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**Project name:**  
Peel Water Modelling Support

**Project ref:**  
60570509

**From:**  
Benny Wan, P.Eng.

**CC:**

**Date:**  
August 14, 2020

# Memo

**Subject:** Hydraulic Analysis for Downtown Brampton Watermain (RFQ 2020.003)

## Introduction

The Region retained AECOM to undertake a hydraulic modelling analysis to support the Municipal Class Environmental Assessment that the Region is current undertaking. The purpose of the hydraulic modelling analysis is to determine the hydraulic implications to the Region's system with the inclusion of various routing options of the future watermain that service the future Downtown Brampton developments. Based on the proposed short listed routing for the future watermain, the following routing options were analyzed in this study.

- Option 2A: Centre Street
- Option 2B: Centre and Beech Street
- Option 4B: Main and Centre Street
- Option 4C: Main and Mill Street
- Option 4D: Main and Centre with Church Street
- Option 5: West Neighborhood

Figure 1 below shows the location of the short-listed routing options.

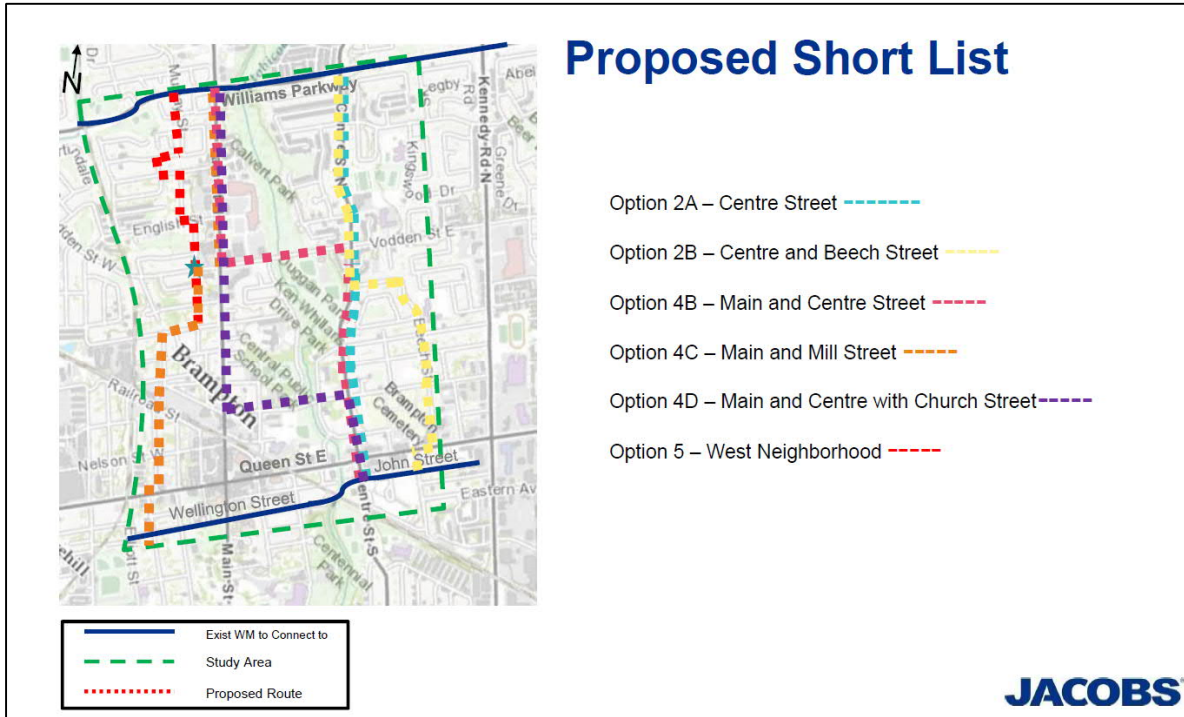


Figure 1: Short-Listed Routing Option<sup>1</sup>

For Option 4B, the proposed watermain location included a section of watermain on Vodden Street East; which was overlapping with the existing 600mm watermains. As suggested by the Region, an alternate option, Option 4B-2 was developed; which excluded the proposed watermain on Vodden Street East.

This memo presents the summary of hydraulic modelling analysis results for the routing options as noted above. Detailed hydraulic analysis results are included in the Appendix.

**Model Update**

In addition to the scenario development for each routing option, the modelling pipes were updated to reflect the Region’s latest plan for infrastructure upgrades. Figure 2 shows the update applied to the model.

<sup>1</sup> Source: Alternative Solutions Workshop Presentation, April 24, 2020

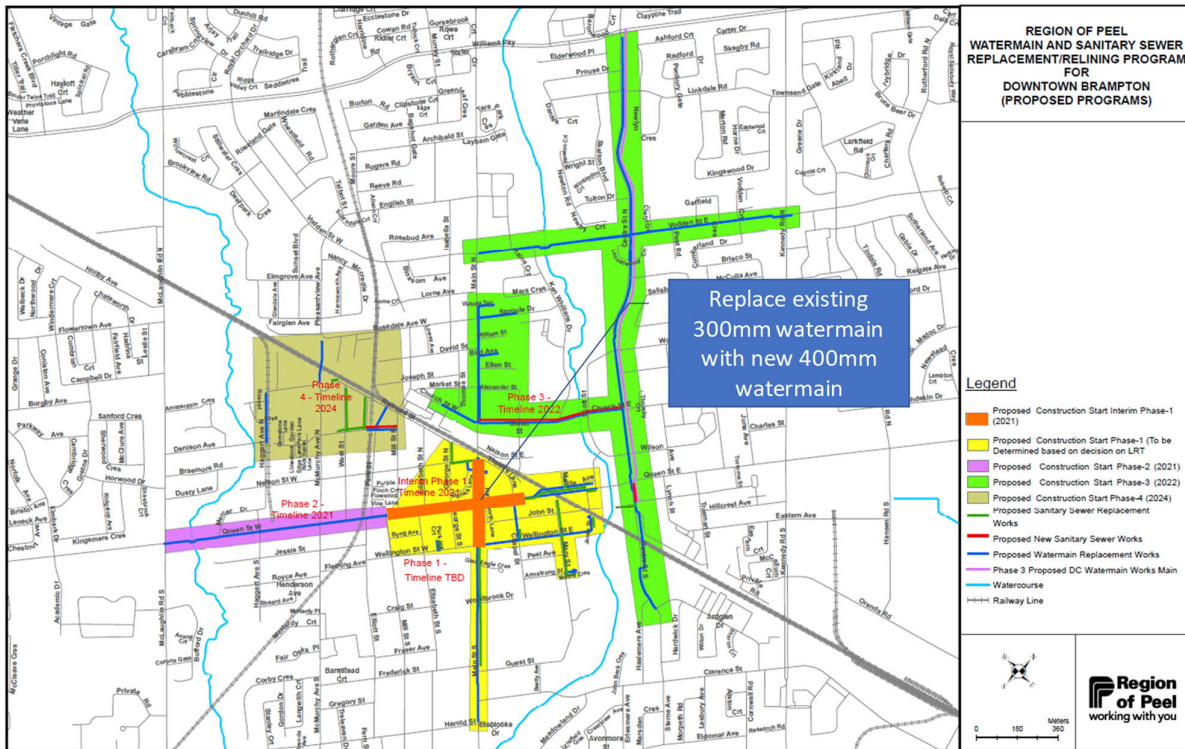


Figure 2: Proposed Upgrades in Downtown Brampton

### Modelling Approach

The following describes the approach applied for the hydraulic modelling analysis

- Determine hydraulic performances / benefit of the proposed watermain under high demand scenario. Pressure, velocity, watermain volumetric turnover were evaluated.
  - 2041 Maximum Day Demand (MDD) conditions based on Region's Master Plan growth scenario (Scenario 16)
  - 2041 Maximum Day Demand (MDD) plus fire flow conditions
- Determine potential water quality implications in the system when the proposed watermain was commissioned. To evaluate the impacts under worse case scenario, watermain volumetric turnover was evaluated under low demand scenario
  - 2026 Average Day Demand (ADD) conditions based on Region's Master Plan growth scenario (Scenario 16)
- For the routing options that provide the highest hydraulic benefit to the system, water quality implications in the system was further evaluated by performing the water age analysis. Low demand scenario was used for water age analysis.
  - 2026 Average Day Demand (ADD) conditions based on Region's Master Plan growth scenario (Scenario 16)

In addition to the evaluation approach / scenarios as noted above, potential interconnection locations and size requirement for the proposed watermain were reviewed.

### Evaluation Criteria

The following criteria were applied in evaluating the hydraulic performance of the system.

- Pressure under normal operating condition: 40 to 100psi

- Maximum velocity of the watermain: 2.0m/s
- Minimum turnover rate in the watermain: 0.5 times per day
- Maximum available fire flow of 386L/s at a minimum pressure of 20psi at the bench connection of the proposed watermain.

**Hydraulic Modelling Results Summary**

With the completion of the hydraulic analysis, the following summarizes the key findings.

- 2041 MDD:
  - The differences / improvements in hydraulic performances in terms of pressures and velocity between the options versus the BASE scenarios (without the future watermains) were insignificant. Following table summarizes the maximum velocity in the proposed watermain for each routing option:

Routing Option	Max Velocity (m/s)	Minimum Pressure at Queen Street East and Main Street (psi)
BASE (without new watermain)	-	75.1
Option 2A	0.04	75.1
Option 2B	0.04	74.7
Option 4B	0.05	75.1
Option 4B-2	0.04	75.3
Option 4C	0.05	75.3
Option 4D	0.05	75.1
Option 5	0.04	75.3

- 2041 MDD plus Fire Flow:
  - With the future Downtown Brampton watermain, the maximum available fire flow for the core development areas (along Queen Street East, between Main Street and Centre Street) was generally maintained above 200L/s at 20psi.
  - Specific fire flow of 386L/s for 6hr (maximum flow for determining fire storage in the reservoir) was assigned to the interconnection of Queen Street East and Main Street to evaluate the system capacity for providing fire flow under 2041 maximum day demand conditions. The results shown that the residual pressures were maintained above 20psi (~60psi) for all routing options.
- Water Turnover under 2026 Average Day Demand conditions:
  - Minimum turnover rate of 0.5 times per day were identified for all watermains (local distribution and sub transmission mains) for all routing options with the proposed size of the Downtown Brampton watermain being 750mm.
  - The evaluations also included the future watermain size of 600mm as well as the potential interconnection(s) to the existing system
    - The size of the Downtown Brampton watermain being 600mm would further improve the turnover rate
- The following locations for each watermain route options were suggested in addition to the interconnection point that the EA team identified.
  - Option 2A
    - interconnection at Church and Centre ONLY IF the Region will / can build the future 600mm on Church Street East.



- Interconnection at Queen Street East and Centre Street North for providing redundancy to the connection at John Street and Centre Street South
- Option 2B
  - Interconnection at Queen Street East and Beech Street for providing redundancy to the connection at John Street and Centre Street South
- Option 4B
  - Interconnection at Vodden Street East and Centre Street North
    - The 750mm section on Vodden Street East may not be required since the existing 600mm watermain on Vodden Street East between Centre Street North and Main Street North would provide adequate capacity for transferring water from William Parkway to Queen Street East with the proposed watermains on Main Street North and Centre Street North
  - interconnection at Church Street East and Centre Street North ONLY IF the Region will / can build the future 600mm on Church Street East.
  - Interconnection at Queen Street East and Centre Street North for providing redundancy to the connection at John Street and Centre Street South
- Option 4C
  - No other interconnection point was identified
- Option 4D
  - interconnection at Church Street East and Main Street North ONLY IF the Region will / can build the future 600mm on Church Street East.
  - interconnection at Church Street East and Centre Street North ONLY IF the Region will / can build the future 600mm on Church Street East.
- Option 5
  - No other interconnection point was identified
- Water Age Analysis Results:
  - Based on the discussion with the Region, routing option 2A, 4B and 4D would be considered as the option that would provide the highest hydraulic benefit to the future Downtown Brampton developments.
    - Option 4D was considered as the ideal option for the system and the future 600mm watermain project (Master Plan Project ID: WM-D-227) on Church would not be necessary. However, TRCA approval could be the key challenge in implementing this option and therefore this option is not considered as a preferred option; water age analysis was not completed for this option.
  - To further confirm the water quality implication to the future Zone 5 system, water age analysis was completed for the Option 2A and Option 4B for 2021 Average Day Demand conditions.
    - The size of 600mm for the proposed Downtown Brampton watermain would provide similar water age as the those identified in the BASE scenario (existing system without proposed Downtown Brampton watermain)
    - The size of 750mm for the proposed Downtown Brampton watermain would significantly increase the water age in the first 80hours but stabilized after 80hours to which it was similar to those identified in the BASE scenario.
      - The increase in water age could be associated with the current pump controls assigned in the hydraulic model. Since the identical pump controls were used for the modelling, the increase in water age presented a possibility that the 750mm watermain would increase the chance for low chlorine residual in the system when the water demands were low.

- To reduce the chance in having any possible low chlorine residual in the system, the water age analysis results suggested the Region could consider a 600mm watermain for the future Downtown Brampton watermain.

## Conclusions and Recommendations

- The hydraulic analysis was completed
- Routing option 2A, 4B and 4D would be considered as the option that would provide the highest hydraulic benefit to the future Downtown Brampton developments.
  - Option 4D was considered as the ideal option for the system and the future 600mm watermain project (Master Plan Project ID: WM-D-227) on Church would not be necessary. However, TRCA approval could be the key challenge in implementing this option and therefore this option is not considered as a preferred option.
  - With 600mm watermain as the future watermain, the proposed section on Vodden Street East for Option 4B would not be necessary.
- The water age analysis results shown that the size of 600mm for the future Downtown Brampton watermain could minimize the potential water quality implication when the watermain was commissioned in year 2026. The Region could consider downsizing the future Downtown Brampton watermain from 750mm to 600mm.
- The Region should consider the following interconnections for each option:
  - Option 2A
    - interconnection at Church and Centre ONLY IF the Region will / can build the future 600mm on Church Street East.
    - Interconnection at Queen Street East and Centre Street North for providing redundancy to the connection at John Street and Centre Street South
  - Option 2B
    - Interconnection at Queen Street East and Beech Street for providing redundancy to the connection at John Street and Centre Street South
  - Option 4B
    - Interconnection at Vodden Street East and Centre Street North
      - The 750mm section on Vodden Street East may not be required since the existing 600mm watermain on Vodden Street East between Centre Street North and Main Street North would provide adequate capacity for transferring water from William Parkway to Queen Street East with the proposed watermains on Main Street North and Centre Street North
    - interconnection at Church Street East and Centre Street North ONLY IF the Region will / can build the future 600mm on Church Street East.
    - Interconnection at Queen Street East and Centre Street North for providing redundancy to the connection at John Street and Centre Street South
  - Option 4D
    - interconnection at Church Street East and Main Street North ONLY IF the Region will / can build the future 600mm on Church Street East.
    - interconnection at Church Street East and Centre Street North ONLY IF the Region will / can build the future 600mm on Church Street East.



Appendix A: Hydraulic Analysis Results

# Region of Peel Zone 5 750mm Sub Transmission Main EA

Modelling Support

June 2020

# 2041MDD BASE

Without 750mm (W-D-227)

# 2041MDD BASE Scenario - System Pressures

1:16.976 Bentley WaterGEMS Drawing Anal 10 B I U A

Table Of Contents

- Layers
  - Water\_Pressure\_Zone
  - Junction
    - MIN\_PRESS
      - less than 20.0000
      - 20.0000 ~ 40.0000
      - 40.0000 ~ 50.0000
      - 50.0000 ~ 100.0000
      - 100.0000 ~ 99,999.0000
    - Tank
      - <all other values>
      - TYPE
        - Active
        - Domain
        - Inactive
    - Reservoir
      - <all other values>
      - TYPE
        - Active
        - Domain
        - Inactive
    - Pump
      - <all other values>
      - TYPE
        - Active
        - Domain
        - Inactive
    - Valve
      - <all other values>
      - TYPE
        - Active
        - Domain
        - Inactive
    - Pipe
      - <all other values>
      - TYPE
        - Active



Model Explorer

BASE2041MDD

\*Active\*:Standard Refresh Output

00:00 hrs

JUNCTION: 599261

(ID)	599261
Description	
<input checked="" type="checkbox"/> Geometry	
X	599943.417215856
Y	4837727.848422100
<input checked="" type="checkbox"/> Modeling	
Existing Demands (lps)	0.3366
Pattern 1	ZONE5
Residential Growth (lps)	0.0000
Pattern 2	RES_SUMMER, From Peel Cal
Employment Growth (lps)	0.1069
Pattern 3	ICI_TYP
GTAA (lps)	0.0000
Pattern 4	
Demand 5 (lps)	0.0000
Pattern 5	
Demand 6 (lps)	0.0000
Pattern 6	
Demand 7 (lps)	0.0000
Pattern 7	
Demand 8 (lps)	0.0000
Pattern 8	
Demand 9 (lps)	0.0000
Pattern 9	
York Supply (lps)	0.0000
Pattern 10	
<input checked="" type="checkbox"/> Information	
Year of Installation	1995
Year of Retirement	9999
Zone	5
Elevation (m)	211.9804
Phase	
NORTHPEEL	
LOCAL_CHAR	
SCADA_TAG	
NOTES	

Attribute Operation

Message Board

MESSAGE: Output Relate 'DEMAND' Update Succeeded.  
MESSAGE: Output Relate 'VELOCITY' Update Succeeded.  
Updating output data... Done.

Message Validation Result







Option 2A

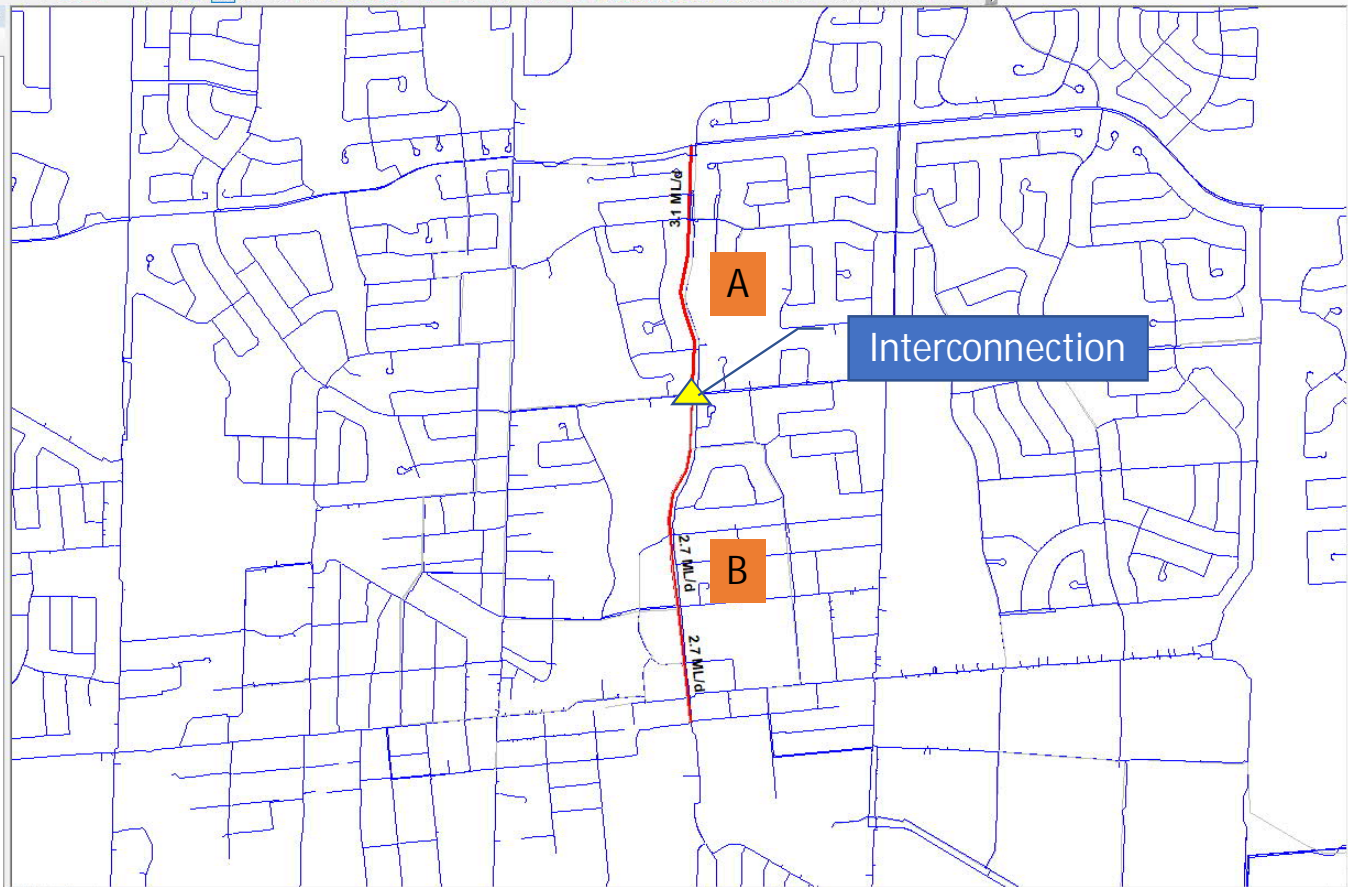




# AVGQ

Table of Contents

- Layers
  - Junction
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Tank
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Reservoir
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pump
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Valve
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pipe
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - ANNO-1
  - SLSNPEEL



