Functional Servicing Report for

333 Albert

333 Albert Street, City of Waterloo, Ontario

November 25, 2022

Revised March 9, 2023

Project Reference Number 20-235

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
85 McINTYRE DRIVE, KITCHENER, ONTARIO N2R 1H6
TELEPHONE (519) 748-1199 FAX (519) 748-6100

Table of Contents

Introduction 1
Background Information 1
Sanitary Servicing 2
Water Servicing 2
Stormwater Servicing 3
Conclusions 3

Appendices

Appendix A – Sanitary Sewer Design Sheet
Appendix B – Water Demand and Fire Flow Requirement Calculations

Tables

Table 1 – Peak Discharge Rates from Subject Property

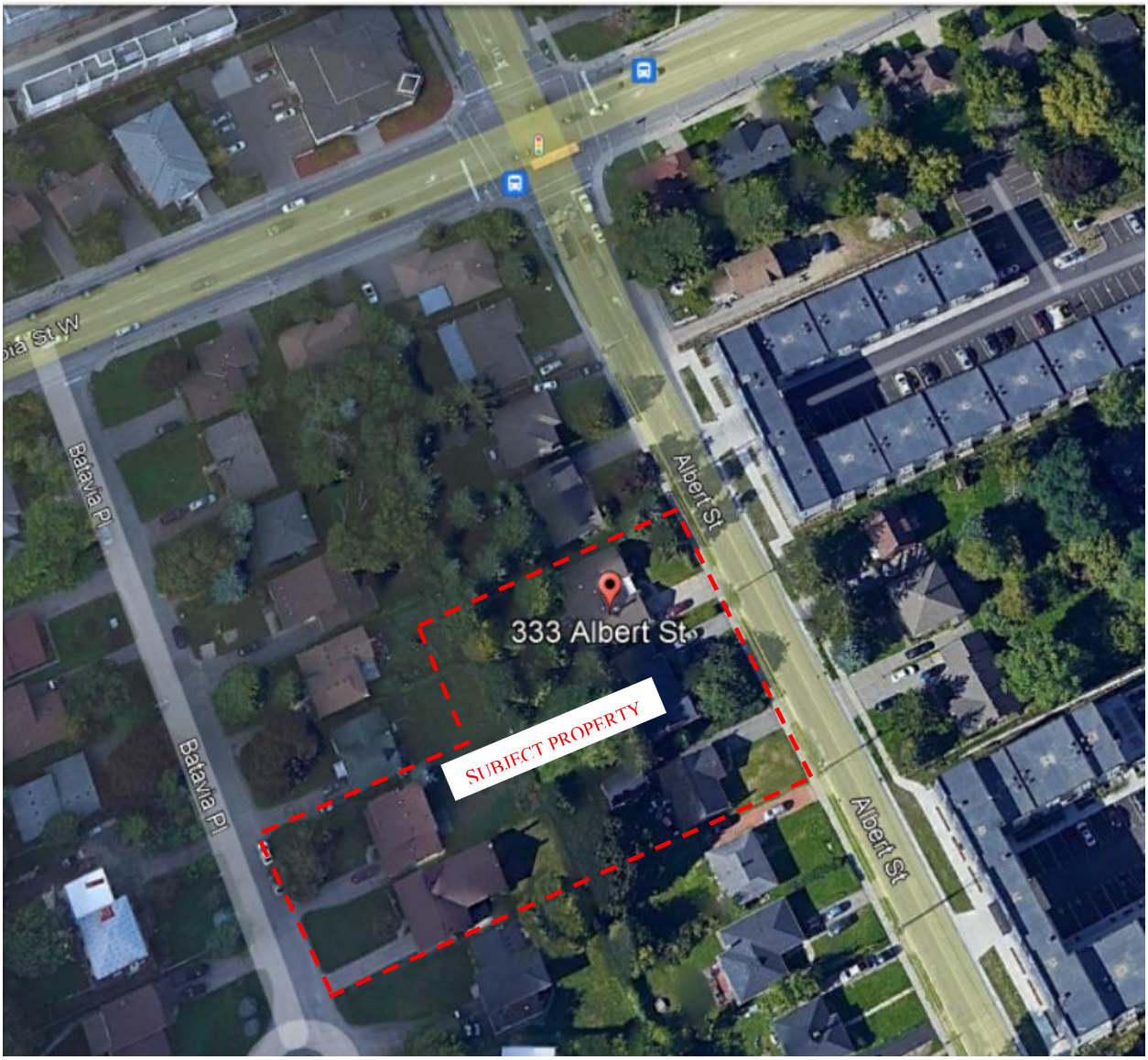
Introduction

This report will review the functional servicing for the proposed development at 333 Albert Street, City of Waterloo, Ontario.

Background Information

The subject property includes blocks 309-333 Albert Street, and 318-320 Batavia Place in City of Waterloo. The 0.357 ha property is located on the west side of Albert Street and east side of Batavia Place. The site is currently occupied by five (5) one to two story residential dwellings. Landscaping fills the property land except the access driveways. The proposed 6 story, 85 units building will replace the existing buildings. The subject property is bounded by Albert Street to the east, Batavia Place to the west, and existing residential buildings to the north and south. The site location is shown below.

Figure 1- Site Location



Sanitary Servicing

There is an existing 200 mm diameter sanitary sewer, which runs along the front property line on Batavia Place. The proposed 6 story building consists of 85 units. The wastewater flows from the proposed development are calculated using 2019-Region of Waterloo's Design Guidelines and City of Waterloo-Development Engineering Manual Part 7 guidelines. The residential sewage flow was calculated using the population density estimate of 1.76 persons per unit (apartments), an average flow of 275 L/c/d, and peaking factors according to Harmon formula. The commercial sewage flow was calculated using 0.95 L/s/ha and peaking factor of 2.5. An inflow and infiltration allowance of 0.25 L/s/ha was considered for calculating the total peak flows. The total peak flow from the proposed development was calculated to be 2.69 L/s.

The proposed 150 mm sanitary sewer will convey the building wastewater to the proposed manhole MH1A on Batavia Place.

