



Watermain Distribution Analysis

**216 Centennial Avenue, Central Elgin
Len Graat**

LDS PROJECT NO. LD-00303

AUGUST 18, 2023

Submitted to:

MUNICIPALITY OF CENTRAL ELGIN

1.0 INTRODUCTION

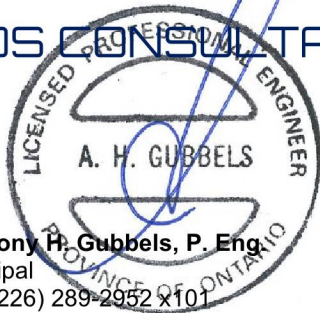
LDS Consultants Inc. (LDS) has been retained by Len (Leonard) Graat to investigate and confirm there is adequate domestic and fire flow water supply to the proposed 8 unit development. To provide the most accurate modelling results, we modelled the watermain source from the fire flows test results at the fire hydrant nearest to the site entrance.

The report materials that follow demonstrates the proposed watermain distribution strategy for the development area has adequate water pressures and flows, which are being supplied from the existing 450mm diameter source connection on Centennial Avenue.

We would be pleased to address any questions that might arise related to the specific details of this application.

All of which is respectfully submitted,

LDS CONSULTANTS INC.



Anthony H. Gubbels, P. Eng.
Principal
Tel: (226) 289-2952 x101
anthony.gubbels@LDSconsultants.ca

216 Centennial Avenue - Water Distribution Report

Len Graat

Water Demand Summary

LD-00303

August 17, 2023



City of St. Thomas	
Average day demands	270 L/cap/day
Fire underwriters survey (1999) (single family)	5,000 L/min.
Maximum day peaking factor	3.5
Maximum hour peaking factor	7.8
Minimum maximum hour pressure	40 psi.
Minimum maximum day + fire pressure	20 psi.
Maximum velocity - peak hour	1.55 m/s
Maximum velocity - fire demand	3.0 m/s
<u>Hazen-Williams C factor for watermains:</u>	
100-150mm diameter	100.0
200-250mm diameter	110.0
300-600mm diameter	120.0
Greater than 600mm	130.0

Assumed unlimited capacity from fire flow results at hydrant H896

Base Demand (8 lots x 3.0 persons/S.F. lot)	24 persons	=	4.5	L/min.
Peak Hour Demand		=	35.1	L/min.
Max Day + Single Family Fire		=	5,015.8	L/min.

Fire Flow Demands for Single Family Home

$$F = 220C\sqrt{A}$$

$$A = 156\text{m}^2 \times 2 \text{ floors} = 312 \text{ m}^2$$

$$C = 1.0$$

$$F = 220 \times 1.0 \times \sqrt{312} = 3,886 \text{ L/min.}$$

Less non-combustible occupancy rating (-25%)

$$= 3,886 - 25\% = 2,914.5 \text{ L/min.}$$

Plus side exposure (25% + 25% + 10% + 10%) = 70%

$$= 2,914.5 + 70\% = 4,954.6 \text{ L/min.}$$

Therefore fire flow demand = 5,000 L/min.

Results

Peak Hour:

All requirements were met and fall within the allowable pressure and velocity constraints under the peak hour demand scenario.

Max Day + Fire:

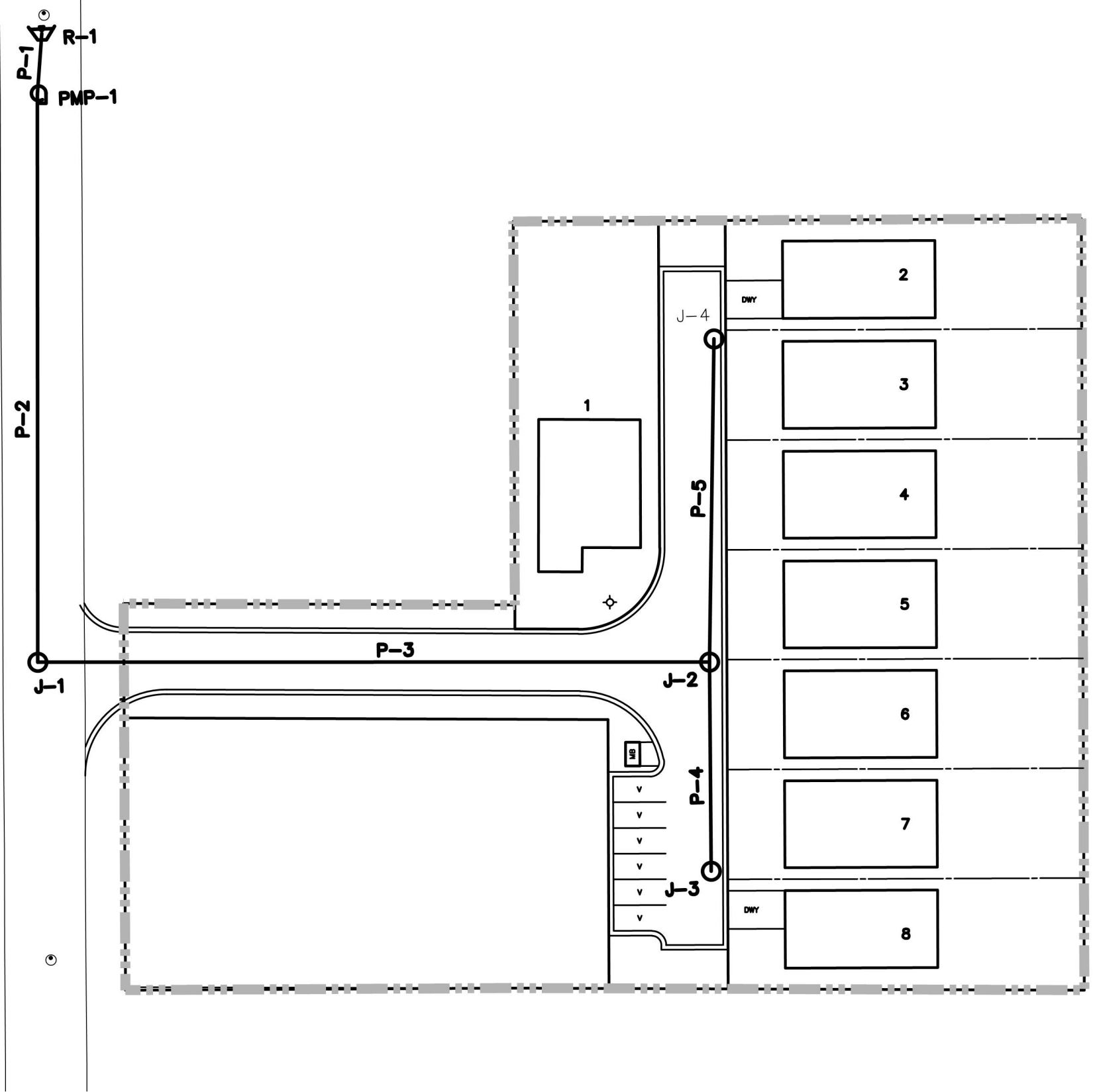
All requirements were met and fall within the allowable pressure and velocity constraints under the maximum day + fire demand scenario.

