

6. Dry Pond (Block 13)

A C-factor of 0.83 was assumed for the Dry Pond because the water surface from large storm events would be considered 90% impermeable.

7. Park (Block 7)

A C-factor of 0.40 was assumed for the park given that this area is mainly grassed with minimal infrastructure.

8. **Abutting Existing Units on Navan and Page that drain into 3079 Navan Road**

The C-factor breakdowns based on actual impervious cover within the existing catchment areas are summarized in Table 2 and Table 3. A weighted average was calculated for impervious (C=0.9) and grassed (C=0.2).

Table 2: Existing Units on Navan Road C-factor breakdown

Description	**Area (m^2)**	**C-Factor**
Impervious	0.169	0.9
Grassed	0.971	0.2
Total	1.14	0.3

Table 3: Existing Units on Page Road C-factor breakdown

Description	**Area (m^2)**	**C-Factor**
Impervious	0.096	0.9
Grassed	0.598	0.2
Total	0.694	0.3

Table 4 below presents a summary of run-off coefficients to be used for functional design.

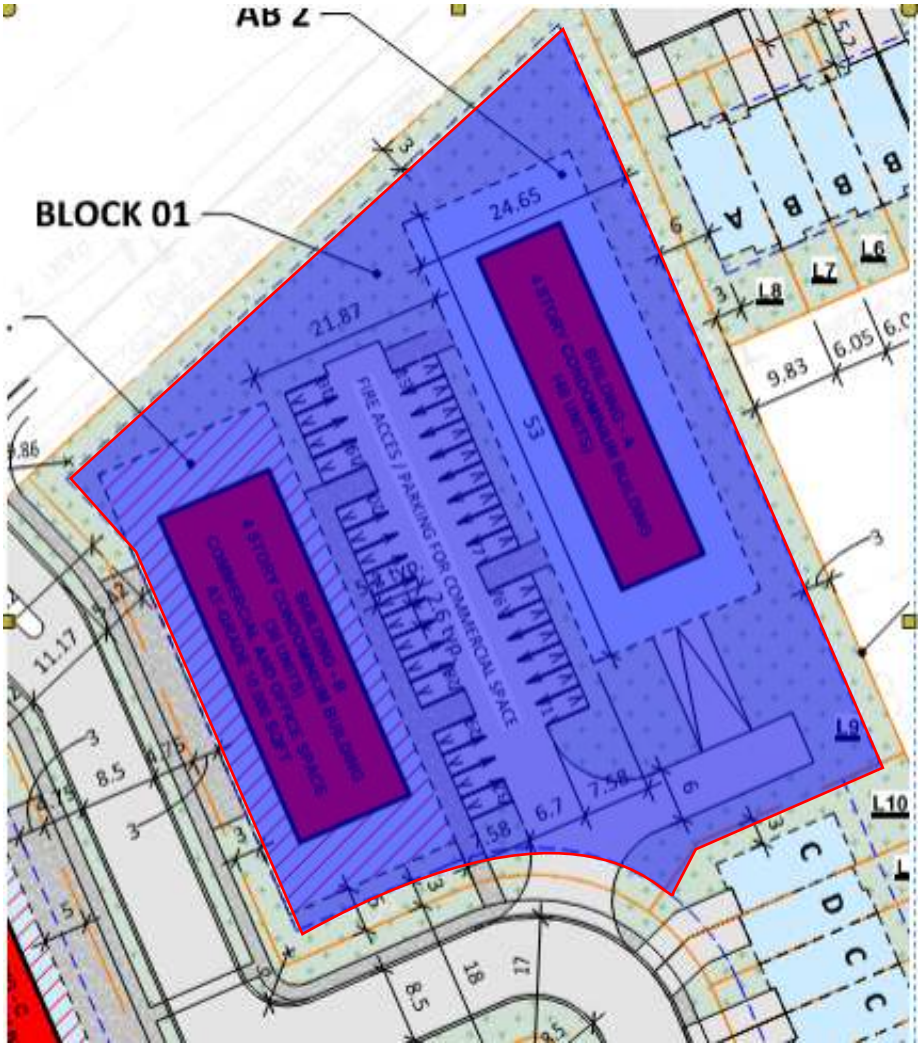
Table 4: Functional Design Run-off Coefficients

Scenario	**Runoff Coefficient (C)**
Rear Yards – Townhouse Units Only	**0.61**
Front Yards and ROW	**0.66**
Residential Site Plan	**0.77**
Industrial Site Plan (Gas Bar)	**0.90**
Abutting Properties on Navan and Page	**0.30**
Park	**0.40**
Dry Pond	**0.83**

SAMPLE C-FACTOR CALCULATION FIGURES

BLOCK 4

BLOCK 14



C-FACTOR CALCULATED BASED ON ZONING SET BACKS AND MAXIMUM DRIVEWAY WIDTH OF 50% AREA OF FRONT YARD

ALL AREAS MEASURED DIRECTLY FROM CONCEPT PLAN IN APPENDIX B1 OF THE FUNCTIONAL SERVICING REPORT

LEGEND

ZONING AREA FOR INTERIOR RESIDENTIAL UNIT

ZONING AREA FOR CORNER RESIDENTIAL UNIT

ZONING AREA FOR SITE PLAN (10% AREA FOR AMENITY SPACE ASSUMED)

PROPERTY LINE (ORANGE LINE IN CONCEPT PLAN)

Appendix G7

Water Quality Excerpts

4.3 POND GRADING AND STORAGE DESIGN

Mild side slopes for safety (average 4:1) have been provided throughout the facility, 5:1 slopes extend 3 m below the permanent water level, and 3:1 within the bottom 0.6 m of the forebay, and along the forebay berms. These slopes have been varied throughout to promote a more natural aesthetic. A 2.0 m wide flat aquatic shelf that will also act as a safety bench has been provided in the grading design below the permanent pool (@ 66.80 m) to enhance the perimeter vegetation for additional shading and quality control functions.

4.3.1 Water Quality and Erosion Control

Maximum permanent water depths within the forebay and wet pond components of the facility are 1.5 m and 1.2 m respectively. Water quality control will be provided to a Normal Protection Level (70% TSS removal efficiency), which is equivalent to former Level 2 as described in the Stormwater Management Planning and Design Manual (MOE, 2003). This is in keeping with the background documentation. The required storage volume is generated from Table 3.1 of the MOE manual, which is based on the percent imperviousness of the tributary drainage area. The total area to Pond 3 is 180.66 ha (including the pond block area), with a weighted percent imperviousness of 45.3%. Therefore, the required total volume is as described in **Table 4.2**. The extended detention volume is defined by the overflow weir (67.90 m), which is constrained by the receiving ditch elevation (67.45 m). As a result, over-control is provided. This configuration contains the 4-hr, 25-mm Chicago storm runoff volume and discharges over the prescribed 36 hours.

Table 4.2: SWM Facility Water Quality Volumes

Total Contributing Area	180.66 ha
Imperviousness of Contributing Area	45.3 %
Unit Area Storage Volume Requirements as per SWMPD	100.3 m^3/ha
Required Total Water Quality Volume	18,113 m^3
Required Permanent Pool Volume	10,887 m^3
Permanent Pool Volume Provided (Total above sediment)	18,986 m^3
Required Extended Detention Volume (40 m^3/ha)	7,226 m^3
Extended Detention Volume Provided	22,873 m^3

4.3.2 Water Quantity Control

Due to the limitations of the surface outlet elevation and pipe capacity (0.19 m^3/s), a degree of over-control above the 25 mm storm is provided in the facility before discharge to the VIA Rail ditch. As a result, the pond outflows are maintained well below the target rates. The secondary pond outlet occurs via a 15.0 m wide weir that discharges to the VIA ditch. The weir will be constructed of concrete to provide a 'sharp-crest' at elevation 67.90 m. The remainder of the channel between the pond and the ditch will be lined with 500 mm diameter rock protection over geotextile.

