# PROPOSED NIAGARA HISTORICAL SOCIETY MUSEUM ADDITION
# 43 CASTLEREAGH STREET, NIAGARA-ON-THE-LAKE

## FUNCTIONAL SERVICING DESIGN BRIEF

## PROPOSED WATER AND SANITARY SERVICES

REV 2 – March 23, 2026

**PREPARED BY:**

HALLEX PROJECT # 251023

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## INTRODUCTION

The proposed Niagara Historical Society Museum Addition will take place in two recently merged properties: the Niagara-on-the-Lake Museum at 43 Castlereagh Street and a former residential property at 25 Castlereagh Street, known as the Museum Annex. This development is located at the northwest corner of the Davy Street and Castlereagh Street intersection in the Town of Niagara-on-the-Lake, ON.

The existing site at 43 Castlereagh Street currently consists of a 3-storey memorial hall building, a 2-storey high school building with an existing 1 storey link joining the existing buildings. The existing site at 25 Castlereagh Street currently consists of a 2-storey museum annex.

The existing buildings are to remain, and the 2-storey addition is proposed behind the existing memorial hall building. The purpose of the service assessment is to determine the functional sizing of the proposed sanitary and water services in addition to the post-development flows from the site to determine the impact on the existing municipal infrastructure.

## SANITARY

The existing site at 43 Castlereagh Street is currently serviced with a sanitary sewer connection from the existing 250mm diameter municipal sanitary sewer at Castlereagh Street to the building, however the size of the existing sanitary lateral is unknown.

The existing site at 25 Castlereagh Street is currently serviced with a sanitary sewer connection, however, the size and location of the existing connection is unknown.

Given the site is to be partially redeveloped for the proposed Niagara Historical Society Museum Addition, all existing sanitary laterals at 25 and 43 Castlereagh Street are to be located, capped, and abandoned at the main in accordance with municipal standards. A new sanitary lateral shall be proposed from the building to the existing 250mm municipal sanitary sewer at Castlereagh Street.

The building development is currently in the concept phase; therefore, the following assumptions based on the architectural drawings are made in carrying out the calculations:

- The plumbing fixtures and the number of plumbing fixtures indicated in Exhibit #1 include a combination of the existing plumbing fixtures and those proposed for the new addition and existing buildings. The proposed fixtures are preliminary and may not represent the final building plumbing design.

The wastewater generation for the subject development is determined to be 9,670 L/day using Table 8.2.1.3.B. of the Ontario Building Code. The peak drainage rate for the proposed development is determined to be 231.1 L/min based on the fixtures and fixture units shown in Exhibit #1 attached. Table 7.4.10.5 in the Ontario Building Code is used to determine probable peak drainage rates for the total fixture units.

Based on the above, Hallex recommends a minimum 150mm sanitary sewer @ 2.0% to be installed to convey sanitary flows from the proposed and existing buildings to the existing 250mm municipal sanitary sewer at Castlereagh Street.

## WATER

The existing site at 43 Castlereagh Street is currently serviced with a 19mm water service connection from the existing 250mm diameter municipal watermain at Castlereagh Street to the building.

The existing site at 25 Castlereagh Street is currently serviced with a 19mm water service connection from the existing 250mm diameter municipal watermain at Castlereagh Street to the building.

Given the site is to be partially redeveloped for the proposed Niagara Historical Society Museum Addition, and a new fire suppression system is required, all existing water services at 25 and 43 Castlereagh Street are to be located, capped, and abandoned at the main. Therefore, a new water service shall be proposed from the building to the existing 250mm municipal watermain at Castlereagh Street.

The building development is currently in the concept phase; therefore, the following assumptions based on the architectural drawings are made in carrying out the calculations:

- The plumbing fixtures and the number of plumbing fixtures indicated in Exhibit #2 are preliminary and may not represent the final building plumbing design.
- The proposed building addition is assumed to be of non-combustible construction and will have sprinklers and hose cabinets installed throughout the building as per applicable standards.

The domestic water demand for the proposed development is determined to be 228.2 L/min based on the fixtures and fixture units shown in Exhibit #2 attached. Table 7.4.10.5 in the Ontario Building Code is used to determine water demands for the total fixture units. Extrapolation of Table 7.4.10.5 in the Ontario Building Code using the recommended flow rate for 9,000 fixture units and 10,000 fixture units was used to determine water demands for the total fixture units.

Using the calculations provided in the Fire Underwriters Survey – 2020 Water Supply for Public Fire Protection, the minimum water supply flow rate for fire protection is determined to be 7,000 L/min for the building based on the above assumptions as shown in Exhibit #3, attached. There are 2 existing municipal fire hydrants located near the site. The first is located approximately 26.5m west of the property on the north side of Castlereagh Street. The second is approximately 22.7m south of the property on the west side of Davy Street.

