



Watermain Distribution Report

**Elmhurst Street, Kilworth
Sweid Holdings Inc.**

LDS PROJECT NO. LD-00203

NOVEMBER 11, 2022

Submitted to:

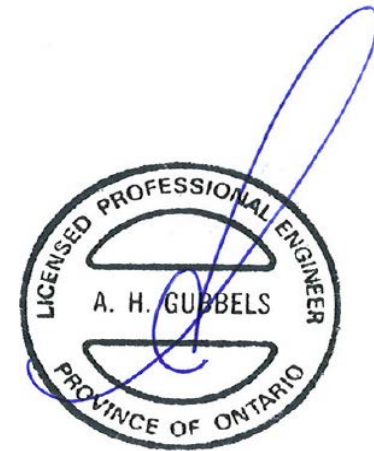
MUNICIPALITY OF MIDDLESEX CENTRE

**Elmhurst Street
Water Demand Summary & Results
161400203**

November 11, 2022



Middlesex Centre Design Criteria	
Average day demands	350 L/cap/day
Fire flow (single family) OBC	3,600 L/min.
Fire flow (medium density) OBC	3,600 L/min.
Maximum day peaking factor	2.75
Maximum hour peaking factor	4.13
Minimum maximum hour pressure	40 psi.
Minimum maximum day + fire pressure	20 psi.
Maximum maximum hour velocity	1.5 m/s
Maximum maximum day + fire velocity	2.4 m/s
<u>Hazen-Williams C factor for watermains:</u>	
100-150mm diameter	100.0
200-250mm diameter	110.0
300-450mm diameter	120.0
600mm and larger	130.0



Assumed unlimited capacity from flow test at hydrant K-42

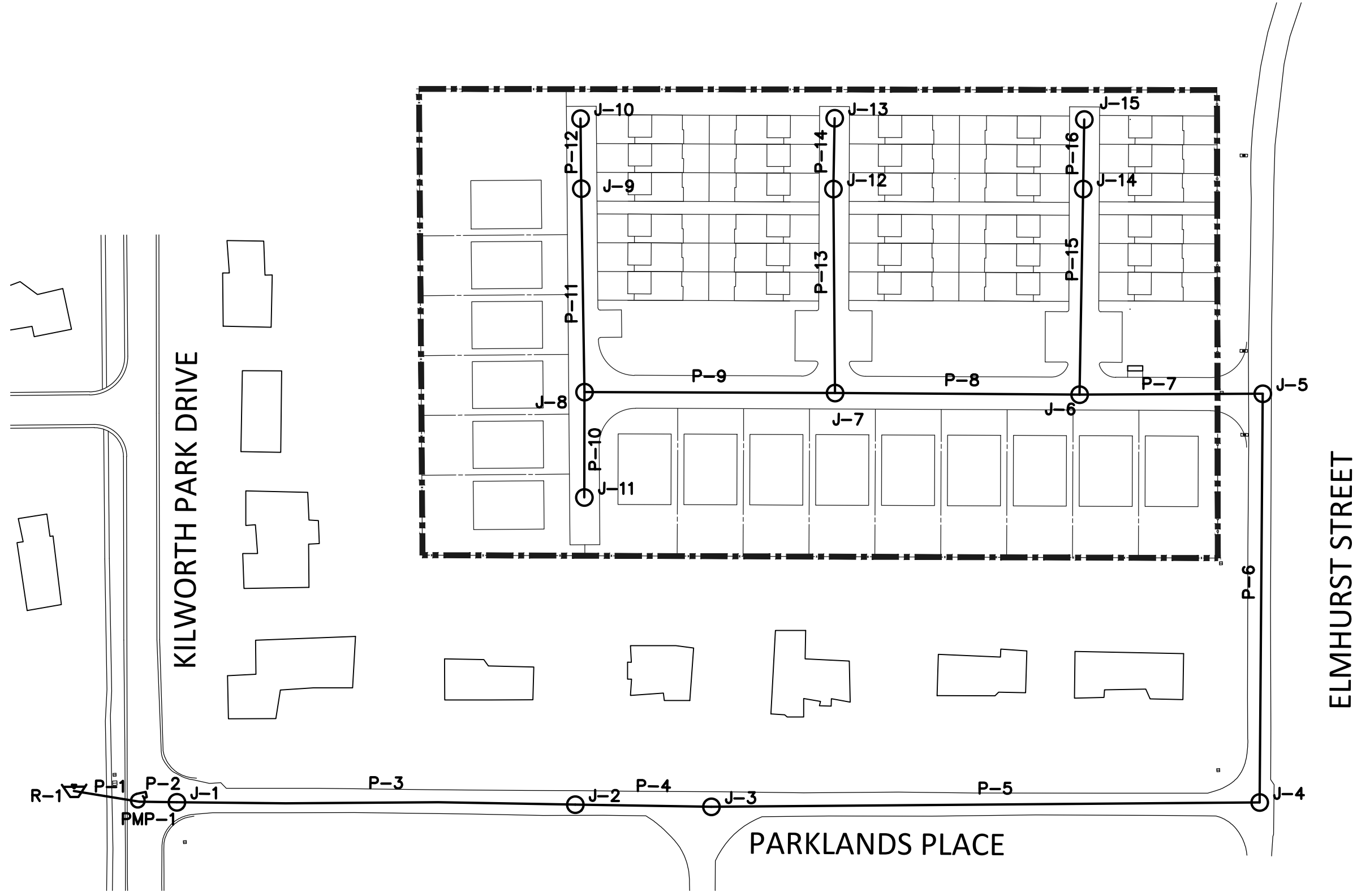
Medium Density Units	(30x2.4)=	72	
Single Family Units	(15x3)=	45	
Average day demand		117 persons	= 28.4 L/min.
Peak Hour Demand		117 persons x 4.13	= 117.4 L/min.
Maximum Day Demand		117 persons x 2.75	= 78.2 L/min.
Fire Demand			= 3,600.0 L/min.
Maximum Day + Fire Demand			= 3,678.2 L/min.

