vallee

Consulting Engineers,
Architects & Planners

November 24, 2022

Lally Holdings Ltd.
4025 Dorchester Road, Suite 349
Niagara Falls, ON

Attention: **Mr. John Lally**

Reference: **Functional Servicing Report**
Allanburg Bungalow Towns
City of Thorold – Niagara Region
Project No. 21-248

Introduction

This Functional Servicing Report has been prepared in support of the site plan application required for the construction of a 15-unit townhouse development in the City of Thorold, Niagara Region. This report presents the functional serving for the proposed development, including sanitary servicing, storm servicing and domestic and fire water servicing.

Background

The 0.80 ha proposed development site is located at 2248 Centre Street in the City of Thorold, Niagara Region. The subject lands are is bounded by an existing residential dwelling to the south, an existing railway to the east, Centre Street to the west and vacant land to the north. Refer to figure below.

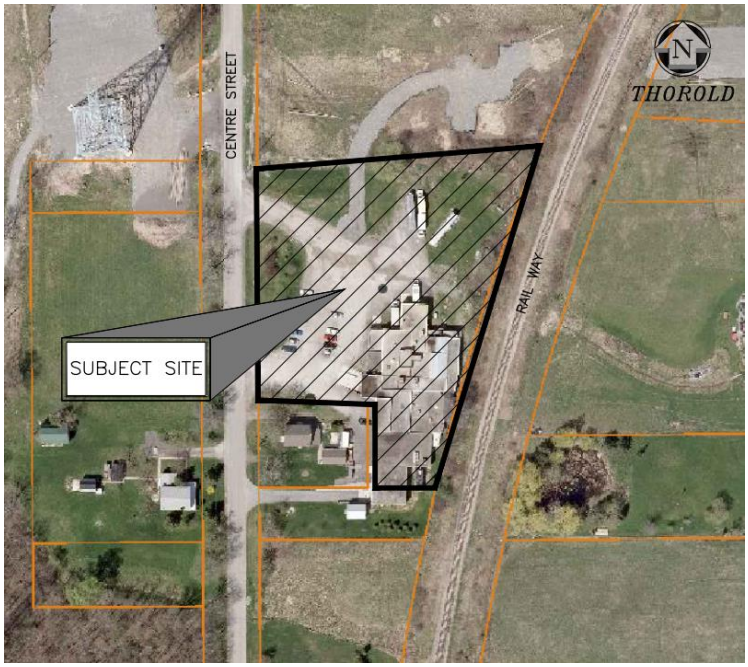

Figure - Site Location

The development site currently features a large industrial building and paved parking lot area, with some grassed area. The proposed residential developments shall consist of the following construction:

- 15 – 1-storey residential dwelling units;
- Storm and sanitary infrastructure to support proposed construction;
- Swales, parking areas and other miscellaneous items to support proposed construction.

Sanitary Servicing

As-constructed drawings of Centre Street indicate existing 200mm diameter asbestos cement sanitary gravity sewers, as shown in Appendix A. It is proposed that an internal sanitary sewer network with convey sanitary flows from the development to the existing 200mm sanitary sewer along Centre Street.

Sanitary design flows for the proposed development were calculated using the Niagara Region Design Criteria, as presented in Table 1. In summary, the development site is anticipated to generate an additional sanitary flow of approximately 1.05 L/s to the existing sanitary sewer along Centre Street. Refer to complete calculations in Appendix B.

Table 1
Sanitary Design Flow Information

Total Number of Units	15
Population Density (persons/units)	4.0
Per Capita Flow (L/person/day)	275
Peak Extraneous Flow (L/sec/hectare)	0.286
Development Area (ha)	0.80
Infiltration Flow (L/s)	0.23
Sewage Flow (L/s)	0.82
Peak Design Flow (L/s)	1.05

Based on these calculations it can be concluded that the additional sanitary flow generated by the proposed development is minimal. To confirm the calculations presented, it is recommended that sanitary hydraulic modelling be completed by the City of Thorold's consultant to determine if the existing infrastructure provides adequate capacity to accommodate the estimated sanitary design flow from the proposed development.

Stormwater Management

Complete details of the proposed stormwater management design are provided in the Stormwater Management Memo dated November 22, 2022 included with the site plan submission.

Water Servicing

As-constructed drawings indicate an existing 200mm diameter PVC watermain along the west side of Centre Street, as shown in Appendix A. The proposed development will utilize the existing 200mm watermain on Centre Street as the water supply.

