FUNCTIONAL SERVICING REPORT

for

175 John Street North

Hamilton, Ontario

Prepared for:

Darpel Investments

Prepared by:

LANHACK CONSULTANTS INC.
1709 Upper James Street
Hamilton, ON L9B 1K7

Project No. 22080

November 19, 2024

Table of Contents

SECTION 1 – STORM WATER MANAGEMENT

Stormwater Management (SWM) Report

175 John Street North

Prepared for:
Darpel Investments

Prepared by:
Lanhack Consultants Inc.
1709 Upper James Street
Hamilton, ON L9B 1K7

Lanhack File No. 22045
Date: January 25,2024

1.0 INTRODUCTION

Lanhack Consultants Inc. has been retained by Darpel Investments to assess the storm water management requirements relating to the proposed development located at 175 John Street North in the City of Hamilton. Refer to Figure 1 for the Location Map.

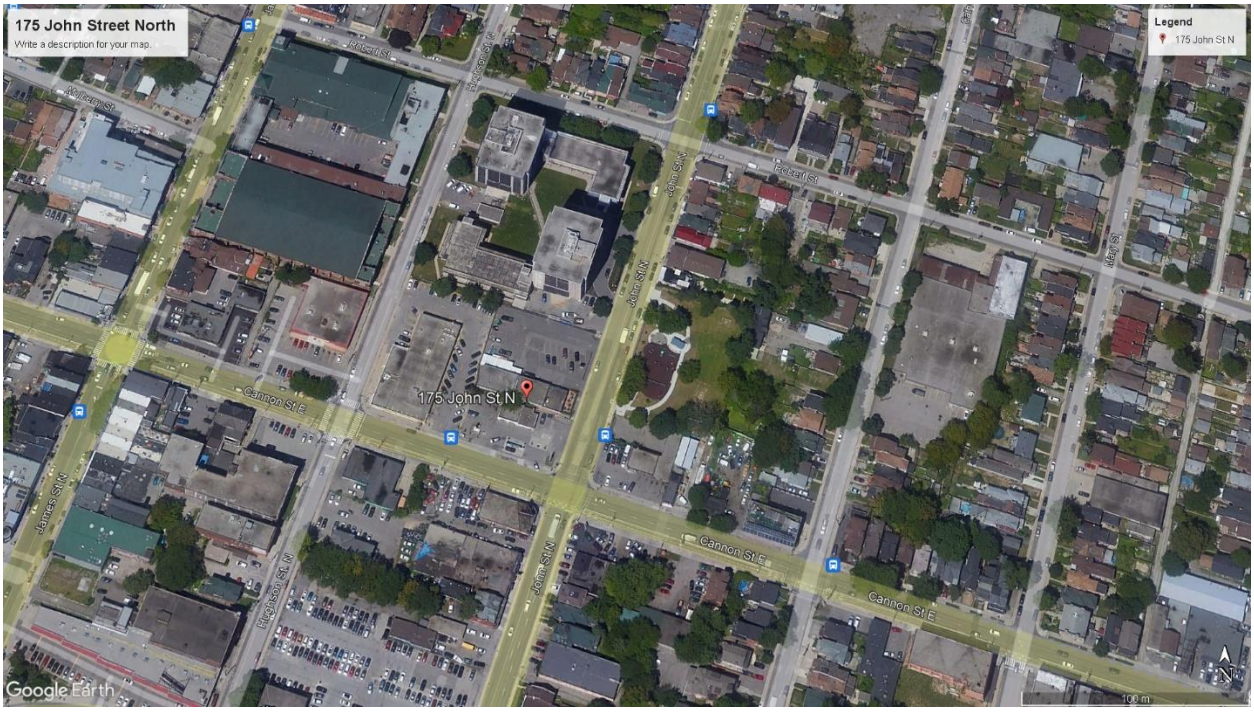


Figure 1 – Site Location Map

The site is approximately 1951m^2 in size, 1860m^2 after road widening, and currently has 100.0% impervious coverage. The proposal calls for the construction of a multiple unit residential building. The proposed development would reduce the impervious coverage to approximately 82.1% owing to the required perimeter setbacks. This report will review the recommended storm water management strategy used to develop the proposed site in accordance with City of Hamilton storm water management criteria.

2.0 STORMWATER MANAGEMENT

The following section will describe the proposed stormwater management (SWM) plan for the existing and proposed development conditions.

2.1 Stormwater Management Criteria

There is an existing 450mm combined sewer on John Street North. This sewer currently collects all storm and sanitary runoff from the subject lands. Based on the City of Hamilton standard conditions the following stormwater management (SWM) criteria will be applied to the site:

Stormwater Quantity Control

The 100yr post-development peak flow should be controlled to the 2-year pre-development flow taking into account the difference in sanitary flows to the receiving system. Based on discussions with City of Hamilton staff the pre-development runoff rate should be based on a runoff co-efficient of 0.70 rather than based on actual site conditions.

Stormwater Quality Control

Water quality control requirement is to provide Level 1 (enhanced) treatment levels for the proposed site works as per the MOECC SWM Practices Planning and Design Manual (2003).

2.2 Existing/Proposed Conditions

Under existing conditions the 2yr peak storm flow to the City of Hamilton sewer system is estimated to be 28.1 l/s (Rational Method C=0.70). The sanitary peak flow to the sewer system is estimated to increase by 5.3 l/s (0.05 l/s existing, 5.31 l/s proposed). Hence the total allowable 100yr peak storm flow to the sewer system is **22.8 l/s** based on City of Hamilton criteria.

The existing and proposed conditions were assessed using the SWMHYMO Hydrologic Modeling and the 2-year and 100-year IDF parameters for the City of Hamilton design storms. It is proposed

to control the storm runoff release rate to the John Street North sewer system through the combined use of roof top storage for a portion of the roof plus the installation of an underground storm water storage tank. A total of 695m^2 of the roof area can be collected and controlled. At a maximum average depth of 0.075m this roof area could provide a total of 52m^3 storage and could be controlled through roof drains set to allow a maximum of 3l/s from this area. Flows from the controlled roof drains would be combined with the collected flows from the site and directed to a storm water storage tank in the underground parking area. This tank would have a footprint of 52.1m^2 with a floor set to elevation 87.48. The outlet rate from the tank would be controlled through the installation of a 110mm orifice plate.

Table 1.0 Hydrologic modelling results.

	2yr (m^3/s)
Pre-Development	
2yr Storm Peak Flow l/s (SWMHYMO)	53
2yr Storm Peak Flow l/s (Rational C=0.70)	28.1
Sanitary Peak Flow Rate l/s	0.05
Total Outlet Rate l/s	**28.15**
Post- Development	
100yr Storm Peak Inflow to Roof Drains l/s	44
100yr Roof Storage Volume m^3	45.2
Maximum Depth m	0.13
100yr Storm Peak Inflow to Tank l/s	57
100yr Tank Storage Volume m^3	28.0
Maximum Depth m	0.54
100yr Controlled Peak Outlet l/s	21
Total 100yr Storm Outlet Rate	22
Sanitary Peak Flow Rate l/s	5.31
Total Outlet Rate l/s	**27.31**

Stormwater Quality Control

Level 1 enhanced quality control for the proposed site works is required. The site is primarily covered with roof top area. A small portion of the site will have surface parking. In order to treat the storm runoff from this 459m^2 area it is proposed to install a Hydro First Defense FD-3HC unit, or equivalent. Based on manufacturers specifications this unit can provide 90.0% TSS removal efficiency using the NJ/DEP ETV sediment distribution.

2.3 Sediment and Erosion Control

During development of the site, it is important that sediment disturbed by the construction operations are controlled and maintained throughout the construction period. Sediment and erosion control measures will be implemented on site during construction and will conform to the Erosion & Sediment Control Guideline for Urban Construction and City of Hamilton Standards.

Sediment and erosion control measures will include:

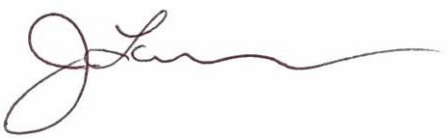
- Installation of silt control fencing at strategic locations around the perimeter of the site where feasible;
- Preventing silt or sediment laden water from entering inlets (existing catch basins/catch basin manholes) by wrapping their tops with filter fabric or installing silt sacks, where feasible;
- Maintaining sediment and erosion control structures in good repair (including periodic cleaning as required) until such time that the Engineer or City of Hamilton approves their removal. Erosion control measures to be inspected daily and after any rainfall event.
- Should excess mud-tracking occur during construction, mud-mats shall be installed to assist with mud-tracking control; where feasible.

2.4 Conclusions and Recommendations

Based on the information provided herein, we conclude that:

- The 100yr peak runoff rate from this site into the John Street North combined sewer system will effectively be controlled to the existing 2yr peak rate, based on the City of Hamilton supplied runoff co-efficient, considering the estimated increase in sanitary sewer flow. This is achieved through the use of partial roof top storage in combination with a 52.1m^2 storage tank with a 110mm orifice plate to limit the runoff rate. The estimated 100yr depth within the tank is 0.54m (28.0m^3 at elevation 88.02).
- In order to treat the storm runoff from the 459m^2 surface parking area it is proposed to install a Hydro First Defense FD-3HC unit or equivalent. Based on manufacturers specifications this unit can provide 90.0% TSS removal efficiency using the NJ/DEP ETV sediment distribution.
- Erosion and sediment controls be installed as described in section 2.3 of this report.

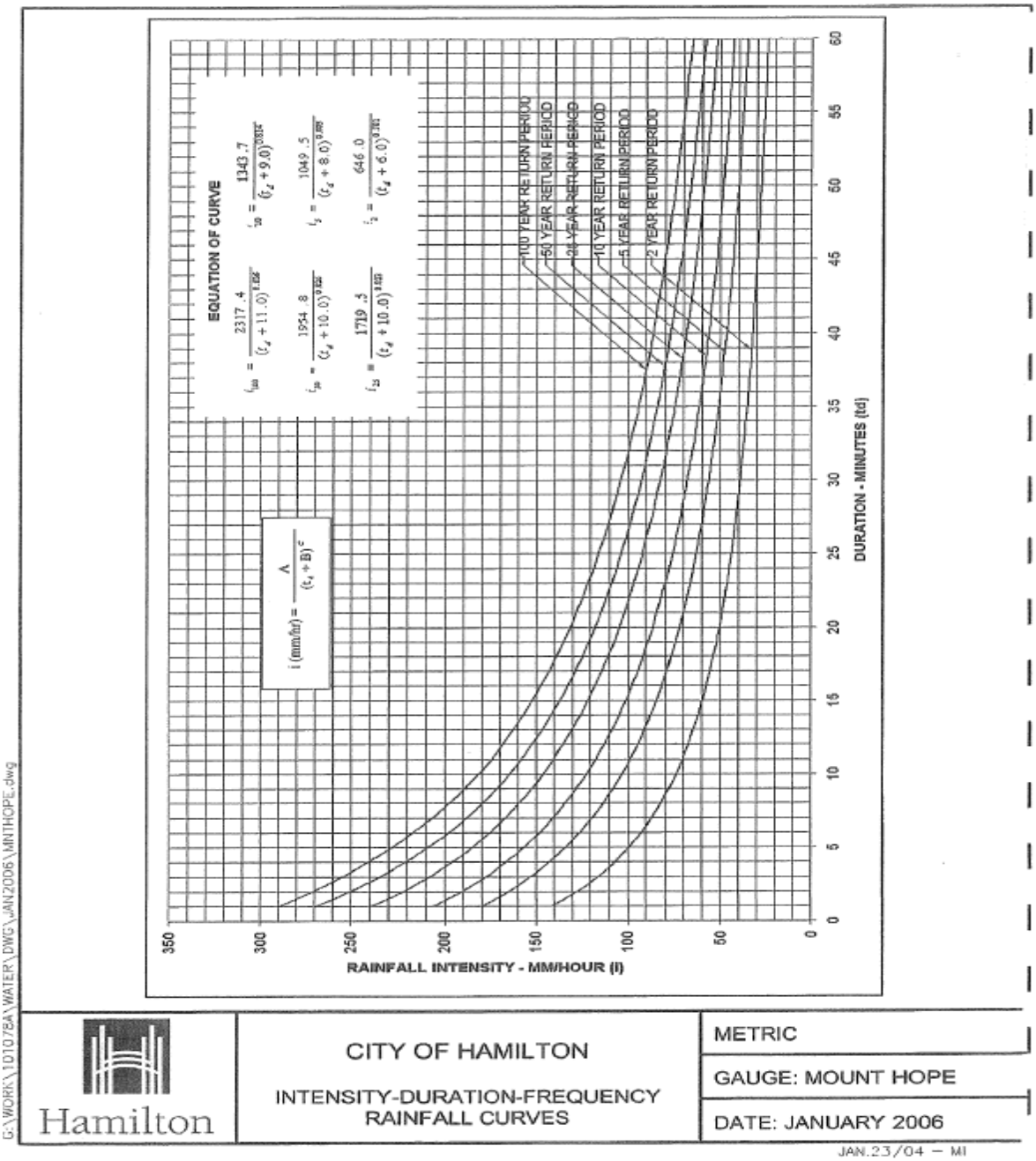
Respectfully submitted,



John Lamarre, P.Eng.
Lanhack Consultants Inc.

APPENDIX A

The rainfall intensities used in the SWMHYMO Modeling Program were taken from the IDF Curve from the City of Hamilton design guidelines.



Design storm information used in the hydrologic modeling was based on Chicago Storm Distribution Intensity-Duration Frequency (IDF) equations for the City of Hamilton in the form:

$$i = \frac{A}{(t+B)^C}$$

- i = rainfall intensity (mm/hour)
- t = time of concentration in minutes (10 minutes)
- A, B and C = constant (see above)

Stage Storage Discharge
175 John Street North

Input Data:	Orifice Diameter	110	mm			
	Orifice Elevation	87.38	(Center)	87.32	(MH1)	
				87.48	(Base of Tank)	
	C Co-efficient	0.62				

Stage Storage Discharge

Elev. (m)	Incr. Elev.	Tank Area (m2)	Total Depth (m)	Total Volume m3	Orifice Outlet m3/s	Orifice Outlet m3/s	Weir Outlet m3/s	Total Outflow m3/s
87.48	0.00	52.10	0.16	8.3		0.000		0.0000
87.78	0.30	52.10	0.46	15.6		0.017		0.0166
88.08	0.30	52.10	0.76	31.3		0.022		0.0219
88.38	0.30	52.10	1.06	46.9		0.026		0.0262
88.68	0.30	52.10	1.36	62.5		0.030		0.0298
88.98	0.30	52.10	1.66	78.1		0.033		0.0331
89.28	0.30	52.10	1.96	93.8		0.036		0.0360

Project No. 22080
Sheet No. 1
Checked by: JL
Computed by:
Date: October 19, 2023

CITY OF HAMILTON

STORM SEWER DESIGN

Project: 175 John Street North

$i = \frac{A}{(T+B)^C}$

A= 646.00
B= 6.00
C= 0.781
n= 0.013

Vmin=0.90m/s
Vmax=3.65m/s

Area No.	Street Name	From MH	To MH	Area [ha]	C	A*C	Cumulative A*C	Time of Conc. [min]	Intensity [mm/hr]	Qpeak [m³/s]	Pipe Characteristcs: Diameter [mm]	Slope [%]	Length [m]	Capacity [m³/s]	Velocity [m/s]	Travel Time [min]	Fraction Full [%]	Remarks
2yr Flow Rates Based on City GIS																		
	John Street			0.1951	0.700	0.14	0.14	10.00	74.10	**0.0281**								2 Yr
Allowable flow rate = **22.8 l/s** (28.1 l/s less 5.26 l/s increase in sanitary sewer flows).																		

```
*#************************************************
*#                                      *
*#          175 John Street North         *
*#                                      *
*#                                      *
*#            DATE:  January 2024         *
*#            FILE:   John3.dat           *
*#                                      *
*#************************************************
*#
START           TZERO=[0.0]hrs,  METOUT=[2],  NSTORM=[1],  NRUN=[1]

*#*******************************
*# PRE-DEVELOPMENT 2yr
*#*******************************

CHICAGO STORM      IUNITS=2 TD=4hrs TPRAT=.38 CSDT=5min ICASEcs=1
                   A=646.0  B=6 and C=.781

*# PREDEVELOPMENT

CALIB STANDHYD     ID=1 NHYD=100 DT=5 min AREA=0.1860ha XIMP=0.999
                  TIMP=0.999  DWF=0 cms, LOSS=2, CN=74
                   IAper=5.0 mm SLPP=1.0% LGP=35m, MNP=0.250 SCP=0.0
                   IAimp=1.0 mm SLPI=1.0%  LGI=35m,  MNI=0.014  SCI=0.0 -1

*#*********************************
*# POST DEVELOPMENT 100yr
*#*********************************
CHICAGO STORM      IUNITS=2  TD=4hrs TPRAT=.40  CSDT=5 min
                   ICASEcs=1     A=2317.4  B=11  C=.836

*# ROOF TOP CONTROLLED AREA
*# 695m2 at 0.075m ave Depth= 52m3
*# 2 ROOF DRAINS CONTROLLED TO 3l/s TOTAL

*#ROOF AREA
CALIB STANDHYD     ID=1 NHYD=100 DT=5 min AREA=0.0695ha XIMP=0.999
                   TIMP=0.999  DWF=0 cms, LOSS=2, CN=74
                   IAper=5.0 mm SLPP=1.0% LGP=15m, MNP=0.250 SCP=0.0
                   IAimp=1.0 mm SLPI=1.0%  LGI=15m,  MNI=0.014  SCI=0.0 -1

ROUTE RESERVOIR    ID=2 NHYD=100  IDIN=1  DT=2min
                    DISCH(cms)  STORAGE(ha m)
                      0.000         .0000
                      0.0015        .0020
                      0.003         .0052
                      0.020         .0055    -1  -1
*#BALANCE OF SITE TO TANK

CALIB STANDHYD     ID=3 NHYD=100 DT=5 min AREA=0.1105ha XIMP=0.701
                  TIMP=0.701  DWF=0 cms, LOSS=2, CN=74
                  IAper=5.0 mm SLPP=1.0% LGP=25m, MNP=0.250 SCP=0.0
                   IAimp=1.0 mm SLPI=1.0%  LGI=25m,  MNI=0.014  SCI=0.0 -1
```

```
ADD HYD              ID=4 NHYD=100  ID=2,3

ROUTE RESERVOIR    ID=5 NHYD=100  IDIN=4  DT=2min
                   DISCH(cms)  STORAGE(ha m)
                    0.0000       .0000
                    0.0166       .00156
                    0.0219       .00313
                    0.0262       .00469
                    0.0298       .00625
                    0.0331       .00781
                    0.0360       .00938
                    1.0000       .01000   -1  -1

*# PERIMITER OF SITE UNCONTROLLED

CALIB STANDHYD     ID=6 NHYD=100 DT=5 min AREA=0.0060ha XIMP=0.95
                   TIMP=0.95  DWF=0 cms, LOSS=2, CN=74
                   IAper=5.0 mm SLPP=1.0% LGP=10m, MNP=0.250 SCP=0.0
                    IAimp=1.0 mm SLPI=1.0%  LGI=10m,  MNI=0.014  SCI=0.0 -1

*#TOTAL SITE RUNOFF

ADD HYD              ID=10  NHYD=100   ID=5 ID=6

FINISH
```

```
******************************** S U M M A R Y  O U T P U T ********************************
*************************************************************************************************
*            RUN DATE: 2024-02-13    TIME: 11:56:09    RUN COUNTER: 000002            *
*************************************************************************************************
* Input   file: D:\WORK FILES\LANHACK PROJECTS\22080 - 175 John Street\John3.dat            *
* Output  file: D:\WORK FILES\LANHACK PROJECTS\22080 - 175 John Street\John3.out            *
* Summary file: D:\WORK FILES\LANHACK PROJECTS\22080 - 175 John Street\John3.sum            *
* User comments:                                                                           *
* 1:_____*
* 2:_____*
* 3:_____*
*************************************************************************************************


#************************************************
#                                      *
#          175 John Street North         *
#                                      *
#                                      *
#            DATE:   January 2024        *
#            FILE:    John3.dat          *
#                                      *
#************************************************
#
 RUN#:COMMAND#
R0001:C00001-------------------------------------------------------------------------------
   START
    [TZERO =    .00 hrs on       0]
    [METOUT=   2    (1=imperial, 2=metric output)]
    [NSTORM=   1 ]
    [NRUN  = 0001 ]
#*******************************
# PRE-DEVELOPMENT 2yr
#*******************************
R0001:C00002-------------------------------------------------------------------------------
   CHICAGO STORM
    [SDT= 5.00:SDUR=   4.00:PTOT=  35.07]
    [A/B/C= 646.000/   6.000/    .781]
# PREDEVELOPMENT
R0001:C00003-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
 *  CALIB STANDHYD       5.0 01:      100     .19     .050 No_date    1:30   34.04 .971     .000
    [XIMP=***:TIMP=***]
    [LOSS= 2 :CN= 74.0]
    [Pervious    area: IAper= 5.00:SLPP=1.00:LGP=  35.:MNP=.250:SCP=   .0]
    [Impervious   area: IAimp= 1.00:SLPI=1.00:LGI=  35.:MNI=.014:SCI=   .0]
#***********************************
# POST DEVELOPMENT 100yr
#***********************************
R0001:C00004-------------------------------------------------------------------------------
   CHICAGO STORM
    [SDT= 5.00:SDUR=   4.00:PTOT=  91.39]
    [A/B/C=2317.400/  11.000/    .836]
# ROOF TOP CONTROLLED AREA
# 695m2 at 0.075m ave Depth= 52m3
```

```
# 2 ROOF DRAINS CONTROLLED TO 3l/s TOTAL
#ROOF AREA
R0001:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
 *  CALIB STANDHYD       5.0 01:      100     .07     .044 No_date    1:35   90.34 .989     .000
    [XIMP=***:TIMP=***]
    [LOSS= 2 :CN= 74.0]
    [Pervious    area: IAper= 5.00:SLPP=1.00:LGP=  15.:MNP=.250:SCP=   .0]
    [Impervious  area: IAimp= 1.00:SLPI=1.00:LGI=  15.:MNI=.014:SCI=   .0]
R0001:C00006------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
   ROUTE RESERVOIR ->   5.0 01:      100     .07     .044 No_date    1:35   90.34  n/a     .000
           out <=    1.7 02:      100     .07     .003 No_date    2:23   90.34  n/a     .000
    {MxStoUsed=.4523E-02  m3}
#BALANCE OF SITE TO TANK
R0001:C00007------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
 *  CALIB STANDHYD       5.0 03:      100     .11     .055 No_date    1:35   76.05 .832     .000
    [XIMP=.70:TIMP=.70]
    [LOSS= 2 :CN= 74.0]
    [Pervious    area: IAper= 5.00:SLPP=1.00:LGP=  25.:MNP=.250:SCP=   .0]
    [Impervious  area: IAimp= 1.00:SLPI=1.00:LGI=  25.:MNI=.014:SCI=   .0]
R0001:C00008------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
   ADD HYD              1.7 02:      100     .07     .003 No_date    2:23   90.34  n/a     .000
              +     5.0 03:      100     .11     .055 No_date    1:35   76.05  n/a     .000
            SUM=     1.7 04:      100     .18     .057 No_date    1:35   81.57  n/a     .000
R0001:C00009------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
   ROUTE RESERVOIR ->   1.7 04:      100     .18     .057 No_date    1:35   81.57  n/a     .000
           out <=    1.7 05:      100     .18     .021 No_date    1:46   81.57  n/a     .000
    {MxStoUsed=.2798E-02  m3}
# PERIMITER OF SITE UNCONTROLLED
R0001:C00010------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
 *  CALIB STANDHYD       5.0 06:      100     .01     .004 No_date    1:35   87.99 .963     .000
    [XIMP=.95:TIMP=.95]
    [LOSS= 2 :CN= 74.0]
    [Pervious    area: IAper= 5.00:SLPP=1.00:LGP=  10.:MNP=.250:SCP=   .0]
    [Impervious  area: IAimp= 1.00:SLPI=1.00:LGI=  10.:MNI=.014:SCI=   .0]
#TOTAL SITE RUNOFF
R0001:C00011------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
   ADD HYD              1.7 05:      100     .18     .021 No_date    1:46   81.57  n/a     .000
              +     5.0 06:      100     .01     .004 No_date    1:35   87.99  n/a     .000
            SUM=     1.7 10:      100     .19     .022 No_date    1:41   81.78  n/a     .000
R0001:C00012-----------------------------------------------------------------------------------------
   FINISH
```

