1000 ROBERT GRANT AVENUE
RENE'S COURT
OTTAWA, ONTARIO

SERVICEABILITY REPORT

Prepared by:

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

June 27, 2019

Ref: R-2019-096
Novatech File: 117151

June 27, 2019 BY COURIER

City of Ottawa
Planning and Growth Management Department
110 Laurier Avenue West, 4th Floor
Ottawa, Ontario
K1P 1J1

Attention: Kathy Rygus

Dear Ms Rygus:

Re: 1000 Robert Grant Avenue (Rene's Court)
Serviceability Report
Our File No.: 117151

Please find enclosed three (3) copies of the above noted report dated June 27, 2019. This report is submitted in support of a Zoning By-law Amendment Application.

If you have any questions, please contact the undersigned.

Yours truly,

NOVATECH

Cara Ruddle, P.Eng.
Senior Project Manager, Land Development Engineering

cc:

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1.0. INTRODUCTION

Novatech has been retained to prepare a Serviceability Report for the property located at 1000 Robert Grant Avenue within the City of Ottawa. ***Figure 1*** is a Key Plan showing the site location. The purpose of this report is to demonstrate that the potential development can be serviced with the existing Municipal infrastructure surrounding the property.

2.0. EXISTING DEVELOPMENT

The property is approximately 2.0 hectares in size and is currently undeveloped, vacant land. The property (1000 Robert Grant Avenue) is currently identified as Block 203 and is included as part of the Phase 1 and 2 Fernbank Crossing Development. The property is bound by Robert Grant Avenue to the west, Livery Street to the east, another mixed-use parcel to the south, and Block 200 a future transit station to the North. The topography of the site gradually slopes towards Livery Street (west to east). ***Figure 2*** shows the existing site conditions.

3.0. PROPOSED DEVELOPMENT

It is proposed to develop an apartment complex consisting of three apartment buildings and a one-story clubhouse all connected by an underground parking garage. The apartment buildings will consist of a combination of one-bedroom and two-bedroom units. The proposed development will have access from both Livery Street and Robert Grant Avenue. The Robert Grant Avenue entrance will provide access to all buildings at ground level and access to the underground parking garage. The Livery Street site entrance will be to the underground parking garage only. ***Figure 3*** shows a concept of the potential development plan.

4.0. SERVICING REPORT REFERENCES

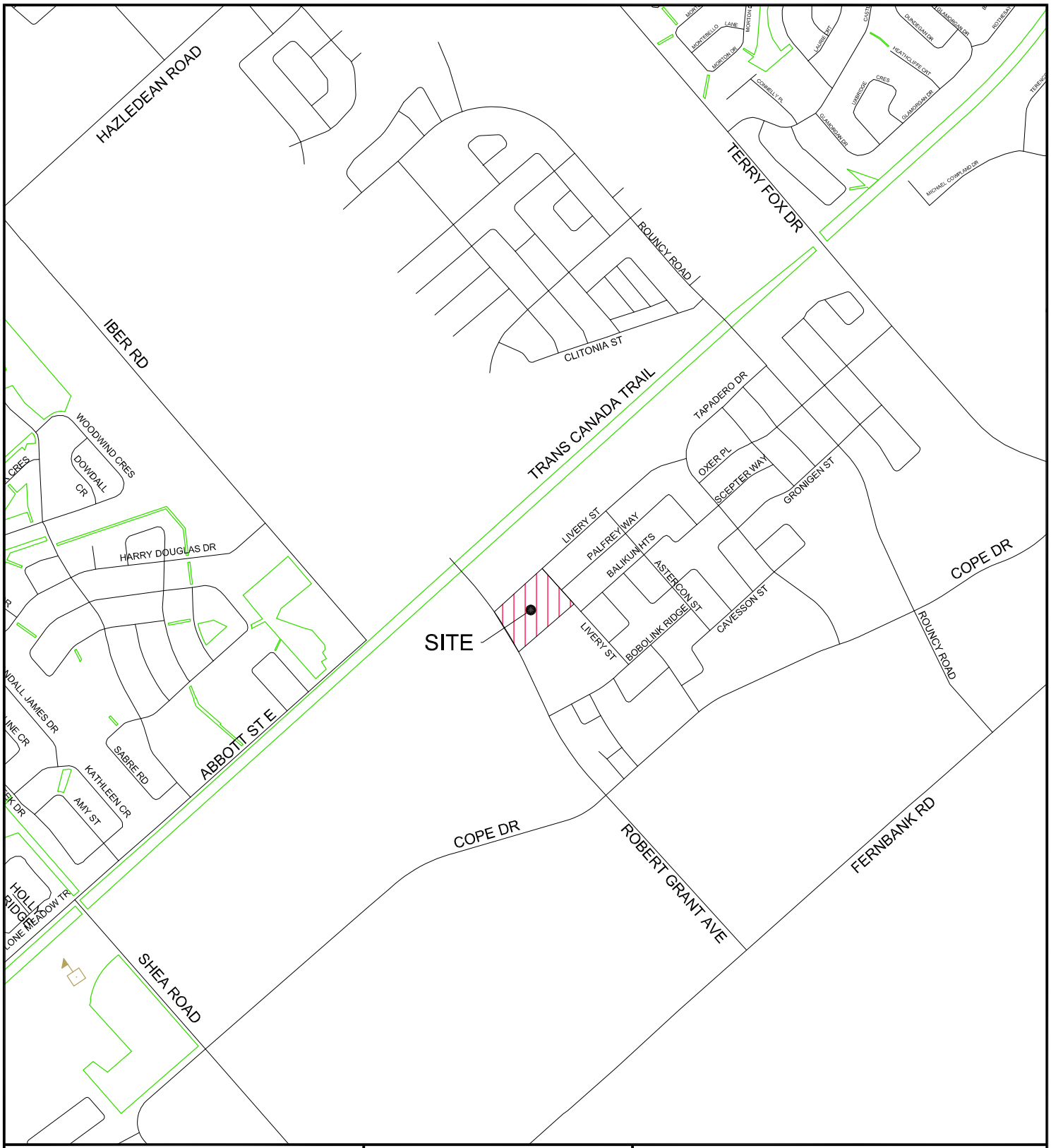
- Novatech, Fernbank Crossing Servicing Design Brief (Phase 1 & 2), Revised Dated August 17, 2012.
- Novatech, Fernbank Crossing Servicing Stormwater Management Report (Phase 1 & 2), Revised Dated August 17, 2012.
- IBI, Conceptual Site Servicing Study Stormwater Site Management Plan and Erosion Sediment Control Plan Westpark – Phase 1 Fernbank Community Date February 2010.

5.0. WATER SERVICING

The property has an existing capped 200mm watermain stub at the corner of Livery Street. There is an existing 200mm diameter watermain within the Livery Street right-of-way. A portion of the City sewer mapping is included in **Appendix A** for reference.

To service the development, it is proposed to extend the existing capped watermain stub into the building and constructing a second water service to the south. The second water service is provided for redundancy purposes as the daily water demand is greater than 50 cubic meters. ***Figure 4*** Conceptual Servicing Plan shows the potential servicing options for the development.

Water demand and fire flow calculations have been prepared based on the current concept plans for the development. The water demands are calculated from criteria in Section 4 of the City of Ottawa Design Guidelines for Water Distribution Systems and are based on a total



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

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

RENE'S COURT BLOCK 203

KEY PLAN

SCALE		
N.T.S		
DATE MAR 2019	JOB 117151	FIGURE 1

SHT8X11.DWG - 216mmx279mm

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Engineers, Planners & Landscape Architects
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Ottawa, Ontario, Canada K2M 1P6

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RENE'S COURT BLOCK 203

EXISTING CONDITIONS PLAN

SCALE	DATE	JOB	FIGURE
1 : 750	MAR 2019	117151	2

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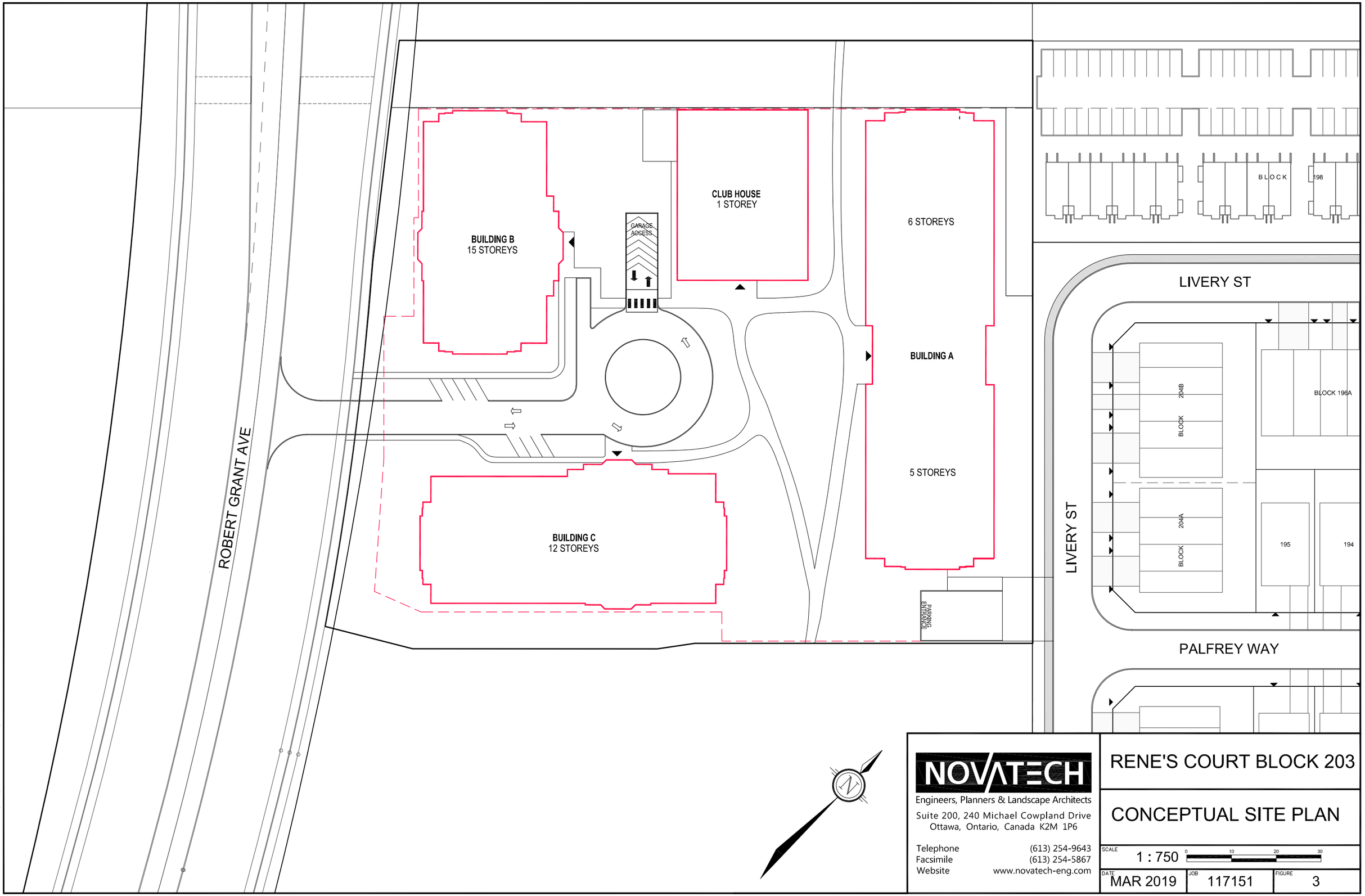
BUILDING B
15 STOREYS
CLUB HOUSE
1 STOREY
GARAGE ACCESS
6 STOREYS
BUILDING A
5 STOREYS
BUILDING C
12 STOREYS
PARKING ENTRANCE
ROBERT GRANT AVE
LIVERY ST
PALFREY WAY
BLOCK 198
BLOCK 204B
BLOCK 204A
BLOCK 196A
195
194
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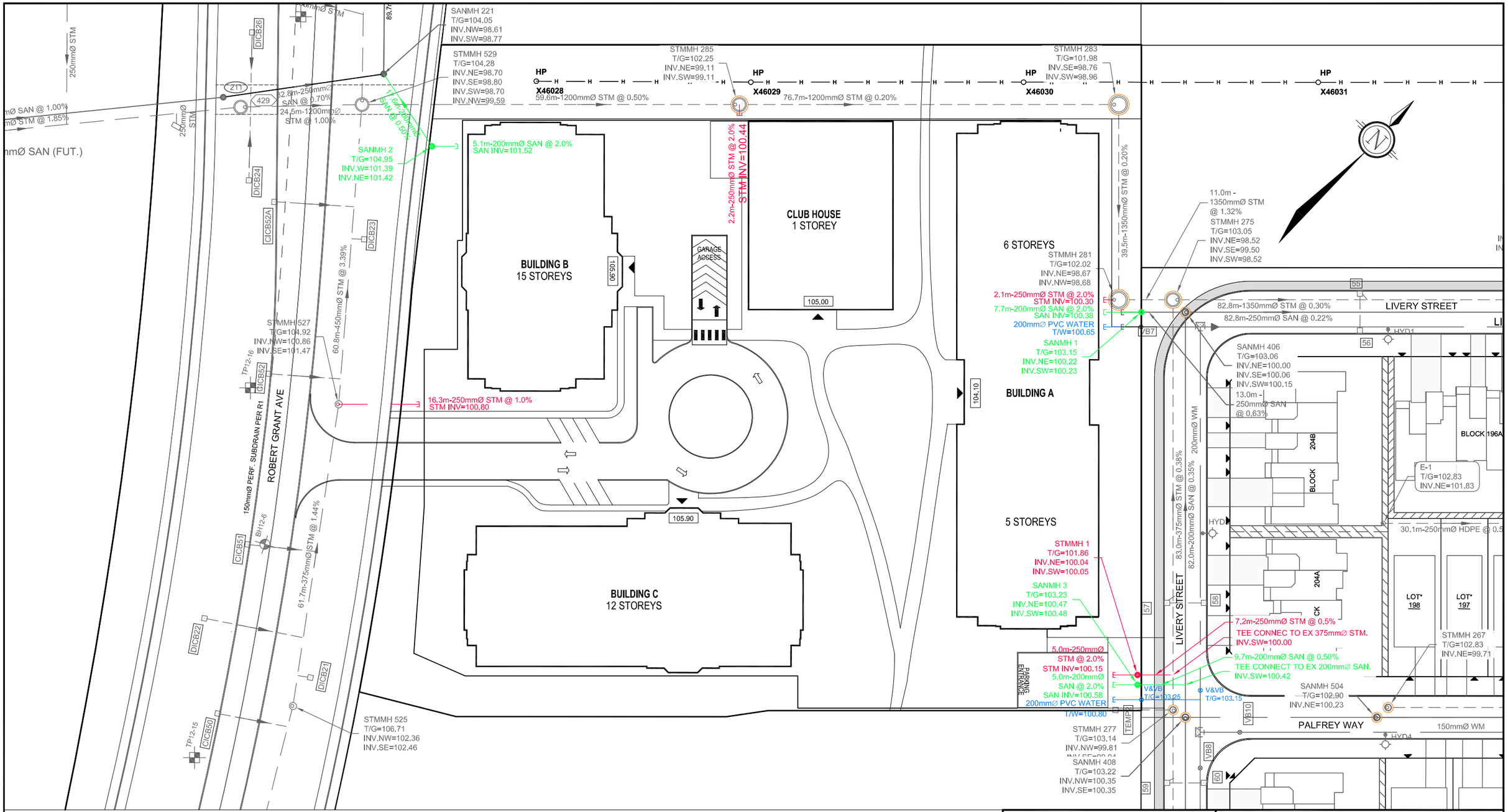
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com
RENE'S COURT BLOCK 203
CONCEPTUAL SITE PLAN
SCALE 1 : 750
0 10 20 30
DATE MAR 2019
JOB 117151
FIGURE 3
M:\2017\117151\CAD\Design\Figures\117151-PR.dwg, PROP, Mar 07, 2019 - 12:54pm, mhrehoriak



LEGEND

STMMH	PROPOSED STORM SEWER AND MANHOLE
SANMH	PROPOSED SANITARY SEWER AND MANHOLE
V&VB	PROPOSED WATERMAIN AND VALVE & VALVEBOX
STMMH	*PROPOSED STORM SEWER AND MANHOLE*
SANMH	*PROPOSED SANITARY SEWER AND MANHOLE*
V&VB	*PROPOSED WATERMAIN AND VALVE & VALVEBOX*

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RENE'S COURT BLOCK 203

CONCEPTUAL SERVICING PLAN

SCALE	DATE	JOB	FIGURE
1 : 750	MAR 2019	117151	4

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population 1019 people from a total of 566 units. Fire flows are calculated using the Fire Underwriters Survey method using assumptions on building construction and sprinkler requirements. Preliminary water demand and fire flows are summarized in **Table 5.1** below.

Table 5.1 Water Demand Summary

Use	Ave. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand (L/s)	Fire Flow (L/s)
Residential	4.13	10.32	22.70	167

For the purposes of this report to determine if the proposed development concept can be serviced, excepts from the Novatech Fernbank Crossing (Phase 1 & 2) Servicing Design Brief have been reviewed and are provided in **Appendix A** for reference.

From the Fernbank Crossing (Phase 1 & 2) Design Brief the proposed development is located within the 3W pressure zone and is serviced from the existing 400mm diameter watermain along the Trans Canada Trail and a 400mm diameter watermain in Terry Fox Drive. City boundary conditions and a location map for the connections described above are provided in **Appendix A**. The Fernbank Crossing internal watermain network has been designed to satisfy the following three conditions:

- Average Day Demand, pressures are to be less than 80psi.
- Peak Hour Demand, pressures are to be greater than 40psi.
- Maximum Day plus Fire Flow, pressures are to be greater than 20psi.

The Fernbank Crossing (Phase 1 & 2) watermain network was modelled with epanet using the City provided boundary conditions. A summary of the critical nodes (low pressure, high pressure and pressure at the node nearest Block 203) from the watermain analysis are provided below in **Table 5.2**.

Table 5.2 Water Analysis Results Summary

Condition	Junction ID	Demand (L/s)	Min/Max Allowable Operating Pressures (psi)	Limits of Design Operating Pressures (psi)
High Pressure	TMU1 (Low)	9.1	80psi (Max)	80.84
	T12 (High)			89.65
	T1 (Site)			87.38
Max Day + Fire Flow	HYD10	125	20psi (Min)	69.28
	HYD33	217		40.91
	HYD 3 (Site)	217		54.12
Peak Hour	TMU1 (Low)	45.4	40psi (Min)	66.57
	T12 (High)			75.42
	T1 (Site)			72.95

The Fernbank Crossing watermain analysis is based on an average day demand contribution of 2.95 L/s from the entirety of the Mixed-Use Block. The subject site area (2.0ha) is approximately 30% of the total mixed-use block area (7.1ha) with an average day demand of 4.13 L/s. The domestic demands are greater than originally anticipated however, there is more than adequate pressure in the existing watermain to service the proposed development for domestic use. The watermain surrounding Block 203 (1000 Robert Grant Avenue) was designed for a fireflow of 217L/s at a pressure of 54.1psi which is greater than the 167L/s required by the proposed development. Therefore, there is also adequate pressure to service the proposed development's fire demand. Pressure reduction valves will likely be required as the watermain pressures exceed the maximum 80psi operating pressure in the average day condition. Refer to **Appendix A** for detailed water demand calculations, fire flow calculations and excerpts from the Fernbank Crossing (Phase 1 & 2) Servicing Design Brief.

6.0. SANITARY SERVICING

The property has an existing capped 250mm diameter sanitary sewer stub at the corner of Livery Street. There is an existing 200mm diameter sanitary sewer fronting the development on Livery Street and a 250mm diameter sanitary sewer at the northwest corner of the development in the Robert Grant Avenue right-of-way. The sanitary sewer in Robert Grant Avenue flows to the north and connects into the Stittsville sanitary trunk sewer (750mm diameter) to the north of Block 203. The sanitary sewer on Livery Street flows to the east and becomes a 375mm diameter sewer at Oxford Place and a 600mm diameter sewer at Rouncey Road. The 600mm diameter sewer on Rouncey Road flows to the north and connects into the Stittsville sanitary trunk sewer (1200mm diameter). A portion of the City sewer mapping is included in **Appendix B** for reference.

Sanitary flows for the proposed development are calculated from criteria in Section 4 of the City of Ottawa Sewer Design Guidelines and are based on a total population 1019 people from a total of 566 units. The peak sanitary flow was calculated to be 11.35 L/s based on an average domestic demand of 280 L/day/person. Detailed sanitary flow calculations are provided in **Appendix B** for reference.

There are multiple sanitary servicing options for the proposed development. Connections can be made to any of the existing sewers noted above. It is likely that multiple services will be required due to the size of the development. ***Figure 4*** Conceptual Servicing Plan shows the potential servicing options for the development.

The Livery Street sanitary sewer was designed as a part of the Fernbank Crossing Phase 1 & 2 development and drains into the sanitary sewers within the Westpark Phase 1 development. The Fernbank Crossing (Phase 1 & 2) Design Brief prepared by Novatech includes a sanitary sewer design sheet with Block 203 (1000 Robert Grant Avenue, labelled as Area A4-3). The total peak flow allotted for Block 203 is 3.3L/s into the Livery Street sanitary sewer. Since the allotted flows are less than the proposed flows an investigation into the downstream sanitary sewer system is required. A copy of the drainage area plan and design sheet for Fernbank Crossing Phase 1 & 2 are included in **Appendix B**.

Upon review of the downstream sewers, it should be noted that there is one section of sewer within the Westpark Phase 1 sanitary sewer system that is near capacity. The sanitary sewer design sheet for the Westpark Phase 1 development, prepared by IBI, indicates that the existing 375mm diameter sewer on Oxford Place (between MH 103A and MH 202A) is currently

operating at 92% with 6.57L/s of available capacity. This sewer is downstream of Livery Street and is shown on the IBI West Park General Plan of Services provided in **Appendix B**.

The IBI Westpark Phase 1 development sanitary design sheet is dated May 2012. The City of Ottawa design criteria has since been updated in 2018 to reduce theoretical sanitary design flows. The new City of Ottawa criteria reduces design flows by approximately 35% from a reduction in domestic demand and the harmon correction factor. Therefore, the sanitary sewer between MH 103A and MH 202A has more available capacity given the new City design criteria. Also, a portion of the sanitary flows from the proposed development are to be conveyed by the Robert Grant sanitary sewer which is currently operating at 32.2% of capacity. The proposed development flow of 11.35 L/s is greater than originally anticipated however, there is capacity in the existing sewers to service the proposed development. Refer to **Appendix B** for all relevant sanitary sewer drainage area plans and sanitary sewer design sheets.

7.0. STORM SERVICING & STORMWATER MANAGEMENT

Stormwater currently sheet drains across the site towards Livery Street. Stormwater is collected by an existing temporary catchbasin at the south east corner of the property which outlets to the existing 375mm diameter storm sewer fronting the development in Livery Street. Refer to **Appendix C** for the Existing Storm Drainage Area Plan.

There is also an existing 1200mm and 1350mm diameter trunk storm sewer in an easement along the north and a portion of the east property line and an existing 450mm diameter storm sewer in the Robert Grant Avenue right-of-way. All storm sewers described above drain into the existing stormwater management facility (pond 6) to the south of Block 203 at the Asturcon and Cavesson Street intersection. Multiple service connections are possible and may be required due to the size of the development. ***Figure 4*** Conceptual Servicing Plan shows the potential servicing options for the development.

The following stormwater management design criteria for the proposed development was provided in the Novatech Fernbank Crossing Stormwater Management Report (Phase 1 & 2):

- Quantity control of stormwater is required for up to and including 100-year storm event to a runoff coefficient of 0.8.
- Quality control of stormwater is not required as an enhanced level treatment (80% TSS removal) is provided in downstream SWM facility (pond 6).

Stormwater flows in excess of the allowable release rate must be stored on site for storms up to and including the 100-year storm event. Preliminary stormwater management calculations have been completed for the proposed development. The allowable release rate for the site has been calculated to be 353.0 L/s. Quantity control measures will be proposed in order to meet the allowable release rate. Storage of stormwater will be provided by underground storage tanks. The preliminary stormwater management calculations are summarized below in **Table 7.1**.

Table 7.1 Stormwater Management Summary

Area ID	Area (ha)	1:5 Year Weighted Cw	Orifice Size & Type	**100 Year Storm Event**	
				Flow (L/s)	Required Vol (cu.m)
A1	0.323	0.35	N/A	66.1	N/A
A2	0.106	0.84	N/A	286.9	307.2
Total Flow to Pond 6 from development				**353.0**	
Allowable Flow to Pond 6				**353.0**	

During storms in excess of the 100-year storm event, site grading will provide an overland flow route to Livery Street and ultimately to the stormwater management facility (pond 6) and the Monahan Drain. ***Figure 5*** Conceptual Grading Plan shows the preliminary conceptual grading design.

In Summary, the existing storm sewer infrastructure can service the proposed development and appropriate stormwater management methods can be used to meet the allowable release rate. Refer to **Appendix C** for preliminary stormwater management calculations and pre and post development drainage area figures.