An analysis of the hydraulic modelling will be conducted by the City of Thorold's consultant to determine the water servicing capacity and constraints on the existing water system to ensure adequate system flows and pressure for the domestic and fire demands. Niagara Region's design criteria stipulates the following requirements for system pressures, and the system shall be designed to meet the greater of either of the following requirements;

- Fire flow conditions– not less than 140 kPa
- Normal operating conditions – not less than 280 kPa

Domestic Water Demand

The following summarizes the domestic water flow information for the proposed development. Refer to complete calculations in Appendix C.

- Total Number of Units: 15
- Population Density: 4 persons per unit
- Population: 60 people
- Average Daily Water Demand (per person) 0.30 m^3/person/day
- Average Daily Water Demand: 18.00 m^3/day (0.21 L/s)
- Peak Hourly Demand Factor (Residential) 4.0
- Peak Hourly Demand 3.00 m^3/hour (0.83 L/s)

Fire Water Service

According to the as-constructed drawings, an existing fire hydrant located on the west side of Centre Street, across from the proposed development site. However, the hydrant is greater than 90 m away from the furthest proposed unit. Consequently, a fire hydrant will be installed on subject property to service the proposed development.

Typically, available fire flow during the peak hourly demand is the critical criteria when evaluating a watermain distribution system's ability to service a residential development. The estimated fire flow requirement for the development has been determined using both the recommendations of the Fire Underwriters Survey – 1999 (FUS) and the Ontario Building Code (OBC) method. Using the FUS recommendations and the OBC fire flow calculation procedure, the minimum required fire flow was determined to be 83 L/s and 60 L/s, respectively. It should be noted that the FUS method is generally conservative. Supporting calculations for both methods are detailed in Appendix C. Firewalls have been utilized to decrease the required fire flow, and will be refined further in the detailed design process.

The Niagara Region Master Servicing Plan estimates that the available fire flow in the existing watermain on Centre Street ranges from 50 L/s to 100 L/s, as displayed in Appendix C. Therefore, the available municipal watermain is anticipated to provide sufficient flow to service the development using both the FUS and OBC calculation procedure. It should be noted that the modeling is from 2016, consequently, it is recommended that the City of Thorold review against their current model and provide more current available demands to confirm that the supply is adequate.

Conclusions and Recommendations

The functional servicing design for the proposed development can be summarized as follows:

- The proposed development will be serviced by a new sanitary sewer network that connects to the existing 200mm sanitary sewer along Centre Street.
- A peak sanitary design flow of approximately 1.05 L/s is anticipated from the proposed development.
- Modelling from the City of Thorold's consultant is recommended to determine the impact of the proposed additional sanitary flows on existing infrastructure.
- Complete details of the proposed stormwater management design are provided in the Stormwater Management Memo dated November 22, 2022.
- The existing 200mm watermain on Centre Street shall serve as the water supply for the proposed development.
- An analysis of the hydraulic modelling will be conducted by the City of Thorold's consultant to determine the water servicing capacity and constraints on the existing water system to ensure adequate system flows and pressure for the aforementioned domestic and fire demands.
- The domestic average day demand and peak hourly demand were found to be 0.21 L/s and 0.83 L/s, respectively.
- The required fire flow demand for the proposed development was found to be 83 L/s, which is within the estimated range of available fire flow.

It is recommended that this memo be provided to the City of Thorold, in support of the application for site plan approval of the proposed development.

We trust that this information is complete and sufficient for submission. Should you have any questions or require further information please do not hesitate to contact us