604-00293: Gloucester East Urban Community, Pond 3 Redesign
Model Input
DDSWMM Input Parameter Summary - EUC

Post Development Subcatchment Parameters													
Model Catchment ID	Downstream Segment	Area (ha)	Imp. (%)	Mannings n (Imp.)	Mannings n (Perv.)	Slope (m/m)	Width (m)	Ia Imp. (mm)	Ia Perv. (mm)	Infiltration Method	fo (mm)	fc (mm)	k (s^{-1})
NW	NSD	ASW	PIMP	CNIMP	CNP	S	WLAT	DETIMP	DETP		MAX	MIN	DECAY
Trunk No. 4													
'A601A'	'601AR'	5.95	38	0.013	0.2	0.02	310	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A601'	'601R'	6.71	39	0.013	0.2	0.02	1000	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A602'	'602R'	6.56	47	0.013	0.2	0.0	295	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A602_COL'	'602R'	1.75	87	0.013	0.2	0.02	900	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A603B'	'603BR'	9.13	34						4.67	Hortons	76.2	13.2	0.0011E
'A603B_COL'	'603BR'	1.80	87						4.67	Hortons	76.2	13.2	0.0011E
'A603A'	'603AR'	6.66	33						4.67	Hortons	76.2	13.2	0.0011E
'A603A_COL'	'603AR'	0.38	87						4.67	Hortons	76.2	13.2	0.0011E
'A603'	'603R'	0.94	41	0.013	0.2	0.02	200	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A604'	'604R'	1.55	43	0.013	0.2	0.02	300	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A605'	'605R'	1.69	39	0.013	0.2	0.02	300	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A606'	'606R'	2.4	41	0.013	0.2	0.02	500	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A607'	'607R'	0.25	82	0.013	0.2	0.02	180	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A608E'	'608ER'	5.78	38	0.013	0.2	0.02	425	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A608D'	'608DR'	0.39	82	0.013	0.2	0.02	300	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A608C'	'608CR'	8.19	40	0.013	0.2	0.02	310	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A608B'	'608BR'	4.08	37	0.013	0.2	0.02	870	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A608A'	'608AR'	4.8	32	0.013	0.2	0.02	715	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A608'	'608R'	3.71	41	0.013	0.2	0.02	580	1.57	4.67	Hortons	76.2	13.2	0.0011E
Trunk No. 5													
'A700'	'700R'	24.52	20	0.013	0.2	0.02	800	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A701A'	'701AR'	6.89	23	0.013	0.2	0.02	660	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A701A_COL'	'701AR'	1.29	87	0.013	0.2	0.0	660	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A701'	'701R'	2.02	37	0.013	0.2	0.02	180	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A701_COL'	'701R'	1.30	87	0.013	0.2	0.02	630	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A702A'	'702AR'	4.78	74	0.013	0.2	0.02	330	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A702'	'702R'	0.90	62	0.013	0.2	0.0	210	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A703'	'703R'	5.84	8	0.013	0.2	0.02	160	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A704'	'704R'	5.18	54	0.013	0.2	0.02	180	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A705A'	'705AR'	3.8	55	0.013	0.2	0.02	470	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A705'	'705R'	1.36	48	0.013	0.2	0.02	320	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A706C'	'706CR'	7.2	46	0.013	0.2	0.02	450	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A706B'	'706BR'	0.86	44	0.013	0.2	0.02	180	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A706A'	'706AR'	2.9	52	0.013	0.2	0.02	540	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A706'	'706R'	0.71	46	0.013	0.2	0.02	160	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A707'	'707R'	3.86	47	0.013	0.2	0.02	350	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A708'	'708R'	2.05	48	0.013	0.2	0.02	360	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A609'	'609R'	4.21	40	0.013	0.2	0.02	470	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A610'	'610R'	4.94	35	0.013	0.2	0.02	920	1.57	4.67	Hortons	76.2	13.2	0.0011E
Trunk No. 6													
'A800'	'800R'	3.24	43	0.013	0.2	0.02	730	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A801'	'801R'	1.36	44	0.013	0.2	0.02	270	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A802'	'802R'	2.83	45	0.013	0.2	0.0	390	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A803'	'803R'	2.35	48	0.013	0.2	0.02	460	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A804'	'804R'	3.59	43	0.013	0.2	0.02	570	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A805'	'805R'	2.21	48	0.013	0.2	0.02	680	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A806'	'806R'	2.51	29	0.013	0.2	0.0	115	1.57	4.67	Hortons	76.2	13.2	0.0011E
'A807'	'807R'	1.2	46	0.013	0.2	0.02	190	1.57	4.67	Hortons	76.2	13.2	0.0011E
Total		176.62											

Overall Imperviousness is 40% across 17.97 ha

1) Standard City of Ottawa Data for Initial Abstraction Parameters, Infiltration values, and width
2) Width based on 225m/ha
3) See Drainage Area Plan
4) Assumed that 100 m^3/ha is available per catchment for storage; excess flow (spill) assumed to enter pond without routing effects

Ontario

Ministry of the Environment **Ministère de l'Environnement**

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 7367-4SUGSG

City of Ottawa
1595 Telesat Court, P.O. Box 8333,
Gloucester, Ontario
K1G 3V5

Site Location: Fourth Line Road Pond No. 3
Pt. Lot 7, Conc. 4, O.F., Plan 4R-7806
City of Ottawa (former City of Gloucester)

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

a stormwater management facility and associated appurtenances to be constructed to service the East Urban Community, located in the former City of Gloucester, now in the City of Ottawa, as follows:

Stormwater Management Facility (Pond No. 3)

A stormwater management facility located on a site on the north side of the Via Rail R.O.W. approx. 1000 m east of Fourth Line and Via Rail R.O.W. intersection, consisting of a stormwater extended detention wet pond with quality/erosion and an adjacent stormwater detention dry cell with quantity control functions. The stormwater management facility has an available storage volume of approx. 18,018 m^3 of detention storage in the dry pond cell, 16,700 m^3 of extended detention (quality/erosion) storage in the main wet pond and 10,467 m^3 of permanent pool storage (including forebay). An inlet forebay is provided to enhance sediment removal. Discharge from the forebay to the main wet pond is provided over the forebay berm. Piping through the forebay berm is provided to empty the forebay for maintenance purposes together with a maintenance hole structure equipped with a sluice gate. Discharge control downstream of the main wet pond is provided via an outlet control structure consisting of a reverse slope sewer pipe and orifice created by a sluice gate, designed to provide quality control by detaining the runoff from the 25 mm - 4 hr design storm event prior to discharge over a 36 hour period to the existing ditch along the north side of Via Rail R.O.W.. Quantity control in the dry cell is provided by attenuating the catchment area post-development flows to the allowable discharge rates of 1.0 m^3/s, 2.3 m^3/s, 4.3 m^3/s and 6.0 m^3/s during the 2, 5, 25 and 100 year design storm events respectively prior to discharging to the existing ditch along the north side of Via Rail R.O.W. and including inlet and outlet piping and control structures, weirs, low flow channel, emergency spillway and fencing and provisions for emptying the pond cells for maintenance and sediment removal;

together with storm sewer outlet piping along the north side of the Via Rail R.O.W. from the stormwater management facility to approximately 210 m east of Fourth Line and Via Rail R.O.W. intersection;

including temporary erosion/sedimentation stormwater management measures during construction, all in accordance with the stormwater management report and final drawings prepared by Stantec Consulting Ltd., Consulting Engineers.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

(1) "Owner" means the Corporation of the City of Ottawa and includes its successors and assignees;

(2) "Environmental Appeal Board" means the Environmental Review Tribunal, as defined in the Environmental Review Tribunal Act, as amended from time to time.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the stormwater works do not constitute a safety or health hazard to the general public.