8.0. EROSION AND SEDIMENT CONTROL MEASURES

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

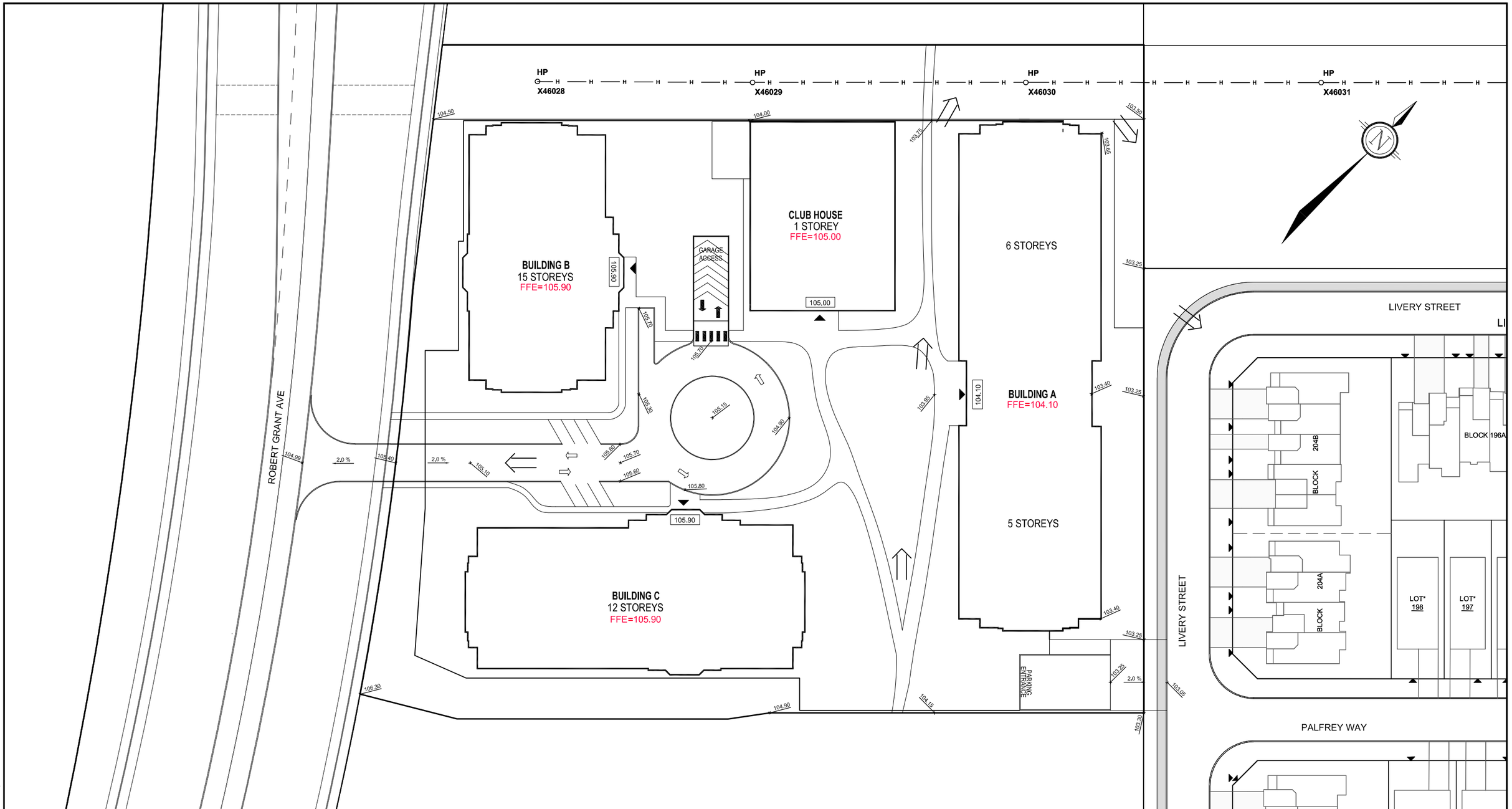
- Filter socks will be placed in existing catchbasins and manholes, and will remain in place until vegetation has been established and construction is completed;
- Silt fencing will be placed along the surrounding construction limits;
- Mud mats will be installed at the site entrances;
- The contractor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

The erosion and sediment control measures will be required prior to construction and will remain in place during all phases of construction. Regular inspection and maintenance of the erosion control measures will be undertaken

9.0. CONCLUSIONS AND RECOMMENDATIONS

The conclusions of this report are as follows:

- Water servicing, including both domestic and fire protection, can be provided by connection to the existing watermain infrastructure within Livery Street. Pressure reduction valves will be required.
- Sanitary servicing can be provided from the existing sanitary sewer infrastructure surrounding the site.



LEGEND

2.0 %	SLOPE DIRECTION
⟹	MAJOR OVERLAND FLOW ROUTE
104.15	PROPOSED ELEVATION
104.30	PROPOSED FINISHED FLOOR ELEVATION AT ENTRANCE

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Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
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RENE'S COURT BLOCK 203

CONCEPTUAL GRADING PLAN

SCALE	DATE	JOB	FIGURE
1 : 750	MAR 2019	117151	5

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- Storm servicing can be provided for the proposed development. Quantity control of stormwater can be provided through storage of stormwater in underground storage tanks. Quality control is provided in the downstream stormwater management facility (pond 6).
- An overland flow route will be provided to Livery Street.
- Erosion and sediment control measures will be required during construction.

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

NOVATECH

Prepared by:

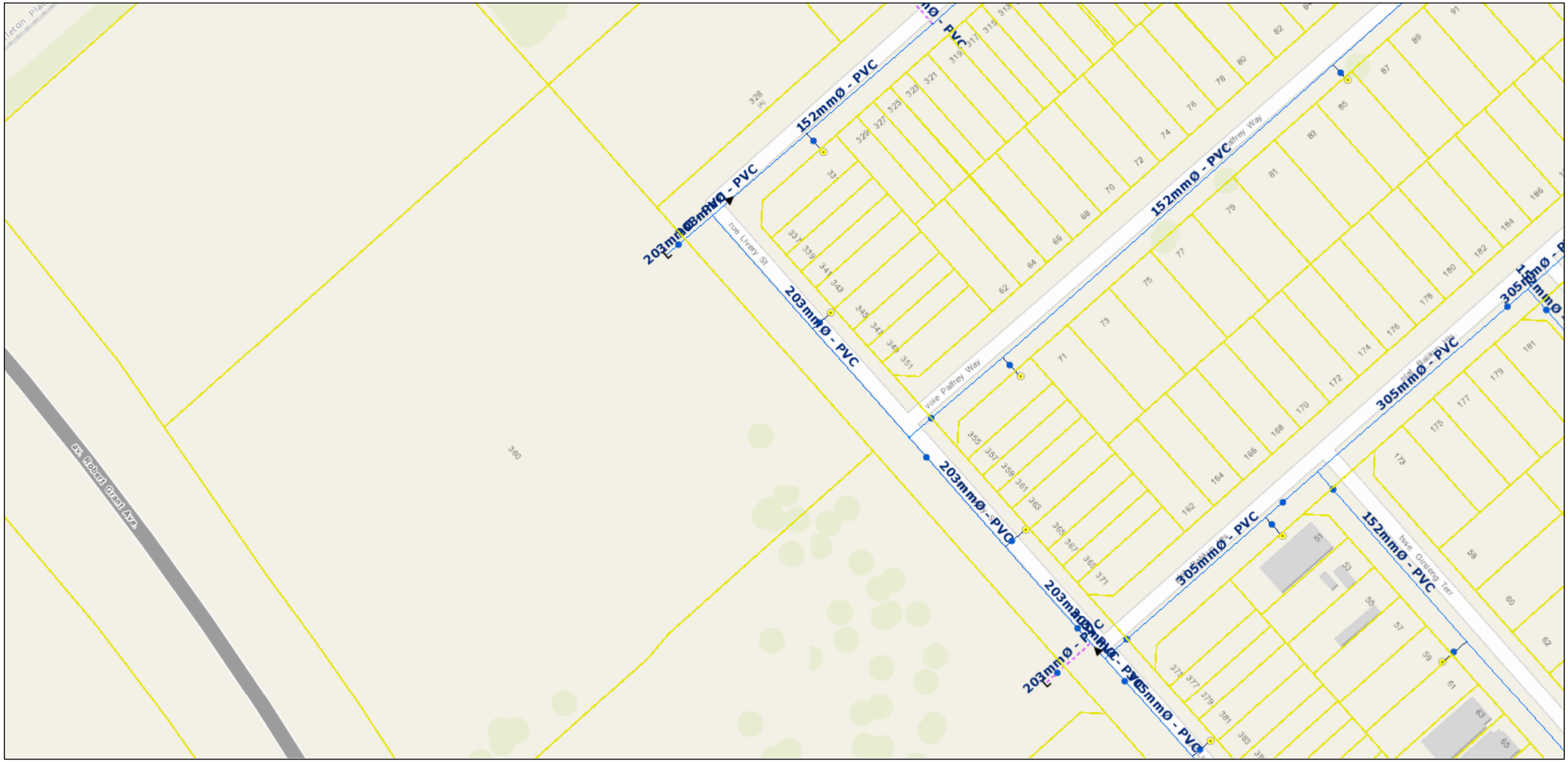
Matthew Hrehoriak, P.Eng.
Project Engineer
Land Development Engineering

Reviewed by:

Cara Ruddle, P.Eng.
Senior Project Manager
Land Development Engineering

APPENDIX A
Watermain Information

1000 Robert Grant Ave Water Info



March 6, 2019

1:1,500

0 0.0175 0.035 0.07 mi

0 0.0275 0.055 0.11 km

City of Ottawa

- Property Parcels

Water Labels / Étiquettes

Valves / Vannes

- Valve / Vanne
- TVS, A, D

Water Fittings / Raccords de conduite d'eau

- Cap / bouchon
- Reducer / réducteur
- Hydrants / Bornes-fontaines
- Hydrant Laterals / Branchements de borne-fontaine

Water Mains / Conduites d'eau principales

- Private / Branchement privé
- Public / Branchement public

Misc. Water Structures / Structures d'aqueduc - divers

- Pumping Station / Station de pompage des eaux
- Well Supply / Alimentation par puits
- Elevated Tank / Château d'eau
- In Ground Tank / Réservoir souterrain
- Water Treatment Plant / Usine d'épuration des eaux

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RENE'S COURT
HYDRAULIC ANALYSIS

JOB NO. 117151
DATE PREPARED: 2/25/19

Table 1
Water Demand

	Unit Type		Total Demand (L/s)		
Building ID	**Average Apartment**	**Total Population**	**Avg Day**	**Max. Daily**	**Peak Hour**
Building A	146	263	1.07	2.66	5.86
Building B	207	373	1.51	3.78	8.31
Building C	213	383	1.55	3.88	8.53
Totals	566	1019	**4.13**	**10.32**	**22.70**

Design Parameters:

- Average Apartment = 1.8 persons/unit

Design Criteria from Section 4 Ottawa Design Duidelines Water Distribution

- Average Domestic Flow	350	L/person/day
Max. Daily Demand:		
- Residential Peak Factor	2.5	x Avg Day
Peak Hourly Demand:		
- Residential Peak Factor	2.2	x Max Day

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

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Novatech Project #: 117151
Project Name: Rene's Court
Date: 2/25/2019
Input By: Matt Hrehoriak
Reviewed By: Cara Ruddle

Legend: Input by User; No Information or Input Required

Building Description: 6 Storey Apartment Building A
Fire Resistive Construction

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame		1.5	0.8	
		Ordinary construction		1		
		Non-combustible construction	Yes	0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	2848			
		Number of Floors/Storeys	6			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**4,272**	
	F	**Base fire flow without reductions**				**12,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**10,200**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-5,100**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**4,590**
		East Side	30.1- 45 m		5%	
		South Side	20.1 - 30 m		10%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**45%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**10,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**167**
				or	USGPM	2,642
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	1200

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

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Engineers, Planners & Landscape Architects

Novatech Project #: 117151
Project Name: Rene's Court
Date: 2/25/2019
Input By: Matt Hrehoriak
Reviewed By: Cara Ruddle

Legend: Input by User; No Information or Input Required

Building Description: 15 Storey Apartment Building B
Fire Resistive Construction

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame		1.5	0.8	
		Ordinary construction		1		
		Non-combustible construction	Yes	0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1515			
		Number of Floors/Storeys	15			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**2,273**	
	F	**Base fire flow without reductions**				**8,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**6,800**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-3,400**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**2,380**
		East Side	20.1 - 30 m		10%	
		South Side	20.1 - 30 m		10%	
		West Side	> 45.1m		0%	
				Cumulative Total	**35%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**6,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**100**
				or	USGPM	1,585
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	720

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 117151
Project Name: Rene's Court
Date: 2/25/2019
Input By: Matt Hrehoriak
Reviewed By: Cara Ruddle

Legend: Input by User; No Information or Input Required

Building Description: 12 Storey Apartment Building C
Fire Resistive Construction

Step			Choose		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame		1.5	0.8	
		Ordinary construction		1		
		Non-combustible construction	Yes	0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1955			
		Number of Floors/Storeys	12			
		Protected Openings (1 hr)	Yes			
		Area of structure considered (m^2)			**2,933**	
	F	**Base fire flow without reductions**				**10,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**8,500**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-4,250**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	20.1 - 30 m		10%	**2,550**
		East Side	30.1- 45 m		5%	
		South Side	10.1 - 20 m		15%	
		West Side	> 45.1m		0%	
				Cumulative Total	**30%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**7,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**117**
				or	USGPM	1,849
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	840

Boundary Conditions at Fernbank-Abott site

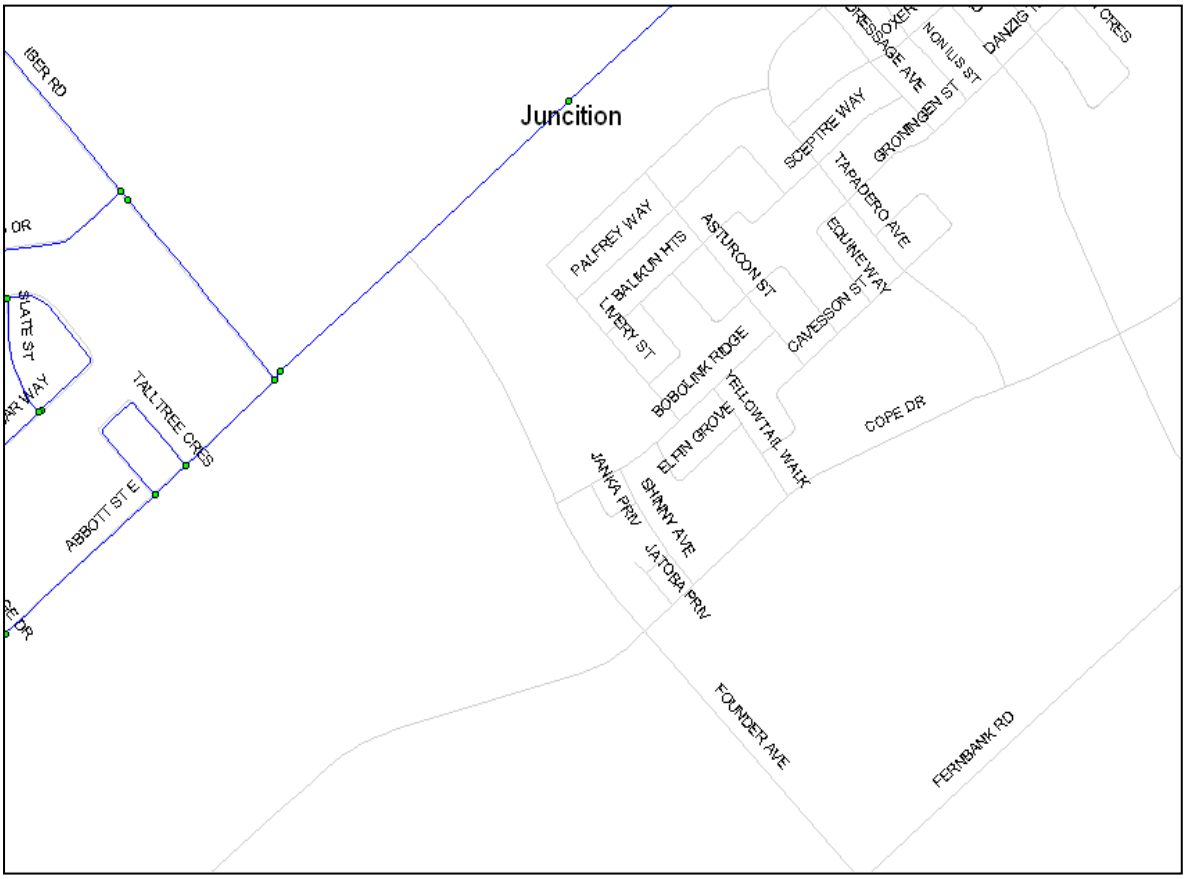
Junction

INFORMATION FROM FERNBANK CROSSING PHASE 1 & 2 SERVICING DESIGN BRIEF

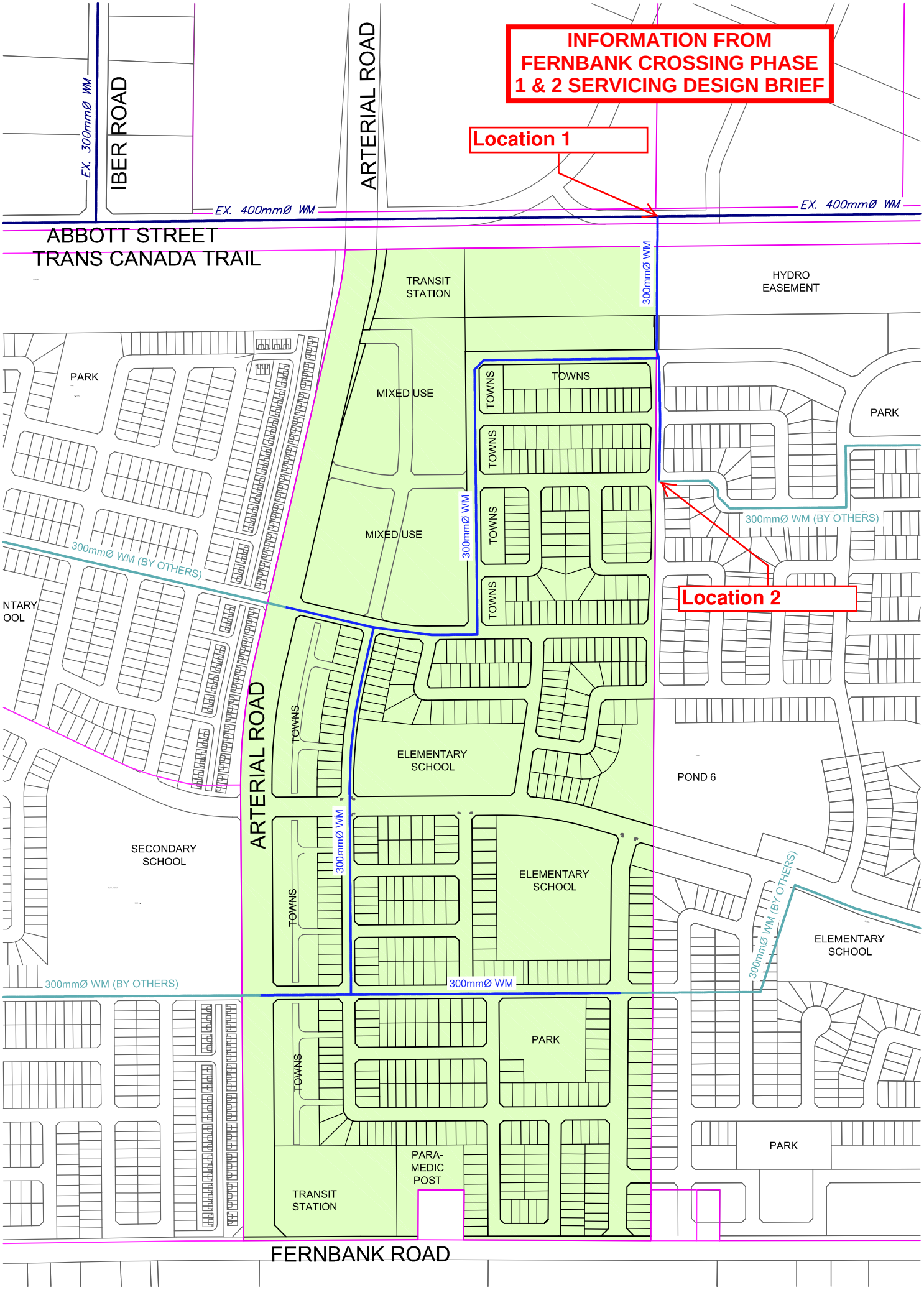
Max HGL = 162.4m
PKHR = 155.5m
MXDY+Fire (167 L/s) = 152.9m
MXDY+Fire (217 L/s)= 151.2m

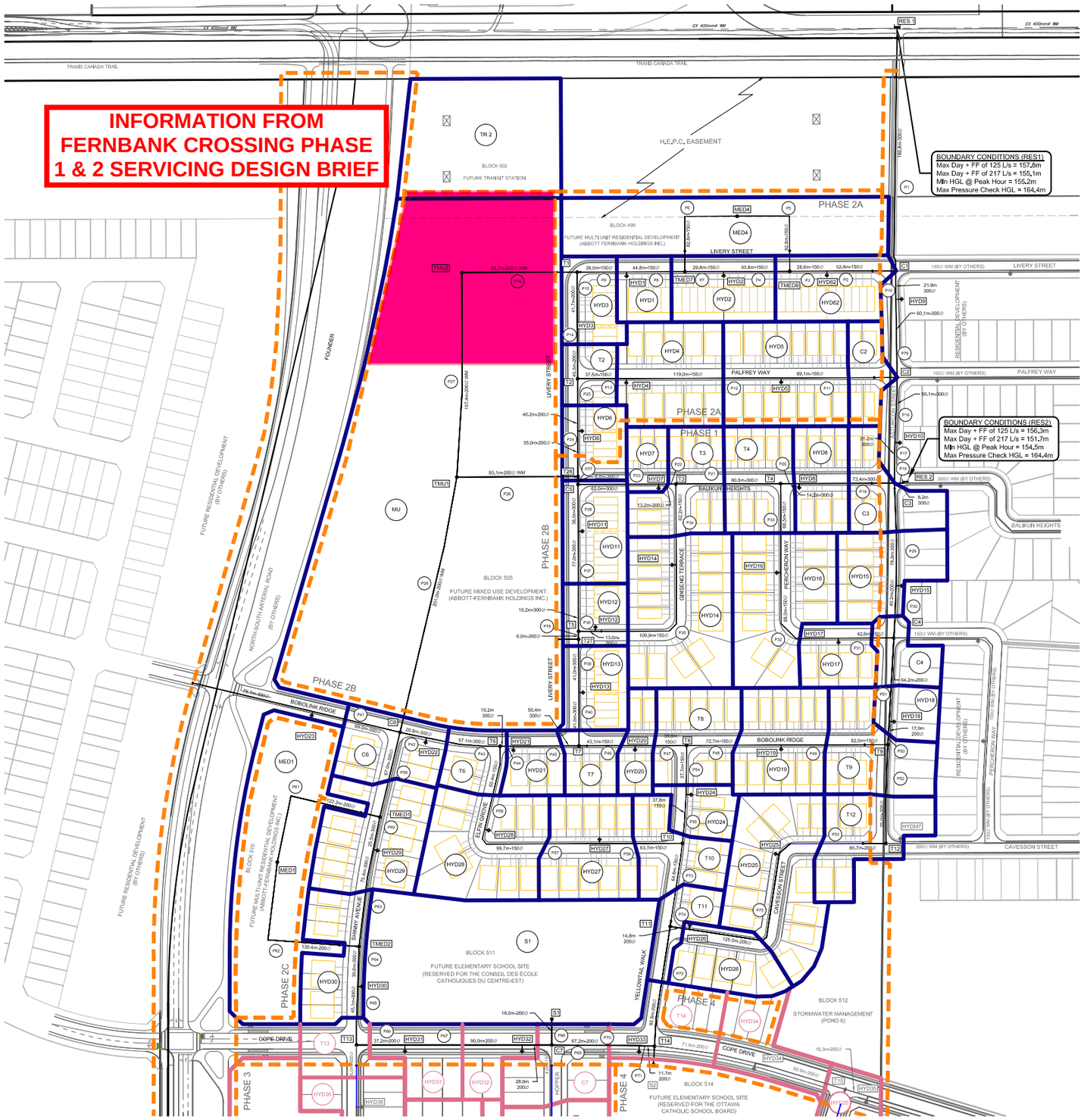
Note:
The site exceeds standard Bench Mark of maximum pressure (80 psi). Therefore, according to the City's guidelines it requires Pressure Reducing Valve (PRV) to maintain a safe and continuous water supply.

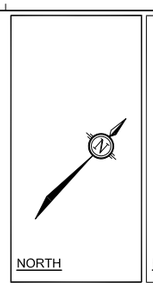
Location of Connections:

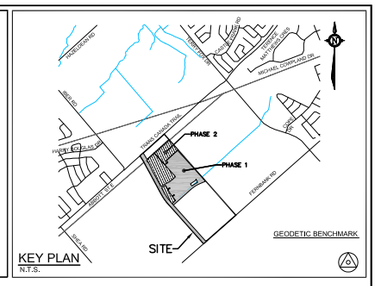


Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation 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.


