**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

**LRL File No.** 220536-03
**Project** Commercial Development
**Location:** 5254 Bank Street, Ottawa
**Date** 2024-04-02
**Designed:** K. Herold

## 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**

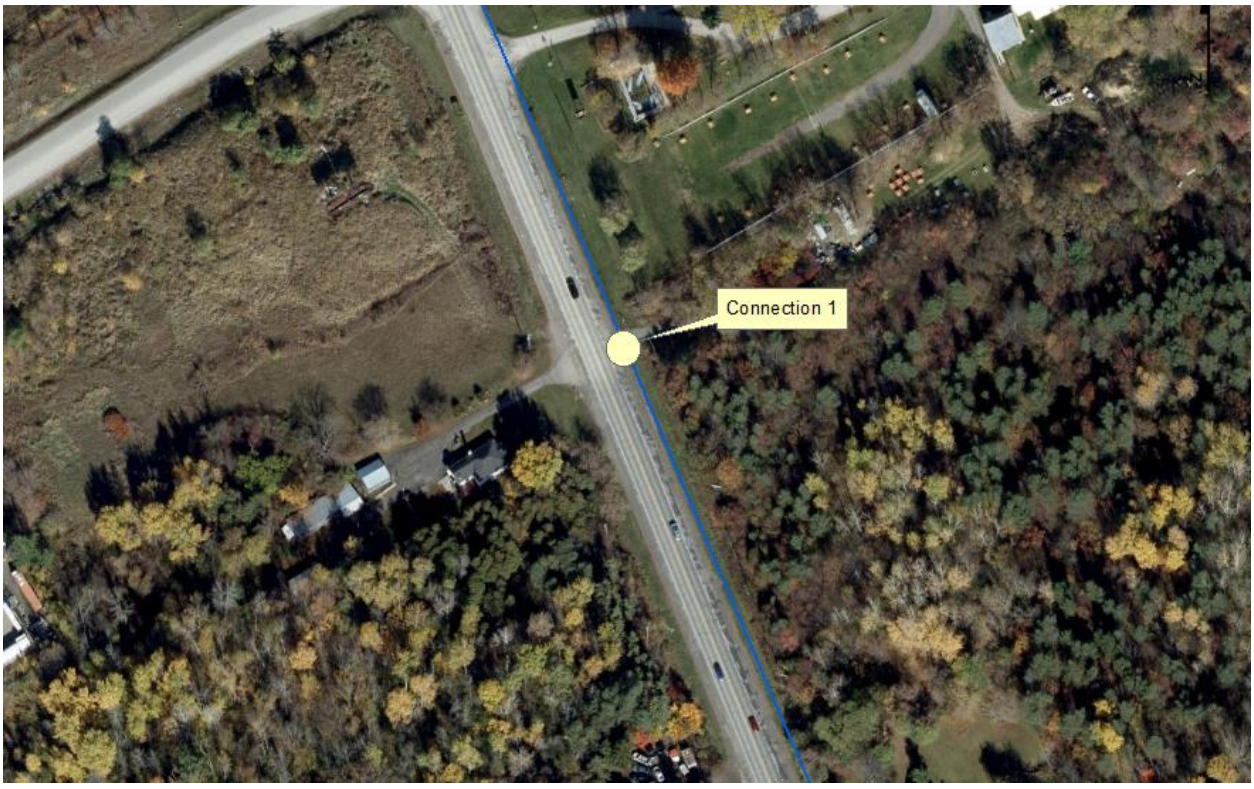
| | | |
|---|---|---|
| Q (L/s) | 0.186 | |
| C | 150 | |
| L (m.) | 39.5 | |
| I.D. (mm) | 19 | |
| V (m/s) | 0.66 | |
| $h_f$ (m) | 1.21 | |
| Head Loss (psi) | 1.71 | |
| Min. Pressure (psi) | 65.12 | |
| Max. Pressure (psi) | 72.66 | |
| Service Obv. @ Street Connection (m) | 110.53 | |
| Service 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 |