2. The Owner shall ensure that sediment and excessive decaying vegetation are removed from the above noted stormwater management system at such a frequency as to prevent the excessive buildup and potential overflow of sediment and/or decaying vegetation into the receiving watercourse.

3. OPERATION AND MAINTENANCE

(1) The Owner shall ensure that at all times, the sewage works and the related equipment and appurtenances which are installed or used to achieve compliance with this certificate are properly operated and maintained.

(2) The Owner shall prepare an operations manual for the operation of the sewage works and retain a copy of the manual at the Transportation Utilities and Public Works Department. Upon request, the Owner shall make the manual available for inspection and copying by the Ministry personnel.

(3) The Owner shall ensure that the manual includes the following information:

(a) inspection program including frequency of inspection of the forebay, wet pond, catch basins and manholes for sediment accumulation and method for removal of sediment; and

(b) maintenance program for all the components of the sewage works which need maintenance.

4. WATER QUALITY MONITORING

(1) Composite samples consisting of four (4) grab samples of the effluent shall be collected at the outlet from the wet detention pond at approximately 7, 18, 27 and 35 hours after each of four (4) rainfall events per year (May to September inclusive), and analyzed for the following parameters:

Total Suspended Solids, Total Phosphorus, Oil and Grease (total), Ammonia plus Ammonium, pH and temperature.

(2) In addition to the monitoring requirements specified in sub-section (1), the Owner shall measure the Dissolved Oxygen in the pond at the end of sample collection for each of the four (4) rainfall events noted in sub-section (1).

(3) Pursuant to subsections (1) and (2) the Owner shall prepare and submit in writing a monitoring report to the District Manager by the 31st day of October immediately following the monitoring period;

(4) The monitoring program described in subsections (1), (2) and (3) shall begin when 30% and again at 80% of the lands tributary to the pond being developed. After its inception, the said monitoring program is to span a period of no less than four (4) years in total, not necessarily in succession.

5. RECORD KEEPING AND RETENTION

(1) The Owner shall retain for a minimum of three (3) years or longer if requested in writing by the District Manager, all records and information related to or resulting from the monitoring activities required by this certificate or proposed by the Owner.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed because it is not in the public interest for the Director to approve facilities which, by reason of potential health and safety hazards do not generally comply with legal standards or approval requirements falling outside the purview of this Ministry.

2. Condition 2 is included as regular removal of sediment and excessive decaying vegetation from this approved stormwater management system are required to mitigate the impact of sediment and/or decaying vegetation on the downstream receiving watercourse. It is also required to ensure that adequate storage is maintained in the stormwater management facilities at all times as required by the design.

3. Condition 3 is included to ensure that the sewage works are properly operated and maintained such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented.

4. Conditions 4 and 5 are included to ensure that various water quality parameters of the effluent discharged from the stormwater management pond are monitored and the sewage works is performing as designed.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Appeal Board
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Appeal Board's requirements for an appeal can be obtained directly from the Board at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

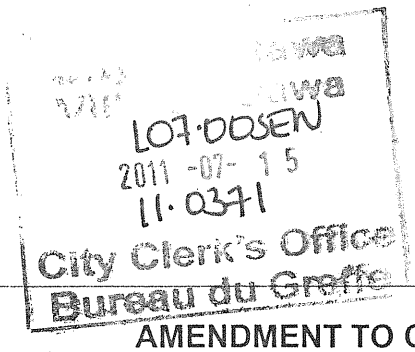
DATED AT TORONTO this 7th day of March, 2001

Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

JC/
c: District Manager, MOE Ottawa
Clerk, City of Ottawa
Curtis Rampersad, Stantec Consulting Limited

EUC 3
SWF - 1933

L07-03-COFA
Zone 9



Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDMENT TO CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 7226-6GLJQM
Notice No. 1
Issue Date: June 24, 2011

Ashcroft Homes - Eastboro Inc.
18 Antares Dr, No. Suite 102
Nepean, Ontario, K2E 1A9

NOTICE -1

Site Location: Eastboro Phase 1A-SWMF WORKS W/ EUC POND #3
Renaud Road, Lot Part Lot 4, Concession 4, City of Ottawa .

You are hereby notified that I have amended Certificate of Approval No. 7226-6GLJQM issued on November 8, 2005 for a Stormwater Management Works, namely EUC Pond # 3 , as follows:

addition of private stormwater quantity control facilities as follows:

1. a super-pipe stormsewer system to receive, store and attenuate upto 100-year return storm surface drainage from an approximately 0.80ha rear yard and parking areas consisting of 74m long 1350mm diameter and 67m long 1200mm diameter storm sewers; finally to discharge into a 450mm diameter pipe upstream of manhole MH #117A at a flow rate of not over 8.8L/s via a flow restricter located at manhole MH #122 (Model Hydrovex 75HV-1 or approved equivalent).

2. a temporary/interim swale located along the north-east corner of the site to receive, store and attenuate upto 100-year return storm surface drainage from an approximately 1.40ha rear yard and parking areas consisting of 150m long, trapezoidal section with bottom width of 2m, side slopes of 3:1, a minimum top width of 8m and a minimum depth of 1m; having a minimum volume of 545cu.m.; finally to discharge into a 375mm diameter pipe downstream of manhole MH #100 at a flow rate not over 6.8L/s, via a flow restricter located at manhole MH #100 (Model Hydrovex 100VHV-1 or approved equivalent);
all flows are to discharge into the existing stormsewer system to be finally collected for quality control in the existing EUC Pond #3 prior discharge into Mud Creek via the existing ditch along north side of the Via Rail right-of-way (ROW).

The reason(s) for this amendment to the Certificate of Approval is (are) as follows: the existing storm sewers downstream of the MH #122 and MH #100 are conceived to be surcharging and the Municipality required flow control as stipulated in the EUC Master Servicing Study.

all in accordance with the **Application for Approval of Municipal and Private Sewage Works, Stormwater Management facilities for Eastboro Subdivision Phase 1A, City of Ottawa,** dated February 08, 2011 and supporting information and documentation prepared by Kris Kilborn and Neal Cody, P.Eng., Stantec Consulting Ltd, Consulting Engineers.

This Notice shall constitute part of the approval issued under Certificate of Approval No. 7226-6GLJQM dated November 8, 2005

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 24th day of June, 2011

THIS NOTICE WAS MAILED
ON June 30 2011
SP
(Signed)

Ian Parrott, P.Eng.

Director
Section 53, *Ontario Water Resources Act*

MN/

c: District Manager, MOE Ottawa
Clerk, the City of Ottawa.
Kris Kilborn / Neal Cody, P.Eng,, Stantec Consulting Ltd.