Model Explorer

2041MDD-OPT2A

"Active":Standard Refresh Output

00:00 hrs

PIPE: WM-Z6753388; 16-1199- CAM-RDS\_5-4a

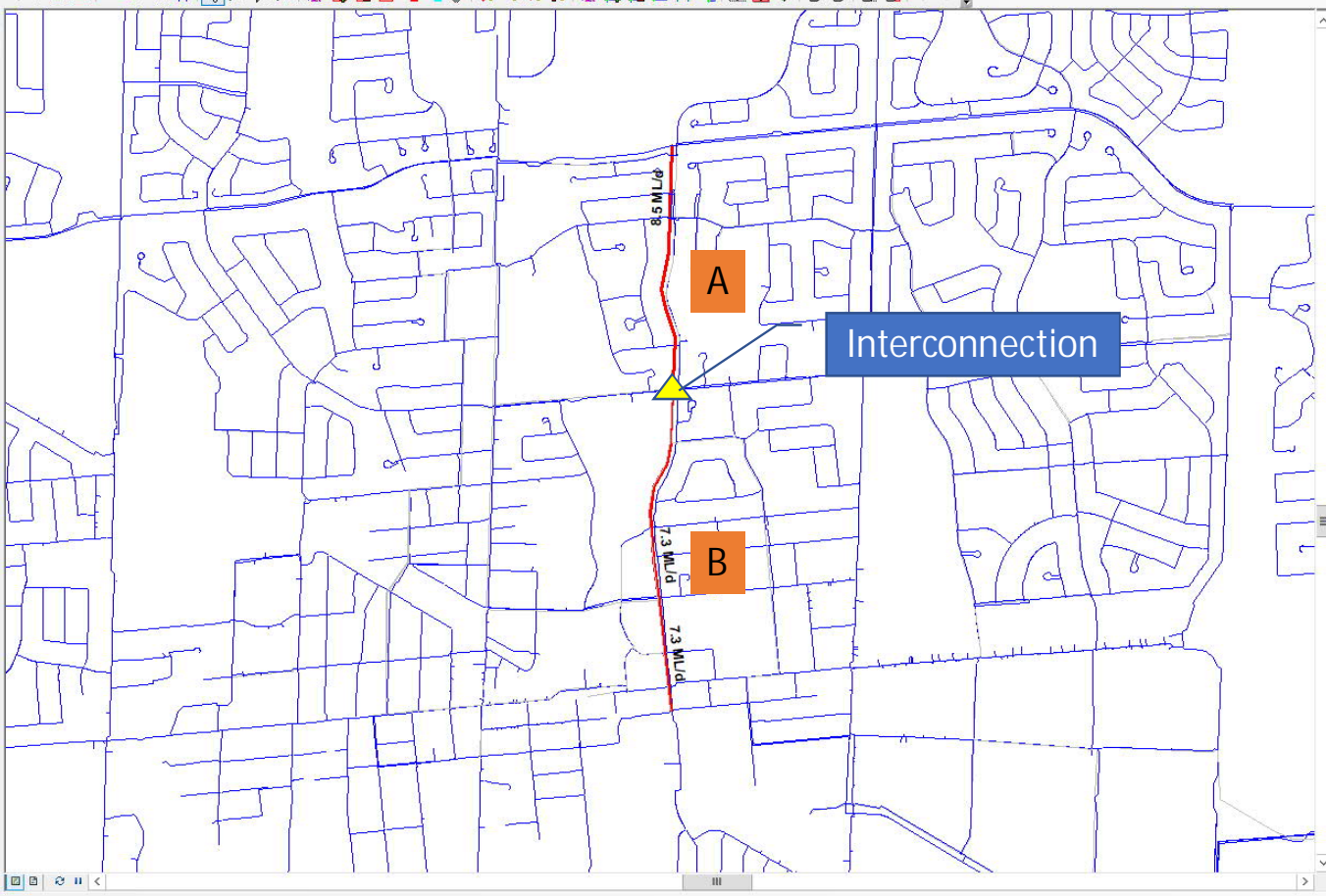
(ID)	WM-Z6753388
Description	16-1199- CAM-RDS_5-4a
Geometry	Reverse
Start Node	J-Z6-8018
End Node	J-Z6-8021
Modeling	
Length (m)	908.8234
Diameter (mm)	750.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
Information	
Year of Installation	2026
Year of Retirement	9999
Zone	5
Material	
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	N
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	
INFRA_STAT	PROPOSED
DC	
SOURCE	GIS2016
MP2018	W-ST-094
FIREFLOW	
ZONEID	
NEW_WM	
FACILITY	
Output	
Flow	3.8117 ML/d
Flow Direction	Reverse
Velocity	0.0946 m/s
Headloss	0.0134 m
HL/1000	0.0147 m/k-m
Status	Open
Flow Reversal	0

Attribute	Operation
-----------	-----------

# Max Q

Table Of Contents

- Junction
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Tank
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Reservoir
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Pump
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Valve
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Pipe
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- ANNO-1
- SLSNPEEL



Model Explorer

2041MDD-OPT2A

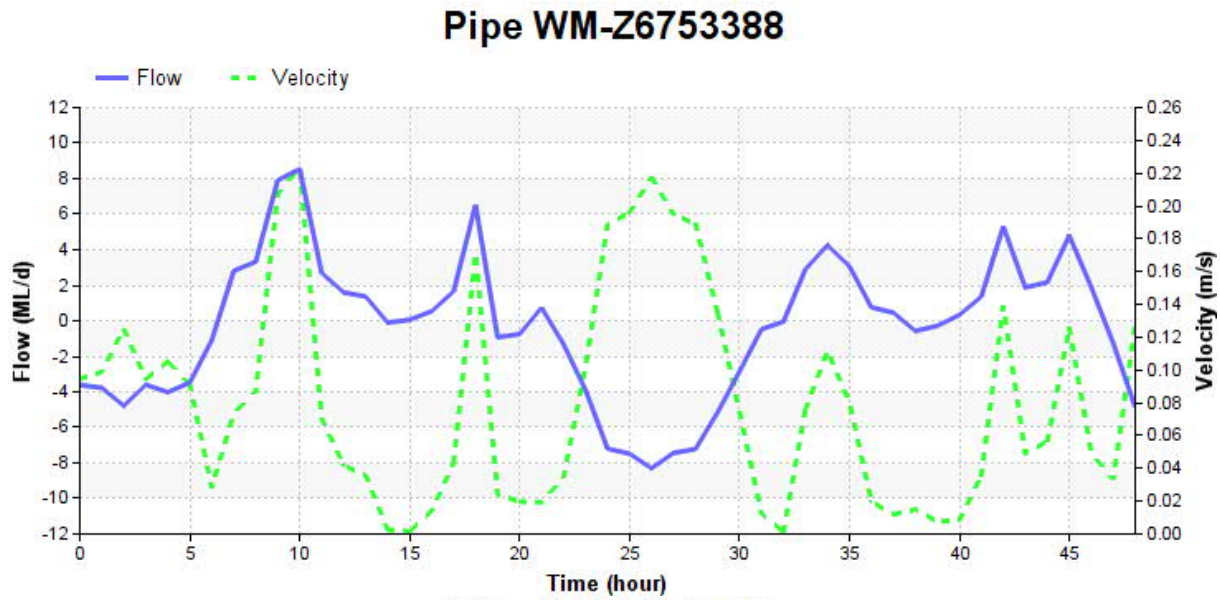
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00:00 hrs

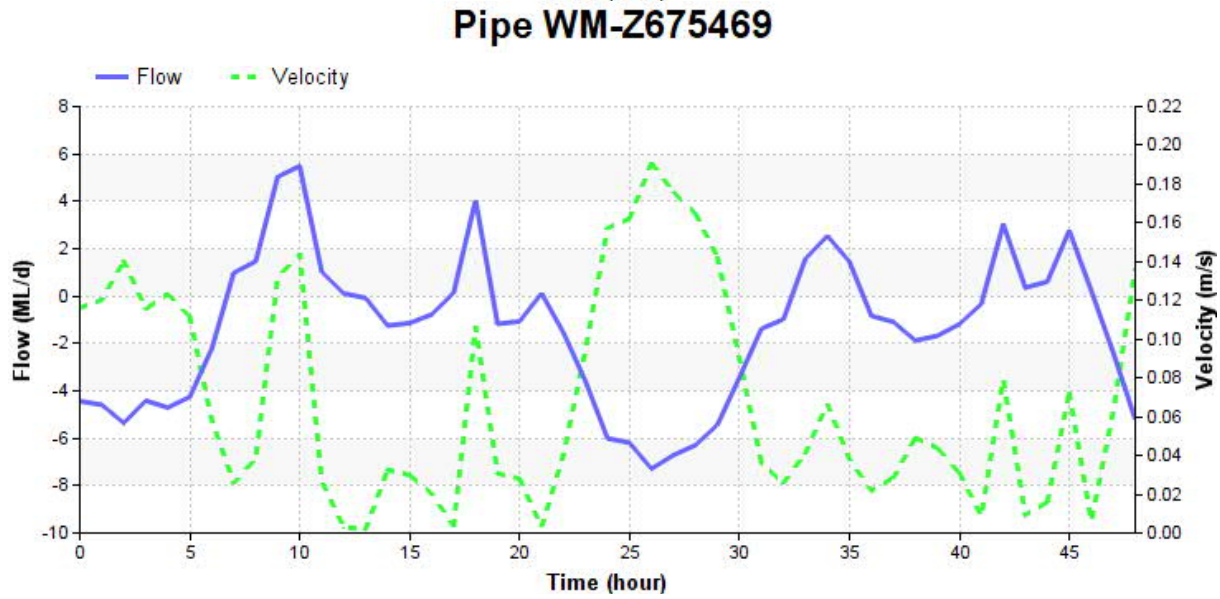
- Annotation
  - ANNO-1, New Annotation
  - PRESSURE, New Annotation
- Contour
- Curve
- DB Query
- Output Relate
- Pattern
- Query Set
- Selection Set
- Simulation Options
- Simulation Report
- Simulation Time

Attribute Operation

A



B





# Option 2A- System Pressures

Table of Contents

- MIN\_PRESS
  - less than 20.0000
  - 20.0000 ~ 40.0000
  - 40.0000 ~ 50.0000
  - 50.0000 ~ 100.0000
  - 100.0000 ~ 99,999.0000
- Tank
  - <all other values>
  - TYPE
  - Active
  - Domain
  - Inactive
- Reservoir
  - <all other values>
  - TYPE
  - Active
  - Domain
  - Inactive
- Pump
  - <all other values>
  - TYPE
  - Active
  - Domain
  - Inactive
- Valve
  - <all other values>
  - TYPE
  - Active
  - Domain
  - Inactive
- Pipe
  - <all other values>
  - TYPE
  - Active
  - Domain
  - Inactive
- ANNO-1
- SLSNPEEL
- Final\_parcel\_S16\_OSI



Model Explorer

2041MDD-OPT2A

"Active":Standard Refresh Output

00:00 hrs

PIPE: WM-Z675469, 16-1199- CAM-RDS\_5-4a

(ID)	WM-Z675469
Description	16-1199- CAM-RDS_5-4a
Geometry	Reverse
Start Node	J-Z6-8021
End Node	J-NEW-6003
Modeling	
Length (m)	794.6644
Diameter (mm)	750.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
Information	
Year of Installation	2026
Year of Retirement	9999
Zone	5
Material	
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	N
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	
INFRA_STAT	PROPOSED
DC	
SOURCE	GIS2016
MP2018	W-ST-094
FIREFLOW	
ZONEID	
NEW_WM	
FACILITY	
Output	
Flow	4.4337 ML/d
Flow Direction	Reverse
Velocity	0.1162 m/s
Headloss	0.0171 m
HL/1000	0.0215 m/k-m
Status	Open
Flow Reversal	0

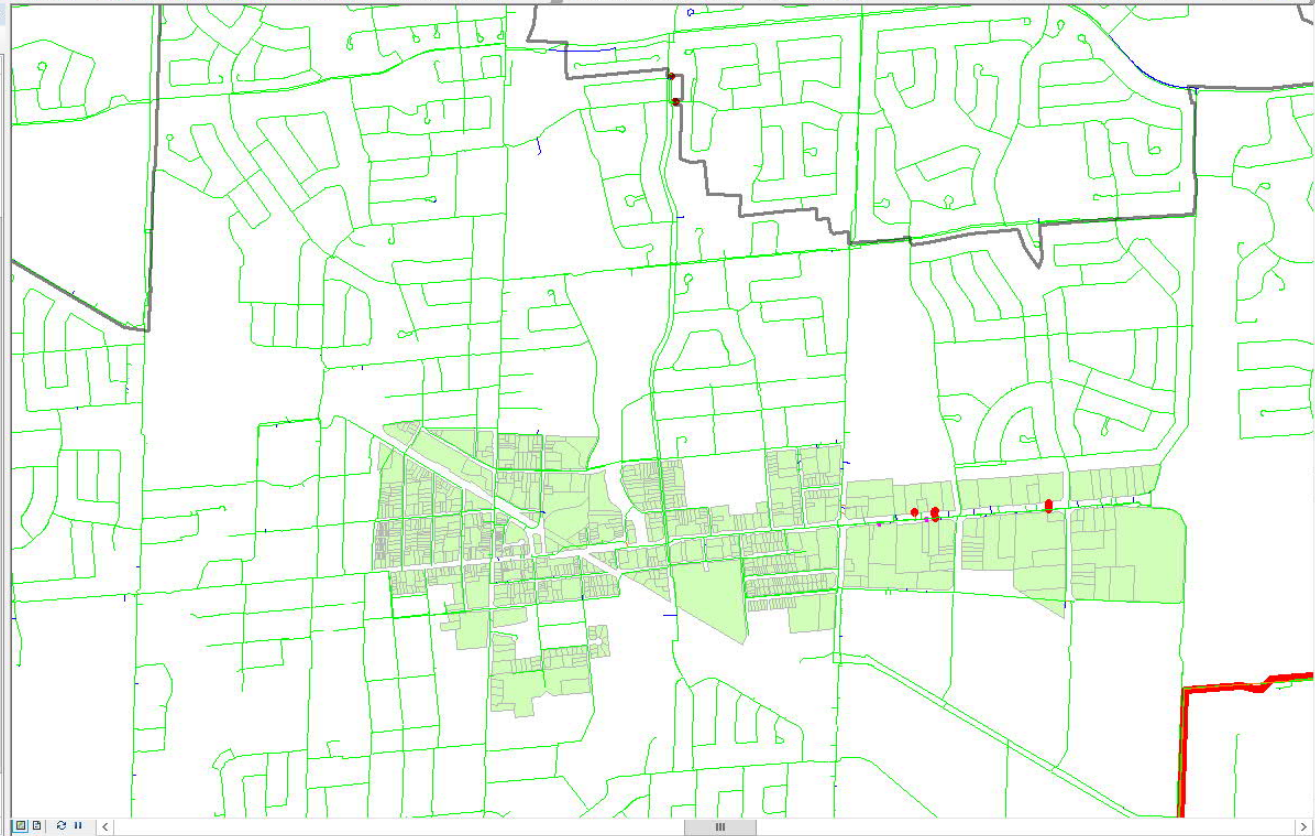
Attribute	Operation
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# Option 2A – watermain velocity

Table Of Contents

- Domain
- Reservoir
- TYPE
- Active Domain
- Pump
- TYPE
- Active Domain
- Valve
- TYPE
- Active Domain
- Pipe
- MAX\_VELOC
- less than 0.0001
- 0.0001 ~ 1.0000
- 1.0000 ~ 1.5000
- 1.5000 ~ 2.0000
- 2.0000 ~ 137.3103
- ANNO-1
- SLSNPEEL
- Final\_parcel\_S16\_QSI
- Water\_Valve
- Water\_Main
- Water\_Main\_Non\_Active
- base\_junc
- base\_pipe
- add\_junc
- add\_wm



Model Explorer

2041MDD-OPT2A

"Active":Standard Refresh Output

00:00 hrs

PIPE: WM-NEW-6051, 121375 G

(ID)	WM-NEW-6051
Description	121375 G
<input checked="" type="checkbox"/> Geometry	Reverse
Start Node	599547
End Node	599261
<input checked="" type="checkbox"/> Modeling	
Length (m)	12.5814
Diameter (mm)	400.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
<input checked="" type="checkbox"/> Information	
Year of Installation	2021
Year of Retirement	9999
Zone	5
Material	DI
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	Y
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	De-activated
INFRA_STAT	A
DC	
SOURCE	GIS2016
MP2018	
FIREFLOW	YES
ZONEID	P2M10
NEW_WM	
FACILITY	
TURNOVER	0.0000
<input checked="" type="checkbox"/> Output	

Attribute Operation

Message Board

Updating output data... Done.

Message Validation Result

Option 2B

Avg Q

Table of Contents

- Layers
  - Junction
    - TYPE
    - Active
    - Domain
  - Tank
    - TYPE
    - Active
    - Domain
  - Reservoir
    - TYPE
    - Active
    - Domain
  - Pump
    - TYPE
    - Active
    - Domain
  - Valve
    - TYPE
    - Active
    - Domain
  - Pipe
    - TYPE
    - Active
    - Domain
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI



Model Explorer

2041MDD-OPT2B

\*Active: Standard Refresh Output

00:00 hrs

- Annotation
  - ANNO-1, New Annotation
  - PRESSURE, New Annotation
- Contour
- Curve
- DB Query
- Output Relate
- Pattern
- Query Set
- Selection Set
- Simulation Options
- Simulation Report
- Simulation Time

Attribute Operation





# Max Q

Table of Contents

- Layers
  - Junction
    - TYPE
    - Active
    - Domain
  - Tank
    - TYPE
    - Active
    - Domain
  - Reservoir
    - TYPE
    - Active
    - Domain
  - Pump
    - TYPE
    - Active
    - Domain
  - Valve
    - TYPE
    - Active
    - Domain
  - Pipe
    - TYPE
    - Active
    - Domain
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI



Model Explorer

2041MDD-OPT2B

"Active":Standard Refresh Output

00:00 hrs

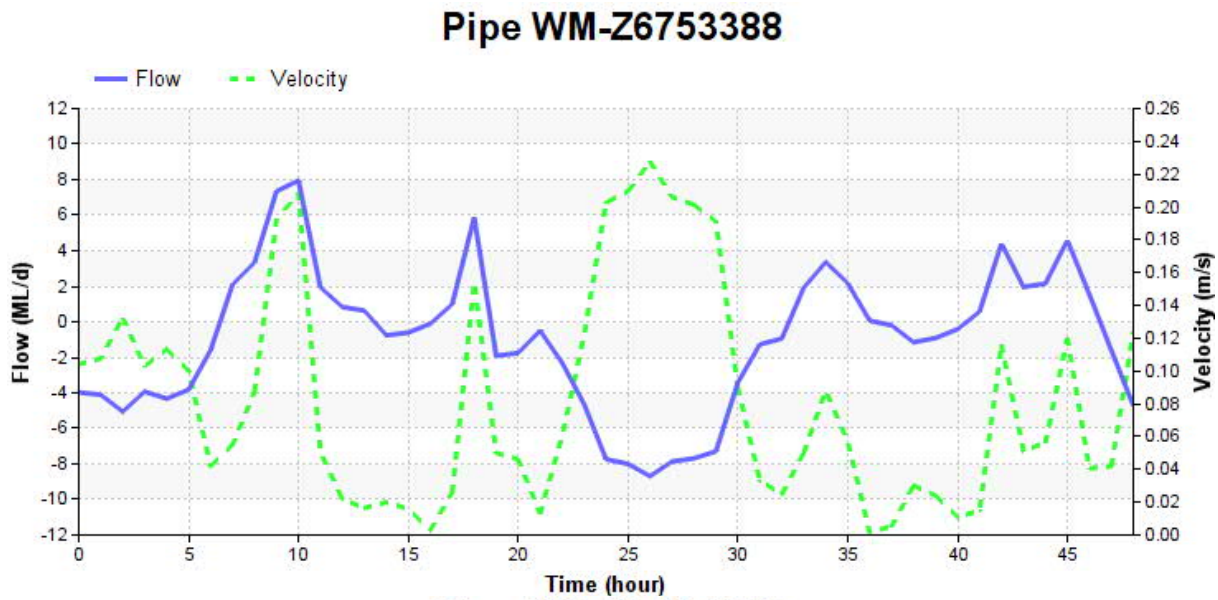
PIPE: WM-Z675470

(ID)	Description
WM-Z675470	WM-Z675470

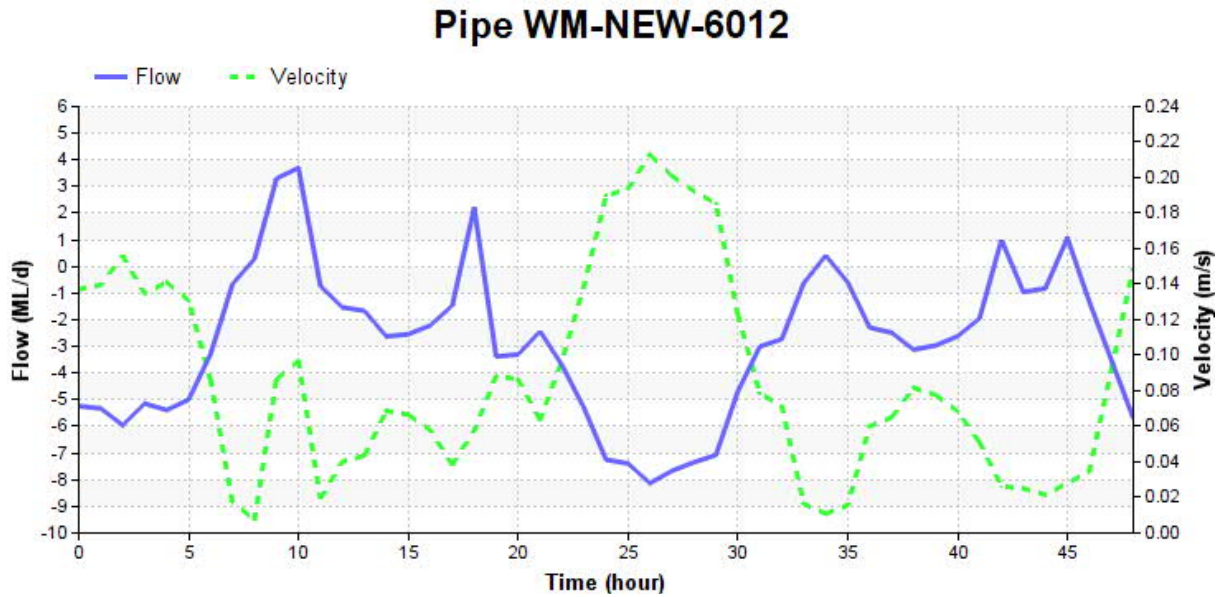
Property	Value
Start Node	J-Z6-8021
End Node	599509
Length (m)	22.9005
Diameter (mm)	750.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
Year of Installation	2022
Year of Retirement	9999
Zone	5
Material	
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	N
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	
INFRA_STAT	PROPOSED
DC	
SOURCE	GIS2016
MP2018	
FIREFLOW	
ZONEID	
NEW_WM	
FACILITY	
Flow	1.2631 ML/d
Flow Direction	Forward
Velocity	0.0331 m/s
Headloss	0.0000 m
HL/1000	0.0016 m/k-m
Status	Open
Flow Reversal	0

Attribute	Operation
-----------	-----------

A



B





# Option 2B- System Pressures

## Table of Contents

- Layers
  - Junction
    - MIN\_PRESS
      - less than 20.0000
      - 20.0000 ~ 40.0000
      - 40.0000 ~ 50.0000
      - 50.0000 ~ 100.0000
      - 100.0000 ~ 99,999.0000
  - Tank
    - TYPE
    - Active
    - Domain
  - Reservoir
    - TYPE
    - Active
    - Domain
  - Pump
    - TYPE
    - Active
    - Domain
  - Valve
    - TYPE
    - Active
    - Domain
  - Pipe
    - TYPE
    - Active
    - Domain
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI



## Model Explorer

2041MDD-OPT2B

"Active":Standard Refresh Output

00:00 hrs

PIPE: WM-NEW-6012, 16-1199- CAM-RDS\_5-4a

(ID)	WM-NEW-6012
Description	16-1199- CAM-RDS_5-4a
Geometry	Reverse
Start Node	J-Z6-8021
End Node	597307
Modeling	
Length (m)	1554.5682
Diameter (mm)	750.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
Information	
Year of Installation	9999
Year of Retirement	9999
Zone	Option2B
Material	
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	N
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	
INFRA_STAT	PROPOSED
DC	
SOURCE	GIS2016
MP2018	W-ST-094
FIREFLOW	
ZONEID	
NEW_WM	
FACILITY	
Output	
Flow	5.2369 ML/d
Flow Direction	Reverse
Velocity	0.1372 m/s
Headloss	0.0466 m
HL/1000	0.0293 m/k-m
Status	Open
Flow Reversal	0

Attribute	Operation
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# Option 2B – watermain velocity

- Domain
  - Reservoir TYPE
  - Pump TYPE
  - Valve TYPE
    - Active
    - Domain
  - Pipe
    - MAX\_VELOC
      - less than 0.0001
      - 0.0001 ~ 1.0000
      - 1.0000 ~ 1.5000
      - 1.5000 ~ 2.0000
      - 2.0000 ~ 137.3103
    - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI
  - Water\_Valve
  - Water\_Main
  - Water\_Main\_Non\_Active
  - base\_junc
  - base\_pipe
  - add\_junc
  - add\_wm



Model Explorer

2041MDD-OPT2B

"Active":Standard Refresh Output

00:00 hrs

PIPE: WM-NEW-6051, 121375 G

(ID)	WM-NEW-6051
Description	121375 G
<input checked="" type="checkbox"/> Geometry	Reverse
Start Node	599547
End Node	599261
<input checked="" type="checkbox"/> Modeling	
Length (m)	12.5814
Diameter (mm)	400.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
<input checked="" type="checkbox"/> Information	
Year of Installation	2021
Year of Retirement	9999
Zone	5
Material	DI
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	Y
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	De-activated
INFRA_STAT	A
DC	
SOURCE	MP2018
MP2018	GIS2016
FIREFLOW	YES
ZONEID	P2M10
NEW_WM	
FACILITY	
TURNOVER	0.0000
<input checked="" type="checkbox"/> Output	

Message Board

Updating output data... Done.