Results

- All Middlesex Centre requirements were met and fall within the allowable velocity constraints under the peak hour demand scenario.
- All Middlesex Centre requirements were met and fall within the allowable pressure constraints under the maximum day + fire demand scenario.
- Water age analysis confirms the water turn-over rate is less than the maximum 72 hours in all pipes.

Fire Hydrant Ratings

Hydrant J-6 at 20 psi	4,271 L/min	=	Class A - Green markers required
Hydrant J-8 at 20 psi	3,964 L/min	=	Class A - Green markers required



21.014-0003 - ELMHURST, KILWORTH WATER DISTRIBUTION PLAN WATER DISTRIBUTION PLAN
 2021-11-11 10:52:25 AM BY: [unreadable]

EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION	DETAILS	No.	REVISIONS	DATE	CONSULTANT	CONSULTANT OR DIVISION	ENGINEER'S STAMP	SCALE	TITLE	PROJECT No.				
					DESIGN	AH					ENGINEER'S STAMP	NOT TO SCALE	ELMHURST STREET, KILWORTH SWEID HOLDING INC.	LD-00203				
				DRAWN BY	AH												SHEET No.	
				CHECKED	AG													WM-1
				APPROVED	AG													PLAN FILE No.
				DATE	2021-07-09													
LD00203_Water Distribution Planning																		

Active Scenario: Peak Hour
FlexTable: Junction Table

Label	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (psi)
J-1	238.40	0.00	284.14	65
J-2	238.50	0.00	284.14	65
J-3	238.50	0.00	284.14	65
J-4	239.40	0.00	284.13	63
J-5	240.40	0.00	284.13	62
J-6	241.20	12.06	284.12	61
J-7	241.40	12.06	284.12	61
J-8	241.60	7.39	284.12	60
J-9	241.30	15.65	284.12	61
J-10	241.20	4.83	284.12	61
J-11	241.00	6.03	284.12	61
J-12	241.70	19.29	284.12	60
J-13	241.80	9.62	284.11	60
J-14	241.80	20.69	284.12	60
J-15	241.90	9.62	284.11	60

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-1	14	R-1	PMP-1	1,200.0	PVC	120.0	117.25	0.00
P-2	12	PMP-1	J-1	200.0	PVC	110.0	117.25	0.06
P-3	93	J-1	J-2	200.0	PVC	110.0	117.25	0.06
P-4	32	J-2	J-3	200.0	PVC	110.0	117.25	0.06
P-5	130	J-3	J-4	200.0	PVC	110.0	117.25	0.06
P-6	95	J-4	J-5	200.0	PVC	110.0	117.25	0.06
P-7	43	J-5	J-6	200.0	PVC	110.0	117.25	0.06
P-8	58	J-6	J-7	200.0	PVC	110.0	74.88	0.04
P-9	60	J-7	J-8	200.0	PVC	110.0	33.91	0.02
P-10	27	J-8	J-11	50.0	PVC	90.0	6.03	0.05
P-11	47	J-8	J-9	100.0	PVC	100.0	20.48	0.04
P-12	17	J-9	J-10	50.0	PVC	90.0	4.83	0.04
P-13	48	J-7	J-12	100.0	PVC	100.0	28.91	0.06
P-14	14	J-12	J-13	50.0	PVC	90.0	9.62	0.08
P-15	50	J-14	J-6	100.0	PVC	100.0	-30.31	0.06
P-16	15	J-15	J-14	50.0	PVC	90.0	-9.62	0.08