Ontario

Ministry of the Environment **Ministère de l'Environnement**

AMENDED CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 7226-6GLJQM
Issue Date: November 8, 2005

City of Ottawa
110 Laurier Avenue West
Ottawa, Ontario
K1P 1J1

Site Location: East Urban Community
Lot Part of 7, Concession 4
Ottawa City

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

a stormwater management *Works* to be established in the City of Ottawa (former City of Gloucester) to service the East Urban Community, located on a site on the north side of the Via Rail R.O.W. approx. 1000 m east of Fourth Line and Via Rail R.O.W. intersection, comprised of an elongated stormwater extended detention wet pond with quality/erosion and quantity control functions and including the following:

Stormwater Management *Works* (Pond No. 3)

-an onsite stormwater management *Works* having a minimum permanent pool liquid volume of 10,887 m^3 plus a combined minimum detention storage volume of approx. 33,450 m^3 including a minimum extended detention volume of 19,194 m^3. An inlet forebay is provided to enhance sediment removal for runoff generated by storm events less than or equal to the 4 hr - 25 mm design storm event. Discharge from the forebay to the main wet pond is provided over a weir located on top of an impermeable berm. The forebay weir crest is set at the lowest gravity outlet elevation to empty the forebay for maintenance purposes. Discharge control downstream of the main wet pond is provided via an outlet control structure consisting of a reverse slope sewer pipe and orifice created by a sluice gate, designed to provide quality/erosion control by detaining the extended detention runoff prior to discharge over a 50 hour period to the existing ditch along the north side of Via Rail R.O.W.. Quantity control is provided by attenuating the catchment area post-development flows to below the allowable discharge rates of 1.0 m^3/s, 2.3 m^3/s, 4.3 m^3/s and 6.0 m^3/s during the 2, 5, 25 and 100 year design storm events respectively prior to discharging to the existing ditch along the north side of Via Rail R.O.W. and including inlet control flow-splitter control structure to bypass runoff generated by storm events greater than the 4 hr - 25 mm design storm event directly to the main wet pond, outlet piping and control structures, weirs**,** emergency overflow spillway and fencing and provisions for emptying the pond cells for maintenance and sediment removal;

together with storm sewer outlet piping along the north side of the Via Rail R.O.W. from the stormwater management pond to approximately 210 m east of Fourth Line and Via Rail R.O.W. intersection;

including erosion/sedimentation stormwater management measures during construction, all in accordance with the following submitted supporting documents:

1. Application for Approval of Municipal and Private Sewage Works date stamped received August 26, 2005; and

2. Stormwater management design brief update dated August 22, 2005 and enclosed drawings, prepared by Stantec Consulting Ltd., Consulting Engineers.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"*Certificate*" means this entire certificate of approval document, issued in accordance with Section 53 of the Ontario Water Resources Act, and includes any schedules;

"*Director*" means any *Ministry* employee appointed by the Minister pursuant to section 5 of the Ontario Water Resources

Act;

"*discharge event*" means the period of time during which the discharge flow from the facility is greater than the normal dry-weather discharge flow;

"*District Manager*" means the District Manager of the Ottawa District Office of the *Ministry*;

"*effluent composite sample*" means a composite sample consisting of a number of sample aliquots collected during an entire "discharge event" by means of grab sampling or an automated sampling device.

"*influent composite sample*" means a composite sample consisting of a number of sample aliquots collected during an entire "storm event" by means of grab sampling or an automated sampling device.

"*Ministry*" means the Ontario Ministry of the Environment;

"*Owner*" means the Corporation of the City of Ottawa and includes its successors and assignees;

"*storm event*" means the period of time during which the rain storm generated influent flow to the facility is greater than the normal dry-weather influent flow;

"*Works*" means the sewage works described in the *Owner*'s application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate*, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

(2) Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(3) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

2. EXPIRY OF APPROVAL

The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate*.

3. CHANGE OF OWNER

The *Owner* shall notify the *District Manager* and the *Director*, in writing, of any of the following changes within thirty (30) days of the change occurring:

(a) change of *Owner*;

(b) change of address of the *Owner*;

(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager*; and

(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager*.

4. OPERATION AND MAINTENANCE.

(1) The *Owner* shall ensure that the design minimum liquid retention volume is maintained at all times.

(2) The *Owner* shall inspect the *Works* at least once a year and, if necessary, clean and maintain the *Works* to prevent the excessive buildup of sediments, oil and/or vegetation.

(3) The *Owner* shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook for inspection by the *Ministry*. The logbook shall include the following:

(a) the name of the *Works*; and

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed.

(4) The Owner shall ensure that at all times, the sewage works and the related equipment and appurtenances which are installed or used to achieve compliance with this certificate are properly operated and maintained.

(5) The Owner shall prepare an operations manual for the operation of the *Works* and retain a copy of the manual at the Transportation Utilities and Public Works Department. Upon request, the Owner shall make the manual available for inspection and copying by the Ministry personnel.

(6) The Owner shall ensure that the manual includes the following information:

(a) inspection program including frequency of inspection of the forebay, wet pond, catch basins and manholes for sediment accumulation and method for removal of sediment; and

(b) maintenance program for all the components of the sewage works which need maintenance.

5. WATER QUALITY MONITORING

(1) Composite samples from the influent and effluent of the wet detention pond shall be collected on an approximately monthly basis for five (5) rainfall events per year (May to September inclusive) with a rainfall depth between 7 mm and 20 mm. The *influent composite samples* shall consist of at least four (4) aliquots distributed throughout the duration of the *storm event*. *Effluent composite samples* shall be collected throughout the *discharge event* and consist of at least four (4) aliquots distributed at approximately 7, 18, 27, and 35 hours from the start of the rainfall event. Samples to be analyzed for the following parameters:

Total Suspended Solids, Total Phosphorus.

(2) Pursuant to subsections (1) the Owner shall prepare and submit in writing a monitoring report on an annual basis to the District Manager, by the 31 st day of March of the following year of operation.

(3) The monitoring program described in subsections (1) and (2) shall begin when 30% of the lands tributary to the pond has been developed. After its inception, the said monitoring program is to span a period of no less than four (4) years in total, not necessarily in succession.

6. RECORD KEEPING

The *Owner* shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this *Certificate,* or longer if requested in writing by the District Manager.

7. GENERAL CONDITION

The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the stormwater works do not constitute a safety or health hazard to the general public.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment..

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved works and to ensure that subsequent owners of the works are made aware of the certificate and continue to operate the works in compliance with it.

4. Condition 4 is included to require that the *Works* be properly operated and maintained such that the environment is protected . Regular removal of sediment, oil and excessive decaying vegetation from this approved stormwater management system are required to mitigate the impact of sediment, oil and/or decaying vegetation on the downstream receiving watercourse. It is also required to ensure that adequate storage is maintained in the stormwater management facilities at all times as required by the design.

5. Condition 5 is included to ensure that various water quality parameters of the effluent discharged from the stormwater management pond are monitored and the sewage works is performing as designed.

6. Condition 6 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the *Works*.

7. Condition 7 is imposed because it is not in the public interest for the Director to approve facilities which, by reason of potential health and safety hazards do not generally comply with legal standards or approval requirements falling outside the purview of this Ministry.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 7367-4SUGSG issued on March 7, 2001.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;

2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary* Environmental Review Tribunal 2300 Yonge St., 12th Floor P.O. Box 2382 Toronto, Ontario M4P 1E4	AND	The Director Section 53, *Ontario Water Resources Act* Ministry of the Environment 2 St. Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 8th day of November, 2005

Mohamed Dhalla, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

JC/
c: District Manager, MOE Ottawa
Clerk, City of Ottawa
Dave Eadie, P.Eng., Stantec Consulting Ltd.

