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# FUNCTIONAL SERVICING REPORT

**AT**

**701 Balm Beach Road E.,**
**Midland, ON**

**PREPARED FOR:**

**1001042456 Ontario Inc.**

**February 4th , 2026**

# TABLE OF CONTENTS

## SUMMARY

King EPCM (the Engineer) was retained by 1001042456 Ontario Inc. (the Client) for the creation of a functional servicing report for a property located at 701 Balm Reach Road E., Midland, Ontario.

The Site, in its existing conditions, hosts the Castle Village. The proposed development for the subject property seeks to utilize the existing building on the subject property for the purpose of a microbrewery and associated retail spaces. At both the pre- and post-development conditions, the total impervious area (TIMP) is calculated as 4,015.93 m², representing 50.9% of the total site area.

According to the Client's consideration, the required domestic water is 3,000 L/day (2.08 L/min). Therefore, this requirement has been considered as the domestic water demand, as well as the sanitary flow.

The total water demand, including both domestic and fire flow requirements, is 4,502 L/min (75.04 L/s). While the domestic water demand can be supplied by the existing 50 mm water service on the Site. The firefighting demand will be supplied by the hydrant located in front of the Site.

The required firefighting flow for the Site is 4,500 L/min. The actual and available firefighting flows from the hydrant are 5,958 L/min at 50 psi and 11,415 L/min at 20 psi (two outlets), respectively. Therefore, the hydrant provides sufficient firefighting capacity for the Site.

The maximum sanitary flow in post-development conditions is 1.42 L/sec, while the full capacity of the sanitary servicing pipe is estimated at 16.47 L/sec.

The proposed site will have a total impervious surface area of 4,016 $m^2$ (50.9% of the Site). While the gravel surface of the parking area and driveway will be replaced with asphalt, there will be no change to the overall pervious and impervious areas under post-development conditions.

Additionally, similar to the pre-development conditions, runoff from both minor and major storm events on the Site will continue to be directed toward the southeast corner of the Site as surface flow.

# 1. INTRODUCTION

King EPCM (the Engineer) was retained by 1001042456 Ontario Inc. (the Client) for the creation of a functional servicing report for a property located at 701 Balm Reach Road E., Midland, Ontario (the Site), PIN of 58397-0064 (LT). The Functional Services Report is presented here to assess the existing capacity and the future demand for domestic and firefighting water services, and sanitary sewer, including a brief stormwater plan. The functional Servicing Report will also be used to indicate the synchrony of the proposed development's FSR with the existing water, sanitary, and stormwater infrastructures.

# 2. PROPERTY INFORMATION

At the existing condition, the original lot area is 7,894.4 $m^2$, including a total area of 731.37 $m^2$ for the main building and several playgrounds. In post-development conditions, the areas are the same. The Site is bounded by residential dwellings to the west, Balm Beach Road E., to the north, an industrial property to the east, and landscape to the south. An aerial view and a topographic map of the Site are shown in Figures 1 and 2.


*Figure 1- An aerial photo of 701 Balm Beach Road E., Midland, Ontario*


*Figure 2- A topographic map of the Site*

## 3. PROPOSED DEVELOPMENT

The Site, in its existing conditions, hosts the Castle Village. The proposed development for the subject property seeks to utilize the existing building on the subject property for the purpose of a microbrewery and associated retail spaces. At both the pre- and post-development conditions, the total impervious area (TIMP) is calculated as 4,015.93 m², representing 50.9% of the total site area.

Below is a summary of the proposed site conditions after development:

Building (TIMP = 731.37 $m^2$)
Driveway/Parking (TIMP = 3,284.56 $m^2$)
Landscape (Total area = 3,878.47 $m^2$, Timp = 0.0)

In Appendix I, the site plan in pre- and post-development conditions is indicated.

# 4. WATER SERVICING

## 4.1. AVAILABLE WATER SERVICES

Under the current conditions, the property is serviced by a 50 mm water service, which connects to a 100 mm water service at the property line. The 100 mm service pipe is then connected to the 300 mm PVC water main on Balm Beach Road East (see Appendix II).

A review of the area indicates that no fire hydrants are present in proximity to the site. Therefore, the availability of water for fire flow through the existing water main pipe on Balm Beach Road E. is investigated.

## 4.2. DOMESTIC WATER DEMAND

According to the Client's consideration (see Appendix II), the required domestic water is 3,000 L/day (2.08 L/min). Therefore, this requirement has been considered as the domestic water demand, as well as the sanitary flow.

As stated above, the diameter of the existing water main pipe in the proximity of the Site on the Balm Beach Road E. is 300 mm. Additionally, the diameter of the pipe that provides water service for the Site is 50 mm. Considering a velocity of 2.5 m/sec, these pipes are able to convey 177 L/sec (10,620 L/min) and 4.9 L/sec (294.4 L/min), respectively. Therefore, the existing water services in the Site can be able to provide the required domestic water demand to the Site in the post-development conditions.

## 4.3. FIREFIGHTING FLOW DEMAND

Following the recommended guidelines by the Town of Midland (2024), the minimum fire flow in an industrial area is to be 75 L/sec (4,500 L/min).

Additionally, based on the Office of Fire Marshal guidelines, the required minimum water supply flow rate is 2,700 L/min (see Appendix III). Therefore, a minimum fire flow of 4,500 L/min is required for the Site. This demand will be supplied by the hydrant located in front of the property on the north side of Balm Beach Road East.

A hydrant test was carried out on two hydrants, which are located in front of the Site, on Balm Beach Road W., on December 23, 2025. According to the results, the actual and available flows were 1006.76 GPM (3,811.00 L/min or 151.47 L/sec) and 2,400.88 GPM (9,088.30 L/min or 151.47 L/sec) with 1 port and a static pressure of 50 psi, respectively. Additionally, the amounts

for 2 ports were 1,574.04 GPM (5,958.38 L/min or 99.31 L/sec) and 3,015.58 GPM (11,415.2 L/min or 190.25 L/sec), respectively. For more details of the hydrant test, see Appendix IV.

### 4.4. TOTAL WATER DEMAND

The total water demand, including both domestic and fire flow requirements, is 4,502 L/min (75.04 L/s). While the domestic water demand can be supplied by the existing 50 mm water service on the Site. The firefighting demand will be supplied by the hydrant located in front of the Site.

The required firefighting flow for the Site is 4,500 L/min. The actual and available firefighting flows from the hydrant are 5,958 L/min at 50 psi and 11,415 L/min at 20 psi (two outlets), respectively. Therefore, the hydrant provides sufficient firefighting capacity for the Site.

## 5. SANITARY SEWER SERVICING

### 5.1. AVAILABLE SANITARY SERVICES

Under the current conditions, the property is serviced by a septic system consisting of a septic tank and a septic bed located at the southwest corner of the building. For the post-development conditions, a tank and pump station are proposed. The sanitary flow will be pumped into a 150 mm sanitary pipe with a 1% slope, which will discharge to the existing manhole at the property line. From there, the flow will connect by gravity to the 375 mm PVC SDR 35 sanitary sewer on Balm Beach Road East.

### 5.2. DOMESTIC SANITARY FLOW

According to the regulation set by the Town of Midland (Town of Newmarket, 2024), the average daily domestic flow for the properties with commercial purposes is 2.5 L/day/$m^2$ of the floor area, while for light industrial purposes is 35 $m^3$/day/ha. The maximum design flows are to be determined using average daily flows and a minimum peak factor of 3. Additionally, a wet weather infiltration rate of 20,000 L/ha/day (0.23 L/sec/gross area (ha)), as the extraneous flow is to be used to determine the maximum sanitary flow for design purposes. In Table 1, the sanitary design flow for the Site is presented.

*Table 1- Sanitary flow determination for the Site*

| Description of Property Application | Gross area of the Site (ha) | Average daily flow (L/sec/ha) | Average Daily flow (L/sec) | Peak factor | Infiltration rate (L/sec) | Design sanitary flow (L/sec) |
|---|---|---|---|---|---|---|
| Microbrewery (light industrial) | 0.78 | 0.4 | 0.31 | 4 | 0.18 | 1.42 |

The full capacity of the existing sanitary pipe with a diameter of 150 mm, slope of 1%, manning coefficient of 0.012 is 16.47 L/sec. Considering the design sanitary flow of 1.42 L/sec, the remaining freeboard for a 150 mm sanitary pipe is 127.5 mm. Therefore, the existing sanitary pipe is able to provide the required sanitary services for the Site. See Appendix VI for hydraulic calculations of the existing sanitary services on the Site.

# 6. STORM SEWER SERVICING

The site conditions in both the pre-development and post-development scenarios are identical. Consequently, the calculations used to determine runoff from storm events with return periods ranging from 2 years to 100 years will be the same for both conditions.

The site characteristics can be categorized into several groups of information:

## 6.1. PERVIOUS AND IMPERVIOUS AREA, AND PRECIPITATION

- The Site is considered rectangular in shape, measures approximately 7,894 $m^2$, and is located on the south side of Balm Beach Road E. The Site currently hosts the Castle Village, and includes parking and driveways, and landscapes, TIMP = 50.9%.
- The subject land is mostly grass fields (>50%).
- Annual precipitation is 1057 mm, with the highest rainfall in October.

## 6.2. WATER QUANTITY CALCULATIONS (PRE-DEVELOPMENT CONDITIONS)

- No storm sewer system is present near the Site.

- According to the existing site grading drawing, all minor and major storms resulting from the storm events on the Site are directed toward the southeast corner of the Site as surface runoff.
- Following the Town of Midland (2024), the Rational Method is used to determine the storm runoff.
- Pre-development 1 in 2 years, 1 in 5 years, 1 in 10 years, 1 in 25 years, 1 in 50 years, and 1 in 100-year design storm events. Flow conditions are calculated as follows:
- Rational Formula: $Qp = 2.78 \times A \times C \times Ca \times i$
  - A = area in ha = 0.7894
  - C = runoff coefficient
  - Ca = Antecedent Precipitation Factor = 1.0 for 2, 5, and 10 years, 1.10 for 25 years, 1.20 for 50 years, and 1.25 for 100 years.

- i = average rainfall intensity in mm/hour

- Time of Concentration:
  - Tc = 15 min, according to the Town of Midland (2024).

- See Table 2: Pre-development peak flows for the 1:2-year through 1:100-year design storms based on the Township's Rational Method with A, B, C values of 3-parameter design storm as Intensity = $A/(t+B)^C$ and Q = $2.78 \times C \times C_a \times I \times A$. IDF curves and the Rational Method calculations are included in Appendix V for reference.

*Table 2 – Existing peak flows and rainfall intensities based on the Rational Method*

| Design Storm | Return Period (Years) | | | | | |
|---|---|---|---|---|---|---|
| | 2 | 5 | 10 | 25 | 50 | 100 |
| A | 807.44 | 1135.4 | 1387 | 1676.2 | 1973.1 | 2193.1 |
| B | 6.75 | 7.5 | 7.97 | 8.3 | 9 | 9.04 |
| C | 0.828 | 0.841 | 0.852 | 0.858 | 0.868 | 0.871 |
| Intensity (mm/hr) | 63.05 | 82.79 | 96.02 | 112.50 | 125.06 | 137.49 |
| Total Runoff $Q_p$ (l/s) | 83.87 | 110.12 | 127.72 | 158.95 | 180.08 | 199.45 |

## 6.3. DESIGN CRITERIA FOR STORMWATER MANAGEMENT PLAN

Following the Town of Midland (2024), the stormwater drainage system should be designed in accordance with MECP 2003 Stormwater Management Practices Planning and Design Manual. The following design criteria are to be satisfied in the proposed SWM plan:

- The modified rational method, or equivalent, should be used for the analysis.
- An overland flow route shall be clearly marked on drawings. The grading of parking lots and landscaped areas must provide a safe path for the overland flow route to the surrounding municipal right of way during storms exceeding the design storm event.
- Post-to-pre quantity control shall be provided unless otherwise directed by the town or Severn Sound Environmental Association (SSEA).
- All new developments and site plans shall provide post-to-pre infiltration on-site, where soils permit, and unless otherwise established at the plan stage. Sites shall minimize any anticipated changes in the water balance between pre-development and post-development conditions and shall provide a minimum infiltration equivalent to the first 5 mm of any given rainfall event.
- The gravel surface of the parking area and driveway will be replaced with asphalt.

Therefore, there will be no change to the overall pervious and impervious areas under post-development conditions (see Appendix II for communication regarding driveway paving).

## 6.4. PROPOSED STORMWATER MANAGEMENT PLAN

The Client has proposed converting the Castle Village application into a microbrewery with associated retail space. As a result, there will be no changes to the catchment area or to the proportions of pervious and impervious surfaces between the pre-development and post-development conditions.

As there are no changes to the pervious and impervious areas in the post-development conditions, likewise to the pre-development conditions, the minor and major storms resulting from the storm events on the Site will be directed toward the south-east corner of the Site as surface runoff.

Below is a summary of the proposed site conditions:

- Total site surface area = 7,894.4 $m^2$
- Total pervious surface area (landscape) = 3,878.47 $m^2$ (49.1%)
- Total impervious surface area (TIMP) = 4,015.93 $m^2$ (50.9%)
    - 731.37 $m^2$ – buildings
    - 3,284.56 $m^2$ – Driveways & Parking lots
- Rooftop downspouts discharge directly onto the gravel area surrounding the building, from which stormwater flows as sheet flow toward the southeast boundary of the Site.
- The runoff from the proposed driveway and parking lots located in the north part of the Site will be directed toward the southeast side of the Site as sheet flow.
- Post-development flow conditions are identical to pre-development conditions.
  See Table 3: Post-development peak flows for the 1:2-year through 1:100-year design storms based on the Township's Rational Method, along with appropriate pre-development peak flow.