INFORMATION FROM FERNBANK CROSSING PHASE 1 & 2 SERVICING DESIGN BRIEF
Location 1
Location 2
EX. 300mmØ WM
IBER ROAD
ARTERIAL ROAD
EX. 400mmØ WM
EX. 400mmØ WM
ABBOTT STREET
TRANS CANADA TRAIL
TRANSIT STATION
300mmØ WM
HYDRO EASEMENT
PARK
MIXED USE
TOWNS
TOWNS
TOWNS
TOWNS
TOWNS
PARK
MIXED USE
300mmØ WM
300mmØ WM (BY OTHERS)
300mmØ WM (BY OTHERS)
NTARY
OOL
TOWNS
ELEMENTARY SCHOOL
POND 6
ARTERIAL ROAD
SECONDARY SCHOOL
300mmØ WM
TOWNS
ELEMENTARY SCHOOL
300mmØ WM (BY OTHERS)
ELEMENTARY SCHOOL
300mmØ WM (BY OTHERS)
300mmØ WM
PARK
TOWNS
PARK
PARA-MEDIC POST
TRANSIT STATION
FERNBANK ROAD







LEGEND

- NODE ID
- PIPE ID
- FUTURE NODE ID
- 150Ø WM — PROPOSED WATERMAIN AND SIZE
- WATER SERVICE BOUNDARY
- WATERMAIN RESEVOIR (THEORETICAL)
- HYD2 — FIRE HYDRANT AND ID#
- T2 — PIPE NODE AND ID#
- PIPE REDUCER

WATERMAIN NODE TABLE

NODE ID	F/G ELEVATION	AVG. DAY DEMAND	MAX DAY	PEAK FLOW	FIRE FLOW
C1	102.23	0.000	0.000	0.000	-
C2	102.07	0.055	0.138	0.303	-
C3	101.96	0.083	0.207	0.455	-
C4	101.83	0.028	0.069	0.152	-
C5	103.52	0.000	0.000	0.000	-
C6	104.89	0.055	0.137	0.301	-
C7	102.87	0.000	0.000	0.000	-
HYD1	102.73	0.055	0.137	0.301	125
HYD2	102.55	0.131	0.328	0.722	125
HYD3	103.20	0.077	0.191	0.421	217
HYD4	102.95	0.138	0.344	0.758	125
HYD5	102.63	0.207	0.516	1.136	125
HYD6	103.45	0.077	0.191	0.421	217
HYD7	102.80	0.041	0.103	0.227	125
HYD8	102.15	0.096	0.241	0.530	125
HYD9	102.18	0.000	0.000	0.000	125
HYD10	101.94	0.000	0.000	0.000	125
HYD11	103.42	0.109	0.273	0.602	217
HYD12	103.33	0.044	0.109	0.241	217
HYD13	103.08	0.098	0.246	0.541	217
HYD14	102.92	0.207	0.516	1.136	125
HYD15	101.93	0.110	0.275	0.606	125
HYD16	102.41	0.165	0.413	0.909	125
HYD17	101.96	0.055	0.138	0.303	125
HYD18	101.70	0.041	0.103	0.227	125
HYD19	102.05	0.165	0.413	0.909	125
HYD20	102.81	0.055	0.138	0.303	125
HYD21	103.62	0.041	0.103	0.227	217
HYD22	104.62	0.000	0.000	0.000	217
HYD23	106.50	0.000	0.000	0.000	217
HYD24	102.63	0.041	0.103	0.227	125
HYD25	101.98	0.165	0.413	0.909	125
HYD26	102.34	0.069	0.172	0.379	217
HYD27	103.03	0.138	0.344	0.758	125
HYD28	103.55	0.138	0.344	0.758	125
HYD29	104.83	0.131	0.328	0.722	125
HYD30	104.48	0.077	0.191	0.421	217
HYD31	104.10	0.041	0.103	0.227	217
HYD32	103.20	0.028	0.069	0.152	217
HYD33	102.55	0.000	0.000	0.000	217
HYD62	102.35	0.131	0.328	0.722	125
MED1	105.33	0.911	2.279	5.013	125
MED4	102.75	0.687	1.717	3.776	125
S1	103.50	0.684	1.026	1.846	-
T1	102.98	0.000	0.000	0.000	-
T2	103.14	0.044	0.109	0.241	-
T3	102.56	0.124	0.310	0.682	-
T4	102.42	0.110	0.275	0.606	-
T5	103.33	0.000	0.000	0.000	-
T6	103.93	0.041	0.103	0.227	-
T7	102.97	0.041	0.103	0.227	-
T8	102.33	0.110	0.275	0.606	-
T9	101.66	0.124	0.310	0.682	-
T10	102.65	0.083	0.207	0.455	-
T11	102.33	0.028	0.069	0.152	-
T12	101.38	0.096	0.241	0.530	-
T13	104.37	0.000	0.000	0.000	-
T14	102.39	0.000	0.000	0.000	-
T27	103.33	0.000	0.000	0.000	-
T28	103.58	0.000	0.000	0.000	-
TMED1	104.53	0.000	0.000	0.000	-
TMED2	104.38	0.000	0.000	0.000	-
TMED7	104.53	0.000	0.000	0.000	-
TMED8	102.41	0.000	0.000	0.000	-
TMU1	107.57	2.946	6.391	13.476	217
TMU2	103.54	0.000	0.000	0.000	217

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

FERNBANK CROSSING
the Heart of the Community

REGIONAL
THE REGIONAL GROUP
Corporate Head Office:
121 Bayfield Street, Bayfield Place
Ottawa, Ontario K2C 0P9
Telephone: 613-230-2100
Fax: 613-230-2992

No.	REVISION	DATE	BY
3.	ISSUED FOR APPROVAL (PHASE 1&2)	AUG 17/12	KJM
2.	ISSUED FOR APPROVAL (PHASE 1&2)	JUN 21/12	KJM
1.	ISSUED FOR APPROVAL	MAR 9/12	KJM

SCALE 1:1500

DESIGN KJM
CHECKED MAB
DRAWN RCH
CHECKED KJM
APPROVED MAB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER K.J. MURPHY 100123021 PROVINCE OF ONTARIO
LICENSED PROFESSIONAL ENGINEER M.A. BISSETT PROVINCE OF ONTARIO

NOVATECH ENGINEERING CONSULTANTS LTD.
ENGINEERS & PLANNERS
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada
K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Email novainfo@novatech-eng.com

CITY of OTTAWA
FERNBANK CROSSING

WATERMAIN DISTRIBUTION PLAN
PHASE 1 & 2

PROJECT No. 108180-10
REV REV # 3
DRAWING No. 108180-WTR1

PLANB1.DWG - 1000mmx707mm

M:\2008\108180\CAD\Design\108180-WM.dwg, Phase 1&2, Aug 20, 2012 - 2:39pm, kmurphy

Fernbank Crossing - Watermain Analysis

Network Table - Nodes - (Peak Hour)

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc C1	102.2	0	154.75	52.52	515.22	74.73
Junc C2	102.07	0.3	154.61	52.54	515.42	74.75
Junc C3	101.96	0.46	154.5	52.54	515.42	74.75
Junc C4	101.83	0.15	154.44	52.61	516.10	74.85
Junc C5	103.52	0	154.41	50.89	499.23	72.41
Junc C6	104.89	0.3	154.37	49.48	485.40	70.40
Junc C7	102.87	0	154.37	51.5	505.22	73.28
Junc HYD1	102.73	0.3	154.43	51.7	507.18	73.56
Junc HYD2	102.55	0.72	154.47	51.92	509.34	73.87
Junc HYD3	103.2	0.42	154.41	51.21	502.37	72.86
Junc HYD4	102.95	0.76	154.43	51.48	505.02	73.25
Junc HYD5	102.63	1.14	154.51	51.88	508.94	73.82
Junc HYD6	103.45	0.42	154.41	50.96	499.92	72.51
Junc HYD7	102.8	0.23	154.42	51.62	506.39	73.45
Junc HYD8	102.15	0.53	154.46	52.31	513.16	74.43
Junc HYD9	102.18	0	154.71	52.53	515.32	74.74
Junc HYD10	101.94	0	154.54	52.6	516.01	74.84
Junc HYD11	103.42	0.6	154.4	50.98	500.11	72.54
Junc HYD12	103.33	0.24	154.39	51.06	500.90	72.65
Junc HYD13	103.08	0.54	154.39	51.31	503.35	73.00
Junc HYD14	102.92	1.14	154.41	51.49	505.12	73.26
Junc HYD15	101.93	0.61	154.46	52.53	515.32	74.74
Junc HYD16	102.41	0.91	154.45	52.04	510.51	74.04
Junc HYD17	101.96	0.3	154.44	52.48	514.83	74.67
Junc HYD18	101.7	0.23	154.41	52.71	517.09	75.00
Junc HYD19	102.05	0.91	154.39	52.34	513.46	74.47
Junc HYD20	102.81	0.3	154.38	51.57	505.90	73.37
Junc HYD21	103.62	0.23	154.38	50.76	497.96	72.22
Junc HYD22	104.62	0	154.37	49.75	488.05	70.79
Junc HYD23	106.5	0	154.37	47.87	469.60	68.11
Junc HYD24	102.63	0.23	154.38	51.75	507.67	73.63
Junc HYD25	101.98	0.91	154.38	52.4	514.04	74.56
Junc HYD26	102.4	0.38	154.37	51.97	509.83	73.94
Junc HYD27	103.03	0.76	154.37	51.34	503.65	73.05
Junc HYD28	103.55	0.76	154.37	50.82	498.54	72.31
Junc HYD29	104.83	0.72	154.37	49.54	485.99	70.49
Junc HYD30	104.48	0.42	154.37	49.89	489.42	70.98
Junc HYD31	104.1	0.23	154.37	50.27	493.15	71.53
Junc HYD32	103.2	0.15	154.37	51.17	501.98	72.81
Junc HYD33	102.55	0	154.37	51.82	508.35	73.73
Junc HYD62	102.35	0.72	154.59	52.24	512.47	74.33
Junc MED1	105.33	5.01	154.36	49.03	480.98	69.76
Junc MED4	102.75	3.78	154.46	51.71	507.28	73.57
Junc RED112	103.12	0	154.39	51.27	502.96	72.95
Junc S1	103.51	1.85	154.36	50.85	498.84	72.35
Junc T1	102.98	0	154.41	51.43	504.53	73.18
Junc T2	103.14	0.24	154.41	51.27	502.96	72.95
Junc T3	102.56	0.68	154.43	51.87	508.84	73.80
Junc T4	102.42	0.61	154.46	52.04	510.51	74.04
Junc T5	103.33	0	154.39	51.06	500.90	72.65
Junc T6	103.93	0.15	154.38	50.45	494.91	71.78
Junc T7	102.97	0.23	154.38	51.41	504.33	73.15
Junc T8	102.33	0.61	154.38	52.05	510.61	74.06
Junc T9	101.66	0.68	154.41	52.75	517.48	75.05
Junc T10	102.65	0.46	154.37	51.72	507.37	73.59
Junc T11	102.33	0.15	154.37	52.04	510.51	74.04
Junc T12	101.38	0.53	154.39	53.01	520.03	75.42
Junc T13	104.37	0	154.37	50	490.50	71.14
Junc T14	102.39	0	154.37	51.98	509.92	73.96
Junc T27	103.33	0	154.39	51.06	500.90	72.65
Junc T28	103.58	0	154.4	50.82	498.54	72.31
Junc TMED1	104.53	0	154.37	49.84	488.93	70.91
Junc TMED2	104.38	0	154.37	49.99	490.40	71.13
Junc TMED7	102.62	0	154.45	51.83	508.45	73.74
Junc TMED8	102.41	0	154.51	52.1	511.10	74.13
Junc TMU1	107.57	13.48	154.36	46.79	459.01	66.57
Junc TMU2	103.54	0	154.39	50.85	498.84	72.35
Resvr RES1	155.2	-53.02	155.2	0	0.00	0.00
Resvr RES2	154.5	7.57	154.5	0	0.00	0.00

INFORMATION FROM FERNBANK CROSSING PHASE 1 & 2 SERVICING DESIGN BRIEF

NOVATECH ENGINEERING CONSULTANTS LTD.

Fernbank Crossing - Watermain Analysis

Network Table - Links - (Peak Hour)

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	187	297	120	53.02	0.77	2.42	0.024
Pipe P2	53	155	100	-9.09	0.48	3.07	0.040
Pipe P3	29	155	100	-8.36	0.44	2.63	0.041
Pipe P4	51	155	100	-4.34	0.23	0.78	0.045
Pipe P5	83	155	100	4.02	0.21	0.68	0.045
Pipe P6	83	155	100	0.24	0.01	0.00	0.070
Pipe P7	30	155	100	-3.62	0.19	0.56	0.046
Pipe P8	45	155	100	3.87	0.20	0.63	0.046
Pipe P9	38	155	100	3.56	0.19	0.54	0.046
Pipe P10	22	297	120	43.94	0.63	1.71	0.025
Pipe P11	89	155	100	-5.25	0.28	1.11	0.044
Pipe P12	119	155	100	-4.12	0.22	0.71	0.045
Pipe P13	38	155	100	-3.36	0.18	0.49	0.047
Pipe P14	40	204	110	-1.25	0.04	0.02	0.047
Pipe P15	42	204	110	-0.83	0.03	0.01	0.050
Pipe P16	50	297	120	38.38	0.55	1.33	0.025
Pipe P17	31	297	120	38.38	0.55	1.33	0.025
Pipe P18	8	297	120	7.57	0.11	0.07	0.032
Pipe P19	73	297	120	22.66	0.33	0.50	0.027
Pipe P20	14	297	120	22.13	0.32	0.48	0.027
Pipe P21	81	297	120	19.83	0.29	0.39	0.028
Pipe P22	13	297	120	16.46	0.24	0.28	0.029
Pipe P23	62	297	120	16.23	0.23	0.27	0.029
Pipe P24	35	204	110	1.45	0.04	0.02	0.046
Pipe P25	40	204	110	1.87	0.06	0.04	0.044
Pipe P26	93	204	110	-7.31	0.22	0.45	0.036
Pipe P27	157	204	110	4.39	0.13	0.18	0.039
Pipe P28	201	204	110	-1.78	0.05	0.03	0.044
Pipe P29	79	204	110	7.70	0.24	0.50	0.036
Pipe P30	40	204	110	7.09	0.22	0.43	0.036
Pipe P31	43	155	100	-0.48	0.03	0.01	0.062
Pipe P32	88	155	100	-0.78	0.04	0.03	0.058
Pipe P33	69	155	100	-1.69	0.09	0.14	0.052
Pipe P34	62	155	100	2.69	0.14	0.32	0.048
Pipe P35	105	155	100	-1.56	0.08	0.12	0.052
Pipe P36	13	204	110	1.32	0.04	0.02	0.046
Pipe P37	77	297	120	9.77	0.14	0.11	0.031
Pipe P38	36	297	120	10.37	0.15	0.12	0.031
Pipe P39	41	297	120	-11.09	0.16	0.13	0.030
Pipe P40	41	297	120	10.55	0.15	0.12	0.031
Pipe P41	69	297	120	0.00	0.00	0.00	0.000
Pipe P42	21	297	120	-8.22	0.12	0.08	0.032
Pipe P43	57	297	120	-8.22	0.12	0.08	0.032
Pipe P44	10	297	120	-9.28	0.13	0.10	0.031
Pipe P45	50	297	120	-9.51	0.14	0.10	0.031
Pipe P46	43	155	100	0.81	0.04	0.04	0.057
Pipe P47	40	155	100	0.51	0.03	0.01	0.061
Pipe P48	73	155	100	-1.42	0.08	0.10	0.053
Pipe P49	82	155	100	-2.33	0.12	0.25	0.049
Pipe P50	18	204	110	-7.19	0.22	0.44	0.036
Pipe P51	64	204	110	-7.41	0.23	0.46	0.036
Pipe P52	76	204	110	4.18	0.13	0.16	0.039
Pipe P53	86	204	110	3.65	0.11	0.12	0.040
Pipe P54	38	155	100	1.32	0.07	0.09	0.054
Pipe P55	38	155	100	1.09	0.06	0.06	0.055
Pipe P56	64	155	100	0.61	0.03	0.02	0.060
Pipe P57	100	155	100	-0.15	0.01	0.00	0.074
Pipe P58	65	155	100	-0.91	0.05	0.04	0.057
Pipe P59	67	297	120	6.14	0.09	0.04	0.033
Pipe P60	26	297	120	3.49	0.05	0.02	0.036
Pipe P61	122	204	110	-2.65	0.08	0.07	0.042
Pipe P62	130	204	110	-2.36	0.07	0.06	0.043
Pipe P63	75	297	120	2.77	0.04	0.01	0.037
Pipe P64	31	297	120	0.41	0.01	0.00	0.051
Pipe P65	45	297	120	-0.01	0.00	0.00	0.000
Pipe P66	37	204	110	-0.01	0.00	0.00	0.000
Pipe P67	90	204	110	-0.24	0.01	0.00	0.061
Pipe P68	29	204	110	-0.39	0.01	0.00	0.053
Pipe P69	18	204	110	-1.85	0.06	0.04	0.044
Pipe P70	61	204	110	-2.24	0.07	0.05	0.043
Pipe P71	12	204	110	-2.24	0.07	0.05	0.043
Pipe P72	93	204	110	-2.24	0.07	0.05	0.043
Pipe P73	65	155	100	-0.03	0.00	0.00	0.000
Pipe P74	15	204	110	2.36	0.07	0.06	0.042
Pipe P75	125	204	110	-2.74	0.08	0.07	0.042
Pipe P76	89	204	110	4.39	0.13	0.18	0.039
Pipe P77	6	297	120	-5.86	0.08	0.04	0.033
Pipe P78	6	297	120	-11.09	0.16	0.13	0.030
Pipe P79	60	297	120	43.94	0.63	1.71	0.025
Pipe P80	5	204	110	-1.56	0.05	0.03	0.046

Fernbank Crossing - Watermain Analysis

Network Table - Nodes - (Max Pressure Check)

Node ID	Elevation m	Demand LPS	Head m	Pressure m	Pressure kPa	Pressure psi
Junc C1	102.2	0	164.4	62.2	610.18	88.50
Junc C2	102.07	0.05	164.4	62.33	611.46	88.68
Junc C3	101.96	0.08	164.4	62.44	612.54	88.84
Junc C4	101.83	0.03	164.4	62.57	613.81	89.03
Junc C5	103.52	0	164.39	60.87	597.13	86.61
Junc C6	104.89	0.05	164.39	59.5	583.70	84.66
Junc C7	103.87	0	164.39	60.52	593.70	86.11
Junc HYD1	102.73	0.05	164.39	61.66	604.88	87.73
Junc HYD2	102.55	0.13	164.39	61.84	606.65	87.99
Junc HYD3	103.2	0.08	164.39	61.19	600.27	87.06
Junc HYD4	102.95	0.14	164.39	61.44	602.73	87.42
Junc HYD5	102.63	0.21	164.4	61.77	605.96	87.89
Junc HYD6	103.45	0.08	164.39	60.94	597.82	86.71
Junc HYD7	102.8	0.04	164.39	61.59	604.20	87.63
Junc HYD8	102.15	0.1	164.4	62.25	610.67	88.57
Junc HYD9	102.18	0	164.4	62.22	610.38	88.53
Junc HYD10	101.94	0	164.4	62.46	612.73	88.87
Junc HYD11	103.42	0.11	164.39	60.97	598.12	86.75
Junc HYD12	103.33	0.04	164.39	61.06	599.00	86.88
Junc HYD13	103.08	0.1	164.39	61.31	601.45	87.23
Junc HYD14	102.92	0.21	164.39	61.47	603.02	87.46
Junc HYD15	101.93	0.11	164.4	62.47	612.83	88.88
Junc HYD16	102.41	0.17	164.4	61.99	608.12	88.20
Junc HYD17	101.96	0.05	164.4	62.44	612.54	88.84
Junc HYD18	101.7	0.04	164.39	62.69	614.99	89.20
Junc HYD19	102.05	0.17	164.39	62.34	611.56	88.70
Junc HYD20	102.81	0.05	164.39	61.58	604.10	87.62
Junc HYD21	103.62	0.04	164.39	60.77	596.15	86.46
Junc HYD22	104.62	0	164.39	59.77	586.34	85.04
Junc HYD23	106.5	0	164.39	57.89	567.90	82.37
Junc HYD24	102.63	0.04	164.39	61.76	605.87	87.87
Junc HYD25	101.98	0.17	164.39	62.41	612.24	88.80
Junc HYD26	102.4	0.07	164.39	61.99	608.12	88.20
Junc HYD27	103.03	0.14	164.39	61.36	601.94	87.30
Junc HYD28	103.55	0.14	164.39	60.84	596.84	86.56
Junc HYD29	104.83	0.13	164.39	59.56	584.28	84.74
Junc HYD30	104.48	0.08	164.39	59.91	587.72	85.24
Junc HYD31	104.1	0.04	164.39	60.29	591.44	85.78
Junc HYD32	103.2	0.03	164.39	61.19	600.27	87.06
Junc HYD33	102.55	0	164.39	61.84	606.65	87.99
Junc HYD62	102.35	0.13	164.4	62.05	608.71	88.29
Junc MED1	105.33	0.91	164.39	59.06	579.38	84.03
Junc MED4	102.75	0.69	164.39	61.64	604.69	87.70
Junc RED112	103.12	0	164.39	61.27	601.06	87.18
Junc S1	103.51	0.69	164.39	60.88	597.23	86.62
Junc T1	102.98	0	164.39	61.41	602.43	87.38
Junc T2	103.14	0.04	164.39	61.25	600.86	87.15
Junc T3	102.56	0.12	164.39	61.83	606.55	87.97
Junc T4	102.42	0.11	164.4	61.98	608.02	88.19
Junc T5	103.33	0	164.39	61.06	599.00	86.88
Junc T6	103.93	0.03	164.39	60.46	593.11	86.02
Junc T7	102.97	0.04	164.39	61.42	602.53	87.39
Junc T8	102.33	0.11	164.39	62.06	608.81	88.30
Junc T9	101.66	0.12	164.39	62.73	615.38	89.25
Junc T10	102.65	0.08	164.39	61.74	605.67	87.84
Junc T11	102.33	0.03	164.39	62.06	608.81	88.30
Junc T12	101.38	0.1	164.39	63.01	618.13	89.65
Junc T13	104.37	0	164.39	60.02	588.80	85.40
Junc T14	102.39	0	164.39	62	608.22	88.21
Junc T27	103.33	0	164.39	61.06	599.00	86.88
Junc T28	103.58	0	164.39	60.81	596.55	86.52
Junc TMED1	104.53	0	164.39	59.86	587.23	85.17
Junc TMED2	104.38	0	164.39	60.01	588.70	85.38
Junc TMED7	102.62	0	164.39	61.77	605.96	87.89
Junc TMED8	102.41	0	164.39	61.98	608.02	88.19
Junc TMU1	107.57	2.95	164.39	56.82	557.40	80.84
Junc TMU2	103.54	0	164.39	60.85	596.94	86.58
Resvr RES1	164.4	-1.47	164.4	0	0.00	0.00
Resvr RES2	164.4	-7.64	164.4	0	0.00	0.00

INFORMATION FROM FERNBANK CROSSING PHASE 1 & 2 SERVICING DESIGN BRIEF

NOVATECH ENGINEERING CONSULTANTS LTD.

Fernbank Crossing - Watermain Analysis

Network Table - Links - (Max Pressure Check)

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	187	297	120	1.47	0.02	0.00	0.041
Pipe P2	53	155	100	-1.20	0.06	0.07	0.054
Pipe P3	29	155	100	-1.07	0.06	0.06	0.055
Pipe P4	51	155	100	0.55	0.03	0.02	0.061
Pipe P5	83	155	100	0.53	0.03	0.02	0.061
Pipe P6	83	155	100	-0.16	0.01	0.00	0.066
Pipe P7	30	155	100	0.41	0.02	0.01	0.066
Pipe P8	45	155	100	0.25	0.01	0.00	0.063
Pipe P9	73	155	100	0.20	0.01	0.00	0.070
Pipe P10	22	297	120	0.27	0.00	0.00	0.000
Pipe P11	89	155	100	-0.85	0.04	0.04	0.057
Pipe P12	119	155	100	-0.64	0.03	0.02	0.060
Pipe P13	38	155	100	-0.50	0.03	0.01	0.061
Pipe P14	40	204	110	-0.71	0.02	0.01	0.051
Pipe P15	42	204	110	-0.64	0.02	0.00	0.052
Pipe P16	50	297	120	-0.64	0.01	0.00	0.026
Pipe P17	31	297	120	-0.64	0.01	0.00	0.082
Pipe P18	8	297	120	-7.64	0.11	0.07	0.032
Pipe P19	73	297	120	5.22	0.08	0.03	0.034
Pipe P20	14	297	120	5.13	0.07	0.03	0.033
Pipe P21	81	297	120	4.70	0.07	0.03	0.035
Pipe P22	13	297	120	4.00	0.06	0.02	0.035
Pipe P23	62	297	120	3.95	0.06	0.02	0.035
Pipe P24	35	204	110	0.33	0.01	0.00	0.042
Pipe P25	40	204	110	-0.25	0.01	0.00	0.062
Pipe P26	93	204	110	-1.60	0.05	0.03	0.045
Pipe P27	157	204	110	0.83	0.03	0.01	0.050
Pipe P28	201	204	110	-0.51	0.02	0.00	0.054
Pipe P29	79	204	110	1.70	0.05	0.03	0.045
Pipe P30	40	204	110	1.59	0.05	0.03	0.046
Pipe P31	43	155	100	-0.09	0.00	0.00	0.054
Pipe P32	88	155	100	-0.15	0.01	0.00	0.083
Pipe P33	69	155	100	-0.31	0.02	0.01	0.066
Pipe P34	62	155	100	0.58	0.03	0.02	0.060
Pipe P35	105	155	100	-0.38	0.02	0.01	0.065
Pipe P36	13	204	110	-0.33	0.01	0.00	0.056
Pipe P37	77	297	120	1.91	0.03	0.01	0.039
Pipe P38	36	297	120	2.02	0.03	0.01	0.039
Pipe P39	41	297	120	2.24	0.03	0.01	0.038
Pipe P40	41	297	120	2.15	0.03	0.01	0.039
Pipe P41	69	297	120	0.00	0.00	0.00	0.000
Pipe P42	21	297	120	-1.85	0.03	0.01	0.044
Pipe P43	57	297	120	-1.85	0.03	0.00	0.037
Pipe P44	10	297	120	-2.00	0.03	0.01	0.051
Pipe P45	50	297	120	-2.04	0.03	0.01	0.037
Pipe P46	43	155	100	0.06	0.00	0.00	0.000
Pipe P47	40	155	100	0.01	0.00	0.00	0.000
Pipe P48	73	155	100	-0.38	0.02	0.01	0.063
Pipe P49	82	155	100	-0.54	0.03	0.02	0.061
Pipe P50	18	204	110	-1.61	0.05	0.03	0.046
Pipe P51	64	204	110	-1.65	0.05	0.03	0.045
Pipe P52	76	204	110	0.95	0.03	0.01	0.048
Pipe P53	86	204	110	0.85	0.03	0.01	0.050
Pipe P54	38	155	100	0.27	0.01	0.00	0.072
Pipe P55	38	155	100	0.23	0.01	0.00	0.069
Pipe P56	64	155	100	0.15	0.01	0.00	0.069
Pipe P57	100	155	100	0.01	0.00	0.00	0.000
Pipe P58	65	155	100	-0.12	0.01	0.00	0.060
Pipe P59	67	297	120	1.29	0.02	0.00	0.042
Pipe P60	26	297	120	0.79	0.01	0.00	0.032
Pipe P61	122	204	110	0.49	0.02	0.00	0.054
Pipe P62	130	204	110	-0.42	0.01	0.00	0.056
Pipe P63	75	297	120	0.66	0.01	0.00	0.047
Pipe P64	31	297	120	0.24	0.00	0.00	0.000
Pipe P65	45	297	120	0.17	0.00	0.00	0.000
Pipe P66	37	204	110	0.17	0.01	0.00	0.077
Pipe P67	90	204	110	0.13	0.00	0.00	0.056
Pipe P68	29	204	110	0.10	0.00	0.00	0.286
Pipe P69	18	204	110	0.69	0.02	0.01	0.047
Pipe P70	61	204	110	-0.59	0.02	0.00	0.053
Pipe P71	12	204	110	-0.59	0.02	0.00	0.059
Pipe P72	93	204	110	-0.59	0.02	0.00	0.052
Pipe P73	65	155	100	0.00	0.00	0.00	0.000
Pipe P74	15	204	110	0.62	0.02	0.01	0.056
Pipe P75	125	204	110	-0.69	0.02	0.01	0.051
Pipe P76	89	204	110	0.83	0.03	0.01	0.050
Pipe P77	6	297	120	1.93	0.03	0.01	0.046
Pipe P78	6	297	120	2.24	0.03	0.01	0.052
Pipe P79	60	297	120	0.27	0.00	0.00	0.000
Pipe P80	5	204	110	-0.38	0.01	0.00	0.000

NOVATECH ENGINEERING CONSULTANTS LTD.