Hydro First Defense® - HC

Net Annual Water Quality Worksheet

Rev. 9.8

Project Name:	**175 John Street North**	*Report Date:*	**October 19/2023** Paste
Street:		*City:*	**Hamilton**
Province:	**Ontario**	*Country:*	
Designer:		*email:*	

Treatment Parameters:

Structure ID:		
TSS Goal:	80	% Removal
TSS Particle Size:	NJDEP / ETV	
Area:	0.0459	ha
Percent Impervious:	100%	
Rational C value:	0.90	Calc. Cn
Rainfall Station:	Hamilton, ONT	MAP
Peak Storm Flow:	416	L/s

Model Specification:

Model:	**FD-3HC**	
Diameter:	900	mm
Peak Flow Capacity:	425.00	L/s
Sediment Storage:	0.31	m^3
Oil Storage:	473.00	L

Installation Configuration:

Placement:	Online		
Outlet Pipe Size:		mm	*OK*
Inlet Pipe 1 Size:		mm	*OK*
Inlet Pipe 2 Size:		mm	*OK*
Inlet Pipe 3 Size:		mm	*OK*
Rim Level:		m	Calc Invs.
Outlet Pipe Invert:		m	
Invert Pipe 1:		m	*OK!*
Invert Pipe 2:		m	
Invert Pipe 3:		m	

RESULTS SUMMARY

Model	TSS	Volume
FD-3HC	**90.0%**	**99.9%**
FD-4HC	96.8%	99.9%
FD-5HC	96.2%	99.9%
FD-6HC	97.4%	99.9%
FD-8HC	98.7%	99.9%

Net Annual Removal Model: FD-3HC

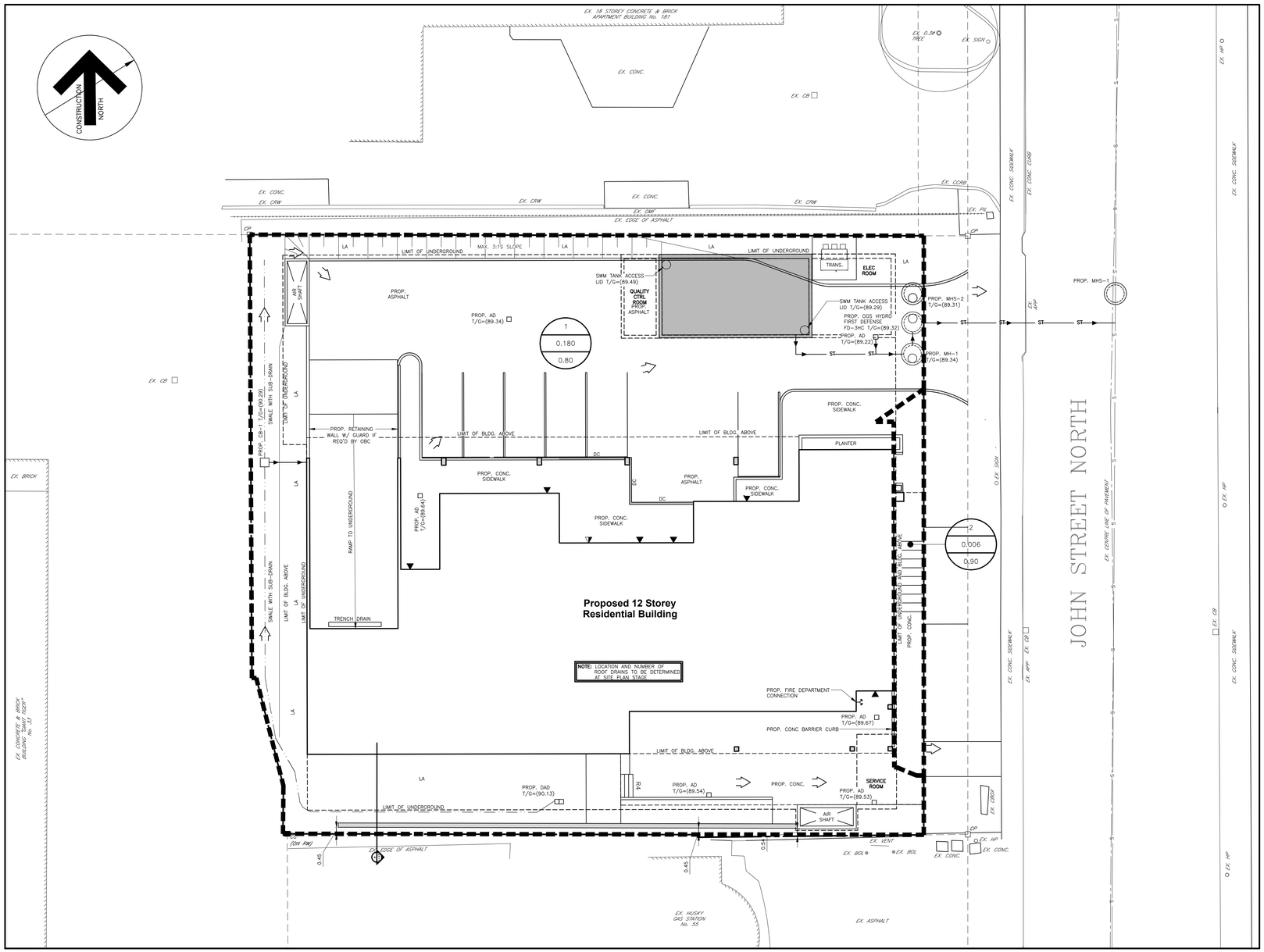
Intensity[1] (mm/hr)	Fraction of Rainfall[1] (%)	FD-3HC Removal Efficiency[2] (%)	Weighted Net Annual Efficiency (%)
0.50	0.4%	100.0%	0.4%
1.00	18.8%	100.0%	18.8%
1.50	10.9%	99.9%	10.9%
2.00	13.9%	96.8%	13.4%
2.50	4.5%	94.4%	4.3%
3.00	2.7%	92.4%	2.5%
3.50	7.8%	90.7%	7.1%
4.00	4.2%	89.3%	3.7%
4.50	2.2%	88.0%	1.9%
5.00	4.7%	86.9%	4.1%
6.00	4.2%	84.9%	3.5%
7.00	4.2%	83.3%	3.5%
8.00	3.2%	81.8%	2.6%
9.00	1.9%	80.5%	1.6%
10.00	2.6%	79.4%	2.1%
20.00	9.2%	71.9%	6.6%
30.00	2.3%	67.5%	1.5%
40.00	1.1%	64.4%	0.7%
50.00	0.5%	62.0%	0.3%
100.00	0.6%	54.5%	0.3%
150.00	0.1%	50.2%	0.0%
200.00	0.0%	47.0%	0.0%
Total Net Annual Removal Efficiency:			**90.0%**
Total Annual Runoff Volume Treated:			**99.9%**

1. Rainfall Data: 1970:2007, HLY03, Hamilton, ON, 6153194.
2. Based in NJDEP / Canada ETV PSD.
3. Rainfall adjusted to 5 min peak intensity based on hourly average.

Designer Notes

LEGEND

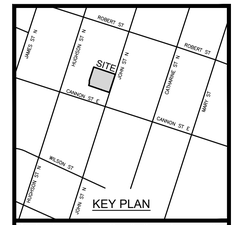
- PROPOSED CATCHMENT AREA
- XX — CATCHMENT NAME
- XX — CATCHMENT AREA
- XX — IMPERVIOUSNESS COEFFICIENT



1 / C3-1 — Proposed Area Drainage Plan

SCALE BAR 1:150

0 6 12 18 24 30 — 1 : 150



Contractor must verify all dimensions on the Project Site and report any discrepancies before proceeding with the Work.

This drawing is a part of the Contract Documents and is to be read in conjunction with all other Contract Documents.

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SOURCE
– EXISTING BOUNDARY SURVEY AND TOPOGRAPHICAL INFORMATION OBTAINED FROM A.T. MCLAREN LTD., DWG NO –36814, DATED – DEC 23, 2021

THE POSITION OF THE POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

Revision Record

No.	Description	Date (m/d/y)
C	RE-ISSUED FOR ZBA/OPA	11/19/24
B	RE-ISSUED FOR ZBA/OPA	02/14/24
A	ISSUED FOR ZBA/OPA	12/02/22
No.	Description	Date (m/d/y)

Issue Record

LICENSED PROFESSIONAL ENGINEER — J. D. LAMARRE — NOVEMBER 2024 — PROVINCE OF ONTARIO

NOT FOR CONSTRUCTION

LANHACK Consultants Inc.
Consulting Engineers
1709 Upper James Street
Hamilton, ON L9B 1K7
Tel: (905) 777-1454
Fax: (905) 336-8142

Proposed 12 Storey Residential Building

175 JOHN STREET NORTH
HAMILTON, ON

Date:	NOVEMBER 2024
Drawn By:	GRW
Chkd By:	SMP
Scale:	AS NOTED

Proposed Drainage Area Plan

Project No.:	Drawing No.:	Rev.:
22080	C3-1	C

Plot Date: 11/20/24
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SECTION 2 – WATER/WASTEWATER GENERATION

WATER AND WASTEWATER GENERATION REPORT

for

175 John Street North

Hamilton, Ontario

Prepared for:

Darpel Investments

Prepared by:

LANHACK CONSULTANTS INC.
1709 Upper James Street
Hamilton, ON L9B 1K7

Project No. 22080

February 14, 2024

Table of Contents

1.0 INTRODUCTION

1.1 Overview

Lanhack Consultants Inc. has been retained by Darpel Investments to prepare a Water/Wastewater Generation Report (WWGR) in support of a proposed 12-storey residential building. This report is being prepared for the Zoning By-Law and Official Plan Amendment. The property is approximately 0.186 hectares, after road widening, located on the west side of John Street North between Cannon Street East and Robert Street. Please refer to **Figure 1** for the Location Map and **Appendix B** for the Site Plan prepared by SRM Architects Inc.

The site is currently developed with an existing restaurant.

The site will be equipped with sanitary and water service connections to John Street North. The proposed building will be sprinklered.

This portion of the report will provide the conceptual framework for sanitary sewage, water distribution, and fire flows for the development of this site. This report will also provide design drawings in support of the planning applications.

Please refer to the Lanhack engineering drawings attached in **Appendix B** for additional information.

1.2 Background Information

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

Ref 1: Ontario Building Code (OBC - 2012)

Ref 2: Comprehensive Development Guidelines and Financial Policies Manual 2019

Ref 3: Design Guidelines for Drinking-Water Systems (MOE, 2008)

1.3 Location Plan

***Figure 1**: Location plan of 175 John Street North*

2.0 Wastewater Assessment

The proposed development will consist of a 12-storey residential building containing 93 one-bedroom units and 33 two-bedroom units, totaling 126 residential units. Based on the site plan, floor plans and information provided by SRM Architects Inc. the design population and equivalent sanitary flow for the development were determined using the City of Hamilton Design Standards and Part 8 of the Ontario Building Code.

2.1 Existing Sanitary Drainage System

The existing sanitary drainage system consists of an existing 450mmØ combined sewer within the John Street North right-of-way. See Servicing Plan in **Appendix B** for more details.

2.2 Sanitary Demands

The anticipated sanitary discharge from the proposed residential development was estimated using the City of Hamilton Development Guidelines (2019) and Part 8 of the Ontario Building Code. The anticipated sanitary discharge flow from the subject site is summarized in **Table 2.1.**

Table 2.1: Sanitary Discharge Flow Rate

Type of Unit	Total Number of Units (1)	Persons per Unit (2)	Design Population (2)	Average Daily Flow per Capita (L/d) (3)	Total Peak Flow (L/s) (4)(5)	Including Infiltration Allowance (L/s) (6)
1-Bedroom Unit 2-Bedroom Unit	93 33	2.0 4.0	186 132	360 360	6.65	**6.76**
*(1) Number of bedrooms based on site plan prepared by SRM Architects Inc.- **Appendix B***						
(2) Design population based on two (2) persons per sleeping room within a dwelling unit or suite. Refer to OBC Section 3.1.17.1.(1).(b)						
(3) Average Domestic Sewage Flow Rate from City of Hamilton Development Guideline Chapter E.1.4 Daily Flow = 360 L/day/capita						
(4) Total Avg. Flow = [(Avg. Daily Flow per Capita) x (Total Design Population)] = (360 L/d/person x (186 persons + 132 persons)) / 24 / 60 / 60 = 1.33 L/s						
(5) Total peak flow determined from City of Hamilton Development Guideline Chapter E.1.5 (Babbitt Formula) $M = 5 / P^{0.2} = 5 / (318/1000)^{0.2} = 6.29$ As per Section E.1.5. – 2<M<5, Therefore M=5						
(6) Infiltration Allowance determined from the City of Hamilton development Guideline Chapter E.1.6. Infiltration Allowance of 0.6 L/s/ha was used for the site. = 0.6 L/s x 0.186 ha = 0.11 L/s						

Total Sanitary Discharge Peak Flow Rate = 6.76 L/s

2.3 Proposed Servicing Plan and Capacity Analysis

The proposed site will be serviced with a 300mmØ sanitary service that will drain to the existing 450mmØ combined sewer within the John Street North right-of-way. As calculated in **Table 2.1**, the total anticipated peak sanitary sewer discharge from the proposed development is **6.76 L/s.**

3.0 Water Assessment

The proposed development will consist of a 12-storey residential. building containing 93 one-bedroom units and 33 two-bedroom units, totaling 126 residential units. Based on the site plans, floor plans and information provided by SRM Architects Inc., the design population for the development will be determined using the City of Hamilton Design Standards and the equivalent domestic water flow will be determined using the Design Guidelines for Drinking-Water Systems (MOE, 2008).

3.1 Existing Water Distribution System

The existing municipal water distribution system around the site consists of a 150mmØ watermain along John Street North. There is an existing fire hydrant located on the east side of John Street North at the intersection of John Street North and Cannon Street East. See Servicing Plan in **Appendix B** for more detail.

3.2 Domestic/Fire Water Demands

The expected domestic demand for the proposed development was estimated according to the City of Hamilton Design Standards and MOE design criteria. The estimated water consumption was calculated based on an occupancy rate of 2.0 persons per sleeping room within a dwelling unit or suite as per OBC Section 3.1.17.1(1).(b). The design population will be taken at 318 persons at the domestic water demand at a rate of 360 L/day/capita. Anticipated water demands are summarized in **Table 3.1**.

Water supply calculations for fire protection were determined using the Ontario Building Code (OBC 2012) and the City of Hamilton Watermain Fire Flow Requirement Design Guidelines. See **Appendix B** for a detailed analysis. The required fire flow is **150.00 L/s.**

Table 3.1: Estimated Domestic Water Supply Demands

Expected (1) Population	Average Day (2) Demand (L/s)	Maximum Day (3) Demand (L/s)	Peak Hour (4) Demand (L/s)	Fire Flow (5) (L/s)	Max. Day + Fire Flow (L/s)
318	1.33	**2.53**	3.99	**150.00**	**152.53**
(1) Design population based on two (2) persons per sleeping room within a dwelling unit or suite. Refer to OBC Section 3.1.17.1.(1).(b)					
(2) Average Consumption Rate for Residential Area = 360 L/cap/day = (360 L/d x 318 persons) / 24 / 60 / 60 = 1. L/s					
*(3) *Maximum Day Factor of 1.9 x Average Day Demand*					
*(4) *Peak Hour Factor of 3.0 x Average Day Demand*					
*(5) Fire Flow of (**150.00 L/s**) calculation based on greater of OBC and the City of Hamilton Watermain Fire Flow Requirement Design Guidelines - **Appendix B***					

**Demand Factors from: City of Hamilton Water and Wastewater Masterplan, Class Environmental Assessment Report (November 2006)*

3.3 Proposed Water Servicing Plan and Analysis

Water servicing for the site will include the installation of a 200mmØ water service connected to the existing 450mmØ watermain on John Street North. Based on the Watermain Hydraulic Analysis prepared by CIMA+ it has been determined that the water supply on John Street North does not meet the required water service demand and size for the proposed residential development.

As per the CIMA+ report, the John Street North watermain is required to be upgraded to a 200mmØ, from Cannon Street East to Robert Street, to meet the requirements of the proposed residential development. See **Appendix C** for Watermain Hydraulic Analysis prepared by CIMA+ report and refer to the Servicing Plan in **Appendix B** for details.

The fire department's connection will be serviced by the existing fire hydrant located on the east side of John Street North at the intersection of John Street North and Cannon Street East. Refer to the Servicing Plan in **Appendix B** for more details.

Note: Typical water demand analysis would require a fixture-unit approach, but the floor plans have not been finalized yet. Instead, an equivalent population + 360 L/day/person + peak factors were used to determine the water rates. This will provide a rough estimate of water usage rates for the development (at a conservative rate of 360 L/day/person). A fixture-unit approach can be provided at a later date, if required, once floor plans have been finalized.

4.0 Conclusion (Domestic/Fire and Sanitary)

Based on the information provided herein, we conclude that the sanitary discharge at 175 John Street North will meet the design requirements of the City of Hamilton, OBC and the Ministry of Environment (MOE) and the maximum water supply flow will meet once the necessary upgrades have been made. The available flows within the municipal system are not expected to be negatively impacted from the proposed development. Therefore, it is recommended that:

Sanitary Drainage System

- The sanitary discharge for the subject site will drain to the existing 450mmØ municipal combined sewer along John Street North. The anticipated total peak discharge, to John Street West, will be **6.76 L/s.**

Water Supply System

- The water supply for the subject site will have and anticipated maximum daily water consumption rate for the development will be **2.53 L/s**.
- A minimum fire suppression flow of **9,000 L/min (150.00 L/s)** will be required as per the City of Hamilton Watermain Fire Flow Requirement Design Guidelines and OBC.
- Based on the Watermain Hydraulic Analysis prepared by CIMA+, dated December 21, 2023, see **Appendix C**, the John Street North watermain is required to be upgraded to a 200mmØ, from Cannon Street East to Robert Street, to meet the requirements of the proposed residential development. To be submitted under a separate cover.

We trust the information enclosed is satisfactory. Should you have any questions please do not hesitate to contact our office.

Respectfully submitted,

Glenn Worley
Lanhack Consultants Inc.

Dave Hacking, P.Eng
Lanhack Consultants Inc.

APPENDIX A: Fire Flow Requirements Calculations

The following calculations are for the proposed development at 175 John Street North, Hamilton, Ontario. The required fire flow will be based calculated using the Ontario Building Code (OBC) and the City of Hamilton Watermain Fire Flow Requirement Design Guidelines, the greater of both methods will be used in the design calculations.