*Table 3 – Proposed peak flows based on the Rational Method in post-development conditions*

| Design Storm | Return Period (Years) | | | | | |
|---|---|---|---|---|---|---|
| | **2** | **5** | **10** | **25** | **50** | **100** |
| Intensity for post-development (mm/hr) | 63.05 | 82.79 | 96.02 | 112.50 | 125.06 | 137.49 |
| Post-Development Peak Flows (l/s) | 83.87 | 110.12 | 127.72 | 158.95 | 180.08 | 199.45 |
| Stormwater volume resulting from a 15-minute rainfall ($m^3$) | 50.32 | 66.07 | 76.63 | 95.37 | 108.05 | 119.67 |

See Appendix VI for detailed design information.

## 6.5. MAJOR-MINOR SYSTEM CONVEYANCE

There are no major differences between pre-development and post-development overland routes. The proposed development shall control both minor flows (i.e., 82.79 mm/hr precipitation in a 5-year storm event) and major (i.e., 137.49 mm/hr precipitation in a 100-year storm event) to the downstream storm drainage capacity, i.e., Little Lake.

## 7. RELIANCE & SIGNATURE

This report is the intellectual property of King EPCM, and has been prepared for the sole use of 1001042456 Ontario Inc. (the Client). King EPCM accepts no liability for claims arising from the use of this report, or from actions taken or decisions made as a result of this report, by parties other than the Client. The Client may submit this report to the Town of Midland regarding the Client's commercial development project at 701 Balm Beach Road E., Town of Midland, ON.

Respectfully,


Ebrahim Amiri Tokaldany, Ph.D., P.Eng.
Senior Engineer – Civil and Water Resources Engineering
King EPCM

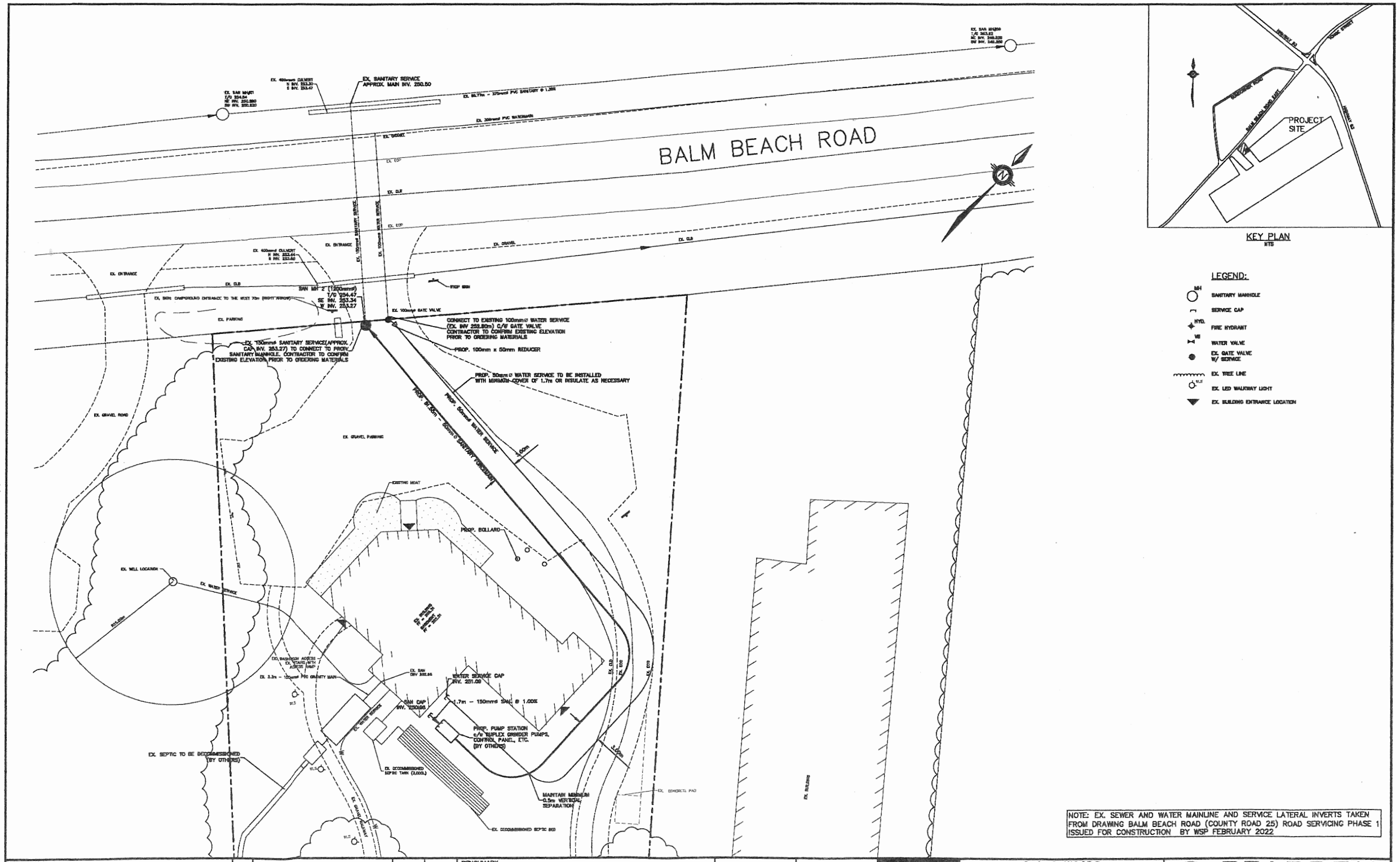

Amir Samadi, Ph.D., P. Eng
Senior Engineer – Water Resources
King EPCM

# 8. REFERENCES:

Ontario Ministry of Environment (MOE), (2003). Stormwater Management Planning and Design Manual.

Town of Midland (2024). Engineering Development Design Standards.

# APPENDIX I – SITE PLAN IN PRE- AND POST-DEVELOPMENT CONDITIONS




NOTE: EX. SEWER AND WATER MAINLINE AND SERVICE LATERAL INVERTS TAKEN FROM DRAWING BALM BEACH ROAD (COUNTY ROAD 25) ROAD SERVICING PHASE 1 ISSUED FOR CONSTRUCTION BY WSP FEBRUARY 2022

BENCHMARK

BENCHMARK TOP NUT OF HYDRANT LOCATED ON THE NORTH SIDE OF BALM BEACH ROAD 247m SOUTH OF MH#50 HAVING A NORTHING OF 4953728.44m, EASTING OF 586168.48m AND AN ELEVATION OF 255.13m

| NO. | REVISION NOTE | DATE | BY |
|---|---|---|---|
| 1 | REVISED PUMP STATION LOCATION | 07/31/23 | AMC |

G & G WOODS
701 BALM BEACH ROAD
TOWN OF MIDLAND

SITE SERVICING PLAN

PEARSON ENGINEERING
PEARSONENG.COM PH. 705.719.4785

| | | | |
|---|---|---|---|
| DESIGNED BY | AMC | HORIZ SCALE | 1:200 |
| DRAWN BY | GD | VERT SCALE | N/A |
| CHECKED BY | MND | DATE | APRIL 2023 |
| PROJECT # | 23044 | | |
| DRAWING # | SS-1 | | |
| REVISION # | 1 | | |

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# APPENDIX II- THE CITY'S INFRASTRUCTURES PER AVAILABLE DRAWINGS

# BALM BEACH ROAD (COUNTY ROAD 25)

# ROAD SERVICING

# PHASE 1

## RECORD DRAWING

## THE TOWN OF MIDLAND


KEY PLAN
N.T.S.

DRAWING LIST

COVER SHEET

PHASE 1



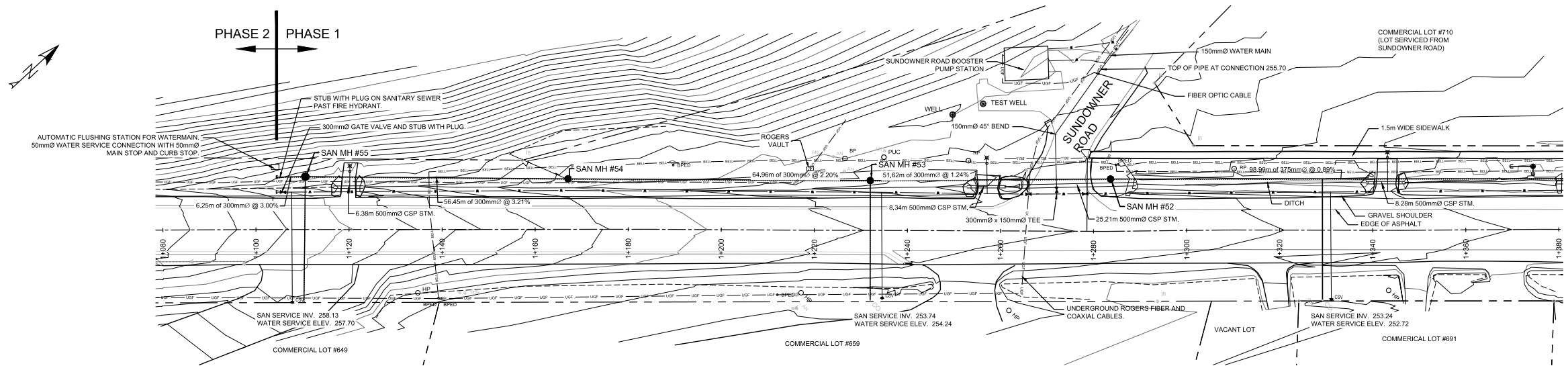

wsp

101-1450 1st AVENUE W.
OWEN SOUND, ONTARIO
CANADA N4K6W2
PHONE: 519-376-7612 FAX: 519-376-8008
WWW.WSP.COM


RECORD DRAWING

DATE: JUNE 2023

JOB NO.: 191-11732-00




## LEGEND

### NEW CONSTRUCTION

- NEW SANITARY SEWER
- NEW SANITARY SERVICE
- NEW WATER MAIN
- NEW WATER SERVICE
- NEW STORM SEWER
- NEW CENTERLINE OF DITCH GRADING
- NEW SIDEWALK
- SANMH — NEW SANITARY MANHOLE
- CBMH — NEW CATCHBASIN MANHOLE
- CB — NEW CATCHBASIN
- DICB — NEW DITCH INLET CATCHBASIN
- NEW WATERMAIN GATE VALVE
- CSV — NEW WATER SERVICE CURB STOP
- NEW FIRE HYDRANT
- NEWMARKET HYDRO POLE AND ANCHOR

### EXISTING CONDITIONS

- PROPERTY LINES
- CENTERLINE OF ROAD
- EDGE OF EXISTING PAVEMENT
- EDGE OF EXISTING GRAVEL
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING WATER MAIN
- SANMH — EXISTING SANITARY MANHOLE
- CB — EXISTING CATCH BASIN
- CSV — EXISTING CURB STOP VALVE
- FH — EXISTING FIRE HYDRANT
- WV — EXISTING GATE VALVE
- BP — EXISTING BELL POLE
- RP — EXISTING RODGERS POLE
- PUC — EXISTING MIDLAND PUC POLE
- LP — EXISTING LIGHTING POLE
- HP — EXISTING HYDRO POLE
- AN — EXISTING HYDRO GUY WIRE
- X — EXISTING FENCE
- EXISTING TREE LINE
- GAS — EXISTING UNDERGROUND GAS LINE
- UGF — EXISTING UNDERGROUND FIBER
- CATV — EXISTING CABLE TV PEDESTAL
- BPED — EXISTING TELEPHONE PEDESTAL
- EB — EXISTING STANDARD IRON BAR
- IP — EXISTING IRON BAR

BM — BENCHMARK: TOP OF NUT ON FIRE HYDRANT ON EAST SIDE SIDE OF BALM BEACH ROAD BETWEEN LOTS 785 AND 795. ELEVATION = 247.36

