LRL File No. 220536-03
Project: Commercial Development
Location: 5254 Bank Street, Ottawa
Date: April 2, 2024
Designed: K.Herold

Water Demand
(Based on City of Ottawa Design Guidelines - Water Distribution, 2010)

Commercial / Industrial Demand

Unit Type	Unit Rate		Area (ft^2)	Area (ha)	Demand (L/d)
Service/Repair Shop (Industrial-Light)	35000	L/(grossha)/d	18331.0	0.17	5960.3
				0.17	**5960.3**

Commercial / Industrial Consumption Rates

Unit Type	Value	Units	Value	Units
Average Daily Demand	**5,960**	**L/d**	**0.069**	**L/s**
Maximum Daily Factor	1.5	*(Design guidelines - water distribution Table 4.2)*		
Maximum Daily Demand	**8,940**	**L/d**	**0.103**	**L/s**
Peak Hour Factor	1.8	*(Design guidelines - water distribution Table 4.2)*		
Maximum Hour Demand	**16,093**	**L/d**	**0.186**	**L/s**

Total Demand

Demand	Value	Units	Value	Units
Average Daily Demand	**5,960**	**L/d**	**0.069**	**L/s**
Maximum Daily Demand	**8,940**	**L/d**	**0.103**	**L/s**
Maximum Hourly Demand	**16,093**	**L/d**	**0.186**	**L/s**

Water Service Pipe Sizing

Q = VA	Q = Flow Rate	V = Velocity	A = Area of pipe
Assumed maximum velocity =	*1.8*	*m/s*	

$Q =$ 0.19 L/s
$Q =$ 0.00019 m^3/s

Minimum pipe diameter (d) = $(4Q/\pi V)^{1/2}$
$=$ 0.011 m
$=$ 11 mm

Proposed pipe diameter (d) = **19 mm**
3/4 in

Pipe Pressure Losses Calculations

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Piezometric Head Equation (Derived from Bernoulli's Equation)

$$h = \frac{p}{\gamma} + z$$

Where:

h = HGL (m)
p = Pressure (Pa)
γ = Specific weight (N/m3) = 9810
z = Ground Elevation (m) = 112.93

Water Pressure on Huron Street			
HGL (m)		Pressure	
		kPa	psi
Minimum =	159.9	460.78	66.83
Maximum =	165.2	512.77	74.37
Max. Day + Fire =	155.2	414.67	60.14

Hazen Williams Equation

$$h_f = \frac{10.67 \times Q^{1.85} \times L}{C^{1.85} \times d^{4.87}}$$

Where:

h_f = Head loss over the length of pipe (m)
Q = Volumetric flow rate (m^3/s)
L = Length of pipe (m)
C = Pipe roughness coefficient
d = Pipe diameter (m)

Scenario 1: maximum daily demand

Q (L/s)	0.103
C	150

L (m.)	39.5	
I.D. (mm)	19	
V (m/s)	0.36	
h_f (m)	0.41	
Head Loss (psi)	0.58	
Min. Pressure (psi)	66.25	
Max. Pressure (psi)	73.79	
Service Obv. @ Street Connection (m)	110.53	
Service Obv. @ Building Connection (m)	111.60	
Pressure Adjustment (psi)	-1.52	(due to service elev. Diff. from street to building)
Adjusted Min. Pressure (psi)	64.73	(must not be less than 50psi)
Adjusted Max. Pressure (psi)	72.27	(must not be more than 80psi)