Fire Flow calculated using the OBC:

The Ontario Building Code 2012 requires that a minimum water supply source 'Q' be provided at a minimum pressure of 140 kPa (20 psi). The minimum flow 'Q' can be calculated as:

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

Determining 'K' – Water Supply Coefficient:

As per SRM Architects Inc. design, the building is classified under the OBC as 3.2.2.42 Group C, Any Height, Any Area, Sprinklered. Therefore, the building will be of non-combustible construction with fire separations and fire resistance ratings provided in accordance with Subsection 3.2.2.42.

Using the OBC Div. B – A-3.2.5.7. Table 1 we determine the value of 'K' as:

K = 10

Determining 'V' – Volume of Building:

The approximate volume of the proposed 12-storey building was provided by SRM Architects Inc., and determined to be the following:

V = 30,005.16 m^3

Determining 'S_{tot}' – Spatial Coefficient:

The spatial coefficient is based on the exposure distance from the property line to all sides of the 12-storey residential building. Refer to site plan designed by SRM Architects Inc., **Appendix B**. The spatial coefficient can be calculated as:

$$\mathbf{S_{tot}} = 1.0 + (S_N + S_E + S_S + S_W)$$

Each face to the proposed building will be labelled as S_x with respect to the which direction that side is facing (i.e. North Face = S_N)

Side	Exposure Distance (m) [1][2]	Spatial Coefficient [3]
Side S_N	13.69	0.0
Side S_E	14.81	0.0
Side S_S	3.00	0.5
Side S_W	1.74	0.5
(1) Refer to site plan designed by SRM Architects Inc. – ***Appendix B***		
(2) When facing a street, the property line shall be deemed to be the centre of the street as per the "Fire Protection Water Supply Guideline for Part 3 in the Ontario Building Code"		
(3) Spatial Coefficient from OBC Div. B – A-3.2.5.7. Figure 1		

$$S_{tot} = 1.0 + (0.0 + 0.0 + 0.5 + 0.5)$$

$$\mathbf{S_{tot} = 2.0}$$

Determining 'Q' – Minimum Water Supply in Litres:

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

$$Q = 10 \times 30{,}005.16 \times 2.0$$

$$\mathbf{Q = 600{,}103.20\ L}$$

Determining Minimum Water Supply Flow Rate:

Using OBC Div. B – A-3.2.5.7. Table 2 we can determine the minimum water supply flow rate using the value Q = 600,103.20 L. Since the value of Q is greater than 270,000 L, we can determine the minimum water supply flow rate as:

Flow Rate = 9,000 L/min = 150.00 L/s

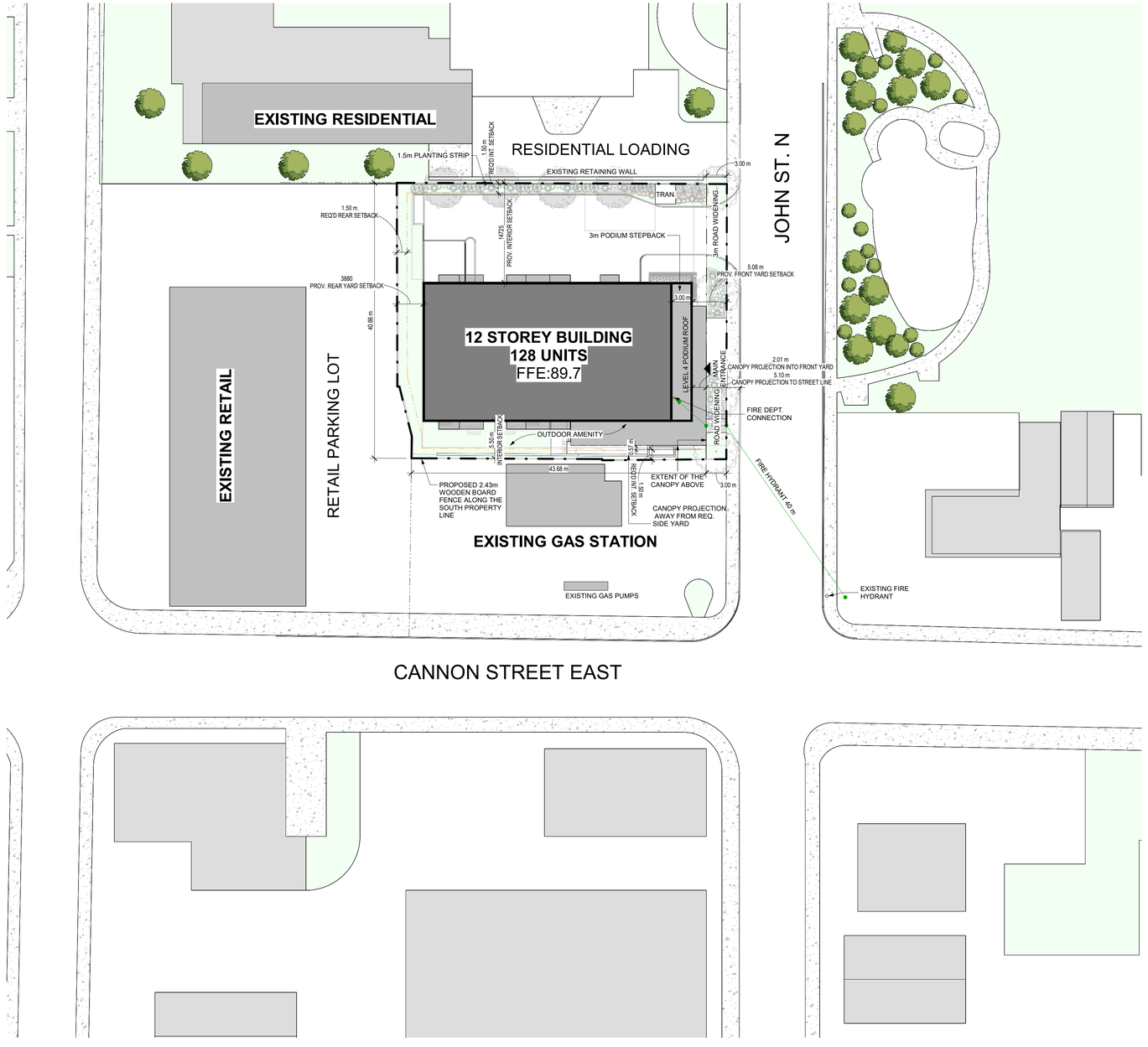
Fire Flow calculated using City of Hamilton Watermain Fire Flow Requirement Design Guidelines:

The Land Use is classified as Residential Multi (greater than 3 units) therefore we can determine the target available fire flow as:

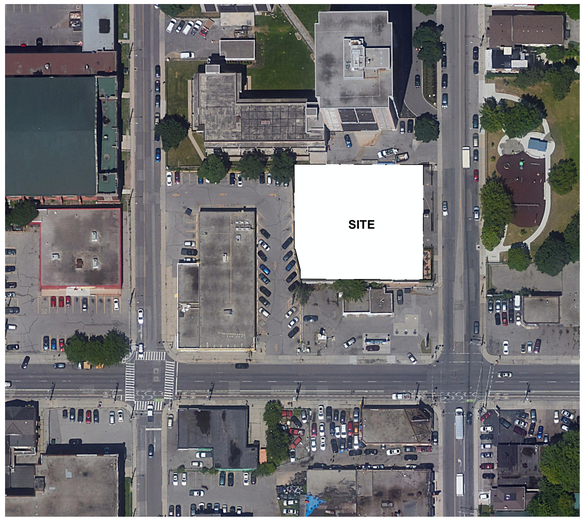
Flow Rate = 150.00 L/s

APPENDIX B: Site Plan and Engineering Drawings

- *Site Plan prepared by SRM Architects Inc.*
- *Preliminary Grading, Erosion and Sediment Control Plan prepared by Lanhack Consultants Inc.*
- *Preliminary Servicing Plan prepared by Lanhack Consultants Inc.*



1 SITE PLAN
1 : 350



KEY PLAN - NOT TO SCALE

Project North **True North**

GENERAL NOTES

1. **Do not scale drawings.** Written dimensions shall have precedence over scaled dimensions.
2. All work shall comply with the 2012 Ontario Building Code and amendments.
3. Contractors must check and verify all dimensions and specifications and report any discrepancies to the architect before proceeding with the work.
4. All contractors and sub-contractors shall have a set of approved construction documents on site at all times.
5. All documents remain the property of the architect. Unauthorized use, modification, and/or reproduction of these documents is prohibited without written permission. The contract documents were prepared by the consultant for the account of the owner.
6. The material contained herein reflects the consultants best judgement in light of the information available to him at the time of preparation. Any use which a third party makes of the contract documents, or any reliance on/or decisions to be made based on them are the responsibility of such third parties.
7. The consultant accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on the contract documents.

SITE DATA

175 JOHN ST N., HAMILTON, ONTARIO

DATA		REQUIRED	PROVIDED
ZONING		ZONING - M1	
LOT AREA (m²)		BEFORE ROAD WIDEDNING 1,981m² (21,323 ft²) WITH ROAD WIDENING 1,859m² (20,010 ft²)	
SETBACKS	FRONT YARD (m)	0 (m)	2.08 (m)
	INTERIOR SIDE YARD (m)	1.5 (m)	5.50 (m)
	INTERIOR SIDE YARD (m)	1.5 (m)	14.73 (m)
	REAR YARD (m)	1.5 (m)	3.88 (m)

BUILDING DATA

DATA	REQUIRED	PROVIDED
LOT COVERAGE (m²)	%	44.6% (LEVEL 3)
TOTAL DENSITY (# of units)	--	128 UNITS
BUILDING AREA (GROUND FLR.)	--	571.64 m² (6,153.1 ft²)
GROSS FLOOR AREA	--	9,067.3 m² (97,599.3 ft²)
GROSS CONSTRUCTION AREA	--	12,150.7 m² (130,788.7 ft²)
NUMBER OF STOREYS	---	12
BUILDING HEIGHT (m)	-- (m) MAX.	40.2 (m)
AMENITY AREA (m²)	4m² / unit < 50m² 4 x 48 = 192m² 6m² /unit > 50m² 6 x 80 = 480m² TOTAL 672 m² (7,233 ft²)	INDOOR AMENITY 177.1 m² (1906.3 ft²) OUTDOOR AMENITY 192.2 m² (2068.8 ft²) BALCONIES 938.3 m² (10099.8 ft²) TOTAL 1,307.6 m² (14075 ft²)

LANDSCAPING DATA

DATA	REQUIRED	PROVIDED
LANDSCAPE AREA (percentage)	-- (%)	21 (%)
LANDSCAPE AREA (m²)	-- (m²)	411 m² (4424 ft²)

VEHICLE PARKING DATA

DATA	REQUIRED	PROVIDED
RESIDENTIAL PARKING	0	42
VISITOR PARKING	2 + 0.05 / UNIT = 8.4	9 (INCLUDED ABOVE)
BARRIER FREE PARKING	1	2 (INCLUDED ABOVE)

BICYCLE PARKING DATA

DATA	REQUIRED	PROVIDED
SHORT TERM BICYCLE PARKING	5 Stalls	8
LONG TERM BIKE PARKING	0.5 / 128 units = 64	102

UNIT MIX DATA

UNIT TYPE	UNIT COUNT	PERCENTAGE
STUDIO	19	15%
1 BED	39	30%
1 BED + DEN	44	35%
2 BED	20	15%
3 BED	6	5%
TOTAL	**128**	

UNIT BREAKDOWN	STUDIO	1 BED	1 BED + DEN	2 BED	3 BED
LEVEL 2	1 PER FLR.	1 PER FLR.	4 PER FLR.	2 PER FLR.	2 PER FLR.
LEVEL 3-4	1 PER FLR.	3 PER FLR.	4 PER FLR.	1 PER FLR.	2 PER FLR.
LEVEL 5-12	2 PER FLR.	4 PER FLR.	4 PER FLR.	2 PER FLR.	-
TOTAL	**19**	**39**	**44**	**20**	**6**

No.	Date	Revision
2	2024-11-29	Re-issued for ZBA
1	2024-02-20	Re-issued for ZBA

Client:

Project Name / Address:

175 JOHN ST N, HAMILTON

SRM architects+ urban⋆designers

Project No: 22018
Drawing Date: AUGUST 16, 2024
Drawn by: ZMK | Checked by: EJT
Office Location: TORONTO
Plot Date / Time: 2024-11-19 1:43:42 PM

Drawing Name:

SITE PLAN

PRELIMINARY

Drawing Scale: As indicated
Status: REISSUED FOR ZBA
Revision No.: r2
Drawing No.: **D1.1**

Do not scale drawings. Contractors must check and verify all dimensions and report any discrepancies to the Architect before proceeding with the work. All documents remain the property of the Architect. Unauthorized use, modification, and/or reproduction of these documents is prohibited without written permission. The Contract Documents were prepared by the Consultant for the account of the Owner.
The material contained herein reflects the Consultants best judgement in light of the information available to him at the time of preparation Any use which a third party makes of the Contract Documents, or any reliance on/ or decisions to be made based on them are the responsibility of such third parties. The Consultant accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this Contract Documents.

C:\Users\zalkasake\Documents\22018 - 175 John St N, Hamilton - V17_zalkasakesrm.rvt

LEGEND

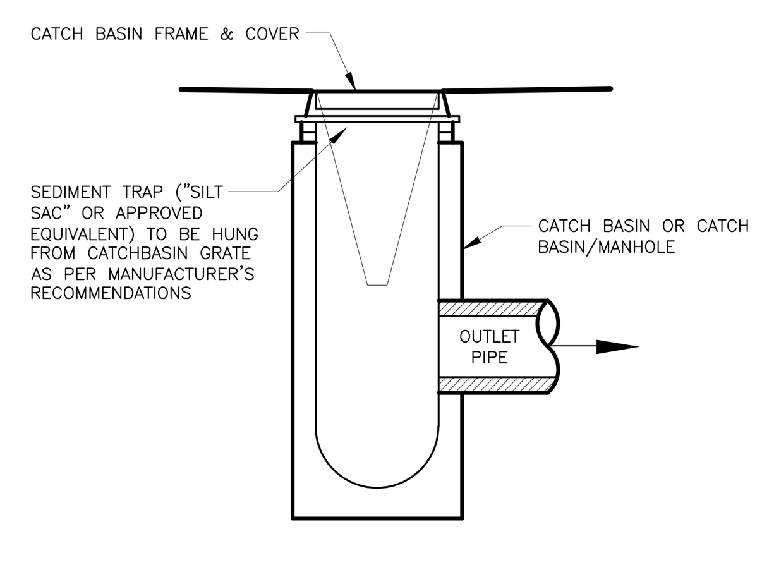
XXX.XX	EXISTING GRADE	APP	APPROACH
(XXX.XX)	PROPOSED GRADE	APPROX.	APPROXIMATE
EX(XXX.XX)	PROPOSED GRADE = EXISTING GRADE	AD	AREA DRAIN
FFE=(XXX.XX)	PROPOSED FINISHED FLOOR ELEVATION	BOL	BOLLARD
(XXX.XX)SW	PROPOSED SWALE ELEVATION	BLDG	BUILDING
T/G=(XXX.XX)	PROPOSED TOP OF GRATE ELEVATION	CB	CATCH BASIN
		CONC	CONCRETE
▲	ENTRANCE	CCRB	CONCRETE CURB
	PROPOSED SHEET FLOW DIRECTION	CRW	CONCRETE RETAINING WALL
	EXISTING SHEET FLOW DIRECTION	DC	DROP CURB
		DN	DOWN
	DIRECTION OF OVERLAND DRAINAGE	EX.	EXISTING
		HP	HYDRO POLE
	PROPOSED HEAVY DUTY SILT FENCE AS PER OPSD 219.130	LA	LANDSCAPING
		MH	MANHOLE
	PROPOSED SILT SAC AS PER **DETAIL 2/C1-1**	ORM	ORNAMENTAL FENCE
		PIL	PILLAR
		PROP.	PROPOSED
		TYP.	TYPICAL

PRIOR TO CONSTRUCTION

NOTE: a) CONTRACTOR TO INSTALL SILT SAC'S ON ALL EX. CB'S WHERE SHOWN. SILT SAC'S ON PROPOSED INFRASTRUCTURE TO BE INSTALLED IMMEDIATELY WITH INSTALLATION OF FRAME AND GRATE.

b) SILT SAC'S SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD AND EMPTIED FOLLOWING EVERY RAINFALL EVENT, IF REQ'D.

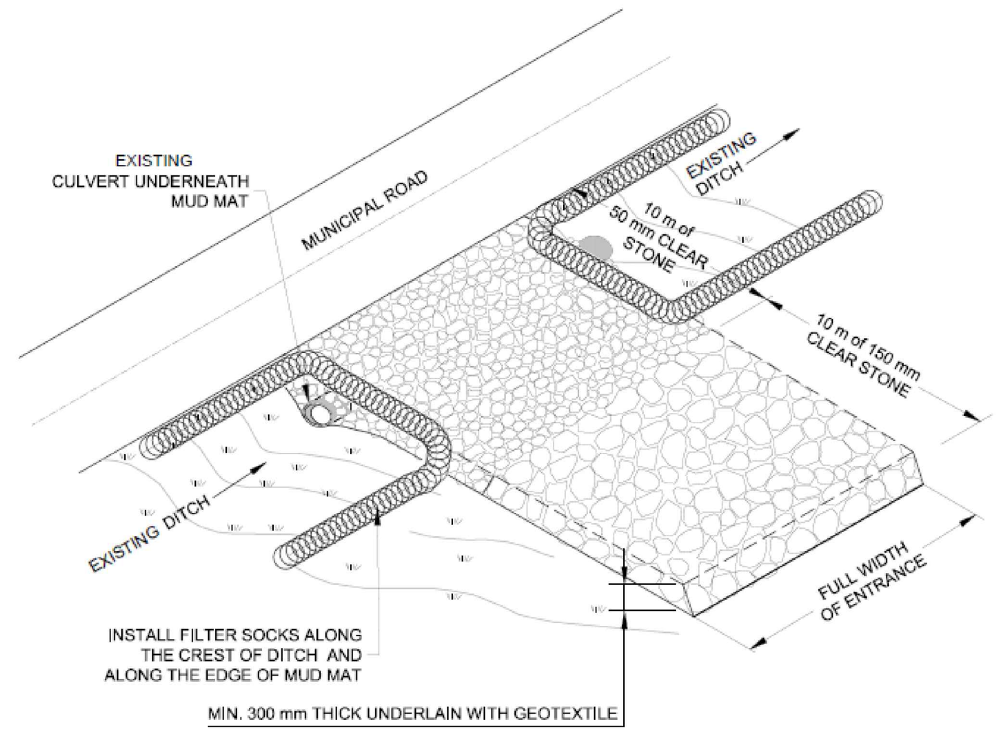
c) CONTRACTOR SHALL REMOVE SILT SAC'S FOLLOWING PLACEMENT OF BASE ASPHALT ONLY.



2 / C1-1 **Silt Sac Sediment Control Detail** N.T.S.