Active Scenario: Max Day + Fire at J6

FlexTable: Junction Table

Label	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (psi)
J-1	238.40	0.00	272.87	49
J-2	238.50	0.00	270.50	45
J-3	238.50	0.00	269.69	44
J-4	239.40	0.00	266.38	38
J-5	240.40	0.00	263.96	33
J-6	241.20	3,608.03	262.87	31
J-7	241.40	8.03	262.87	30
J-8	241.60	4.92	262.87	30
J-9	241.30	10.42	262.87	31
J-10	241.20	3.22	262.87	31
J-11	241.00	4.01	262.87	31
J-12	241.70	12.84	262.87	30
J-13	241.80	6.41	262.87	30
J-14	241.80	13.78	262.87	30
J-15	241.90	6.41	262.87	30

Active Scenario: Max Day + Fire at J6

FlexTable: Pipe Table

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Material	Hazen- Williams C	Flow (L/min)	Velocity (m/s)
P-1	14	R-1	PMP-1	1,200.0	PVC	120.0	3,678.07	0.05
P-2	12	PMP-1	J-1	200.0	PVC	110.0	3,678.07	1.95
P-3	93	J-1	J-2	200.0	PVC	110.0	3,678.07	1.95
P-4	32	J-2	J-3	200.0	PVC	110.0	3,678.07	1.95
P-5	130	J-3	J-4	200.0	PVC	110.0	3,678.07	1.95
P-6	95	J-4	J-5	200.0	PVC	110.0	3,678.07	1.95
P-7	43	J-5	J-6	200.0	PVC	110.0	3,678.07	1.95
P-8	58	J-6	J-7	200.0	PVC	110.0	49.86	0.03
P-9	60	J-7	J-8	200.0	PVC	110.0	22.58	0.01
P-10	27	J-8	J-11	50.0	PVC	90.0	4.01	0.03
P-11	47	J-8	J-9	100.0	PVC	100.0	13.64	0.03
P-12	17	J-9	J-10	50.0	PVC	90.0	3.22	0.03
P-13	48	J-7	J-12	100.0	PVC	100.0	19.25	0.04
P-14	14	J-12	J-13	50.0	PVC	90.0	6.41	0.05
P-15	50	J-14	J-6	100.0	PVC	100.0	-20.18	0.04
P-16	15	J-15	J-14	50.0	PVC	90.0	-6.41	0.05

Active Scenario: Max Day + Fire at J8

FlexTable: Junction Table

Label	Elevation (m)	Demand (L/min)	Hydraulic Grade (m)	Pressure (psi)
J-1	238.40	0.00	272.88	49
J-2	238.50	0.00	270.50	45
J-3	238.50	0.00	269.69	44
J-4	239.40	0.00	266.38	38
J-5	240.40	0.00	263.97	33
J-6	241.20	8.03	262.88	31
J-7	241.40	8.03	261.43	28
J-8	241.60	3,604.29	259.95	26
J-9	241.30	10.42	259.95	26
J-10	241.20	3.22	259.95	27
J-11	241.00	4.01	259.95	27
J-12	241.70	12.84	261.42	28
J-13	241.80	6.41	261.42	28
J-14	241.80	13.78	262.88	30
J-15	241.90	6.41	262.87	30