## NOTES:

- ALL LOT FABRIC SHOWN IN DRAWINGS IS GIS PARCEL FABRIC.
- ALL WATER SERVICES ARE 50mmØ WITH CURB STOP AND CURB STOP BOX UNLESS STATED OTHERWISE.
- ALL SANITARY SERVICES ARE 150mmØ UNLESS STATED OTHERWISE.
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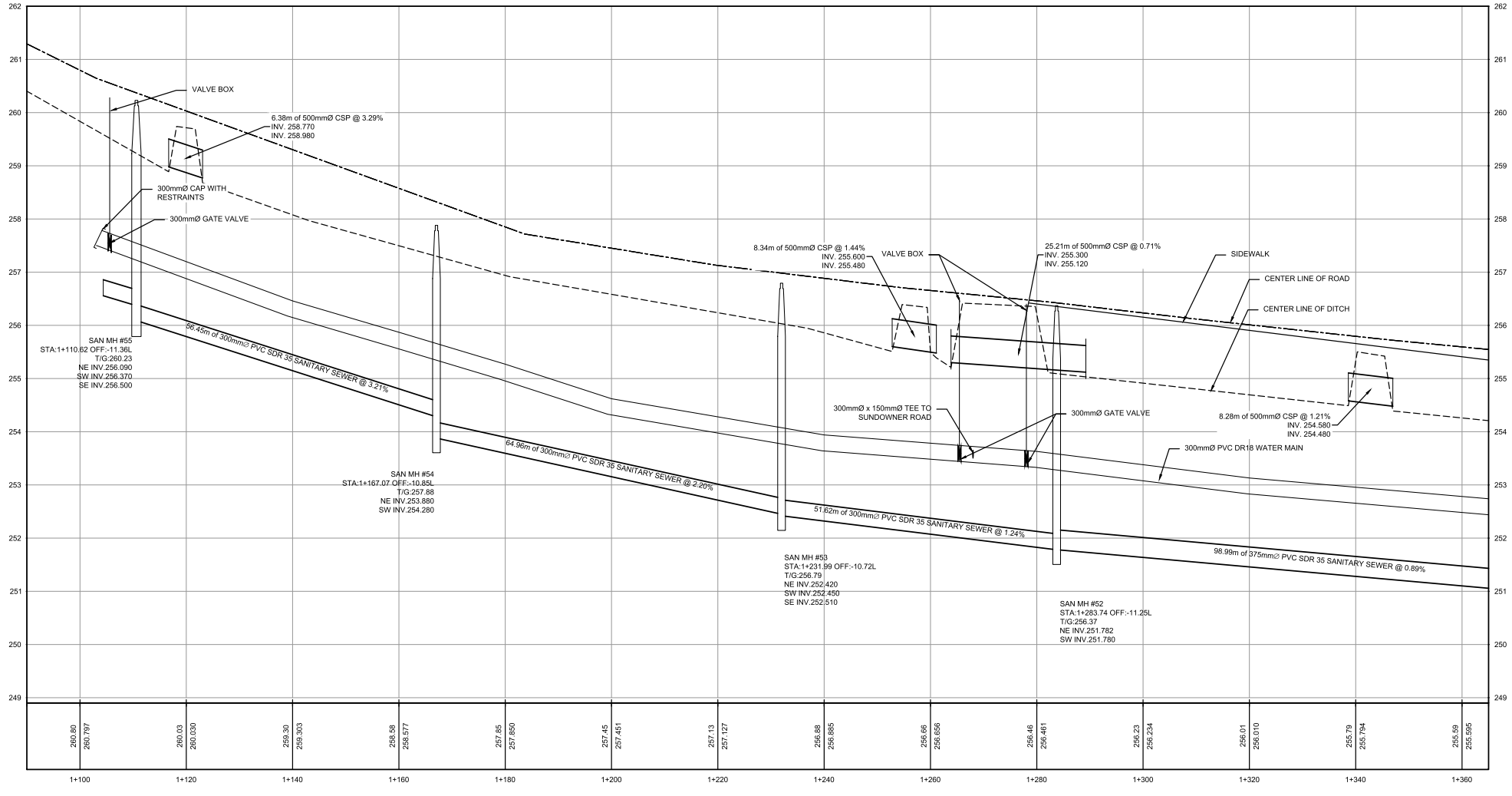



RECORD DRAWING


wsp

101-1450 1st AVENUE W
OWEN SOUND (ONTARIO) CANADA N4K 6W2
TEL.: 519-376-7612 | FAX: 519-376-8008 | WWW.WSP.COM


CONSULTANT - SUB-CONSULTANT:

SEAL:

CLIENT:

**THE TOWN OF MIDLAND**

CLIENT REF. #: --

PROJECT:

# BALM BEACH ROAD (COUNTY ROAD 25) ROAD SERVICING

KEY PLAN:



ISSUED FOR - REVISION:

| IS. | RV. | DATE | DESCRIPTION |
|---|---|---|---|
| 5 | | JUNE 2023 | ISSUED AS RECCORD DRAWING |
| 4 | | FEB 2022 | ISSUED FOR CONSTRUCTION |
| 3 | | DEC 2021 | ISSUED FOR TENDER |
| 2 | | NOV 2020 | ISSUED FOR MECP ECA APPROVAL |
| 1 | | AUG 2020 | ISSUED FOR CLIENT REVIEW |

PROJECT NO: 191-11732-00
DATE: OCT 2019
ORIGINAL SCALE: H 1:500 V 1:50
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
DESIGNED BY: C. WILSON
DRAWN BY: C. HAINES
CHECKED BY: C. WILSON
25mm

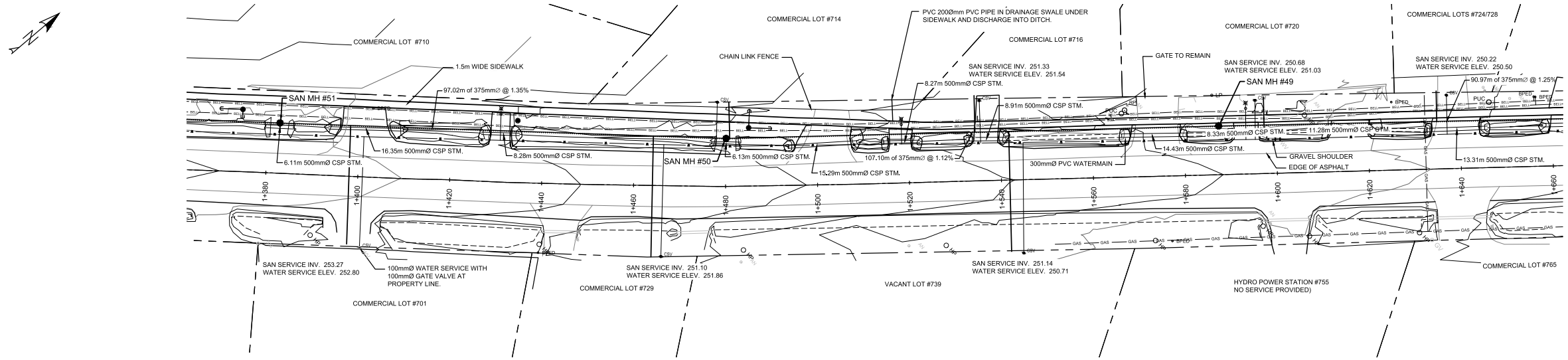
DISCIPLINE: **CIVIL**

TITLE:

**PHASE 1**
**PLAN AND PROFILE**
**BALM BEACH ROAD**
**STA 1+090 TO STA 1+365**

SHEET NUMBER: **RD1.1**
SHEET #: 2 OF 5

ISSUE: **RECORD DRAWING**
DATE OF: **JUNE 2023**
RV. #




BALM BREACH ROAD
(COUNTY ROAD 25)

## LEGEND

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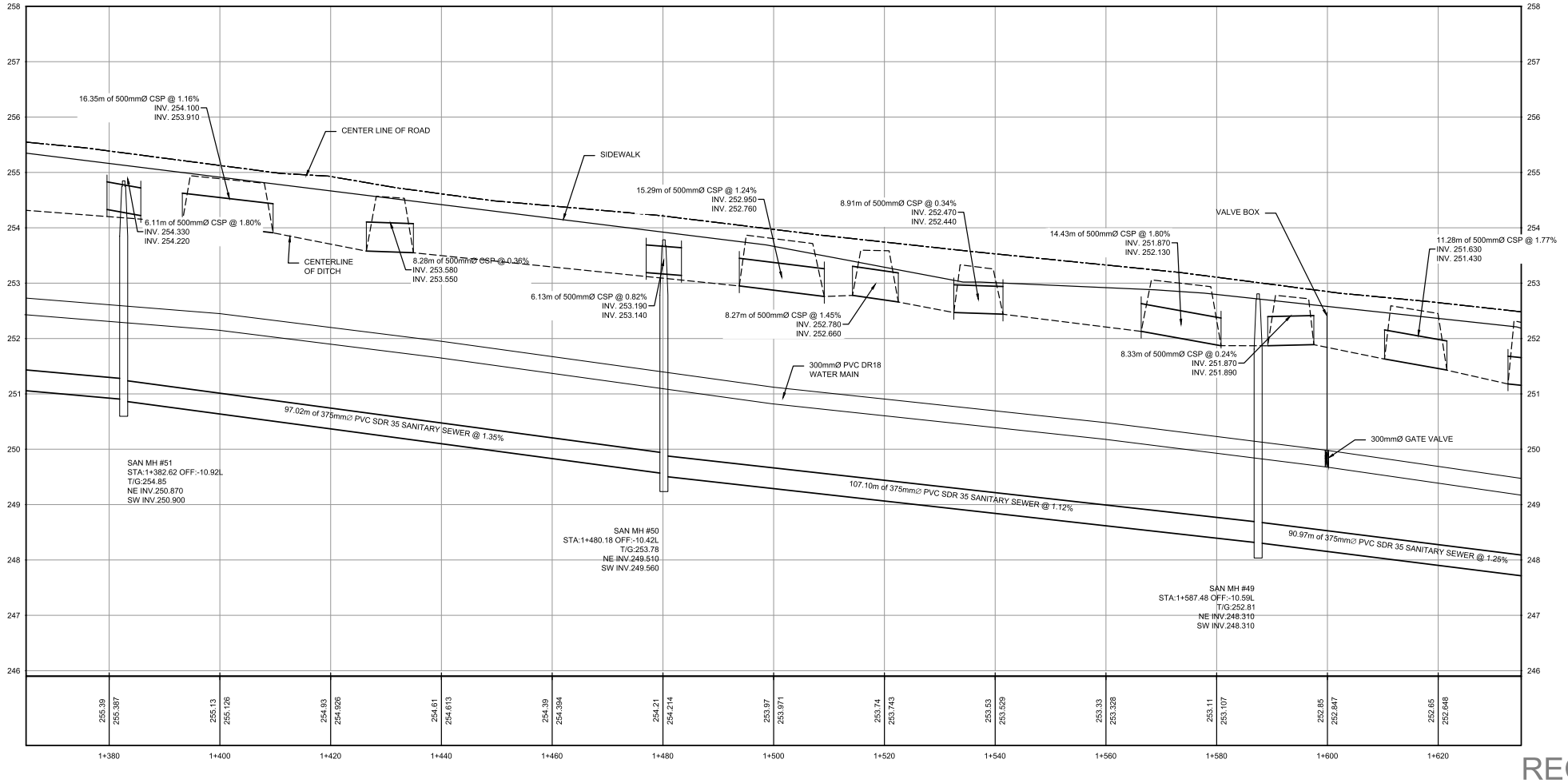


RECORD DRAWING


wsp
101-1450 1st AVENUE W
OWEN SOUND (ONTARIO) CANADA N4K 6W2
TEL.: 519-376-7612 | FAX: 519-376-8008 | WWW.WSP.COM


CONSULTANT - SUB-CONSULTANT:

SEAL:

CLIENT:

**THE TOWN OF MIDLAND**

CLIENT REF. #: --

PROJECT:

**BALM BEACH ROAD (COUNTY ROAD 25) ROAD SERVICING**

KEY PLAN:



ISSUED FOR - REVISION:

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25mm
DESIGNED BY: C. WILSON
DRAWN BY: C. HAINES
CHECKED BY: C. WILSON

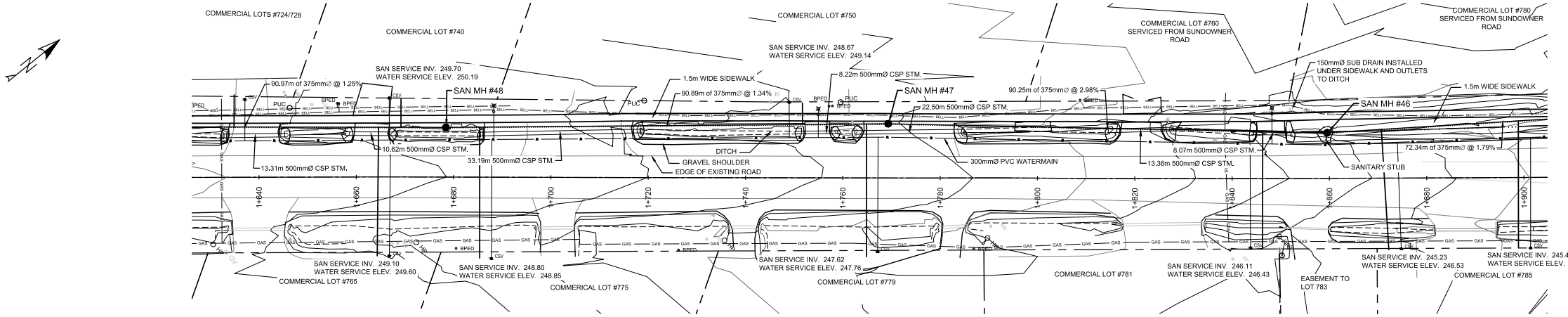
DISCIPLINE: **CIVIL**

TITLE:

**PHASE 1**
**PLAN AND PROFILE**
**BALM BEACH ROAD**
**STA 1+365 TO STA 1+635**

SHEET NUMBER: **RD1.2**
SHEET #: 3 OF 5

ISSUE: **RECORD DRAWING**
DATE OF: **JUNE 2023**
RV. #




BALM BREACH ROAD
(COUNTY ROAD 25)