Fernbank Crossing - Watermain Analysis

Network Table - Nodes - (Fire Flow Summary)

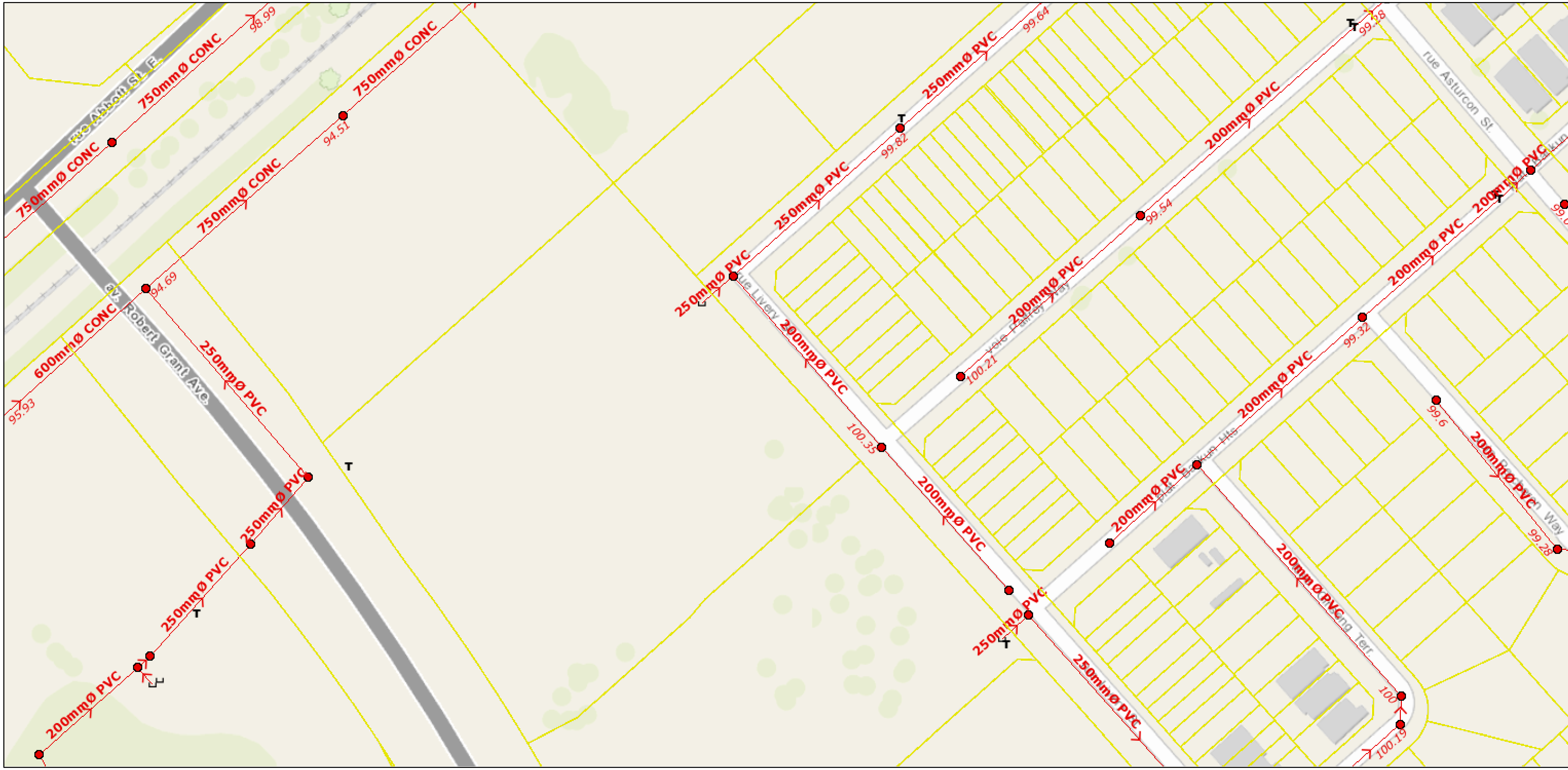
Fire Flow		Minimum Pressure		
Node	Flow (L/s)	Pressure (kPa)	Pressure (PSI)	Node
HYD1	125	432.62	62.75	HYD1
HYD2	125	386.61	56.07	HYD2
HYD3	217	373.17	54.12	HYD3
HYD4	125	428.60	62.16	HYD4
HYD5	125	397.50	57.65	HYD5
HYD6	217	396.62	57.52	TMU1
HYD7	125	466.07	67.60	23
HYD8	125	472.16	68.48	23
HYD9	125	477.45	69.25	TMU1
HYD10	125	477.65	69.28	TMU1
HYD11	217	396.13	57.45	TMU1
HYD12	217	397.40	57.64	TMU1
HYD13	217	393.28	57.04	HYD23
HYD14	125	424.48	61.57	HYD14
HYD15	125	474.41	68.81	TMU1
HYD16	125	421.83	61.18	HYD16
HYD17	125	438.90	63.66	HYD17
HYD18	125	471.17	68.34	TMU1
HYD19	125	410.65	59.56	HYD19
HYD20	125	445.86	64.67	HYD20
HYD21	217	383.28	55.59	HYD23
HYD22	217	374.94	54.38	HYD23
HYD23	217	350.12	50.78	HYD23
HYD24	125	430.86	62.49	HYD24
HYD25	125	459.40	66.63	HYD25
HYD26	217	308.03	44.68	HYD26
HYD27	125	375.04	54.39	HYD27
HYD28	125	385.04	55.85	HYD28
HYD29	125	462.15	67.03	HYD23
HYD30	217	360.32	52.26	HYD30
HYD31	217	322.45	46.77	HYD31
HYD32	217	284.59	41.28	HYD32
HYD33	217	282.04	40.91	HYD33
HYD62	125	436.15	63.26	HYD62
MED1	125	436.45	63.30	MED1
MED4	125	335.40	48.65	MED4
TMU1	217	342.66	49.70	TMU1
TMU2	217	328.64	47.66	TMU2

INFORMATION FROM FERNBANK CROSSING PHASE 1 & 2 SERVICING DESIGN BRIEF

NOVATECH ENGINEERING CONSULTANTS LTD.

APPENDIX B
Sanitary Calculations

1000 Robert Grant Ave Sanitary Info



March 6, 2019

Property Parcels

Upstream Invert / Radier amont

Downstream Invert / Radier aval

Sanitary Pipe Details / Détails de la conduite de réseau d'égout domestique

Sewer Fittings / Raccords

Cap / bouchon

Tee / raccord en T

Sanitary Manholes / Regards d'égout domestique

Sanitary Pipes / Conduites d'égout domestique

Private / Branchement privé

Public / Branchement public

Sanitary Pump Stations and Treatment Plants / Installations d'infrastructure

Sanitary Pump Station / Station de pompage des eaux usées

Wastewater Treatment Plant / Usine d'épuration des eaux usées

Combined Manholes / Regards d'égout unitaire

Combined Pipes / Conduites d'égout unitaire

Public / Branchement public

Private / Branchement privé

1:2,000

0 0.0225 0.045 0.09 mi

0 0.0375 0.075 0.15 km

City of Ottawa

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PROJECT #: 117151
PROJECT NAME: RENE'S COURT
LOCATION: OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: MARCH 2019

RENE'S COURT SANITARY FLOWS

LOCATION									INFILTRATION				PIPE					
AREA	FROM	TO	Apartment Units		TOTAL							Total Flow (l/s)						
			Avg Unit	Pop.	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)		Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
	Block 203	**EX**	566	1019	1019	1019	3.2	10.69	2.017	2.017	0.67	11.35	200	2.00	N/A	46.3	1.48	24.5%

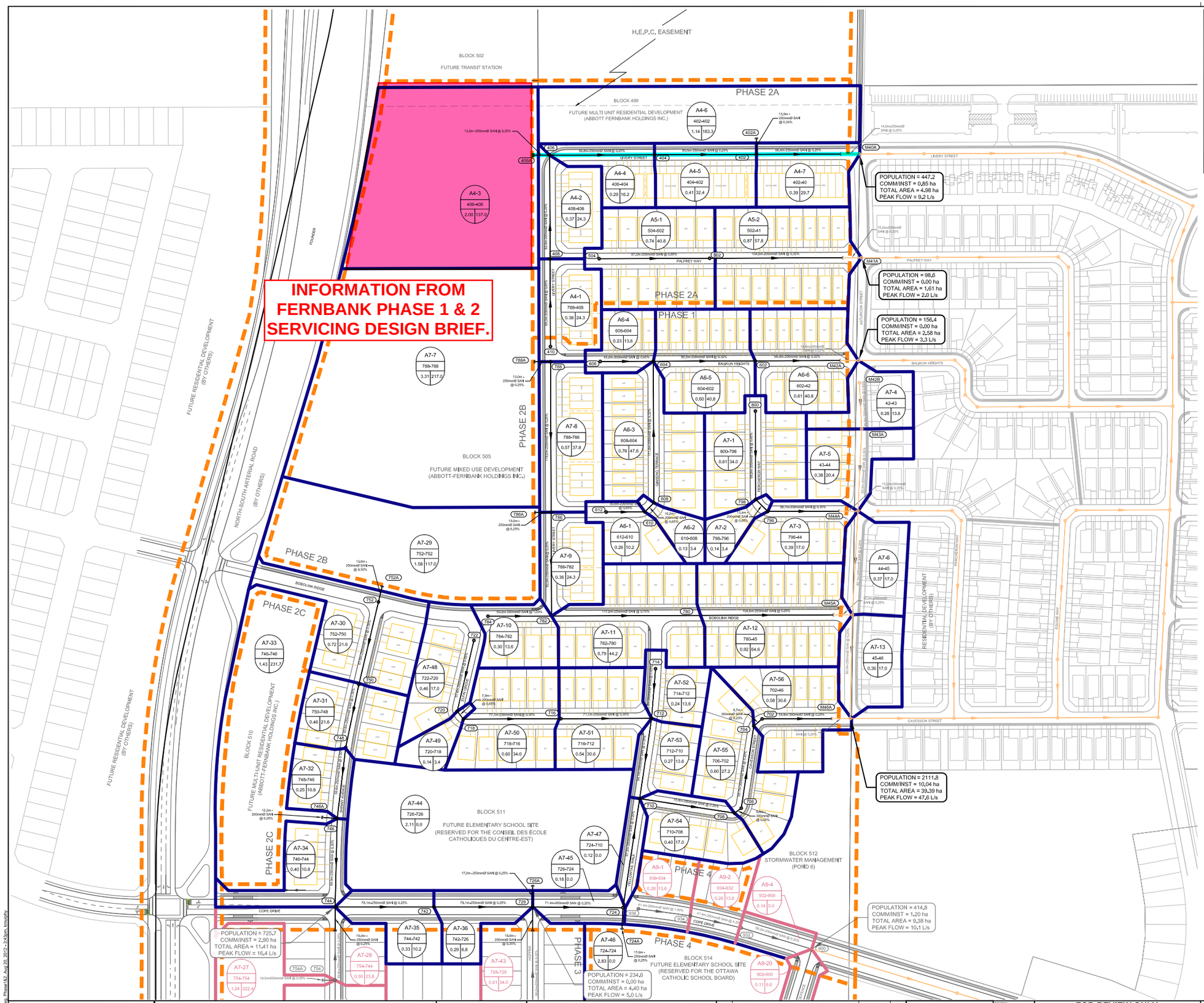
Design Parameters:

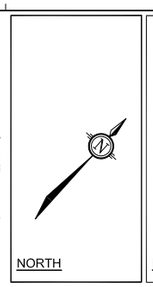
- Average Apartment = 1.8 persons/unit

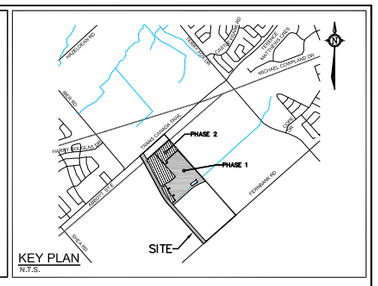
Section 4.0 Ottawa Sewer Design Guidelines

- Average Domestic Flow 280 L/person L/person/day
- Extraneous Flows 0.33 l/s/ha l/s/ha

Residential Peaking Factor Harmon Equation







LEGEND

- A4-4 / 404-402 / 0.29 | 19.6 — AREA ID; MANHOLE TO MANHOLE; POPULATION EQUIVALENT; AREA IN HECTARES
- SANITARY DRAINAGE AREA BOUNDARY
- PHASE BOUNDARY LINE
- DIRECTION OF FLOW
- 482 — PROPOSED SANITARY SEWER AND MANHOLE
- A4-4 / 404-402 / 0.29 | 19.6 — FUTURE AREA ID; FUTURE MANHOLE TO MANHOLE; FUTURE POPULATION EQUIVALENT; FUTURE AREA IN HECTARES
- FUTURE SANITARY DRAINAGE AREA BOUNDARY
- FUTURE DIRECTION OF FLOW
- 636 — FUTURE PROPOSED SANITARY SEWER AND MANHOLE

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

FERNBANK · CROSSING · the Heart of the Community

ABBOTT-FERNBANK HOLDINGS INC.

REGIONAL — THE REGIONAL GROUP
Corporate Head Office
1737 Woodward Drive, 2nd Floor
Ottawa, Ontario, K2C 0P9
Telephone: 613-230-2100
Fax: 613-230-2992

No.	REVISION	DATE	BY
3.	ISSUED FOR APPROVAL (PHASE 1&2)	AUG 17/12	KJM
2.	ISSUED FOR APPROVAL (PHASE 1&2)	JUN 21/12	KJM
1.	ISSUED FOR APPROVAL	MAR 9/12	KJM

SCALE 1:1250

DESIGN	KJM
CHECKED	MAB
DRAWN	RCH
CHECKED	KJM
APPROVED	MAB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER K. J. MURPHY 100123021 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER M.A. BISSETT PROVINCE OF ONTARIO

NOVATECH ENGINEERING CONSULTANTS LTD.
ENGINEERS & PLANNERS
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada
K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Email novainfo@novatech-eng.com

CITY OF OTTAWA
FERNBANK CROSSING

SANITARY DRAINAGE AREA PLAN
PHASE 1 & 2

PROJECT No. 108180-10
REV REV # 3
DRAWING No. 108180-SAN1

PLANB1.DWG - 1000mmx707mm

Fernbank Crossing - Sanitary Sewer Design Sheet

FLOW ALLOTED FROM BLOCK 203

AREA			RESIDENTIAL												ICI				INFILTRATION				PIPE					
			SINGLES		TOWNS				MIXED USE		TOTAL																	
ID	From	To	Units	Pop.	Units	Pop.	Area	Pop.	Net Area (ha)	Pop.	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	Commercial Area (ha)	Institutional Area (ha)	Accum. Area (ha)	Peak Flow (l/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)	**Total Flow (l/s)**	Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
Outlet 400																												
4-1	410	408	0	0.0	9	24.3	0.0	0.0	0.00	0.0	24.3	24.3	4.0	0.4	0.00	0.00	0.00	0.0	0.38	0.38	0.1	0.5	200	0.65	69.3	27.6	0.85	1.8%
4-2	408	**406**	0	0.0	9	24.3	0.0	0.0	0.00	0.0	24.3	48.6	4.0	0.8	0.00	0.00	0.00	0.0	0.37	0.75	0.2	1.0	200	0.35	82.0	20.2	0.62	4.9%
4-3	406A	**406**	0	0.0	0	0.0	0.0	0.0	1.70	137.0	137.0	137.0	4.0	2.2	0.85	0.00	0.85	0.5	2.00	2.00	0.6	3.3	250	0.25	11.0	31.0	0.61	10.6%
4-4	**406**	404	0	0.0	6	16.2	0.0	0.0	0.00	0.0	16.2	201.8	4.0	3.3	0.00	0.00	0.85	0.5	0.29	3.04	0.9	4.6	250	0.25	82.8	31.0	0.61	14.9%
4-5	404	**402**	0	0.0	12	32.4	0.0	0.0	0.00	0.0	32.4	234.2	4.0	3.8	0.00	0.00	0.85	0.5	0.41	3.45	1.0	5.3	250	0.25	80.5	31.0	0.61	17.0%
4-6	402A	**402**	0	0.0	0	0.0	1.1	183.3	0.00	0.0	183.3	183.3	4.0	3.0	0.00	0.00	0.00	0.0	1.14	1.14	0.3	3.3	200	0.35	11.0	20.2	0.62	16.3%
4-7	**402**	**40A**	0	0.0	11	29.7	0.0	0.0	0.00	0.0	29.7	447.2	4.0	7.2	0.00	0.00	0.85	0.5	0.39	4.98	1.4	9.2	250	0.25	81.3	31.0	0.61	29.5%
Outlet 500																												
5-1	504	502	12	40.8	0	0.0	0.0	0.0	0.00	0.0	40.8	40.8	4.0	0.7	0.00	0.00	0.00	0.0	0.74	0.74	0.2	0.9	200	0.65	87.3	27.6	0.85	3.2%
5-2	502	**41A**	17	57.8	0	0.0	0.0	0.0	0.00	0.0	57.8	98.6	4.0	1.6	0.00	0.00	0.00	0.0	0.87	1.61	0.5	2.0	200	0.32	120.0	19.4	0.60	10.6%
Outlet 600																												
6-1	612	610	3	10.2	0	0.0	0.0	0.0	0.00	0.0	10.2	10.2	4.0	0.2	0.00	0.00	0.00	0.0	0.26	0.26	0.1	0.2	200	0.65	30.6	27.6	0.85	0.9%
6-2	610	608	1	3.4	0	0.0	0.0	0.0	0.00	0.0	3.4	13.6	4.0	0.2	0.00	0.00	0.00	0.0	0.13	0.39	0.1	0.3	200	0.65	10.2	27.6	0.85	1.2%
6-3	608	**604**	14	47.6	0	0.0	0.0	0.0	0.00	0.0	47.6	61.2	4.0	1.0	0.00	0.00	0.00	0.0	0.76	1.14	0.3	1.3	200	0.32	111.8	19.4	0.60	6.8%
6-4	606	**604**	4	13.6	0	0.0	0.0	0.0	0.00	0.0	13.6	13.6	4.0	0.2	0.00	0.00	0.00	0.0	0.23	0.23	0.1	0.3	200	0.65	42.0	27.6	0.85	1.0%
6-5	**604**	602	12	40.8	0	0.0	0.0	0.0	0.00	0.0	40.8	115.6	4.0	1.9	0.00	0.00	0.00	0.0	0.60	1.97	0.6	2.4	200	0.32	80.5	19.4	0.60	12.5%
6-6	602	**42A**	12	40.8	0	0.0	0.0	0.0	0.00	0.0	40.8	156.4	4.0	2.5	0.00	0.00	0.00	0.0	0.61	2.58	0.7	3.3	200	0.32	81.6	19.4	0.60	16.8%
Outlet 700																												
7-1	800	798	10	34.0	0	0.0	0.0	0.0	0.00	0.0	34.0	34.0	4.0	0.6	0.00	0.00	0.00	0.0	0.61	0.61	0.2	0.7	200	0.65	69.9	27.6	0.85	2.6%
7-2	798	796	1	3.4	0	0.0	0.0	0.0	0.00	0.0	3.4	37.4	4.0	0.6	0.00	0.00	0.00	0.0	0.14	0.75	0.2	0.8	200	0.65	13.4	27.6	0.85	3.0%
7-3	796	**44A**	5	17.0	0	0.0	0.0	0.0	0.00	0.0	17.0	54.4	4.0	0.9	0.00	0.00	0.00	0.0	0.39	1.14	0.3	1.2	200	0.35	71.3	20.2	0.62	5.9%
7-4	42B	43A	4	13.6	0	0.0	0.0	0.0	0.00	0.0	13.6	13.6	4.0	0.2	0.00	0.00	0.00	0.0	0.28	0.28	0.1	0.3	200	0.65	36.5	27.6	0.85	1.1%
7-5	43A	**44A**	6	20.4	0	0.0	0.0	0.0	0.00	0.0	20.4	34.0	4.0	0.6	0.00	0.00	0.00	0.0	0.38	0.66	0.2	0.7	200	0.35	65.0	20.2	0.62	3.6%
7-6	**44A**	**45A**	5	17.0	0	0.0	0.0	0.0	0.00	0.0	17.0	105.4	4.0	1.7	0.00	0.00	0.00	0.0	0.37	2.17	0.6	2.3	200	0.35	82.1	20.2	0.62	11.4%
7-7	788A	788	0	0.0	0	0.0	0.0	0.0	2.68	217.0	217.0	217.0	4.0	3.5	1.34	0.00	1.34	0.8	3.31	3.31	0.9	5.3	250	0.25	11.0	31.0	0.61	17.0%
7-8	788	786	0	0.0	14	37.8	0.0	0.0	0.00	0.0	37.8	254.8	4.0	4.1	0.00	0.00	1.34	0.8	0.57	3.89	1.1	6.0	250	0.25	119.0	31.0	0.61	19.4%
7-9	786	**782**	0	0.0	9	24.3	0.0	0.0	0.00	0.0	24.3	279.1	4.0	4.5	0.00	0.00	1.34	0.8	0.36	4.25	1.2	6.5	250	0.25	82.0	31.0	0.61	21.0%
7-10	784	**782**	4	13.6	0	0.0	0.0	0.0	0.00	0.0	13.6	13.6	4.0	0.2	0.00	0.00	0.00	0.0	0.30	0.30	0.1	0.3	200	1.00	50.2	34.2	1.06	0.9%
7-11	**782**	780	13	44.2	0	0.0	0.0	0.0	0.00	0.0	44.2	336.9	4.0	5.5	0.00	0.00	1.34	0.8	0.80	5.35	1.5	7.8	250	0.75	117.8	53.7	1.06	14.5%
7-12	780	**45A**	19	64.6	0	0.0	0.0	0.0	0.00	0.0	64.6	401.5	4.0	6.5	0.00	0.00	1.34	0.8	0.93	6.28	1.8	9.1	250	0.25	120.0	31.0	0.61	29.3%
7-13	**45A**	**46A**	5	17.0	0	0.0	0.0	0.0	0.00	0.0	17.0	523.9	4.0	8.4	0.00	0.00	1.34	0.8	0.36	8.81	2.5	11.7	250	0.25	82.0	31.0	0.61	37.7%

INFORMATION FROM FERNBANK PHASE 1 & 2 SERVICING DESIGN BRIEF.

NOVATECH ENGINEERING CONSULTANTS LTD.

Fernbank Crossing - Sanitary Sewer Design Sheet

AREA			RESIDENTIAL												ICI				INFILTRATION				PIPE					
			SINGLES		TOWNS				MIXED USE		TOTAL																	
ID	From	To	Units	Pop.	Units	Pop.	Area	Pop.	Net Area (ha)	Pop.	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	Commercial Area (ha)	Institutional Area (ha)	Accum. Area (ha)	Peak Flow (l/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)	**Total Flow (l/s)**	Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
Future		**744**	101	343.4	0	0.0	2.4	382.3	0.00	0.0	725.7	725.7	3.9	11.4	0.00	2.90	2.90	1.8	11.41	11.41	3.2	16.4						
7-29	752A	752	0	0.0	0	0.0	0.0	0.0	1.45	117.0	117.0	117.0	4.0	1.9	0.73	0.00	0.73	0.4	1.58	1.58	0.4	2.8	250	0.30	11.0	34.0	0.67	8.2%
7-30	752	750	0	0.0	8	21.6	0.0	0.0	0.00	0.0	21.6	138.6	4.0	2.2	0.00	0.00	0.73	0.4	0.72	2.30	0.6	3.3	250	0.30	67.0	34.0	0.67	9.8%
7-31	750	748	0	0.0	8	21.6	0.0	0.0	0.00	0.0	21.6	160.2	4.0	2.6	0.00	0.00	0.73	0.4	0.44	2.74	0.8	3.8	250	0.30	51.6	34.0	0.67	11.2%
7-32	748	**746**	0	0.0	4	10.8	0.0	0.0	0.00	0.0	10.8	171.0	4.0	2.8	0.00	0.00	0.73	0.4	0.23	2.97	0.8	4.0	250	0.30	55.9	34.0	0.67	11.9%
7-33	746A	**746**	0	0.0	0	0.0	1.4	231.7	0.00	0.0	231.7	231.7	4.0	3.8	0.00	0.00	0.00	0.0	1.43	1.43	0.4	4.2	200	0.35	10.2	20.2	0.62	20.5%
7-34	**746**	**744**	0	0.0	4	10.8	0.0	0.0	0.00	0.0	10.8	413.5	4.0	6.7	0.00	0.00	0.73	0.4	0.40	4.80	1.3	8.5	250	0.30	69.9	34.0	0.67	25.0%
7-35	**744**	742	3	10.2	0	0.0	0.0	0.0	0.00	0.0	10.2	1149.3	3.8	17.5	0.00	0.00	3.76	2.3	0.33	16.54	4.6	24.4	250	0.25	78.1	31.0	0.61	78.7%
7-36	742	**726**	2	6.8	0	0.0	0.0	0.0	0.00	0.0	6.8	1156.1	3.8	17.6	0.00	0.00	3.76	2.3	0.29	16.83	4.7	24.6	250	0.25	78.1	31.0	0.61	79.3%
Future		**726**	69	234.6	0	0.0	0.0	0.0	0.00	0.0	234.6	234.6	4.0	3.8	0.00	0.00	0.00	0.0	4.40	4.40	1.2	5.0						
7-44	726A	**726**	0	0.0	0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	4.0	0.0	0.00	2.12	2.12	1.3	2.12	2.12	0.6	1.9	250	0.25	15.0	31.0	0.61	6.1%
7-45	**726**	**724**	0	0.0	0	0.0	0.0	0.0	0.00	0.0	0.0	1390.7	3.7	20.9	0.00	0.00	5.87	3.6	0.18	23.53	6.6	31.0	300	0.20	71.4	45.1	0.62	68.7%
7-46	**724A**	**724**	0	0.0	0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	4.0	0.0	0.00	2.83	2.83	1.7	2.83	2.83	0.8	2.5	250	0.25	15.0	31.0	0.61	8.1%
7-47	**724**	**710**	0	0.0	0	0.0	0.0	0.0	0.00	0.0	0.0	1390.7	3.7	20.9	0.00	0.00	8.70	5.3	0.11	26.47	7.4	33.6	300	0.20	87.2	45.1	0.62	74.4%
7-48	722	720	5	17.0	0	0.0	0.0	0.0	0.00	0.0	17.0	17.0	4.0	0.3	0.00	0.00	0.00	0.0	0.46	0.46	0.1	0.4	200	0.65	57.6	27.6	0.85	1.5%
7-49	720	718	1	3.4	0	0.0	0.0	0.0	0.00	0.0	3.4	20.4	4.0	0.3	0.00	0.00	0.00	0.0	0.14	0.60	0.2	0.5	200	0.65	7.9	27.6	0.85	1.8%
7-50	718	716	10	34.0	0	0.0	0.0	0.0	0.00	0.0	34.0	54.4	4.0	0.9	0.00	0.00	0.00	0.0	0.60	1.20	0.3	1.2	200	0.35	75.7	20.2	0.62	6.0%
7-51	716	**712**	9	30.6	0	0.0	0.0	0.0	0.00	0.0	30.6	85.0	4.0	1.4	0.00	0.00	0.00	0.0	0.54	1.74	0.5	1.9	200	0.35	73.1	20.2	0.62	9.2%
7-52	714	**712**	4	13.6	0	0.0	0.0	0.0	0.00	0.0	13.6	13.6	4.0	0.2	0.00	0.00	0.00	0.0	0.23	0.23	0.1	0.3	200	0.65	39.4	27.6	0.85	1.0%
7-53	**712**	**710**	4	13.6	0	0.0	0.0	0.0	0.00	0.0	13.6	112.2	4.0	1.8	0.00	0.00	0.00	0.0	0.28	2.25	0.6	2.4	200	0.35	64.1	20.2	0.62	12.1%
7-54	**710**	708	5	17.0	0	0.0	0.0	0.0	0.00	0.0	17.0	1519.9	3.7	22.6	0.00	0.00	8.70	5.3	0.40	29.11	8.2	36.1	300	0.20	75.8	45.1	0.62	79.9%
	708	706	0	0.0	0	0.0	0.0	0.0	0.00	0.0	0.0	1519.9	3.7	22.6	0.00	0.00	8.70	5.3	0.00	29.11	8.2	36.1	300	0.20	6.6	45.1	0.62	79.9%
7-55	706	704	8	27.2	0	0.0	0.0	0.0	0.00	0.0	27.2	1547.1	3.7	23.0	0.00	0.00	8.70	5.3	0.60	29.71	8.3	36.6	300	0.20	65.7	45.1	0.62	81.1%
	704	702	0	0.0	0	0.0	0.0	0.0	0.00	0.0	0.0	1547.1	3.7	23.0	0.00	0.00	8.70	5.3	0.00	29.71	8.3	36.6	300	0.20	8.7	45.1	0.62	81.1%
7-56	702	**46A**	9	30.6	0	0.0	0.0	0.0	0.00	0.0	30.6	1577.7	3.7	23.4	0.00	0.00	8.70	5.3	0.58	30.29	8.5	37.2	300	0.20	69.6	45.1	0.62	82.4%
	46A	**31A**	3	10.2	0	0.0	0.0	0.0	0.00	0.0	10.2	2111.8	3.6	30.5	0.00	0.00	10.04	6.1	0.29	39.39	11.0	47.6	300	0.65	82.0	81.3	1.11	58.6%