Respectfully submitted,

LICENSED PROFESSIONAL ENGINEER
21-248
2022.11.24
J. T. IEZZI
100189485
PROVINCE OF ONTARIO

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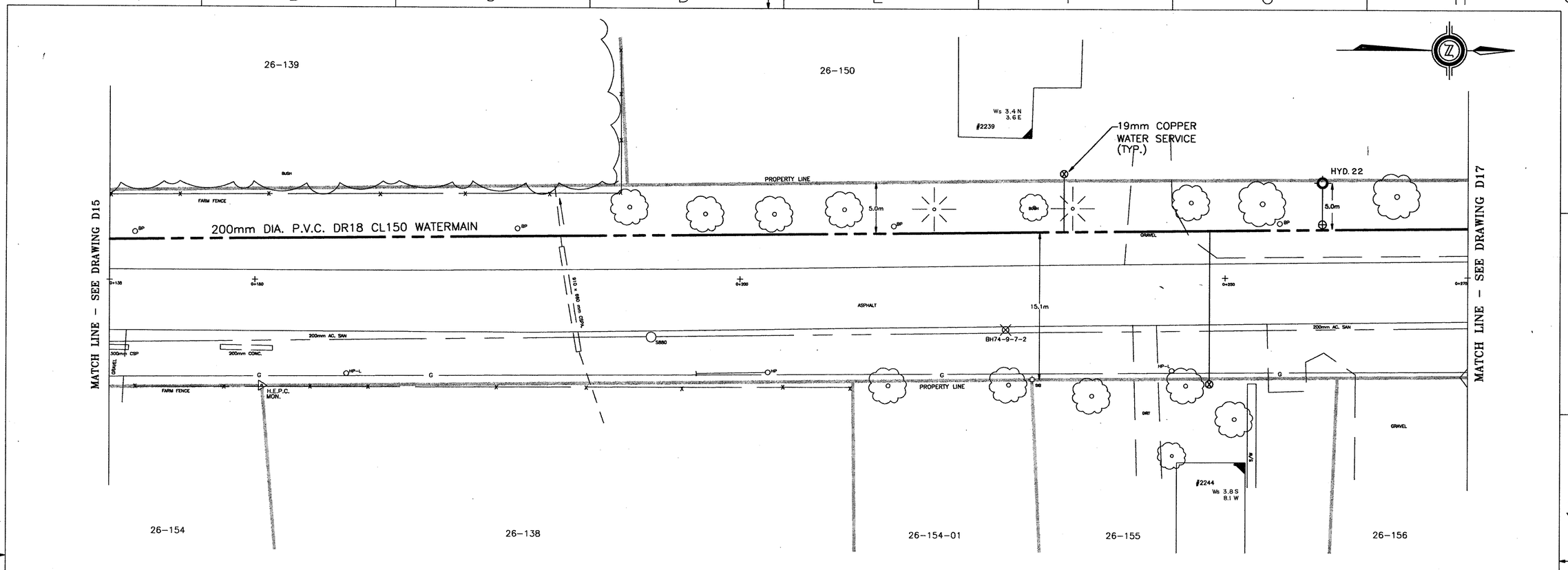
Appendix A
– Centre Street Record Drawings

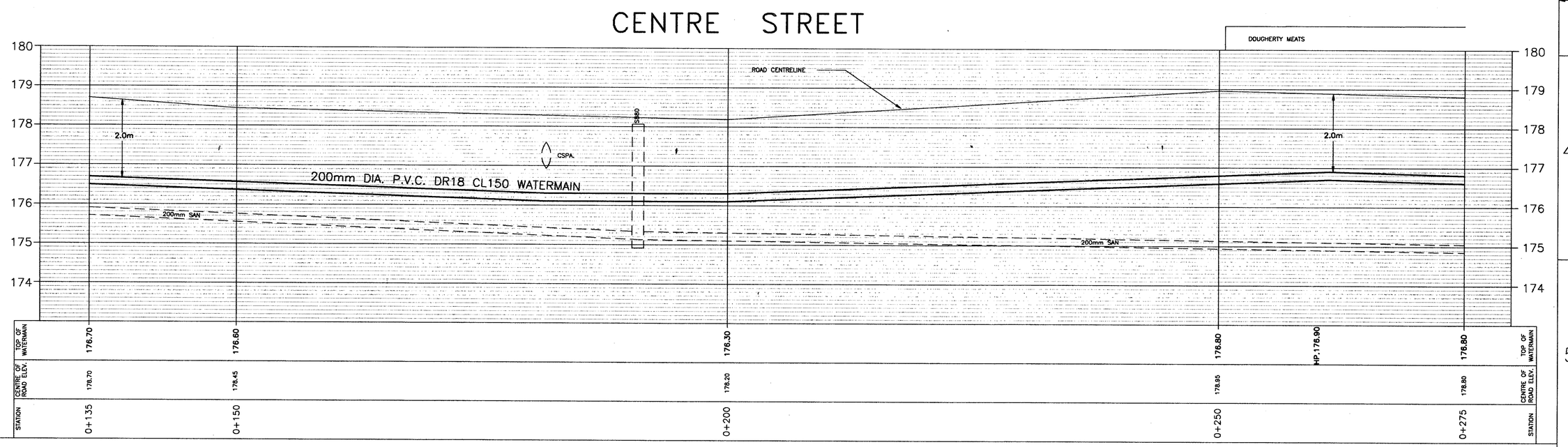
Appendix B
– 21-248 Sanitary Sewer Design Sheet

Appendix B
– 21-248 Domestic Water Demand
– 21-248 FIG1 – Fire Separation Distances
– 21-248 FUS Calculations
– 21-248 OBC Calculations
– Niagara Region Master Servicing Plan Existing System Fire Flow Map

APPENDIX A

Centre Street Record Drawings





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DRAWING STATUS			INIT.
A1	1992 11 23	ISSUED FOR APPROVAL	WCH
T1	1993 01 07	ISSUED FOR TENDER	WCH
R1	AUGUST, 1993	RECORD DRAWINGS	WCH
R2	1994 03 14	WATER SERVICES LOCATION	RB

J.S. HELLINGA
PROJ. MGR.