## LEGEND

### NEW CONSTRUCTION

- NEW SANITARY SEWER
- NEW SANITARY SERVICE
- NEW WATER MAIN
- NEW WATER SERVICE
- NEW STORM SEWER
- NEW CENTERLINE OF DITCH GRADING
- NEW SIDEWALK
- SANMH NEW SANITARY MANHOLE
- CBMH NEW CATCHBASIN MANHOLE
- CB NEW CATCHBASIN
- DICB NEW DITCH INLET CATCHBASIN
- NEW WATERMAIN GATE VALVE
- CSV NEW WATER SERVICE CURB STOP
- NEW FIRE HYDRANT
- NEWMARKET HYDRO POLE AND ANCHOR

### EXISTING CONDITIONS

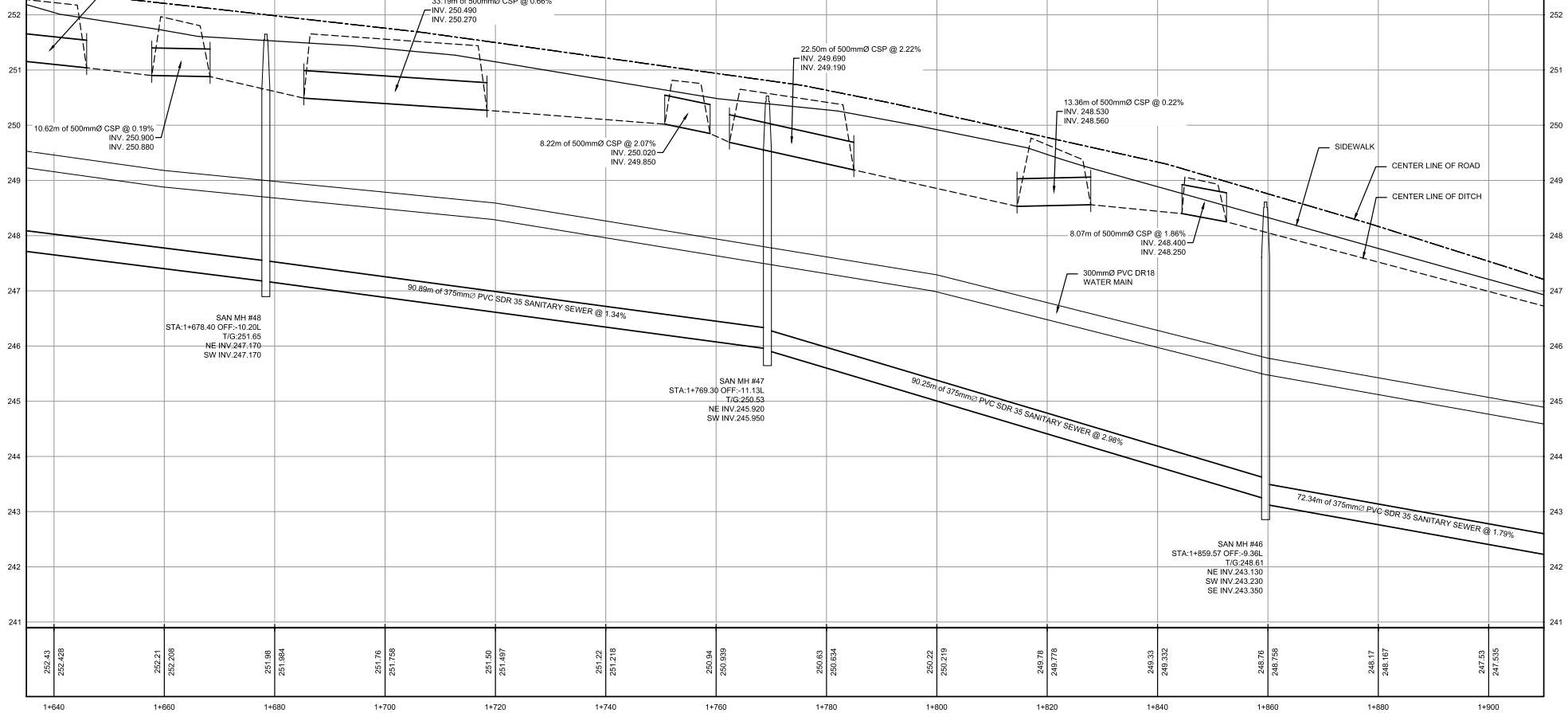
- PROPERTY LINES
- CENTERLINE OF ROAD
- EDGE OF EXISTING PAVEMENT
- EDGE OF EXISTING GRAVEL
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING WATER MAIN
- SANMH EXISTING SANITARY MANHOLE
- CB EXISTING CATCH BASIN
- CSV EXISTING CURB STOP VALVE
- FH EXISTING FIRE HYDRANT
- WV EXISTING GATE VALVE

- BP EXISTING BELL POLE
- RP EXISTING RODGERS POLE
- PUC EXISTING MIDLAND PUC POLE
- LP EXISTING LIGHTING POLE
- HP EXISTING HYDRO POLE
- AN EXISTING HYDRO GUY WIRE
- X EXISTING FENCE
- EXISTING TREE LINE
- GAS GAS EXISTING UNDERGROUND GAS LINE
- UGF UGF EXISTING UNDERGROUND FIBER
- CATV EXISTING CABLE TV PEDESTAL
- BPED EXISTING TELEPHONE PEDESTAL
- EXISTING STANDARD IRON BAR
- EXISTING IRON BAR

BM BENCHMARK: TOP OF NUT ON FIRE HYDRANT ON EAST SIDE SIDE OF BALM BEACH ROAD BETWEEN LOTS 785 AND 795. ELEVATION = 247.36

## NOTES:

- ALL LOT FABRIC SHOWN IN DRAWINGS IS GIS PARCEL FABRIC.
- ALL WATER SERVICES ARE 50mmØ WITH CURB STOP AND CURB STOP BOX UNLESS STATED OTHERWISE.
- ALL SANITARY SERVICES ARE 150mmØ UNLESS STATED OTHERWISE.
- ALL DIMENSIONS GIVEN ON DRAWINGS ARE IN METRIC UNLESS OTHERWISE NOTED. DO NOT SCALE THESE DRAWINGS.




RECORD DRAWING

wsp
101-1450 1st AVENUE W
OWEN SOUND (ONTARIO) CANADA N4K 6W2
TEL.: 519-376-7612 | FAX: 519-376-8008 | WWW.WSP.COM

CONSULTANT - SUB-CONSULTANT:

SEAL:

CLIENT:

**THE TOWN OF MIDLAND**

CLIENT REF. #: --

PROJECT:

**BALM BEACH ROAD (COUNTY ROAD 25) ROAD SERVICING**

KEY PLAN:



ISSUED FOR - REVISION:

| IS. | RV. | DATE | DESCRIPTION |
|---|---|---|---|
| 5 | | JUNE 2023 | ISSUED AS RECCORD DRAWING |
| 4 | | FEB 2022 | ISSUED FOR CONSTRUCTION |
| 3 | | DEC 2021 | ISSUED FOR TENDER |
| 2 | | NOV 2020 | ISSUED FOR MECP ECA APPROVAL |
| 1 | | AUG 2020 | ISSUED FOR CLIENT REVIEW |

PROJECT NO: 191-11732-00
DATE: OCT 2019
ORIGINAL SCALE: H 1:500 V 1:50
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
DESIGNED BY: C. WILSON
DRAWN BY: C. HAINES
CHECKED BY: C. WILSON
25mm

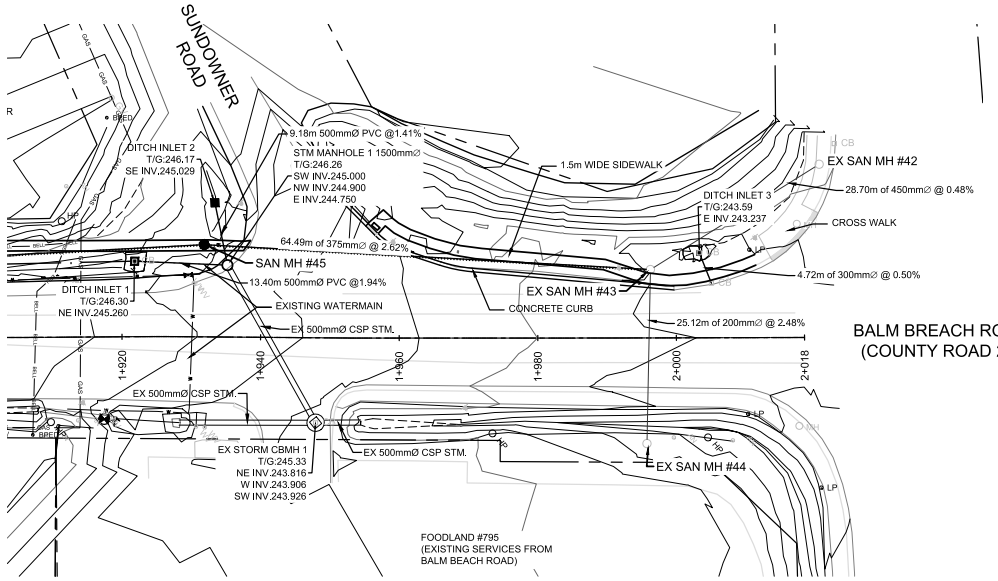
DISCIPLINE: **CIVIL**

TITLE:

**PHASE 1**
**PLAN AND PROFILE**
**BALM BEACH ROAD**
**STA 1+635 TO STA 1+910**

SHEET NUMBER: **RD1.3**
SHEET #: 4 OF 5

ISSUE: **RECORD DRAWING**
DATE OF: **JUNE 2023**
RV. #

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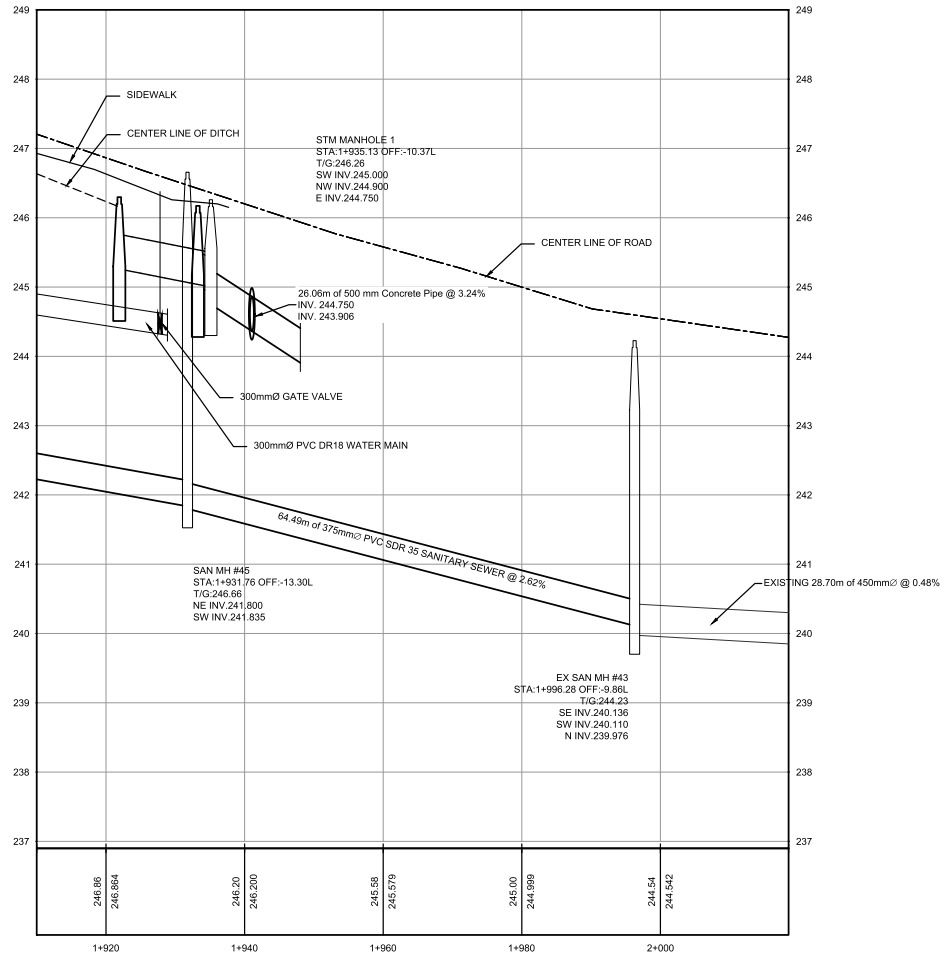


RECORD DRAWING

wsp
101-1450 1st AVENUE W
OWEN SOUND (ONTARIO) CANADA N4K 6W2
TEL.: 519-376-7612 | FAX: 519-376-8008 | WWW.WSP.COM

CONSULTANT - SUB-CONSULTANT:

SEAL:

CLIENT:

**THE TOWN OF MIDLAND**

CLIENT REF. #: --

PROJECT:

**BALM BEACH ROAD (COUNTY ROAD 25) ROAD SERVICING**

KEY PLAN:



ISSUED FOR - REVISION:

| IS. | RV. | DATE | DESCRIPTION |
|---|---|---|---|
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DRAWN BY: C. HAINES
CHECKED BY: C. WILSON
25mm

DISCIPLINE: **CIVIL**

TITLE:

**PHASE 1**
**PLAN AND PROFILE**
**BALM BEACH ROAD**
**STA 1+910 TO STA 2+018**

SHEET NUMBER: **RD1.4**
SHEET #: 5 OF 5

ISSUE: **RECORD DRAWING**
RV. #
DATE OF: **JUNE 2023**

Outlook

---

## Re: 701 Balm Beach Rd E., Midland

---

**From** Cathy Hunter <dgzengineeringpro@gmail.com>
**Date** Mon 10/27/2025 4:00 PM
**To** Amir Samadi <amsamadi@kingepcm.com>

Hello Amir,

The water usage is 3 T/per day at work day. The work operation does not run every day. It is about 15 days/per month.
Thank you,

Catherine Hu

On Mon, Oct 27, 2025 at 12:05 PM Amir Samadi <amsamadi@kingepcm.com> wrote:

> Hi Catherine,
>
> Hope you’re doing well.
>
> We’ve started working on this project with a new FSR study. Could you please let me know the estimated potable water demand required for this site or for the winery operations?
>
> Thanks,
>
> Amir
>
> **********

* Amir Samadi, PhD, PEng
* *Senior Engineer- Water Resources*
* *Manager of Civil Engineering*
* Email: amsamadi@KingEPCM.com
* www.KingEPCM.com
* Cell(Mobile): +1 (416) 871-1991
**********

# Communication in connection with paving the existing driveway

EM

Engineering Shared Mailbox<engineering@midland.ca>

To: Amir Samadi; Engineering Shared Mailbox <engineering@midland.ca>; Mike Campitelli <mcampitelli@midland.ca>

Wed 11/5/2025 1:02 PM

Cc: Tony Wang; Andy Warzin <awarzin@midland.ca>; Bailee Yasher <byasher@midland.ca>

You forwarded this message on Wed 11/5/2025 2:30 PM

Hi Amir,

There is no permit required to pave an existing driveway. A permit is only required if there is a change to the size or design. You may proceed to pave the existing driveway.