Design Parameters:

Avg Flow/Person =	350	l/day
Comm./Inst. Flow =	35000	l/ha/day
Infiltration =	0.28	l/s/ha
Pipe Friction n =	0.013	

Residential Peaking Factor = Harmon Equation (max 4, min 2)

Peaking Factor Comm./Inst. 1.5

Population Density:

	ppl/unit	units/net ha
Mixed Use	1.80	90
Singles	3.40	
Towns	2.70	60

Project: Abbott-Fernbank (108180)

Designed: KJM

Checked: MAB

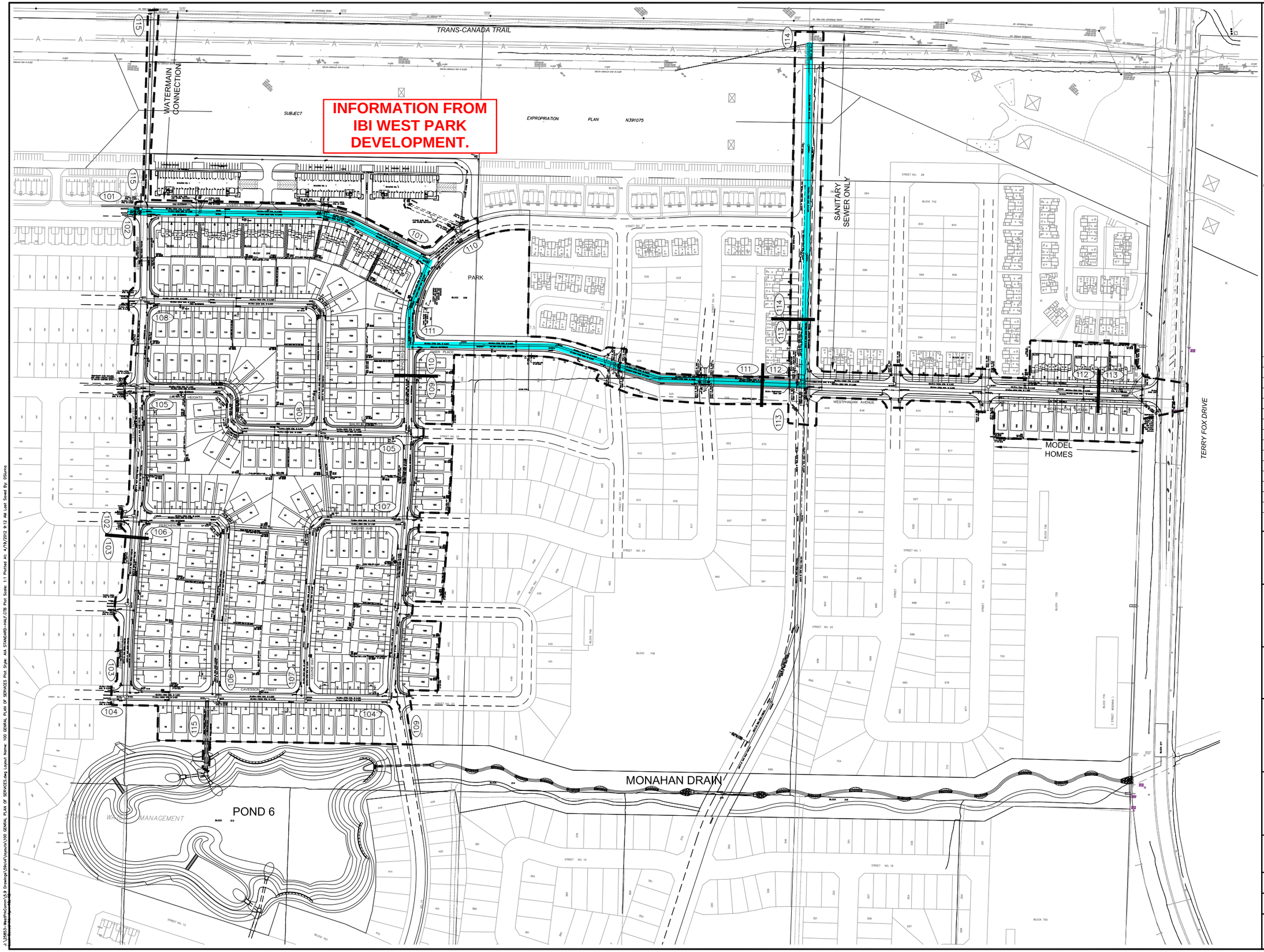
Date: August 17, 2012

INFORMATION FROM FERNBANK CROSSING PHASE 1 & 2 DEVELOPMENT

LICENSED PROFESSIONAL ENGINEER
K. J. MURPHY
100123021
AUG. 17/12
PROVINCE OF ONTARIO

NOVATECH ENGINEERING CONSULTANTS LTD.

M:\2008\108180\DATA\Calculations\SAN\AFH Detail Design\20120817 - SAN Design Sheet (Overall)



LEGEND:

- SINGLE SERVICE LOCATION
- DOUBLE SERVICE LOCATION
- STACKED TOWNHOUSE DOUBLE SERVICE
- DRIVEWAY LOCATION
- CB — STANDARD STREET CATCHBASIN *
- RYCB — REARYARD CB C/W TOP OF GRATE *
- ETCB — ELBOW OR TEE REARYARD CB C/W TOP OF GRATE
- SC — SINGLE CONNECTION BETWEEN PAIRS OF STREET CATCHBASINS
- BARRIER CURB
- MOUNTABLE CURB
- PHASE 1 LIMITS
- DEPRESSED CURB
- * REFER TO CATCHBASIN DATA TABLE ON DRAWING 25853-DETAILS 1 FOR TOP OF GRATE, LEAD INVERT, PIPE SIZE AND INLET CONTROL DEVICE INFORMATION
- 1.01 — DRAWING NUMBER MAIL BOX C/W 2.0m DEPRESSED CURB

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4	ISSUED FOR MOE APPROVAL	LME	12:04:19
3	ISSUED FOR SUBMISSION #3	LME	12:03:29
2	ISSUED FOR SUBMISSION #2	LME	12:01:27
1	ISSUED FOR SUBMISSION #1	LME	11:09:22

IBI GROUP
333 Preston Street
Tower 1, Suite 400
Ottawa, Ontario
Canada K1S 5N4
Tel (613)225-1311
Fax (613)225-9868

Project Title
WEST PARK
MONARCH - CARDEL
PHASE 1

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
PROVINCE OF ONTARIO

N

Drawing Title
GENERAL PLAN
OF SERVICES

Scale
1 : 1500

Design	Date
LME	SEPT 2011
Drawn	Checked
D.D.	RWW
Project No.	Drawing No.
25853	100

J:\25853-WestParkCorner\5.0 Drawings\25civil\layouts\100 GENERAL PLAN OF SERVICES.dwg Layout Name: 100 GENERAL PLAN OF SERVICES Plot Style: AIA STANDARD-HALF CTB Plot Scale: 1:1 Plotted At: 4/19/2012 9:12 AM Last Saved By: DSturro

INFORMATION FROM IBI WEST PARK DEVELOPMENT

IBI GROUP

IBI Group
333 Preston Street - Suite 400
Ottawa, Ontario
K1S 5N4

SANITARY SEWER DESIGN SHEET

PROJECT: WEST PARK IN FERNBANK - PHASE 1
DEVELOPER: MONARCH CORPORATION

JOB #: 25853-5.7
DATE PRINTED: 01-May-12
DESIGN: LE

FLOW FROM FERNBANK CROSSING LIVERY STREET

LOCATION			INDIVIDUAL				CUM. RES. FLOW			ICI				INFILTRATION			TOTAL	PROPOSED SEWER							FLOW DEPTH	
STREET	FROM MH	TO MH	RESID. UNITS Sngls	Towns Semis	Multi Res	POP.	POP.	PEAK FACT.	PEAK FLOW (l/s)	COMM. AREA (Ha)	INSTIT. AREA (Ha)	CUM. AREA (Ha)	PEAK FLOW (l/s)	INCR. AREA (Ha)	CUM. AREA (Ha)	FLOW (l/s)	DESIGN FLOW (l/s)	CAP. l/s	PIPE (mm)	LGTH. (m)	SLOPE %	VEL. (full) m/s	AVAIL. CAP. (l/s)	AVAIL. CAP. (%)	Flow qa/Qa	Depth da/Df
Private Site	211 A	100 A			45	103.5	104	4.00	1.70					0.72	0.72	0.20	**1.90**	**26.49**	200	8.5	0.60	0.82	24.60	93%		
Tapadero Avenue	100 A	101 A				0.0	104	4.00	1.70					0.09	0.81	0.23	**1.92**	**26.49**	200	41.0	0.60	0.82	24.57	93%		
External	Stub	40 A				468.1	468	3.99	7.66					5.05	5.05	1.41	**9.07**	**31.01**	250	15.0	0.25	0.61	21.94	71%	0.29	0.37
Livery Street	40 A	90 A		6		16.2	484	3.98	7.91					0.22	5.27	1.48	**9.38**	**70.74**	250	51.1	1.30	1.40	61.36	87%	0.13	0.25
Private Site	240 A	90 A			56	128.8	129	4.00	2.11					0.49	0.49	0.14	**2.25**	**34.21**	200	9.5	1.00	1.06	31.96	93%		
Livery Street	90 A	91 A		16		43.2	656	3.91	10.52					0.55	6.31	1.77	**12.29**	**39.22**	250	111.5	0.40	0.77	26.93	69%	0.31	0.39
Private Site	241 A	91 A			45	103.5	104	4.00	1.70					0.43	0.43	0.12	**1.82**	**34.21**	200	9.5	1.00	1.06	32.40	95%		
Livery Street	91 A	92 A		3		8.1	768	3.87	12.19					0.11	6.85	1.92	**14.11**	**62.02**	250	27.0	1.00	1.22	47.92	77%	0.23	0.33
	92 A	101 A		10		27.0	795	3.86	12.59					0.39	7.24	2.03	**14.61**	**53.71**	250	83.0	0.75	1.06	39.10	73%	0.27	0.35
Tapadero Avenue	101 A	102 A				0.0	898	3.83	14.11					0.07	8.12	2.27	**16.38**	**34.00**	250	46.2	0.30	0.67	17.62	52%	0.48	0.49
	102 A	103 A	3			10.2	909	3.83	14.25					0.22	8.34	2.34	**16.59**	**34.00**	250	33.0	0.30	0.67	17.41	51%	0.49	0.49
Asturcon Street	42 B	43 A	4			13.6	14	4.00	0.22					0.28	0.28	0.08	**0.30**	**27.60**	200	36.5	0.65	0.85	27.30	99%		
Asturcon Street	43 A	44 A	7			23.8	37	4.00	0.61					0.38	0.66	0.18	**0.80**	**20.24**	200	65.0	0.35	0.62	19.44	96%		
External	Stub	44 A				52.8	53	4.00	0.87					1.14	1.14	0.32	**1.19**	**20.24**	200	15.0	0.35	0.62	19.05	94%		
Asturcon Street	44 A	45 A	5			17.0	107	4.00	1.76					0.36	2.16	0.60	**2.36**	**20.24**	200	82.2	0.35	0.62	17.87	88%		
External	Stub	45 A				412.1	412	4.00	6.76	1.40		1.40	0.85	6.39	6.39	1.79	**9.40**	**31.01**	250	15.0	0.25	0.61	21.61	70%	0.30	0.38
Asturcon Street	45 A	46 A	5			17.0	536	3.96	8.70			1.40	0.85	0.37	8.92	2.50	**12.05**	**31.01**	250	82.0	0.25	0.61	18.96	61%	0.39	0.43
External	Stub	46 A				1586.4	1586	3.66	23.82	0.73	5.15	5.88	3.57	28.97	28.97	8.11	**35.50**	**45.09**	300	15.0	0.20	0.62	9.59	21%	0.79	0.67
Cavesson Street	46 A	31 A	3			10.2	2133	3.56	31.17			7.28	4.42	0.29	38.18	10.69	**46.28**	**127.18**	300	82.0	1.59	1.74	80.90	64%	0.36	0.41
Percheron Way	50 A	51 A	6			20.4	20	4.00	0.33					0.38	0.38	0.11	**0.44**	**28.64**	200	74.4	0.70	0.88	28.19	98%		
	51 A	52 A	2			6.8	27	4.00	0.45					0.21	0.59	0.17	**0.61**	**61.68**	200	10.7	3.25	1.90	61.07	99%		
	52 A	53 A	15			51.0	78	4.00	1.28					0.83	1.42	0.40	**1.68**	**22.96**	200	107.8	0.45	0.71	21.28	93%		
	53 A	31 A	6			20.4	99	4.00	1.62					0.37	1.79	0.50	**2.12**	**42.61**	200	48.6	1.55	1.31	40.49	95%		
Cavesson Street	31 A	30 A	6			20.4	2252	3.55	32.73			7.28	4.42	0.39	40.36	11.30	**48.46**	**59.69**	300	82.0	0.35	0.82	11.23	19%	0.81	0.68

Where Q = average daily per capita flow (350 l/cap.d.) or (0.0041l/sec./cap)
I = Unit of peak extraneous flow (0.28 l/sec/ha)
M = Residential Peaking factor = Harmon Peaking Factor , M = 1+(14/(4+P^0.5)) , where P = population in thousa
Q(p) = Peak population flow (l/s)
Q(i) = peak extraneous flow (l/s)
Commercial, Office Space and School - Average flow 35,000 l/day/ha (0.405 l/s/ha) with Peaking Factor = 1.5

Population Density	
Singles	**3.4**
Towns/Semis	**2.7**
Multi Residential	

IBI GROUP

IBI Group
333 Preston Street - Suite 400
Ottawa, Ontario
K1S 5N4

SANITARY SEWER DESIGN SHEET

PROJECT: WEST PARK IN FERNBANK - PHASE 1
DEVELOPER: MONARCH CORPORATION

JOB #: 25853-5.7
DATE PRINTED: 01-May-12
DESIGN: LE

LOCATION			INDIVIDUAL				CUM. RES. FLOW			ICI				INFILTRATION			TOTAL	PROPOSED SEWER							FLOW DEPTH	
STREET	FROM MH	TO MH	RESID. UNITS Sngls	Towns Semis	Multi Res	POP.	POP.	PEAK FACT.	PEAK FLOW (l/s)	COMM. AREA (Ha)	INSTIT. AREA (Ha)	CUM. AREA (Ha)	PEAK FLOW (l/s)	INCR. AREA (Ha)	CUM. AREA (Ha)	FLOW (l/s)	DESIGN FLOW (l/s)	CAP. l/s	PIPE (mm)	LGTH. (m)	SLOPE %	VEL. (full) m/s	AVAIL. CAP. (l/s)	AVAIL. CAP. (%)	Flow qa/Qa	Depth da/Df
Equine Way	60 A	61 A	3			10.2	10	4.00	0.17					0.23	0.23	0.06	**0.23**	**34.21**	200	12.0	1.00	1.06	33.98	99%		
	61 A	62 A	15			51.0	61	4.00	1.00					0.77	1.00	0.28	**1.28**	**21.63**	200	109.8	0.40	0.67	20.35	94%		
	62 A	30 A	4			13.6	75	4.00	1.23					0.24	1.24	0.35	**1.57**	**37.49**	200	45.4	1.20	1.16	35.91	96%		
Cavesson Street	30 A	107 A	12			40.8	2368	3.53	34.24			7.28	4.42	0.62	42.22	11.82	**50.49**	**63.77**	300	79.4	0.40	0.87	13.29	21%	0.79	0.66
Tapadero Avenue	107 A	106 A	9			30.6	2398	3.52	34.64			7.28	4.42	0.50	42.72	11.96	**51.02**	**70.80**	375	82.2	0.15	0.62	19.77	28%	0.72	0.62
	106 B	105 A	8			27.2	2425	3.52	34.99			7.28	4.42	0.45	43.17	12.09	**51.50**	**70.80**	375	82.2	0.15	0.62	19.30	27%	0.73	0.63
Equine Way	60 A	105 A	10			34.0	34	4.00	0.56					0.55	0.55	0.15	**0.71**	**56.23**	200	73.9	2.70	1.73	55.52	99%		
Tapadero Avenue	105 A	104 A	5			17.0	2476	3.51	35.66			7.28	4.42	0.34	44.06	12.34	**52.41**	**70.80**	375	82.1	0.15	0.62	18.39	26%	0.74	0.63
External	Stub	42 A				151.8	152	4.00	2.49					2.59	2.59	0.73	**3.21**	**20.24**	200	15.0	0.35	0.62	17.02	84%		
Balikun Heights	42 A	70 A	6			20.4	172	4.00	2.82					0.37	2.96	0.83	**3.65**	**21.63**	200	76.2	0.40	0.67	17.98	83%		
	70 A	71 A	2			6.8	179	4.00	2.94					0.18	3.14	0.88	**3.81**	**21.63**	200	11.5	0.40	0.67	17.82	82%		
	71 A	72 A	3			10.2	189	4.00	3.10					0.18	3.32	0.93	**4.03**	**21.63**	200	19.4	0.40	0.67	17.60	81%		
	72 A	73 A	3			10.2	199	4.00	3.27					0.27	3.59	1.01	**4.28**	**21.63**	200	13.5	0.40	0.67	17.35	80%		
	73 A	74 A	5			17.0	216	4.00	3.55					0.35	3.94	1.10	**4.65**	**28.64**	200	72.5	0.70	0.88	23.98	84%		
External	Stub	41 A				95.7	96	4.00	1.57					1.61	1.61	0.45	**2.02**	**20.24**	200	15.0	0.35	0.62	18.22	90%		
Palfrey Way	41 A	80 A	7			23.8	120	4.00	1.96					0.39	2.00	0.56	**2.52**	**30.61**	200	60.0	0.80	0.94	28.09	92%		
	80 A	81 A	13			44.2	164	4.00	2.68					0.76	2.76	0.77	**3.46**	**21.63**	200	95.5	0.40	0.67	18.17	84%		
	81 B	82 A	1			3.4	167	4.00	2.74					0.09	2.85	0.80	**3.54**	**54.09**	200	11.5	2.50	1.67	50.55	93%		
	82 A	74 A	15			51.0	218	4.00	3.58					0.91	3.76	1.05	**4.63**	**21.63**	200	110.2	0.40	0.67	17.00	79%		
Balikun Heights	74 A	104 A	5			17.0	452	4.00	7.40					0.36	8.06	2.26	**9.66**	**39.01**	200	82.0	1.30	1.20	29.36	75%		
Tapadero Avenue	104 A	103 A	10			34.0	2962	3.45	41.86			7.28	4.42	0.58	52.70	14.76	**61.04**	**70.80**	375	82.0	0.15	0.62	9.76	14%	0.86	0.72
Oxer Place	103 A	200 A	3			10.2	3881	3.35	53.22			7.28	4.42	0.20	61.24	17.15	**74.79**	**81.86**	375	68.5	0.20	0.72	7.07	9%	0.91	0.75
	200 A	201 A	4			13.6	3894	3.34	53.39			7.28	4.42	0.30	61.54	17.23	**75.04**	**81.86**	375	66.7	0.20	0.72	6.82	8%	0.92	0.75
	201 A	202 A	4			13.6	3908	3.34	53.55			7.28	4.42	0.28	61.82	17.31	**75.28**	**81.86**	375	57.2	0.20	0.72	6.57	8%	0.92	0.76
Street No. 26	Stub North	202 A	7	19		75.1	75	4.00	1.23					1.00	1.00	0.28	**1.51**	**41.90**	200	11.0	1.50	1.29	40.39	96%		
Street No. 26	Stub South	202 A	31			105.4	105	4.00	1.73					1.80	1.80	0.50	**2.23**	**48.38**	200	6.5	2.00	1.49	46.15	95%		
Block 205	202 A	203 A				0.0	4088	3.32	55.73			7.28	4.42		64.62	18.09	**78.25**	**91.44**	375	42.7	0.25	0.80	13.19	14%	0.86	0.72
	203 A	204 A				0.0	4088	3.32	55.73			7.28	4.42		64.62	18.09	**78.25**	**163.60**	375	40.9	0.80	1.44	85.36	52%	0.48	0.48

Where Q = average daily per capita flow (350 l/cap.d.) or (0.0041l/sec./cap)
I = Unit of peak extraneous flow (0.28 l/sec/ha)
M = Residential Peaking factor = Harmon Peaking Factor , M = 1+(14/(4+P^0.5)) , where P = population in thousa
Q(p) = Peak population flow (l/s)
Q(i) = peak extraneous flow (l/s)
Commercial, Office Space and School - Average flow 35,000 l/day/ha (0.405 l/s/ha) with Peaking Factor = 1.5

Population Density	
Singles	**3.4**
Towns/Semis	**2.7**
Multi Residential	

IBI GROUP

IBI Group
333 Preston Street - Suite 400
Ottawa, Ontario
K1S 5N4

SANITARY SEWER DESIGN SHEET

PROJECT: WEST PARK IN FERNBANK - PHASE 1
DEVELOPER: MONARCH CORPORATION

JOB #: 25853-5.7
DATE PRINTED: 01-May-12
DESIGN: LE

LOCATION			INDIVIDUAL				CUM. RES. FLOW			ICI				INFILTRATION			TOTAL	PROPOSED SEWER							FLOW DEPTH	
STREET	FROM MH	TO MH	RESID. UNITS Sngls	Towns Semis	Multi Res	POP.	POP.	PEAK FACT.	PEAK FLOW (l/s)	COMM. AREA (Ha)	INSTIT. AREA (Ha)	CUM. AREA (Ha)	PEAK FLOW (l/s)	INCR. AREA (Ha)	CUM. AREA (Ha)	FLOW (l/s)	DESIGN FLOW (l/s)	CAP. l/s	PIPE (mm)	LGTH. (m)	SLOPE %	VEL. (full) m/s	AVAIL. CAP. (l/s)	AVAIL. CAP. (%)	Flow qa/Qa	Depth da/Df
Street No. 24	Stub North	204 A	15	29	46	235.1	235	4.00	3.86					3.53	3.53	0.99	**4.84**	**37.49**	200	12.0	1.20	1.16	32.64	87%		
Street No. 24	Stub South	204 A	82			278.8	279	4.00	4.57					5.09	5.09	1.43	**6.00**	**21.63**	200	10.0	0.40	0.67	15.63	72%	0.28	0.36
Block 204	204 A	205 B				0.0	4602	3.28	61.86			7.28	4.42		73.24	20.51	**86.79**	**129.29**	375	89.7	0.50	1.13	42.50	33%	0.67	0.62
Westphalian Avenue	Stub North	209 A		42		113.4	113	4.00	1.86					1.42	1.42	0.40	**2.26**	**21.63**	200	13.8	0.40	0.67	19.37	90%		
	209 A	208 A	6	9		44.7	158	4.00	2.59					0.67	2.09	0.59	**3.18**	**27.60**	200	64.9	0.65	0.85	24.42	88%		
	208 A	207 A	4	4		24.4	183	4.00	2.99					0.41	2.50	0.70	**3.69**	**45.27**	200	67.5	1.75	1.40	41.58	92%		
Street No. 28	Stub North	207 A	12	35		135.3	135	4.00	2.22					1.48	1.48	0.41	**2.63**	**34.21**	200	19.0	1.00	1.06	31.58	92%		
Street No. 21	Stub South	207 A	97			329.8	330	4.00	5.41					6.02	6.02	1.69	**7.09**	**31.01**	250	19.0	0.25	0.61	23.92	77%	0.23	0.33
Westphalian Avenue	207 A	206 A		9		24.3	672	3.90	10.76					0.38	10.38	2.91	**13.66**	**45.09**	300	82.0	0.20	0.62	31.43	70%	0.30	0.38
Street No. 28	Stub North	206 A	20			68.0	68	4.00	1.12					1.16	1.16	0.32	**1.44**	**38.27**	200	20.0	1.25	1.18	36.83	96%		
Westphalian Avenue	206 A	205 A		9		24.3	764	3.87	12.13					0.40	11.94	3.34	**15.48**	**45.09**	300	85.0	0.20	0.62	29.62	66%	0.34	0.40
Street No. 1	Stub South	205 B	27			91.8	92	4.00	1.51					0.90	0.90	0.25	**1.76**	**21.63**	200	20.0	0.40	0.67	19.87	92%		
Street No. 1	Stub North	205 B	10	15		74.5	75	4.00	1.22					1.40	1.40	0.39	**1.61**	**40.47**	200	18.0	1.40	1.25	38.86	96%		
Street No. 1	205 B	205 A				0.0	4769	3.26	63.81			7.28	4.42		75.54	21.15	**89.39**	**129.29**	375	2.5	0.50	1.13	39.90	31%	0.69	0.63
Street No. 1	Stub South	205 A	506	260	86	2620.2	2620	3.49	37.51		2.90	2.90	1.76	57.88	57.88	16.21	**55.48**	**132.98**	450	20.0	0.20	0.81	77.50	58%	0.42	0.47
Street No. 1	205 A	222 A				0.0	8153	3.04	101.69			10.18	6.18	0.30	145.66	40.78	**148.66**	**221.82**	600	120.0	0.12	0.76	73.16	33%	0.67	0.62
Street No. 1	222 A	221 A				0.0	8153	3.04	101.69			10.18	6.18	0.26	145.92	40.86	**148.73**	**221.82**	600	100.0	0.12	0.76	73.08	33%	0.67	0.62
Street No. 1	221 A	FT06				0.0	8153	3.04	101.69			10.18	6.18	0.19	146.11	40.91	**148.79**	**221.82**	600	94.0	0.12	0.76	73.03	33%	0.67	0.62

Where Q = average daily per capita flow (350 l/cap.d.) or (0.0041l/sec./cap)
I = Unit of peak extraneous flow (0.28 l/sec/ha)
M = Residential Peaking factor = Harmon Peaking Factor , M = 1+(14/(4+P^0.5)) , where P = population in thousa
Q(p) = Peak population flow (l/s)
Q(i) = peak extraneous flow (l/s)
Commercial, Office Space and School - Average flow 35,000 l/day/ha (0.405 l/s/ha) with Peaking Factor = 1.5

Population Density	
Singles	**3.4**
Towns/Semis	**2.7**
Multi Residential	**2.3**

FOUNDER AVENUE
SANITARY SEWER DESIGN SHEET

NOVATECH ENGINEERING CONSULTANTS LTD.