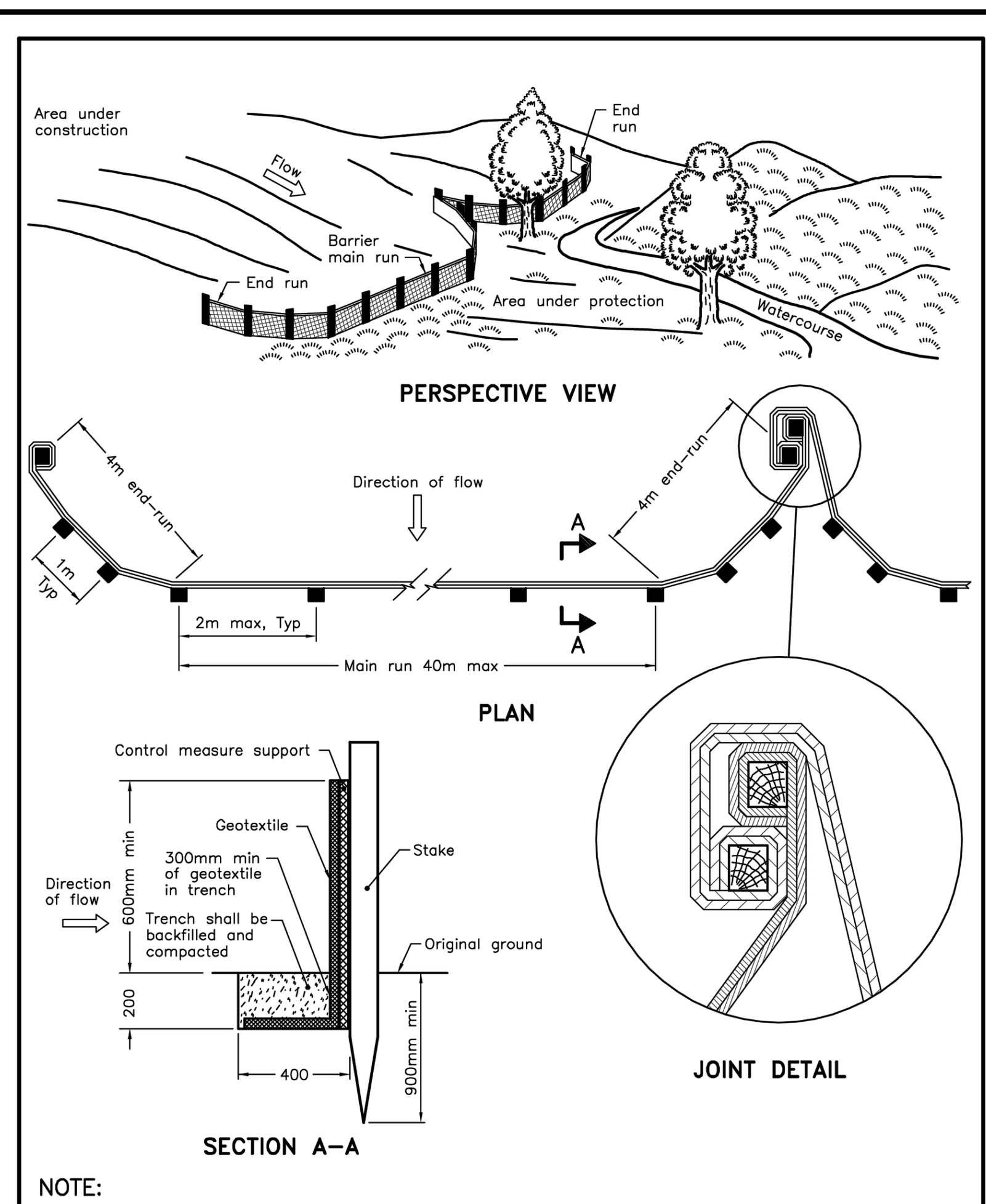
MUD MAT DETAIL NOTES:

1. MUD MAT TO BE UNDERLAIN WITH A GEOTEXTILE CLOTH
2. SEDIMENT WILL BE CLEANED FROM PUBLIC RIGHT OF WAYS AS REQUIRED
3. STORM INLETS IN CLOSE VICINITY TO MUD MAT TO BE PROTECTED WITH INLET CONTROL MEASURES



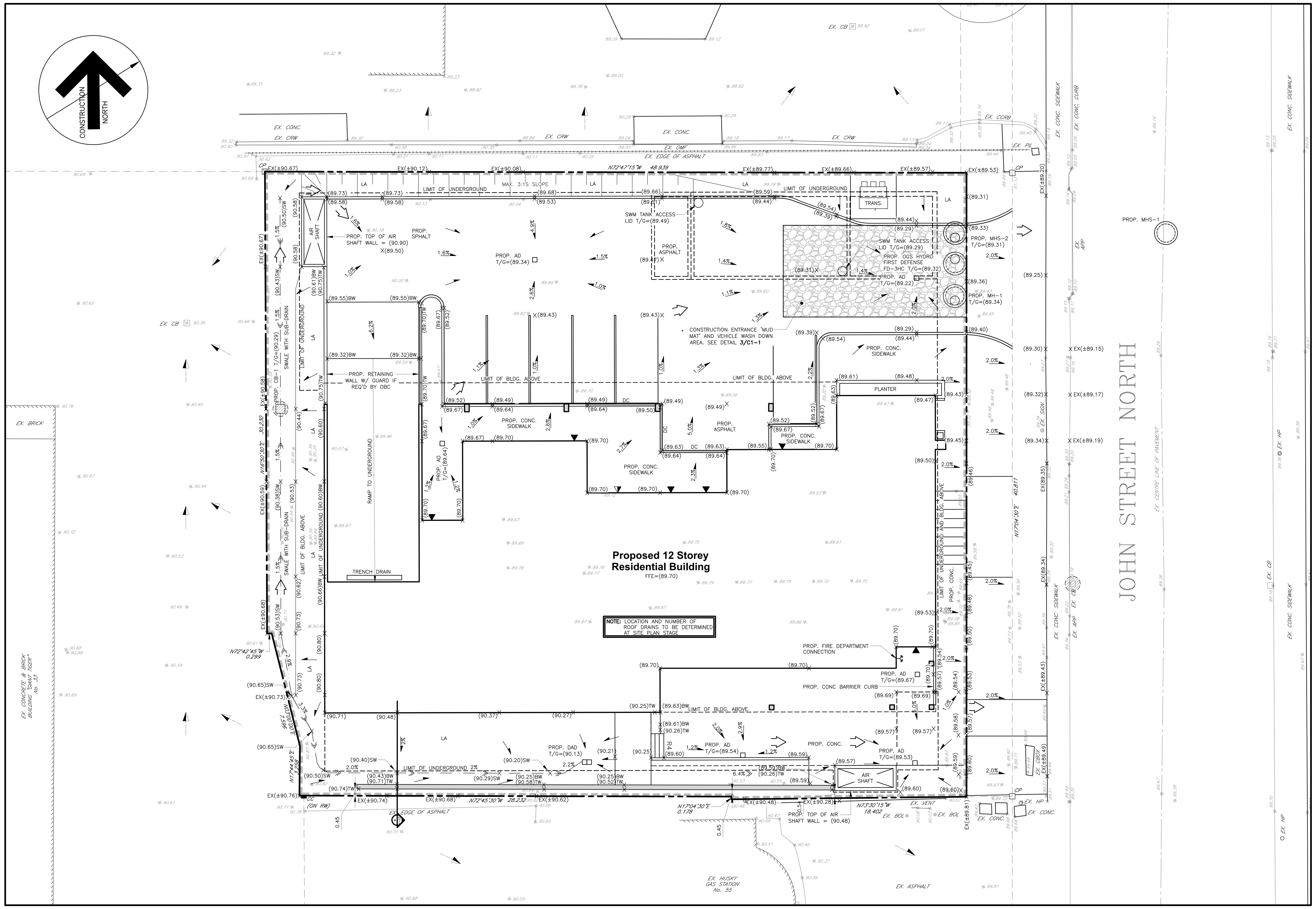
NOTE: THIS DETAIL REPRESENTS AN IDEAL SCENARIO. SITE CONDITIONS VARY AND EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE TAILORED FOR EACH SITE AND PROJECT

3 / C1-1 **Mud Mat Tracking Control Detail** N.T.S.



NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
HEAVY-DUTY SILT FENCE BARRIER	OPSD 219.130	



1 / C1-1 **Grading, Erosion and Sediment Control Plan**

SCALE BAR 1:150 — 1 : 150

GENERAL GRADING NOTES

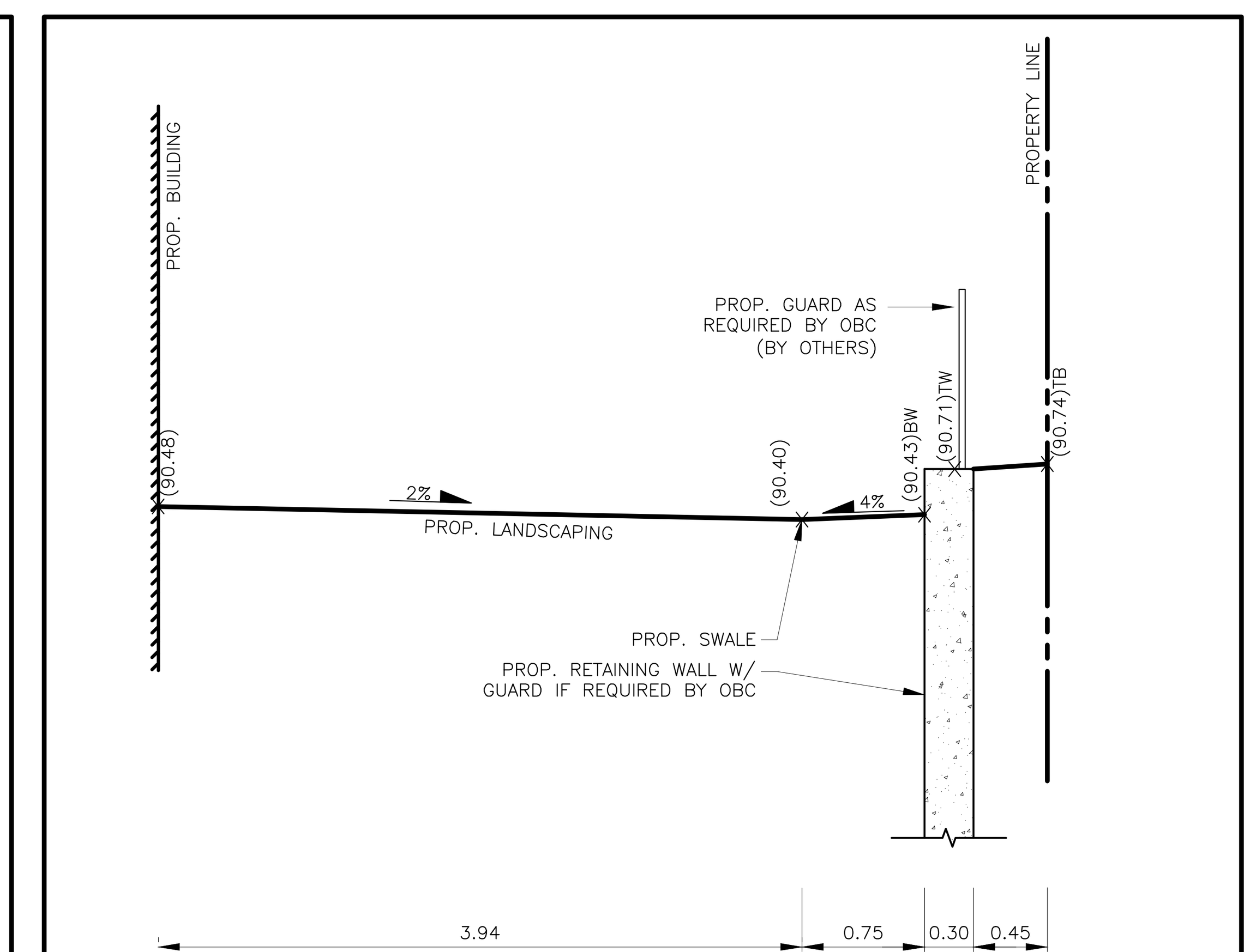
1. ALONG ADJOINING PROPERTIES GRADE TO MEET EXISTING OR PROPOSED ELEVATIONS WITH SODDED SLOPES (MIN. 3H TO 1V) AND/OR RETAINING WALLS AS SPECIFIED
2. ALL RETAINING WALLS, WALKWAYS, CURBS, ETC., SHALL BE PLACED A MIN. OF 0.45m OFF THE PROPERTY LINE. ALL WALLS 1.0m OR HIGHER SHALL BE DESIGNED BY A P.ENG.
3. SHOULD A RETAINING WALL BE REQUIRED, THE TOP OF WALL ELEVATIONS SHALL BE SET 150mm ABOVE THE PROPOSED SIDE YARD SWALES
4. RETAINING WALLS 0.6m IN HEIGHT OR GREATER REQUIRE CONSTRUCTION OF A FENCE OR GUARD RAIL AT THE TOP OF THE REAR OF THE WALL. GUARDS FOR RETAINING WALLS SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF EXTERIOR GUARDS AS CONTAINED IN THE ONTARIO BUILDING CODE
5. SLOPES OF SWALES FOR BOTH "BACK TO FRONT" AND "SPLIT" DRAINAGE SHALL BE NO LESS THAN 2.0% GRADE AND NO GREATER THAN 33% GRADE (3:1 SLOPES)
6. WHEN MATCHING TO EXISTING PROPERTIES WHERE A 2.0% GRADE CANNOT BE ACHIEVED, A 1.5% GRADE IS PERMITTED PROVIDED A 150mm SUB-DRAIN IS INSTALLED BELOW THE BOTTOM OF THE SWALE AND DRAINED TO A SUITABLE OUTLET, (WITH A MINIMUM 0.3m COVER OVER THE SUB-DRAIN), OR OTHER MITIGATION MEASURES
7. MINIMUM GRADE FOR A WRAP-AROUND SWALE IN THE BACKYARD SHALL BE 1.0%
8. UNLESS OTHERWISE NOTED, THE GROUND BETWEEN PROPOSED ELEVATIONS ON SIDE LOTS SHALL BE GRADED AS A STRAIGHT LINE
9. TOP OF FOUNDATION WALLS FOR BUILDINGS SHALL BE 150mm (MIN) ABOVE FINISHED GRADE
10. DRIVEWAY SLOPES SHALL NOT BE LESS THAN 2% AND NOT MORE THAN 7.0%. REVERSED SLOPED DRIVEWAYS IN NEW DEVELOPMENTS ARE NOT PERMITTED
11. GARAGE FLOOR ELEV. TO BE SET MINIMUM 0.3m HIGHER THAN BACK OF WALK, UNLESS OTHERWISE SPECIFIED
12. ALL FILL PLACED ON LOTS SHALL BE COMPACTED TO A MINIMUM 95% SPD (UNLESS OTHERWISE RECOMMENDED BY THE GEOTECHNICAL ENGINEER). ALL MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING 300mm LIFTS
13. FOR DELINEATION OF TREE PROTECTION ZONES, BUFFERS, REMOVALS AND PROTECTION SCHEMATICS, ETC., REFER TO TREE PROTECTION PLAN
14. LOT GRADING FOR ALL LOTS IN THE SUBDIVISION SHALL CONFORM STRICTLY WITH THIS PLAN. ANY CHANGES, UNLESS APPROVED PRIOR TO CONSTRUCTION BY THE CITY, SHALL RESULT IN NON ACCEPTANCE OF THE SUBDIVISION BY THE CITY
15. IF GRADING IS REQUIRED ON LANDS ADJACENT TO THE DEVELOPMENT WHICH ARE NOT OWNED BY THE DEVELOPER, THEN THE DEVELOPER MUST OBTAIN WRITTEN PERMISSION FROM THE ADJACENT PROPERTY OWNER TO ALLOW THE DEVELOPER TO GRADE ON THE ADJACENT LANDS, OTHERWISE RETAINING WALLS MUST BE USED
16. THE WRITTEN PERMISSION REQUIRED FROM THE ADJACENT LANDOWNER SHALL BE OBTAINED PRIOR TO ENTERING THE LANDS. SHOULD PERMISSION NOT BE OBTAINED OR IS WITHDRAWN PRIOR TO COMMENCING THE WORK, THEN THE DEVELOPER SHALL LIMIT HIS ACTIVITIES TO THE LIMITS OF THE DEVELOPMENT SITE
17. DRIVEWAY AND DRIVEWAY APPROACHES SHALL BE LOCATED SUCH THAT HYDRO VAULTS AND OTHER STREET FURNITURE ARE A MIN. OF 1.2m FROM THE PROJECTIONS OF THE OUTSIDE GARAGE WALLS

BEFORE STARTING WORK

1. THE CONTRACTOR SHALL NOTIFY THE CITY OF HAMILTON AND LANHACK CONSULTANTS INC. AT LEAST 48 HOURS PRIOR TO COMMENCING CONSTRUCTION.
2. THE POSITION OF THE POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.
3. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, ALL BENCHMARKS, ELEVATIONS, DIMENSIONS, AND GRADES MUST BE CHECKED BY THE CONTRACTOR AND ANY DISCREPANCIES REPORTED TO THE ENGINEER.
4. ALL EXISTING UNDERGROUND UTILITIES WITHIN THE LIMITS OF CONSTRUCTION SHALL BE LOCATED, MARKED AND PROTECTED. ANY UTILITIES DAMAGED OR DISTURBED DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE ENGINEER, AT THE CONTRACTOR'S EXPENSE.
5. AT LEAST TWO DIFFERENT BENCHMARKS MUST BE REFERRED TO AT ALL TIMES.

SILTATION AND EROSION CONTROL NOTES

1. SILTATION CONTROL BARRIERS SHALL BE PLACED AS DETAILED.
2. SILTATION AND EROSION CONTROL DEVICES SHALL BE INSTALLED PRIOR TO WORKS COMMENCING ON THE SITE AND SHALL BE MAINTAINED FOR THE DURATION OF CONSTRUCTION AND UNTIL GROUND COVER IS ESTABLISHED AND THE SITE IS FULLY DEVELOPED.
3. EROSION AND SEDIMENT CONTROLS MUST BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY RAIN FALL EVENT, AND MUST BE MAINTAINED AND REPAIRED IN A TIMELY MANNER TO PREVENT SEDIMENT FROM LEAVING THE SITE.
4. EXISTING AND PROPOSED CATCHBASINS ARE TO BE PROTECTED WITH A SILTSAC FOR THE DURATION OF CONSTRUCTION.
5. IT IS REQUIRED TO STABILIZE ALL AREAS THAT WILL REMAIN DISTURBED FOR MORE THAN 30 DAYS.
6. SILT FENCE AND CATCHBASIN PROTECTION ARE NOT TO BE REMOVED UNTIL COMPLETION OF CONSTRUCTION.
7. THE SILTATION AND EROSION CONTROL MEASURES ILLUSTRATED ON THIS PLAN ARE CONSIDERED TO BE THE MINIMUM REQUIREMENT. CONDITIONS MAY REQUIRE ADDITIONAL MEASURES WHICH WILL BE IDENTIFIED BY THE ENGINEER DURING CONSTRUCTION.
8. ALL EROSION AND SILTATION CONTROL DEVICES SHOULD BE AS PER THE "GREATER GOLDEN HORSESHOE AREA CONSERVATION AUTHORITIES" AND "EROSION AND SEDIMENT CONTROL GUIDELINE FOR URBAN CONSTRUCTION".
9. THE OWNER IS RESPONSIBLE FOR THE REMOVAL OF ALL MUD AND DEBRIS THAT ARE TRACKED ONTO THE ROADWAYS FROM VEHICLES ENTERING AND LEAVING THE CONSTRUCTION SITE. THE OWNER SHALL, UPON VERBAL AND/OR REQUEST BY THE CITY, IMMEDIATELY PROCEED WITH THE CLEANUP OPERATION AT THEIR EXPENSE. SHOULD THE OWNER FAIL TO MAINTAIN THE ROAD AS DIRECTED, THE CITY WILL HAVE THE CLEANING CARRIED OUT, AND DRAW ON THE SECURITY FOR COSTS AND/OR LAY CHARGES.
10. ADDITIONAL SILT CONTROL LOCATIONS MAY BE REQUIRED AS DETERMINED BY THE CITY OF HAMILTON.



4 / C1-1 **Typical Section** 1:50

Contractor must verify all dimensions on the Project Site and report any discrepancies before proceeding with the Work.

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SOURCE
– EXISTING BOUNDARY SURVEY AND TOPOGRAPHICAL INFORMATION OBTAINED FROM A.T. MCLAREN LTD., DWG NO –36814, DATED – DEC 23, 2021

THE POSITION OF THE POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

Revision Record

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B	RE-ISSUED FOR ZBA/OPA	02/14/24
A	ISSUED FOR ZBA/OPA	12/02/22
No.	Description	Date (m/d/y)

Issue Record

J. D. LAMARRE — LICENSED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO — November 2024

NOT FOR CONSTRUCTION

LANHACK Consultants Inc.
Consulting Engineers
1709 Upper James Street
Hamilton, ON L9B 1K7
Tel: (905) 777-1454
Fax: (905) 336-8142

Proposed 12 Storey Residential Building

175 JOHN STREET NORTH
HAMILTON, ON

Date:	NOVEMBER 2024
Drawn By:	GRW
Chkd By:	SMP
Scale:	AS NOTED

Preliminary Grading, Erosion and Sediment Control Plan

Project No.:	Drawing No.:	Rev.:
22080	C1-1	C

Plot Date: 11/19/24
M:\2022\22080 – 175 John St. N., Pane Del Sole\Civil\22080_C01 – Grading and Servicing Plan.dwg

LEGEND

—— ST ——	EXISTING STORM SEWER
→— ST —→	PROPOSED STORM SEWER W/ FLOW ARROW
—— S ——	EXISTING SANITARY SEWER
→— S —→	PROPOSED SANITARY SEWER W/ FLOW ARROW
—— W ——	EXISTING WATERMAIN
—— W ——	PROPOSED WATERMAIN
Ⓜ	WATER METER
Ⓑ	BACK FLOW PREVENTER
▲	ENTRANCE
SAN.	SANITARY
STM.	STORM
SWM	STORM WATER MANAGEMENT

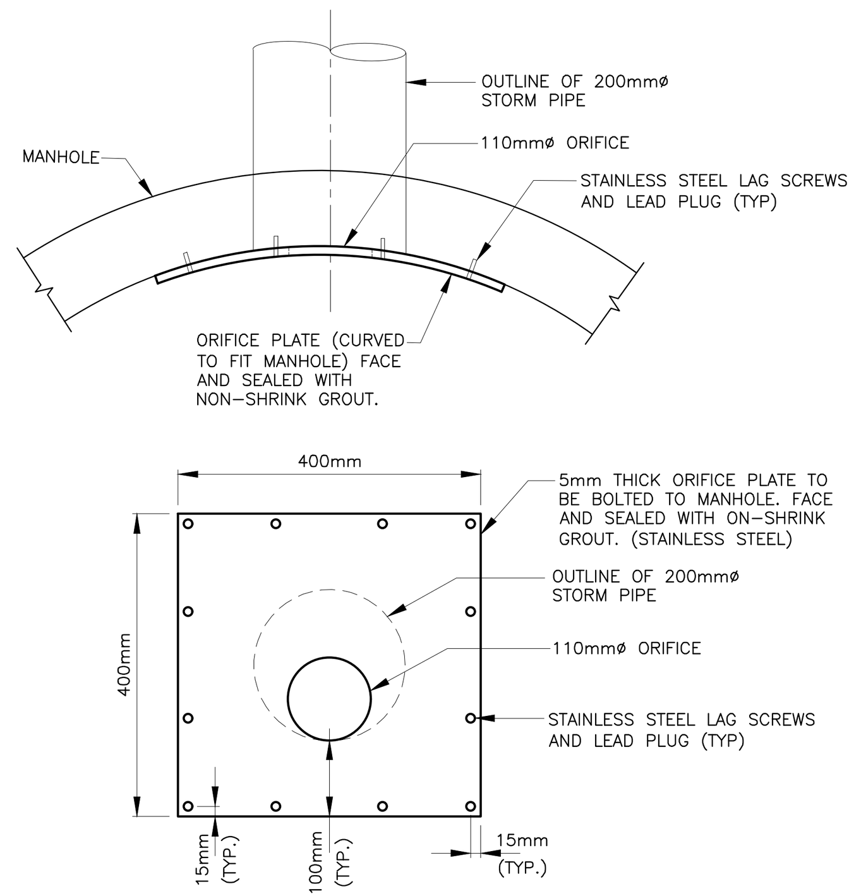
APP	APPROACH
APPROX.	APPROXIMATE
AD	AREA DRAIN
BOL	BOLLARD
BLDG	BUILDING
CB	CATCH BASIN
CONC	CONCRETE
CCRB	CONCRETE CURB
CRW	CONCRETE RETAINING WALL
DC	DROP CURB
DN	DOWN
EX.	EXISTING
HP	HYDRO POLE
LA	LANDSCAPING
MH	MANHOLE
ORM	ORNAMENTAL FENCE
PIL	PILLAR
PROP.	PROPOSED
TYP.	TYPICAL