Active Scenario: Max Day + Fire at J8

FlexTable: Pipe Table

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Material	Hazen- Williams C	Flow (L/min)	Velocity (m/s)
P-1	14	R-1	PMP-1	1,200.0	PVC	120.0	3,677.44	0.05
P-2	12	PMP-1	J-1	200.0	PVC	110.0	3,677.44	1.95
P-3	93	J-1	J-2	200.0	PVC	110.0	3,677.44	1.95
P-4	32	J-2	J-3	200.0	PVC	110.0	3,677.44	1.95
P-5	130	J-3	J-4	200.0	PVC	110.0	3,677.44	1.95
P-6	95	J-4	J-5	200.0	PVC	110.0	3,677.44	1.95
P-7	43	J-5	J-6	200.0	PVC	110.0	3,677.44	1.95
P-8	58	J-6	J-7	200.0	PVC	110.0	3,649.22	1.94
P-9	60	J-7	J-8	200.0	PVC	110.0	3,621.94	1.92
P-10	27	J-8	J-11	50.0	PVC	90.0	4.01	0.03
P-11	47	J-8	J-9	100.0	PVC	100.0	13.64	0.03
P-12	17	J-9	J-10	50.0	PVC	90.0	3.22	0.03
P-13	48	J-7	J-12	100.0	PVC	100.0	19.25	0.04
P-14	14	J-12	J-13	50.0	PVC	90.0	6.41	0.05
P-15	50	J-14	J-6	100.0	PVC	100.0	-20.18	0.04
P-16	15	J-15	J-14	50.0	PVC	90.0	-6.41	0.05

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-1	14	R-1	PMP-1	1,200.0	PVC	120.0	28.39	0.00	4.542
P-2	12	PMP-1	J-1	200.0	PVC	110.0	28.39	0.02	9.244
P-3	93	J-1	J-2	200.0	PVC	110.0	28.39	0.02	10.208
P-4	32	J-2	J-3	200.0	PVC	110.0	28.39	0.02	11.362
P-5	130	J-3	J-4	200.0	PVC	110.0	28.39	0.02	12.851
P-6	95	J-4	J-5	200.0	PVC	110.0	28.39	0.02	14.922
P-7	43	J-5	J-6	200.0	PVC	110.0	28.39	0.02	16.188
P-8	58	J-6	J-7	200.0	PVC	110.0	18.13	0.01	17.419
P-9	60	J-7	J-8	200.0	PVC	110.0	8.21	0.00	20.153
P-10	27	J-8	J-11	50.0	PVC	90.0	1.46	0.01	22.357
P-11	47	J-8	J-9	100.0	PVC	100.0	4.96	0.01	22.676
P-12	17	J-9	J-10	50.0	PVC	90.0	1.17	0.01	23.544
P-13	48	J-7	J-12	100.0	PVC	100.0	7.00	0.01	18.708
P-14	14	J-12	J-13	50.0	PVC	90.0	2.33	0.02	19.262
P-15	50	J-14	J-6	100.0	PVC	100.0	-7.34	0.02	17.025
P-16	15	J-15	J-14	50.0	PVC	90.0	-2.33	0.02	17.576



The following calculations were used to determine required fire flow demands as per Ontario Building Code:

Condo Building	
Building Area	258
Height (3 levels + pitched roof)	9.4
Volume	2425.2
Occupancy	C
K (from occupancy chart)	23
<u>S (tot)</u>	1
side yard	0.5
side yard	0.5
front yard	0
back yard	0
S (total) (cannot exceed 2.0)	2
Q= Formula	Q=KxVxS(total) 111,559.20
"Q" is less than 135,000L, therefore 3,600 L/min is the minimum requirement	

Single Family Building	
Building Area	272
Height (3 levels + pitched roof)	9.4
Volume	2556.8
Occupancy	C
K (from occupancy chart)	23
<u>S (tot)</u>	1
side yard	0.5
side yard	0.5
front yard	0
back yard	0.15
S (total) (cannot exceed 2.0)	2
Q= Formula	Q=KxVxS(total) 117,612.80
"Q" is less than 135,000L, therefore 3,600 L/min is the minimum requirement	



Fire Flow Testing Report

Residual Hydrant #
NFWA Colour Code

Ki-42
BLUE

RESIDUAL HYDRANT INFO.

HYDRANT # Ki-42
 N.F.P.A. COLOUR CODE BLUE
 STATIC PRESSURE 65.0 psi
 RESIDUAL PRESSURE 34.6 psi
 PRESSURE DROP 30.38 psi
 % PRESSURE DROP 46.8 % psi