INFORMATION FROM ROBERT GRANT AVENUE (NS ARTERIAL) DESIGN

AREA			RESIDENTIAL										ICI				INFILTRATION				PIPE					
			SINGLES		TOWNS		MIXED USE		TOTAL																	
ID	From	To	Units	Pop.	Units	Pop.	Net Area (ha)	Pop.	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	Commercial Area (ha)	Institutional Area (ha)	Accum. Area (ha)	Peak Flow (l/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)	**Total Flow (l/s)**	Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
Founder Avenue to Trunk										*523.9**								*6.47**		*10.22**						
HYD1	209	211		0.0		0.0		0.0	0.0	523.9	4.0	8.41	0.00		0.00	0.0	5.12	11.59	3.25	11.66	250	0.70	49	51.9	1.02	22.5%
	211	221		0.0		0.0		0.0	0.0	523.9	4.0	8.41	0.00		0.00	0.0	0.00	11.59	3.25	11.66	250	0.70	33	51.9	1.02	22.5%
FAV1	221	FT18		0.0		0.0		0.0	0.0	523.9	4.0	8.41	0.00		0.00	0.0	0.54	12.13	3.40	11.81	250	0.35	88	36.7	0.72	32.2%

Design Parameters:

Avg Flow/Person =	350	l/day
Comm./Inst. Flow =	35000	l/ha/day
Infiltration =	0.28	l/s/ha
Pipe Friction n =	0.013	

Residential Peaking Factor = Harmon Equation (max 4, min 2)
Peaking Factor Comm./Inst. = 1.5

Population Density:

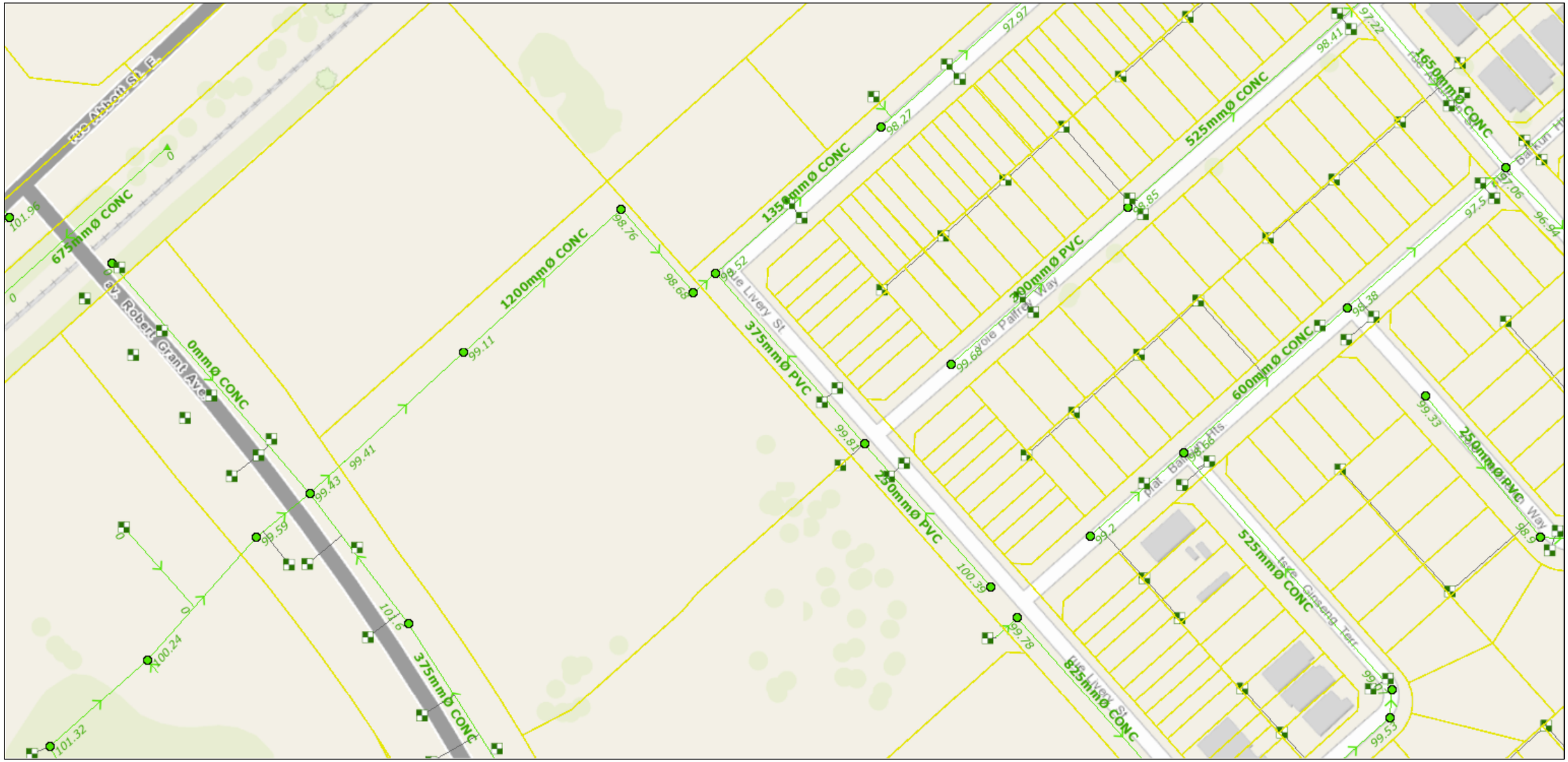
	ppl/unit	units/net ha
Mixed Use	1.80	90
Singles	3.30	
Towns	2.50	

Project: Founder Avenue (101108)
Designed: SML
Checked: MAB
Date: May 7, 2014

**Accumulated Population, Area and Total Flow from CRT Lands Phase 1 Design Brief*

APPENDIX C
Stormwater Management Calculations

1000 Robert Grant Ave Storm Info



March 6, 2019

1:2,000

0 0.0225 0.045 0.09 mi

0 0.0375 0.075 0.15 km

City of Ottawa

Property Parcels

Upstream Invert / Radier amont

Downstream Invert / Radier aval

Storm Pipe Details / Détails de la conduite d'eaux pluviales

Catch Basins / Puisards

Storm Inlets / Prises d'entrée des eaux pluviales

Storm Outlets / Prises de sortie des eaux pluviales

Storm Manholes / Regards de conduites d'eaux pluviales

Storm Inlet Leads / Avaloirs des prises d'entrée des eaux pluviales

Storm Pipes / Conduites d'eaux pluviales

Private / Branchement privé

Public / Branchement public

Storm Pump Stations / Stations de pompage des eaux pluviales

Storm Pump Station / Station de pompage des eaux pluviales

Combined Manholes / Regards d'égout unitaire

Combined Pipes / Conduites d'égout unitaire

Public / Branchement public

Private / Branchement privé

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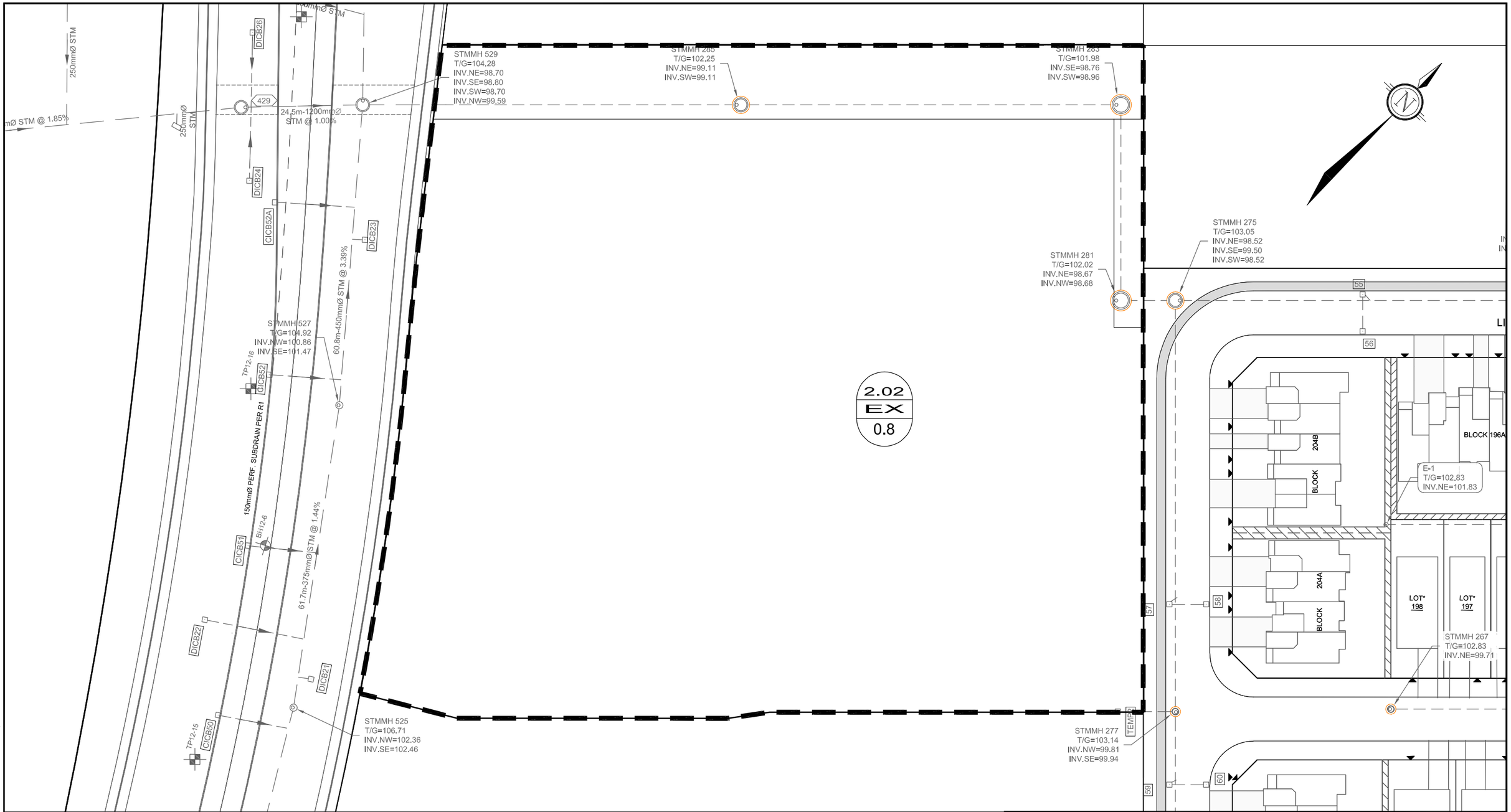

LEGEND

EXISTING STORM SEWER AND MANHOLE

STORMWATER DRAINGE AREA

1.694 / A-2 / 0.84

DRAINGE AREA (ha)

DRAINGE AREA ID

RUNOFF COEFFICIENT 'C'

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

RENE'S COURT BLOCK 203

PRE DEVELOPMENT DRAINAGE AREA PLAN

SCALE	DATE	JOB	FIGURE
1 : 750	MAR 2019	117151	6

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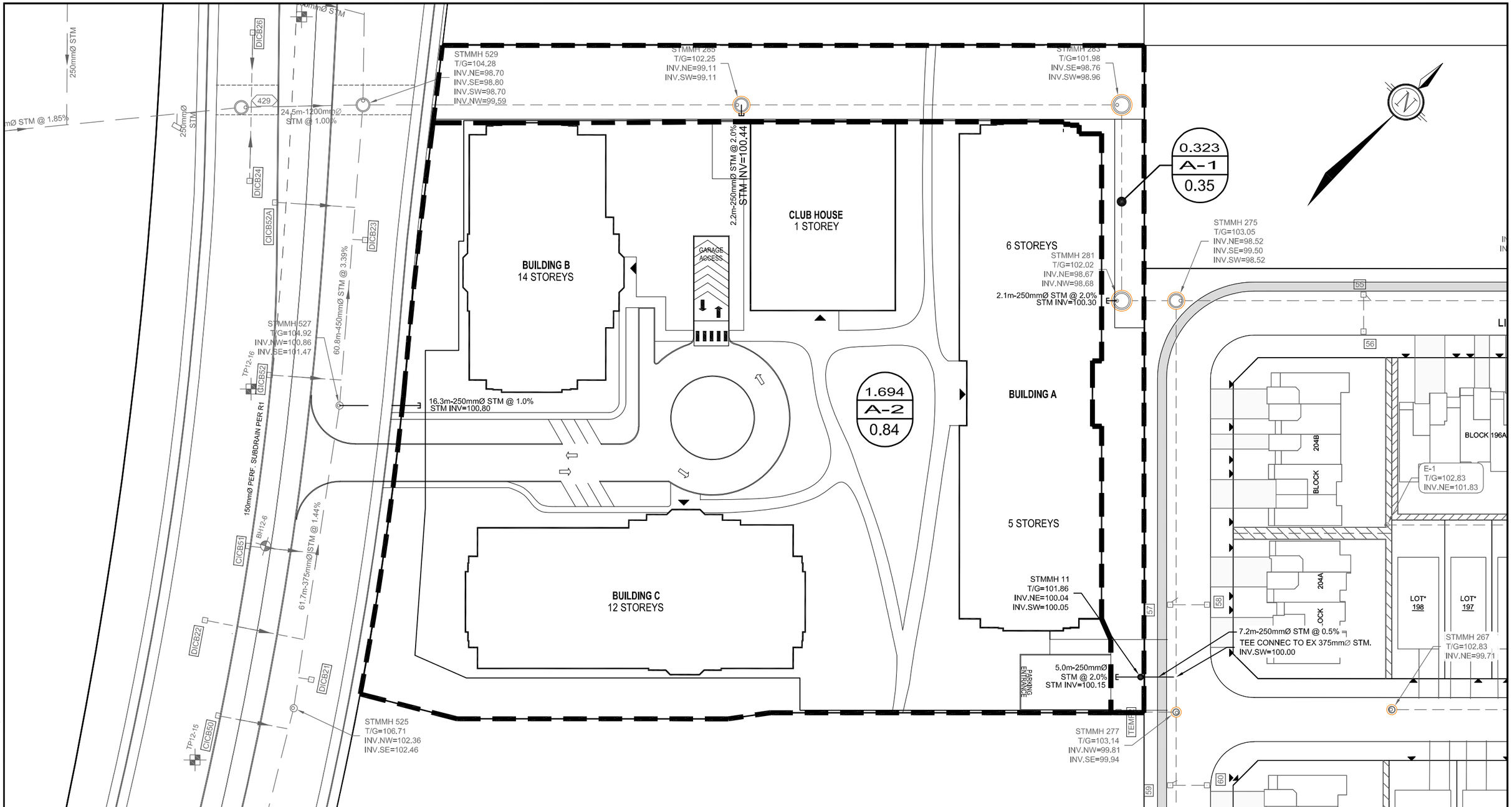

LEGEND

PROPOSED STORM SEWER AND MANHOLE

STORMWATER DRAINGE AREA

1.694 / A-2 / 0.84

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RENE'S COURT BLOCK 203

POST DEVELOPMENT DRAINAGE AREA PLAN

SCALE	DATE	JOB	FIGURE
1 : 750	MAR 2019	117151	7

M:\2017\117151\CAD\Design\117151-SWM.dwg, POST, Feb 28, 2019 - 1:34pm, mhrehoriak

PROJECT #: 117151
PROJECT NAME: RENE'S COURT
LOCATION: OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: MARCH 2019

TABLE 1A: Allowable Runoff Coefficient "C"

Area	"C"
Total	0.80
2.017	

TABLE 1B: Allowable Flows

Outlet Options	Area (ha)	"C"	Tc (min)	$Q_{5\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s/ha)
Maritime Way	2.017	0.80	16.61	**353.0**	**175.0**

Time of Concentration	Tc=	17	min
Intensity (5 Year Event)	I_5=	78.69	mm/hr
Intensity (100 Year Event)	I_{100}=	134.50	mm/hr

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

PROJECT #: 117151
PROJECT NAME: RENE'S COURT
LOCATION: OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: MARCH 2019

TABLE 2A: Post-Development Runoff Coefficient "C" - A-1

Area	Surface	Ha	"C"	C_{avg}	$*C_{100}$
Total	Hard	0.070	0.90	0.35	0.41
0.323	Soft	0.253	0.20		

Runoff Coefficient Equation

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

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

TABLE 2B: Post-Development A-1 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$
Livery Street	0.323	0.35	10	**32.7**	**66.1**

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

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

PROJECT #: 117151
PROJECT NAME: RENE'S COURT
LOCATION: OTTAWA

NOVATECH
Engineers, Planners & Landscape Architects

DATE PREPARED: MARCH 2019

TABLE 3A: Post-Development Runoff Coefficient "C" - A-2

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	$*C_{avg}$
Total	Hard	0.799	0.90	0.84	1.00	0.93
1.694	Roof	0.745	0.90		1.00	
	Soft	0.150	0.20		0.25	

TABLE 3B: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-2

1.694 =Area (ha)
0.93 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	5	242.70	1067.06	286.9	780.16	234.05
	10	178.56	785.05	286.9	498.15	298.89
	15	**142.89**	**628.24**	**286.9**	**341.34**	**307.21**
	20	119.95	527.37	286.9	240.47	288.56
	25	103.85	456.57	286.9	169.67	254.51

Equations:

Flow Equation

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

Where:

C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation

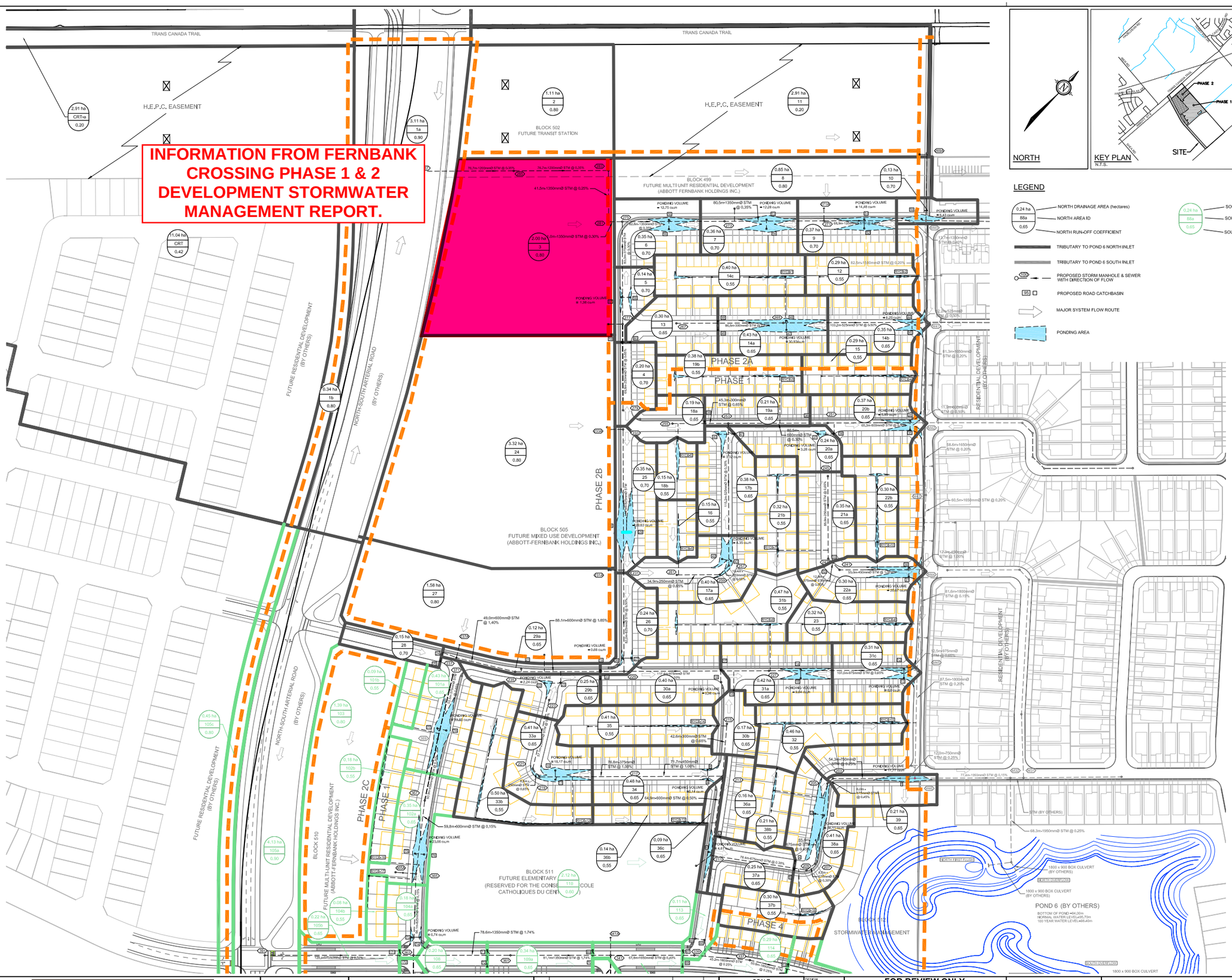
$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

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

Table 4: Post-Development Stormwater Mangement Summary

Area ID	Area (ha)	1:5 Year Weighted Cw	1:100 Year Weighted Cw	Outlet Location	100 Year Storm Event			
					Release (L/s)	Max Ponding Depth (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)
A-1	0.323	0.35	0.41	Livery	66.1	N/A	N/A	N/A
A-2	1.694	0.84	0.93	Livery	286.9	N/A	307.2	307.2
Total					**353.0**			
Allowable					**353.0**			

INFORMATION FROM FERNBANK CROSSING PHASE 1 & 2 DEVELOPMENT STORMWATER MANAGEMENT REPORT.



STM MANHOLE TABLE

MANHOLE ID	OBVERT
203	S=98.33 NE=98.33
205	SE=98.38 N=98.35
207	S=98.72 NW=98.68
209	SW=98.78 N=98.74
211	NW=99.01 NE=99.01
213	SW=99.33 NW=99.33 SE=99.33
215	SE=99.61
217	SW=100.05 NE=100.05
219	W=100.82 NE=100.82
221	NW=100.90 E=100.87
223	SE=101.27
227	SW=99.12 NE=99.12
229	SW=99.70 NE=99.70 NW=99.70
231	SE=100.11 SW=100.18 NW=100.11
233	SE=100.63 SW=100.68
235	SW=101.33 NE=101.33
237	NE=102.02
241	W=99.13 NE=99.13
243	NW=99.21 E=99.21
245	SE=99.65
251	SW=99.09 NE=99.09
253	SE=99.34 SW=99.34 NE=99.34
255	NE=99.63
257	S=99.68 NW=99.68
259	SW=99.78 N=99.75
261	NE=100.01
265	SW=99.45 NE=99.45
267	NE=100.01
269A	SE=99.19
271	SW=99.37 NW=99.37 NE=99.37
273	SW=99.65 NE=99.65
275	SW=99.94 SE=99.94 NE=99.94
277	SE=100.19 NW=100.19
279	NW=100.64
281	NW=100.03 NE=99.97
283	SW=100.13 SE=100.13
285	SW=100.40 NE=100.40
287	NE=100.67
301	SW=98.59 SE=98.59 NE=98.59
335	SW=98.76 SE=98.76 NE=98.76
337	SW=98.89 NE=98.89
339	SW=99.00 NE=99.00
341	SW=99.27 NW=99.27 SE=99.27 NE=99.27
361	SW=100.68 NE=100.68
363	NW=102.05 SW=102.05 SE=102.11 NE=102.05
365	NW=102.15 SW=102.15 SE=102.15
367	NW=102.24 SE=102.24
369	NW=102.34 SE=102.34
371	SE=102.69
391	NE=102.65

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

FERNBANK CROSSING
the Heart of the Community

ABBOTT-FERNBANK HOLDINGS INC.