Thank you,

**Victoria Lesperance**
Administration - Infrastructure
P: 705-526-4275 ext 2406
engineering@midland.ca
transit@midland.ca

**Town of Midland**
575 Dominion Avenue,
Midland, Ontario L4R 1R2
www.midland.ca

# APPENDIX III – DETAILED CALCULATIONS FOR FIRE FIGHTING FLOW

# 701 Balm Beach Road E., Midland, Ontario

## Fire Fighting Calculations

### Based on Office of Fire Marshal (1999)

Table 3.1.2.1.

Major Occupancy Classification

Forming Part of Sentences 3.1.2.1. (1), 3.1.2.2.(1) and 3.11.2.1 (3)

| Major Occupancy Classification | Assembly occupancies not eleswhere classified in Group A |
|---|---|
| Group | A2 |
| Building Area (m^2) | 581.37 |
| Assumed Height (m) | 6 |
| K (max) | 23 |
| V (m^3) | 3488.22 |
| S_total | 1 |
| Minimum Supply of Water in Litres, Q (L) | 80229.06 |
| Required Minimum Water Supply Flow Rate (L/min) | 2700 |

**$Q = KVS_{Tot}$**

where

Q = minimum supply of water in litres (L)
K = water supply coefficient from Table 1
V = total building volume in cubic metres
$S_{Tot}$ = total of spatial coefficient values from property line exposures on all sides, as obtained from the formula:

**$S_{Tot} = 1.0 + [(S_{Side1}) + (S_{Side2}) + (S_{Side3}) + \text{... etc.}]$**

where

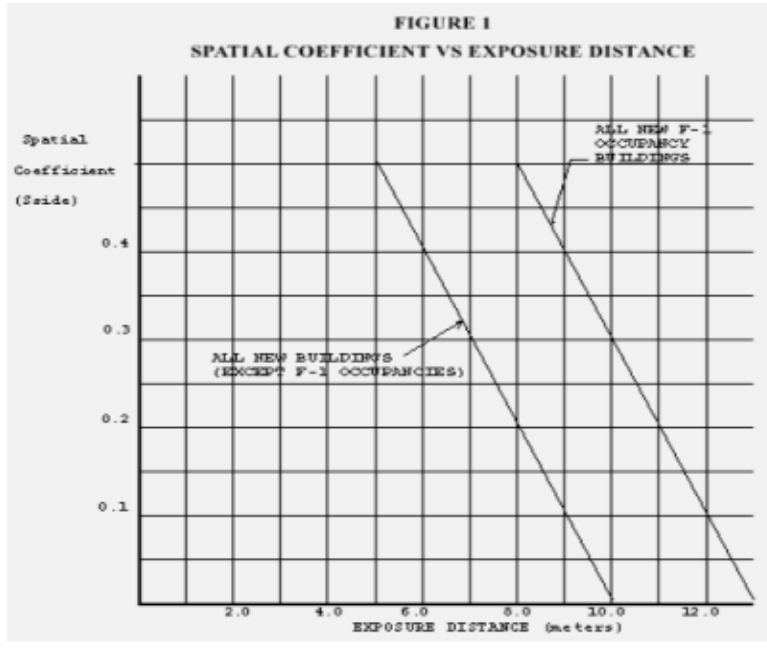
**$S_{Side}$** values are obtained from Figure 1, as modified by Sections 6.3 (e) and 6.3 (f) of this guideline, and
**$S_{Tot}$** need not exceed 2.0
(see also Section 7.0 of this guideline)

**Table 2:**
**Minimum Water Supply Flow Rates**

| Building Code, Part 3 Buildings | Required Minimum Water Supply Flow Rate (L/min.) |
|---|---|
| One-storey building with building area not exceeding 600m² (excluding F-1 occupancies) | 1800 |
| All other buildings | 2700 (If **Q** ≤ 108,000L)[1]<br>3600 (If **Q** > 108,000L **and** ≤ 135,000L)[1]<br>4500 (If **Q** > 135,000L **and** ≤ 162,000L)[1]<br>5400 (If **Q** > 162,000L **and** ≤ 190,000L)[1]<br>6300 (If **Q** > 190,000L **and** ≤ 270,000L)[1]<br>9000 (If **Q** > 270,000L)[1] |

Note: [1] **$Q=KVS_{Tot}$** as referenced in Section 3(a)

**FIGURE 1**
**SPATIAL COEFFICIENT VS EXPOSURE DISTANCE**



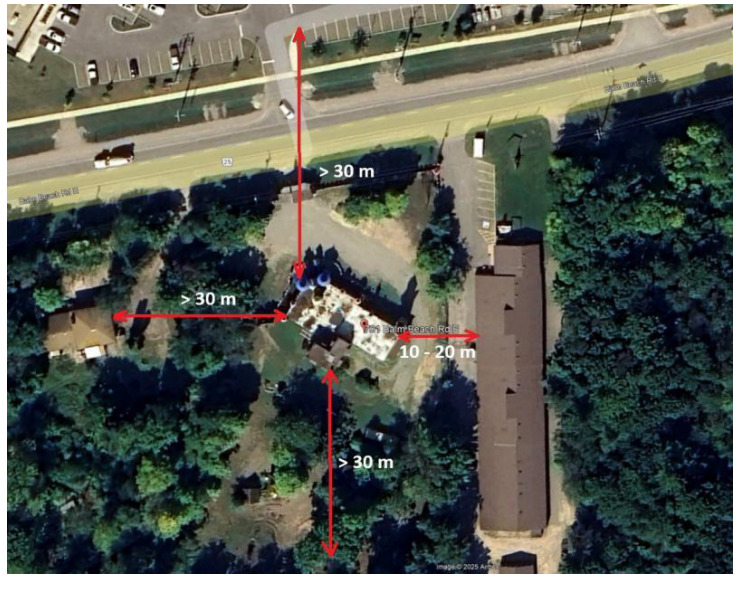




**Table 1:**
**Water Supply Coefficient - K**

| TYPE OF CONSTRUCTION | Classification by Group or Division in Accordance with Table 3.1.2.1 of the Ontario Building Code | | | | |
|---|---|---|---|---|---|
| | A-2 B-1 B-2 B-3 C D | A-4 F-3 | A-1 A-3< | E F-2 | F-1 |
| Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches. | 10 | 12 | 14 | 17 | 23 |
| Building is of noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6. of the OBC. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating. | 16 | 19 | 22 | 27 | 37 |



| | | | | | |
|---|---|---|---|---|---|
| Building is of combustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire-resistance rating where permitted in Subsection 3.2.2. of the OBC. | 18 | 22 | 25 | 31 | 41 |
| Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating. | 23 | 28 | 32 | 39 | 53 |
| Column 1 | 2 | 3 | 4 | 5 | 6 |

# APPENDIX IV – RESULTS FOR HYDRANT TEST FLOW

## Computations for the Available Flow for Firefighting From Hydrant Test

# 701 Balm Beach Road E, Midland, Ontario

## Hydrant Flow Calculations

**Q= 29.83* C* d^2 *P^0.5**
**Q = Flow (GPM)**
**C = Orifice Coefficient = 0.9**
**d = Orifice Size (inch)**
**P = Pressure (psi)**
**P_i = Minimum Pressure (p 20**
**Q (available) @20 psi = QT ((P_static - P_I )/(P_ static - P_Residual))^0.54**
**1 GPM = 3.7854 L/min**

| Hydrant ID | Test | Static Pressure (psi)1 | Orifice Size (inch) | Pitot Pressure (psi)2 | Actual Flow (GPM)3 | Actual Flow (L/min) | Residual Pressure (psi)4 | Q @ 20PSI (Available) (GPM)5 | Q @ 20PSI (Available) (LPM) |
|---|---|---|---|---|---|---|---|---|---|
| N.A. | 1 Port | 50 | 2.5 | 36 | 1006.76 | 3811.00 | 40 | **2400.88** | **9088.30** |
| N.A. | 2 Ports - #1 | 50 | 2.5 | 22 | 787.02 | 2979.19 | 35 | **1507.79** | **5707.60** |
| N.A. | 2 Ports - #2 | 50 | 2.5 | 22 | 787.02 | 2979.19 | 35 | **1507.79** | **5707.60** |

1 The static pressure measured during the test
2 The pressure reading at the pitot gauge during the test
3 Discharge calculated using pitot pressure during the test
4 The residual pressure measured during the test
5 The maximum amount of water that can be delivered from a hydrant at a specific minimum resedual pressure Usually 20 PSI

## #370 – NFPA Guidance on Fire Hydrant Testing

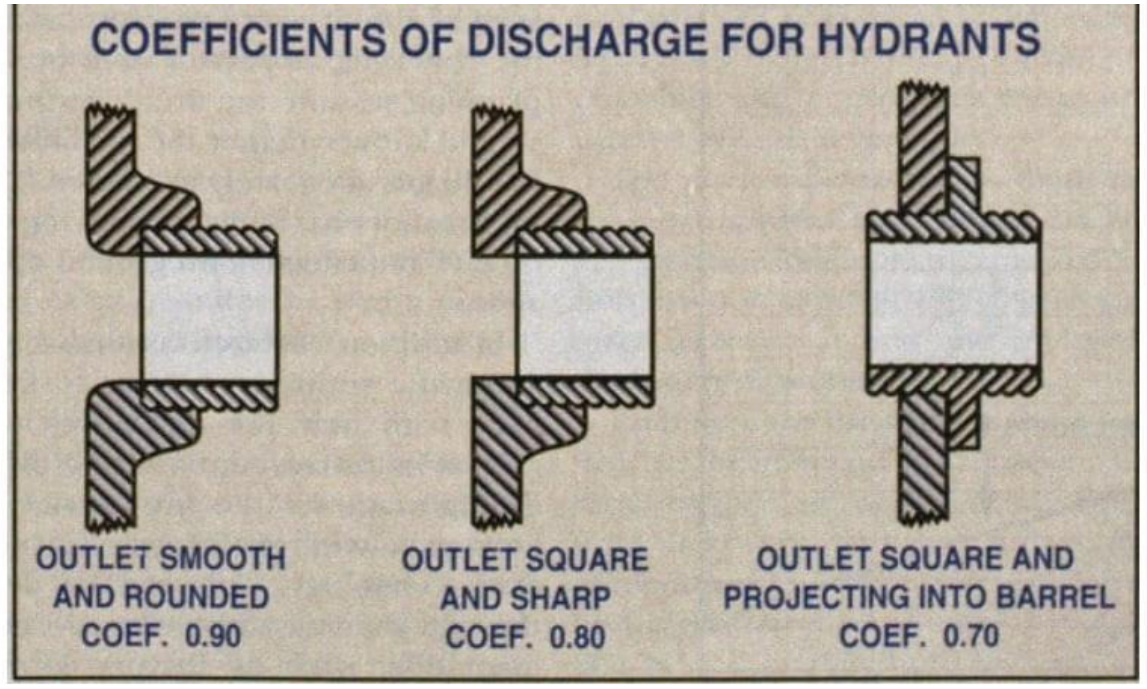
The first equation determines **the flow (gpm) from the tested fire hydrants based on the pitot gauge pressure readings.** A version of it is found in section **4.93** of ***NFPA 291***:

$$Q = 29.83 * c * d^2 * \sqrt{P}$$

Where:

**Q** = discharge; the gallons flowing during the test (gpm)

**c** = coefficient of discharge, which represents friction loss. It's determined by assessing the shape of the transition between the vertical barrel of the hydrant and the horizontal outlet. Most hydrants have a smooth and rounded transition resulting in a .90 coefficient of discharge but not all of them (as shown below):




**d** = diameter of the outlet

**P** = the pressure reading at the pitot gauge during the test (PSI)

The second formula estimates the "**flow predicted at desired residual pressure**," which is sometimes called the "**available fire flow**" (AFF). This essential equation is found in section **4.12.1.2** of NFPA 291**,** but here is a version with more steps broken out:

> $Q_R = Q * (((S - 20)^{0.54}) \div ((S - R)^{0.54}))$

Where:

> $Q_R$ = flow predicted at desired residual pressure/available fire flow
>
> **Q** = the discharge (gpm) measured during the test (the result of the first equation)
>
> **S** = the static pressure measured during the test
>
> **20** = the amount of minimum pressure (in psi) required for most municipal water supplies to prevent backflow and achieve fire protection objectives.