Scenario 2: maximum hourly demand

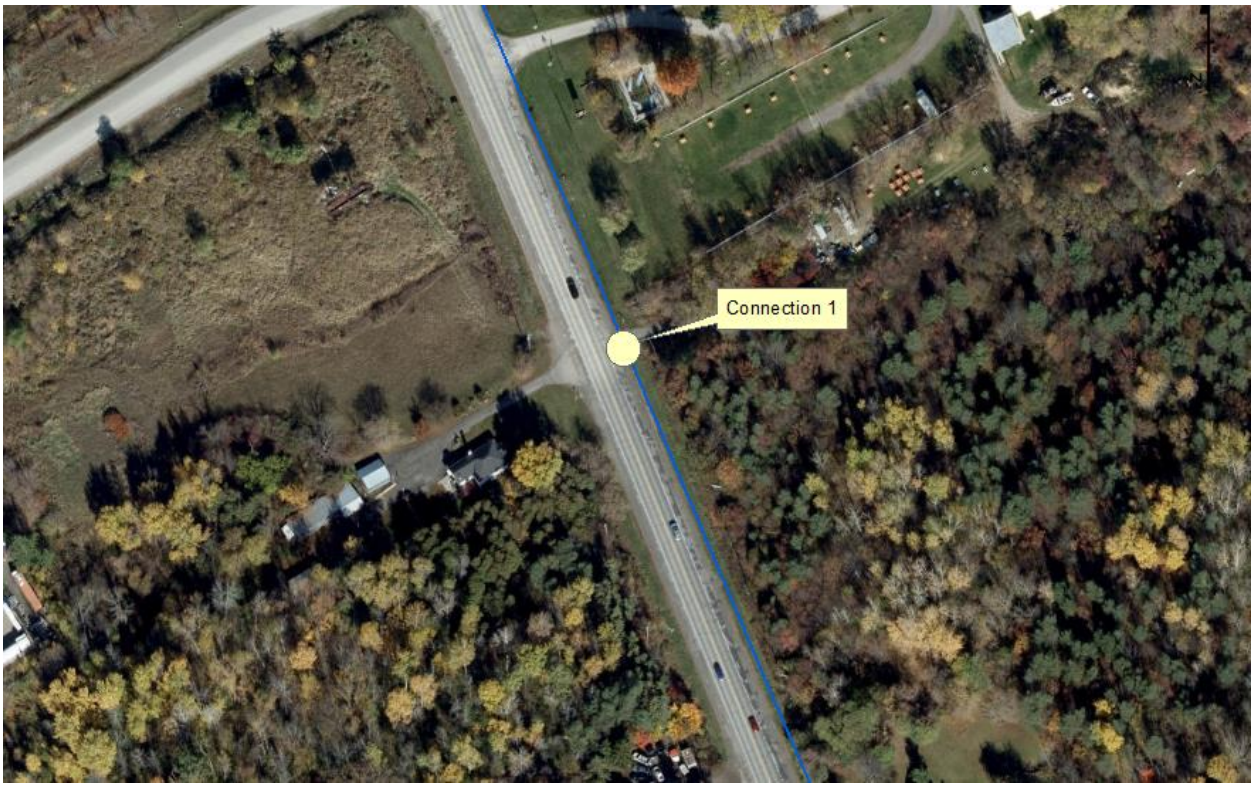
Q (L/s)	0.186	
C	150	
L (m.)	39.5	
I.D. (mm)	19	
V (m/s)	0.66	
h_f (m)	1.21	
Head Loss (psi)	1.71	
Min. Pressure (psi)	65.12	
Max. Pressure (psi)	72.66	
Service Obv. @ Street Connection (m)	110.53	
Service Obv. @ Building Connection (m)	111.60	
Pressure Adjustment (psi)	-1.52	(due to service elev. Diff. from street to building)
Adjusted Min. Pressure (psi)	63.59	(must not be less than 40psi)
Adjusted Max. Pressure (psi)	71.14	(must not be more than 80psi)

Boundary Conditions
5254 Bank Street

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	4.14	0.069
Maximum Daily Demand	6.18	0.103
Peak Hour	11.16	0.186
Fire Flow Demand # 1	6000	100.0

Location



Results

Connection 1 – Bank Street

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	165.2	74.3
Peak Hour	159.9	66.8
Max Day plus Fire #1	155.2	60.1

[1] Ground Elevation = 112.93 m

Notes

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

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PROJECT

PROPOSED MULTI-UNIT
COMMERCIAL DEVELOPMENT
5254 BANK STREET, OTTAWA

DRAWING TITLE

EXISTING FIRE HYDRANTS
(GEOOTTAWA)

CLIENT	DATE	PROJECT	
UNPOISED ARCHITECTURE INC.	DEC142022	220536-01	C000