REGIONAL
THE REGIONAL GROUP
Corporate Head Office
1737 Woodward Drive, 2nd Floor
Ottawa, Ontario K2C 0P9
Telephone: 613-250-2100
Fax: 613-230-2992

No.	REVISION	DATE	BY
3.	ISSUED FOR APPROVAL (PHASE 1&2)	AUG 17/12	KJM
2.	ISSUED FOR APPROVAL (PHASE 1&2)	JUN 21/12	KJM
1.	ISSUED FOR APPROVAL	MAR 9/12	KJM

SCALE 1:1250

DESIGN	KJM
CHECKED	MAB
DRAWN	RCH
CHECKED	KJM
APPROVED	MAB

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER K. J. MURPHY 100123021 AUG 17/12 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER M.A. BISSETT AUG 17/12 PROVINCE OF ONTARIO

NOVATECH ENGINEERING CONSULTANTS LTD.
ENGINEERS & PLANNERS
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada
K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Email: novainfo@novatech-eng.com

CITY OF OTTAWA
FERNBANK CROSSING

STORM DRAINAGE AREA PLAN
PHASE 1 & 2

PROJECT No. 108180-10
REV REV # 3
DRAWING No. 108180-STM1

Fernbank Crossing - Storm Sewer Design Sheet (Rational Method)

LOCATION			AREA												FLOW							PROPOSED SEWER							
Location	From node	To node	Mixed Use	Park N' Ride Paramedic Post Medium Block	Arterial Road ROW	Schools	Parks	Hydro Corridor	Singles Front Yards	Singles Rear Yard	Towns Front Yard	Towns Rear Yard	Total Area	Weighted Runoff Coefficient	Indivi 2.78 AR	Accum 2.78 AR	Time of Concentration	Rain Intensity (mm/hr) 5yr	Rain Intensity (mm/hr) 10yr	Peak Flow	Total Peak Flow (Q)	Pipe	Size	Grade	Length	Capacity	Full Flow Velocity	Time of Flow	Q/Qfull
			0.80	0.80	0.90	0.60	0.40	0.20	0.65	0.55	0.70	0.60	(ha)							(L/s)	(L/s)	Type	(mm)	(%)	(m)	(l/s)	(m/s)	(min.)	(%)
POND 6 North Inlet																													
CRT	CRT	287						2.91					13.95	0.38	14.54	14.54	15.00	83.6		1215.2	**1215.2**								
													0.00		0.00	0.00	15.00			0.0									
1	287	285											0.00		0.00	14.54	15.00	83.6		1215.2	**2257.9**	CONC	1200	0.35	76.7	2406.2	2.06	0.62	93.8%
				0.34	3.11								3.45	0.89	8.54	8.54	10.00		122.1	1042.8									
	285	283											0.00		0.00	14.54	15.62	81.6		1186.8	**2002.6**	CONC	1200	0.35	76.7	2406.2	2.06	0.62	83.2%
													0.00		0.00	8.54	15.62		95.6	815.8									
2	283	281		1.11									1.11	0.80	2.47	17.01	16.24	79.8		1356.7	**2153.9**	CONC	1350	0.25	41.5	2784.1	1.88	0.37	77.4%
													0.00		0.00	8.54	16.24		93.4	797.2									
3	281	275	2.00										2.00	0.80	4.45	21.46	16.61	78.7		1688.9	**2475.5**	CONC	1350	0.30	11.0	3049.8	2.06	0.09	81.2%
													0.00		0.00	8.54	16.61		92.1	786.6									
4	279	277									0.20		0.20	0.70	0.39	0.39	10.00	104.2		40.6	**40.6**	PVC	250	0.65	69.8	50.0	0.99	1.18	81.1%
													0.00		0.00	0.00	10.00			0.0									
5	277	275									0.14		0.14	0.70	0.27	0.66	11.18	98.4		65.1	**65.1**	PVC	375	0.30	83.0	100.2	0.88	1.57	65.0%
													0.00		0.00	0.00	11.18			0.0									
6	275	273									0.35		0.35	0.70	0.68	22.80	16.70	78.4		1788.8	**2572.9**	CONC	1350	0.35	82.8	3294.2	2.23	0.62	78.1%
													0.00		0.00	8.54	16.70		91.8	784.1									
7	273	271									0.36		0.36	0.70	0.70	23.50	17.32	76.8		1803.9	**2571.0**	CONC	1350	0.35	80.5	3294.2	2.23	0.60	78.0%
													0.00		0.00	8.54	17.32		89.9	767.1									
8	271A	271		0.85									0.85	0.80	1.89	1.89	10.00	104.2		197.0	**197.0**	CONC	525	0.25	8.5	224.3	1.00	0.14	87.8%
													0.00		0.00	0.00	10.00			0.0									
9,10	271	**M40**									0.50		0.50	0.70	0.97	26.37	17.92	75.2		1982.2	**2733.6**	CONC	1350	0.40	82.6	3521.6	2.38	0.58	77.6%
													0.00		0.00	8.54	17.92		88.0	751.3									
11	269A	**M40**						2.91					2.91	0.20	1.62	1.62	15.00	83.6		135.2	**135.2**	CONC	450	0.25	54.5	148.7	0.91	1.00	90.9%
													0.00		0.00	0.00	15.00			0.0									
13	267	265							0.30				0.30	0.65	0.54	0.54	10.00	104.2		56.5	**56.5**	PVC	300	0.65	86.6	81.3	1.11	1.29	69.4%
													0.00		0.00	0.00	10.00			0.0									
14	265	**M41**							0.78	0.40			1.18	0.62	2.02	2.56	15.00	83.6		214.2	**214.2**	CONC	525	0.50	115.4	317.2	1.42	1.35	67.5%
													0.00		0.00	0.00	15.00			0.0									
16	261	259								0.15			0.15	0.55	0.23	0.23	15.00	83.6		19.2	**19.2**	PVC	250	0.65	34.9	50.0	0.99	0.59	38.3%
													0.00		0.00	0.00	15.00			0.0									
	259	257											0.00		0.00	0.23	15.59	81.7		18.7	**18.7**	PVC	250	0.65	10.4	50.0	0.99	0.18	37.5%
													0.00		0.00	0.00	15.59			0.0									
17	257	253							0.79				0.79	0.65	1.43	1.66	15.76	81.2		134.5	**134.5**	CONC	525	0.30	115.2	245.7	1.10	1.75	54.7%
													0.00		0.00	0.00	15.76			0.0									
18	255	253							0.19	0.15			0.34	0.61	0.57	0.57	15.00	83.6		47.9	**47.9**	PVC	300	0.65	45.3	81.3	1.11	0.68	58.8%
													0.00		0.00	0.00	15.00			0.0									
19	253	251							0.21	0.38			0.59	0.59	0.96	3.19	17.51	76.2		243.2	**243.2**	CONC	600	0.30	80.5	350.8	1.20	1.12	69.3%
													0.00		0.00	0.00	17.51			0.0									
20	251	**M42**							0.61				0.61	0.65	1.10	4.29	18.63	73.4		315.1	**315.1**	CONC	600	0.50	77.2	452.9	1.55	0.83	69.6%
													0.00		0.00	0.00	18.63			0.0									

INFORMATION FROM FERNBANK CROSSING PHASE 1 & 2 DEVELOPMENT STORMWATER MANAGEMENT REPORT.

NOVATECH ENGINEERING CONSULTANTS LTD.

Fernbank Crossing - Storm Sewer Design Sheet (Rational Method)

LOCATION			AREA												FLOW							PROPOSED SEWER							
Location	From node	To node	Mixed Use	Park N' Ride Paramedic Post Medium Block	Arterial Road ROW	Schools	Parks	Hydro Corridor	Singles Front Yards	Singles Rear Yard	Towns Front Yard	Towns Rear Yard	Total Area	Weighted Runoff Coefficient	Indivi 2.78 AR	Accum 2.78 AR	Time of Concentration	Rain Intensity (mm/hr) 5yr	Rain Intensity (mm/hr) 10yr	Peak Flow	Total Peak Flow (Q)	Pipe	Size	Grade	Length	Capacity	Full Flow Velocity	Time of Flow	Q/Qfull
			0.80	0.80	0.90	0.60	0.40	0.20	0.65	0.55	0.70	0.60	(ha)							(L/s)	(L/s)	Type	(mm)	(%)	(m)	(l/s)	(m/s)	(min.)	(%)
21	245	243								0.32			0.32	0.55	0.49	0.49	15.00	83.6		40.9	**40.9**	PVC	250	0.65	66.9	50.0	0.99	1.13	81.7%
													0.00		0.00	0.00	15.00			0.0									
	243	241							0.35				0.35	0.65	0.63	1.12	16.13	80.1		89.8	**89.8**	PVC	375	0.65	12.9	147.5	1.29	0.17	60.9%
													0.00		0.00	0.00	16.13			0.0									
22	241	**M44**							0.30	0.30			0.60	0.60	1.00	2.12	16.30	79.6		168.9	**168.9**	CONC	450	1.00	67.3	297.4	1.81	0.62	56.8%
													0.00		0.00	0.00	16.30			0.0									
24	233A	233	3.32										3.32	0.80	7.38	7.38	10.00	104.2		769.3	**769.3**	CONC	825	0.45	8.5	1004.6	1.82	0.08	76.6%
													0.00		0.00	0.00	10.00			0.0									
25	233	231									0.35		0.35	0.70	0.68	8.06	10.08	103.8		837.0	**837.0**	CONC	825	0.45	114.0	1004.6	1.82	1.04	83.3%
													0.00		0.00	0.00	10.08			0.0									
26	231	229									0.24		0.24	0.70	0.47	8.53	11.12	98.6		841.4	**841.4**	CONC	825	0.50	82.0	1058.9	1.92	0.71	79.5%
													0.00		0.00	0.00	11.12			0.0									
27	237A	237	1.58										1.58	0.80	3.51	3.51	10.00	104.2		366.1	**366.1**	CONC	600	0.50	9.0	452.9	1.55	0.10	80.8%
													0.00		0.00	0.00	10.00			0.0									
28	237	235									0.15		0.15	0.70	0.29	3.81	10.10	103.7		394.6	**394.6**	CONC	600	1.40	49.0	757.9	2.60	0.31	52.1%
													0.00		0.00	0.00	10.10			0.0									
29	235	229							0.37				0.37	0.65	0.67	4.47	10.41	102.1		456.7	**456.7**	CONC	600	1.85	88.1	871.3	2.99	0.49	52.4%
													0.00		0.00	0.00	10.41			0.0									
30	229	227							0.57				0.57	0.65	1.03	14.04	11.83	95.4		1339.2	**1339.2**	CONC	975	0.50	117.4	1653.2	2.15	0.91	81.0%
													0.00		0.00	0.00	11.83			0.0									
31	227	**M45**							0.73	0.47			1.20	0.61	2.04	16.07	15.00	83.6		1343.1	**1343.1**	CONC	975	0.65	120.0	1884.9	2.45	0.82	71.3%
													0.00		0.00	0.00	15.00			0.0									
	223	221											0.00		0.00	0.00	10.00			0.0	**0.0**	PVC	250	0.65	57.1	50.0	0.99	0.96	0.0%
													0.00		0.00	0.00	10.00			0.0									
	221	219											0.00		0.00	0.00	10.96			0.0	**0.0**	PVC	250	0.65	8.6	50.0	0.99	0.15	0.0%
													0.00		0.00	0.00	10.96			0.0									
33	219	217							0.41	0.50			0.91	0.60	1.51	1.51	15.00	83.6		125.8	**125.8**	PVC	375	1.00	76.8	182.9	1.60	0.80	68.8%
													0.00		0.00	0.00	15.00			0.0									
34	217	213							0.48				0.48	0.65	0.87	2.37	15.80	81.1		192.3	**192.3**	CONC	450	1.00	71.7	297.4	1.81	0.66	64.7%
													0.00		0.00	0.00	15.80			0.0									
35	215	213								0.41			0.41	0.55	0.63	0.63	15.00	83.6		52.4	**52.4**	PVC	300	0.65	42.6	81.3	1.11	0.64	64.4%
													0.00		0.00	0.00	15.00			0.0									
36	213	211							0.25	0.14			0.39	0.61	0.67	3.67	16.46	79.1		290.0	**290.0**	CONC	600	0.50	64.9	452.9	1.55	0.70	64.0%
													0.00		0.00	0.00	16.46			0.0									
37	211	209							0.25	0.30			0.55	0.60	0.91	4.58	17.15	77.2		353.2	**353.2**	CONC	675	0.30	78.4	480.3	1.30	1.00	73.5%
													0.00		0.00	0.00	17.15			0.0									
	209	207											0.00		0.00	4.58	18.16	74.6		341.2	**341.2**	CONC	675	0.30	8.7	480.3	1.30	0.11	71.0%
													0.00		0.00	0.00	18.16			0.0									
38	207	205							0.41	0.21			0.62	0.62	1.06	5.64	18.27	74.3		418.8	**418.8**	CONC	675	0.45	65.8	588.3	1.59	0.69	71.2%
													0.00		0.00	0.00	18.27			0.0									
	205	203											0.00		0.00	5.64	18.96	72.6		409.4	**409.4**	CONC	675	0.45	6.0	588.3	1.59	0.06	69.6%
													0.00		0.00	0.00	18.96			0.0									
	203	**M46**							0.21				0.21	0.65	0.38	6.02	19.02	72.5		436.1	**436.1**	CONC	750	0.25	66.3	580.7	1.27	0.87	75.1%
													0.00		0.00	0.00	19.02			0.0									

NOVATECH ENGINEERING CONSULTANTS LTD.

Fernbank Crossing - Storm Sewer Design Sheet (Rational Method)

LOCATION			AREA												FLOW							PROPOSED SEWER							
Location	From node	To node	Mixed Use	Park N' Ride Paramedic Post Medium Block	Arterial Road ROW	Schools	Parks	Hydro Corridor	Singles Front Yards	Singles Rear Yard	Towns Front Yard	Towns Rear Yard	Total Area	Weighted Runoff Coefficient	Indivi 2.78 AR	Accum 2.78 AR	Time of Concentration	Rain Intensity (mm/hr) 5yr	Rain Intensity (mm/hr) 10yr	Peak Flow	Total Peak Flow (Q)	Pipe	Size	Grade	Length	Capacity	Full Flow Velocity	Time of Flow	Q/Qfull
			0.80	0.80	0.90	0.60	0.40	0.20	0.65	0.55	0.70	0.60	(ha)							(L/s)	(L/s)	Type	(mm)	(%)	(m)	(l/s)	(m/s)	(min.)	(%)
South Outlet																													
107	FUT	363		5.15					3.90	1.36			10.41	0.71	20.58	20.58	20.48	69.2		1424.5	**1424.5**	CONC	1350	0.20	58.8	2490.2	1.69	0.58	57.2%
													0.00		0.00	0.00	20.48			0.0									
105	391	363							0.22				0.22	0.65	0.40	0.40	15.00	83.6		33.2	**1469.2**	CONC	1050	0.50	120.4	2014.4	2.25	0.89	72.9%
				0.64	4.13								4.13	1.02	11.76	11.76	10.00		122.1	1436.0									
101	371	369							0.42	0.09			0.51	0.63	0.90	0.90	15.00	83.6		74.9	**74.9**	PVC	375	0.65	53.5	147.5	1.29	0.69	50.8%
													0.00		0.00	0.00	15.00			0.0									
	369	367											0.00	0.00	0.00	0.90	15.69	81.4		73.0	**73.0**	CONC	450	0.20	50.9	133.0	0.81	1.05	54.9%
													0.00		0.00	0.00	15.69			0.0									
102	367	365							0.35	0.18			0.53	0.62	0.91	1.80	16.74	78.3		141.3	**141.3**	CONC	600	0.15	59.8	248.1	0.85	1.17	57.0%
													0.00		0.00	0.00	16.74			0.0									
103	365A	365		1.39									1.39	0.80	3.09	3.09	10.00	104.2		322.1	**322.1**	CONC	600	0.30	8.7	350.8	1.20	0.12	91.8%
													0.00		0.00	0.00	10.00			0.0									
104	365	363							0.18	0.08			0.26	0.62	0.45	5.34	17.91	75.2		401.8	**401.8**	CONC	825	0.15	66.1	580.0	1.05	1.05	69.3%
													0.00		0.00	0.00	17.91			0.0									
108	363	361							0.20				0.20	0.65	0.36	6.10	20.48	69.2		422.4	**1374.6**	CONC	1350	1.74	78.6	7344.9	4.97	0.26	18.7%
													0.00		0.00	11.76	20.48		81.0	952.2									
109	361	341							0.34	0.36			0.70	0.60	1.16	7.27	20.74	68.7		499.0	**1443.6**	CONC	1350	1.74	81.1	7344.9	4.97	0.27	19.7%
													0.00		0.00	11.76	20.74		80.3	944.6									
111	FUT	341							3.23	1.67			4.90	0.62	8.39	8.39	19.28	71.9		603.1	**603.1**	CONC	825	1.88	86.2	2053.3	3.72	0.39	29.4%
													0.00		0.00	0.00	19.28			0.0									
110	341A	341				2.12							2.12	0.60	3.54	3.54	10.00	104.2		368.4	**368.4**	CONC	675	0.25	12.5	438.5	1.19	0.18	84.0%
													0.00		0.00	0.00	10.00			0.0									
112	341	339							0.18				0.18	0.65	0.33	19.52	21.01	68.1		1329.2	**2266.1**	CONC	1650	0.40	67.8	6013.7	2.72	0.41	37.7%
													0.00		0.00	11.76	21.01		79.7	936.8									
113	339	337							0.11				0.11	0.65	0.20	19.72	21.43	67.3		1326.2	**2251.5**	CONC	1800	0.25	45.2	5995.9	2.28	0.33	37.6%
													0.00		0.00	11.76	21.43		78.7	925.3									
114	337	335							0.29				0.29	0.65	0.52	20.24	21.76	66.6		1348.3	**2264.6**	CONC	1800	0.25	50.8	5995.9	2.28	0.37	37.8%
													0.00		0.00	11.76	21.76		77.9	916.3									
115	335A	335				2.83							2.83	0.60	4.72	4.72	10.00	104.2		491.8	**491.8**	CONC	750	0.25	17.9	580.7	1.27	0.23	84.7%
													0.00		0.00	0.00	10.00			0.0									
116	335	301							0.21				0.21	0.65	0.38	25.34	22.13	65.9		1669.9	**2576.4**	CONC	1800	0.30	57.7	6568.2	2.50	0.38	39.2%
													0.00		0.00	11.76	22.13		77.1	906.4									
117	FUT	301					1.20		5.13	1.57			7.90	0.59	11.67	11.67	23.33	63.7		743.4	**743.4**	CONC	975	0.61	54.7	1826.0	2.37	0.38	40.7%
													0.00		0.00	0.00	23.33			0.0									
118	301	**M97**									0.30		0.30	0.70	0.58	37.60	23.76	63.0		2366.8	**3232.6**	CONC	1950	0.30	78.3	8131.0	2.64	0.49	39.8%
													0.00		0.00	11.76	23.76		73.6	865.8									
119	M97	M98								0.94	0.40		1.34	0.59	2.22	39.81	24.25	62.1		2473.0	**3327.2**	CONC	2100	0.20	78.3	8089.5	2.26	0.58	41.1%
													0.00		0.00	11.76	24.25		72.7	854.2									
119	M98	**M99**											0.00	0.00	0.00	39.81	24.83	61.2		2435.3	**3276.4**	CONC	2400	0.15	29.6	10002.3	2.14	0.23	32.8%
													0.00		0.00	11.76	24.83		71.5	841.2									

Q = 2.78 AIR

WHERE : Q = PEAK FLOW IN LITRES PER SECOND (L/s)
A = AREA IN HECTARES (ha)
I = RAINFALL INTENSITY IN MILLIMETERS PER HOUR (mm/hr)
R = WEIGHTED RUNOFF COEFFICIENT

Q = (1/n) A R(2/3)So(1/2)

WHERE : Q = CAPACITY (L/s)
n = MANNING COEFFICIENT OF ROUGHNESS (0.013)
A = FLOW AREA (m2)

Project: Fernbank Crossing (108180-10)
Designed: KJM
Checked: MAB
Date: August 17 2012

LICENSED PROFESSIONAL ENGINEER
K. J. MURPHY
100123021
AUG. 17/12
PROVINCE OF ONTARIO

NOVATECH ENGINEERING CONSULTANTS LTD.

Fernbank Crossing - Storm Sewer Design Sheet (Fixed Tc)

LOCATION			AREA														FLOW									PROPOSED SEWER							
Location	From node	To node	Mixed Use	Park N' Ride Paramedic Post Medium Block	Arterial Road ROW	Schools	Parks	Hydro Corridor	Singles Front Yards	Singles Rear Yard	Towns Front Yard	Towns Rear Yard	Total Area (10 min)	Total Area (15 min)	Weighted Runoff Coefficient	Weighted Runoff Coefficient	2.78 AR	2.78 AR	Rain Intensity (mm/hr) 5yr		Rain Intensity (mm/hr) 10yr		Peak Flow (10 min)	Peak Flow (15 min)	Total Peak Flow (Q)	Pipe	Size	Grade	Length	Capacity	Full Flow Velocity	Time of Flow	Q/Qfull
			0.80	0.80	0.90	0.60	0.40	0.20	0.65	0.55	0.70	0.60	(ha)	(ha)	(10 min)	(15 min)	(10 min)	(15 min)	(10 min)	(15 min)	(10 min)	(15 min)	(L/s)	(L/s)	(L/s)	Type	(mm)	(%)	(m)	(l/s)	(m/s)	(min.)	(%)
North Outlet																			10.00	15.00	10.00	15.00											
CRT	CRT	287						2.91					0.00	13.95		0.38	0.00	14.54	104.2	83.6			0.0	1215.2	**1215.2**	PVC							
														0.00			0.00	0.00			122.1	97.85		0.0								
1	287	285											0.00	0.00	0.00	0.00	0.00	0.00	104.19	83.56				0.00	**2257.9**	CONC	1200	0.35	76.7	2406.2	2.06	0.62	93.8%
				0.34	3.11								3.45	0.00	0.89	0.00	8.54	0.00	104.19		122.14	97.85	1042.77	0.00									
	285	283											0.00	0.00	0.00	0.00	0.00	0.00	104.19	83.56			0.00	0.00	**2257.9**	CONC	1200	0.35	76.7	2406.2	2.06	0.62	93.8%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
2	283	281		1.11									1.11	0.00	0.80	0.00	2.47	0.00	104.19	83.56			257.22	0.00	**2515.1**	CONC	1350	0.25	41.5	2784.1	1.88	0.37	90.3%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
3	281	275	2.00										2.00	0.00	0.80	0.00	4.45	0.00	104.19	83.56			463.45	0.00	**2978.6**	CONC	1350	0.30	11.0	3049.8	2.06	0.09	97.7%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
4	279	277									0.20		0.20	0.00	0.70	0.00	0.39	0.00	104.19	83.56			40.55	0.00	**40.6**	PVC	250	0.65	69.8	50.0	0.99	1.18	81.1%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
5	277	275									0.14		0.14	0.00	0.70	0.00	0.27	0.00	104.19	83.56			28.39	0.00	**68.9**	PVC	375	0.30	83.0	100.2	0.88	1.57	68.8%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
6	275	273									0.35		0.35	0.00	0.70	0.00	0.68	0.00	104.19	83.56			70.97	0.00	**3118.5**	CONC	1350	0.35	82.8	3294.2	2.23	0.62	94.7%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
7	273	271									0.36		0.36	0.00	0.70	0.00	0.70	0.00	104.19	83.56			72.99	0.00	**3191.5**	CONC	1350	0.35	80.5	3294.2	2.23	0.60	96.9%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
8	271A	271		0.85									0.85	0.00	0.80	0.00	1.89	0.00	104.19	83.56			196.97	0.00	**197.0**	CONC	525	0.25	8.5	224.3	1.00	0.14	87.8%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
9,10	271	**M40**									0.50		0.50	0.00	0.70	0.00	0.97	0.00	104.19	83.56			101.38	0.00	**3489.8**	CONC	1350	0.40	82.6	3521.6	2.38	0.58	99.1%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
11	269A	**M40**						2.91					0.00	2.91	0.00	0.20	0.00	1.62	104.19	83.56			0.00	135.19	**135.2**	CONC	450	0.25	54.5	148.7	0.91	1.00	90.9%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
13	267	265							0.30				0.30	0.00	0.65	0.00	0.54	0.00	104.19	83.56			56.48	0.00	**56.5**	PVC	300	0.65	86.6	81.3	1.11	1.29	69.4%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
14	265	**M41**							0.78	0.40			0.78	0.40	0.65	0.55	1.41	0.61	104.19	83.56			146.86	51.10	**254.4**	CONC	525	0.50	115.4	317.2	1.42	1.35	80.2%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
16	261	259								0.15			0.00	0.15	0.00	0.55	0.00	0.23	104.19	83.56			0.00	19.16	**19.2**	PVC	250	0.65	34.9	50.0	0.99	0.59	38.3%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
	259	257											0.00	0.00	0.00	0.00	0.00	0.00	104.19	83.56			0.00	0.00	**19.2**	PVC	250	0.65	10.4	50.0	0.99	0.18	38.3%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
17	257	253							0.79				0.79	0.00	0.65	0.00	1.43	0.00	104.19	83.56			148.74	0.00	**167.9**	CONC	525	0.30	115.2	245.7	1.10	1.75	68.3%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
18	255	253							0.19	0.15			0.19	0.15	0.65	0.55	0.34	0.23	104.19	83.56			35.77	19.16	**54.9**	PVC	300	0.65	45.3	81.3	1.11	0.68	67.5%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
19	253	251							0.21	0.38			0.21	0.38	0.65	0.55	0.38	0.58	104.19	83.56			39.54	48.55	**310.9**	CONC	600	0.30	80.5	350.8	1.20	1.12	88.6%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
20	251	**M42**							0.61				0.61	0.00	0.65	0.00	1.10	0.00	104.19	83.56			114.85	0.00	**425.8**	CONC	600	0.50	77.2	452.9	1.55	0.83	94.0%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								

INFORMATION FROM FERNBANK CROSSING PHASE 1 & 2 DEVELOPMENT STORMWATER MANAGEMENT REPORT.

NOVATECH ENGINEERING CONSULTANTS LTD.