The sanitary sewer design sheet for the proposed development is included in Appendix A.

Water Servicing

There is an existing 300 mm diameter watermain in Albert Street. A new 150mm diameter water service will be extended from the existing watermain to the building. The water service will provide for fire suppression and domestic water supply to the building.

The residential water demand was calculated based on historic information. The specific usage rate is 225 L/c/d as outlined in the Region's "Water Supply and Distribution Optimization Master Plan, 2015"

Residential Average Day Demand = 225 L/c/d
Residential Maximum Day Demand = 1.07 L/s

The commercial daily water demand was calculated based on Ministry of the Environment - Ontario Design Guidelines for Drinking-Water Systems 2008 - 3.4.3 Commercial and Institutional Water Demands.

Commercial Average Day Demand = 0.013 L/s

The Fire Flow was calculated using Ontario Building Code 3.2.5.7 Municipal Fire Flow Analysis. Total liters per minute required in the municipal water system is 9000 L/min at 20.3 Psi, which is less than total available water of 18057.663 L/min in the municipal water system of Albert Street or 10339.209 L/min in municipal water system of Batavia Place at 20.3 Psi.

Detailed Calculations are included in Appendix B.

Stormwater Servicing

The proposed development consists of a 6-storey building. The parking area will drain to the proposed catchbasin CB1 and the roof runoff drains to the underground chambers. The outflow of the catchbasin CB1 will be controlled by a 75 mm orifice before discharging to the proposed OGS unit. The underground chamber is equipped with a 110 mm orifice for quantity control. The OGS unit and underground chambers discharge to manhole MH2 and finally drain to manhole MH1 on Batavia Place. The manhole MH1 will finally drain to the existing catchbasin manhole CBMH on Batavia Place. The grading of the west and south landscapes will direct the runoff to catchbasin manhole CBMH. The front area of the building on the east side will drain directly to the existing catchbasins on Albert Street. The OGS structure will provide quality control prior to discharge to the proposed manhole MH2. The proposed stormwater management will result in a reduction in flows to municipal storm sewer system compared to the existing conditions.