Based on the above, Hallex recommends a minimum 150mm water service to be installed to provide water supply to the proposed development from the existing 250mm municipal watermain at Castlereagh Street. The water service is to be extended to the mechanical room of the proposed building and is to be installed with a water meter and backflow preventer, as per applicable standards, prior to branching into domestic and fire services, inside the building.

## CONCLUSION

We trust this letter meets your approval. Please contact the undersigned should you have any questions or comments.

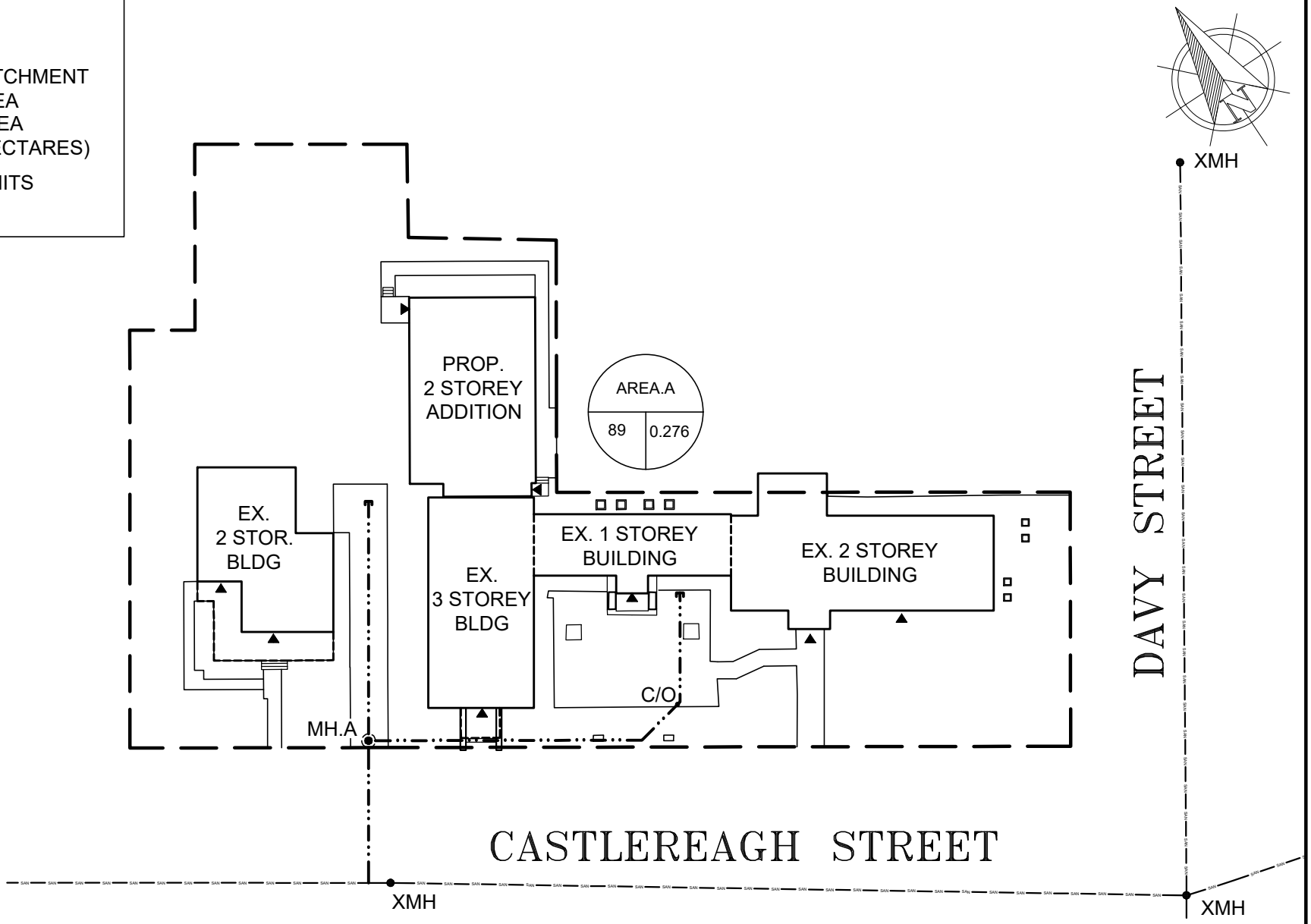
Yours truly,
HALLEX ENGINEERING LTD


Jim Halucha, P.Eng
Civil/Structural Engineer

Anthony Infurna, C.E.T., rcsi
Project Manager

LEGEND

CATCHMENT AREA
AREA (HECTARES)
FIXTURE UNITS





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PROJECT:
NIAGARA HISTORICAL SOCIETY
MUSEUM ADDITION. NOTL, ON

SHEET TITLE:
POST-DEVELOPMENT SANITARY CATCHMENT AREA PLAN

| | |
|---|---|
| SCALE: 1:500 | JOB NUMBER: 251023 |
| DATE: 2026/02/23 | ISSUED FOR: APPROVAL |
| DRAWN BY: MA | DWG CSK3 REV. 1 |
| DESIGNED BY: MA | |
| CHECKED BY: AI | |