Table 4-2: Land Use Pollutant Wash-off Parameters

Land Use	Pollutant				
	Total Suspended Solids (mg/L)	Total Phosphorus (mg/L)	Copper (mg/L)	Zinc (mg/L)	E. Coli (#/100mL)
Agriculture	400	0.35	0.002	0.018	30,000
Commercial	150	0.20	0.020	0.030	30,000
Forest	50	0.12	0.001	0.011	100
Industrial	100	0.35	0.025	0.200	2,000
Institutional	50	0.18	0.015	0.113	8,500
Open Space	70	0.10	0.010	0.020	5,000
Residential	150	0.20	0.025	0.080	40,000
Street	150	0.20	0.020	0.030	40,000

Table 4-3: SWM Facility Pollutant Removal Parameters

SWM Facility	Pollutant Removal (%)				
	Total Suspended Solids	Total Phosphorus	Copper	Zinc	E. Coli
Pond 1	80	52	57	64	70
Pond 2	50	13	33	41	48
Pond 3	80	52	57	64	70

The model was run using rainfall data from the Avalon rain gauge for the period of May 2011 to November 2011. This aligned with the period of water quality monitoring data presented in the Eastern Subwatersheds report to which the modelled Mud Creek results were compared. Pollutant concentrations at seven (7) locations are summarized in **Table 4-4**. The modelled existing conditions pollutant concentrations along Mud Creek generally are comparable to those observed in the surrounding creeks during wet weather flow periods. The E. Coli concentrations presented in the Pinecrest Creek CIS report are approximately one order of magnitude higher than those presented in the Eastern Subwatersheds report which may be indicative of more conservative water quality parameters used in the Pinecrest study and this study. Therefore, modelled E. Coli concentrations in Mud Creek may be overestimated. However, the EMC approach and modelling parameters used in the model are overall considered to provide acceptable estimates of wet weather pollutant concentrations in Mud Creek.

Table 4: Future Development Catchment Imperviousness

Catchment Unique ID	Associated 2014 Existing Conditions Model Catchment Imp. (%)	Total Future Conditions Catchment Area (ha)	Total Roadway Area to be Developed (100% Imp.) (ha)	Total VURLS Area to be Developed (65% Imp.) (ha)	Total Existing Maintained Impervious Area (100% Imp.) (ha)	Future Conditions Model Catchment Imp. (%)
0	11.1	2.0	0.0	0.1	0.0	3.3
1	44.3	6.7	0.0	0.1	3.0**	45.6
2	32.5	8.0	0.6	0.0	2.4	38.2
3	22.2	10.0	0.2	6.6	1.4	58.3
6	13.1	15.9	0.0	13.6	2.1**	65.0
8	3.9	35.8	1.4	3.9	1.2	14.3
34	49.5	39.3	0.0	4.3	19.5**	56.6
35	11.1	2.4	0.3	1.2	0.3	55.2
36*	13.1	13.6	0.0	12.4	1.8**	65.0
37	13.1	4.6	0.0	3.8	0.6**	65.0
38	13.1	8.9	0.0	5.5	2.1***	63.8
39	13.1	11.7	1.0	1.7	2.4	38.6
40	13.1	4.4	0.0	2.5	0.4	45.9
107	42.1	109.3	0.0	1.1	49.1	45.6
~~108~~	~~55.6~~	~~20.6~~	~~0.2~~	~~1.8~~	~~11.4**~~	~~62.5~~
110	32.5	4.5	0.0	4.5	0.0	100.0

* This catchment was mostly developed in 2011, therefore all parameters except for imperviousness were maintained per the 2011 existing conditions model.

** Existing maintained imperviousness calculated using associated existing conditions model catchment imperviousness.

*** Existing maintained imperviousness calculated manually using measurements from aerial photography.

CONVEYANCE CONTROLS

Major and minor system components from the 2014 existing conditions model were revised in areas where development was proposed to occur to reflect the build-out conveyance methods. All major and minor system components used to convey flow from existing conditions catchments were maintained per the existing conditions model. All culvert and creek components were derived from the existing HECRAS model of the area.

All minor system and major system components in the Ashcroft Subdivision model and Chapel Hill Park and Ride model were imported into the Mud Creek future conditions model. This ensured any minor or major system flow from these developments was represented as accurately as possible.