Stormwater Management Design Criteria

Table 1: Peak Discharge Rates from Subject Property

Design Storm	Existing Condition			Proposed Condition		
	Total to Albert Street (m^3/sec)	*Total to Batavia Place* (m^3/sec)	*Total to Municipal Sewer System* (m^3/sec)	*Total to Albert Street* (m^3/sec)	*Total to Batavia Place* (m^3/sec)	*Total to Municipal Sewer System* (m^3/sec)
2 year	0.005	0.024	**0.029**	0.003	0.013	**0.016**
5 year	0.007	0.033	**0.040**	0.004	0.021	**0.025**
100 year	0.016	0.067	**0.083**	0.007	0.066	**0.073**

Full details of the stormwater management plan are included in the Stormwater Management Report prepared by K. Smart Associates Limited under a separate cover.

Conclusions

1. The proposed development will be serviced with a 150 mm diameter sanitary service to the existing 200 mm diameter sanitary sewer in Batavia Place.
2. The 6-story building of the proposed development will be serviced with a 150mm diameter water service connection. The water service will provide for fire suppression and domestic water supply. The water service will connect to the existing 300mm diameter watermain in Albert Street.
3. The proposed development will include stormwater management on site to provide quality and quantity control of runoff. Parking pond and underground chambers will control the runoff quantity. The outlets of the parking lot and underground chambers will finally discharge to the existing catchbasin manhole in Batavia Place.

Hossein Moarefi, P.Eng.
K. Smart Associates Limited



APPENDIX A

Sanitary Sewer Design Sheet

333 Albert Street, Waterloo

SANITARY SEWER DESIGN SHEET

K. Smart Associates Limited	
Project Number:	20-235
Date:	09-Mar-23
Designed by:	Hossein Moarefi, P. Eng.
Checked by:	David Harsch, P.Eng.

Residential Sewage Flow[1]	0.004	L/s/c (275 L/d/c)	
Density- one bedroom[2]	1.76	c/unit	
Building	Units: 85	Commercial Floor Area(ha):	0.039
Residential Peaking Factor	1+14/(4+sqrt(P)), P = Pop/1000		
Commercial Sewage Flow	0.95	L/s/ha (Core)	
Commercial Peaking Factor	2.5		
Infiltration[3]	0.25	L/s/ha	

LOCATION						SEWAGE FLOWS							SEWER DESIGN					
Street	From MH	To MH	Total Area (ha)	Comm. Floor Area (ha)	Total Pop.	Res. Peaking Factor	Average Res. Flow (L/s)	Peak Res. Flow (L/s)	Average Comm. Flow (L/s)	Peak Comm. Flow (L/s)	Infiltration (L/s)	Total Peak Flow (L/s)	Mannings 'n'	Pipe Size (mm)	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)
Batavia Place	building	MH1A	0.343	0.039	150	4.19	0.598	2.508	0.037	0.093	0.086	2.69	0.013	150	5.10	20.5	34.39	1.946

Notes:

1-Region of Waterloo and Area Municipalities - Design Guidelines and Supplemental Specifications - for Municipal Services - January 2019 (DGSSMS), Part B Design Guidelines - B.3.1.2.1 Residential

2- The City of Waterloo Development Engineering Manual 2013 Design 7.0 - Sanitary Sewers

3-Region of Waterloo and Area Municipalities - Design Guidelines and Supplemental Specifications - for Municipal Services - January 2019 (DGSSMS), Part B Design Guidelines - B.3.1.2.6 Extraneous Flows

APPENDIX B

Water Demand and Fire Flow Requirement Calculations

WATER DEMAND CALCULATIONS

333 Albert Street, City of Waterloo

K. Smart Associates Limited	
Project Number:	20-235
Date:	25-Nov-22
Designed by:	Hossein Moarefi, P. Eng.
Checked by:	David Harsch, P.Eng.