Fernbank Crossing - Storm Sewer Design Sheet (Fixed Tc)

LOCATION			AREA														FLOW									PROPOSED SEWER							
Location	From node	To node	Mixed Use	Park N' Ride Paramedic Post Medium Block	Arterial Road ROW	Schools	Parks	Hydro Corridor	Singles Front Yards	Singles Rear Yard	Towns Front Yard	Towns Rear Yard	Total Area (10 min)	Total Area (15 min)	Weighted Runoff Coefficient	Weighted Runoff Coefficient	2.78 AR	2.78 AR	Rain Intensity (mm/hr) 5yr		Rain Intensity (mm/hr) 10yr		Peak Flow (10 min)	Peak Flow (15 min)	Total Peak Flow (Q)	Pipe	Size	Grade	Length	Capacity	Full Flow Velocity	Time of Flow	Q/Qfull
			0.80	0.80	0.90	0.60	0.40	0.20	0.65	0.55	0.70	0.60	(ha)	(ha)	(10 min)	(15 min)	(10 min)	(15 min)	(10 min)	(15 min)	(10 min)	(15 min)	(L/s)	(L/s)	(L/s)	Type	(mm)	(%)	(m)	(l/s)	(m/s)	(min.)	(%)
21	245	243								0.32			0.00	0.32	0.00	0.55	0.00	0.49	104.19	83.56			0.00	40.88	40.9	PVC	250	0.65	66.9	50.0	0.99	1.13	81.7%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
	243	241							0.35				0.35	0.00	0.65	0.00	0.63	0.00	104.19	83.56			65.90	0.00	106.8	PVC	375	0.65	12.9	147.5	1.29	0.17	72.4%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
22	241	**M44**							0.30	0.30			0.30	0.30	0.65	0.55	0.54	0.46	104.19	83.56			56.48	38.33	201.6	CONC	450	1.00	67.3	297.4	1.81	0.62	67.8%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
24	233A	233	3.32										3.32	0.00	0.80	0.00	7.38	0.00	104.19	83.56			769.33	0.00	769.3	CONC	825	0.45	8.5	1004.6	1.82	0.08	76.6%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
25	233	231									0.35		0.35	0.00	0.70	0.00	0.68	0.00	104.19	83.56			70.97	0.00	840.3	CONC	825	0.45	114.0	1004.6	1.82	1.04	83.6%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
26	231	229									0.24		0.24	0.00	0.70	0.00	0.47	0.00	104.19	83.56			48.66	0.00	889.0	CONC	825	0.50	82.0	1058.9	1.92	0.71	84.0%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
27	237A	237	1.58										1.58	0.00	0.80	0.00	3.51	0.00	104.19	83.56			366.13	0.00	366.1	CONC	600	0.50	9.0	452.9	1.55	0.10	80.8%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
28	237	235									0.15		0.15	0.00	0.70	0.00	0.29	0.00	104.19	83.56			30.41	0.00	396.5	CONC	600	1.40	49.0	757.9	2.60	0.31	52.3%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
29	235	229							0.37				0.37	0.00	0.65	0.00	0.67	0.00	104.19	83.56			69.66	0.00	466.2	CONC	600	1.85	88.1	871.3	2.99	0.49	53.5%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
30	229	227							0.57				0.57	0.00	0.65	0.00	1.03	0.00	104.19	83.56			107.32	0.00	1462.5	CONC	975	0.50	117.4	1653.2	2.15	0.91	88.5%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
31	227	**M45**							0.73	0.47			0.73	0.47	0.65	0.55	1.32	0.72	104.19	83.56			137.44	60.05	1660.0	CONC	975	0.65	120.0	1884.9	2.45	0.82	88.1%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
	223	221											0.00	0.00	0.00	0.00	0.00	0.00	104.19	83.56			0.00	0.00	0.0	PVC	250	0.65	57.1	50.0	0.99	0.96	0.0%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
	221	219											0.00	0.00	0.00	0.00	0.00	0.00	104.19	83.56			0.00	0.00	0.0	PVC	250	0.65	8.6	50.0	0.99	0.15	0.0%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
33	219	217							0.41	0.50			0.41	0.50	0.65	0.55	0.74	0.76	104.19	83.56			77.19	63.88	141.1	PVC	375	1.00	76.8	182.9	1.60	0.80	77.1%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
34	217	213							0.48				0.48	0.00	0.65	0.00	0.87	0.00	104.19	83.56			90.37	0.00	231.4	CONC	450	1.00	71.7	297.4	1.81	0.66	77.8%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
35	215	213								0.41			0.00	0.41	0.00	0.55	0.00	0.63	104.19	83.56			0.00	52.38	52.4	PVC	300	0.65	42.6	81.3	1.11	0.64	64.4%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
36	213	211							0.25	0.14			0.25	0.14	0.65	0.55	0.45	0.21	104.19	83.56			47.07	17.89	348.8	CONC	600	0.50	64.9	452.9	1.55	0.70	77.0%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
37	211	209							0.25	0.30			0.25	0.30	0.65	0.55	0.45	0.46	104.19	83.56			47.07	38.33	434.2	CONC	675	0.30	78.4	480.3	1.30	1.00	90.4%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
	209	207											0.00	0.00	0.00	0.00	0.00	0.00	104.19	83.56			0.00	0.00	434.2	CONC	675	0.30	8.7	480.3	1.30	0.11	90.4%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
38	207	205							0.41	0.21			0.41	0.21	0.65	0.55	0.74	0.32	104.19	83.56			77.19	26.83	538.2	CONC	675	0.45	65.8	588.3	1.59	0.69	91.5%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
	205	203											0.00	0.00	0.00	0.00	0.00	0.00	104.19	83.56			0.00	0.00	538.2	CONC	675	0.45	6.0	588.3	1.59	0.06	91.5%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
	203	**M46**							0.21				0.21	0.00	0.65	0.00	0.38	0.00	104.19	83.56			39.54	0.00	577.7	CONC	750	0.25	66.3	580.7	1.27	0.87	99.5%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								

NOVATECH ENGINEERING CONSULTANTS LTD.

Fernbank Crossing - Storm Sewer Design Sheet (Fixed Tc)

LOCATION			AREA														FLOW									PROPOSED SEWER							
Location	From node	To node	Mixed Use	Park N' Ride Paramedic Post Medium Block	Arterial Road ROW	Schools	Parks	Hydro Corridor	Singles Front Yards	Singles Rear Yard	Towns Front Yard	Towns Rear Yard	Total Area (10 min)	Total Area (15 min)	Weighted Runoff Coefficient	Weighted Runoff Coefficient	2.78 AR	2.78 AR	Rain Intensity (mm/hr) 5yr		Rain Intensity (mm/hr) 10yr		Peak Flow (10 min)	Peak Flow (15 min)	Total Peak Flow (Q)	Pipe	Size	Grade	Length	Capacity	Full Flow Velocity	Time of Flow	Q/Qfull
			0.80	0.80	0.90	0.60	0.40	0.20	0.65	0.55	0.70	0.60	(ha)	(ha)	(10 min)	(15 min)	(10 min)	(15 min)	(10 min)	(15 min)	(10 min)	(15 min)	(L/s)	(L/s)	(L/s)	Type	(mm)	(%)	(m)	(l/s)	(m/s)	(min.)	(%)
South Outlet																																	
107	FUT	363		5.15					3.90	1.36			9.05	1.36	0.74	0.55	18.50	2.08	104.19	83.56			1927.66	173.75	**2101.4**	CONC	1350	0.20	58.8	2490.2	1.69	0.58	84.4%
														0.00		0.00	0.00	0.00			122.14	97.85		0.00								
105	391	363							0.22				0.22	0.00	0.65	0.00	0.40	0.00	104.19	83.56			41.42	0.00	**1847.2**	CONC	1050	0.50	120.4	2014.4	2.25	0.89	91.7%
				0.82	5.18								6.00			0.89	14.78	0.00			122.14	97.85	1805.75	0.00								
101	371	369							0.42	0.09			0.42	0.09	0.65	0.55	0.76	0.14	104.19	83.56			79.08	11.50	**90.6**	PVC	375	0.65	53.5	147.5	1.29	0.69	61.4%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
	369	367											0.00	0.00	0.00	0.00	0.00	0.00	104.19	83.56			0.00	0.00	**90.6**	CONC	450	0.20	50.9	133.0	0.81	1.05	68.1%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
102	367	365							0.35	0.18			0.35	0.18	0.65	0.55	0.63	0.28	104.19	83.56			65.90	23.00	**179.5**	CONC	600	0.15	59.8	248.1	0.85	1.17	72.3%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
103	365A	365		1.39									1.39	0.00	0.80	0.00	3.09	0.00	104.19	83.56			322.10	0.00	**322.1**	CONC	600	0.30	8.7	350.8	1.20	0.12	91.8%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
104	365	363							0.18	0.08			0.18	0.08	0.65	0.55	0.33	0.12	104.19	83.56			33.89	10.22	**545.7**	CONC	825	0.15	66.1	580.0	1.05	1.05	94.1%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
108	363	361							0.20				0.20	0.00	0.65	0.00	0.36	0.00	104.19	83.56			37.66	0.00	**4531.9**	CONC	1350	1.74	78.6	7344.9	4.97	0.26	61.7%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
109	361	341							0.34	0.36			0.34	0.36	0.65	0.55	0.61	0.55	104.19	83.56			64.01	45.99	**4641.9**	CONC	1350	1.74	81.1	7344.9	4.97	0.27	63.2%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
111	FUT	341							3.23	1.67			3.23	1.67	0.65	0.55	5.84	2.55	104.19	83.56			608.13	213.36	**821.5**	CONC	825	1.88	86.2	2053.3	3.72	0.39	40.0%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
110	341A	341				2.12							2.12	0.00	0.60	0.00	3.54	0.00	104.19	83.56			368.44	0.00	**368.4**	CONC	675	0.25	12.5	438.5	1.19	0.18	84.0%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
112	341	339							0.18				0.18	0.00	0.65	0.00	0.33	0.00	104.19	83.56			33.89	0.00	**5865.8**	CONC	1650	0.40	67.8	6013.7	2.72	0.41	97.5%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
113	339	337							0.11				0.11	0.00	0.65	0.00	0.20	0.00	104.19	83.56			20.71	0.00	**5886.5**	CONC	1800	0.25	45.2	5995.9	2.28	0.33	98.2%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
114	337	335							0.29				0.29	0.00	0.65	0.00	0.52	0.00	104.19	83.56			54.60	0.00	**5941.1**	CONC	1800	0.25	50.8	5995.9	2.28	0.37	99.1%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
115	335A	335				2.83							2.83	0.00	0.60	0.00	4.72	0.00	104.19	83.56			491.84	0.00	**491.8**	CONC	750	0.25	17.9	580.7	1.27	0.23	84.7%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
116	335	301							0.21				0.21	0.00	0.65	0.00	0.38	0.00	104.19	83.56			39.54	0.00	**6472.4**	CONC	1800	0.30	57.7	6568.2	2.50	0.38	98.5%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
117	FUT	301					1.20		5.13	1.57			5.13	2.77	0.65	0.49	9.27	3.73	104.19	83.56			965.86	312.08	**1277.9**	CONC	975	0.61	54.7	1826.0	2.37	0.38	70.0%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
118	301	**M97**									0.30		0.30	0.00	0.70	0.00	0.58	0.00	104.19	83.56			60.83	0.00	**7811.2**	CONC	1950	0.30	78.3	8131.0	2.64	0.49	96.1%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
119	M97	M98								0.94	0.40		0.40	0.94	0.70	0.55	0.78	1.44	104.19	83.56			81.10	120.09	**8012.4**	CONC	2100	0.20	78.0	8089.5	2.26	0.57	99.0%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								
	M98	**M99**											0.00	0.00	0.00	0.00	0.00	0.00	104.19	83.56			0.00	0.00	**8012.4**	CONC	2400	0.15	29.6	10002.3	2.14	0.23	80.1%
														0.00		0.90	0.00	0.00			122.14	97.85		0.00								

Q = 2.78 AIR

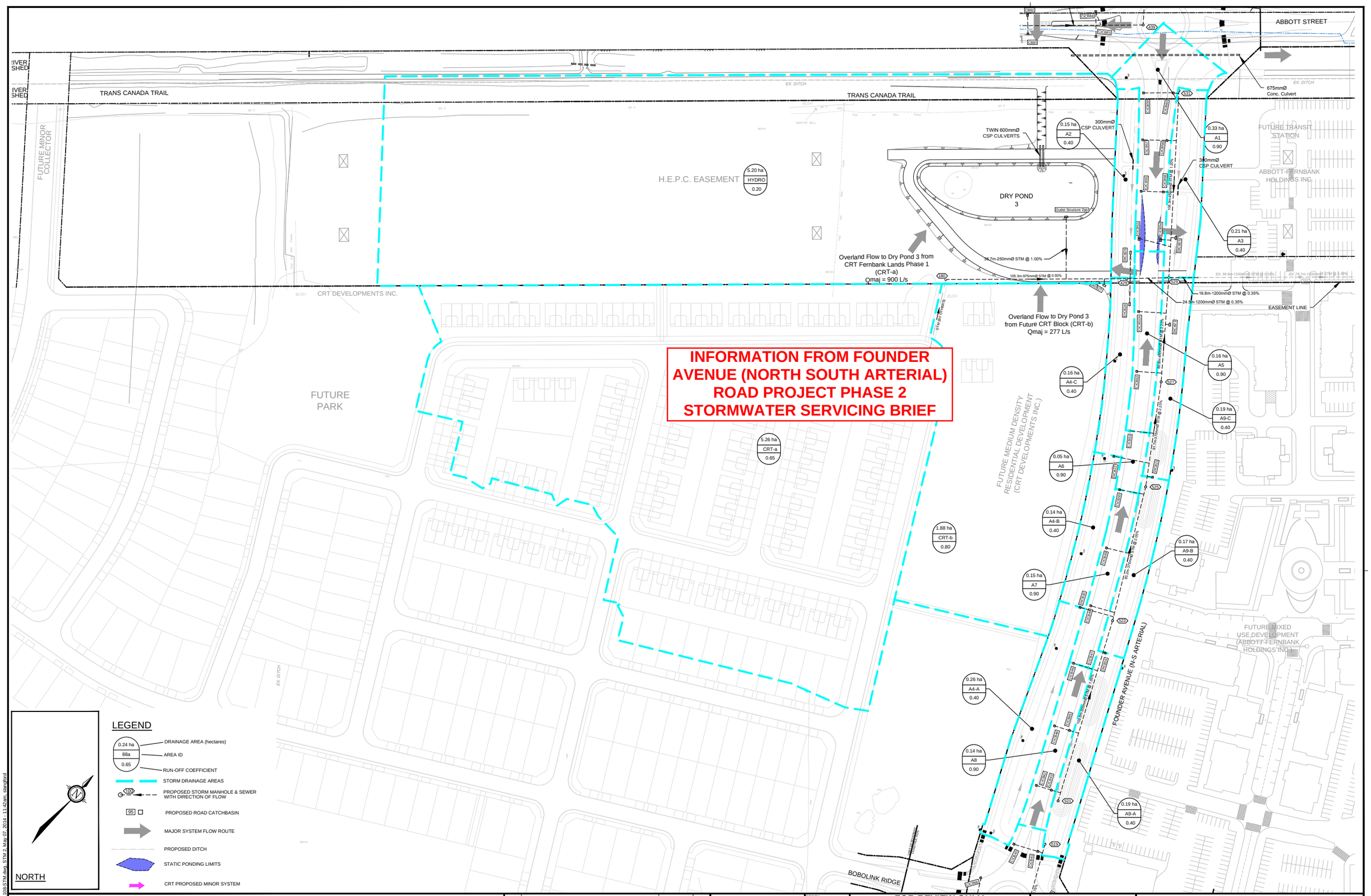
WHERE : Q = PEAK FLOW IN LITRES PER SECOND (L/s)
A = AREA IN HECTARES (ha)
I = RAINFALL INTENSITY IN MILLIMETERS PER HOUR (mm/hr)
R = WEIGHTED RUNOFF COEFFICIENT

Q = (1/n) A R(2/3)So(1/2)

WHERE : Q = CAPACITY (L/s)
n = MANNING COEFFICIENT OF ROUGHNESS (0.013)
A = FLOW AREA (m2)

Project: Fernbank Crossing (108180-10)
Designed: KJM
Checked: MAB
Date: August 17, 2012

NOVATECH ENGINEERING CONSULTANTS LTD.



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

No.	REVISION	DATE	BY
3.	ISSUED WITH PHASE II ECA APPLICATION	MAY 7/14	MJP
2.	ISSUED WITH PHASE 2 RESPONSE TO COMMENTS	MAR 24/14	MJP
1.	ISSUED WITH STORM WATER SERVICING BRIEF	DEC 18/13	MJP

SCALE
1:1000
1:1000
0 10 20 30 40

DESIGN SML
CHECKED MJP
DRAWN RBG
CHECKED SML
APPROVED MJP

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
M.J. PETEPIECE
100079354
May 7/14
PROVINCE OF ONTARIO

NOVATECH ENGINEERING CONSULTANTS LTD.
ENGINEERS & PLANNERS
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada
K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Email: novainfo@novatech-eng.com

LOCATION
City of Ottawa
Fernbank Community Founder Avenue (N-S Arterial)

DRAWING NAME
FOUNDER AVENUE (N-S ARTERIAL)
INTERIM STORM DRAINAGE
AREA PLAN

PROJECT No. 101108-07
REV REV # 3
DRAWING No. 101108-STM2

M:\2008\108180\N-S-Arterial\CAD\Design\101108-STM.dwg, STM 2, May 07, 2014 - 11:42am, slangford

PLANit DWG - 8Frame/Sheet

Founder Avenue (North South Arterial) - Storm Sewer Design Sheet - Ultimate Design (Typical)

NOVATECH ENGINEERING CONSULTANTS LTD.

LOCATION			AREA													FLOW							PROPOSED SEWER							
Location	From node	To node	Mixed Use	Park N' Ride Paramedic Post Medium Block	Arterial Road ROW	Schools	Parks	Hydro Corridor	Singles Front Yards	Singles Rear Yard	CRT Front Yards	CRT Rear Yards	Towns Rear Yard	Total Area (10 min)	Weighted Runoff Coefficient	2.78 AR	Accum* 2.78 AR	Time of Concentration	Rain Intensity (mm/hr) 5yr	Rain Intensity (mm/hr) 10yr	Peak Flow (10 min)**	Total Peak Flow (Q)	Pipe	Size	Grade	Length	Capacity	Full Flow Velocity	Time of Flow	Q/Qfull
			0.80	0.80	0.90	0.60	0.40	0.20	0.65	0.55	0.75	0.80	0.60	(ha)	(10 min)	(10 min)			(10 min)	(10 min)	(L/s)	(L/s)	Type	(mm)	(%)	(m)	(l/s)	(m/s)	(min.)	(%)
North Outlet																														
DRY POND	DI	STM PIPE												0.00	0.00	0.00	0.00	10.00	104.19		0.00	**30.0**	PVC	250	1.00	35.7	62.0	1.22	0.49	48.4%
														0.00	0.00	0.00		10.00		122.14	0.00									
CRT/HYDRO	180	429												0.00	0.00	0.00	13.67	13.52	88.66		0.00	**1230.5**	CONC	975	0.50	105.3	1653.2	2.15	0.82	74.4%
														0.00	0.00	0.00		13.52		103.86	0.00									
ART (SW)	421	423												0.00	0.00	0.00	0.00	10.00	104.19		0.00	**61.6**	PVC	300	0.75	109.3	87.4	1.20	1.52	70.5%
					0.20									0.20	0.90	0.50	0.00	10.00		122.14	61.58									
ART (SW)	423	425												0.00	0.00	0.00	0.00	11.52	96.79		0.00	**94.8**	PVC	300	2.00	67.9	142.7	1.96	0.58	66.4%
					0.12									0.12	0.90	0.29	0.00	11.52		113.42	33.20									
ART (SW)	425	427												0.00	0.00	0.00	0.00	12.10	94.27		0.00	**126.0**	PVC	300	2.25	68.0	151.3	2.07	0.55	83.3%
					0.11									0.11	0.90	0.28	0.00	12.10		110.46	31.20									
ART (SW)	427	429												0.00	0.00	0.00	0.00	12.65	92.02		0.00	**142.2**	PVC	375	2.27	65.8	275.6	2.42	0.45	51.6%
					0.06									0.06	0.90	0.15	0.00	12.65		107.81	16.18									
ART (NW)	431	429												0.00	0.00	0.00	0.00	10.00	104.19		0.00	**82.5**	PVC	375	1.09	112.3	191.0	1.67	1.12	43.2%
					0.27									0.27	0.90	0.68	0.00	10.00		122.14	82.51									
ART	429	529												0.00	0.00	0.00	0.00	13.10	90.24		0.00	**1455.2**	CONC	1200	0.35	24.5	2406.2	2.06	0.20	60.5%
														0.00	0.00	0.00	0.00	13.10		105.72	0.00									
ART (SW)	521	523												0.00	0.00	0.00	0.00	10.00	104.19		0.00	**88.6**	PVC	300	1.00	109.5	100.9	1.38	1.32	87.8%
					0.29									0.29	0.90	0.73	0.00	10.00		122.14	88.62									
ART (SW)	523	525												0.00	0.00	0.00	0.00	11.32	97.70		0.00	**166.0**	PVC	375	2.00	80.2	258.7	2.27	0.59	64.2%
					0.27									0.27	0.90	0.68	0.00	11.32		114.50	77.35									
ART (SW)	525	527												0.00	0.00	0.00	0.00	11.91	95.09		0.00	**218.9**	PVC	375	2.20	61.7	271.3	2.38	0.43	80.7%
					0.19									0.19	0.90	0.48	0.00	11.91		111.42	52.97									
ART (SW)	527	529												0.00	0.00	0.00	0.00	12.34	93.26		0.00	**265.5**	CONC	450	2.20	60.8	441.2	2.69	0.38	60.2%
					0.17									0.17	0.90	0.43	0.00	12.29		109.54	46.59									
ART (NW)	531	529												0.00	0.00	0.00	0.00	10.00	104.19		0.00	**177.2**	CONC	450	1.20	109.9	325.8	1.98	0.92	54.4%
					0.58									0.58	0.90	1.45	0.00	10.00		122.14	177.25									
	529	285												0.00	0.00	0.00	0.00	13.30	89.49		0.00	**1898.0**	CONC	1200	0.35	76.4	2406.2	2.06	0.62	78.9%
														0.00	0.00	0.00	0.00	13.30		104.83	0.00									

Q = 2.78 AIR

WHERE : Q = PEAK FLOW IN LITRES PER SECOND (L/s)
A = AREA IN HECTARES (ha)
I = RAINFALL INTENSITY IN MILLIMETERS PER HOUR (mm/hr)
R = WEIGHTED RUNOFF COEFFICIENT

Q = (1/n) A R(2/3)So(1/2)

WHERE : Q = CAPACITY (L/s)
n = MANNING COEFFICIENT OF ROUGHNESS (0.013)
A = FLOW AREA (m2)

Project: Fernbank Crossing (108180-10)
Designed: SML
Checked: MJP
Date: May 7, 2014

Notes:
*From CRT Lands Storm Sewer Design Sheet
**A 10min Time of Concentration was used at the most upstream node, increasing the Time of Concentration by the Time of Flow between each pipe length to determine the Peak Flow.

INFORMATION FROM FOUNDER AVENUE (NORTH SOUTH ARTERIAL) ROAD PROJECT PHASE 2 STORMWATER SERVICING BRIEF

LICENSED PROFESSIONAL ENGINEER
M.J. PETEPIECE
100079354
May 7/14
PROVINCE OF ONTARIO

Prepared By: Novatech Engineering Consultants
Date: 07/05/2014

M:\2008\108180\NS-Arterial\DATA\Calculations\Sewer Calcs\STM\Stm Dec 2013\Stm Ultimate - April 2014-CRT

Founder Avenue (North South Arterial) - Storm Sewer Design Sheet - Ultimate Design (Fixed Inlet Time)

NOVATECH ENGINEERING CONSULTANTS LTD.

LOCATION			AREA													FLOW						PROPOSED SEWER							
Location	From node	To node	Mixed Use	Park N' Ride Paramedic Post Medium Block	Arterial Road ROW	Schools	Parks	Hydro Corridor	Singles Front Yards	Singles Rear Yard	CRT Front Yards	CRT Rear Yards	Towns Rear Yard	Total Area (10 min)	Weighted Runoff Coefficient	2.78 AR	Accum* 2.78 AR	Rain Intensity (mm/hr) 5yr	Rain Intensity (mm/hr) 10yr	Peak Flow (10 min)**	Total Peak Flow (Q)	Pipe	Size	Grade	Length	Capacity	Full Flow Velocity	Time of Flow	Q/Qfull
			0.80	0.80	0.90	0.60	0.40	0.20	0.65	0.55	0.75	0.80	0.60	(ha)	(10 min)	(10 min)		(10 min)	(10 min)	(L/s)	(L/s)	Type	(mm)	(%)	(m)	(l/s)	(m/s)	(min.)	(%)
North Outlet																													
DRY POND	DI	STM PIPE												0.00	0.00	0.00	0.00	104.19		0.00	**34.0**	PVC	250	1.00	35.7	62.0	1.22	0.49	54.8%
														0.00	0.00	0.00			122.14	0.00									
CRT/HYDRO	180	429												0.00	0.00	0.00	13.69	104.19		0.00	**1234.5**	CONC	975	0.50	105.3	1653.2	2.15	0.82	74.7%
														0.00	0.00	0.00			122.14	0.00									
ART (SW)	421	423												0.00	0.00	0.00	0.00	104.19		0.00	**61.6**	PVC	300	0.75	109.3	87.4	1.20	1.52	70.5%
					0.20									0.20	0.90	0.50	0.00		122.14	61.58									
ART (SW)	423	425												0.00	0.00	0.00	0.00	104.19		0.00	**97.3**	PVC	300	2.00	67.9	142.7	1.96	0.58	68.2%
					0.12									0.12	0.90	0.29	0.00		122.14	35.76									
ART (SW)	425	427												0.00	0.00	0.00	0.00	104.19		0.00	**131.8**	PVC	300	2.25	68.0	151.3	2.07	0.55	87.1%
					0.11									0.11	0.90	0.28	0.00		122.14	34.50									
ART (SW)	427	429												0.00	0.00	0.00	0.00	104.19		0.00	**150.2**	PVC	375	2.27	65.8	275.6	2.42	0.45	54.5%
					0.06									0.06	0.90	0.15	0.00		122.14	18.34									
ART (NW)	431	429												0.00	0.00	0.00	0.00	104.19		0.00	**82.5**	PVC	375	1.09	112.3	191.0	1.67	1.12	43.2%
					0.27									0.27	0.90	0.68	0.00		122.14	82.51									
ART	429	529												0.00	0.00	0.00	0.00	104.19		0.00	**1467.2**	CONC	1200	0.35	24.5	2406.2	2.06	0.20	61.0%
														0.00	0.00	0.00	0.00		122.14	0.00									
ART (SW)	521	523												0.00	0.00	0.00	0.00	104.19		0.00	**88.6**	PVC	300	1.00	109.5	100.9	1.38	1.32	87.8%
					0.29									0.29	0.90	0.73	0.00		122.14	88.62									
ART (SW)	523	525												0.00	0.00	0.00	0.00	104.19		0.00	**171.1**	PVC	375	2.00	80.2	258.7	2.27	0.59	66.2%
					0.27									0.27	0.90	0.68	0.00		122.14	82.51									
ART (SW)	525	527												0.00	0.00	0.00	0.00	104.19		0.00	**229.2**	PVC	375	2.20	61.7	271.3	2.38	0.43	84.5%
					0.19									0.19	0.90	0.48	0.00		122.14	58.06									
ART (SW)	527	529												0.00	0.00	0.00	0.00	104.19		0.00	**281.2**	CONC	450	2.20	60.8	441.2	2.69	0.38	63.7%
					0.17									0.17	0.90	0.43	0.00		122.14	51.95									
ART (NW)	531	529												0.00	0.00	0.00	0.00	104.19		0.00	**177.2**	CONC	450	1.20	109.9	325.8	1.98	0.92	54.4%
					0.58									0.58	0.90	1.45	0.00		122.14	177.25									
	529	285												0.00	0.00	0.00	0.00	104.19		0.00	**1925.6**	CONC	1200	0.35	76.4	2406.2	2.06	0.62	80.0%
														0.00	0.00	0.00	0.00		122.14	0.00									

Q = 2.78 AIR

WHERE : Q = PEAK FLOW IN LITRES PER SECOND (L/s)
A = AREA IN HECTARES (ha)
I = RAINFALL INTENSITY IN MILLIMETERS PER HOUR (mm/hr)
R = WEIGHTED RUNOFF COEFFICIENT

Q = (1/n) A R(2/3)So(1/2)

WHERE : Q = CAPACITY (L/s)
n = MANNING COEFFICIENT OF ROUGHNESS (0.013)
A = FLOW AREA (m2)

Project: Fernbank Crossing (108180-10)
Designed: SML
Checked: MJP
Date: May 7, 2014

Notes:
*From CRT Lands Storm Sewer Design Sheet
**A fixed 10min Time of Concentration has been used to determine the Peak Flow.

INFORMATION FROM FOUNDER AVENUE (NORTH SOUTH ARTERIAL) ROAD PROJECT PHASE 2 STORMWATER SERVICING BRIEF

LICENSED PROFESSIONAL ENGINEER
M.J. PETEPIECE
100079354
May 7/14
PROVINCE OF ONTARIO

Prepared By: Novatech Engineering Consultants
Date: 07/05/2014

M:\2008\108180\NS-Arterial\DATA\Calculations\Sewer Calcs\STM\Stm Dec 2013\Stm Ultimate - April 2014-CRT