

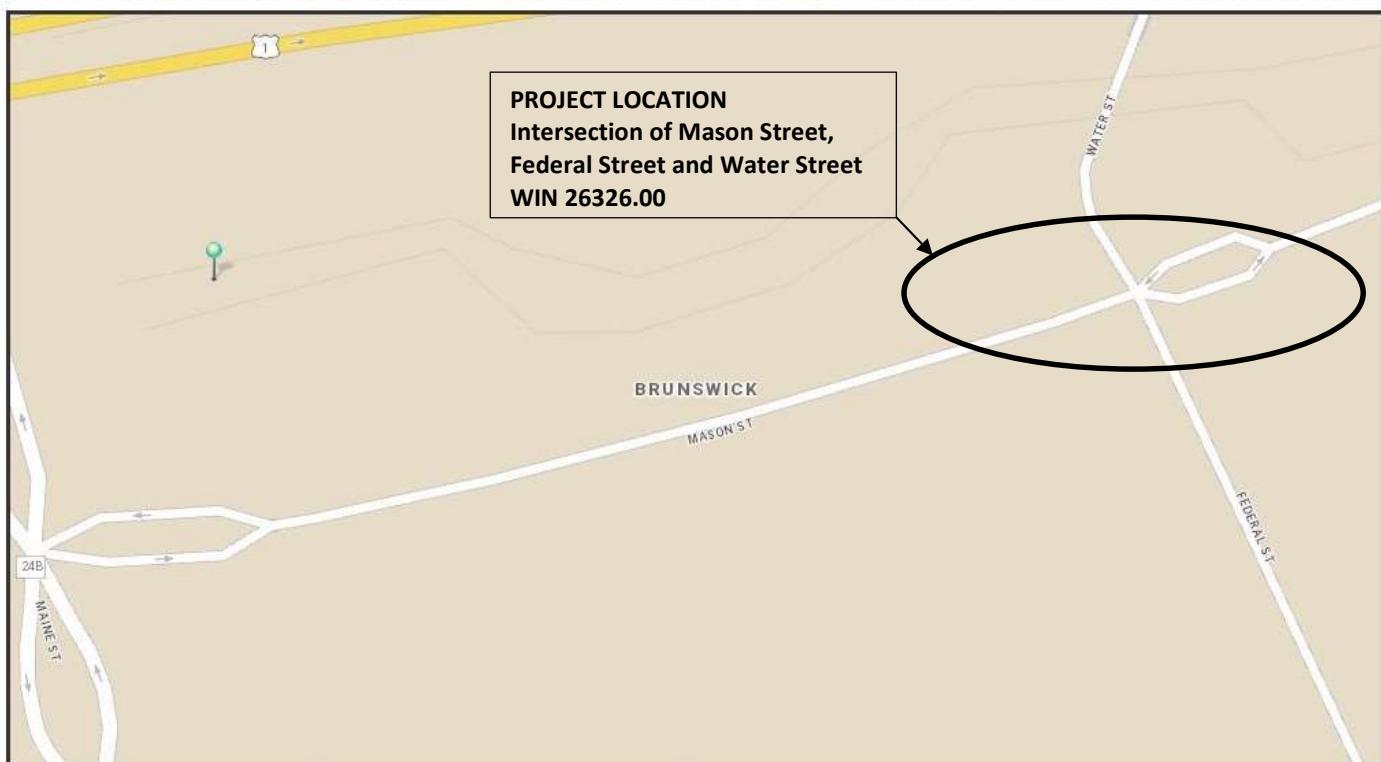
# Preliminary Design Report - Locally Administered Project

Project Name: Intersection of Mason Street, Federal Street & Water Street Draft Distribution Date: 8-22-23  
WIN: 026326.00 Final Distribution Date: 4-19-24

Town: Brunswick	Route:	WIN: 026326.00		
State Project No: 26326.00	Federal Project No: 2632600			
<b>Project Type: Focus Community Project Funding Project (Heads Up Grant)</b>				
<b>Project Location: Intersection of Mason, Federal and Water Streets</b>				
Length: 0.11 miles	BMP: 0.07	Begin Latitude/Longitude: 43.9179/-69.965106		
	EMP: 0.04	End Latitude/Longitude: 43.918076/-69.964354		
Program: Multimodal Program	Program Manager: Jeff Tweedie			
Project Manager: Gerald Dostie	Designer: Kleinfelder: Scott Martin			
FHWA Oversight:	Engineer of Record: Keith Wood			

**LOCATION MAP** Insert map similar to the example below using Google Earth or a similar program. Please label beginning and ending point of a project.

## BRUNSWICK: MASON, FEDERAL AND WATER STREET INTERSECTION



# Preliminary Design Report - Locally Administered Project

**Project Name: Intersection of Mason Street, Federal Street & Water Street** **Draft Distribution Date: 8-22-23**  
**WIN: 026326.00** **Final Distribution Date: 4-19-24**

## PLANNING

### **Project History:**

The Project was identified in the MaineDOT's Heads Up – Pedestrian Safety Action Plan for the Town of Brunswick in March of 2021. The Town of Brunswick submitted a "Focus Community Project Funding" Request in July of 2021. The project was funded in the MaineDOT Three Year Work Plan 2022 Edition. Additional funding was added in the Work Plan 2023 Edition. The Town of Brunswick is locally administering the project.