> **20** = the amount of minimum pressure (in psi) required for most municipal water supplies to prevent backflow and achieve fire protection objectives.
>
> (NFPA 291 calls the "S – 20" calculation above "$h_r$," which equals "pressure drop to desired residual pressure")
>
> **R** = the residual pressure measured during the test
>
> (NFPA 291 calls the "S – R" calculation above "$H_f$," which equals the "pressure drop measured during test")
>
> **0.54** = a constant within the Hazen-Williams equation

After conducting a hydrant test, testers plug in their measurements to the two formulas above, completing one after the other.

## SITE INFORMATION

### SITE MAP


Note: If the main is a dead end, the flowing hydrant shall be closest to the dead end

CLASSIC | FIRE + LIFE SAFETY

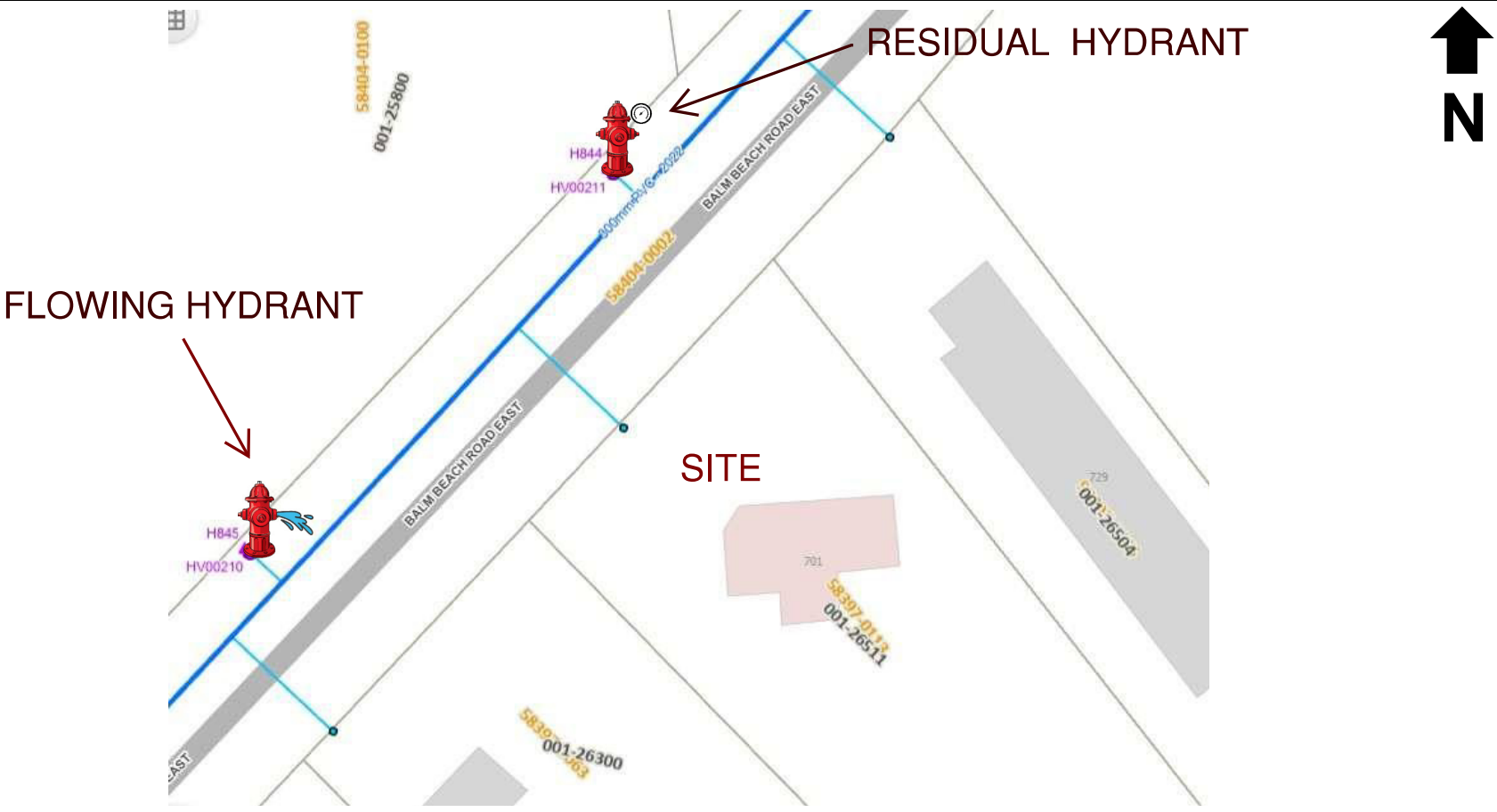
# FLOW TEST REPORT

**Form SD-003B RevDate: Nov 29, 2021**

| PROJECT INFORMATION | | | |
|---|---|---|---|
| Project Name: | 701 Balm Beach Rd E Flow Test | Const. Project #: | SMC-0018532 |
| Site Address: | 701 Balm Beach Rd E Midland ON | Design Project #: | 2025-CFLS-641 |
| City Contact: | Stephane Marinier | Phone #: | 705-528-4479 |
| CFLS Contact: | John Patterson | Phone #: | |
| Technical Contact: | **Andy Coghlin** | Phone #: | **519-476-0761** |

## SITE INFORMATION

### SITE MAP




Note: If the main is a dead end, the flowing hydrant shall be closest to the dead end

| ITEMS TO LABEL ON MAP | HYDRANTS USED | MAIN SIZE |
|---|---|---|
| ☑ Static / Residual & Flow Hydrants | ☑ City Hydrant(s) | City: |
| ☐ Flow Direction (if the main is dead end) | ☐ Site Hydrant(s) | Site: |

| SITE NOTES |
|---|
| |

CLASSIC | FIRE + LIFE SAFETY

# FLOW TEST REPORT

**Form SD-003B RevDate: Nov 29, 2021**

| TEST INFORMATION | | | |
|---|---|---|---|
| Minimum Required Flow: | NA | Min Ports: | 2 |
| CFLS Personnel Present: | John Patterson | Test Date: | 2025-12-23 |
| City / External Company: | Midland Utilities | Test Time: | 8:00am |

| TEST EQUIPMENT | |
|---|---|
| ☐ Hose Monsters with built in Pitot | Hose length used: |
| ☐ Hand held pitot gauge | ☑ Pollard diffuser elbow with built in Pitot |
| ☐ Other: | |

**TEST RESULTS**

| Number of Ports | Outlet Size (IN) | Discharge Coefficient | Pitot Reading (PSI) | Total Flow (GPM) | Static / Residual Pressure (PSI) |
|---|---|---|---|---|---|
| 0 Ports | | | | | 50 |
| 1 Port | 2.5 | 0.9 | 36 | 1,007 | 40 |
| 2 Ports | 2.5 | 0.9 | 22 / 22 | 1,575 | 35 |
| 3 Ports | 2.5 | 0.9 | | 0 | |
| 4 Ports | 2.5 | 0.9 | | 0 | |
| 0 Ports | **STATIC RE-CHECK** | | | | 55 |

**TEST NOTES**

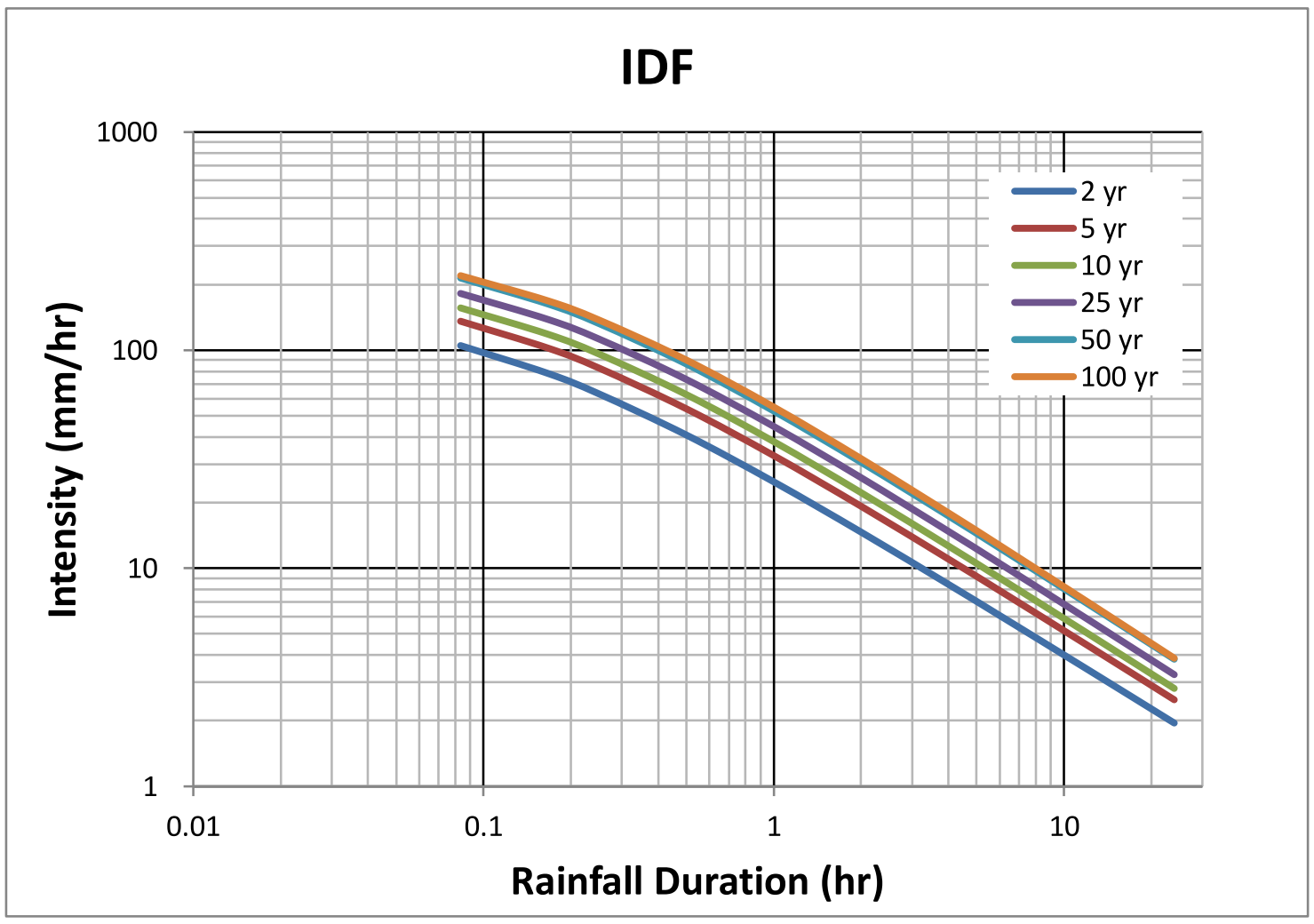
| HYDRAULIC ADJUSTMENTS (FOR OFFICE USE ONLY) | | | |
|---|---|---|---|
| **ADJUSTMENTS FOR HYDRAULIC GRADE LINE (HGL)** | | | |
| Reservoir HGL (m): | | Site Elevation (m): | |
| Theoretical Static Head (PSI): | 0 | PSI to subtract from test pressures: | 50 |
| **OTHER HYDRAULIC ADJUSTMENTS** | | | |
| Other adjustment as required by the City / AHJ: | | | |