# Niagara Historical Society Museum Addition
# Exhibit #1 - Wastewater Generation Rate & Peak Drainage Rate

2026-03-23
Job: 251023

## WASTEWATER GENERATION ASSESSMENT

| Occupancy | # of Units | Development Statistics | Volume (Table 8.2.1.3. A / B) | Total Daily Volume | Notes |
|---|---|---|---|---|---|
| Warehouse Water Closets | 1 | 5 WCs | 950 L/WC | 4750 L/day | * Basements and Upper Floors considered "Warehouse" space |
| Warehouse Loading Bays | 1 | 0 bay | 150 L/bay | 0 L/day | |
| Store Water Closets | 1 | 4 WCs | 1230 L/WC | 4920 L/day | * Main Floors considered "Stores" space. |
| | | | Total = | 9670 L/day | |

Therefore the total calculated sanitary flow from the site is determined to be 9670 L/day.

## MAXIMUM PROBABLE DRAINAGE RATE

| Fixture | # of Units | # of Plumbing Fixtures | Fixture Units (Table 7.4.9.3.) | Total Sanitary Fixture Units |
|---|---|---|---|---|
| Sink (washup) | 1 | 15 fixtures | 3 FUs | 45 FUs |
| Water closet w/ flush tank (public) | 1 | 9 fixtures | 4 FUs | 36 FUs |
| Urinal (other public washout) | 1 | 2 fixtures | 3 FUs | 6 FUs |
| Dishwasher (domestic) | 1 | 2 fixtures | 1 FUs | 2 FUs |
| | | | Total = | 89.0 FUs |
| | | | Total Flow = | 231.1 L/min |

Therefore the total calculated peak drainage rate is determined to be 231.1L/min.

# Niagara Historical Society Museum Addition
## Exhibit #2 - Water Demand



DOMESTIC WATER SUPPLY

| Fixture | # of Units | # of Plumbing Fixtures | Fixture Units (Table 7.6.3.2.A.) | Total Water Fixture Units |
|---|---|---|---|---|
| Sink (washup) | 1 | 15 fixtures | 2 FUs | 30 FUs |
| Water closet w/ flush tank (public) | 1 | 9 fixtures | 5 FUs | 45 FUs |
| Urinal (other public washout) | 1 | 2 fixtures | 4 FUs | 8 FUs |
| Dishwasher (domestic) | 1 | 2 fixtures | 1.4 FUs | 2.8 FUs |
| | | | Total = | 85.8 FUs |
| | | | Total Flow = | 228.2 L/min |

Therefore the maximum domestic water demand is determined to be 228.2 L/min.

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# Niagara Historical Society Museum Addition
## Exhibit #3 - Fire Water Demand

2026-03-23
Job: 251023

FIRE WATER SUPPLY

| | | | |
|---|---|---|---|
| Building Type: | Fire Resistive | | |
| Floor Area | | Reduct. | |
| First Floor | 812.3 $m^2$ | 1.00 | 812.3 $m^2$ |
| Second Floor | 707.8 $m^2$ | 1.00 | 707.8 $m^2$ |
| | | | 1520.1 $m^2$ |

| | | | |
|---|---|---|---|
| Construction Type: | Non-Combustible Const. | Construction Coefficient: | 0.8 |
| 1st Preliminary Fire Flow = | 7000 L/min | | |
| Fire Hazard: | Non-Combustible | Fire Hazard Factor: | -0.25 |
| | | Net Decrease = | -1750 L/min |
| 2nd Preliminary Fire Flow = | 5250 L/min | | |
| Sprinkler System: | Sprinkler & Hose Lines | Sprinkler System Factor: | -0.4 |
| | | Net Decrease = | -2100 L/min |

Separation Factor

| | | |
|---|---|---|
| North | 4.3 m | 0.20 |
| South | 29.6 m | 0.10 |
| West | 9.2 m | 0.20 |
| East | 2.3 m | 0.25 |
| | | 0.75 |

Net Increase = 3937.5 L/min

**FINAL FIRE FLOW = 7000.0 L/min**

Minimum Water Supply Flow Rate for Fire Protection as determined by the Water Supply For Public Fire Protection, dated 2020, by the Fire Underwriter's Survey