STORM STRUCTURES

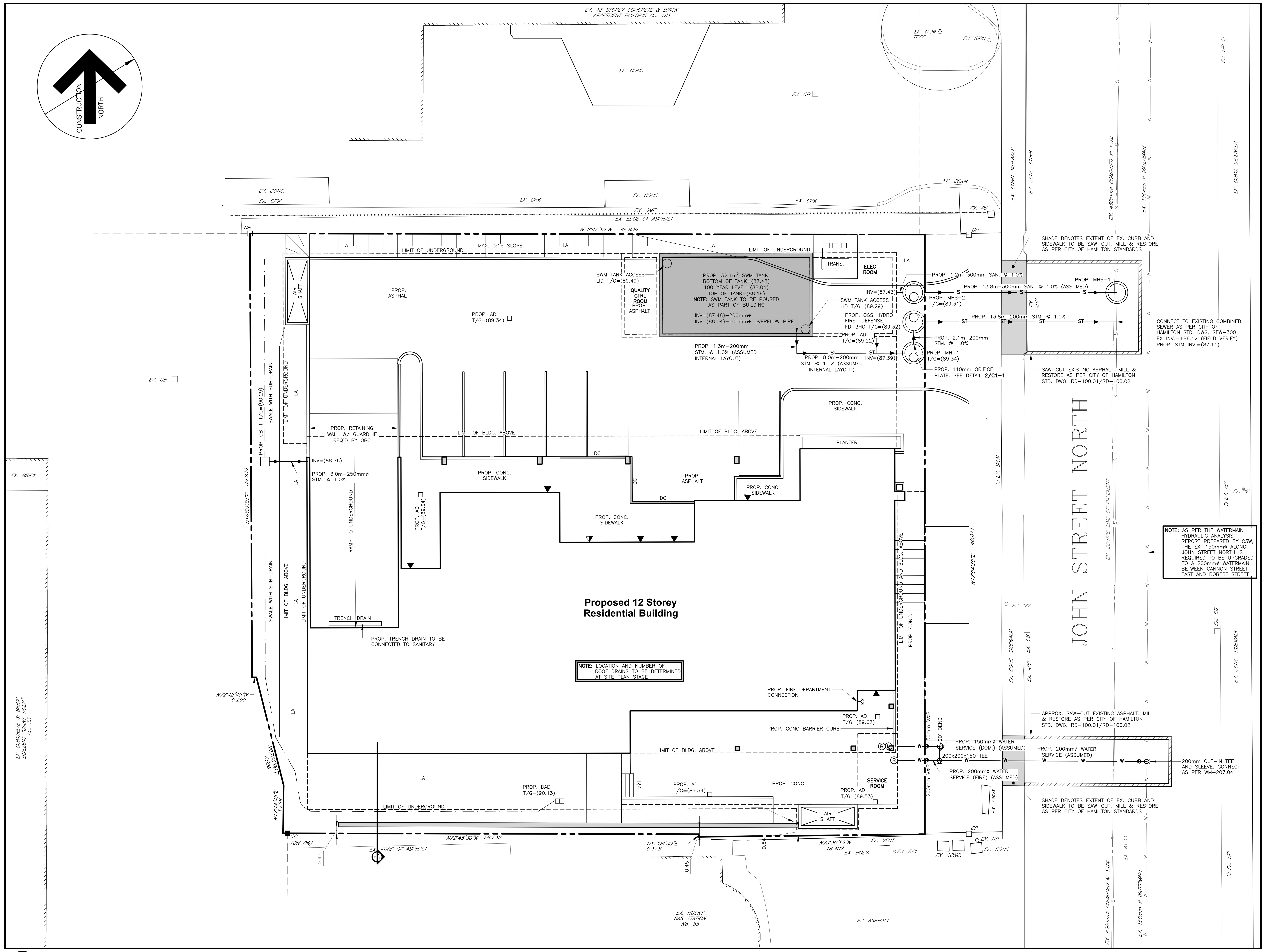
NAME	STANDARD OPSD	T/G	INVERTS				COMMENTS
			North	South	East	West	
FD-3HC	-	89.32	-	87.30	87.25	-	HYDRO FIRST DEFENSE OGS
MH-1	701.010	89.34	87.32	-	-	87.38	
CB-1	705.010	90.29	-	-	88.79	-	

SANITARY STRUCTURES

NAME	STANDARD OPSD	T/G	INVERTS				COMMENTS
			North	South	East	West	
MHS-1	701.010	MATCH	±86.14	±86.14	-	87.25	FIELD VERIFY EX. SAN. INVERT
MHS-2	701.010	89.31	-	-	87.39	87.42	



2 / C2-1 Orifice Plate Detail 1 : 10



1 / C2-1 Site Servicing Plan 1 : 150

SCALE BAR 1:150 — 0, 6, 12, 18, 24, 30

GENERAL SERVICING NOTES:

1. ALL SERVICES TO BE INSTALLED AS PER CITY OF HAMILTON CONSTRUCTION AND MATERIAL SPECIFICATIONS MANUAL (LATEST EDITION) AND MINISTRY OF THE ENVIRONMENT GUIDELINES (LATEST EDITION).
2. MINIMUM HORIZONTAL SEPARATION BETWEEN WATER SERVICES AND SEWERS SHALL BE 2.5m MEASURED FROM THE CLOSEST PIPE EDGE TO CLOSEST PIPE EDGE. VERTICAL SEPARATION BETWEEN WATERMAINS AND SEWERS WHICH CROSS MUST BE 0.5m BETWEEN THE OUTSIDE OF THE WATERMAIN AND THE OUTSIDE OF THE SEWER, WITH THE LENGTH OF THE WATER PIPE BEING CENTRED AT THE POINT OF CROSSING SUCH THAT JOINTS IN THE WATERMAIN WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER, CROSSING PERPENDICULAR IF POSSIBLE.
3. ALL WATER SERVICES TO BE INSTALLED WITH A MINIMUM OF 1.6m COVER. SEWERS TO BE INSTALLED WITH A MINIMUM COVER OF 2.20m AT THE PROPERTY LINE BELOW THE FINAL ROAD GRADE OR AT SUCH HIGHER ELEVATION ONLY AS MAY BE NECESSITATED BY THE LEVEL OF THE MAIN SEWER. ON PRIVATE PROPERTY THE MINIMUM COVER IS TO BE NO LESS THAN 1.2m.
4. RESTORATION OF ROAD OVER UTILITY CUTS IN HAMILTON TO BE AS PER STANDARD DRAWINGS RD–100.01 AND RD–100.02, WITH GRANULAR "A" BEDDING.
5. APPROVAL OF THIS DRAWING IS FOR MATERIAL ACCEPTABILITY AND COMPLIANCE WITH MUNICIPAL AND PROVINCIAL SPECIFICATIONS AND STANDARDS ONLY. APPROVAL AND INSPECTION BY THE CITY OF THE WORKS DOES NOT CERTIFY THE LINE AND GRADE OF THE WORKS AND IT IS THE OWNER'S RESPONSIBILITY TO HAVE THEIR ENGINEER CERTIFY THIS ACCORDINGLY.
6. ALL PROPOSED SERVICE ARE TO PASS BELOW EX. WATERMAINS, BY A MIN. OF 250mm, BASED ON THE TOP OF THE EX. WATERMAIN BEING 1.6m BELOW THE CENTERLINE OF ROAD.
7. ALL BUILDING SERVICE SIZES ARE TO BE CONFIRMED BY THE MECHANICAL ENGINEER AT BUILDING DESIGN PHASE.

BEFORE STARTING WORK

1. THE CONTRACTOR SHALL NOTIFY THE CITY OF HAMILTON AND LANHACK CONSULTANTS INC. AT LEAST 48 HOURS PRIOR TO COMMENCING CONSTRUCTION.
2. THE POSITION OF THE POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.
3. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, ALL BENCHMARKS, ELEVATIONS, DIMENSIONS, AND GRADES MUST BE CHECKED BY THE CONTRACTOR AND ANY DISCREPANCIES REPORTED TO THE ENGINEER.
4. ALL EXISTING UNDERGROUND UTILITIES WITHIN THE LIMITS OF CONSTRUCTION SHALL BE LOCATED, MARKED AND PROTECTED. ANY UTILITIES DAMAGED OR DISTURBED DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE ENGINEER, AT THE CONTRACTOR'S EXPENSE.
5. AT LEAST TWO DIFFERENT BENCHMARKS MUST BE REFERRED TO AT ALL TIMES.

SANITARY AND STORM SEWERS

1. CONSTRUCTION OF SANITARY & STORM SEWERS & PRIVATE DRAINS SHALL BE IN ACCORDANCE WITH CITY STANDARDS & SPECIFICATIONS (LATEST EDITION) AND MINISTRY OF ENVIRONMENT (MOE) GUIDELINES (LATEST EDITION).
2. COVER AND BEDDING MATERIAL FOR CONCRETE PIPE SHALL BE GRANULAR 'A' MATERIAL AS PER OPSD 802.030 OR 802.033, CLASS 'B' BEDDING.
3. COVER AND BEDDING MATERIAL FOR PVC PIPE SHALL BE GRANULAR 'A' MATERIAL AS PER OPSD 802.010 OR 802.013.
4. PVC PIPE WILL REQUIRE SPECIAL CONSTRUCTION PROCEDURES AS PER CITY SPECIFICATIONS.
5. ALL SEWERS TO BE FLUSHED PRIOR TO VIDEO INSPECTION.
6. MANHOLE FRAMES AND COVERS SHALL BE AS PER OPSD 401.010 (STORM–OPEN, SANITARY–CLOSED).
7. SANITARY SEWER (200mm TO 375mm DIA) SHALL BE PVC PIPE, CSA B182.2. SDR–35.
8. STORM SEWER (300mm TO 600mm DIA.) SHALL BE PVC PIPE, CSA B182.2, SDR–35.
9. STORM SEWER > 600mm DIA. SHALL BE CONCRETE PIPE, CSA A257.2 (AS SPECIFIED)
10. PVC (SANITARY AND STORM) SEWERS ARE TO BE TESTED FOR DEFLECTION (MANDREL PASSAGE) AFTER INSTALLATION. SANITARY SEWERS SHALL ALSO BE TESTED FOR LEAKAGE (LOW AIR PRESSURE). PRIOR TO ASSUMPTION BY THE CITY, PIPE DEFLECTION TESTING SHALL BE REPEATED.
11. ALTERNATE MATERIALS MAY BE ACCEPTABLE PROVIDED APPROVAL HAS FIRST BEEN OBTAINED FROM THE CITY/ENGINEER.

CATCH BASINS

1. CATCH BASIN CONNECTIONS TO BE 250mm DIA. PVC PIPE CSA B182.2, SDR–35 UNLESS OTHERWISE NOTED.
2. SINGLE/DOUBLE STREET CATCH BASINS AS PER OPSD 705.010/705.020 RESPECTIVELY WITH GOSS TRAPS AS PER SEW–304.
3. PRIVATE REAR YARD CATCH BASINS AS PER OPSD 705.010 (NO GOSS TRAPS).
4. STREET CB GRATES AS PER OPSD 400.020 (FLAT) AND REAR YARD CB GRATES TO BE BEEHIVE TYPE GRATE AND COVER.

WATERMAINS:

1. CONSTRUCTION OF WATERMAINS & PRIVATE SERVICES SHALL BE IN ACCORDANCE WITH CITY STANDARDS & SPECIFICATIONS (LATEST EDITION) AND MINISTRY OF ENVIRONMENT (MOE) GUIDELINES (LATEST EDITION).
2. PVC PIPE IN SIZES 100mm THROUGH 300mm SHALL BE CLASS 150 DR18 CONFORMING TO AWWA C900. FOR 400mm, SEE SECTION 7: SPECIAL NOTES.
3. TRACER WIRE SHALL BE INSTALLED WITH PVC PIPE IN ACCORDANCE WITH FORM 400. IT SHALL BE 12 GAUGE TW75, TWU75 OR RW90XLPE COATED COPPER AND SHALL BE POSITIONED ALONG THE TOP OF THE PIPE AND FASTENED AT 6 METRE INTERVALS. THE WIRE IS TO BE INSTALLED BETWEEN EACH VALVE AND/OR THE END OF THE NEW PVC WATERMAIN. JOINTS IN THE WIRE BETWEEN VALVES ARE NOT PERMITTED. AT EACH GATE VALVE A LOOP WIRE IS TO BE BROUGHT UP INSIDE THE VALVE BOX TO THE CAP. THE TRACER WIRE SHALL BE BROUGHT TO THE SURFACE AT THE SECONDARY VALVE ON ALL FIRE HYDRANTS. THE TRACER WIRE SHALL ALSO BE CONNECTED TO THE CATHODIC PROTECTION SYSTEM AS REQUIRED.
4. MOLDED PVC FITTINGS FOR PIPE SIZES 100mm TO 300mm SHALL CONFORM TO AWWA C900 AND CERTIFIED TO CSA B137.2.
5. FABRICATED FITTINGS 250mm AND 300mm SHALL BE MANUFACTURED FROM SEGMENTS OF AWWA C900, CLASS 150 (DR18) PVC PIPE, BONDED TOGETHER AND OVER–WRAPPED WITH FIBREGLASS–REINFORCED POLYESTER TO MEET THE REQUIREMENTS OF CSA B137.3.
6. WHERE METAL FITTINGS ARE TO BE USED ON PVC MAINS SUFFICIENT CATHODIC PROTECTION MUST BE PROVIDED AS PER THE FOLLOWING REQUIREMENTS:
   a) MINIMUM OF ONE 11KG ZINC ANODE SHALL BE INSTALLED FOR EVERY 1000m OF TRACER WIRE;
   b) ONE 11KG ZINC ANODE SHALL BE INSTALLED FOR EACH COPPER WATER SERVICE CONNECTION;
   c) ONE 11KG ZINC ANODE SHALL BE INSTALLED ON EVERY VALVE, HYDRANT, BEND, TEE, SLEEVE, REDUCER, PLUG, CAP, JOINT RESTRAINT, COUPLING, ETC., CONNECTED TO THE PVC PIPE.
7. BEDDING AND BACKFILL AS PER WM–200.01 AND WM–200.02 GRANULAR 'A' MATERIAL FOR MAINS AND SERVICES GREATER THAN 50mm.
8. WATERMAIN DEFLECTION FOR PVC PIPE:
   a) MAXIMUM ALLOWABLE DEFLECTION OF 1.5 DEGREES PER JOINT UP TO 250mm DIAMETER (160mm PER 6.1m PIPE LENGTH) AND 1.2 DEGREES FOR 300mm DIAMETER (128mm PER 6.1m PIPE LENGTH) SHALL NOT BE EXCEEDED.
   b) ALL JOINTS SHALL BE DEFLECTED AN EQUAL AMOUNT.

ANCHOR BLOCKS

1. FOR 100mm TO 300mm WATERMAINS STANDARD CONCRETE ANCHOR BLOCKS AS PER WM–204.01

FLUSHING, SWABBING AND TESTING

1. ALL NEW WATERMAINS ARE TO BE SWABBED IN ACCORDANCE WITH CITY SPECIFICATIONS.
2. A REDUCED PRESSURE ZONE BACKFLOW PREVENTER (WATTS SERIES 909 OR APPROVED EQUAL) IS REQUIRED ON THE TEMPORARY SUPPLY LINES USED FOR FILLING AND FLUSHING OR SWABBING OF WATERMAINS.
3. UPON COMPLETION OF INSTALLATION, THE CONTRACTOR SHALL PERFORM A PRESSURE TEST ON THE WATERMAINS AS PER FORM 400. WATERMAIN IS TO BE TESTED PRIOR TO CONNECTION TO EXISTING WATERMAINS USING TEMPORARY CAPS OR PLUGS. PIPE CLOSURES, WHERE REQUIRED, ARE TO BE SUPPLIED BY THE CONTRACTOR. THE CONTRACTOR WILL ALSO SUPPLY AND INSTALL ALL ADAPTOR PIECES IN ORDER TO CONNECT TO EXISTING WATERMAINS.

VALVES AND VALVE BOXES

1. ALL VALVE BOXES TO BE SET TO PROPOSED GRADES.
2. 100mm TO 300mm GATE VALVE & VALVE BOXES AS PER WM–202.

ROADWORKS – GENERAL

1. CONSTRUCTION OF ROADWAYS & RELATED WORKS SHALL BE IN ACCORDANCE WITH CITY STANDARDS AND SPECIFICATIONS (LATEST EDITION).
2. FOLLOWING THE INSTALLATION OF SEWERS, ALL ROADWAYS SHALL BE ROUGH GRADED TO SUBGRADE FOR THE INSTALLATION OF WATERMAINS & UTILITIES.

COMPACTION REQUIREMENTS

1. ALL BEDDING AND BACKFILL MATERIAL, ROAD SUB–GRADES AND GENERALLY ALL MATERIAL USED FOR LOT GRADING AND FILL SECTIONS, ETC., SHALL BE COMPACTED TO MIN. 95% SPD (UNLESS OTHERWISE RECOMMENDED BY THE GEOTECHNICAL ENGINEER). ALL MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING 300mm LIFTS.
2. ALL GRANULAR ROAD BASE MATERIALS SHALL BE COMPACTED TO 95% SPD.
3. FOR ALL SEWERS AND WATERMAINS IN FILL SECTIONS, THE COMPACTION SHALL BE CERTIFIED BY A GEOTECHNICAL ENGINEER PRIOR TO LAYING OF PIPE.

KEY PLAN

Contractor must verify all dimensions on the Project Site and report any discrepancies before proceeding with the Work.

This drawing is a part of the Contract Documents and is to be read in conjunction with all other Contract Documents.

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SOURCE
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A	ISSUED FOR ZBA/OPA	12/02/22
No.	Description	Date (m/d/y)

Issue Record

LICENSED PROFESSIONAL ENGINEER J. D. LAMARRE NOVEMBER 2024 PROVINCE OF ONTARIO

NOT FOR CONSTRUCTION

LANHACK Consultants Inc.
Consulting Engineers
1709 Upper James Street
Hamilton, ON L9B 1K7
Tel: (905) 777-1454
Fax: (905) 336-8142

Proposed 12 Storey Residential Building

175 JOHN STREET NORTH
HAMILTON, ON

Date:	NOVEMBER 2024
Drawn By:	GRW
Chkd By:	SMP
Scale:	AS NOTED

Preliminary Site Servicing Plan

Project No.:	Drawing No.:	Rev.:
22080	C2-1	C

Plot Date: 11/19/24
M:\2022\22080 – 175 John St. N., Pane Del Sole\Civil\22080_C01 – Grading and Servicing Plan.dwg

APPENDIX C: 175 John Street Watermain Hydraulic Analysis prepared by CIMA+

Urban Solutions

175 John Street Watermain Hydraulic Analysis

Thursday, December 21, 2023

C3W-221649

CIMA+

101 Frederick St #900, Kitchener, ON
N2H 6R2

T 905 695 1005 **F** 905 695 0525
cima.ca

Contact

Sam Ziemann, P.Eng
Samuel.Ziemann@cima.ca
T 519 404 4529

Engineering for **people**

Urban Solutions

Watermain Hydraulic Analysis

175 John Street

Project no C3W-221649

Prepared by: Alec Orr, EIT

Verified by: Sam Ziemann, P.Eng.

Table of Contents

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1 Introduction

1.1 Background

The proposed development at 175 John Street North is located in Pressure District 2 (PD2) in the City of Hamilton (City). The development area is located on the west side of John Street North, between Cannon Street East and Robert Street. The development includes an 12-storey multiple dwelling building with 126 dwelling units. The development area is currently supplied by a 150 mm cast iron watermain on John Street North. Figure 1-1 illustrates the proposed development area and the nearby watermains, all of which are cast iron. A figure illustrating the watermains in the development area at a wider scale is included in Appendix A.