Message Validation Result



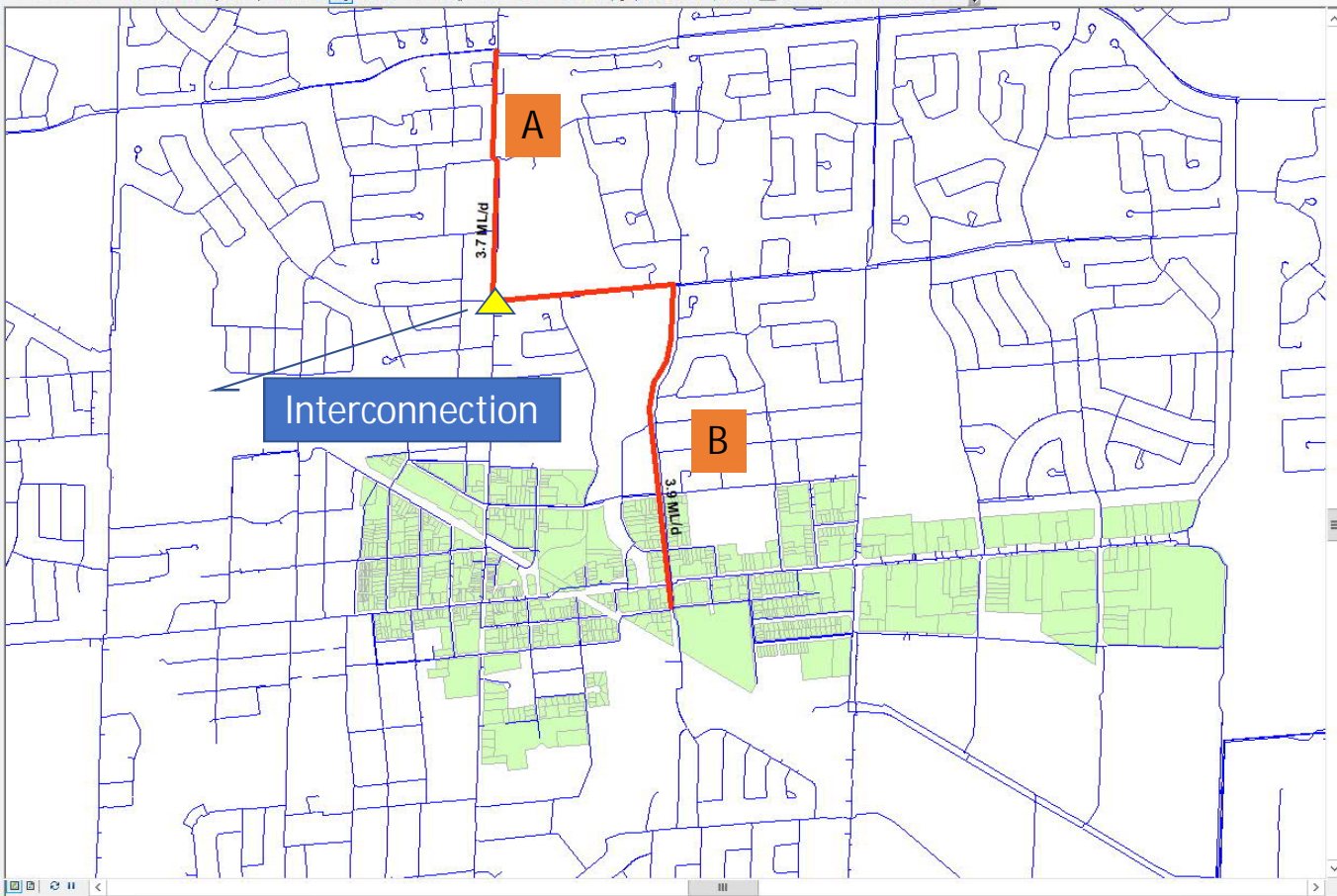
Option 4B



Avg Q

Table Of Contents

- Layers
  - Junction
    - TYPE
    - Active
    - Domain
  - Tank
    - TYPE
    - Active
    - Domain
  - Reservoir
    - TYPE
    - Active
    - Domain
  - Pump
    - TYPE
    - Active
    - Domain
  - Valve
    - TYPE
    - Active
    - Domain
  - Pipe
    - TYPE
    - Active
    - Domain
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI



Model Explorer

- 2041MDD-OPT4B
  - Active: Standard
  - Refresh Output
  - 00:00 hrs
  - Annotation
    - ANNO-1, New Annotation
    - PRESSURE, New Annotation
  - Contour
  - Curve
  - DB Query
  - Output Relate
  - Pattern
  - Query Set
  - Selection Set
  - Simulation Options
  - Simulation Report
  - Simulation Time

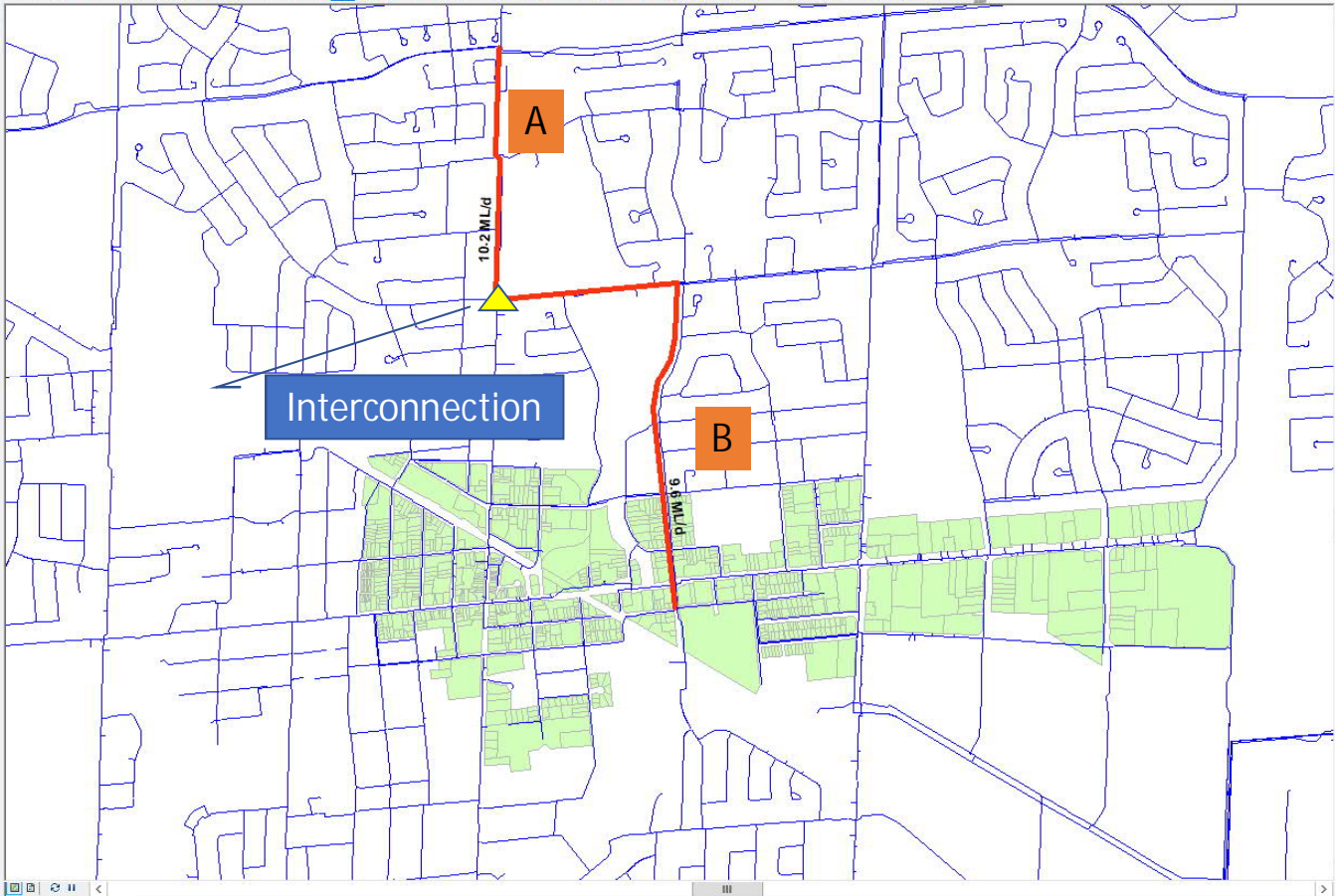
Message Board



# Max Q

Table of Contents

- Layers
  - Junction
    - TYPE
    - Active
    - Domain
  - Tank
    - TYPE
    - Active
    - Domain
  - Reservoir
    - TYPE
    - Active
    - Domain
  - Pump
    - TYPE
    - Active
    - Domain
  - Valve
    - TYPE
    - Active
    - Domain
  - Pipe
    - TYPE
    - Active
    - Domain
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI



Model Explorer

2041MDD-OPT4B

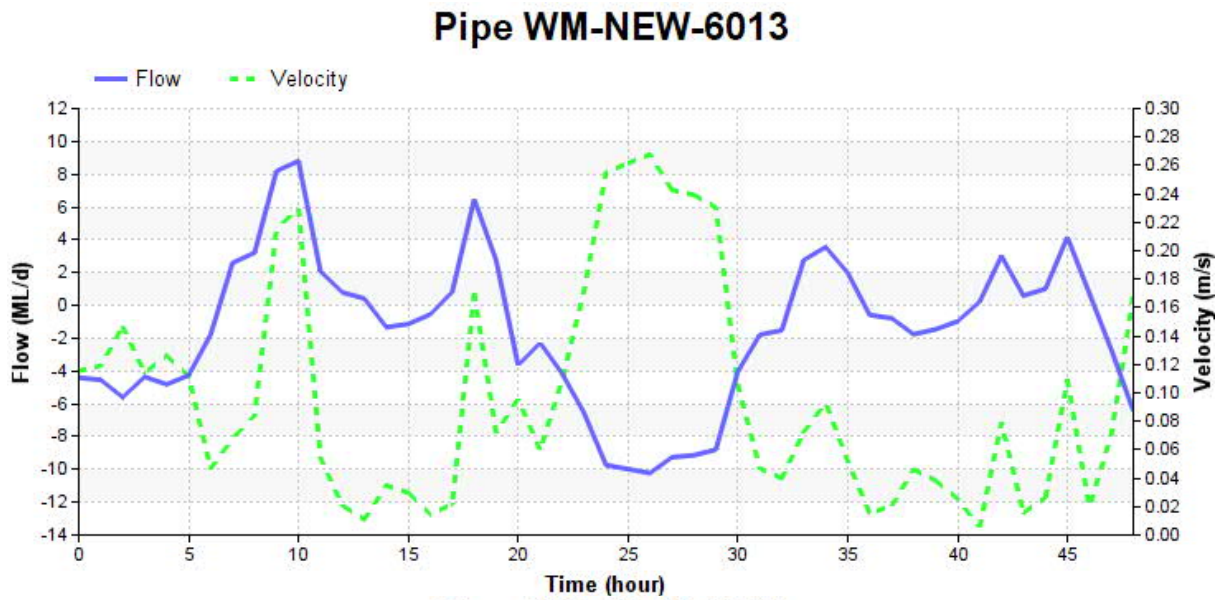
[Active]:Standard Refresh Output

00:00 hrs

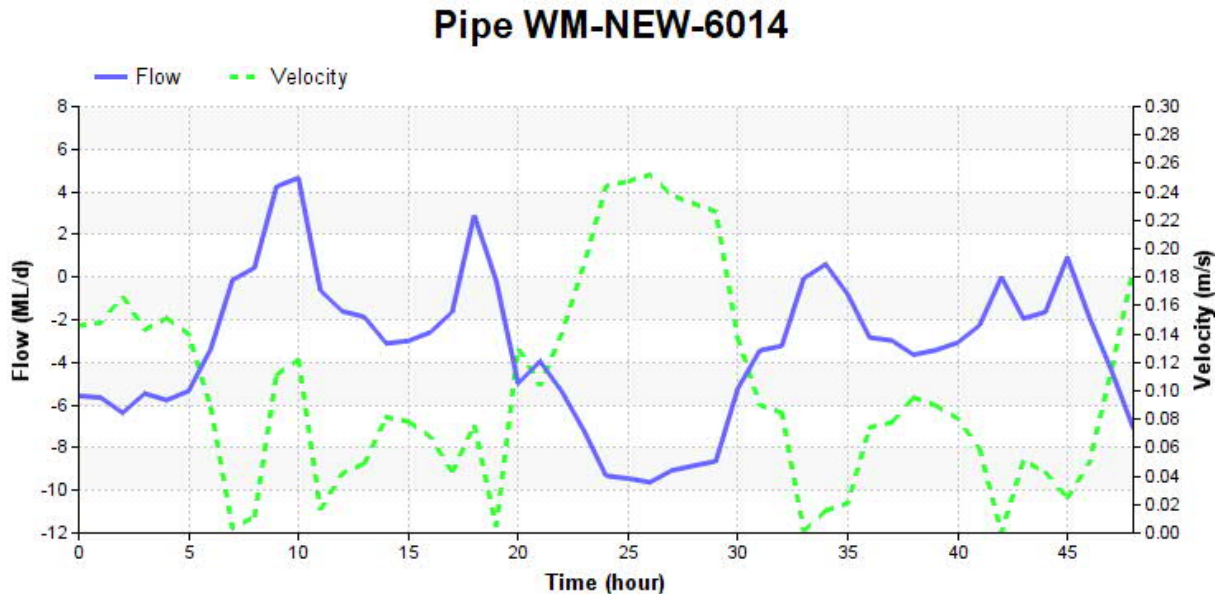
- Annotation
  - ANNO-1, New Annotation
  - PRESSURE, New Annotation
- Contour
- Curve
- DB Query
- Output Relate
- Pattern
- Query Set
- Selection Set
- Simulation Options
- Simulation Report
- Simulation Time

Attribute Operation

A



B





# Option 4B- System Pressures

## Table of Contents

- Layers
  - Junction
    - MIN\_PRESS
      - less than 20.0000
      - 20.0000 ~ 40.0000
      - 40.0000 ~ 50.0000
      - 50.0000 ~ 100.0000
      - 100.0000 ~ 99,999.0000
  - Tank
    - TYPE
    - Active
    - Domain
  - Reservoir
    - TYPE
    - Active
    - Domain
  - Pump
    - TYPE
    - Active
    - Domain
  - Valve
    - TYPE
    - Active
    - Domain
  - Pipe
    - TYPE
    - Active
    - Domain
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI



## Model Explorer

2041MDD-OPT4B

"Active":Standard Refresh Output

00:00 hrs

PIPE: WM-NEW-6014, 16-1199- CAM-RDS\_5-4a

(ID)	WM-NEW-6014
Description	16-1199- CAM-RDS_5-4a
Geometry	Reverse
Start Node	596277
End Node	597306
Modeling	
Length (m)	1864.3260
Diameter (mm)	750.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
Information	
Year of Installation	9999
Year of Retirement	9999
Zone	Option4B
Material	
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	N
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	
INFRA_STAT	PROPOSED
DC	
SOURCE	GIS2016
MP2018	W-ST-094
FIREFLOW	
ZONEID	
NEW_WM	
FACILITY	
Output	
Flow	5.5650 ML/d
Flow Direction	Reverse
Velocity	0.1458 m/s
Headloss	0.0611 m
HL/1000	0.0328 m/k-m
Status	Open
Flow Reversal	0

Attribute Operation

# Option 4B – watermain velocity

## Table Of Contents

- Domain
  - Reservoir
  - TYPE
  - Active
- Pump
  - Domain
  - TYPE
  - Active
- Valve
  - Domain
  - TYPE
  - Active
- Pipe
  - MAX\_VELOC
    - less than 0.0001
    - 0.0001 ~ 1.0000
    - 1.0000 ~ 1.5000
    - 1.5000 ~ 2.0000
    - 2.0000 ~ 137.3103
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI
  - Water\_Valve
  - Water\_Main
  - Water\_Main\_Non\_Active
  - base\_junc
  - base\_pipe
  - add\_junc
  - add\_wm



## Model Explorer

2041MDD-OPT4B  
"Active":Standard Refresh Output  
00:00 hrs

PIPE: WM-NEW-6051, 121375 G

(ID)	WM-NEW-6051
Description	121375 G
<input checked="" type="checkbox"/> Geometry	Reverse
Start Node	599547
End Node	599261
<input checked="" type="checkbox"/> Modeling	
Length (m)	12.5814
Diameter (mm)	400.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
<input checked="" type="checkbox"/> Information	
Year of Installation	2021
Year of Retirement	9999
Zone	5
Material	DI
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	Y
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	De-activated
INFRA_STAT	A
DC	
SOURCE	MP2018
MP2018	
FIREFLOW	YES
ZONEID	P2M10
NEW_WM	
FACILITY	
TURNOVER	0.0000
<input checked="" type="checkbox"/> Output	

Attribute Operation

Message Board  
Updating output data... Done.  
Message Validation Result

# Option 4B-2

With existing 600mm on Vodden



Avg Q

Table Of Contents

- Layers
  - Junction
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Tank
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Reservoir
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pump
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Valve
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pipe
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI



Model Explorer

2041MDD-OPT4B-2

[Active]:Standard Refresh Output

00:00 hrs

- Annotation
  - ANNO-1, New Annotation
  - PRESSURE, New Annotation
- Contour
- Curve
- DB Query
- Output Relate
- Pattern
- Query Set
- Selection Set
- Simulation Options
- Simulation Report
- Simulation Time

Attribute Operation

Table Of Contents

- Layers
  - Junction
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Tank
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Reservoir
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pump
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Valve
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pipe
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI



Model Explorer

2041MDD-OPT4B-2

[Active]:Standard Refresh Output

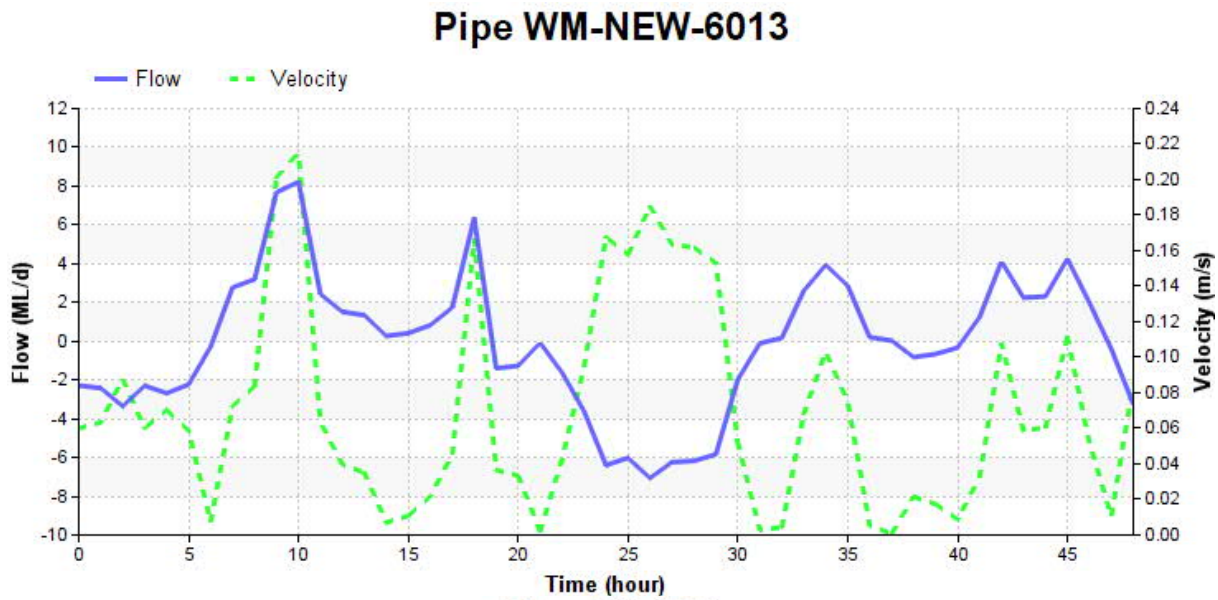
00:00 hrs

- Annotation
  - ANNO-1, New Annotation
  - PRESSURE, New Annotation
- Contour
- Curve
- DB Query
- Output Relate
- Pattern
- Query Set
- Selection Set
- Simulation Options
- Simulation Report
- Simulation Time

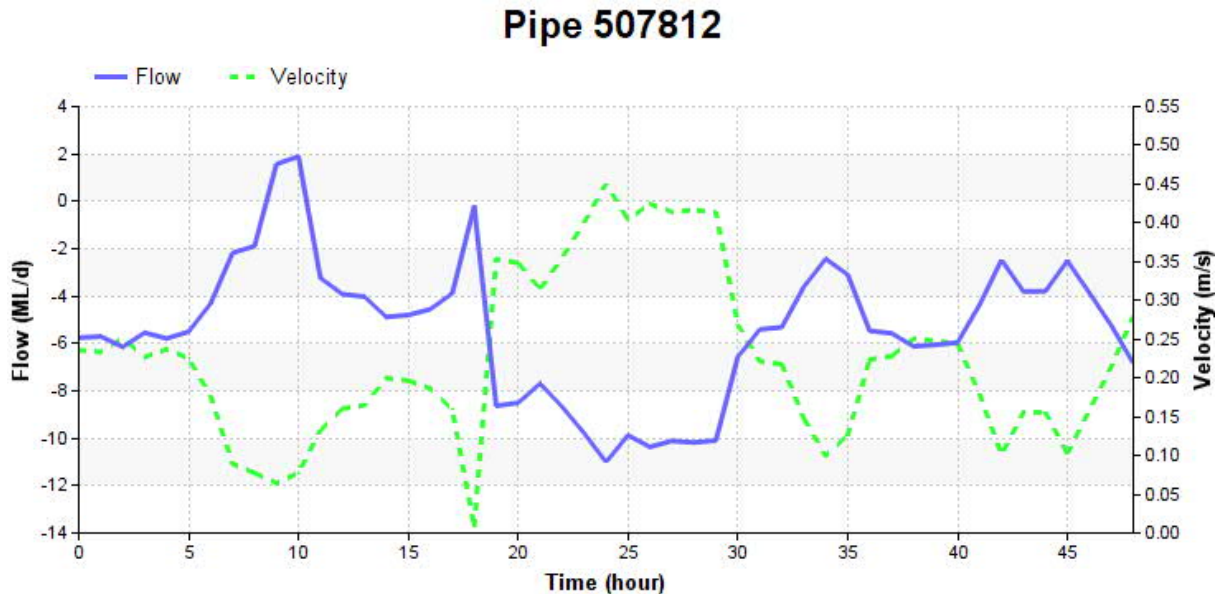
Attribute Operation



A

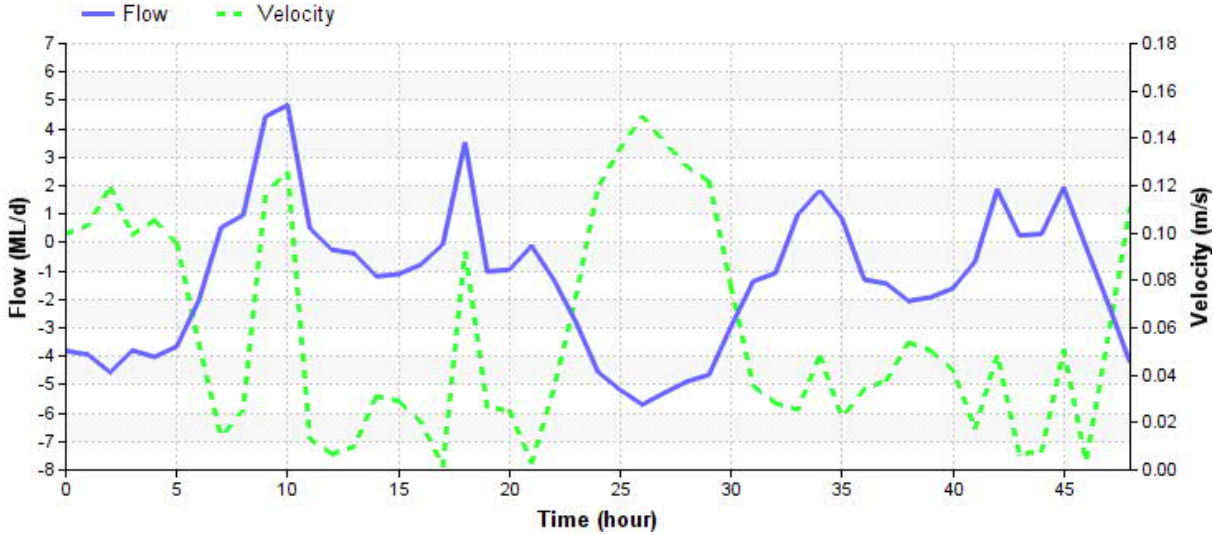


B



C

### Pipe WM-Z675469



# Option 4B-2 - System Pressures

Table of Contents

- Layers
  - Junction
    - MIN\_PRESS
      - less than 20.0000
      - 20.0000 ~ 40.0000
      - 40.0000 ~ 50.0000
      - 50.0000 ~ 100.0000
      - 100.0000 ~ 99,999.0000
  - Tank
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Reservoir
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pump
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Valve
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pipe
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - ANNO-1
  - SLSNPEEL
  - Final parcel S16 OSI