R. BEAULIEU
DESIGNER

R. BEAULIEU
DRAWN BY

LICENSED PROFESSIONAL ENGINEER
W. C. HOLMAN
1994 03 15
PROVINCE OF ONTARIO

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

CITY OF THOROLD
ENGINEERING DEPT.

VILLAGE OF ALLANBURG
WATERMAIN SERVICING
PROJECT NO. 92-305
CENTRE STREET

Gore & Storrie Limited GGS
Consulting Engineers

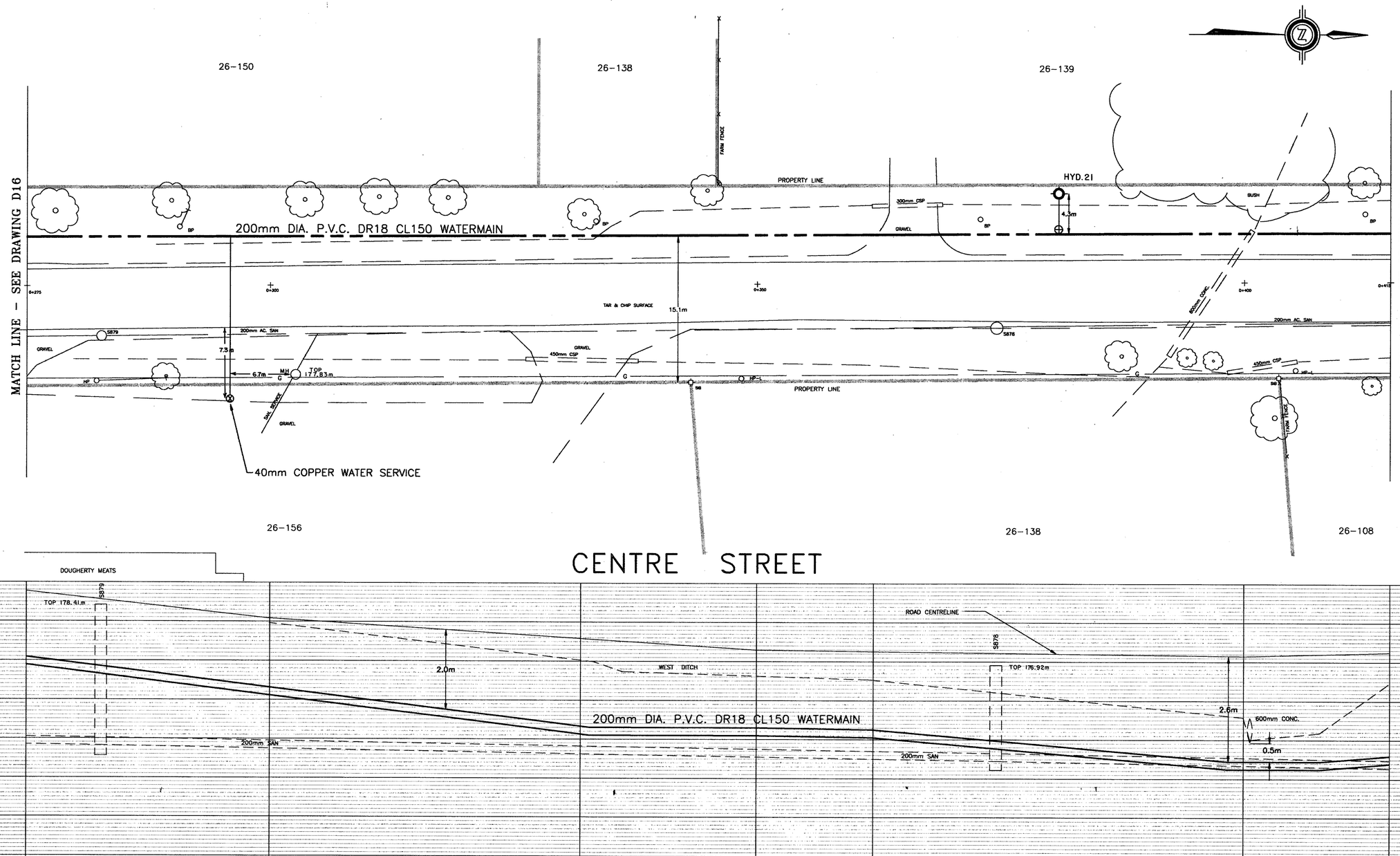
DATE	JULY, 1992	MUN. REF. №	
SCALE	HOR. 1:200 VER. 1:50	DRAWING №	D16