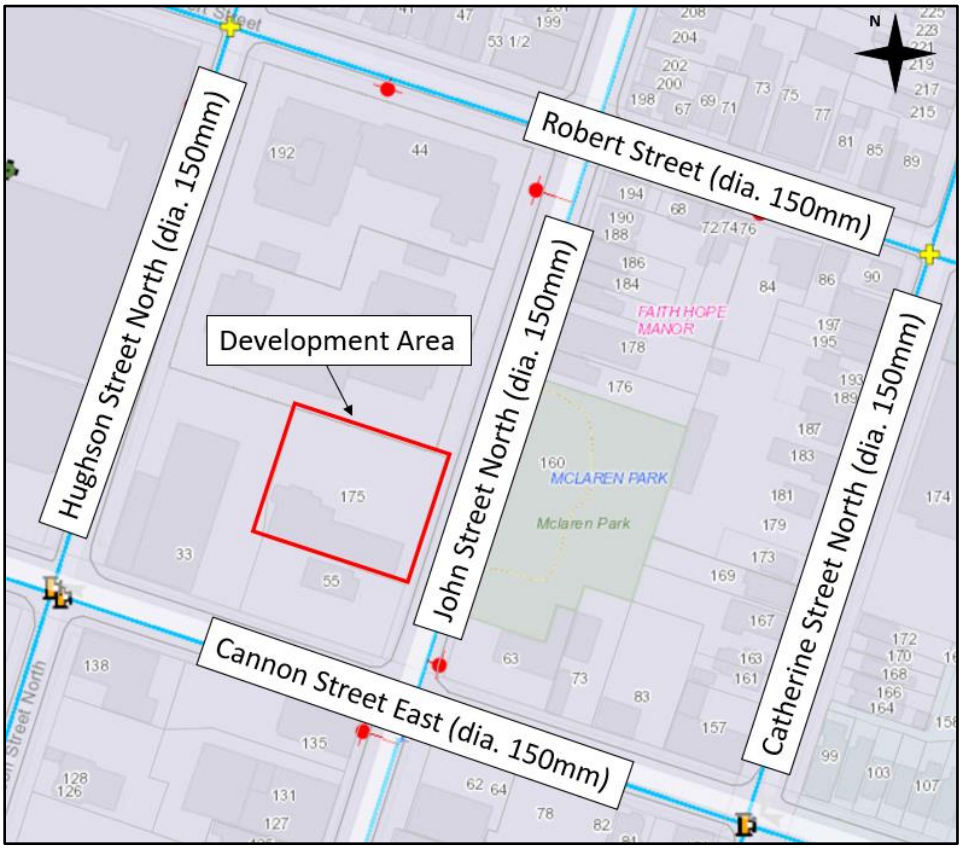


Figure 1-1. Proposed 175 John Street North Development Area (Approximate)

PD2 is supplied by Pressure District 1 through pumping station HD002, which consists of four (4) pumps. PD2 has two (2) storage reservoirs HDR02 and HDR2A that provide balancing storage.

C3 Water Inc (C3W), now CIMA+, has been retained by Urban Solutions to complete a watermain hydraulic analysis for the proposed development. This report provides the watermain hydraulic analysis in accordance with the City of Hamilton's Comprehensive Development Guidelines (2018) (Hamilton Guidelines) and the Ministry of Environment, Conservation and Parks (MECP) Design Guidelines for Drinking-Water Systems (2008) (MECP Guidelines). The hydraulic assessment was completed using the City's full pipe model, titled "Hamilton_EPS_200625_include_PD9_10" using Bentley WaterCAD Connect Edition Update 3 10.03.02.75 software.

1.2 Limitation

This technical memorandum (TM) is intended to provide servicing results for the proposed development based on the City's hydraulic water model. This water model was built and coarsely calibrated by others. As with any modelling assignment, limitations related to the state of the model, the software capabilities, and theoretical data inputs should be considered. The model software also has inherent limitations and assumptions related to the calculation engine and inputs.

2 Criteria

2.1 Pressure Requirements

The MECP Guidelines outline maximum and minimum system pressures for standard operating conditions as well as fire flow conditions. As outlined in the City of Hamilton's Water and Wastewater Masterplan (KMK, 2006), acceptable hydrant and service connection pressures under normal conditions range from 275 kPa to 690 kPa. Standard operating conditions were assessed for the proposed development to ensure that water services maintained acceptable pressure under various demand and fire flow conditions for existing (2021) and future (2031) scenarios. Table 2-1 provides the pressure criteria that were utilized.

Table 2-1. Pressure Requirements

Pressure Requirement	Minimum	Preferred	Maximum
Standard Operating Conditions	275 kPa (40 psi)	350 to 480 kPa (50 to 70 psi)	690 kPa (100 psi)
Maximum Day Demands + Fire Flows	140 kPa (20 psi)		

2.2 Domestic Demand

The maximum daily demand (MDD) for the proposed development was estimated by Lanhack Consultants Inc. (Lanhack) based on a unit count of 93 one (1) bedroom and 33 two (2) bedroom units. The average daily demand (ADD) was calculated to be 1.33 L/s. The maximum daily demand (MDD), and peak hour demand (PHD) were calculated using peaking factors of 1.9 and 3 based on the City of Hamilton's WWWMP. The ADD, MDD and PHD for the development are summarized in Table 2-2.

Table 2-2. Estimated Domestic Demands for the Proposed Development

Development	Demand (L/s)		
	ADD	MDD	PHD
175 John Street North	1.33	2.53	3.99

2.3 Fire Flow Requirements

The fire flow requirements for the proposed development were estimated by Lanhack based on the Ontario Building Code (OBC) and the Hamilton Watermain Fire Flow

Requirement Design Guidelines Policy (PW19096). The City's residential fire flow requirements are summarized in Table 2-3 below. Both methods resulted in a minimum fire flow of 150 L/s. The development is required to meet a minimum fire flow of 150 L/s at a residual pressure of 140 kPa under MDD conditions, as specified in Table 2-1.

Table 2-3. Hamilton Residential Fire Flow Requirements

Development Type	Target Fire Flow (L/s)
Residential Multi (> 3 Units)	**150**
Residential Medium (≤ 3 Units)	125
Residential Single	75
Residential Single (Dead End)	50

3 Hydraulic Water Model

3.1 Boundary Conditions

The proposed development was modelled under the following demand scenarios under both existing (2021) and future (2031) conditions:

- Average Day Demand (ADD)
- Maximum Day Demand (MDD)
- MDD plus Fire Flow
- Peak Hour Demand (PHD)

Table 3-1 summarizes the initial boundary conditions set up in the model for PD2. The pumps at the water treatment plant (WTP) were turned off (reservoir only conditions). All pumps at pump station HD002 were turned off. The tank levels for reservoirs HDR02 and HDR2A were set to 50% full (144.33 m) and 75% full (146.08 m), respectively, as specified by the City.

Table 3-1. Model Boundary Conditions – Base Configuration

Element	Initial Status – HGL	
PD2 Tank Levels	144.33 m (50%)	146.08 m (75%)
Treatment Pumps	**Off**	**Off**
HD002-PMP-1	**Off**	**Off**
HD002-PMP-2	**Off**	**Off**
HD002-PMP-3	**Off**	**Off**
HD002-PMP-4	**Off**	**Off**

3.2 Model Verification

The accuracy of the model in the area of the proposed development was verified using hydrant field test results, completed by SCG Flowmetrix on July 21, 2022. The hydrant field test results are summarized in Table 3-2. Figure 3-1 demonstrates the location of the residual and flow hydrants that were used for verification. Pressures were measured at the residual hydrant (HA17H051). Due to the proximity of the flow hydrant (HA17H038) to an adjacent hydro pole, SCG Flowmetrix was only able to run a one (1) port test.

Table 3-2. Hydrant Field Testing Results – July 21, 2022

Flow (L/s) at Hydrant HA17H038	Pressure (kPa) at Hydrant HA17H051
0	539
51.4	476
Theoretical Flow at 20 psi	
138.9	140

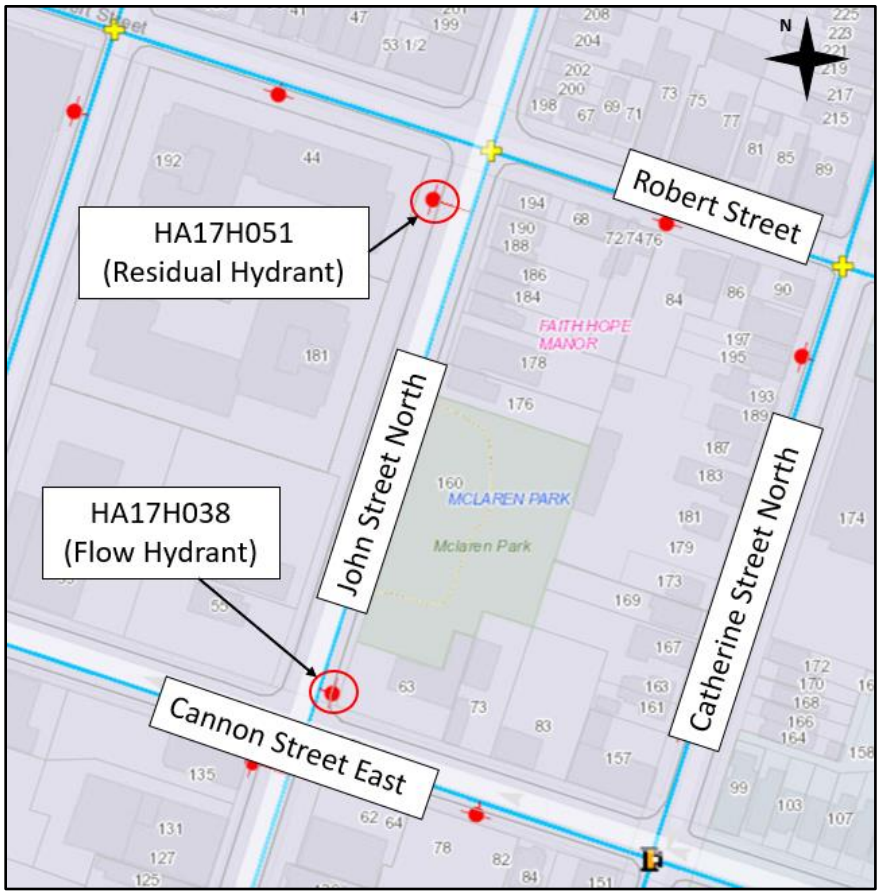


Figure 3-1. Field Testing Hydrant used for Model Verification

PD2 SCADA data was requested from the City to determine the boundary conditions during the field testing. A summary of the boundary conditions used for model verification is provided in Table 3-3. The model was compared to the hydrant test results under 2021 ADD conditions.

Table 3-3. Summary of Boundary Conditions at Time of Hydrant Testing

Element	Hydrant
	HA17H038
Time of Test	1:00 PM
Average Tank HDR02 Level	143.77 m (42%)
Average Tank HDR2A Level	144.38 m (51%)
Treatment Pump 1	**Off**
Treatment Pump 2	On
Treatment Pump 3	On
Treatment Pump 4	**Off**
Treatment Pump 5	On
Treatment Pump 6	**Off**
HD002-PMP-1	**Off**
HD002-PMP-2	**Off**
HD002-PMP-3	**Off**
HD002-PMP-4	On

Figure 3-2 illustrates the field test and model verification results for the hydrant on John St. North (HA17H038). Field results beyond the maximum testing flow are extrapolated.

The static pressure in the model was found to be higher than what was recorded in the field by 19 kPa (2.8 psi). This may be a result of elevation differences between the model node and the pressure recording instrumentation. The focus of the model verification was on the drop in pressure caused by the flow test.

When using the original C-factors in the City's model, the pressure drop caused by the hydrant flow was found to be significantly less than what was recorded in the field. C-factors in the northeast section of PD2, near the development area, were adjusted in the model such that the model results more closely represented the field test results. A majority of the pipes in the northeast section of PD2 are cast iron (CI), ranging from 100mm to 300mm, with C-factors ranging from 80 to 131. The C-factors for the 100mm-200mm CI pipes were reduced to 24 and the C-factors for the 300mm pipes were reduced to 50. A detailed C-factor change log can be found in Appendix C.

The C-factor changes were made to the model to provide a better fit to the field tests. In CIMA+'s opinion the C-factors adjustments required to match the field testing data are lower than expected. There may be other factors limiting the hydraulic capacity of the system such as accuracy of watermain diameters, valve status, and system connectivity.

Additionally, the theoretical fire flow at 138 kPa (20 psi) was extrapolated based on only a 63 kPa (9 psi) difference between the field testing static and residual pressures. Typically, it is recommended that a 25% drop in pressure be required to adequately estimate the pressures at 20 psi, which would require a pressure drop of 131 kPa (19 psi) at hydrant HA17H05 based on the field testing static pressure.

The model was updated to best match the field results within reasonable accuracy, and the adjusted C-factors were used for the remaining analysis.

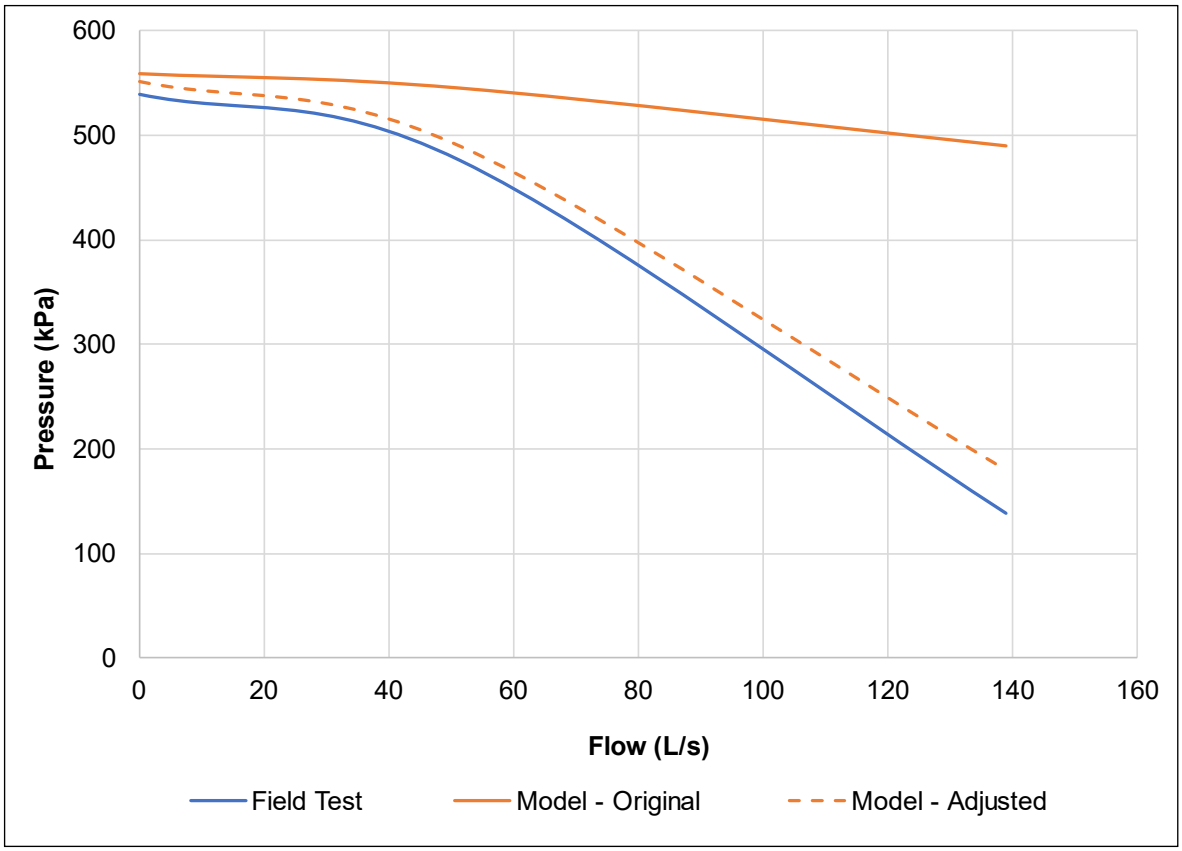


Figure 3-2. Verification Results - Hydrant HA17H038 on John St. North

3.3 Development

Figure 3-3 illustrates the location of the proposed development. The development will be serviced by a service connection on the existing 150 mm watermain on John St. North. Domestic demands for the development were applied to the development node (J-458) shown in Figure 3-3. The elevation of the demand node (89.39 m) was estimated using Hamilton's existing water model and the elevations of the surrounding nodes.

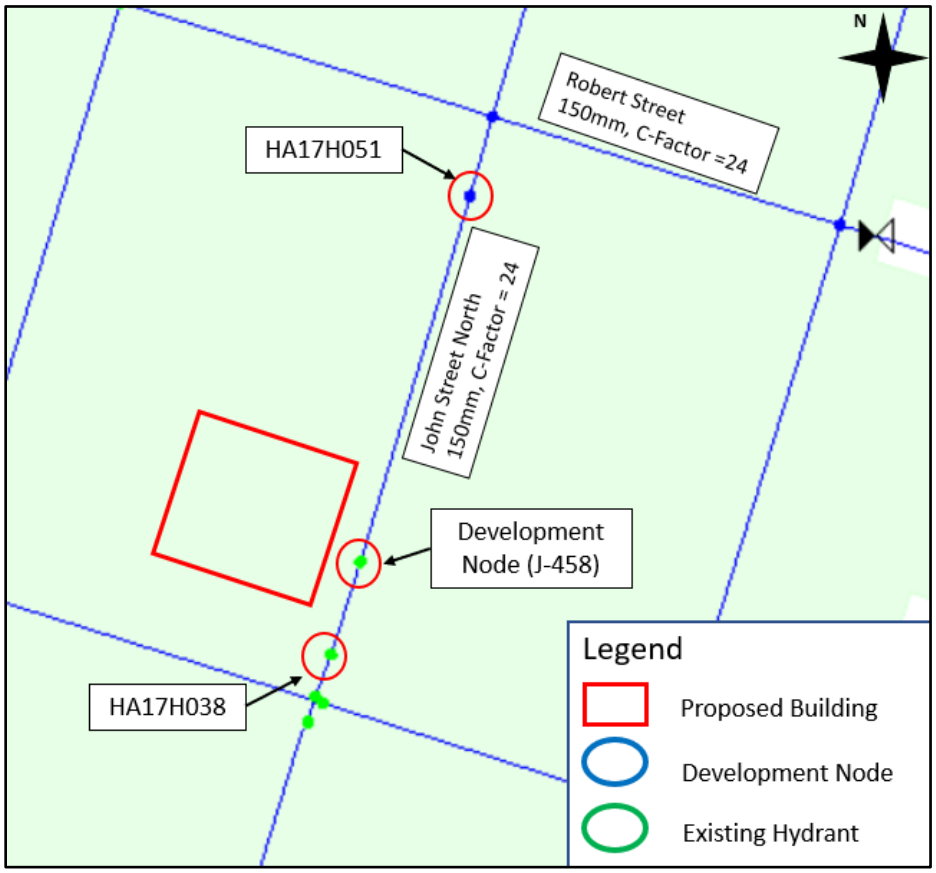


Figure 3-3. Model Layout for the 175 John St. Development

4 Analysis

4.1 Available Fire Flow

The model was used to determine the available fire flow at the development node (J-458) and the existing hydrants shown in Figure 3-3. The model was initially run under MDD 2031 conditions at a residual pressure of 140 kPa, and HDR02 and HDR2A tank levels set at 50%, to determine the worst case available fire flow. The worst-case available fire flow at the development node (J-458) and existing hydrants is summarized in Table 4-1. Under this condition, the fire flow did not meet the minimum available fire flow requirement of 150 L/s. Fire flow analysis for the existing hydrants under pre-development conditions is discussed in section 4.1.1.

The fire flow results in the model are lower than the field testing results due to pressure and flow being measured at different hydrants during the field test. The headlosses in the watermain between the two (2) hydrants is not accounted for in the field test since the pressure is not measured at the flow hydrant. In the model analysis, both the flow and pressure are measured at the same hydrant so the headlosses associated with the low C-factor in the existing 150mm watermain on John St. N are included in the calculation. Due to the low C-factor, there is a high headloss in this section of pipe which results in a low available fire flow.

Table 4-1. Worst Case Available Fire Flow Results (MDD 2031, tanks at 50%)

Node	Fire Flow (L/s)	Meets FF Criteria?
HA17H038	57.6	FALSE
HA17H051	78.1	FALSE
J-458	56.6	FALSE

The model was also run under the MDD 2031 scenario with different PD2 pump configurations and tank levels to observe the change in available fire flow at the development node and existing hydrants. Under these scenarios, the fire flow did not meet the minimum available fire flow requirement of 150 L/s at the development node or the existing hydrants. The results of this analysis are summarized in Table 4-2.

Table 4-2. Fire Flow Results - Different Pumping Scenarios and Tank Levels (MDD 2031)

Scenario	All PD2 Pumps	PD2 Tank Levels	Node	Fire Flow (L/s)	Meets FF Criteria?
1	ON	50%	HA17H038	59.2	FALSE
			HA17H051	80.4	FALSE
			J-458	58.2	FALSE
2	OFF	75%	HA17H038	58.9	FALSE
			HA17H051	80.0	FALSE
			J-458	57.97	FALSE
3	ON	75%	HA17H038	60.4	FALSE
			HA17H051	82.1	FALSE
			J-458	59.5	FALSE

By upgrading the existing 150mm watermain on John St. North, between Cannon St. East and Robert St., to a 200mm watermain (C-factor of 110), the fire flows at the development node (J-458) and the existing hydrants met the minimum available fire flow requirement of 150 L/s. Table 4-3 summarizes the fire flow results for the development node (J-458) and existing hydrants with the watermain upgrades on John St. North. Figure 4-1 summarizes the proposed watermain upgrades required on John St. North to meet the minimum available fire flow. Approximately 190 m of watermain will need to be upgraded. Fire flow results are available in Appendix D.