DATE 12-Jan-20
 TIME 11:15 AM

ADDRESS 56 Kilworth Park Dr
Middlesex, ON

SIZE-inches/mm 6 150

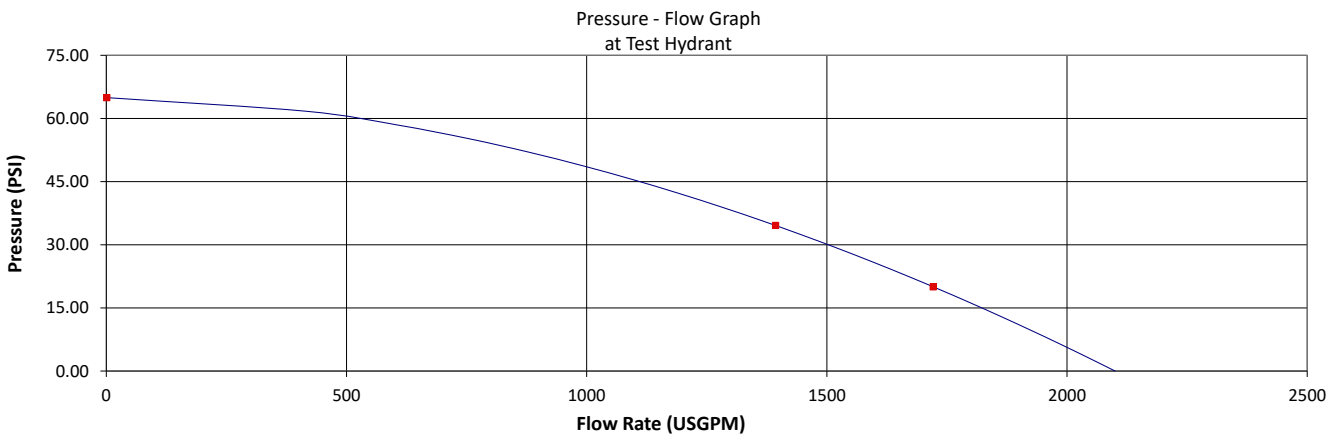
LDS Consultants Inc
Abe Harder
C: (519) 537-0045
E: abe.harder@LDSconsultants.ca

Flow on Water Main At Test Hydrant - 20 psi 1722 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)
Ki-58	2	2.5	Round	LPD250	0.90	5.3	697	0
		2.5	Round	LPD250	0.90	5.3	697	0
								0
								0
Total Flow (USGPM)							1393	0
Total Flow (USGPM)							1393	

FIRE FLOW CHART



COMMENTS

Pumps were turned off.

OPERATOR FMX Jordan Withlock
 OPERATOR FMX Scott Withlock
 OPERATOR FMX Middlesex Centre

PRESSURE ZONE n/a
 TOWER LEVEL ft n/a
 PUMPS (ON/OFF) n/a
 OTHER-1 n/a
 OTHER-2 n/a

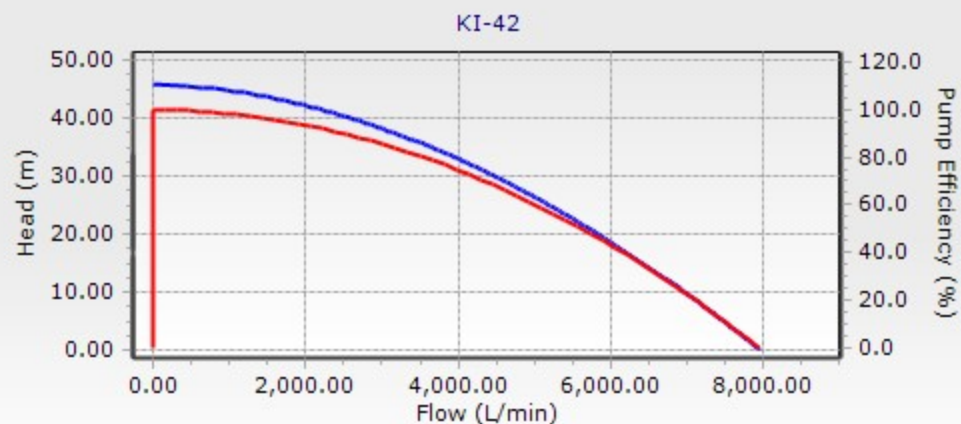


Label
 KI-42

Head Efficiency NPSH Required Motor Transient Library Notes

Pump Definition Type: Standard (3 Point)

	Flow (L/min)	Head (m)
Shutoff:	0.00	45.76
Design:	5,272.51	24.36
Max. Operating:	6,517.77	14.08



Coefficients: $a = 45.76 \text{ m}$; $b = 2.779\text{e-}006 \text{ m}/(\text{L}/\text{min})^c$; $c = 1.850$

Close Help