Age Analysis:

Water age analysis confirms the water turn-over rate is less than the maximum 72 hours in all pipes.



CENTENNIAL AVENUE



LEGEND

- PMP-1 DENOTES PUMP
- R-1 DENOTES RESERVOIR
- J-31 DENOTES JUNCTION/NODE
- P-28 DENOTES PIPE

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2023-06-16 11:56:58 AM BY: BETHAMER

EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION	DETAILS	No.	REVISIONS	DATE	CONSULTANT
					DESIGN	AB			
					DRAWN BY	SB			
					CHECKED	SB			
					APPROVED	AB			
					DATE	2023-06-16			
					00303_WM Plan.dwg				

CONSULTANT OR DIVISION

LDS

ENGINEER'S STAMP

AUG. 2023

SCALE

TITLE

216 CENTENNIAL AVENUE
MUNICIPALITY OF CENTRAL ELGIN

WATER DISTRIBUTION PLAN

PROJECT No. LD-00303

SHEET No. WM1

PLAN FILE No.

Active Scenario: Peak Hour
FlexTable: Junction Table

Label	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (psi)
J-1	243.30	0.00	279.10	50.8
J-2	241.90	17.55	279.10	52.8
J-3	241.90	8.81	279.09	52.8
J-4	241.90	8.81	279.08	52.8

Active Scenario: Peak Hour

FlexTable: Pipe Table

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Material	Hazen- Williams C	Flow (L/min)	Velocity (m/s)
P-4	22	J-2	J-3	50.0	PVC	90.0	8.81	0.07
P-5	34	J-2	J-4	50.0	PVC	90.0	8.81	0.07
P-1	5	R-1	PMP-1	900.0	PVC	150.0	35.18	0.00
P-2	84	PMP-1	J-1	450.0	PVC	150.0	35.18	0.00
P-3	70	J-1	J-2	200.0	PVC	110.0	35.18	0.02

Active Scenario: Max Day + Fire J-2

FlexTable: Junction Table

Label	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (psi)
J-1	243.30	0.00	274.32	44.0
J-2	241.90	5,007.87	271.13	41.5
J-3	241.90	3.96	271.13	41.5
J-4	241.90	3.96	271.13	41.5

Active Scenario: Max Day + Fire J-2

FlexTable: Pipe Table

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Flow (L/min)	Velocity (m/s)
P-4	22	J-2	J-3	50.0	PVC	90.0	3.96	0.03
P-5	34	J-2	J-4	50.0	PVC	90.0	3.96	0.03
P-1	5	R-1	PMP-1	900.0	PVC	150.0	5,015.78	0.13
P-2	84	PMP-1	J-1	450.0	PVC	150.0	5,015.78	0.53
P-3	70	J-1	J-2	200.0	PVC	110.0	5,015.78	2.66

Active Scenario: Age Analysis

FlexTable: Pipe Table

Current Time: 72.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Flow (L/min)	Velocity (m/s)	Age (Calculated) (hours)
P-4	22	J-2	J-3	50.0	PVC	90.0	1.13	0.01	70.547
P-5	34	J-2	J-4	50.0	PVC	90.0	1.13	0.01	70.719
P-1	5	R-1	PMP-1	900.0	PVC	150.0	4.51	0.00	6.269
P-2	84	PMP-1	J-1	450.0	PVC	150.0	4.51	0.00	37.315
P-3	70	J-1	J-2	200.0	PVC	110.0	4.51	0.00	66.135