Residential		
Number of units	85	
Population density	1.76	persons per unit
Residential Average Daily Demand[1]	225	L/c/d
Residential Peaking Factor:	2.75	
Max. Daily Water Demand:	1.071	L/s

Commercial		
Commmercial area	0.039	ha
Commercial Average Daily Demand1[2]:	28	m^3/ha/d
Average Daily Water Demand:	0.013	L/s

Notes:

1- 2019 DGSSMS - Region of Waterloo and Area Municipalities - Design Guidelines and Supplemental Specifications for Municipal Services - January 2019 - B.2.2.2 Domestic

2- Ministry of the Environment - Ontario Design Guidelines for Drinking-Water Systems 2008 - 3.4.3 Commercial and Institutional Water Demands

STUMPF
FIRE PROTECTION LIMITED
167 LEXINGTON CT., UNIT 1
WATERLOO, ON N2J 4R9
PHONE: (519) 888-0043
FAX: (519) 888-9961
WWW.STUMPFFIRE.COM

CASA
Canadian Automatic Sprinkler Association

ONTARIO BUILDING CODE 3.2.5.7 MUNICIPAL FIRE FLOW ANALYSIS REPORT

1.01 BUILDING NAME: **333 Albert Inc**

1.02 ADDRESS: **333 Albert St, Waterloo, Ontario**

1.03 ATTACHMENTS:

Y N SITE PLAN C/W REQUIRED FIRE HYDRANT LOCATIONS (OBC 3.2.5.7 (2), 3.2.5.16 (1), 3.2.5.16 (2) AND THE WATER FLOW TEST AND RESIDUAL HYDRANT LOCATIONS.

Y N WATER FLOW TEST (FLOW AND RESIDUAL DATA C/W GRAPH.)

1.04 BUILDING CODE CLASSIFICATION: **A2, C & F2**, TYPE OF CONSTRUCTION: O.B.C 3.2.2#**(24)(43)(57)(67)**

1.05 BUILDING AREA IN SQUARE METERS = **2,971.31m²**

1.06 BUILDING VOLUME IN CUBIC METRES = **26,500m³**

Y N BUILDING WILL HAVE 100% SPRINKLER PROTECTION IN ACCORDANCE WITH THE ONTARIO BUILDING CODE AND REFERENCED N.F.P.A STANDARDS. ENGINEERED SPRINKLER DRAWINGS AND HYDRAULIC CALCULATIONS WILL BE SUBMITTED UNDER SEPARATE COVER TO THE BUILDING DEPARTMENT FOR APPROVAL WHEN COMPLETED. **(FIRE FLOW ANALYSIS NOT REQUIRED)**

Y N PRIVATE FIRE HYDRANT(S) AND SPRINKLER SYSTEM(S) TO BE CONNECTED TO THE MUNICIPAL WATER SYSTEM AND CALCULATED WITH A DEMAND LESS THAN THAT AVAILABLE.

Y N PRIVATE FIRE HYDRANT(S) AND SPRINKLER SYSTEM(S) WILL BE CONNECTED TO AN INDEPENDENT WATER SOURCE FROM THE MUNICIPAL SYSTEM.

1.07 CALCULATION: Q=KxVxStot (Q=MINIMUM SUPPLY OF WATER IN LITRES, K=WATER SUPPLY COEFFICIENT FROM TABLE 1, V=TOTAL BUILDING VOLUME IN CUBIC METRES, Stot=TOTAL SPATIAL COEFFICIENT VALUES FROM PROPERTY LINE EXPOSURES ON ALL SIDES AS OBTAINED FROM FORMULA: Stot=1.0 + (SIDE1+SIDE2+SIDE3+SIDE4) MINIMUM=1 MAXIMUM=2.0

Q=K@ (17) x V@ 26,500m³ x Stot@ (2) = 901,000 LITRES

Stot = 1+ (.5) S1+ (.5) S2+ (.5) S3+ (0.0) S4 = 2.5

1.08 TOTAL LITRES PER MINUTE REQUIRED IN THE MUNICIPAL WATER SYSTEM AS PER TABLE 2 = **9,000** LITRES PER MINUTE AT 140 KPA (20.3PSI).