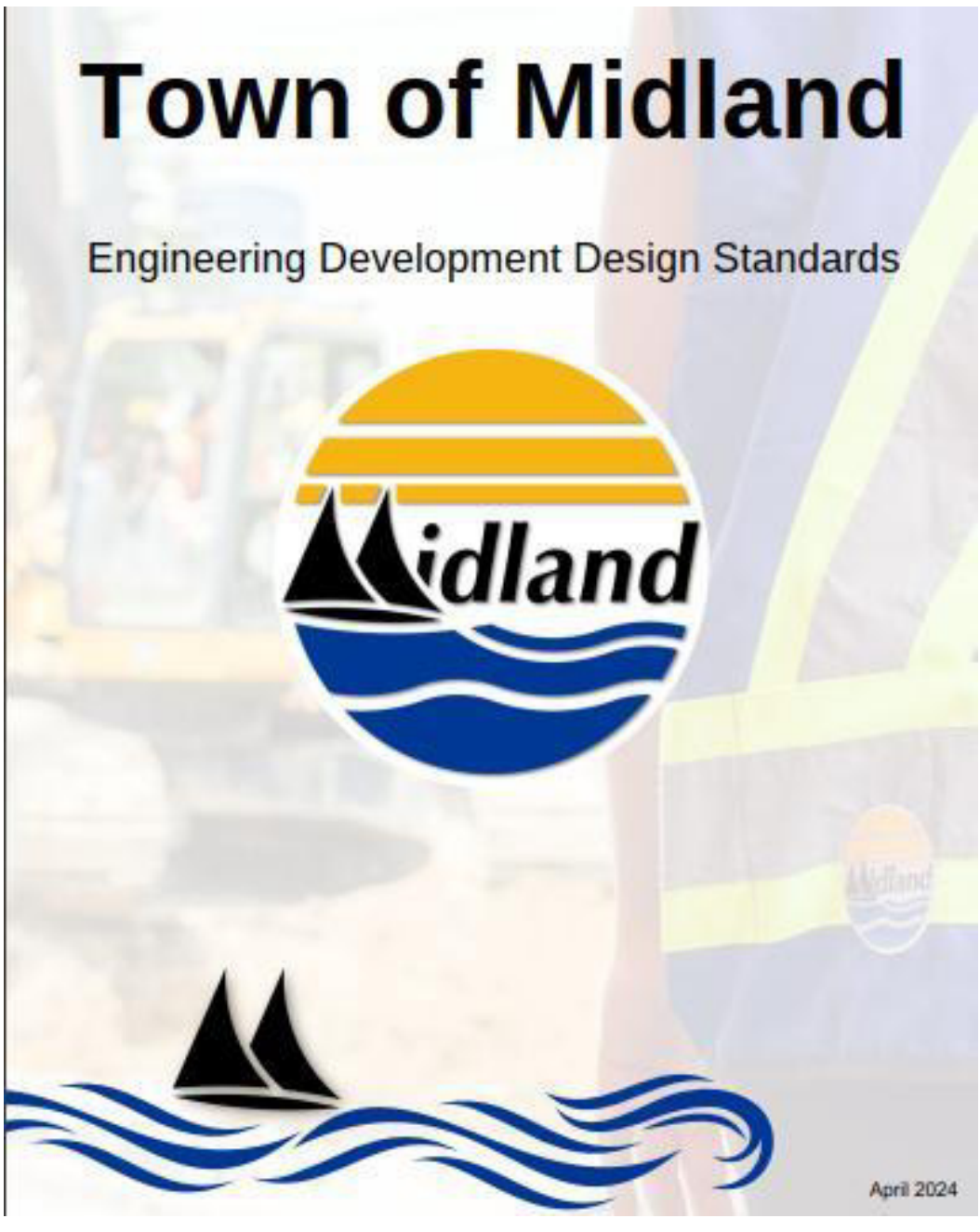
# APPENDIX V – INTENSITY-DURATION-FREQUENCY (IDF) DATA

# IDF Information and Curves

**I = A/(B+ T)^C, where I = Intensity (mm/hr), T = Concentration Time (min), A, B, and C are parameters taken from IDF information and are dimensionless**

| IDF Parameters | | Return Period (year) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2 | 5 | 10 | 25 | 50 | 100 |
| A | | 807.44 | 1135.4 | 1387 | 1676.2 | 1973.1 | 2193.1 |
| B | | 6.75 | 7.5 | 7.97 | 8.3 | 9 | 9.04 |
| C | | 0.828 | 0.841 | 0.852 | 0.858 | 0.868 | 0.871 |
| Duration (min) | Duration (hr) | Intensity (mm/hr) | | | | | |
| 5 | 0.083 | 104.98 | 135.72 | 156.26 | 182.00 | 214.23 | 219.64 |
| 10 | 0.167 | 78.28 | 102.27 | 118.36 | 138.40 | 162.92 | 168.45 |
| 15 | 0.25 | 63.05 | 82.79 | 96.02 | 112.50 | 132.42 | 137.49 |
| 30 | 0.50 | 40.84 | 53.88 | 62.57 | 73.44 | 86.45 | 90.13 |
| 60 | 1.00 | 24.92 | 32.86 | 38.10 | 44.71 | 52.63 | 54.85 |
| 120 | 2.00 | 14.65 | 19.25 | 22.22 | 26.03 | 30.64 | 31.81 |
| 240 | 4.00 | 8.44 | 11.02 | 12.65 | 14.77 | 17.39 | 17.94 |
| 360 | 6.00 | 6.08 | 7.90 | 9.04 | 10.53 | 12.40 | 12.74 |
| 720 | 12.00 | 3.45 | 4.45 | 5.05 | 5.87 | 6.91 | 7.04 |
| 1440 | 24.00 | 1.95 | 2.49 | 2.81 | 3.25 | 3.83 | 3.87 |






### 6.2.7 Meteorology

The intensity-duration frequency (IDF) curves used for the Town of Midland were originally derived from rainfall data taken from the Orillia Atmospheric Environment services weather station. The equations for these curves are as follows:

2 Year Storm 1= $\frac{807.44}{(T.C. +6.75)\ 0.828}$

5 Year Storm 1= $\frac{1135.4}{(T.C. + 7.5)\ 0.841}$

10 Year Storm 1= $\frac{1387}{(T.C. + 7.97)\ 0.852}$

25 Year Storm 1= $\frac{1676.2}{(T.C. +8.3)\ 0.858}$

50 Year Storm 1= $\frac{1973.1}{(T.C. + 9.0)\ 0.868}$

100 Year Storm 1= $\frac{2193.1}{(T.C. +9.04)\ 0.871}$

# APPENDIX VI– HYDRAULIC CALCULATIONS AND THE RATIONAL METHOD

# 701 Balm Beach Road E., Midland, Ontario

## Hydraulic Calculations of Existing Sanitary Services

| Guide for the Codes | |
|---|---|
| 1 | Sanitary pipe inside the Site |
| 2 | Sanitary pipe on the Balm Beach Road E. |

Manning's Coefficient 0.012

| Code | Pipe Diam. (mm) | Area (m^2) | Hyd. Rad. (m) | Slope (-) | Full Discharge (lit/sec) | Partial flow (80%) (lit/sec) | d/D (-) | Remained Freeboard (mm) |
|---|---|---|---|---|---|---|---|---|
| 1 | 150 | 0.0177 | 0.0375 | 0.01 | 16.47 | 13.18 | 0.75 | 37.50 |
| 2 | 375 | 0.1104 | 0.09375 | 0.0135 | 220.41 | 176.32 | 0.75 | 93.75 |

**Calculating avaialable free board under existing conditions**

| | | |
|---|---|---|
| Q_partial (m^3/sec) | 0.00142 | Design sanitary flow |
| n = | 0.012 | (-) |
| D (m) = | 0.15 | Diameter of the existing sanitary pipe |
| R (m) = | 0.0375 | R = D/4 |
| d (m) = | 0.010 | |
| Q_partial/Q_full (-) | 0.086206 | |
| d/D (-) | 0.15 | From figure below |
| d (mm) | 22.5 | Depth of flow inside pipe |
| Available Freeboard (mm) | 127.5 | |

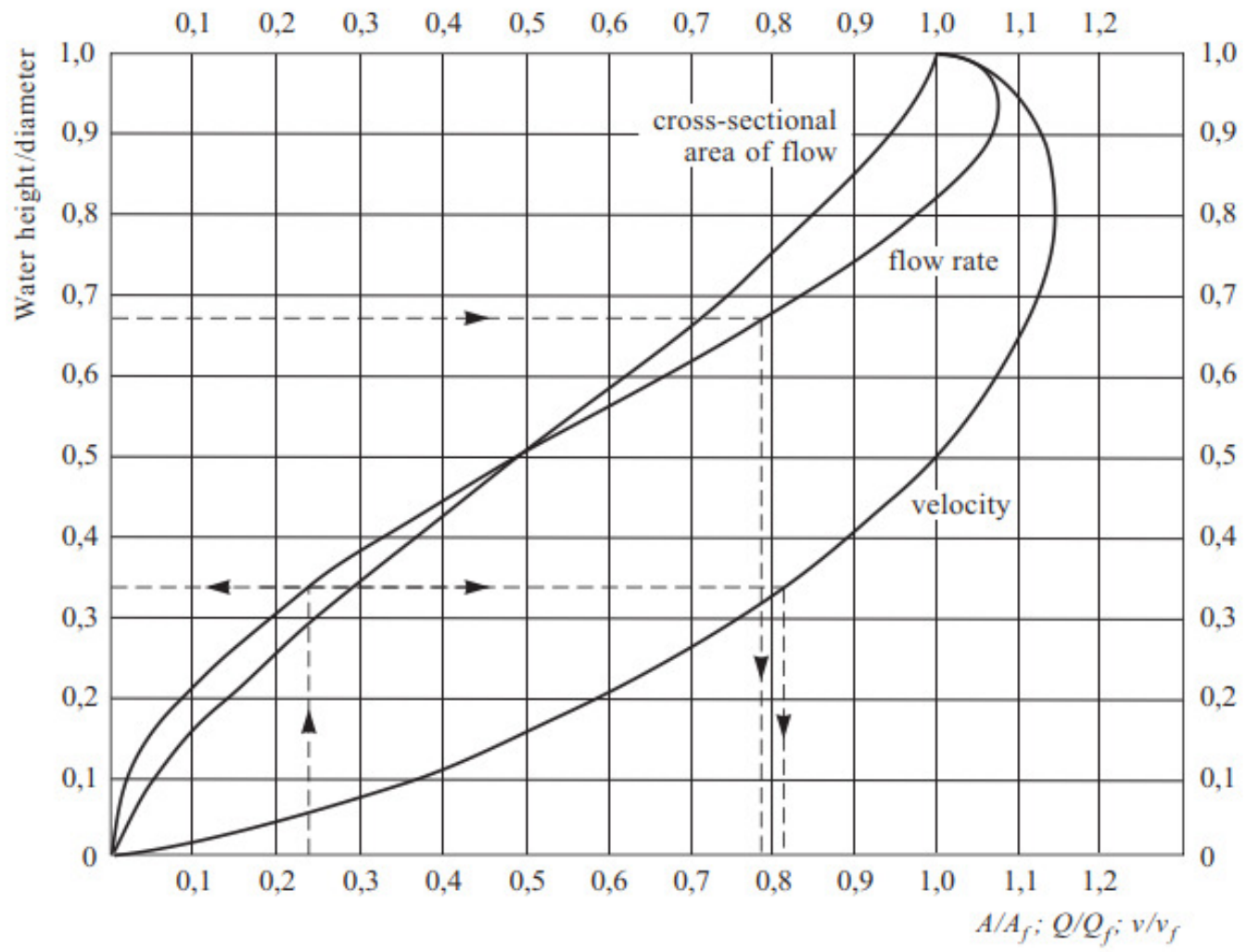



**Figure 2.12** Flow conditions (uniform) in **circular sewer pipes not flowing full** (index *f* means "flowing full"); *n* (Kutter) = 0,015; the Manning coefficient, *n*, does not vary with the water height in the pipe

## 701 Balm Beach Road E., Midland, ON

### Peak Flow Calculation

**Qp (l/s)= 2.78 C Ca A I ---- A (Area) in ha, I (Intensity) in mm/hr**

**I (mm/hr) = A /( T+ B)^C, T (min) ---- A, B, and C dimensionless**

**Concentration Time (min) = 15**

| Retrun period | A | B | C | C.Ca (Pre) | C.Ca (Post) |
|---|---|---|---|---|---|
| 2 | 807.44 | 6.75 | 0.828 | 0.606 | 0.606 |
| 5 | 1135.4 | 7.5 | 0.841 | 0.606 | 0.606 |
| 10 | 1387 | 7.97 | 0.852 | 0.606 | 0.606 |
| 25 | 1676.2 | 8.3 | 0.858 | 0.644 | 0.644 |
| 50 | 1973.1 | 9 | 0.868 | 0.656 | 0.656 |
| 100 | 2193.1 | 9.04 | 0.871 | 0.661 | 0.661 |

| Pre-Development Condition | |
|---|---|
| Area # | 1 |
| Area (hr) | 0.789 |

| | |
|---|---|
| Return Rate | 2 |
| I (mm/hr) | 63.05 |
| Qp (l/s) | 83.9 |
| Return Rate | 5 |
| I (mm/hr) | 82.79 |
| Qp (l/s) | 110.1 |
| Return Rate | 10 |
| I (mm/hr) | 96.02 |
| Qp (l/s) | 127.7 |
| Return Rate | 25 |
| I (mm/hr) | 112.50 |
| Qp (l/s) | 112.5 |
| Return Rate | 50 |
| I (mm/hr) | 125.06 |
| Qp (l/s) | 180.1 |
| Return Rate | 100 |
| I (mm/hr) | 137.49 |
| Qp (l/s) | 199.5 |

| Post-Development Condition | |
|---|---|
| Area # | 1 |
| Area (hr) | 0.789 |

| | |
|---|---|
| Return Rate | 2 |
| I (mm/hr) | 63.05 |
| Qp (l/s) | 83.9 |
| Return Rate | 5 |
| I (mm/hr) | 82.79 |
| Qp (l/s) | 110.1 |
| Return Rate | 10 |
| I (mm/hr) | 96.02 |
| Qp (l/s) | 127.7 |
| Return Rate | 25 |
| I (mm/hr) | 112.50 |
| Qp (l/s) | 158.9 |
| Return Rate | 50 |
| I (mm/hr) | 125.06 |
| Qp (l/s) | 180.1 |
| Return Rate | 100 |
| I (mm/hr) | 137.49 |
| Qp (l/s) | 199.5 |