Model Explorer

2041MDD-OPT4B-2

"Active":Standard Refresh Output

00:00 hrs

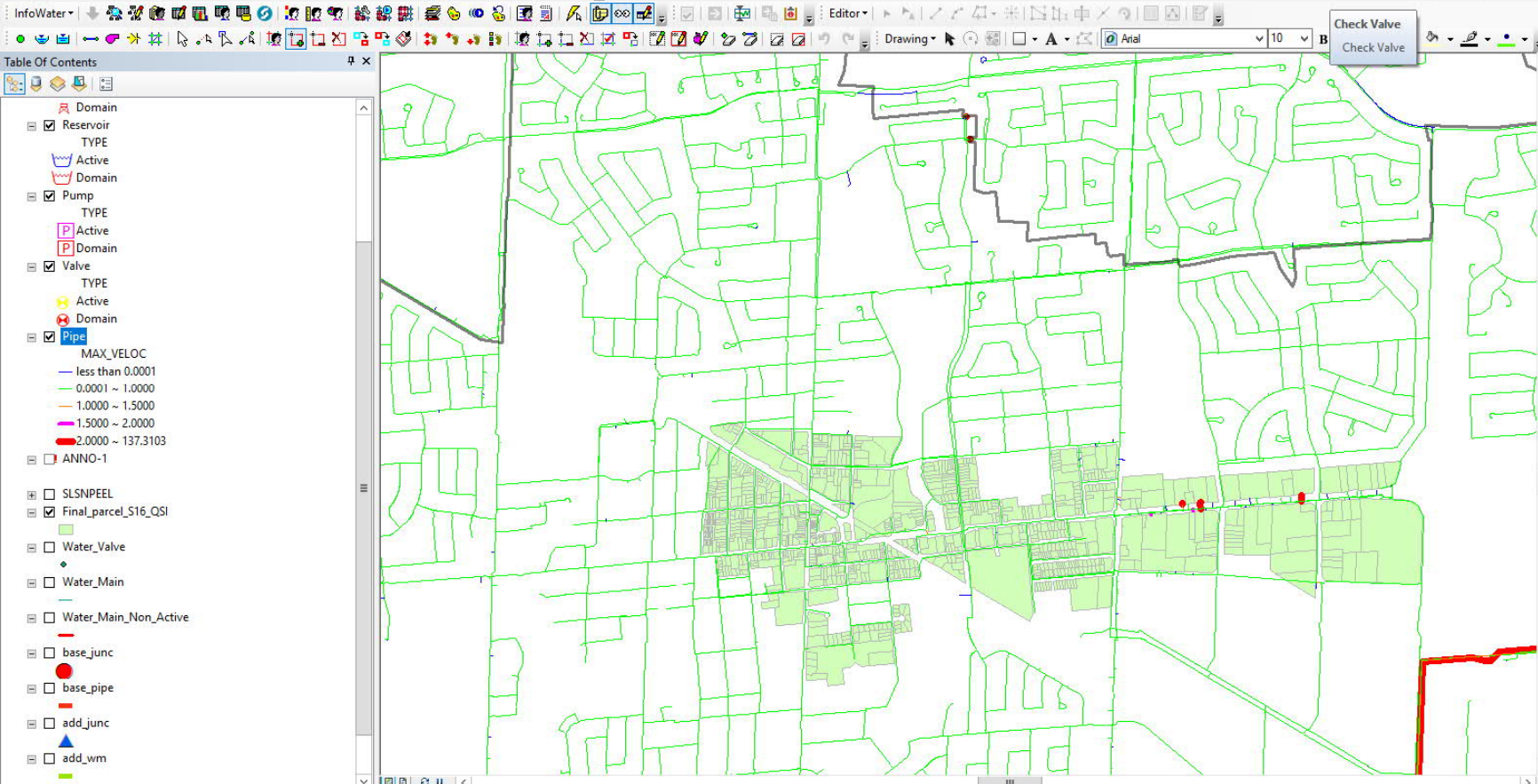
PIPE: WM-Z675469, 16-1199- CAM-RDS\_5-4a

(ID)	WM-Z675469
Description	16-1199- CAM-RDS_5-4a
Geometry	Reverse
Start Node	J-Z6-8021
End Node	J-NEW-6003
Modeling	
Length (m)	794.6644
Diameter (mm)	750.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
Information	
Year of Installation	2026
Year of Retirement	9999
Zone	5
Material	
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	N
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	
INFRA_STAT	PROPOSED
DC	
SOURCE	GIS2016
MP2018	W-ST-094
FIREFLOW	
ZONEID	
NEW_WM	
FACILITY	
Output	
Flow	3.8075 ML/d
Flow Direction	Reverse
Velocity	0.0998 m/s
Headloss	0.0129 m
HL/1000	0.0162 m/k-m
Status	Open
Flow Reversal	0

Attribute	Operation
-----------	-----------



# Option 4B2 – watermain velocity



Model Explorer

2041MDD-OPT4B-2

"Active":Standard Refresh Output

00:00 hrs

PIPE: WM-NEW-6051, 121375 G

(ID)	WM-NEW-6051
Description	121375 G
<input checked="" type="checkbox"/> Geometry	Reverse
Start Node	599547
End Node	599261
<input checked="" type="checkbox"/> Modeling	
Length (m)	12.5814
Diameter (mm)	400.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
<input checked="" type="checkbox"/> Information	
Year of Installation	2021
Year of Retirement	9999
Zone	5
Material	DI
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	Y
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	De-activated
INFRA_STAT	A
DC	
SOURCE	MP2018
MP2018	GIS2016
FIREFLOW	YES
ZONEID	P2M10
NEW_WM	
FACILITY	
TURNOVER	0.0000
<input checked="" type="checkbox"/> Output	

Attribute Operation

Message Board

Updating output data... Done.

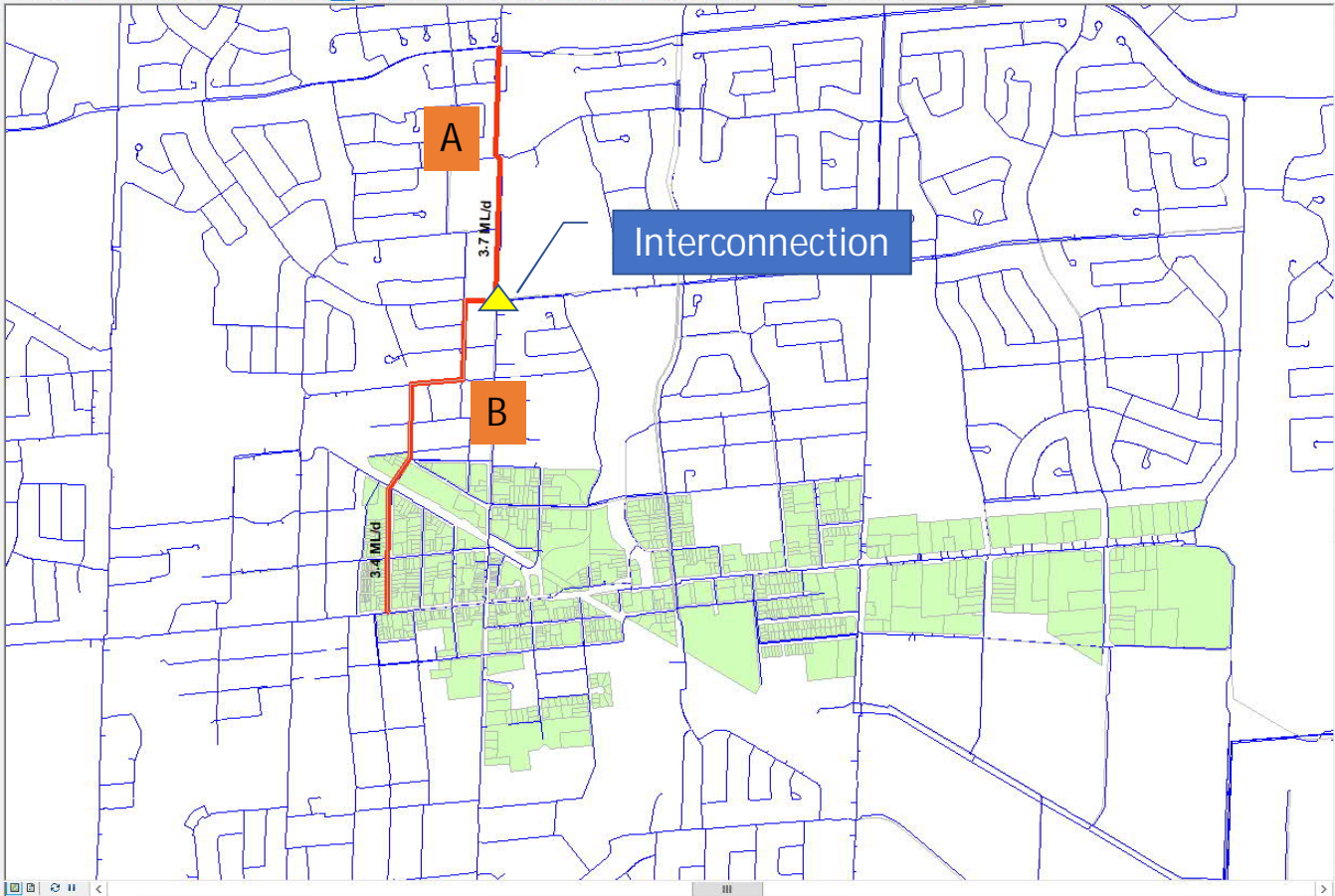
Message Validation Result

Option 4C

Avg Q

Table Of Contents

- Junction
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Tank
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Reservoir
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Pump
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Valve
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Pipe
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- ANNO-1
- SLSNPEEL
- Final\_parcel\_S16\_QSI



Model Explorer

2041MDD-OPT4C

[Active]:Standard Refresh Output

00:00 hrs

- Annotation
  - ANNO-1, New Annotation
  - PRESSURE, New Annotation
- Contour
- Curve
- DB Query
- Output Relate
- Pattern
- Query Set
- Selection Set
- Simulation Options
- Simulation Report
- Simulation Time

Attribute Operation

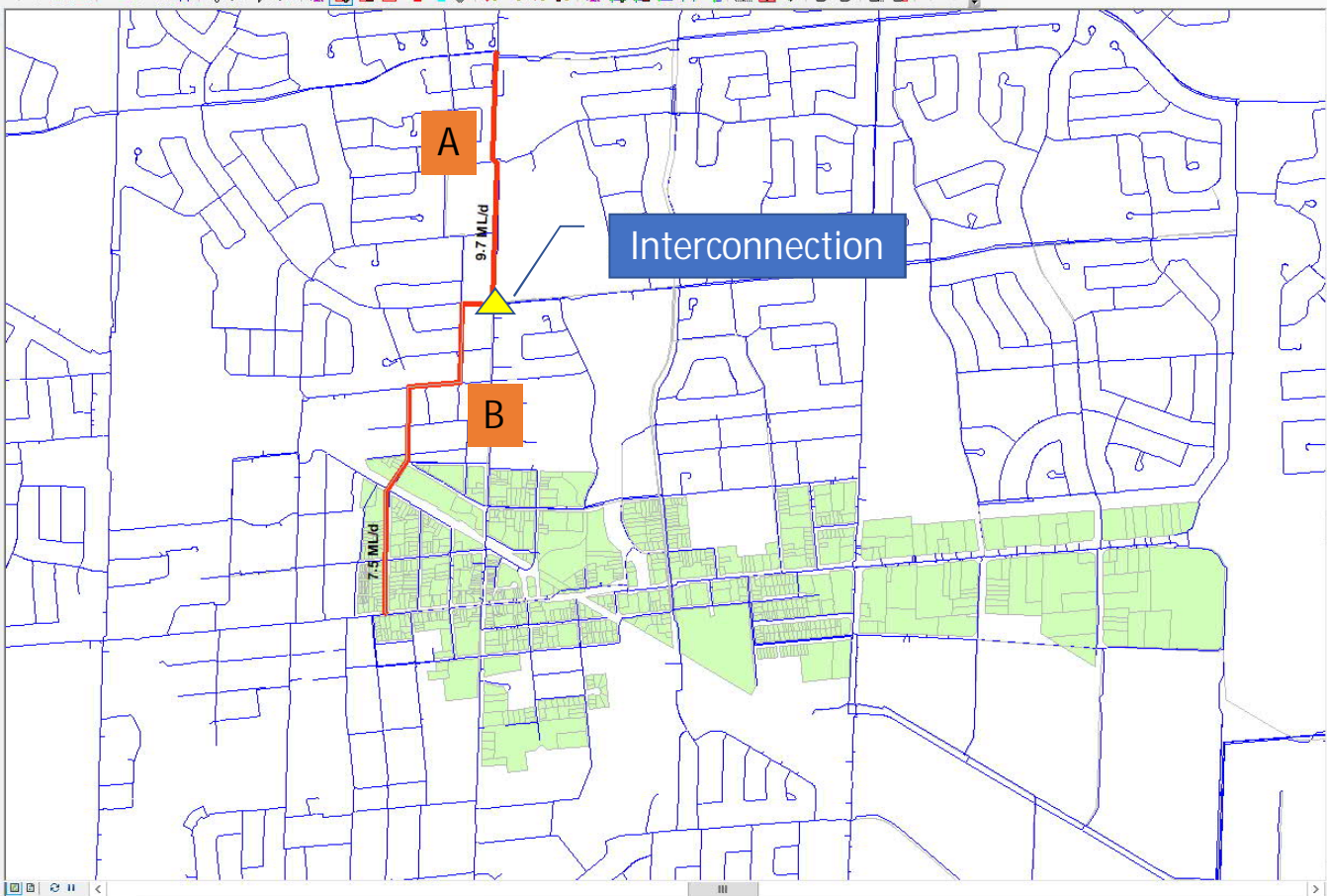




# Max Q

Table Of Contents

- Junction
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Tank
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Reservoir
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Pump
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Valve
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Pipe
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- ANNO-1
- SLSNPEEL
- Final\_parcel\_S16\_QSI



Model Explorer

2041MDD-OPT4C

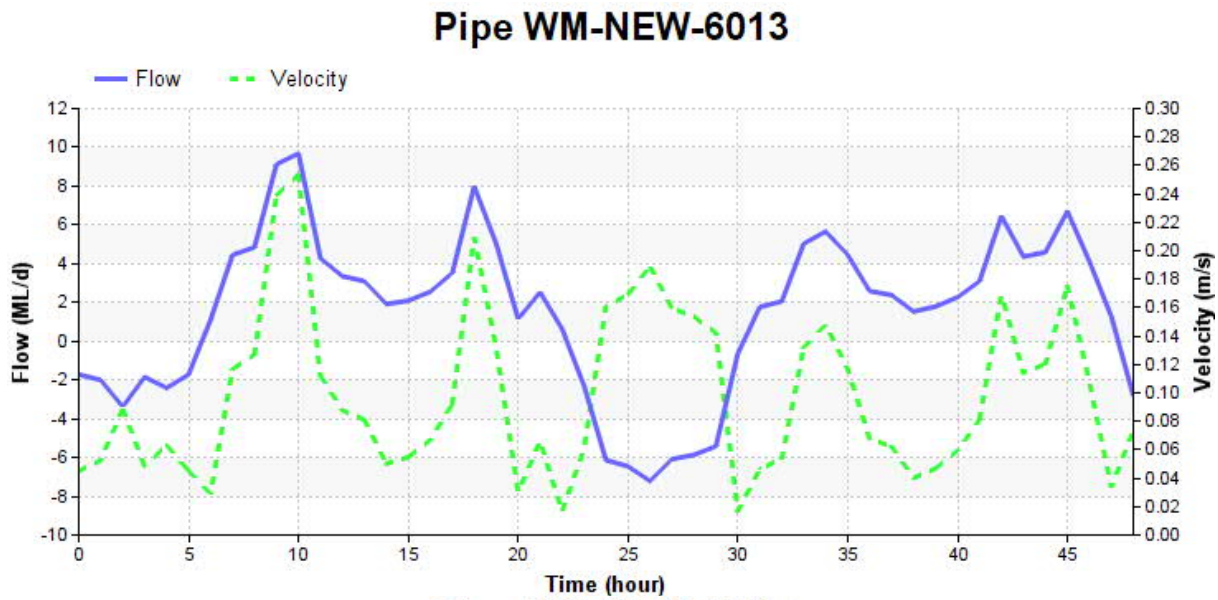
[Active]:Standard Refresh Output

00:00 hrs

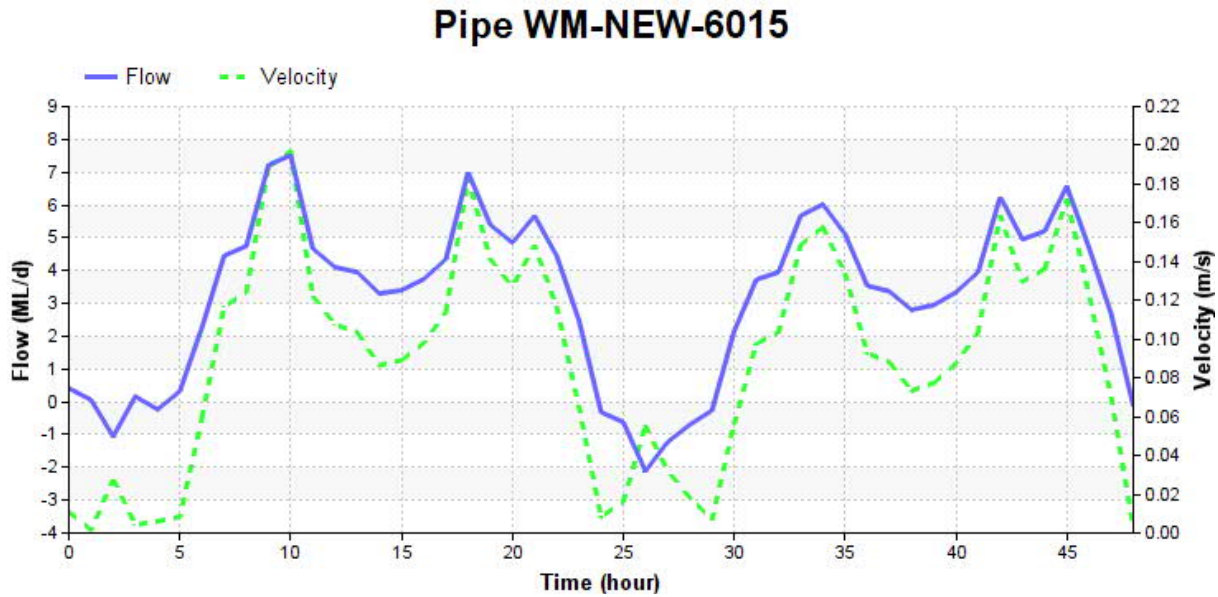
- Annotation
  - ANNO-1, New Annotation
  - PRESSURE, New Annotation
- Contour
- Curve
- DB Query
- Output Relate
- Pattern
- Query Set
- Selection Set
- Simulation Options
- Simulation Report
- Simulation Time

Attribute Operation

A



B





# Option 4C- System Pressures

## Table of Contents

- Layers
  - Junction
    - MIN\_PRESS
      - less than 20.0000
      - 20.0000 ~ 40.0000
      - 40.0000 ~ 50.0000
      - 50.0000 ~ 100.0000
      - 100.0000 ~ 99,999.0000
  - Tank
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Reservoir
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pump
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Valve
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pipe
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - ANNO-1
  - SLSNPEEL
  - Final parcel S16 OSI



## Model Explorer

2041MDD-OPT4C

"Active":Standard Refresh Output

00:00 hrs

PIPE: WM-NEW-6015, 16-1199- CAM-RDS\_5-4a

(ID)	WM-NEW-6015
Description	16-1199- CAM-RDS_5-4a
Geometry	Reverse
Start Node	599277
End Node	599884
Modeling Length (m)	1454.6029
Diameter (mm)	750.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
Information	
Year of Installation	9999
Year of Retirement	9999
Zone	Option4C
Material	
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	N
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	
INFRA_STAT	PROPOSED
DC	
SOURCE	GIS2016
MP2018	W-ST-094
FIREFLOW	
ZONEID	
NEW_WM	
FACILITY	
Output	
Flow	0.4126 ML/d
Flow Direction	Forward
Velocity	0.0108 m/s
Headloss	0.0004 m
HL/1000	0.0003 m/k-m
Status	Open
Flow Reversal	0

Attribute	Operation
-----------	-----------

# Option 4C – watermain velocity

Table Of Contents

- Domain
  - Reservoir TYPE
  - Pump TYPE
  - Valve TYPE
  - Pipe
    - MAX\_VELOC
      - less than 0.0001
      - 0.0001 ~ 1.0000
      - 1.0000 ~ 1.5000
      - 1.5000 ~ 2.0000
      - 2.0000 ~ 137.3103
    - ANNO-1
- SLSNPEEL
- Final\_parcel\_S16\_QSI
- Water\_Valve
- Water\_Main
- Water\_Main\_Non\_Active
- base\_junc
- base\_pipe
- add\_junc
- add\_wm



Model Explorer

2041MDD-OPT4C

"Active":Standard Refresh Output

00:00 hrs

PIPE: WM-NEW-6051, 121375 G

(ID)	WM-NEW-6051
Description	121375 G
Geometry	Reverse
Start Node	599547
End Node	599261
Modeling	
Length (m)	12.5814
Diameter (mm)	400.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
Information	
Year of Installation	2021
Year of Retirement	9999
Zone	5
Material	DI
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	Y
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	De-activated
INFRA_STAT	A
DC	
SOURCE	GIS2016
MP2018	
FIREFLOW	YES
ZONEID	P2M10
NEW_WM	
FACILITY	
TURNOVER	0.0000
Output	