SUPERSEDES ALL DRAWINGS BEARING PREVIOUS REVISION NUMBERS
A1 | T1 | R1 | R2

FRAME SIZE 566 x 801 mm
DRAWING SIZE A1 (595 x 841 mm)

FILE NAME: D16-A9

239.18-A1-198



TOP OF WATERMAIN	178.80	176.30	175.30	175.30	174.45	174.80	TOP OF WATERMAIN
CENTRE OF ROAD ELEV.	178.80	178.10	177.30	177.15	177.25	CENTRE OF ROAD ELEV.
STATION	0+275	0+300	0+332	0+350	0+362	0+400	0+415	STATION

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DRAWING STATUS			INIT.
A1	1992 11 23	ISSUED FOR APPROVAL	WCH
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PROJ. MGR.

R. BEAULIEU
DESIGNER

R. BEAULIEU
DRAWN BY

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CITY OF THOROLD
ENGINEERING DEPT.

VILLAGE OF ALLANBURG
WATERMAIN SERVICING
PROJECT NO. 92-305
CENTRE STREET

Gore & Storrie Limited GS
Consulting Engineers

DATE JULY, 1992
MUN. REF. №
SCALE HOR. 1:200 VER. 1:50
DRAWING № D17

SUPERSEDES ALL DRAWINGS BEARING PREVIOUS REVISION NUMBERS
A1 T1 R1 R2

FRAME SIZE 566 x 801 mm
DRAWING SIZE A1 (595 x 841 mm)

FILE NAME: D17-AB

239.18-A1-199

APPENDIX B

21-248 Sanitary Sewer Design Sheet

SANITARY SEWER DESIGN SHEET

Date: 11/24/2022
Project: 21-148 Allanburg Towns, Centre Street
Town/County: Thorold, Niagara

Pipe Material: PVC
N 0.013

Designed by: NLB
Checked by: JI
Sheet: 1 of 1

Location				Area						Flow			Sewer Design							
Area	Street	From	To	Section	Cumul.	Section	Cumul	Total	M=Peak	Q(i)	Q(s)	Q(d)	Material	Size	Length	N	Slope	Cap	Q(d)/Cap	Full V
		MH	MH	Ha	Ha	Units	Units	Pop.	Factor	L/s	L/s	L/s		mm	m		%	L/s	%	m/s
SA1	-	SAMH2	SAMH1	0.80	0.80	15	15	60	4.298	0.229	0.821	1.050	PVC	200	58.7	0.013	1.04%	33.4	✓ 3.1%	1.06
	-	SAMH1	EX SEWER	0.00	0.80	0	15	60	4.298	0.229	0.821	1.050	PVC	200	4.8	0.013	1.00%	32.8	✓ 3.2%	1.04

Design Information:

Q(s) = Sewage Flow = P q M / 86.4
Q(i) = Infiltration Flow = I A
Q(d) = Peak Design Flow = Q(s) + Q(i)

P = Population in thousands
M = Peaking Factor = 1 + 14 / (4 + P^.5)
A = Tributary Area

q = Per Capita Flow= **275** L/cap d
I = Peak Extraneous Flow = **0.286** L/s/ha
Population Density **4** persons /unit (2 per bedroom per OBC)

APPENDIX C

21-248 Domestic Water Demand
21-248 FIG1 – Fire Separation Distances
21-248 FUS Calculations
21-248 OBC Calculations
Niagara Region Master Servicing Plan Existing System Fire Flow Map

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Subject:	Allanburg Towns, Centre Street		
Date:	11/24/2022	By:	NLB
Project #:	21-248	Page	

Average Daily Demand

Total Number of Units	15	units	
Zoning of Land	Residential		
Equiv. Population Density	4	ppl/unit	(Per OBC)
Equiv. Population	60		
Av. Daily Demand Per Capita	0.30	m^3/capita/day	
Average Daily Demand	18.00	m^3/day	
	0.21	l/s	

Maximum Day Demand

Total Number of Units	15	units
Zoning of Land	Residential	
Equiv. Population Density	4	ppl/ha
Equiv. Population	60	
Av. Daily Demand Per Capita	0.30	m^3/capita/day
Maximum Hourly Demand Peaking Factor	4	
Maximum Hourly Demand	3.00	m^3/hour
	0.83	l/s