Table 4-3. Fire Flow Results with Watermain Upgrades on John St. North

Node	2021		2031		Meets FF Criteria?
	Tank Level				
	50%	75%	50%	75%	
HA17H038	175	179	174	179	TRUE
HA17H051	215	220	214	220	TRUE
J-458	204	209	203	208	TRUE

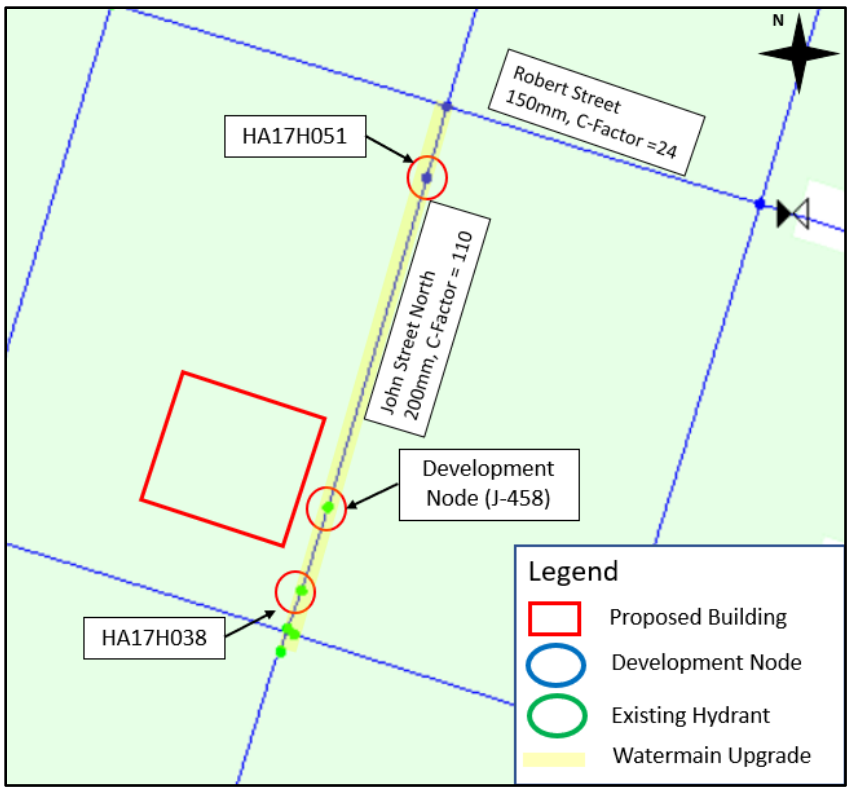


Figure 4-1. Proposed Watermain Upgrades on 175 John St. North

4.1.1 Pre-Development Conditions

Table 4-4 summarizes the fire flow results at the existing hydrants on John St. North under pre-development conditions and the MDD 2021 scenario with the PD2 tank levels set at 50% and 75%. Under pre-development conditions the fire flow did not meet the minimum available fire flow requirement of 150 L/s. The low available fire flows at the existing hydrants could be a result of the low C-factor adjustment required to match the field tests, or due to the hydrants being close to the PD2 boundary. Full fire flow results for the pre-development conditions are available in Appendix D.

Table 4-4. Fire Flow Results under Pre-Development Conditions

Node	2021		Meets FF Criteria?
	Tank Level		
	50%	75%	
HA17H038	58	60	FALSE
HA17H051	80	82	FALSE

4.2 System Pressures

The pressure results for the development node (J-458) are summarized in Table 4-5 and Table 4-6, with PD2 tank levels set to 50% and 75%, respectively, and the PD2 and WTP pumps off. This analysis was completed with the watermain upgrades on John St. North. Under each of the scenarios, the pressures ranged between 508 kPa and 551 kPa, which are within the City's allowable operating pressure range of 275 to 690 kPa. Full system pressure results are included in Appendix E.

Table 4-5. Pressure Results (kPa) with Tanks Set to 50%

Node	ADD		MDD		PHD	
	2021	2031	2021	2031	2021	2031
J-458	534	533	525	523	512	508

Table 4-6. Pressure Results (kPa) with Tanks set to 75%

Node	ADD		MDD		PHD	
	2021	2031	2021	2031	2021	2031
J-458	551	551	542	541	529	525

4.3 Flushing

The hydraulic model was used to evaluate the flushing capacity in the proposed 200mm watermain on John St. North, with PD2 tank levels set at 50% full and the PD2 and WTP pumps offline. The 2021 ADD scenario was used to represent existing conditions for construction flushing requirements. Flushing demands were modelled to replace domestic demands while the area is under development. Results were based on a minimum velocity of 0.8 m/s as required by the MECP Guidelines. Hydrant nodes were modelled with an emitter coefficient of 11.2 L/s/m$^{0.5}$ (150 gpm/psi). This value is recommended by the American Water Works Association (AWWA) to represent a single 60mm (2.5") outlet and considers all lateral valve and bends within the hydrant.

Table 4-7 summarizes the flushing results for the proposed 200 mm watermain on John St. North. A flushing velocity of 0.8 m/s was achieved in the proposed 200 mm

watermain when the tank levels are set to 50%. The complete flushing reports are available in Appendix F.

Table 4-7. Flushing Results with Tanks set to 50% (ADD 2021)

Pipe	Length (m)	Diameter (mm)	Flushing Velocity (m/s)	Meets Criteria
HA18W14187(1)	19	200	1.47	TRUE
HA18W14187(2)(1)(1)	119	200	1.47	TRUE
HA18W14187(2)(1)(2)	30	200	1.42	TRUE
HA18W14187(2)(2)	15	200	2.46	TRUE

5 Conclusions

This analysis was based on the City's existing hydraulic water model. The model was verified using field test results and the City's historical SCADA data. The C-factors of the watermains near the development area were adjusted to provide a closer representation of the hydraulic capacity of the water system based on field testing data provided. Lower than expected C-factors were required on the CI watermains near the development area to better match the model results to the field testing.

The watermain hydraulic assessment of the proposed 175 John St. North development demonstrated that:

1. The minimum available fire flow requirement of 150 L/s was not achieved at the development node (J-458) or the existing hydrants under MDD 2021 or MD 2031 conditions.
    a. Under pre-development conditions, the fire flow requirement of 150 L/s was not met at the existing hydrants. This could be a result of the low C-factor adjustment required to match the field tests, or due to the hydrants being close to the PD2 boundary.
2. When the watermain on John St. North between Cannon St. East and Robert St. was upgraded from 150 mm to 200 mm (C-factor of 110), the minimum fire flow requirement of 150 L/s was achieved at the development node (J-458) and the existing hydrants under MDD 2021 and MDD 2031 conditions, with the PD2 tanks at 50% and 75%,
3. The service pressures under existing (MDD 2021) and ultimate build-out (currently MDD 2031*) conditions are expected to range between 508 - 551 kPa, with the watermain on John St. North upgraded to a 200 mm. The service pressures are within the City's allowable operating pressure range of 275 to 690 kPa.
4. The proposed upgraded 200 mm watermain on John St. North can achieve the minimum flushing velocity of 0.8 m/s as required by the MECP guidelines.

* As amended from time to time as per Official Plan Report Content

A

Existing Watermains Near Development

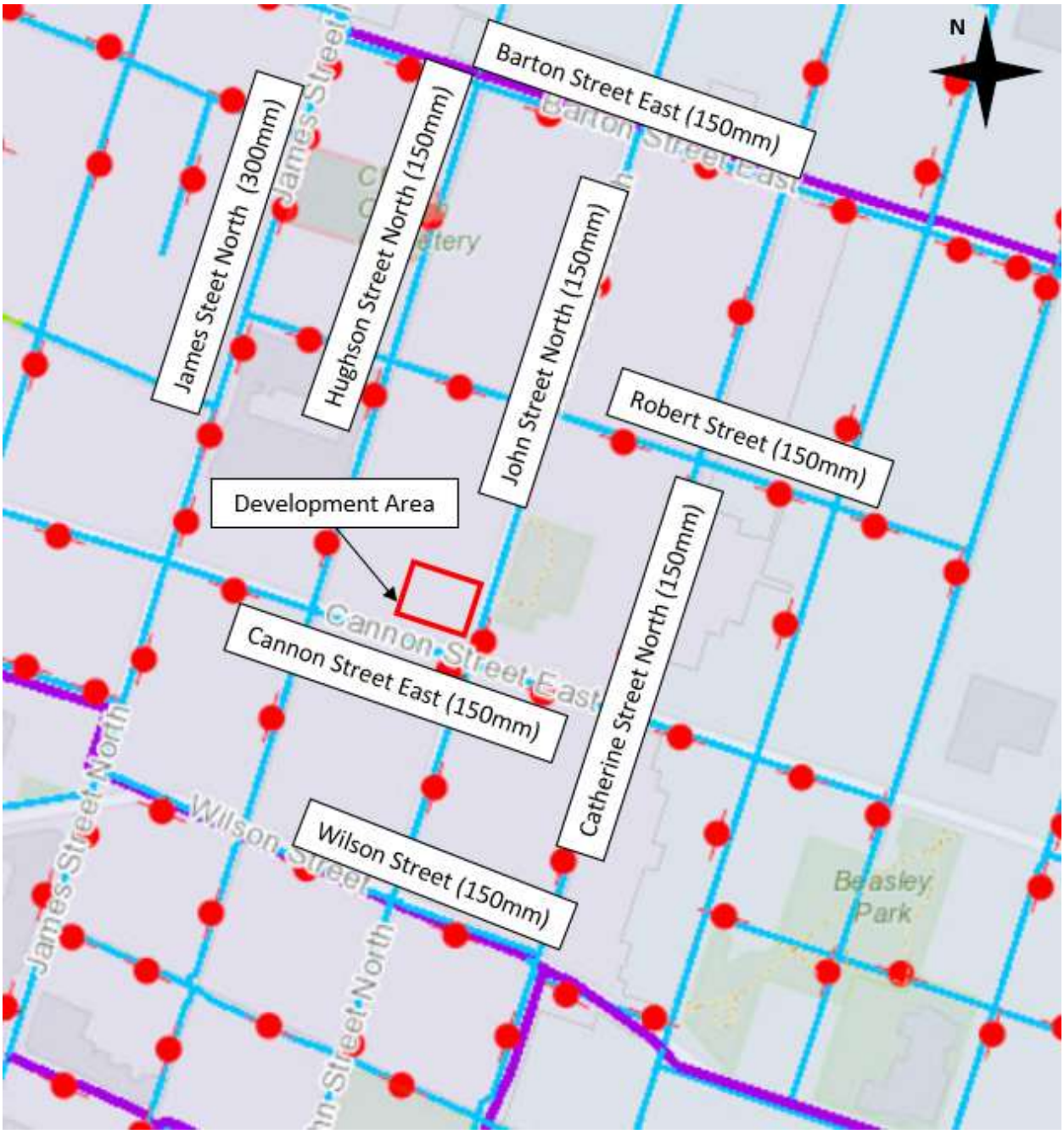


Figure A-1 Cast Iron Watermains and Diameters near Development Area

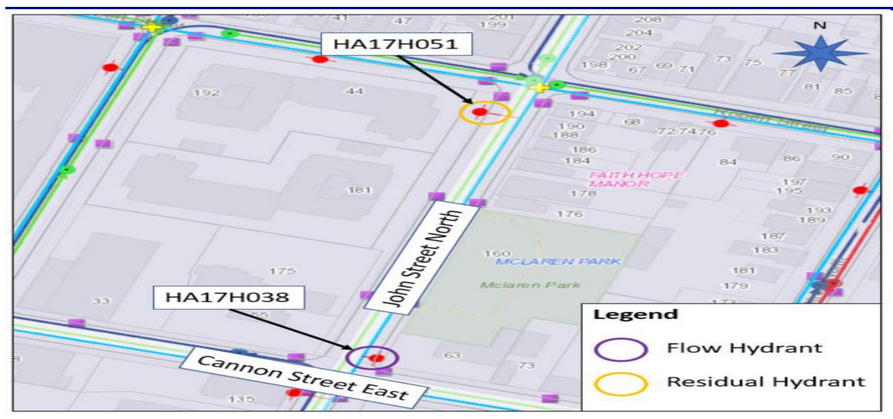
B

Hydrant Test Report

FLOWMETRIX
INDU-TECH
PROCESS

Fire Flow Testing Report

Residual Hydrant #	**HA17H051**
NFPA Colour Code	**BLUE**



DATE	July 21, 2022
TIME	1:00 PM
ADDRESS	189 John Street N Hamilton, ON L8L 7Z8
SIZE-inches/mm	6 — 150
MATERIAL	CI
CONTACT INFO	Stephen Erickson Urban Solutions (905) 546-1087 serickson@urbansolutions.info

RESIDUAL HYDRANT INFO.

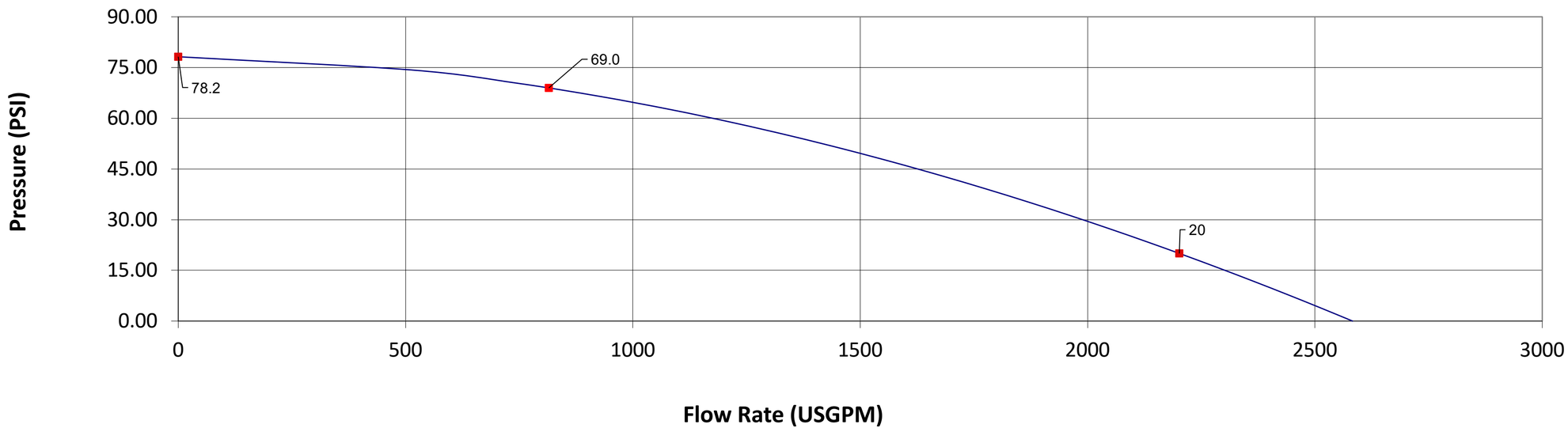
HYDRANT #	HA17H051	
N.F.P.A. COLOUR CODE	BLUE	
STATIC PRESSURE	78.2	psi
RESIDUAL PRESSURE - ONE PORT OPEN	69.0	psi
RESIDUAL PRESSURE - TWO PORTS OPEN	0.0	psi
PRESSURE DROP	9.2	psi
% PRESSURE DROP	11.8	% psi
Flow at Test Hydrant @ 20 psi	2202	USGPM

FLOW HYDRANT(S) INFO.

HYDRANT ASSET ID	HYD. # PORTS	OUTLET DIAMETER (INCHES)	NOZZLE COEFFICIENT	DIFFUSER TYPE	DIFFUSER COEFFICIENT	PITOT READING (psi)	PITOT FLOW (USGPM)	FLOW METER (USGPM)
HA17H038	1	2.5	Round	LPD250	0.90	**29.1**	815	0
								0

FIRE FLOW CHART

Pressure - Flow Graph
at Test Hydrant



COMMENTS

OPERATOR	FMX	Jordan Whitlock
OPERATOR		Brendan Howatt
OPERATOR		City of Hamilton

C

Model Verification – C-factor Change Log

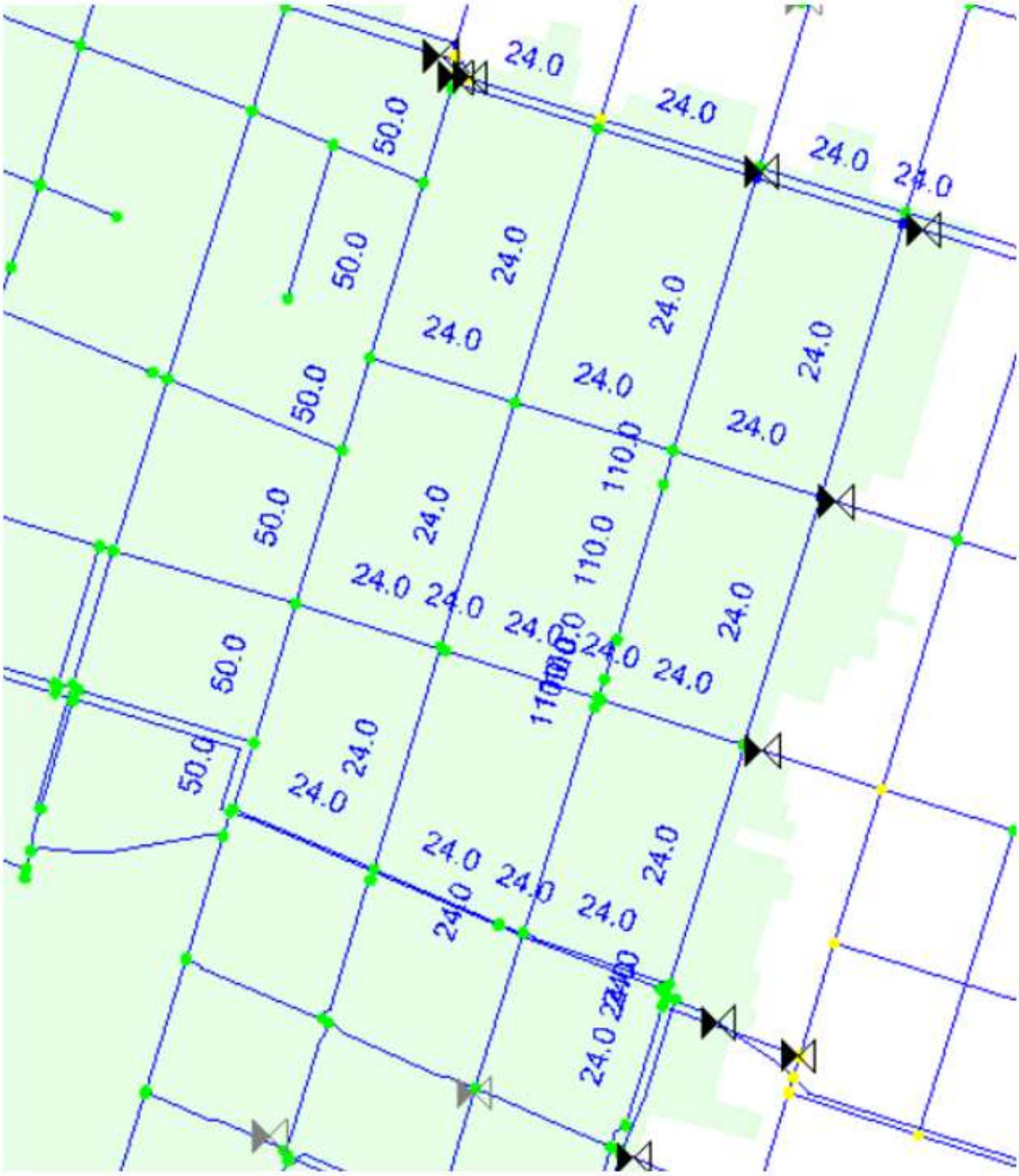


Figure B-1 Adjusted C-Factors in Pressure District 2 near Development Area

Table B-1 Model Verification C-Factor Adjustment Log

ID	Label	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Length (m)	Adjusted (verification)
23476	HA17W14168	HA17T004	HA17R009	150	Cast Iron	80	88	24
23475	HA17W14169	HA17T002	HA17T004	150	Cast Iron	80	8	24
23473	HA17W14170	HA17T001	HA17T002	150	Cast Iron	80	8	24
23393	HA17W14174	HA17T001	HA17C007	150	Cast Iron	80	110	24
23462	HA17W14178	HA17T022	HA17R003	150	Cast Iron	80	8	24
23468	HA17W14180	HA17T001	HA17T014	150	Cast Iron	80	178	24
23467	HA17W14184	HA17T014	HA18C010	150	Cast Iron	80	184	24
23428	HA17W14185	HA17T017	HA17T014	200	Cast Iron	80	106	24
23427	HA17W14186	HA17T016	HA17T017	150	Cast Iron	80	117	24
23453	HA17W14188	HA17T023	HA18C017	150	Cast Iron	80	181	24
16604	HA17W14190	HA17T023	HA17C008	150	Cast Iron	80	165	24
23392	HA17W14191	HA17C007	HA17T031	150	Cast Iron	80	19	24
26554	HA17W14192	HA17T027	HA17T031	150	Cast Iron	80	1	24
23391	HA17W14193	HA17T031	HA17C008	150	Cast Iron	80	97	24
23429	HA17W14699	HA17T022	HA17T017	150	Cast Iron	80	4	24
23424	HA17W14703	HA17T023	HA17T016	150	Cast Iron	80	5	24
23727	HA18W14018	HA18C015	HA18T030	150	Cast Iron	80	118	24
22821	HA18W14023	HA18V031	HA18T024	150	Cast Iron	80	15	24
22820	HA18W14024	HA18T024	HA18C015	150	Cast Iron	80	109	24
22885	HA18W14054	HA18C017	HA18T030	150	Cast Iron	80	203	24
22862	HA18W14055	HA18C017	HA18C011	150	Cast Iron	80	117	24
22933	HA18W14056	HA18C011	HA18C015	150	Cast Iron	80	202	24
22975	HA18W14058	HA18C010	HA18T024	150	Cast Iron	80	202	24
22867	HA18W14059	HA18C011	HA18C010	150	Cast Iron	80	110	24
33452	HA18W14187(1)	HA18C011	HA17H038	150	Cast Iron	80	19	24
33458	HA18W14187(2)(1)(1)	HA17H038	J-458	150	Cast Iron	80	119	24
33459	HA18W14187(2)(1)(2)	J-458	HA17H051	150	Cast Iron	80	30	24
33456	HA18W14187(2)(2)	HA17H051	HA17T022	150	Cast Iron	80	15	24