Attribute Operation



Option 4D

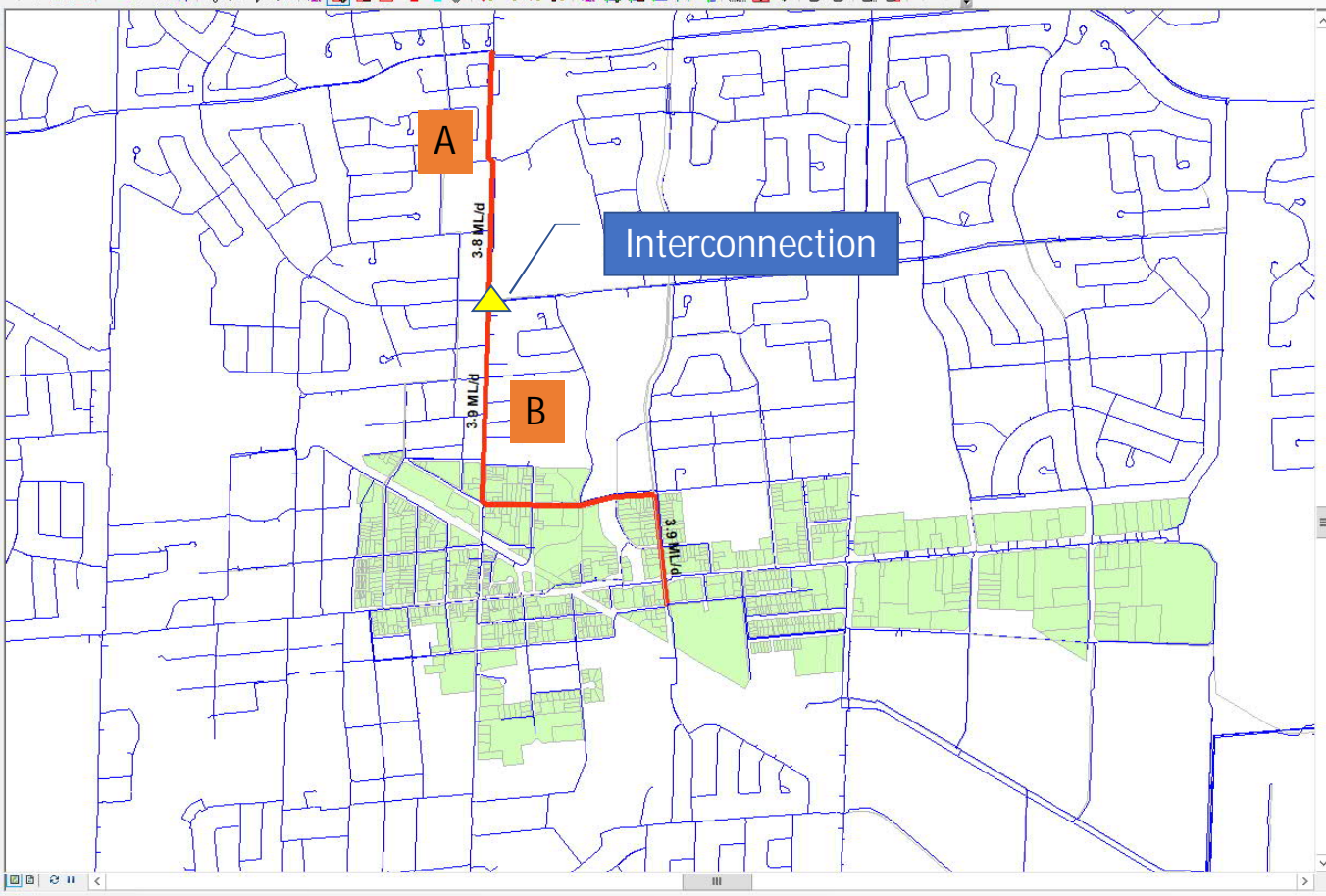


Avg Q



Table Of Contents

- Junction
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Tank
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Reservoir
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Pump
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Valve
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Pipe
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- ANNO-1
- SLSNPEEL
- Final\_parcel\_S16\_QSI



Model Explorer

2041MDD-OPT4D

\*Active: Standard Refresh Output

00:00 hrs

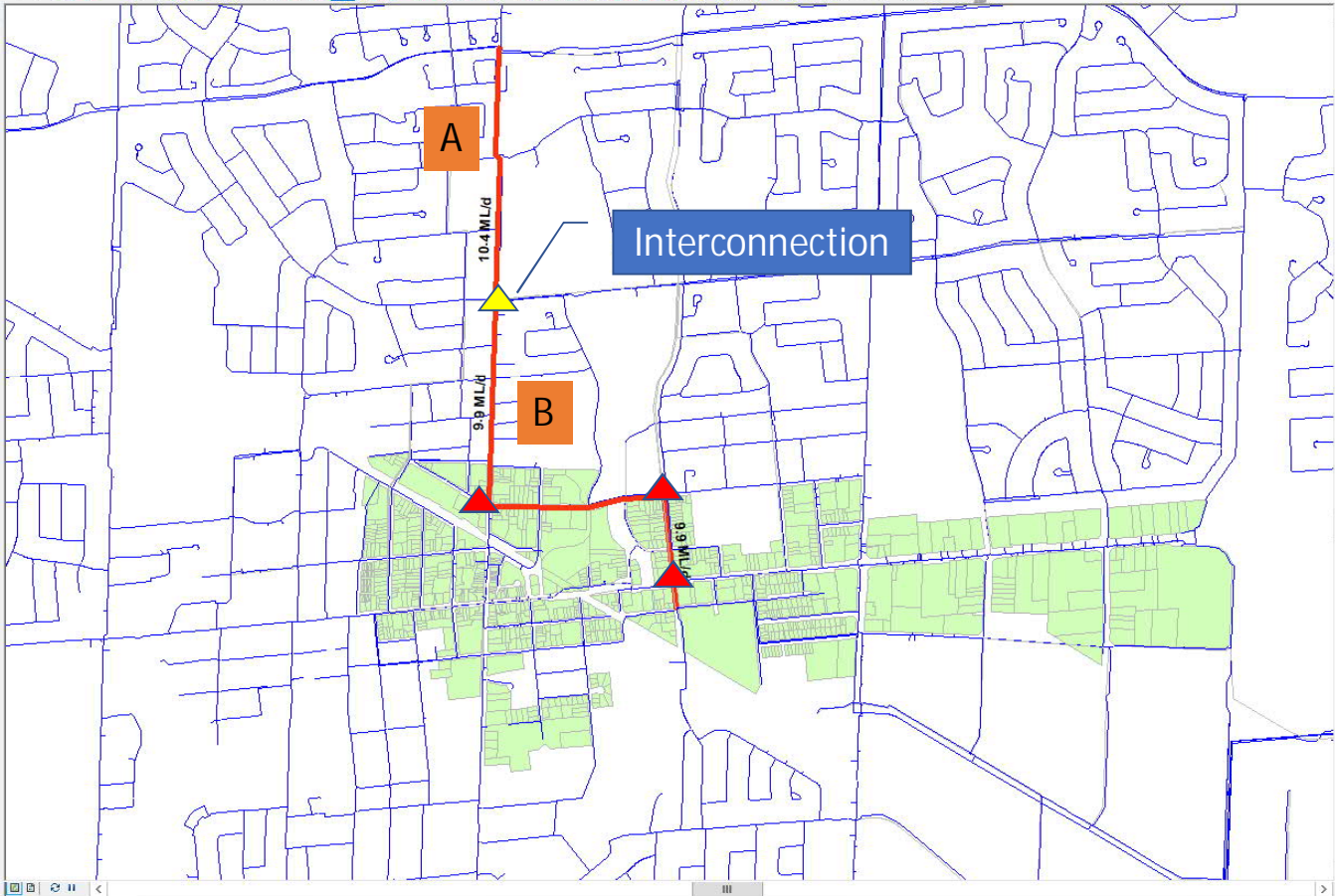
- Annotation
  - ANNO-1, New Annotation
  - PRESSURE, New Annotation
- Contour
- Curve
- DB Query
- Output Relate
- Pattern
- Query Set
- Selection Set
- Simulation Options
- Simulation Report
- Simulation Time

Attribute Operation

# Max Q

Table Of Contents

- Junction
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Tank
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Reservoir
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Pump
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Valve
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- Pipe
  - <all other values>
  - TYPE
- Active
- Domain
- Inactive
- ANNO-1
- SLSNPEEL
- Final\_parcel\_S16\_QSI



Model Explorer

2041MDD-OPT4D

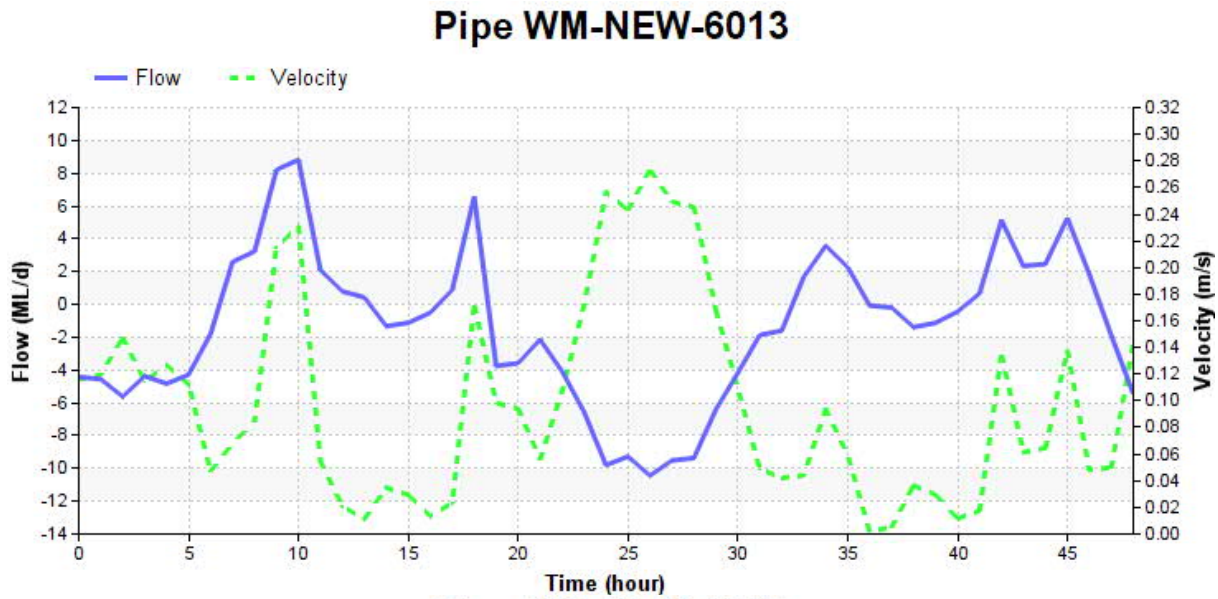
[Active]:Standard Refresh Output

00:00 hrs

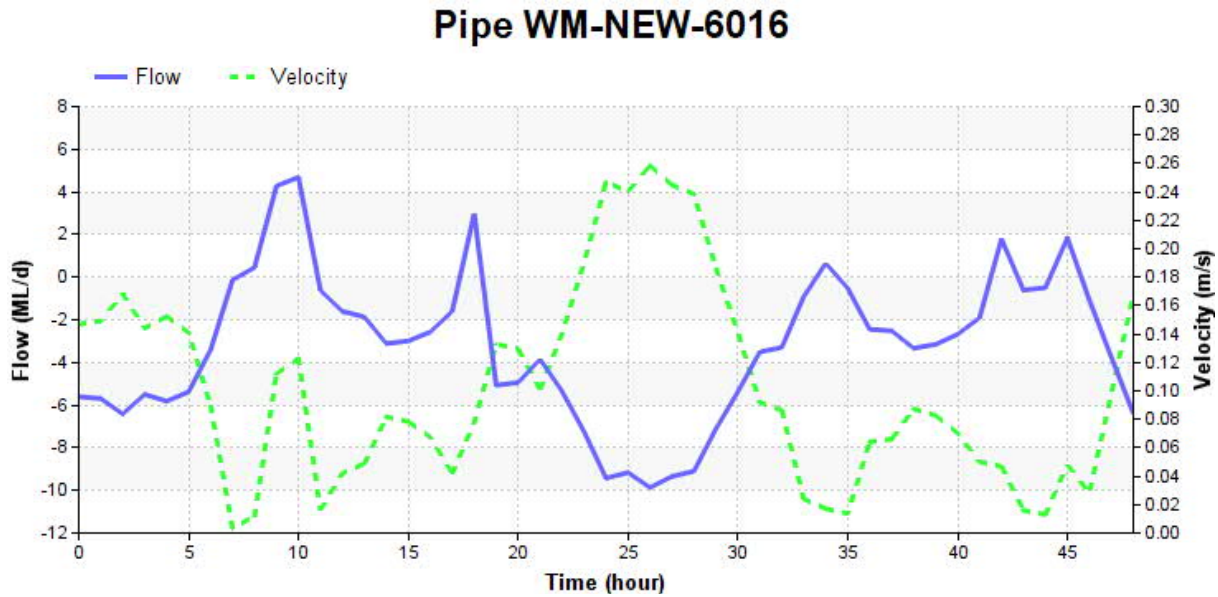
- Annotation
  - ANNO-1, New Annotation
  - PRESSURE, New Annotation
- Contour
- Curve
- DB Query
- Output Relate
- Pattern
- Query Set
- Selection Set
- Simulation Options
- Simulation Report
- Simulation Time

Attribute Operation

A



B





# Option 4D- System Pressures

Table of Contents

- Layers
  - Junction
    - MIN\_PRESS
      - less than 20.0000
      - 20.0000 ~ 40.0000
      - 40.0000 ~ 50.0000
      - 50.0000 ~ 100.0000
      - 100.0000 ~ 99,999.0000
  - Tank
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Reservoir
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pump
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Valve
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pipe
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel S16\_OSI



Model Explorer

2041MDD-OPT4D

"Active":Standard Refresh Output

00:00 hrs

PIPE: WM-NEW-6016, 16-1199- CAM-RDS\_5-4a

(ID)	WM-NEW-6016
Description	16-1199- CAM-RDS_5-4a
Geometry	Reverse
Start Node	599277
End Node	J-NEW-6003
Modeling	
Length (m)	1383.6946
Diameter (mm)	750.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
Information	
Year of Installation	9999
Year of Retirement	9999
Zone	Option4B
Material	
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	N
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	
INFRA_STAT	PROPOSED
DC	
SOURCE	GIS2016
MP2018	W-ST-094
FIREFLOW	
ZONEID	
NEW_WM	
FACILITY	
Output	
Flow	5.6084 ML/d
Flow Direction	Reverse
Velocity	0.1469 m/s
Headloss	0.0460 m
HL/1000	0.0333 m/k-m
Status	Open
Flow Reversal	0

Attribute	Operation
-----------	-----------

# Option 4D – watermain velocity

Table Of Contents

- Domain
  - Reservoir TYPE
  - Pump TYPE
  - Valve TYPE
    - Active
  - Pipe
    - MAX\_VELOC
      - less than 0.0001
      - 0.0001 ~ 1.0000
      - 1.0000 ~ 1.5000
      - 1.5000 ~ 2.0000
      - 2.0000 ~ 137.3103
    - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI
  - Water\_Valve
  - Water\_Main
  - Water\_Main\_Non\_Active
  - base\_junc
  - base\_pipe
  - add\_junc
  - add\_wm



Model Explorer

2041MDD-OPT4D

"Active":Standard Refresh Output

00:00 hrs

PIPE: WM-NEW-6051, 121375 G

(ID)	WM-NEW-6051
Description	121375 G
<input checked="" type="checkbox"/> Geometry	Reverse
Start Node	599547
End Node	599261
<input checked="" type="checkbox"/> Modeling	
Length (m)	12.5814
Diameter (mm)	400.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
<input checked="" type="checkbox"/> Information	
Year of Installation	2021
Year of Retirement	9999
Zone	5
Material	DI
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	Y
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	De-activated
INFRA_STAT	A
DC	
SOURCE	GIS2016
MP2018	
FIREFLOW	YES
ZONEID	P2M10
NEW_WM	
FACILITY	
TURNOVER	0.0000
<input checked="" type="checkbox"/> Output	

Attribute Operation

Message Board

Updating output data... Done.

Message Validation Result

Option 5

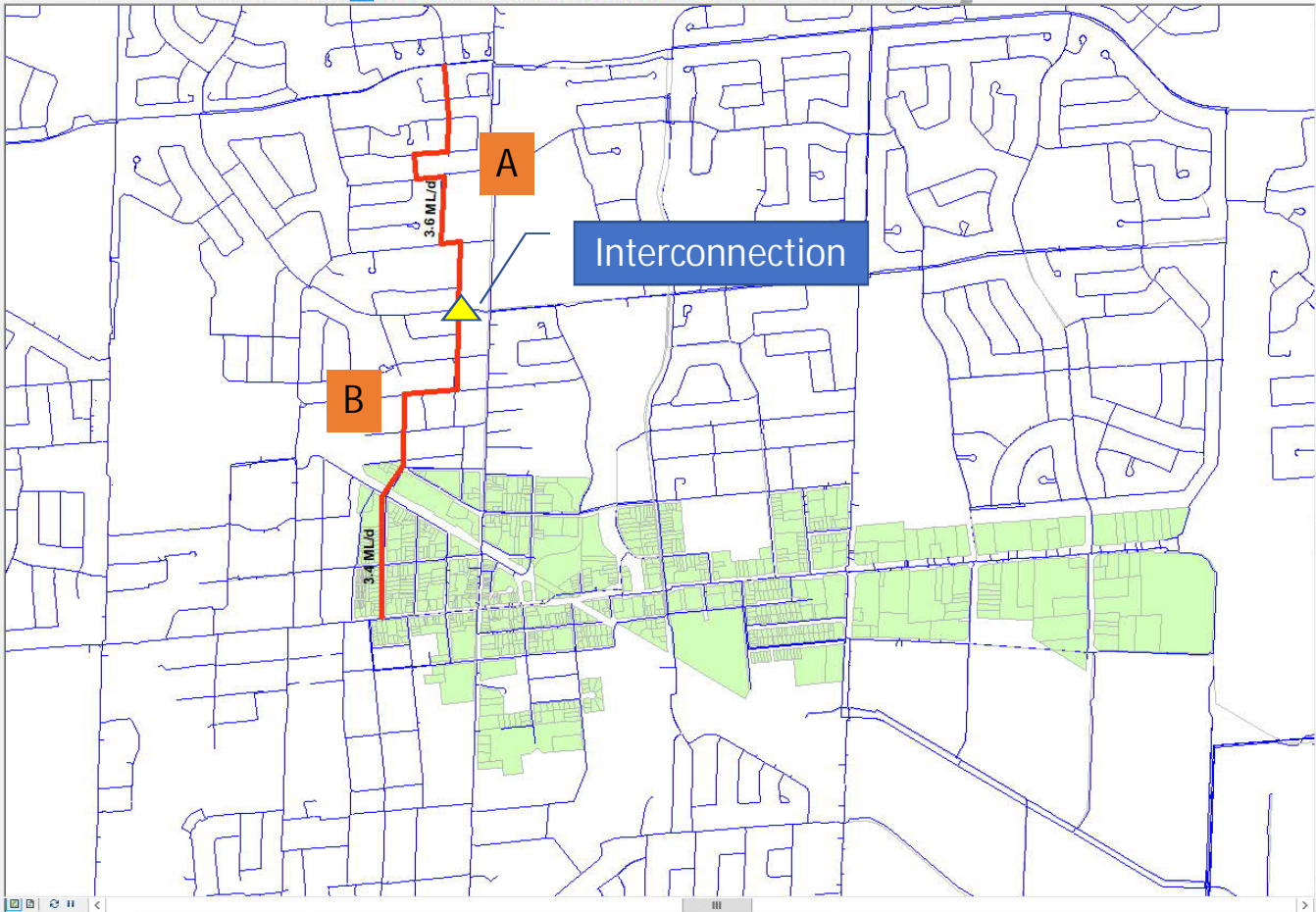




Avg Q

Table Of Contents

- Layers
  - Junction
    - <all other values>
    - TYPE
  - Tank
    - Active
    - Domain
    - Inactive
  - Reservoir
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pump
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Valve
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pipe
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI



Model Explorer

2041MDD-OPT5

"Active":Standard Refresh Output

00:00 hrs

- Annotation
  - ANNO-1, New Annotation
  - PRESSURE, New Annotation
- Contour
- Curve
- DB Query
- Output Relate
- Pattern
- Query Set
- Selection Set
- Simulation Options
- Simulation Report
- Simulation Time

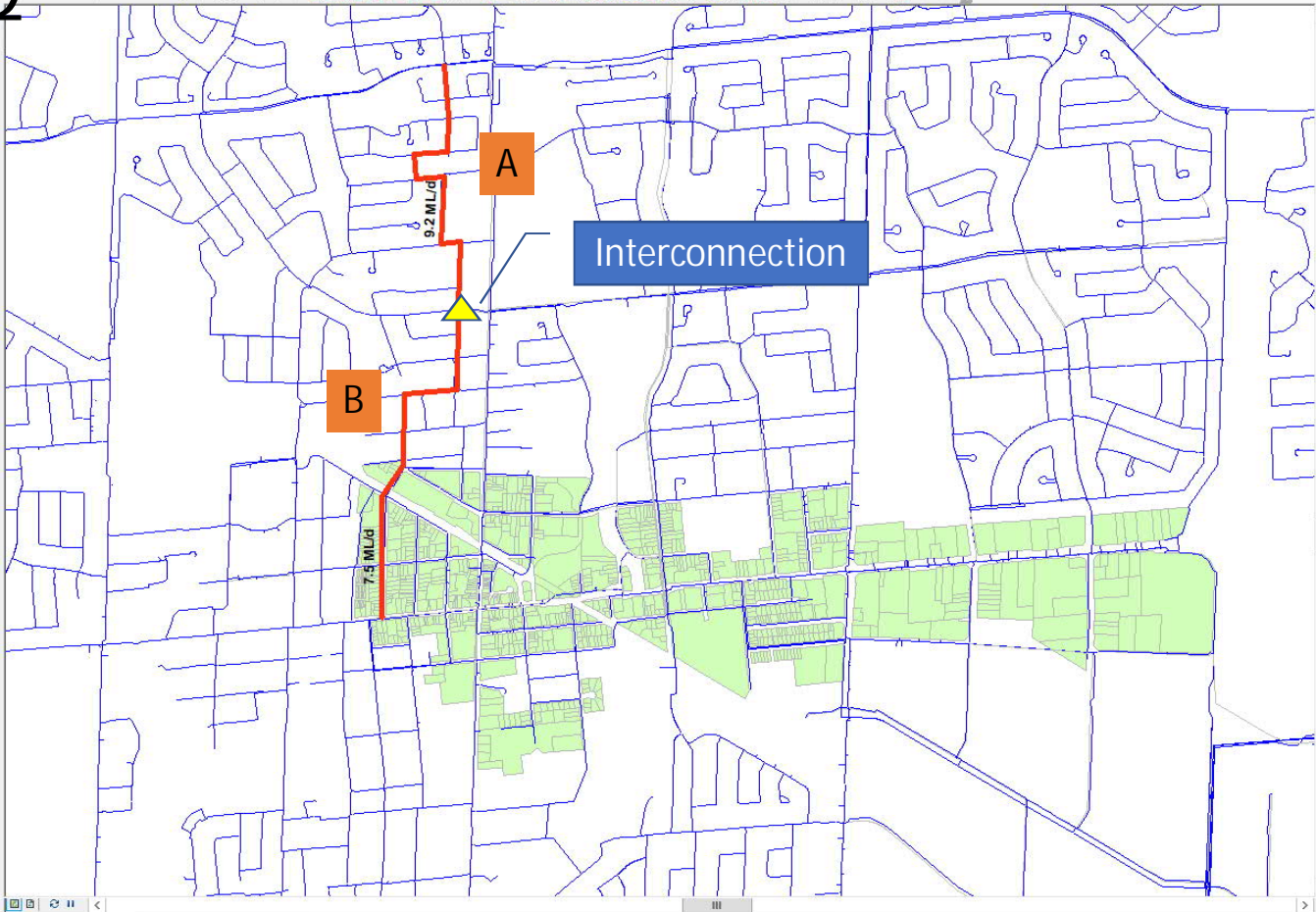
Attribute Operation



# Max Q

Table Of Contents

- Layers
  - Junction
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Tank
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Reservoir
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pump
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Valve
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - Pipe
    - <all other values>
    - TYPE
    - Active
    - Domain
    - Inactive
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI



Model Explorer

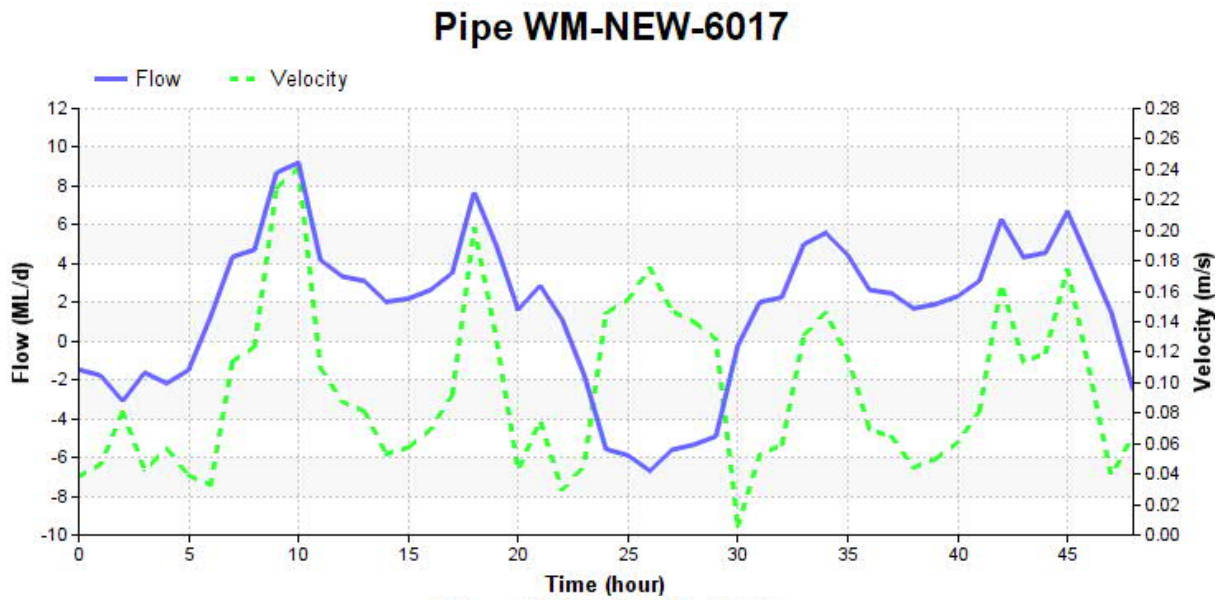
2041MDD-OPT5

"Active":Standard Refresh Output

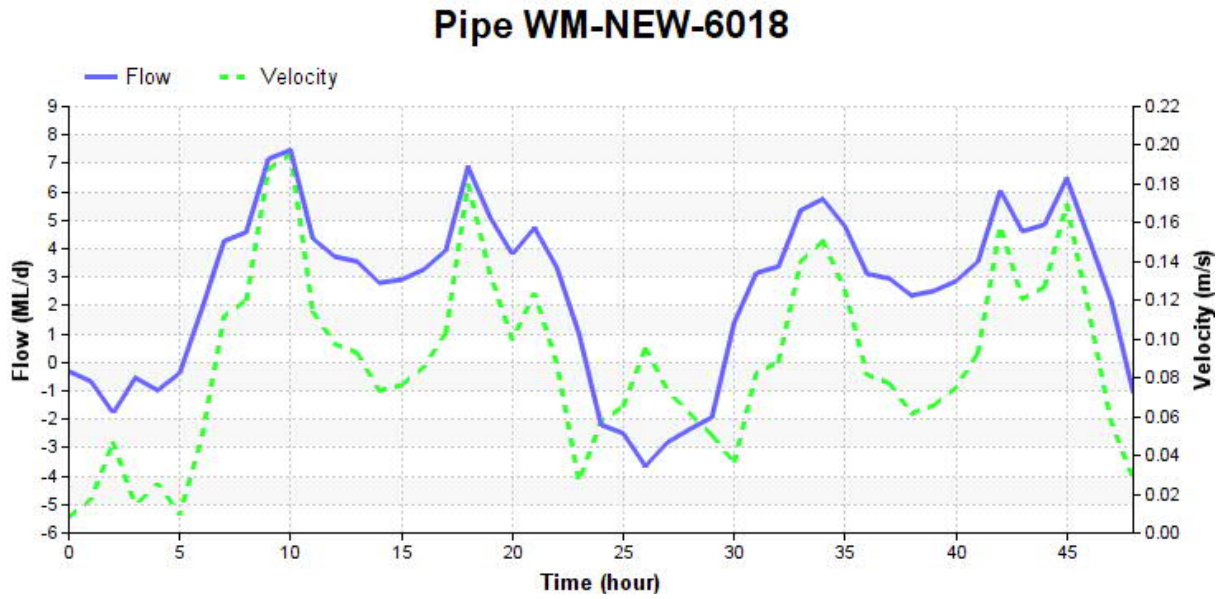
00:00 hrs

- Annotation
  - ANNO-1, New Annotation
  - PRESSURE, New Annotation
- Contour
- Curve
- DB Query
- Output Relate
- Pattern
- Query Set
- Selection Set
- Simulation Options
- Simulation Report
- Simulation Time

A



B





# Option 5- System Pressures

Table Of Contents

- Layers
  - Junction
    - MIN\_PRESS
      - less than 20.0000
      - 20.0000 ~ 40.0000
      - 40.0000 ~ 50.0000
      - 50.0000 ~ 100.0000
      - 100.0000 ~ 99,999.0000
  - Tank
    - <all other values>
    - TYPE
      - Active
      - Domain
      - Inactive
  - Reservoir
    - <all other values>
    - TYPE
      - Active
      - Domain
      - Inactive
  - Pump
    - <all other values>
    - TYPE
      - Active
      - Domain
      - Inactive
  - Valve
    - <all other values>
    - TYPE
      - Active
      - Domain
      - Inactive
  - Pipe
    - <all other values>
    - TYPE
      - Active
      - Domain
      - Inactive
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI



Model Explorer

2041MDD-OPT5

"Active":Standard Refresh Output

00:00 hrs

PIPE: WM-NEW-6018, 16-1199-CAM-RDS\_5-4a

(ID)	WM-NEW-6018
Description	16-1199-CAM-RDS_5-4a
Geometry	Reverse
Start Node	599864
End Node	599884
Modeling	
Length (m)	1339.9090
Diameter (mm)	750.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
Information	
Year of Installation	9999
Year of Retirement	9999
Zone	Option5
Material	
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	N
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	
INFRA_STAT	PROPOSED
DC	
SOURCE	GIS2016
MP2018	W-ST-094
FIREFLOW	
ZONEID	
NEW_WM	
FACILITY	
Output	
Flow	0.3130 ML/d
Flow Direction	Reverse
Velocity	0.0082 m/s
Headloss	0.0002 m
HL/1000	0.0002 m/k-m
Status	Open
Flow Reversal	0
Type	Pipe
From Node	599864

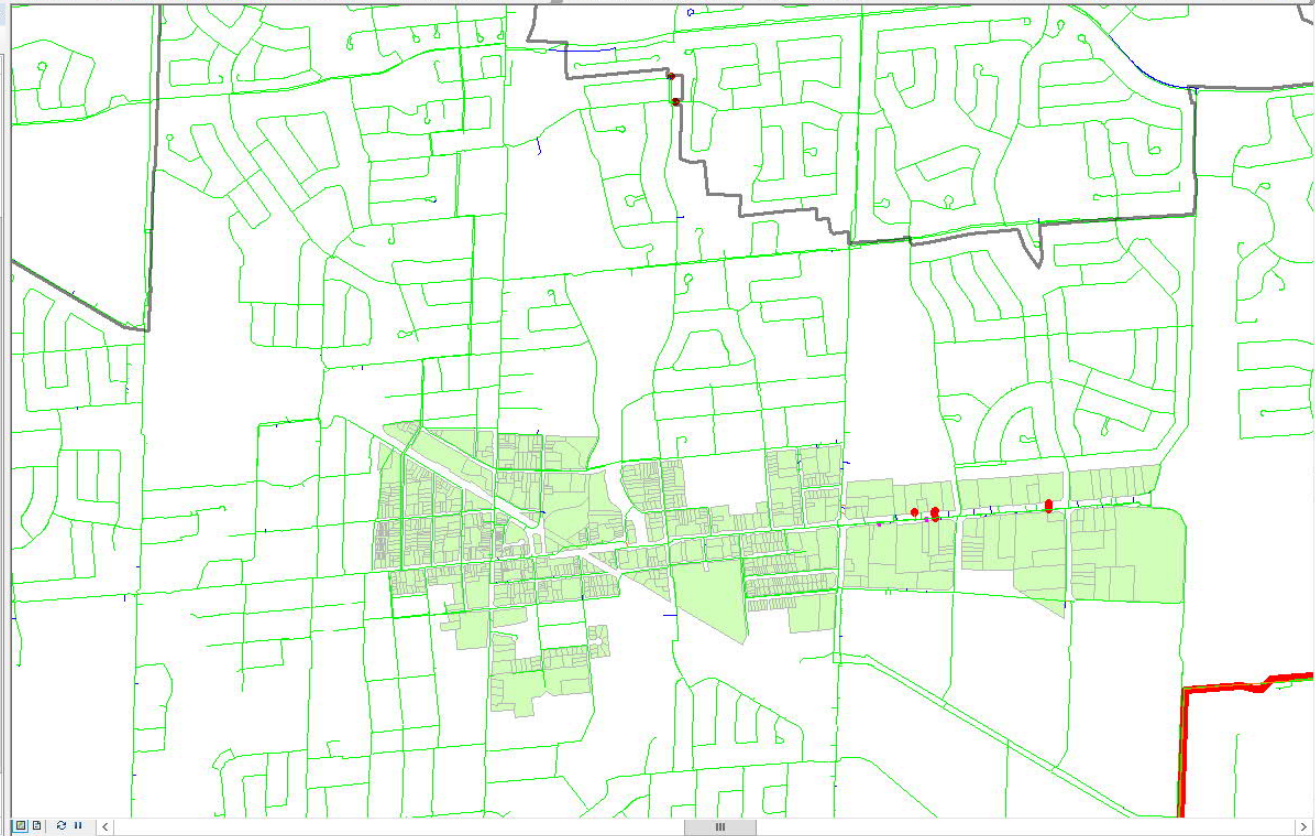
Attribute	Operation
-----------	-----------

# Option 5 – watermain velocity

1:16,240 Bentley WaterGEMS Sign in Editor Drawing Anal

Table Of Contents

- Domain
  - Reservoir TYPE
  - Pump TYPE
  - Valve TYPE
    - Active
    - Domain
  - Pipe
    - MAX\_VELOC
      - less than 0.0001
      - 0.0001 ~ 1.0000
      - 1.0000 ~ 1.5000
      - 1.5000 ~ 2.0000
      - 2.0000 ~ 137.3103
    - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI
  - Water\_Valve
  - Water\_Main
  - Water\_Main\_Non\_Active
  - base\_junc
  - base\_pipe
  - add\_junc
  - add\_wm



Model Explorer

2041MDD-OPT5  
"Active":Standard Refresh Output  
00:00 hrs

PIPE: WM-NEW-6051, 121375 G

(ID)	WM-NEW-6051
Description	121375 G
<input checked="" type="checkbox"/> Geometry	Reverse
Start Node	599547
End Node	599261
<input checked="" type="checkbox"/> Modeling	
Length (m)	12.5814
Diameter (mm)	400.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
<input checked="" type="checkbox"/> Information	
Year of Installation	2021
Year of Retirement	9999
Zone	5
Material	DI
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	Y
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	De-activated
INFRA_STAT	A
DC	
SOURCE	GIS2016
MP2018	
FIREFLOW	YES
ZONEID	P2M10
NEW_WM	
FACILITY	
TURNOVER	0.0000
<input checked="" type="checkbox"/> Output	

Attribute Operation

Message Board

Updating output data... Done.

Message Validation Result

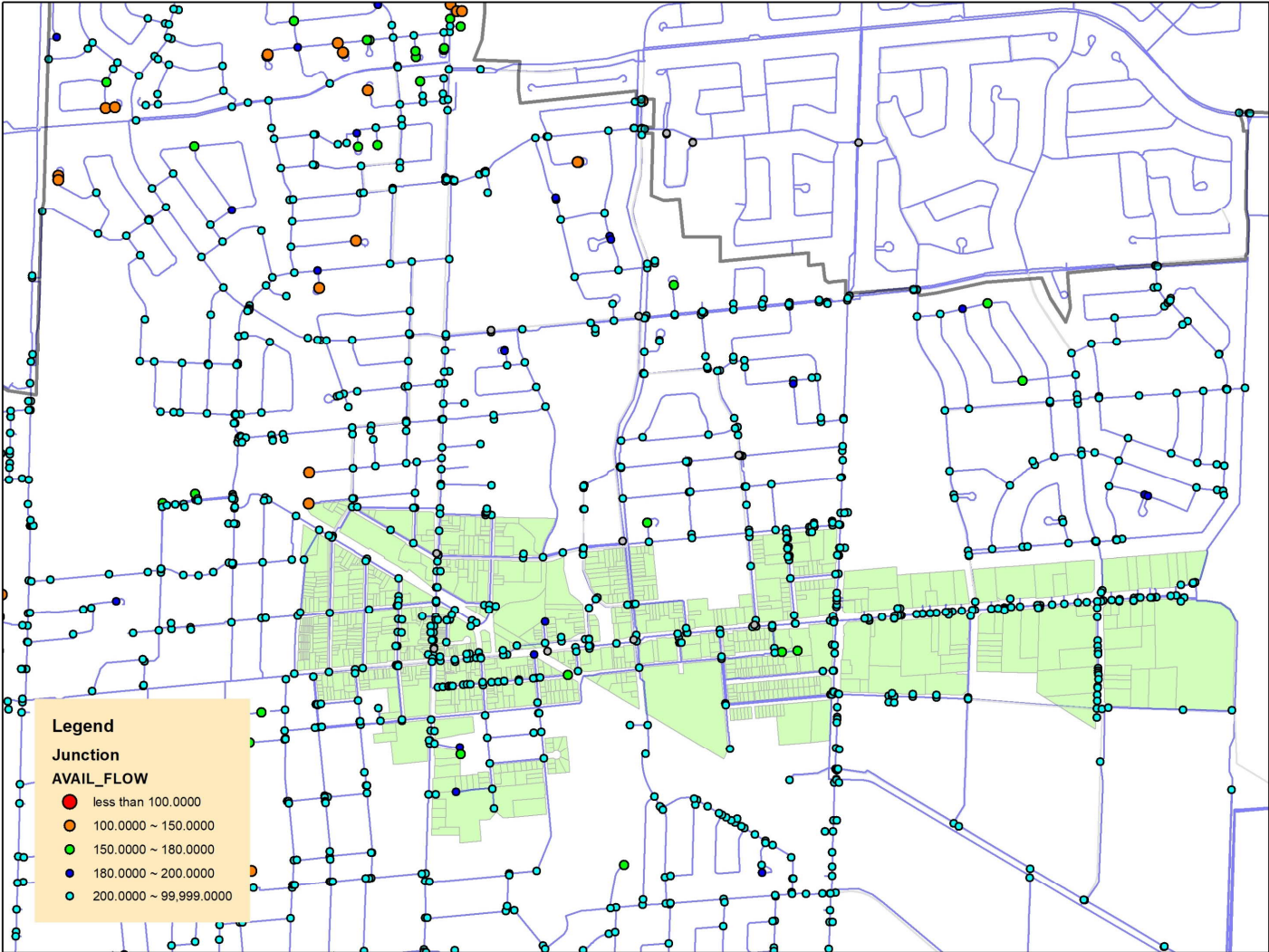


Appendix B: Water Turnover Results

# Fire Flow Analysis Results

# Fire Flow Analysis Results

Option 2A





# Fire Flow Analysis Results

Option 2B



# Fire Flow Analysis Results

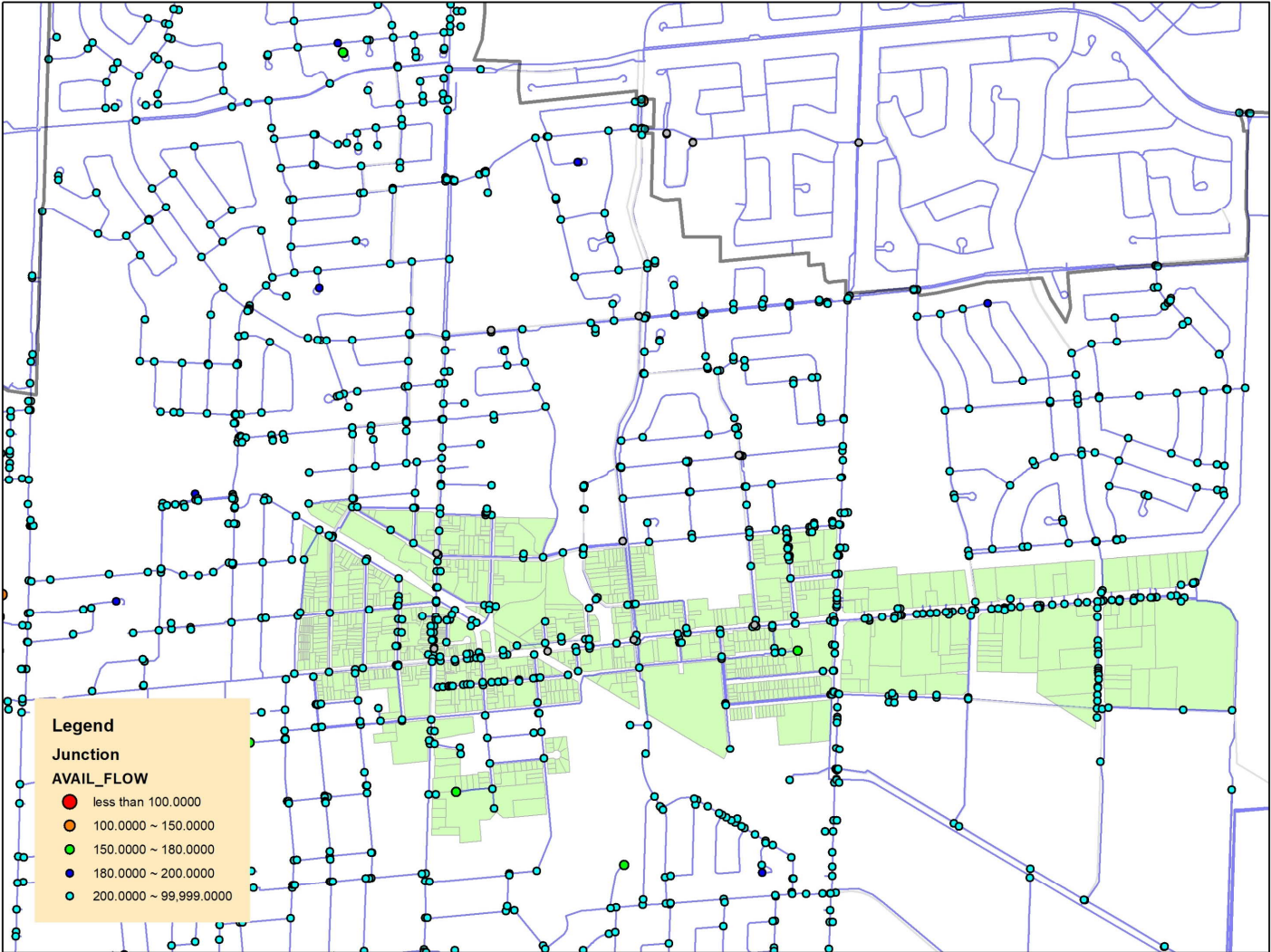
Option 4B



# Fire Flow Analysis Results

Option 4B-2

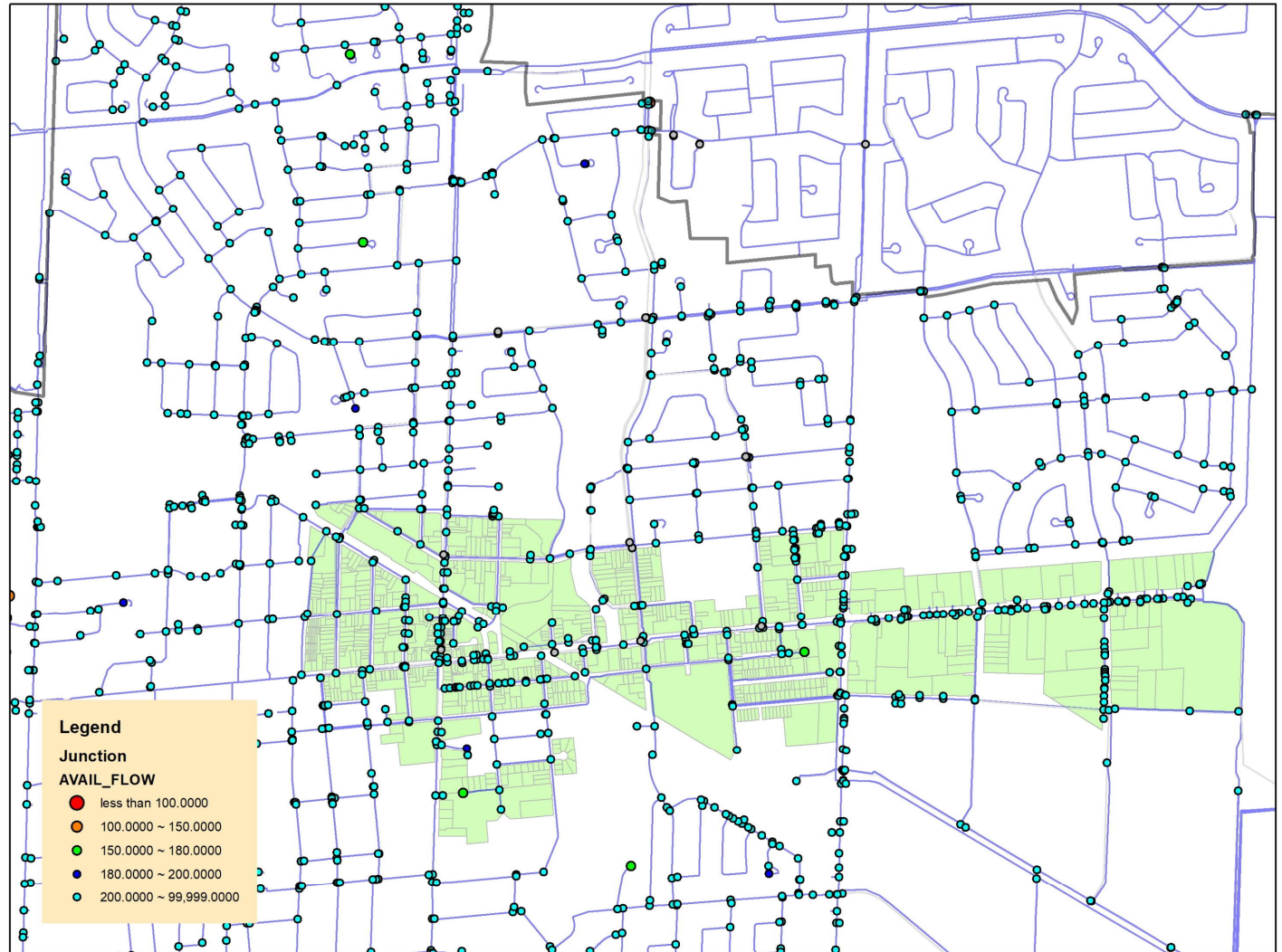
(without new watermain on Vodden Street East)