LEGEND

- PROPERTY/CATCHMENT BOUNDARY
- PROPOSED FIREWALL

DATE	REVISION

Stamp

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

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Consulting Engineers, Architects & Planners

G. DOUGLAS VALLEE LIMITED
CONSULTING ENGINEERS AND ARCHITECT
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Project Title

ALLANBURG BUNGALOW TOWNS

2248 CENTRE STREET, THOROLD, NIAGARA

Drawing Title

FIRE SEPARATION DISTANCES

Designed by :	Drawn By :	Checked By :
N.L.B	N.L.B	J.T.I.
Scale : NTS	Date : NOV 2022	Drawing No. FIG1
Project No. 21-248		

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Subject:	Allanburg Towns, Centre Street		
Date:	Nov-22	By:	N.L.B
Project #:	21-248	Page:	1

Units 11-12

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C= 1.5 Construction coefficient for wood frame construction

276.0 Floor Area m^2 = main floor area

0.0 Floor Area m^2 = second floor area

A= 276.0 Fire Area m^2 = main floor area + second floor area

F_1= 5483 L/min

F_1= 5000 L/min (Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Residential Non-Combustible

Reduction: 25%

Surcharge: 0%

$F_2=F_1+(F_1$*Reduction/Surcharge) (L/min)

F_2= 3750 L/min

3) Sprinkler System

Sprikler System: Not Applicable (assumed no sprinkler system in service)

Reduction: 0%

$F_3=F_2$*Reduction (L/min)

F_3= 0 L/min

4) Seperation

Location	Direction	Distance (m)	Surcharge
Front	North	20.0	15%
Side	East	3.2	20%
Side	West	Firewall	0%
Rear	South	21.9	10%
		Total:	45%

Separation Surcharges	
0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
30.1 to 45m	5%

F4=(TOTAL)*F2 (L/min)

F_4= 1688 L/min

Total Fire Flow

$F=F_2-F_3+F_4$ = 5438 L/min

= 5000 L/min (Round to the nearest 1,000 l/min)

= **83.3 L/s**

Notes: 1) All calculations and factors from "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 1999

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Subject:	Allanburg Towns, Centre Street		
Date:	Nov-22	By:	NLB
Project #:	21-248	Page:	1

ON-SITE FIRE PROTECTION SUPPLY CALCULATION

Per Fire Protection Water Supply Guideline, Ontario Building Code Division 3, Part B, 3.2.5.7

Project:	21-248 Allanburg Towns	Building/Block #:	Units 11-12
Project Location:	Thorold, Niagara Region	Firewalls/Sprinkler:	

Conditions not requiring On-Site Fire Protection:

Building area is Less than 200 m^2 or Less	☐
Building height is 2 Storeys or Less	☑
Building does not have a Group B Occupancy (Care or Detention)	☑
Building does not require a sprinkler system or standpipe and hose system	☑
Limiting distance from the property line is at least 13 m if the building has an F-1 (high hazard industrial) occupancy	☑
Building constitutes no significant environmental contamination potential under fire conditions	☑
On-Site Supply Required?	**YES**

Calculation Information:

$$Q = K^* V * S_{Tot}$$

where: Q = Minimum supply of water in litres (L)
V = Total Building Volume in cubic metres
K = Water supply coefficient from Table 1
S_{Tot} = total of spatial coefficient values from property line exposures on all sides, as obtained from the formula:

$$S_{Tot} = 1.0 + [(S_{Side1}) + (S_{Side2}) + (S_{Side3}) + \ldots \text{ etc.}]$$

where: S_{Side} = values are obtained from Figure 1, as modified by Sections 6.3 (e) and 6.3 (f) of the OBC Guideline
S_{Tot} = need not exceed 2.0 (see Section 7.0 of the OBC Guideline)

Determining K Value:

Major Occupancy Classification	Residential Occupancies
Group	C
Division	-

Building is of combustible construction. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire resistance rating.