ID	Label	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Length (m)	Adjusted (verification)
23056	HA23W04412	HA23T002	HA23T007	300	Cast Iron	130	70	50
23057	HA23W14013	HA23T001	HA23T002	300	Cast Iron	130	130	50
23059	HA23W14014	HA23T001	HA18C017	150	Cast Iron	100	108	24
22814	HA23W14015	HA18T030	HA23T007	150	Cast Iron	80	109	24
22856	HA23W14053	HA24T017	HA23T001	300	Cast Iron	130	68	50
23340	HA24W14050	HA24T024	HA24T027	300	Cast Iron	131	49	50
23338	HA24W14051	HA24C007	HA24T024	300	Cast Iron	130	103	50
23336	HA24W14052	HA24T017	HA24C007	300	Cast Iron	130	114	50
23354	HA24W14195	HA17C008	HA24T027	150	Cast Iron	100	109	24
23426	HA24W14701	HA24C007	HA17T016	150	Cast Iron	100	112	24

D

Fire Flow Results

Fire Flow Analysis - Development

MDD 2021 - Tank 50%

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Is Fire Flow Run Balanced?
HA17H038	2	3	TRUE	150	175.04	150	175.04	20	20	TRUE
HA17H051	2	3	TRUE	150	215.11	150	215.11	20	20	TRUE
J-458	2	3	TRUE	150	203.7	151.98	205.68	20	20	TRUE

MDD 2021 - Tank 75%

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Is Fire Flow Run Balanced?
HA17H038	2	3	TRUE	150	179.16	150	179.16	20	20	TRUE
HA17H051	2	3	TRUE	150	220.36	150	220.36	20	20	TRUE
J-458	2	3	TRUE	150	208.62	151.98	210.6	20	20	TRUE

MDD 2031 - Tank 50%

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Is Fire Flow Run Balanced?
HA17H038	2	3	TRUE	150	174.47	150	174.47	20	20	TRUE
HA17H051	2	3	TRUE	150	214.39	150	214.39	20	20	TRUE
J-458	2	3	TRUE	150	203.02	151.98	205	20	20	TRUE

MDD 2031 - Tank 75%

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Is Fire Flow Run Balanced?
HA17H038	2	3	TRUE	150	178.6	150	178.6	20	20	TRUE
HA17H051	2	3	TRUE	150	219.65	150	219.65	20	20	TRUE
J-458	2	3	TRUE	150	207.95	151.98	209.93	20	20	TRUE

Fire Flow Analysis - Pre-Existing

MDD 2021 - Tank 50%

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Is Fire Flow Run Balanced?
HA17H038	2	3	FALSE	150	58.45	150	58.45	20	20	TRUE
HA17H051	2	3	FALSE	150	80.11	150	80.11	20	20	TRUE
J-458	2	3	FALSE	150	58.73	150	58.73	20	20	TRUE

MDD 2021 - Tank 75%

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Needed) (L/s)	Flow (Total Available) (L/s)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Is Fire Flow Run Balanced?
HA17H038	2	3	FALSE	150	59.82	150	59.82	20	20	TRUE
HA17H051	2	3	FALSE	150	82.04	150	82.04	20	20	TRUE
J-458	2	3	FALSE	150	60.13	150	60.13	20	20	TRUE

E

System Pressures

System Pressures

ADD 2021 - Tank 50%

ID	Label	Is Active?	Elevation (m)	Zone	Demand (L/s)	Demand Collection	Hydraulic Grade (m)	Pressure (kPa)
33457	J-458	TRUE	89.34	2	1.6	<Collection: 1 item>	143.9	534

ADD 2021 - Tank 75%

ID	Label	Is Active?	Elevation (m)	Zone	Demand (L/s)	Demand Collection	Hydraulic Grade (m)	Pressure (kPa)
33457	J-458	TRUE	89.34	2	1.6	<Collection: 1 item>	145.65	551

ADD 2031 - Tank 50%

ID	Label	Is Active?	Elevation (m)	Zone	Demand (L/s)	Demand Collection	Hydraulic Grade (m)	Pressure (kPa)
33457	J-458	TRUE	89.34	2	1.6	<Collection: 1 item>	143.84	533

ADD 2031 - Tank 75%

ID	Label	Is Active?	Elevation (m)	Zone	Demand (L/s)	Demand Collection	Hydraulic Grade (m)	Pressure (kPa)
33457	J-458	TRUE	89.34	2	1.6	<Collection: 1 item>	145.59	551

MDD 2021 - Tank 50%

ID	Label	Is Active?	Elevation (m)	Zone	Demand (L/s)	Demand Collection	Hydraulic Grade (m)	Pressure (kPa)
33457	J-458	TRUE	89.34	2	3.04	<Collection: 1 item>	143.01	525

MDD 2021 - Tank 75%

ID	Label	Is Active?	Elevation (m)	Zone	Demand (L/s)	Demand Collection	Hydraulic Grade (m)	Pressure (kPa)
33457	J-458	TRUE	89.34	2	3.04	<Collection: 1 item>	144.75	542

MDD 2031 - Tank 50%

ID	Label	Is Active?	Elevation (m)	Zone	Demand (L/s)	Demand Collection	Hydraulic Grade (m)	Pressure (kPa)
33457	J-458	TRUE	89.34	2	3.04	<Collection: 1 item>	142.82	523

MDD 2031 - Tank 75%

ID	Label	Is Active?	Elevation (m)	Zone	Demand (L/s)	Demand Collection	Hydraulic Grade (m)	Pressure (kPa)
33457	J-458	TRUE	89.34	2	3.04	<Collection: 1 item>	144.58	541

PHD 2021 - Tank 50%

ID	Label	Is Active?	Elevation (m)	Zone	Demand (L/s)	Demand Collection	Hydraulic Grade (m)	Pressure (kPa)
33457	J-458	TRUE	89.34	2	4.8	<Collection: 1 item>	141.69	512

PHD 2021 - Tank 75%

ID	Label	Is Active?	Elevation (m)	Zone	Demand (L/s)	Demand Collection	Hydraulic Grade (m)	Pressure (kPa)
33457	J-458	TRUE	89.34	2	4.8	<Collection: 1 item>	143.43	529

PHD 2031 - Tank 50%

ID	Label	Is Active?	Elevation (m)	Zone	Demand (L/s)	Demand Collection	Hydraulic Grade (m)	Pressure (kPa)
33457	J-458	TRUE	89.34	2	4.8	<Collection: 1 item>	141.28	508

PHD 2031 - Tank 75%

ID	Label	Is Active?	Elevation (m)	Zone	Demand (L/s)	Demand Collection	Hydraulic Grade (m)	Pressure (kPa)
33457	J-458	TRUE	89.34	2	4.8	<Collection: 1 item>	143.03	525

F

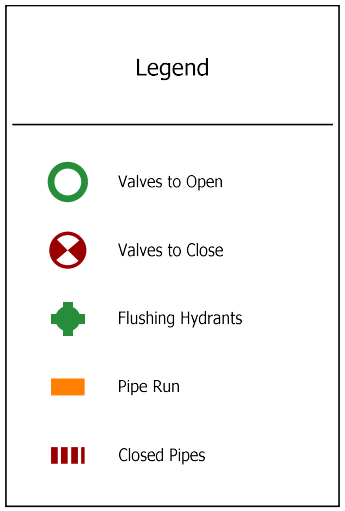
Flushing Results

Flushing Analysis - ADD 2021, Tanks at 50%

ID	Label	Length (m)	Diameter (mm)	Flushing Event	Velocity (Maximum Flushing) (m/s)	Satisfies Flushing Target Velocity?	Shear Stress (Maximum Flushing) (kg/m²)	Satisfies Flushing Target Shear Stress?	Satisfies Flushing Target?
33452	HA18W14187(1)	19	200	Event - 1	1.47	TRUE	0.75	TRUE	TRUE
33458	HA18W14187(2)(1)(1)	119	200	Event - 1	1.47	TRUE	0.75	TRUE	TRUE
33459	HA18W14187(2)(1)(2)	30	200	Event - 1	1.42	TRUE	0.71	TRUE	TRUE
33456	HA18W14187(2)(2)	15	200	Event - 2	2.46	TRUE	1.95	TRUE	TRUE

Flushing Field Report

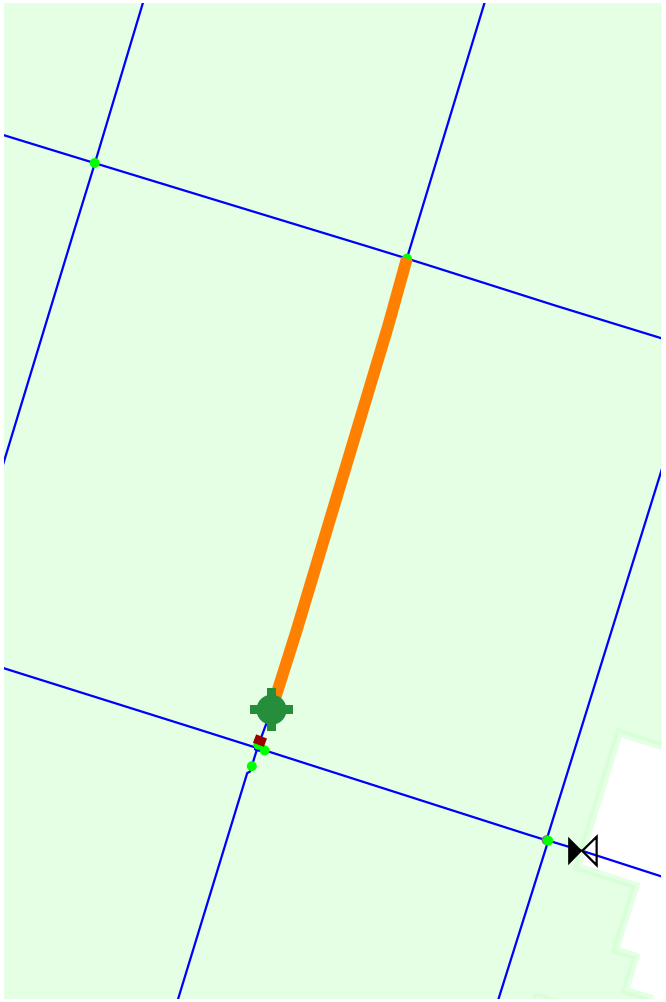
Study: Flushing Study



Flushing Field Report

Study: Flushing Study; Area: John St Flushing; Event: Event - 1

Primary View



Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA
+1-203-755-1666

Flushing Field Report

Study: Flushing Study; Area: John St Flushing; Event: Event - 1

Fire Hydrant	Notes	Pressure (kPa) Static, Dynamic	Measured Flow (L/s)	Predicted Pressure (kPa)	Predicted Flow (L/s)
HA17H051				153	44.63

Valve	Operation	Notes
HA18W14187(2)(2)	Close ☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	

Flushing	Minimum	Recommended
Time (min)	1.9	1.9
Volume (ML)	0.0	0.0

Start Time _____

End Time _____

Operator _____

Date

Water Quality	Initial	Final
Clear	☐	☐
Colored	☐	☐
Chlorine Residual		
Turbidity		

Pipe Run to be Cleaned
HA18W14187(1), HA18W14187(2)(1)(1), HA18W14187(2)(1)(2)

Notes _____

Flushing Field Report

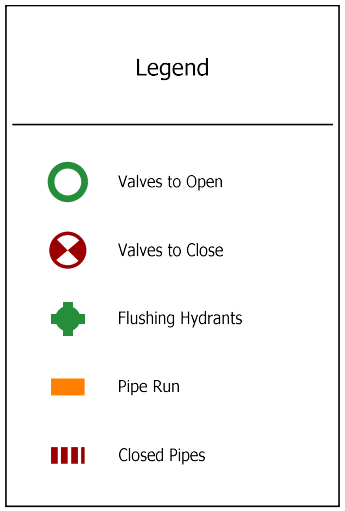
Study: Flushing Study; Area: John St Flushing; Event: Event - 1

Final Actions

Valve	Operation	Notes
HA18W14187(2)(2)	Reopen ☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	

Flushing Field Report

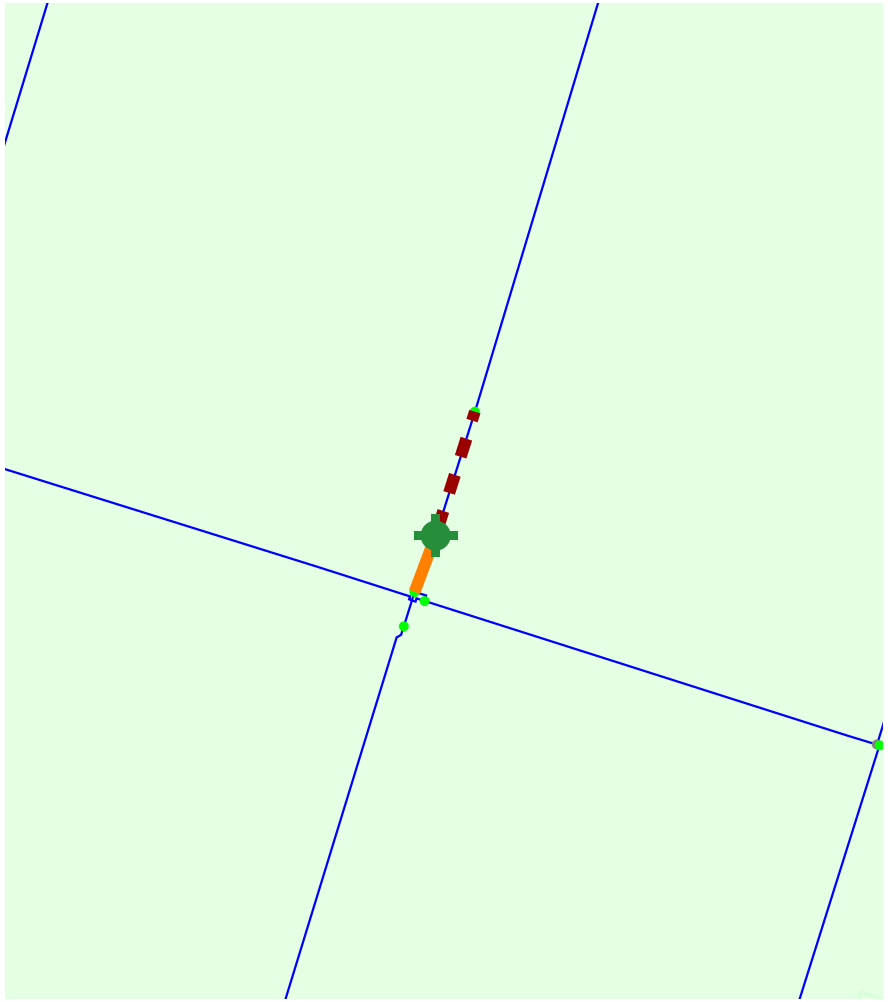
Study: Flushing Study



Flushing Field Report

Study: Flushing Study; Area: John St Flushing; Event: Event - 2

Primary View



Flushing Field Report

Study: Flushing Study; Area: John St Flushing; Event: Event - 2

Fire Hydrant	Notes	Pressure (kPa) Static, Dynamic	Measured Flow (L/s)	Predicted Pressure (kPa)	Predicted Flow (L/s)
HA17H051				459	77.24

Valve	Operation	Notes
HA18W14187(2)(2)	Reopen ☐	
HA18W14187(2)(1)(2)	Close ☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	

Flushing	Minimum	Recommended
Time (min)	0.1	0.1
Volume (ML)	0.0	0.0

Start Time

End Time

Operator

Date

Water Quality	Initial	Final
Clear	☐	☐
Colored	☐	☐
Chlorine Residual		
Turbidity		

Pipe Run to be Cleaned
HA18W14187(2)(2)

Notes

Flushing Field Report

Study: Flushing Study; Area: John St Flushing; Event: Event - 2

Final Actions

Valve	Operation	Notes
HA18W14187(2)(1)(2)	Reopen ☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	
	☐	

SECTION 3 – GEOTECHNICAL

GEOTECHNICAL

Based on discussions between Urban Solutions and the City of Hamilton the Geotechnical Report is being deferred to the Site Plan Stage. See **Appendix A** for the email from the City of Hamilton.

APPENDIX A

- *Email between Urban Solution and the City of Hamilton*

Daniel Cavalluzzo

From: Panovski, Zivko <Zivko.Panovski@hamilton.ca>
Sent: December 7, 2022 10:53 AM
To: Spencer McKay, BA, CPT
Cc: Dimitroulias, Peter; Matthew LeBlanc, MPL, BA (Hons); Stephen Erickson, BA, CPT; Barnett, Daniel
Subject: RE: 175 John St N

Agree,

Zivko Panovski, P. Eng.
Senior Project Manager
PED, Growth Management Division
City of Hamilton

From: Spencer McKay, BA, CPT <smckay@urbansolutions.info>
Sent: December 7, 2022 10:50 AM
To: Panovski, Zivko <Zivko.Panovski@hamilton.ca>
Cc: Dimitroulias, Peter <Peter.Dimitroulias@hamilton.ca>; Matthew LeBlanc, MPL, BA (Hons) <mleblanc@urbansolutions.info>; Stephen Erickson, BA, CPT <serickson@urbansolutions.info>; Barnett, Daniel <Daniel.Barnett@hamilton.ca>
Subject: FW: 175 John St N

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Please confirm.

Thank you again,
Spencer

Spencer McKay, BA, CPT
Project Manager

URBAN SOLUTIONS
PLANNING & LAND DEVELOPMENT

3 Studebaker Place, Unit 1, Hamilton, ON L8L 0C8
T: (905) 546-1087 **C:** (905) 515-5279
Email: smckay@urbansolutions.info
Website: https://urbansolutions.info

This email may contain confidential and/or privileged information. If you are not the intended recipient (or have received this email in error) please notify the sender immediately and destroy this email. Any unauthorized copying, disclosure, or distribution of the material in this email is strictly forbidden. Please consider the environment before printing this email.

From: Spencer McKay, BA, CPT <smckay@urbansolutions.info>
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To: Matthew LeBlanc, MPL, BA (Hons) <mleblanc@urbansolutions.info>; Dimitroulias, Peter <Peter.Dimitroulias@hamilton.ca>
Cc: Barnett, Daniel <Daniel.Barnett@hamilton.ca>; Stephen Erickson, BA, CPT <serickson@urbansolutions.info>
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Sent: December 1, 2022 1:15 PM
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Cc: Barnett, Daniel <Daniel.Barnett@hamilton.ca>; Stephen Erickson, BA, CPT <serickson@urbansolutions.info>
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Hi Peter,

Please see the attached FC Document that Spencer is referencing.

Regards,

Matthew LeBlanc, MPL, BA (Hons)
Planner

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Importance: High

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From: Barnett, Daniel <Daniel.Barnett@hamilton.ca>
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Subject: 175 John St N

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The requirement for a Hydro G brief at the OPA & ZBA stage was included in the comments provided from Engineering staff at the FC stage which is why it was included in the FC document as being required at that stage. If you disagree with this you would need to bring the matter up with Engineering staff, Peter Dimitroulias provided the comments at the FC stage and if they agree we would need something in writing from them.

Daniel Barnett,
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City of Hamilton, City Hall
71 Main Street West, 5th Floor
Hamilton, Ontario L8P 4Y5

t. 905-546-2424 x4445
f. 905-546-4202
Daniel.Barnett@hamilton.ca
www.hamilton.ca

SECTION 4 – HYDROGEOLOGICAL

HYDROGEOLOGICAL

Based on discussions between Urban Solutions and the City of Hamilton the Hydrogeological Report is being deferred to the Site Plan Stage. See **Appendix A** for the email from the City of Hamilton.

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SECTION 5 – FUNCTIONAL SERVICING REPORT SUMMARY

Functional Servicing Summary

Section 1 - Storm Water Management

- The 100yr peak runoff rate from this site into the John Street North combined sewer system will effectively be controlled to the existing 2yr peak rate, based on the City of Hamilton supplied runoff co-efficient, considering the estimated increase in sanitary sewer flow. This is achieved through the use of partial roof top storage in combination with a 52.1m^2 storage tank with a 110mm orifice plate to limit the runoff rate. The estimated 100yr depth within the tank is 0.54m (28.0m3 at elevation 88.02).
- In order to treat the storm runoff from the 459m^2 surface parking area it is proposed to install a Hydro First Defense FD-3HC unit or equivalent. Based on manufacturers specifications this unit can provide 90.0% TSS removal efficiency using the NJ/DEP ETV sediment distribution.
- Erosion and sediment controls be installed as described in section 2.3 of this report.

Section 2 - Water/Wastewater Generation

- The sanitary discharge for the subject site will drain to the existing 450mmØ municipal combined sewer along John Street North. The anticipated total peak discharge, to John Street West, will be **6.76 L/s.**
- The water supply for the subject site will have and anticipated maximum daily water consumption rate for the development will be **2.53 L/s**.
- A minimum fire suppression flow of **9,000 L/min (150.00 L/s)** will be required as per the City of Hamilton Watermain Fire Flow Requirement Design Guidelines and OBC.
- Based on the Watermain Hydraulic Analysis prepared by CIMA+, dated December 21, 2023, see **Appendix C**, the John Street North watermain is required to be upgraded to a 200mmØ, from Cannon Street East to Robert Street, to meet the requirements of the proposed residential development. To be submitted under a separate cover.

Section 3 - Geotechnical

- The Geotechnical Report is being deferred to the Site Plan Stage.

Section 4 - Hydrogeological

- The Hydrogeological Report is being deferred to the Site Plan Stage.