# 701 Balm Beach Road E., Midland, Ontario

## Peak Flow Calculation for Catch Basins in Post-Development Conditions

**Qp (l/s)= 2.78 C Ca A I ---- A (Area) in ha, I (Intensity) in mm/hr**

**I (mm/hr) = A/( T+B)^C, T (min) ---- A, b, and C dimensionless**

**Concentration Time (min) = 15**

| Retrun period (year) | A | B | C | C.Ca (Pre) | C.Ca (Post) #201 | C.Ca (Post) #203 |
|---|---|---|---|---|---|---|
| 2 | 807.44 | 6.75 | 0.828 | 0.606 | 0.000 | 0.606 |
| 5 | 1135.4 | 7.5 | 0.841 | 0.606 | 0.000 | 0.606 |
| 10 | 1387 | 7.97 | 0.852 | 0.606 | 0.000 | 0.606 |
| 25 | 1676.2 | 8.3 | 0.858 | 0.644 | 0.000 | 0.644 |
| 50 | 1973.1 | 9 | 0.868 | 0.656 | 0.000 | 0.656 |
| 100 | 2193.1 | 9.04 | 0.871 | 0.661 | 0.000 | 0.661 |

| Pre-D. Condition | |
|---|---|
| | |
| **Area #** | **101** |
| **Area (ha)** | **0.789** |

| R.P. | 2 years |
|---|---|
| I (mm/hr) | 63.05 |
| Qp (l/s) | 83.9 |

| R.P. | 5 years |
|---|---|
| I (mm/hr) | 82.79 |
| Qp (l/s) | 110.1 |

| R.P. | 10 years |
|---|---|
| I (mm/hr) | 96.02 |
| Qp (l/s) | 127.7 |

| R.P. | 25 years |
|---|---|
| I (mm/hr) | 112.50 |
| Qp (l/s) | 158.9 |

| R.P. | 50 years |
|---|---|
| I (mm/hr) | 125.06 |
| Qp (l/s) | 180.1 |

| R.P. | 100 years |
|---|---|
| I (mm/hr) | 137.49 |
| Qp (l/s) | 199.5 |

| Post-D. Condition | | | |
|---|---|---|---|
| **Controlled Area** | | **Uncontrolled Area** | |
| **Area #** | **201** | **Area #** | **202** |
| **Area (ha)** | **0.000** | **Area (ha)** | **0.789** |

| R.P. | 2 years | 2 years |
|---|---|---|
| I (mm/hr) | 63.05 | 63.05 |
| Qp (l/s) | 0.00 | 83.87 |

| R.P. | 5 years | 5 years |
|---|---|---|
| I (mm/hr) | 82.79 | 82.79 |
| Qp (l/s) | 0.00 | 110.12 |

| R.P. | 10 years | 10 years |
|---|---|---|
| I (mm/hr) | 96.02 | 96.02 |
| Qp (l/s) | 0.00 | 127.72 |

| R.P. | 25 years | 25 years |
|---|---|---|
| I (mm/hr) | 112.50 | 112.50 |
| Qp (l/s) | 0.00 | 158.95 |

| R.P. | 50 years | 50 years |
|---|---|---|
| I (mm/hr) | 125.06 | 125.06 |
| Qp (l/s) | 0.00 | 180.08 |

| R.P. | 100 years | 100 years |
|---|---|---|
| I (mm/hr) | 137.49 | 137.49 |
| Qp (l/s) | 0.00 | 199.45 |

Notes: R.P. = Return Period; D. = Development

# 701 Balm Beach Road E., Midland, Ontario

**I, (Intensity,mm/hr)= A/(T+B)^C, T= Time of concentration (hours)**

| | 2 year | 5 year | 10 year | 25 year | 50 year | 100 year |
|---|---|---|---|---|---|---|
| **A** | 807.44 | 1135.4 | 1387 | 1676.2 | 1973.1 | 2193.1 |
| **B** | 6.75 | 7.5 | 7.97 | 8.3 | 9 | 9.04 |
| **C** | 0.828 | 0.841 | 0.852 | 0.858 | 0.868 | 0.871 |
| **Intensity (mm/hr)** | **63.05** | **82.79** | **96.02** | **112.50** | **125.06** | **137.49** |
| **15 min rainfall (mm)** | 15.76 | 20.70 | 24.01 | 28.12 | 31.27 | 34.37 |

Note: Following per recommendation minmum value for time of concentration is 15 minutes

| Description | C | Post-Development | | Pre-development | |
|---|---|---|---|---|---|
| | | Area | Area*C | Area | Area*C |
| **Building** | 0.95 | 731.37 | 694.80 | 731.37 | 694.80 |
| **Landscape** | 0.25 | 3878.47 | 969.62 | 3878.47 | 969.62 |
| **PDW** | 0.6 | 3284.56 | 1970.74 | 3284.56 | 1970.74 |
| **Total** | | **7894.40** | **3635.16** | **7894.40** | **3635.16** |

| | | | | | |
|---|---|---|---|---|---|
| **C (weighted average)** | | | **0.460** | | **0.460** |
| | | | **Post** | | **Pre** |
| TIMP (for Pre-Dev.) | 0.509 | **4015.93** | | | |
| TIMP (for Post-Dev.) | 0.509 | **4015.93** | | | |

## For Pre-Development conditions

C (Runoff Coeff.) *Ca (Antecedent Prec. Factor - 1.00 for 2, 5, 10 year, 1.1 for 25 year, 1.25 for 50, 100 year , Max 1.0)

| Description | Area | 2 yr | 5 yr | 10 yr | 25 yr | 50 yr | 100 yr |
|---|---|---|---|---|---|---|---|
| **Building** | 731.37 | 0.95 | 0.95 | 0.95 | 1 | 1 | 1 |
| **Landscape** | 3878.47 | 0.25 | 0.25 | 0.25 | 0.275 | 0.3 | 0.31 |
| **PDW** | 3284.56 | 0.95 | 0.95 | 0.95 | 1 | 1 | 1 |
| **Total** | **7894.40** | 0.606 | 0.606 | 0.606 | 0.644 | 0.656 | 0.661 |
| PDW =Parking+driveway+walkway | | | | | | | |

## For Post-Devevlopment Conditions

C (Runoff Coeff.) *Ca (Antecedent Prec. Factor - 1.00 for 2, 5, 10 year, 1.1 for 25 year, 1.25 for 50, 100 year , Max 1.0)

| Description | Area | 2 yr | 5 yr | 10 yr | 25 yr | 50 yr | 100 yr |
|---|---|---|---|---|---|---|---|
| **Building** | 731.37 | 0.95 | 0.95 | 0.95 | 1 | 1 | 1 |
| **Landscape** | 3878.47 | 0.25 | 0.25 | 0.25 | 0.275 | 0.3 | 0.31 |
| **PDW** | 3284.56 | 0.95 | 0.95 | 0.95 | 1 | 1 | 1 |
| **Total** | **7894.40** | 0.606 | 0.606 | 0.606 | 0.644 | 0.656 | 0.661 |

**Controlled area: Post-Development #201**

C (Runoff Coeff.) *Ca (Antecedent Prec. Factor - 1.00 for 2, 5, 10 year, 1.1 for 25 year, 1.25 for 50, 100 year , Max 1.0)

| Description | Area | 2 yr | 5 yr | 10 yr | 25 yr | 50 yr | 100 yr |
|---|---|---|---|---|---|---|---|
| **Building** | 0.00 | 0.95 | 0.95 | 0.95 | 1 | 1 | 1 |
| **Landscape** | 0.00 | 0.25 | 0.25 | 0.25 | 0.275 | 0.3 | 0.31 |
| **PDW** | 0.00 | 0.95 | 0.95 | 0.95 | 1 | 1 | 1 |
| **Total** | **0.00** | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

**Controlled area: Post-Development #202**

C (Runoff Coeff.) *Ca (Antecedent Prec. Factor - 1.00 for 2, 5, 10 year, 1.1 for 25 year, 1.25 for 50, 100 year , Max 1.0)

**Uncontrolled area: Post-Development**

C (Runoff Coeff.) *Ca (Antecedent Prec. Factor - 1.00 for 2, 5, 10 year, 1.1 for 25 year, 1.25 for 50, 100 year , Max 1.0)

| Description | Area | 2 yr | 5 yr | 10 yr | 25 yr | 50 yr | 100 yr |
|---|---|---|---|---|---|---|---|
| **Building** | 731.37 | 0.95 | 0.95 | 0.95 | 1 | 1 | 1 |
| **Landscape** | 3878.47 | 0.25 | 0.25 | 0.25 | 0.275 | 0.3 | 0.310 |
| **Walkway** | 3284.56 | 0.95 | 0.95 | 0.95 | 1 | 1 | 1 |
| **Total** | **7894.40** | 0.606 | 0.606 | 0.606 | 0.644 | 0.656 | 0.661 |

**Qp = 2.78 *A * C.Ca * I, Qp (peak flow, l/s), A (Drainage area, ha), I (Intensity, mm/hour)**

| | | | | | |
|---|---|---|---|---|---|
| A (CB #1)- m^2 | 0.00 | A (CB #2) | 0.00 | A(CB #3) | 7894.40 |

| | | |
|---|---|---|
| A (total) | 7894.4 | Drainage area (m2) |

| Return Period (years) | 2 | 5 | 10 | 25 | 50 | 100 |
|---|---|---|---|---|---|---|

**For Pre-Development Conditions**

| | | | | | | |
|---|---|---|---|---|---|---|
| C.Ca | 0.606 | 0.606 | 0.606 | 0.644 | 0.656 | 0.661 |
| Qp (l/sec) | 83.87 | 110.12 | 127.72 | 158.95 | 180.08 | 199.45 |

**For Post-Development Condition -Without Mitigation**

| | | | | | | |
|---|---|---|---|---|---|---|
| C.Ca (CB #1) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| C.Ca (CB #3) | 0.606 | 0.606 | 0.606 | 0.644 | 0.656 | 0.661 |
| Qp (l/sec) -CB #1 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Q0 (l/sec) - CB #3 | 83.868 | 110.120 | 127.724 | 158.949 | 180.076 | 199.450 |
| Total Qp (l/sec) | 83.87 | 110.12 | 127.72 | 158.95 | 180.08 | 199.45 |

**Stormwater Volume (m^3) : Pre-Development Conditions**

| | | | | | | |
|---|---|---|---|---|---|---|
| V(m^3) | 50.32 | 66.07 | 76.63 | 95.37 | 108.05 | 119.67 |

**Stormwater Volume (m^3) : Post-Development Conditions**

| | | | | | | |
|---|---|---|---|---|---|---|
| V- CB #1 (m^3) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| V- CB #3 (m^3) | 50.32 | 66.07 | 76.63 | 95.37 | 108.05 | 119.67 |
| V - Total (m^3) | 50.32 | 66.07 | 76.63 | 95.37 | 108.05 | 119.67 |

**Difference in Volumes: Post (2-100)-Pre (2-100)**

| | | | | | | |
|---|---|---|---|---|---|---|
| Delta V- Total (m^3) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Run-off coefficients for the Rational Method shall be as follows:

| Category | Soil Type, Area or Medium | Coefficient | Category | Soil Type, Area or Medium | Coefficient |
|---|---|---|---|---|---|
| Lawns | Sandy soil, Flat, 2% | 0.05-0.10 | Industrial | Light Areas | 0.50-0.80 |
| | Sandy soil, average, 2-7% | 0.10-0.15 | | Heavy Areas | 0.60-0.90 |
| | Sandy soil, steep% | 0.15-0.20 | Parks, Cemeteries | | 0.10-0.25 |
| | Heavy soil, flat, 2% | 0.13-0.17 | Railroad Yard Areas | | 0.20-0.40 |
| | Heavy soil, average 2-7% | 0.18-0.22 | Unimproved Areas | | 0.10-0.30 |
| | Heavy soil, steep, 7% | 0.25-0.35 | Streets | Asphalt | 0.70-0.95 |
| Business | Downtown Areas | 0.0-0.95 | | Concrete | 0.80-0.95 |
| | Neighborhood Areas | 0.50-0.70 | | Brick | 0.70-0.85 |
| Residential | Single-Family Areas | 0.30-0.50 | Driveways and Walkways | | 0.75-0.85 |
| | | | Roofs | | 0.75-0.95 |
| | Multi-units Detached | 0.40-0.60 | Apartment Dwelling Areas | | 0.5-0.70 |
| | Multi-units, Attached | 0.60-0.75 | | | |
| | Suburban | 0.25-0.40 | | | |

Table 3- Run-off Coefficients

### *6.3.4 Time of Concentration*

The minimum initial time of concentration is to be 15 minutes.

### *6.3.5 Pre-Development*

To calculate the initial time of concentration (tic) for upstream, undeveloped lands, the following formulas may be used: Bransby Williams, HYMO/OTTHYMO, SCS Upland Method, etc. The most appropriate method will be determined at the discretion of the Town.

### *6.3.6 Post-Development*

To calculate the initial external time of concentration (tc) for external lands that are scheduled for future development, a straight line is to be drawn from the furthest point within the watershed to the proposed inlet. The top 50 metres shall have an initial tc of 10 minutes and the remainder shall have tc assuming the velocity in the sewer is 2m/s. The summation of the two tc's will give the future external time of concentration.

If the upstream area has adequate storm sewers, channels, or culverts, the velocity of the flow through these sewers, channels, or culverts shall supersede the 2m/s calculation.