K Factor **23**

Determining Building Volume:

Average Length (m)	20.6
Average Width (m)	13.4
Height, including basements (m)	11.0

Building Volume (m^3) **3036**

Total Spatial Coefficient:

	Exposure Distance (m)	Factor
North Side	>10	0
East Side	3.2	0.7
South Side	>10	0
West Side	Firewall	0

S_{Tot} Factor **1.7**

Minimum Water Supply Flow:

Q (L) **118,725**

Minimum Water Supply Flow Rate OBC:

3600	**L/min**
60.0	**L/sec**

Table 2: Minimum Water Supply Flow Rates

Building Code, Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min.)
One-storey building with building area not exceeding 600m² (excluding F-1 occupancies)	1800
All other buildings	2700 (If **Q** ≤ 108,000L)(1)
	3600 (If **Q** > 108,000L **and** ≤ 135,000L)(1)
	4500 (If **Q** > 135,000L **and** ≤ 162,000L)(1)
	5400 (If **Q** > 162,000L **and** ≤ 190,000L)(1)
	6300 (If **Q** > 190,000L **and** ≤ 270,000L)(1)
	9000 (If **Q** > 270,000L)(1)

Note: (1) **$Q=KVS_{Tot}$** as referenced in Section 3(a)

Ontario Building Code Tables and Figures

XX

Table 3.1.2.1.
Major Occupancy Classification

Forming Part of Sentences 3.1.2.1.(1), 3.1.2.2.(1) and 3.11.2.1.(3)

Item	Column 1 Group	Column 2 Division	Column 3 Description of *Major Occupancies*
1.	A	1	*Assembly occupancies* intended for the production and viewing of the performing arts
2.	A	2	*Assembly occupancies* not elsewhere classified in Group A
3.	A	3	*Assembly occupancies* of the arena type
4.	A	4	*Assembly occupancies* in which occupants are gathered in the open air
5.	B	1	Detention occupancies
6.	B	2	Care and treatment occupancies
7.	B	3	Care occupancies
8.	C	---	Residential occupancies
9.	D	---	Business and personal services occupancies
10.	E	---	Mercantile occupancies
11.	F	1	High hazard industrial occupancies
12.	F	2	Medium hazard industrial occupancies
13.	F	3	Low hazard industrial occupancies

Table 2:
Minimum Water Supply Flow Rates

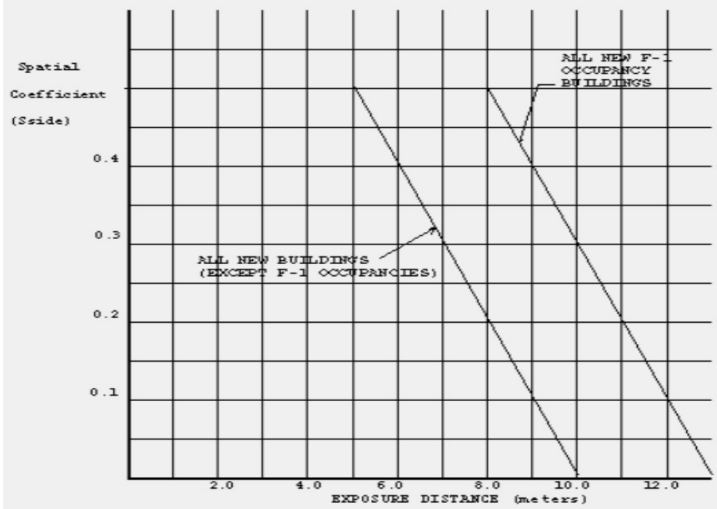
Building Code, Part 3 Buildings	**Required Minimum Water Supply Flow Rate (L/min.)**
One-storey building with building area not exceeding 600m² (excluding F-1 occupancies)	1800
All other buildings	2700 (If **Q** ≤ 108,000L)[1] 3600 (If **Q** > 108,000L **and** ≤ 135,000L)[1] 4500 (If **Q** > 135,000L **and** ≤ 162,000L)[1] 5400 (If **Q** > 162,000L **and** ≤ 190,000L)[1] 6300 (If **Q** > 190,000L **and** ≤ 270,000L)[1] 9000 (If **Q** > 270,000L)[1]

Note: [1] **$Q=KVS_{Tot}$** as referenced in Section 3(a)