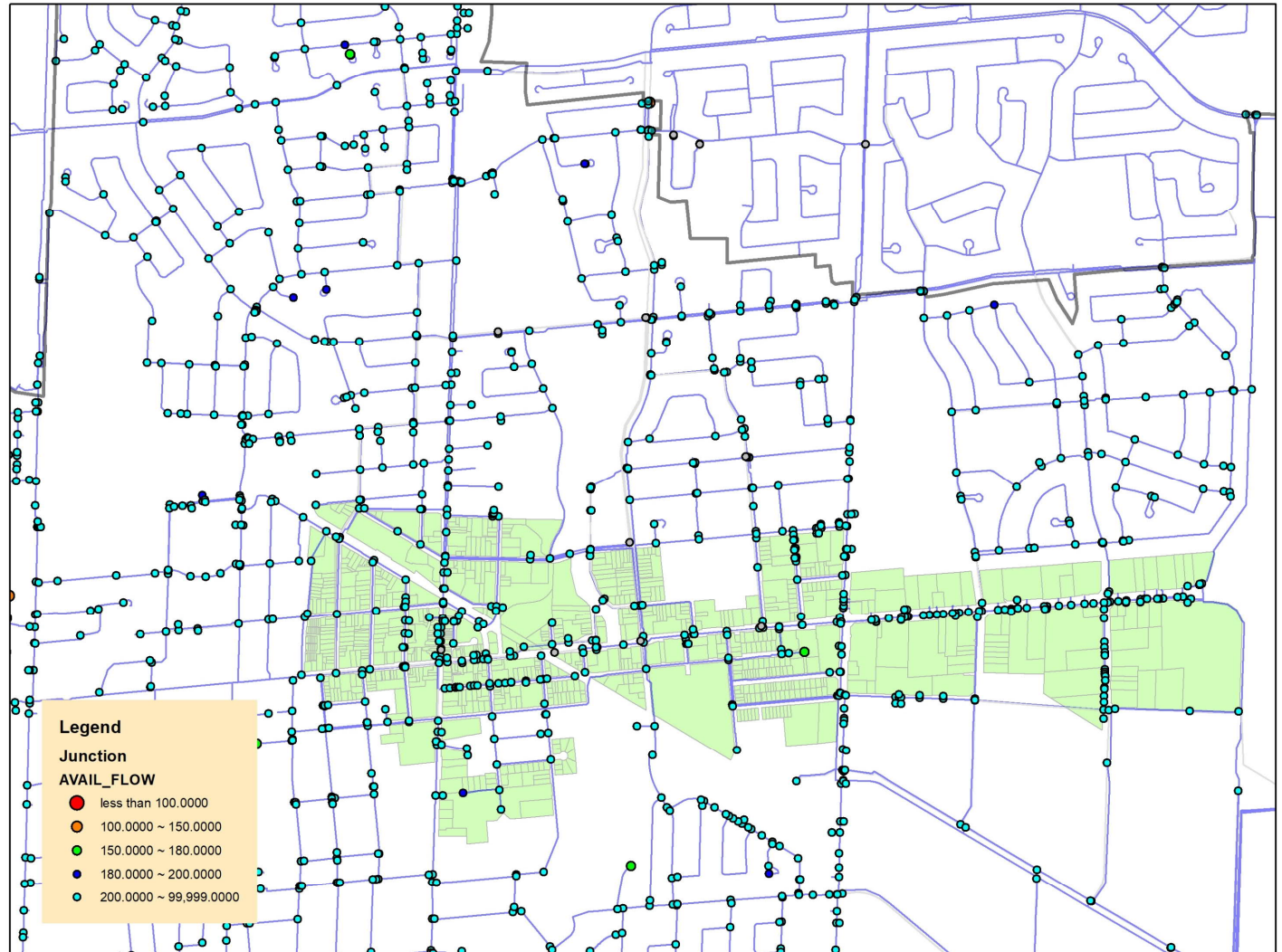
# Fire Flow Analysis Results

Option 4C



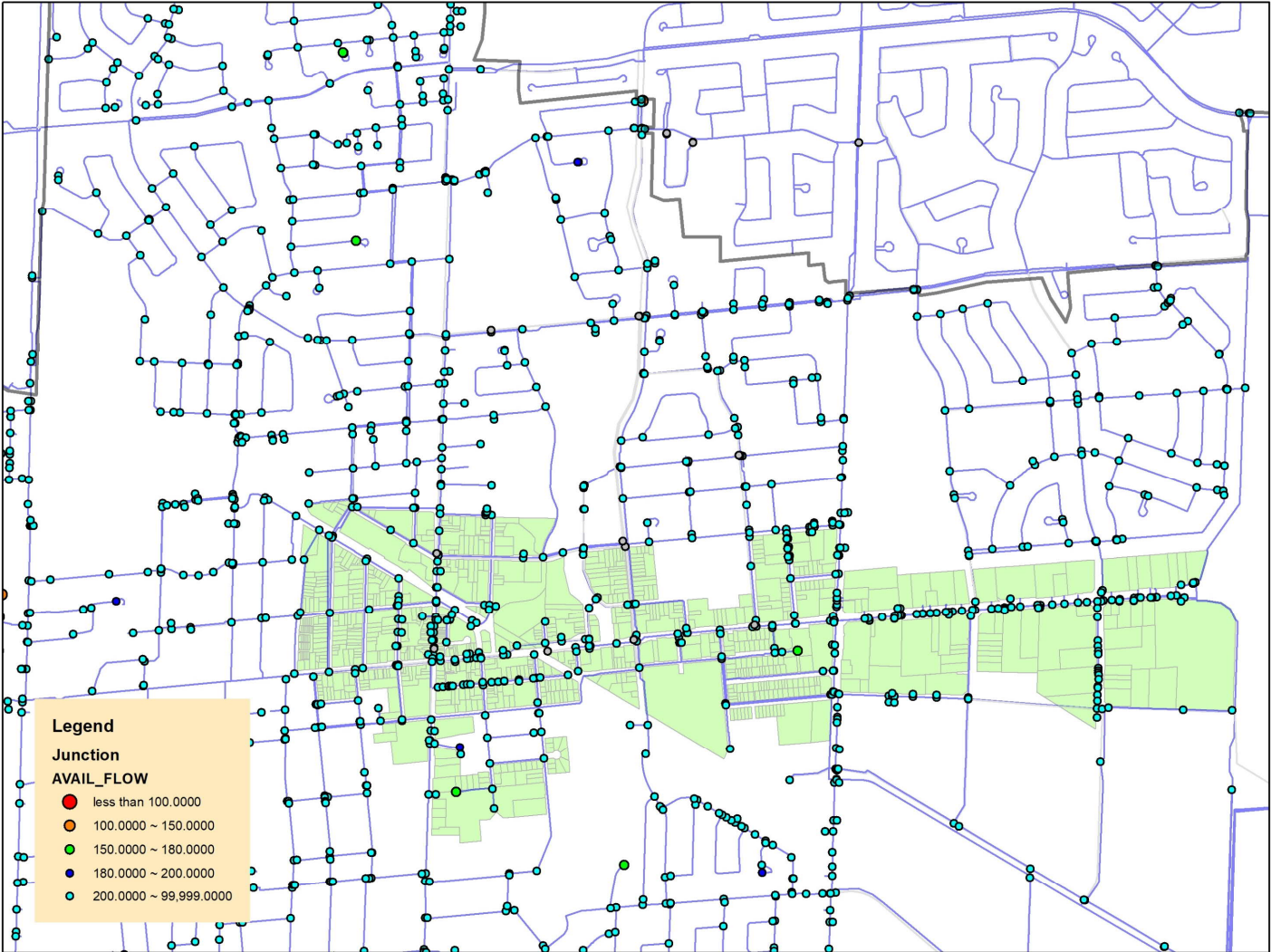
# Fire Flow Analysis Results

Option 4D



# Fire Flow Analysis Results

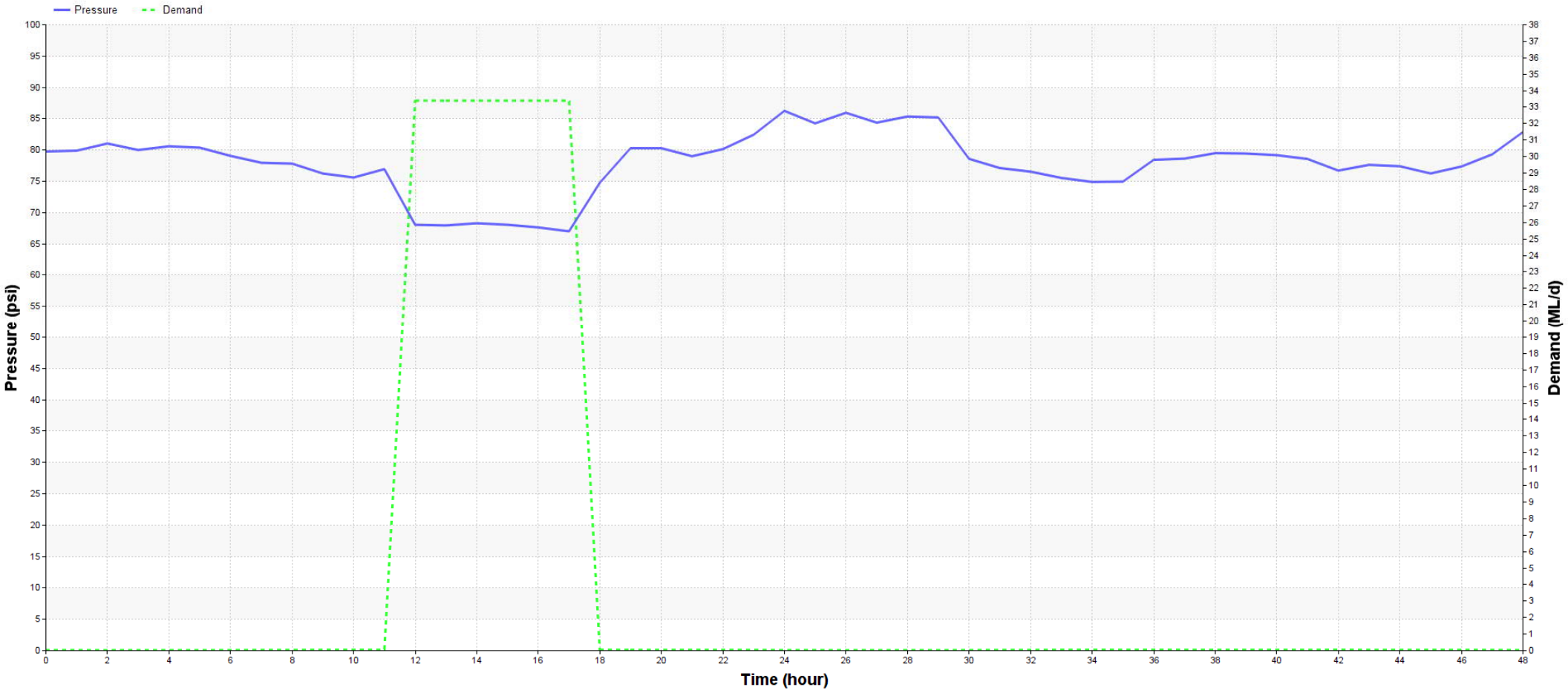
Option 5





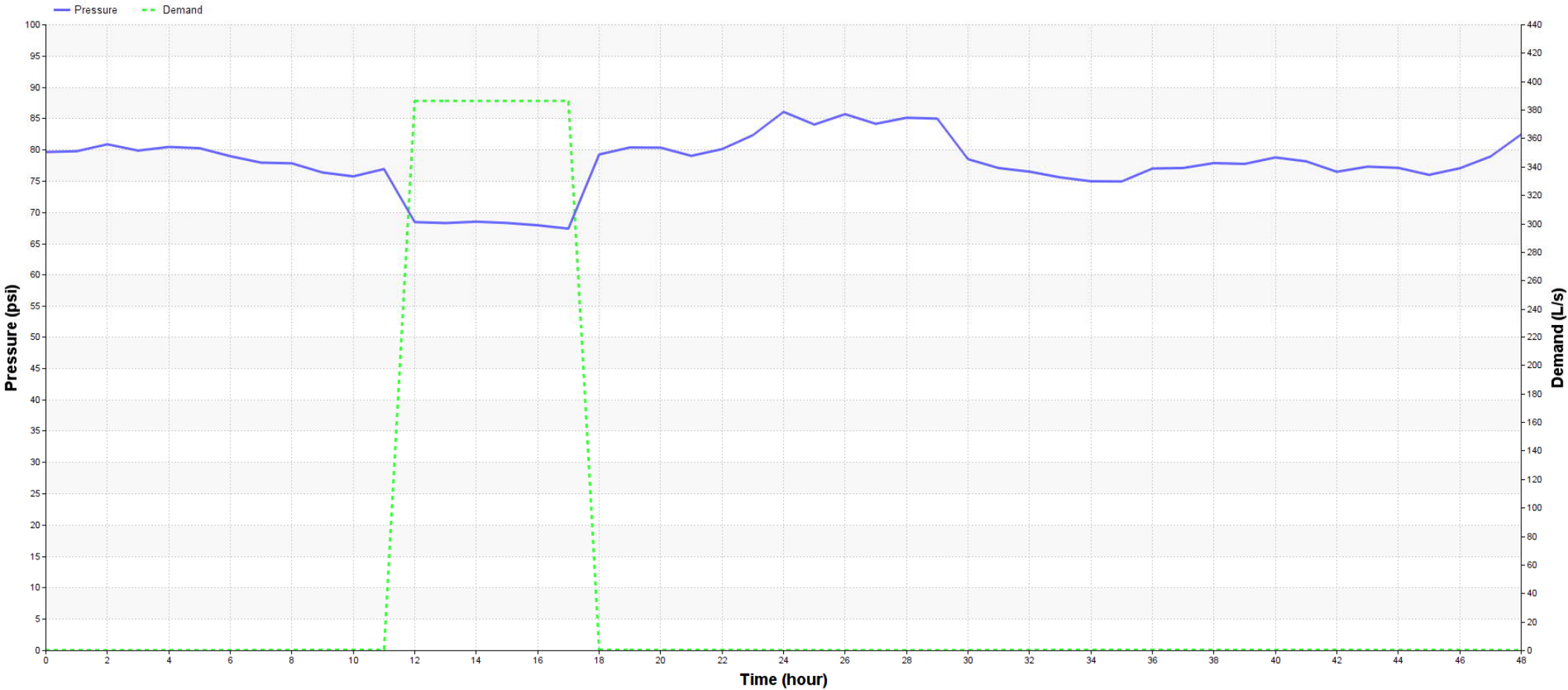
# Fire Flow (386L/s for 6hr) without 750mm

## Junction 599261



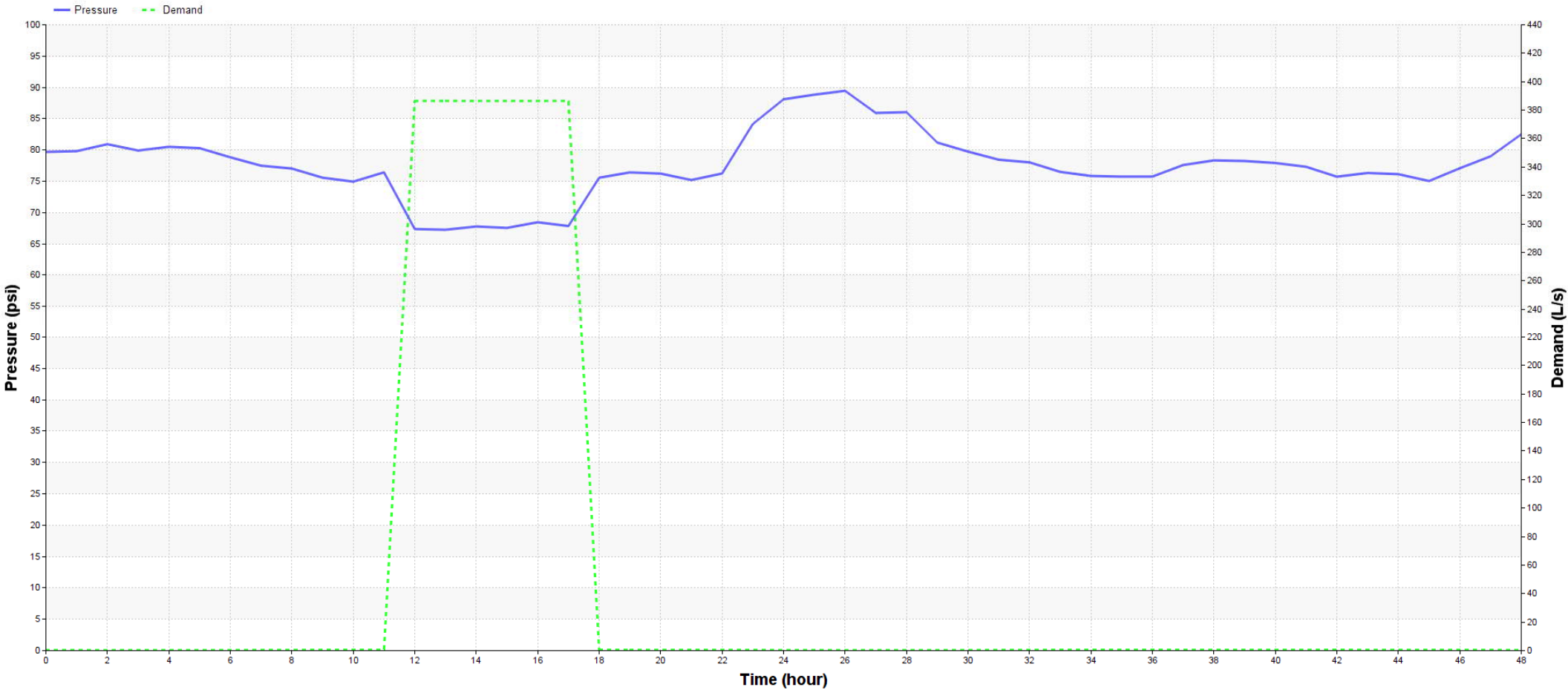
# Fire Flow (386L/s for 6hr) with Option 2A

## Junction 599261



# Fire Flow (386L/s for 6hr) with Option 2B

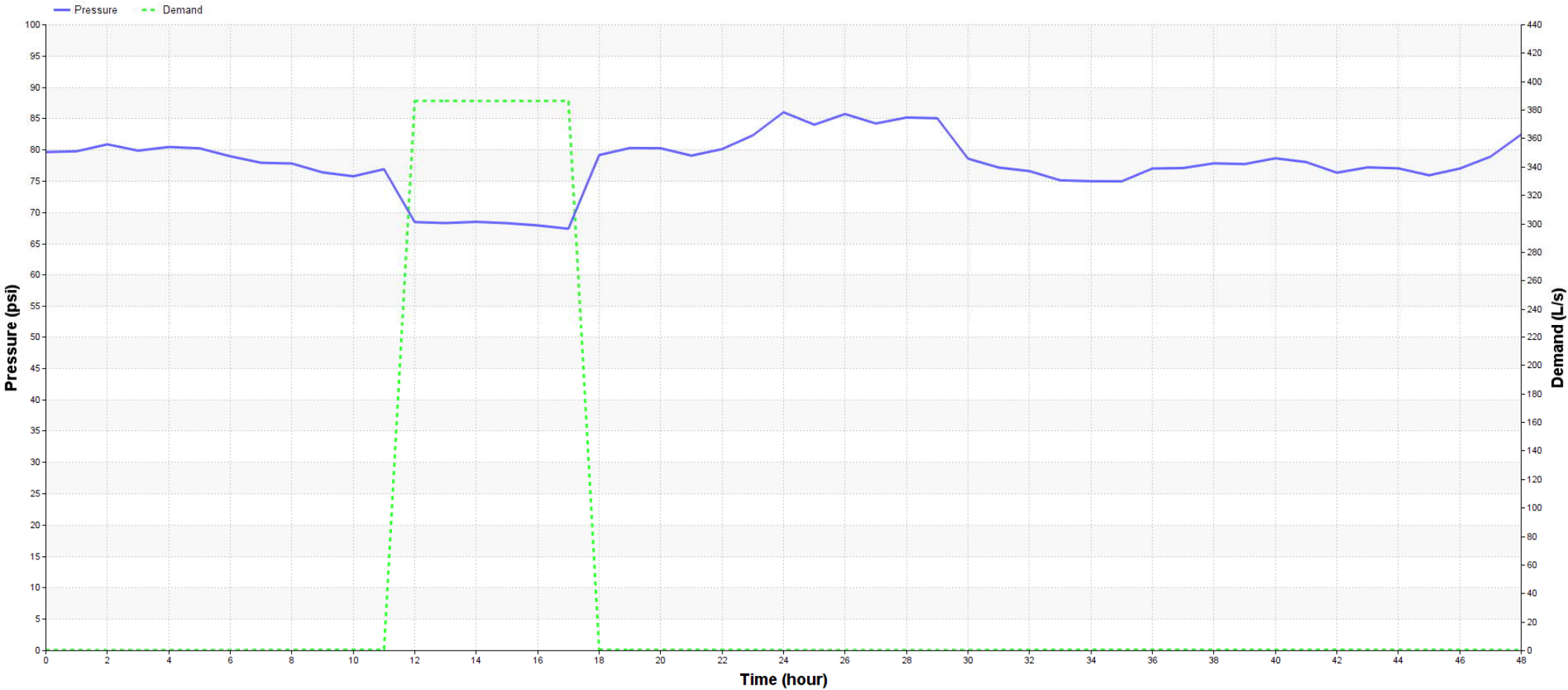
## Junction 599261





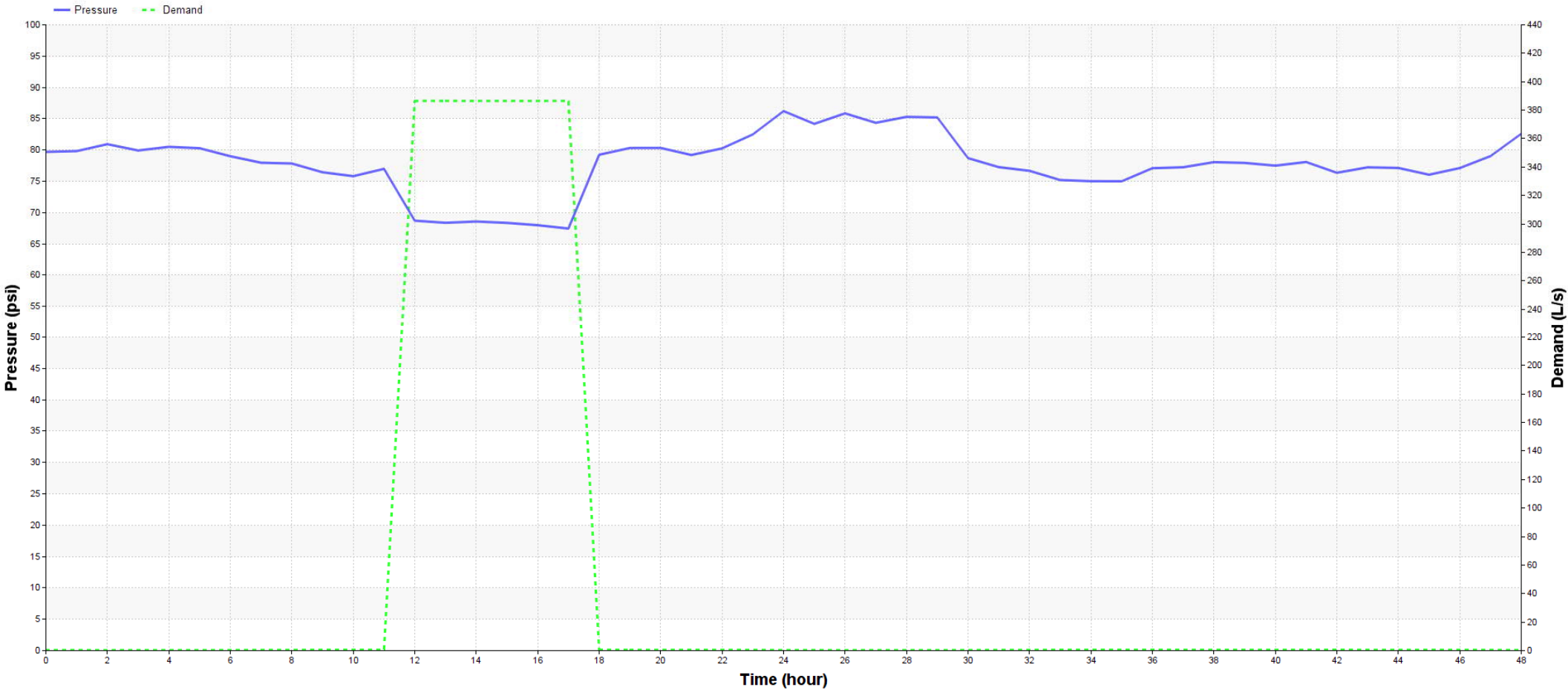
# Fire Flow (386L/s for 6hr) with Option 4B