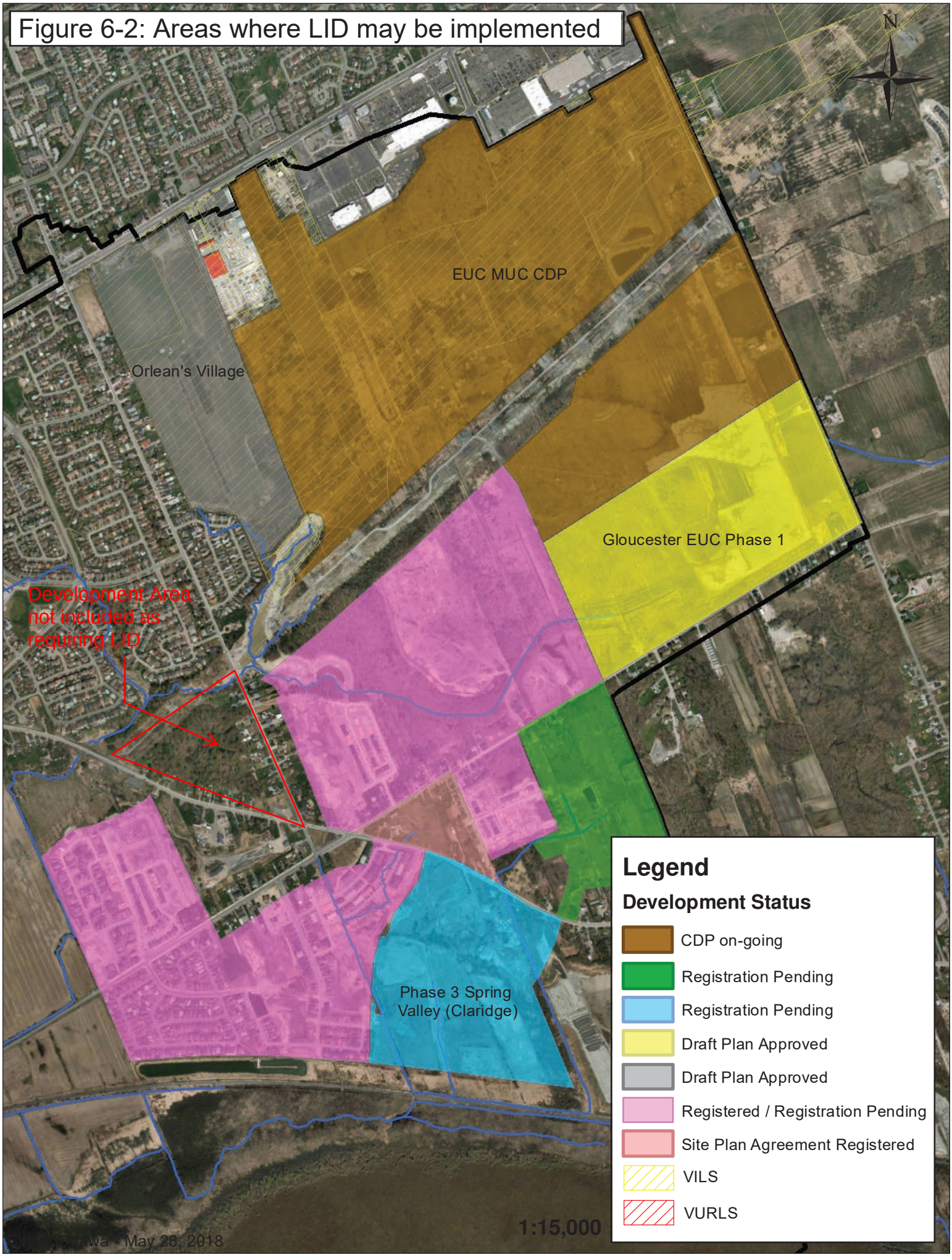
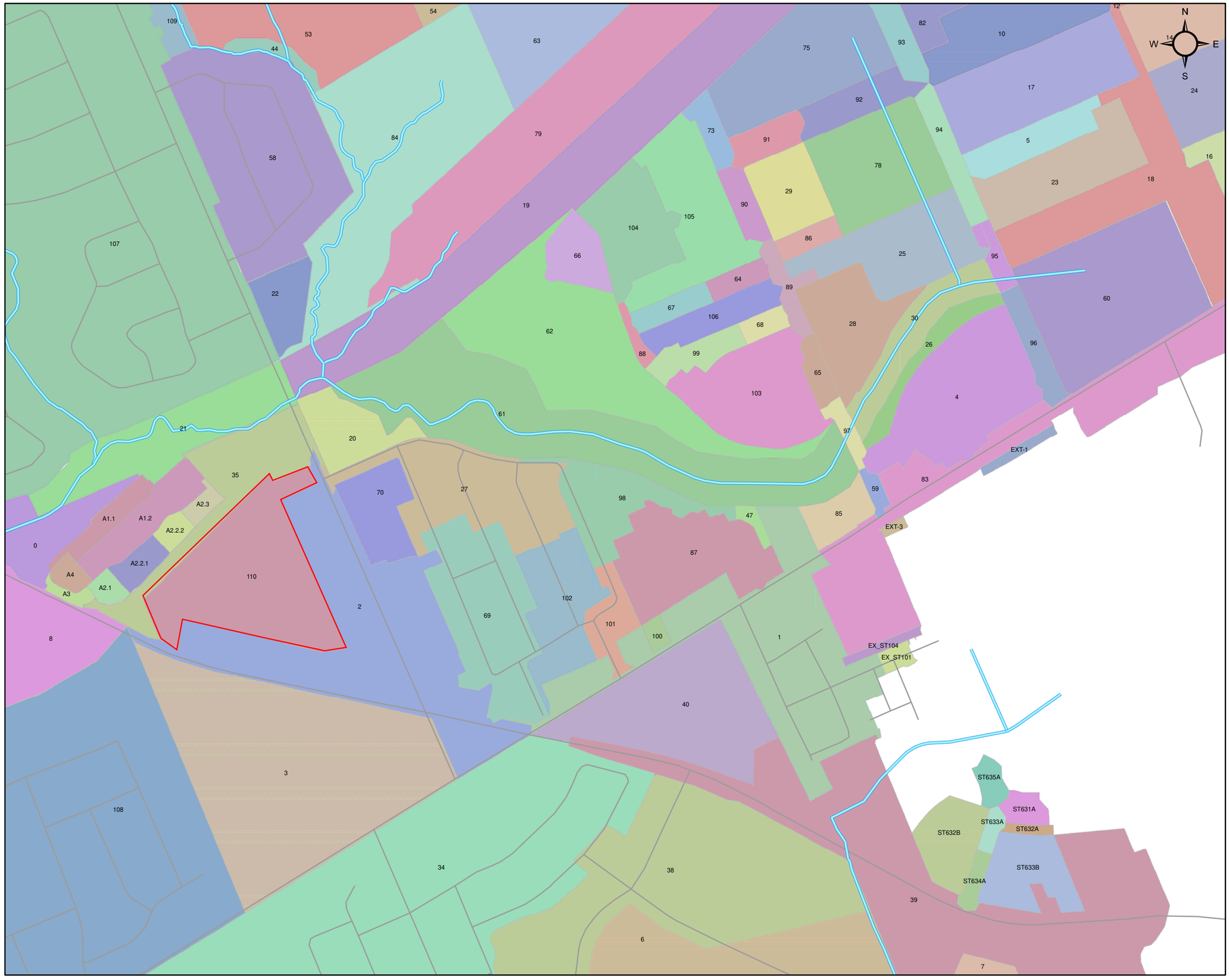


Figure 6-2: Areas where LID may be implemented
N
EUC MUC CDP
Orlean's Village
Gloucester EUC Phase 1
Development Area not included as requiring LID
Phase 3 Spring Valley (Claridge)
Legend
Development Status
CDP on-going
Registration Pending
Registration Pending
Draft Plan Approved
Draft Plan Approved
Registered / Registration Pending
Site Plan Agreement Registered
VILS
VURLS
1:15,000
May 28, 2018



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Legend

- Watercourses
- Future Conditions Model Catchments (varying colours), Labelled by Unique ID
- Snow Disposal Facility

Client / Project:

CITY OF OTTAWA

MUD CREEK
CUMULATIVE IMPACTS STUDY

OTTAWA, ON

Title:

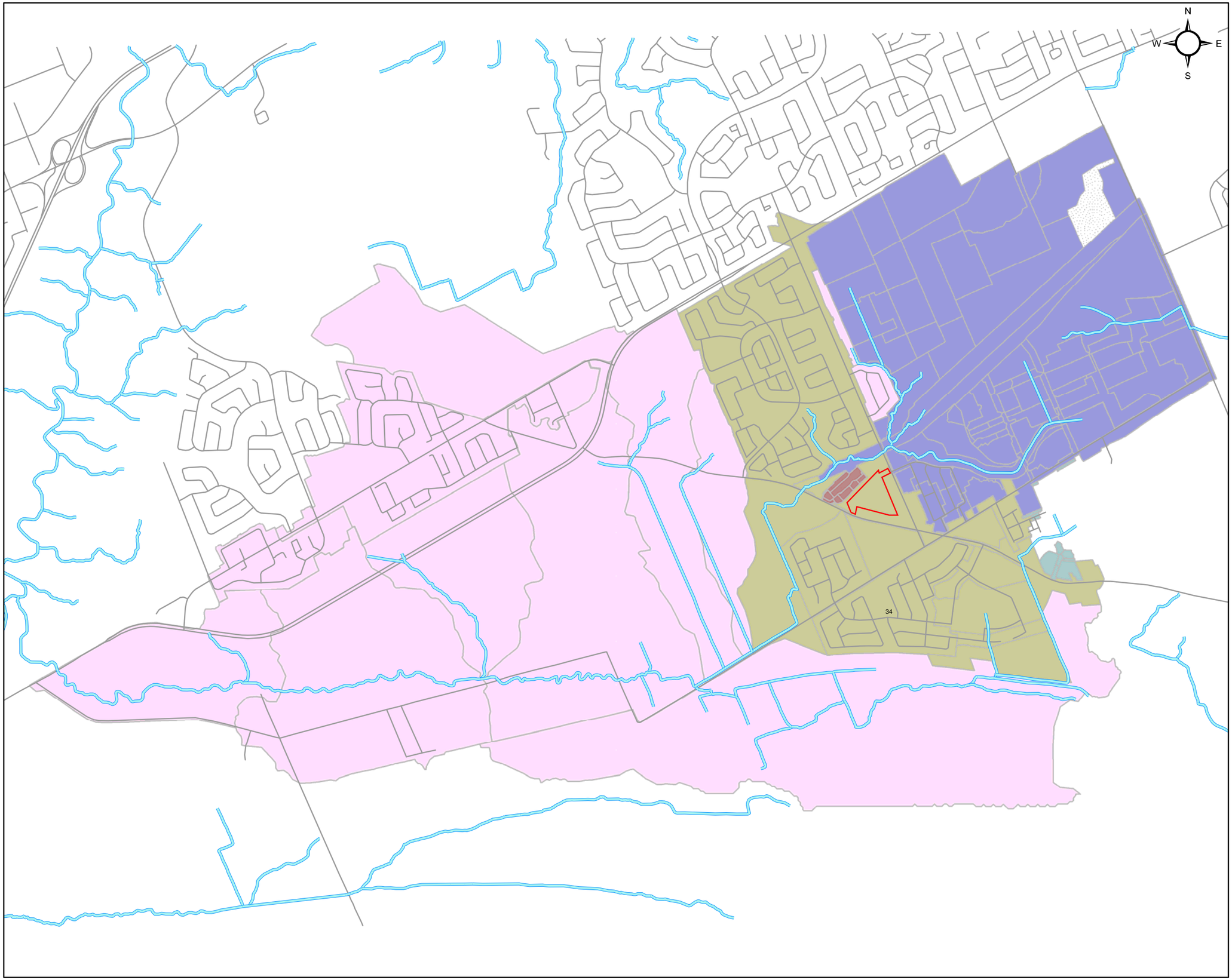
Future Conditions Model Catchments (Close-up)