1.09 TOTAL LITRES PER MINUTE AVAILABLE IN THE MUNICIPAL WATER SYSTEM = **Albert St 18,057.663** or **Batavia 10,339.209**, LITRES PER MINUTE AT 140KPA (20.3PSI).

1.10 TOTAL STORED LITRES REQUIRED ON SITE IF NOT SUFFICIENT MUNICIPAL WATER = ...
1.8 – 1.9 - .....LITRES x 30 MINUTES = ... LITRES.

COMPLETED BY: (print) **Jeff Hayhurst** DATE: **Nov. 16, 22**

REGISTERED PROFESSIONAL ENGINEER
G. N. CATT
PROVINCE OF ONTARIO

STUMPF
FIRE PROTECTION LIMITED

WWW.STUMPFFIRE.COM • 167 LEXINGTON CT., UNIT 1 • WATERLOO, ON N2J 4R9 • PHONE: 519-888-0043 • FAX: 519-888-9961

PG Design Studio Inc
256 Columbia St W
Waterloo, Ontario

November 16, 2022

Attn: Project Manager

Re: 333 Albert st – Hydrant Flow Test

Hydrant flow test was completed for the above project on November 7, 2022 at approx. 11:00am

Test #1

Static: 48 PSI (Hyd#324 on Albert St)

Test Hydrant: Hydrant #324 (Albert St)
Flow Hydrant: Hydrant #330 (Albert St)

Residual: 44 PS
Pitot: 28 PSI
Flow: 987 USGPM

Results are from (1) 2-1/2" hydrant port.

Residual: 43 PSI
Pitot: 20/20 PSI
Flow: 1668 USGPM (834 ea. Port)

Results are from (2) 2-1/2" hydrant ports.

GPM's are from Table 4.10.1(a) of the NFPA 291, 2002 Edition.

If you any question, please feel free to call.

Sincerely
Jeff Hayhurst, Designer, STUMPF FIRE PROTECTION

Cc: Scott Donelle scott.donelle@waterloo.ca
Jeff Schultz jeff.schultz@waterloo.ca

U.A. LOCAL 853 SPRINKLER FITTERS ONTARIO 19 76
CASA Canadian Automatic Sprinkler Association MEMBER
CANADIAN FIRE ALARM ASSOCIATION CFAA

STUMPF
FIRE PROTECTION LIMITED

WWW.STUMPFFIRE.COM • 167 LEXINGTON CT., UNIT 1 • WATERLOO, ON N2J 4R9 • PHONE: 519-888-0043 • FAX: 519-888-9961

PG Design Studio Inc
256 Columbia St W
Waterloo, Ontario

November 16, 2022

Attn: Project Manager

Re: 333 Albert st – Hydrant Flow Test

Hydrant flow test was completed for the above project on November 7, 2022 at approx. 11:00am

Test #2

Static: 52 PSI (Hyd#326 on Sunview St)

Test Hydrant: Hydrant #326 (Sunview St)
Flow Hydrant: Hydrant #334 (Batavia St)

Residual: 47 PS
Pitot: 24 PSI
Flow: 914 USGPM

Results are from (1) 2-1/2" hydrant port.

Residual: 44 PSI
Pitot: 12/12 PSI
Flow: 1292 USGPM (646 ea. Port)

Results are from (2) 2-1/2" hydrant ports.

GPM's are from Table 4.10.1(a) of the NFPA 291, 2002 Edition.

If you any question, please feel free to call.

Sincerely
Jeff Hayhurst, Designer, STUMPF FIRE PROTECTION

Cc: Scott Donelle scott.donelle@waterloo.ca
Jeff Schultz jeff.schultz@waterloo.ca

U.A. LOCAL 853 SPRINKLER FITTERS ONTARIO 19 76
CASA Canadian Automatic Sprinkler Association MEMBER
CANADIAN FIRE ALARM ASSOCIATION CFAA