## Junction 599261



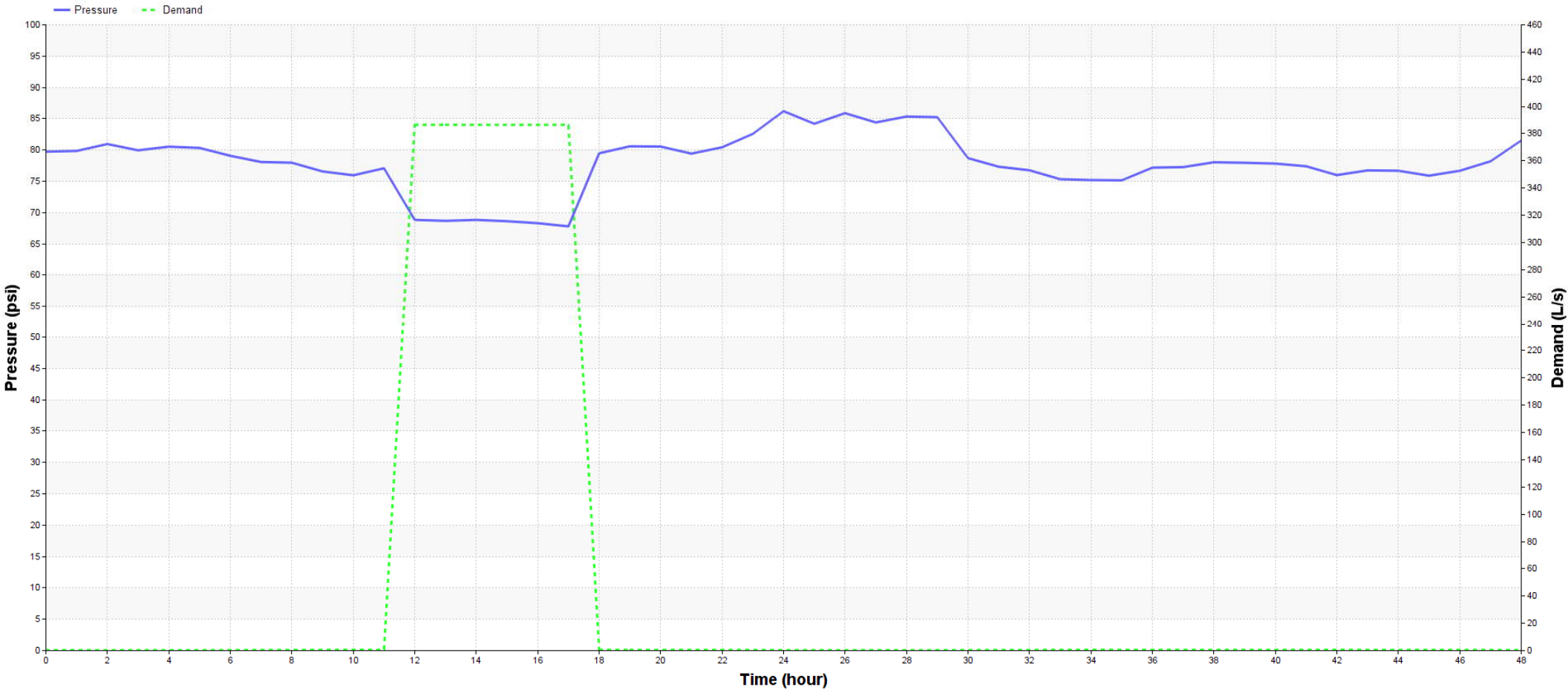
# Fire Flow (386L/s for 6hr) with Option 4B-2

## Junction 599261



# Fire Flow (386L/s for 6hr) with Option 4C

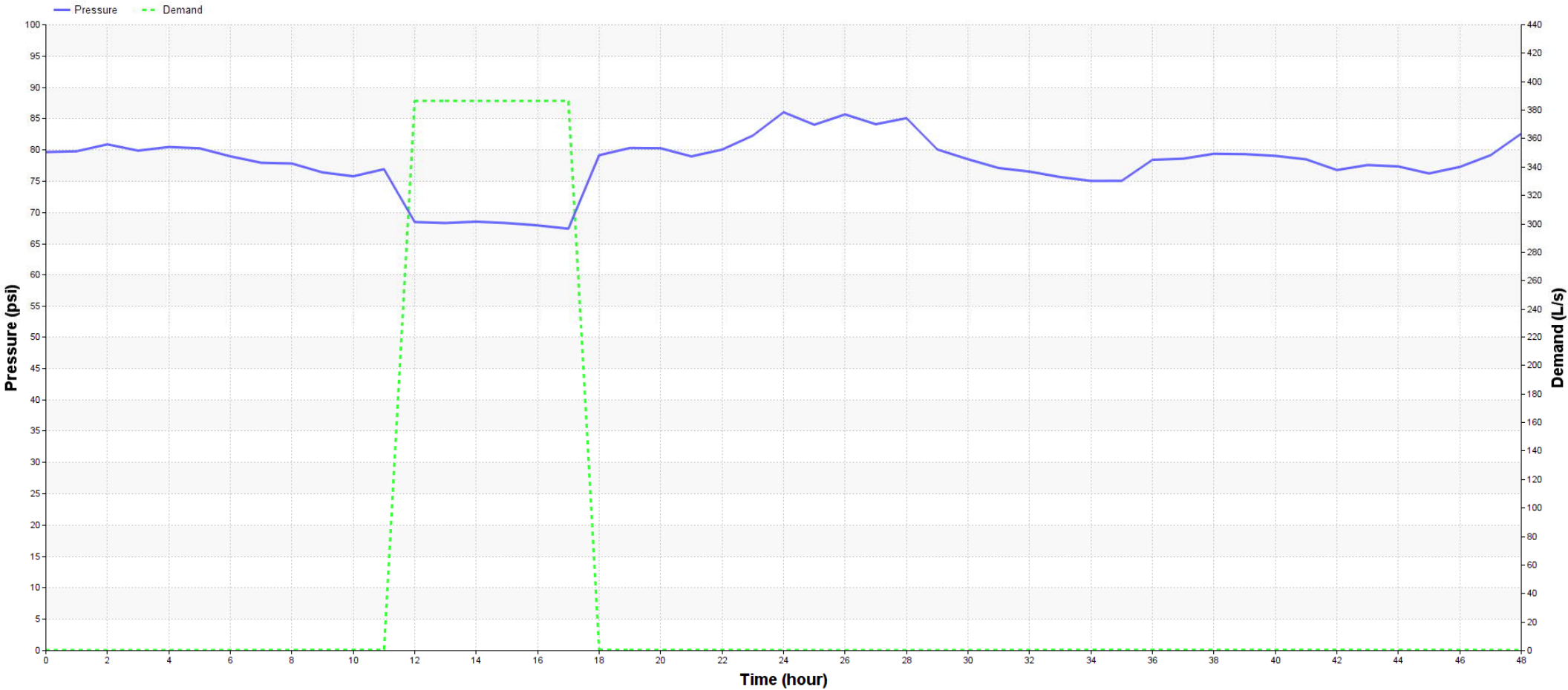
## Junction 599261





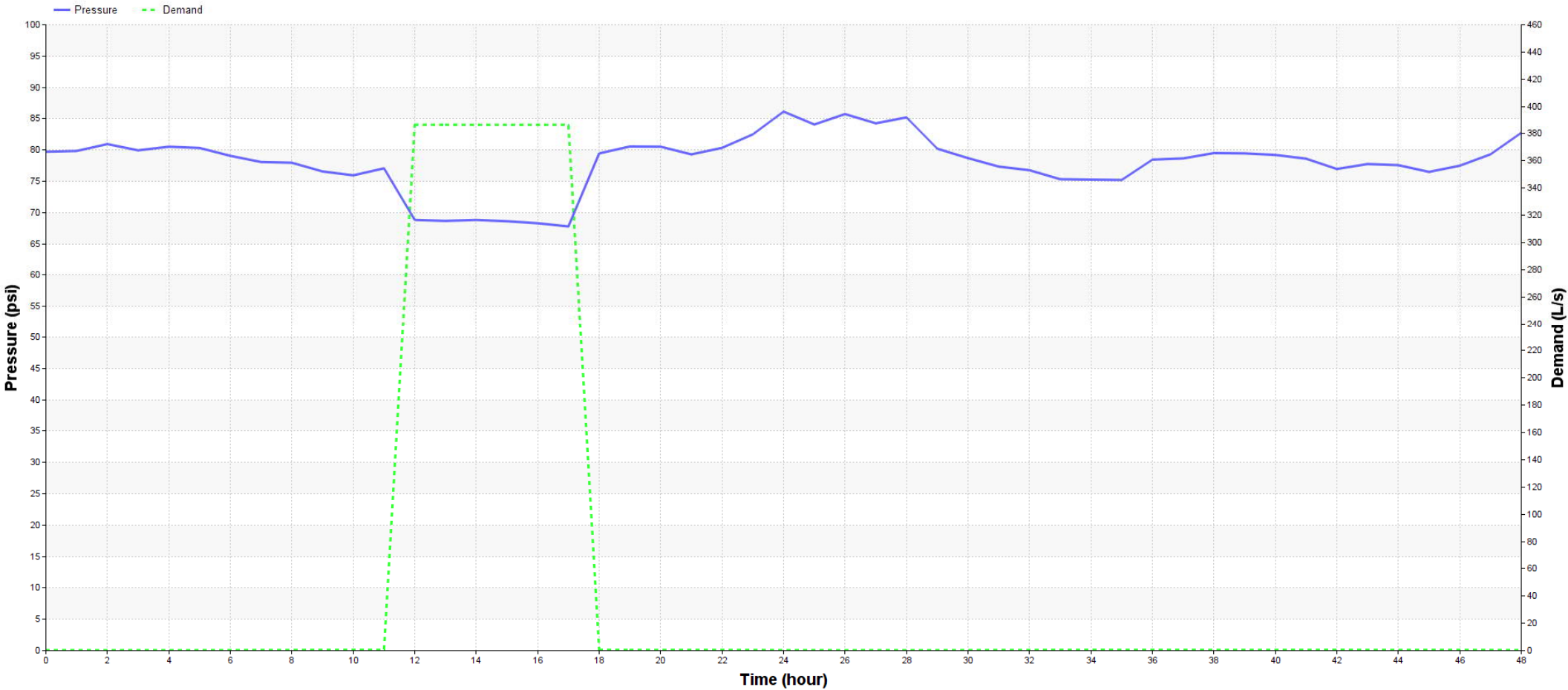
# Fire Flow (386L/s for 6hr) with Option 4D

## Junction 599261



# Fire Flow (386L/s for 6hr) with Option 5

## Junction 599261



## Appendix C: Water Age Analysis Results

# Water Age Analysis Results

2026 Average Day Demand Conditions



# BASE 2021ADD

Table Of Contents

- Layers
  - Water\_Pressure\_Zone
  - Junction
    - AVE\_QUAL
      - less than 50.0000
      - 50.0000 ~ 100.0000
      - 100.0000 ~ 200.0000
      - 200.0000 ~ 300.0000
      - 300.0000 ~ 500.0000
  - Tank
    - TYPE
      - Active
      - Domain
  - Reservoir
    - TYPE
      - Active
      - Domain
  - Pump
    - TYPE
      - Active
      - Domain
  - Valve
    - TYPE
      - Active
      - Domain
  - Pipe
    - TYPE
      - Active
      - Domain
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI
  - Water\_Valve



Model Explorer

BASE2026ADD\_WPKWY

\*Active:Standard Refresh Output

00:00 hrs

JUNCTION: 599261

(ID)	599261
Description	
<input checked="" type="checkbox"/> Geometry	X: 599943.417215656 Y: 4837727.848422100
<input checked="" type="checkbox"/> Modeling	
Existing Demands (lps)	0.2716
Pattern 1	ZONE5
Residential Growth (lps)	0.0000
Pattern 2	RES_SUMMER, From Peel Cal
Employment Growth (lps)	0.0199
Pattern 3	ICI_TYP
GTAA (lps)	0.0000
Pattern 4	
Demand 5 (lps)	0.0000
Pattern 5	
Demand 6 (lps)	0.0000
Pattern 6	
Demand 7 (lps)	0.0000
Pattern 7	
Demand 8 (lps)	0.0000
Pattern 8	
Demand 9 (lps)	0.0000
Pattern 9	
York Supply (lps)	0.0000
Pattern 10	
<input checked="" type="checkbox"/> Information	
Year of Installation	1995
Year of Retirement	9999
Zone	5
Elevation (m)	211.9804
Phase	NORTHPEEL
LOCAL_CHAR	

Attribute Operation

Message Board

MESSAGE: Output Relate 'PRESSURE' Update Succeeded.  
MESSAGE: Output Relate 'DEMAND' Update Succeeded.  
MESSAGE: Output Relate 'VELOCITY' Update Succeeded.  
MESSAGE: Output Relate 'FLOW' Update Succeeded.  
Updating output data... Done.

Message Validation Result



# 2021ADD Option 2A - 750mm

Table Of Contents

- Layers
  - Water\_Pressure\_Zone
  - Junction
    - AVE\_QUAL
      - less than 50.0000
      - 50.0000 ~ 100.0000
      - 100.0000 ~ 200.0000
      - 200.0000 ~ 300.0000
      - 300.0000 ~ 500.0000
  - Tank
    - TYPE
      - Active
      - Domain
  - Reservoir
    - TYPE
      - Active
      - Domain
  - Pump
    - TYPE
      - Active
      - Domain
  - Valve
    - TYPE
      - Active
      - Domain
  - Pipe
    - TYPE
      - Active
      - Domain
    - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI
  - Water\_Valve



Model Explorer

2026ADD\_OPT2A

"Active":Standard Refresh Output

00:00 hrs

PIPE: WM-Z6753388; 16-1199- CAM-RDS\_5-4a

(ID)	WM-Z6753388
Description	16-1199- CAM-RDS_5-4a
<input checked="" type="checkbox"/> Geometry	Reverse
Start Node	J-Z6-8018
End Node	J-Z6-8021
<input checked="" type="checkbox"/> Modeling	
Length (m)	908.8234
Diameter (mm)	750.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
<input checked="" type="checkbox"/> Information	
Year of Installation	2026
Year of Retirement	9999
Zone	5
Material	
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	N
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	
INFRA_STAT	PROPOSED
DC	
SOURCE	GIS2016
MP2018	W-ST-094
FIREFLOW	
ZONEID	
NEW_WM	
FACILITY	

Attribute Operation

Message Board

MESSAGE: Output Relate 'PRESSURE' Update Succeeded.  
MESSAGE: Output Relate 'DEMAND' Update Succeeded.  
MESSAGE: Output Relate 'VELOCITY' Update Succeeded.  
MESSAGE: Output Relate 'FLOW' Update Succeeded.  
Updating output data... Done.

Message Validation Result



# 2021ADD Option 2A - 600mm

Table Of Contents

- Layers
  - Water\_Pressure\_Zone
  - Junction
    - AVE\_QUAL
      - less than 50.0000
      - 50.0000 ~ 100.0000
      - 100.0000 ~ 200.0000
      - 200.0000 ~ 300.0000
      - 300.0000 ~ 500.0000
  - Tank
    - TYPE
      - Active
      - Domain
  - Reservoir
    - TYPE
      - Active
      - Domain
  - Pump
    - TYPE
      - Active
      - Domain
  - Valve
    - TYPE
      - Active
      - Domain
  - Pipe
    - TYPE
      - Active
      - Domain
  - ANNO-1
  - SLSNPPEEL
  - Final\_parcel\_S16\_QSI
  - Water\_Valve



Model Explorer

2026ADD\_OPT2A

Active: Standard Refresh Output

00:00 hrs

JUNCTION: 599261

ID	Description
599943.417215856	X
4837727.848422100	Y
0.2716	Existing Demands (lps)
ZONE5	Pattern 1
0.0000	Residential Growth (lps)
RES_SUMMER, From Peel Call	Pattern 2
0.0199	Employment Growth (lps)
ICI_TYP	Pattern 3
0.0000	GTA (lps)
0.0000	Pattern 4
0.0000	Demand 5 (lps)
0.0000	Pattern 5
0.0000	Demand 6 (lps)
0.0000	Pattern 6
0.0000	Demand 7 (lps)
0.0000	Pattern 7
0.0000	Demand 8 (lps)
0.0000	Pattern 8
0.0000	Demand 9 (lps)
0.0000	Pattern 9
0.0000	York Supply (lps)
0.0000	Pattern 10
1995	Year of Installation
9999	Year of Retirement
5	Zone
211.9804	Elevation (m)
NORTHPEEL	Phase
LOCAL_CHAR	LOCAL_CHAR

Attribute Operation

Message Board

MESSAGE: Output Relate 'PRESSURE' Update Succeeded.  
MESSAGE: Output Relate 'DEMAND' Update Succeeded.  
MESSAGE: Output Relate 'VELOCITY' Update Succeeded.  
MESSAGE: Output Relate 'FLOW' Update Succeeded.  
Updating output data... Done.

Message Validation Result



# 2021ADD Option 4B - 750mm

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

1:20.643 Bentley WaterGEMS Editor Drawing Anal 10 B I U A

Table Of Contents

- Layers
  - Water\_Pressure\_Zone
  - Junction
    - AVE\_QUAL
      - less than 50.0000
      - 50.0000 ~ 100.0000
      - 100.0000 ~ 200.0000
      - 200.0000 ~ 300.0000
      - 300.0000 ~ 500.0000
  - Tank
    - TYPE
    - Active
    - Domain
  - Reservoir
    - TYPE
    - Active
    - Domain
  - Pump
    - TYPE
    - Active
    - Domain
  - Valve
    - TYPE
    - Active
    - Domain
  - Pipe
    - TYPE
    - Active
    - Domain
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI
  - Water\_Valve



Model Explorer

2026ADD\_OPT4B

"Active":Standard Refresh Output

00:00 hrs

PIPE: WM-NEW-6040, 16-1199- CAM-RDS\_5-4a

(ID)	WM-NEW-6040
Description	16-1199- CAM-RDS_5-4a
<input checked="" type="checkbox"/> Geometry	Reverse
Start Node	J-NEW-6021
End Node	597306
<input checked="" type="checkbox"/> Modeling	
Length (m)	95.2094
Diameter (mm)	750.0000
Roughness	130.0000
Minor Loss	0.0000
Totalizer	No
Check Valve	No
<input checked="" type="checkbox"/> Information	
Year of Installation	9999
Year of Retirement	9999
Zone	Option4B
Material	
Lining	
Cost ID	
Phase	0
NORTHPEEL	
LOCAL_WM	N
SCADA_TAG	
GDO_GID	0
NOTES	Pipe_Repl
AECOM_NOTE	
INFRA_STAT	PROPOSED
DC	
SOURCE	GIS2016
MP2018	W-ST-094
FIREFLOW	
ZONEID	
NEW_WM	
FACILITY	

Attribute Operation

Message Board

MESSAGE: Output Relate 'PRESSURE' Update Succeeded.  
MESSAGE: Output Relate 'DEMAND' Update Succeeded.  
MESSAGE: Output Relate 'VELOCITY' Update Succeeded.  
MESSAGE: Output Relate 'FLOW' Update Succeeded.  
Updating output data... Done.

Message Validation Result



# 2021ADD Option 4B – 600mm

Table Of Contents

- Layers
  - Water\_Pressure\_Zone
  - Junction
    - AVE\_QUAL
      - less than 50.0000
      - 50.0000 ~ 100.0000
      - 100.0000 ~ 200.0000
      - 200.0000 ~ 300.0000
      - 300.0000 ~ 500.0000
  - Tank
    - TYPE
      - Active
      - Domain
  - Reservoir
    - TYPE
      - Active
      - Domain
  - Pump
    - TYPE
      - Active
      - Domain
  - Valve
    - TYPE
      - Active
      - Domain
  - Pipe
    - TYPE
      - Active
      - Domain
  - ANNO-1
  - SLSNPEEL
  - Final\_parcel\_S16\_QSI
  - Water\_Valve



Model Explorer

2026ADD\_OPT4B

Active: Standard Refresh Output

00:00 hrs

JUNCTION: 599261

ID	Description
599261	

Geometry

X: 599943.417215856  
Y: 4837727.848422100

Modeling

Existing Demands (lps): 0.2716

Pattern 1: ZONE5

Residential Growth (lps): 0.0000

Pattern 2: RES\_SUMMER, From Peel Call

Employment Growth (lps): 0.0199

Pattern 3: ICI\_TYP

GTA (lps): 0.0000

Pattern 4: Demand 5 (lps): 0.0000

Pattern 5: Demand 6 (lps): 0.0000

Pattern 6: Demand 7 (lps): 0.0000

Pattern 7: Demand 8 (lps): 0.0000

Pattern 8: Demand 9 (lps): 0.0000

Pattern 9: York Supply (lps): 0.0000

Pattern 10: York Supply (lps): 0.0000

Information

Year of Installation: 1995

Year of Retirement: 9999

Zone: 5

Elevation (m): 211.9804

Phase: NORTHPEEL

LOCAL\_CHAR

Attribute	Operation
-----------	-----------

Message Board

MESSAGE: Output Relate 'PRESSURE' Update Succeeded.  
MESSAGE: Output Relate 'DEMAND' Update Succeeded.  
MESSAGE: Output Relate 'VELOCITY' Update Succeeded.  
MESSAGE: Output Relate 'FLOW' Update Succeeded.  
Updating output data... Done.

Message Validation Result