Project No.: **163401321**

Figure No.: **6-1**

Scale:

0 0.15 0.3 Kilometers



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Legend

Watercourses

Future Conditions Catchment Types

DESCRIPT

- Snow Disposal Facility
- Ashcroft Subdivision
- CDP Development
- Chapel Hill Park and Ride
- Future Development
- Undeveloped Existing

* Catchment 34 was mostly developed in 2011, therefore all parameters except for imperviousness were maintained per the 2011 existing conditions model

Client / Project:

CITY OF OTTAWA

MUD CREEK
CUMULATIVE IMPACTS STUDY

OTTAWA, ON

Title:

Future Conditions Model Catchment Types

Project No.:	Figure No.:
163401321	**6-2**

Scale:

0 0.5 1 Kilometers

Appendix A: Catchment Land Use Categorization

Name	Description	Agricultural	Commercial	Forest	Industrial	Institutional	OpenSpace	Residential	Street	Total
0	Future Development	0.0%	0.0%	0.0%	0.0%	0.0%	87.1%	3.2%	9.7%	**100.0%**
1	Future Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
10	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
100	Future Development	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	**100.0%**
101	Future Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
102	Future Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
103	CDP Development	0.0%	0.0%	1.5%	0.0%	0.2%	15.7%	57.0%	25.6%	**100.0%**
104	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
105	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
106	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
107	Existing Developed	0.0%	0.7%	0.0%	0.0%	0.9%	10.8%	58.7%	28.9%	**100.0%**
108	Existing Developed	0.2%	0.0%	0.0%	0.6%	0.0%	16.8%	60.9%	21.5%	**100.0%**
109	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
11	CDP Development	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**100.0%**
110	Future Development	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**100.0%**
12	CDP Development	0.0%	25.8%	0.0%	0.0%	0.0%	14.1%	41.5%	18.6%	**100.0%**
13	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
14	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	44.3%	38.5%	17.2%	**100.0%**
15	CDP Development	0.0%	6.9%	0.0%	0.0%	0.0%	14.9%	54.0%	24.2%	**100.0%**
16	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
17	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
18	CDP Development	0.0%	0.0%	0.0%	0.0%	0.8%	19.8%	54.8%	24.6%	**100.0%**
19	Future Development	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	**100.0%**
2	Future Development	0.0%	13.1%	0.0%	0.0%	0.0%	0.1%	57.0%	29.7%	**100.0%**
20	CDP Development	0.0%	0.0%	8.9%	0.0%	0.0%	18.8%	49.9%	22.4%	**100.0%**
21	Future Development	0.0%	0.0%	0.0%	0.0%	0.0%	69.3%	17.4%	13.3%	**100.0%**
22	CDP Development	0.0%	0.0%	90.0%	0.0%	0.0%	10.0%	0.0%	0.0%	**100.0%**
23	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
24	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	62.5%	25.9%	11.6%	**100.0%**
25	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	24.2%	52.3%	23.4%	**100.0%**
26	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
27	CDP Development	0.0%	0.0%	0.1%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
28	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	**100.0%**
29	CDP Development	0.0%	0.0%	0.0%	0.0%	4.9%	15.2%	55.1%	24.7%	**100.0%**
3	Future Development	0.0%	16.6%	0.0%	0.0%	0.0%	6.3%	54.6%	22.5%	**100.0%**
30	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	92.2%	5.4%	2.4%	**100.0%**
31	Existing Developed	0.0%	19.5%	0.0%	0.5%	0.0%	6.5%	52.1%	21.4%	**100.0%**
32	Existing Developed	0.0%	1.5%	0.0%	0.0%	5.3%	10.6%	61.0%	21.6%	**100.0%**
33	Existing Developed	0.0%	0.0%	79.8%	0.0%	0.0%	19.3%	0.6%	0.3%	**100.0%**
34	Existing Developed	0.0%	0.0%	0.0%	2.6%	0.0%	20.0%	50.7%	26.7%	**100.0%**
35	Future Development	0.0%	0.0%	0.0%	0.0%	0.0%	75.4%	11.3%	13.4%	**100.0%**
36	Future Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
37	Future Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
38	Future Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
39	Future Development	0.0%	0.0%	0.0%	18.4%	13.1%	7.7%	27.4%	33.4%	**100.0%**
4	CDP Development	0.0%	0.0%	0.0%	0.0%	0.3%	16.0%	57.8%	25.9%	**100.0%**
40	Future Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
41_1	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
41_2	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
42_1	CDP Development	0.0%	98.1%	1.1%	0.0%	0.0%	0.1%	0.5%	0.2%	**100.0%**
42_2	CDP Development	0.0%	98.1%	1.1%	0.0%	0.0%	0.1%	0.5%	0.2%	**100.0%**
43	CDP Development	0.0%	0.0%	0.1%	0.0%	0.0%	21.6%	54.1%	24.2%	**100.0%**
44	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	**100.0%**
45	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
46	CDP Development	0.0%	99.5%	0.0%	0.0%	0.0%	0.1%	0.3%	0.1%	**100.0%**
47	Future Development	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	**100.0%**
48	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
49	CDP Development	0.0%	97.5%	0.0%	0.0%	0.0%	2.5%	0.0%	0.0%	**100.0%**
5	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
50	CDP Development	0.0%	9.5%	90.5%	0.0%	0.0%	0.0%	0.0%	0.0%	**100.0%**
51	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	36.9%	43.6%	19.5%	**100.0%**
52	CDP Development	0.0%	0.0%	0.8%	0.0%	0.0%	15.9%	57.6%	25.8%	**100.0%**
53	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	39.2%	42.0%	18.8%	**100.0%**
54	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	51.9%	33.2%	14.9%	**100.0%**
55	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
56	CDP Development	0.0%	59.4%	0.0%	0.0%	0.0%	6.5%	23.6%	10.6%	**100.0%**
57	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
58	Existing Developed	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%	72.6%	25.9%	**100.0%**
59	CDP Development	0.0%	0.0%	0.0%	0.0%	76.5%	3.8%	13.7%	6.1%	**100.0%**
6	Future Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
60	CDP Development	0.0%	0.0%	0.0%	0.0%	98.4%	0.3%	0.9%	0.4%	**100.0%**
61	CDP Development	0.0%	0.0%	50.8%	0.0%	13.3%	35.7%	0.1%	0.1%	**100.0%**
62	CDP Development	0.0%	0.0%	97.5%	0.0%	0.5%	0.3%	1.1%	0.5%	**100.0%**
63	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.7%	57.5%	25.8%	**100.0%**
64	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
65	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	30.0%	48.3%	21.7%	**100.0%**
66	CDP Development	0.0%	0.0%	91.9%	0.0%	0.0%	1.3%	4.7%	2.1%	**100.0%**
67	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
68	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
69	Future Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
7	Existing Developed	15.8%	0.0%	6.4%	5.4%	0.0%	71.8%	0.2%	0.4%	**100.0%**
70	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**
71	Existing Developed	50.2%	0.0%	33.6%	0.2%	0.0%	11.0%	0.4%	4.6%	**100.0%**
72	Existing Developed	43.3%	0.7%	6.6%	0.6%	1.0%	35.9%	4.0%	7.9%	**100.0%**
73	CDP Development	0.0%	0.0%	0.0%	0.0%	0.0%	16.0%	58.0%	26.0%	**100.0%**