Table 1:
Water Supply Coefficient - K

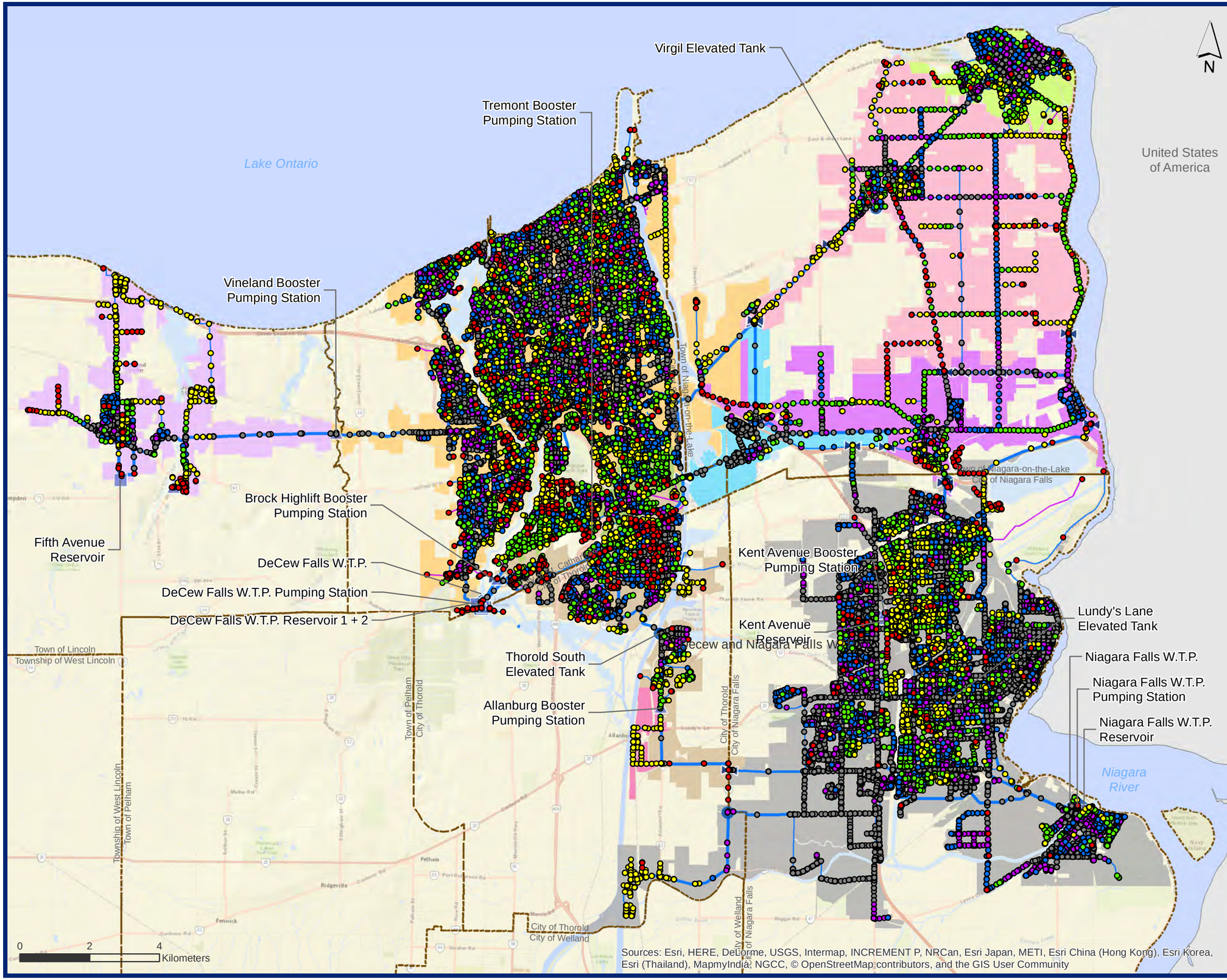
TYPE OF CONSTRUCTION	**Classification by Group or Division in Accordance with Table 3.1.2.1 of the Ontario Building Code**				
	A-2 B-1 B-2 B-3 C D	**A-4 F-3**	**A-1 A-3<**	**E F-2**	**F-1**
Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches.	10	12	14	17	23
Building is of noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6. of the OBC. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.	16	19	22	27	37
Building is of combustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire-resistance rating where permitted in Subsection 3.2.2. of the OBC.	18	22	25	31	41
Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.	23	28	32	39	53
Column 1	2	3	4	5	6

FIGURE 1
SPATIAL COEFFICIENT VS EXPOSURE DISTANCE



Niagara Region

2016 MASTER SERVICING PLAN



Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Water Facilities

- Water Treatment Plant
- Reservoir
- Elevated Tank
- Standpipe
- Chlorine Facility
- Pressure Reducing Valve

Pumping Station

- Regional
- Municipal

Water Network

- Regional
- Local
- Private

Pressure Zone System*

*Pressure zone limits are shown based on property boundaries.

127, 161, 180, 227, 144, 164, 200, 250, 154, 168, 220, 257

Available Fire Flow (L/s)

- < 50
- 50 - 100
- 100 - 150
- 150 - 200
- 200 - 250
- > 250

Figure 3.B.10

Existing System Fire Flow

Decew and Niagara Falls WTP

BluePlan ENGINEERING

May 2017
715023-W-6-Existing Fire Flow (DCNF)
NAD 1983 UTM Zone 17N