Appendix G8

ICD Curves

Volume III: TEMPEST INLET CONTROL DEVICES

Municipal Technical Manual Series

SECOND EDITION

LMF (Low to Medium Flow) ICD

HF (High Flow) ICD

MHF (Medium to High Flow) ICD

IPEX
by aliaxis

Chart 1: LMF 14 Preset Flow Curves

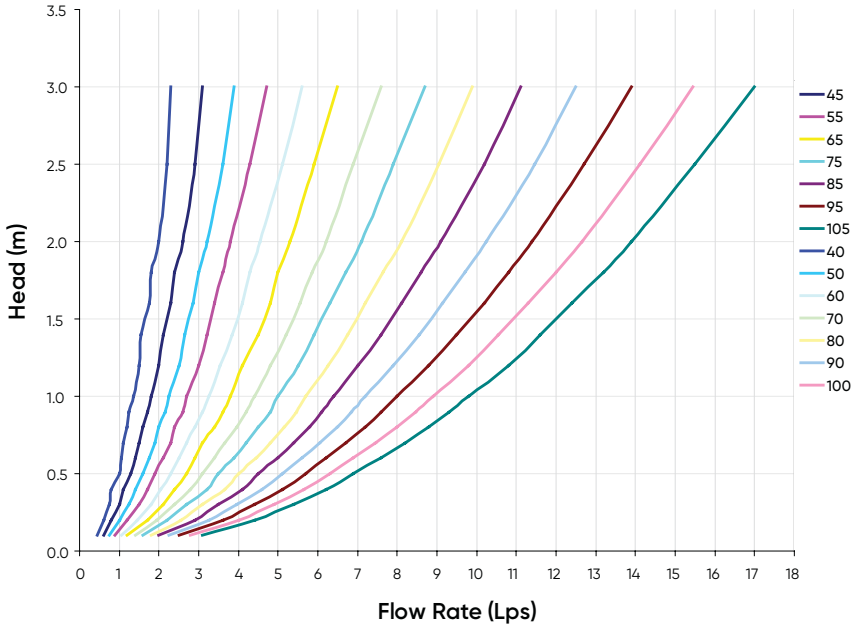


Chart 2: LMF Flow vs. ICD Alternatives

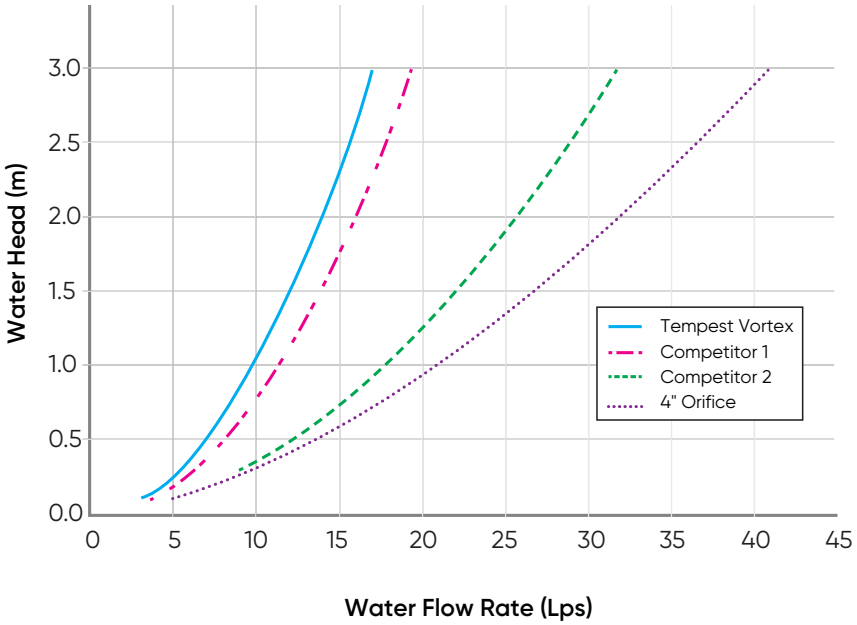
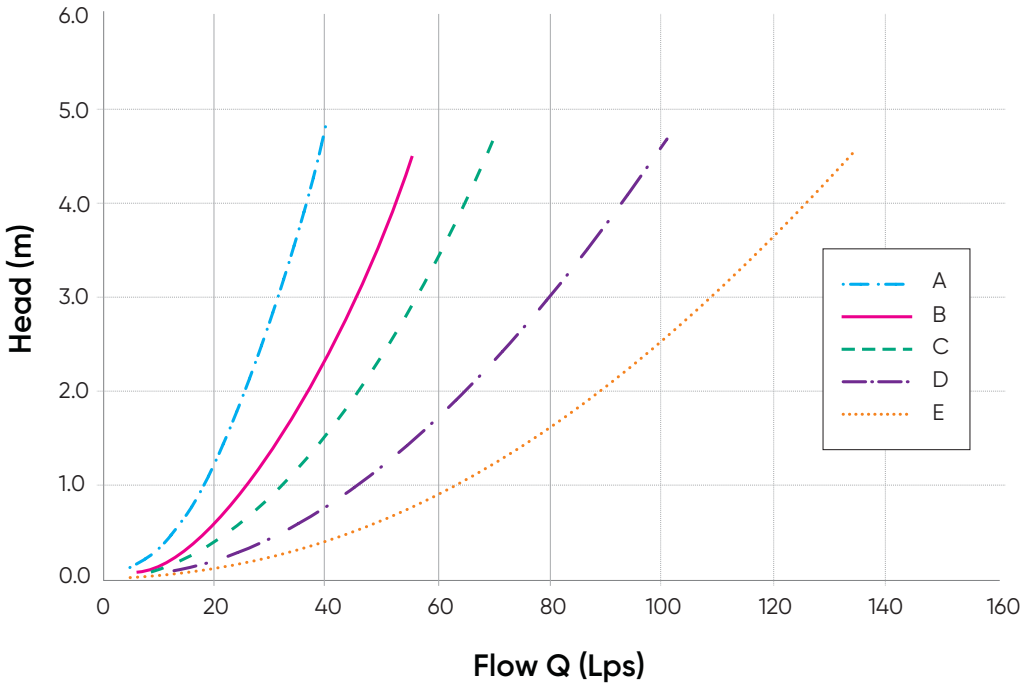


Chart 3: HF & MHF Preset Flow Curves



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