### **Purpose & Need:**

To improve pedestrian safety and bring sidewalk ramps up to current ADA standards. The existing conditions include substandard turning radii, confusing intersection (3-way stop) and sidewalks that do not meet ADA standards.

### **Brief Summary of Proposed Scope of Work:**

The proposed project consists of pedestrian safety improvements at the intersection of Mason Street, Federal Street and Water Street. The intersection will be converted from a 3-way stop to a 2-way stop with Mason Street free flowing. The sidewalk pedestrian ramps at the intersection crosswalk locations will be upgraded to meet current ADA standards. Sign clutter at the immediate approaches and at the intersection will be reduced by eliminating some signs and by moving other signs.

The Mason Street crosswalk will be relocated easterly, and the plan will provide RRFB's on each side of Mason Street. The RRFB's will be solar powered from a separate solar system mounted to a pole behind the guardrail in the northeast corner of the intersection. The power to the RRFB's will be connected from the solar system to each of the RRFB's via lines installed in conduit. The tight turning radii from Federal Street and Water Street are causing trucks to drive over the existing refuge islands. The existing islands will be removed. The guardrail on the northerly side of the easterly leg of Mason Street will be relocated to accommodate the 5'-6" sidewalk pedestrian ramps and new sidewalk turning the corner at Water Street and will run behind the existing light pole on Mason Street. The light pole will be removed, and the base will be retrofitted with a new breakaway base. Tree clearing is proposed at this northeast corner of Mason and Water Streets (owned by the State of Maine) to improve site distances. The existing refuge islands on Mason Street will be removed.

The Water Street crosswalk will remain in its current location with adjacent sidewalks and ramps being upgraded. The stop bar at Water Street will be relocated closer to the intersection to improve sight distances. The guardrail on both sides of Water Street will require some relocation. The northeasterly corner of Mason and Water Streets (owned by the State of Maine) will be cleared to improve sight distances.

### **Scope changes:**

Remove refuge island on the easterly leg of Mason Street.

## TRAFFIC

# Preliminary Design Report - Locally Administered Project

**Project Name: Intersection of Mason Street, Federal Street & Water Street** **Draft Distribution Date: 8-22-23**  
**WIN: 026326.00** **Final Distribution Date: 4-19-24**

James W. Sewall Company (Sewall) completed a Traffic and Safety Analysis Memo in December of 2022. Based on the accident data and traffic counts the memo recommends elimination of the 3-way stop condition by eliminating the stop sign on the easterly leg of Mason Street allowing Mason Street to be free flowing.

The study also discussed traffic calming measure to enlarge the island and narrow the lanes located on the easterly leg of Mason Street and to narrow the Water Street leg and move the cross walk closer to the intersection. These recommendations could not be accommodated based on the existing substandard turning radii for the design vehicle.

See Appendix A – James W. Sewall Company (Sewall) Traffic and Safety Analysis Dated December 22, 2022.  
*Intersections*

**Design Vehicle (without encroachment): WB-40**

**Design Vehicle (with encroachment): WB-67**

## **Auxiliary Lanes:**

The geometry and curb offsets of all four corners of the intersection will not substantially change as part of this project.

## **Crash Data**

### **Analysis Period:**

2019-2021

### **High Crash Locations (including Critical Rate Factor and number of crashes):**

CFR 2.87 and 14 reported crashes (6 in 2010, 2 in 2020 and 6 in 2021)

## **DESIGN CRITERIA**

### **Basic Design Controls**

	<b>Section 1</b>	<b>Section 2</b>	<b>Section 3</b>	<b>Section 4</b>
	<b>Mason Street (East)</b>	<b>Mason Street (West)</b>	<b>Federal Street</b>	<b>Water Street</b>
<b>Corridor Priority</b>	2	4	4	5
<b>Functional Class</b>	Minor Arterial/Urban Collector	Major/Urban Collector	Major/Urban Collector	Local/Urban
<b>NHS/Non-NHS</b>	Non-NHS	Non-NHS	Non-NHS	Non-NHS
<b>Posted Speed</b>	25 mph	25 mph	25 mph	25 mph
<b>2023 AADT (Current)</b>	4792	8260	6030	2172
<b>20XX AADT (Design)</b>	N/A	N/A	N/A	N/A
<b>DHV</b>	N/A	N/A	N/A	N/A

# Preliminary Design Report - Locally Administered Project

Project Name: Intersection of Mason Street, Federal Street & Water Street   Draft Distribution Date: 8-22-23  
 WIN: 026326.00   Final Distribution Date: 4-19-24

Scope (choices below)	Spot Improvement	Spot Improvement	Spot Improvement	Spot Improvement
(New Construction, Reconstruction, Rehabilitation, Restoration/Resurfacing, Spot Improvement)				

## Controlling Criteria

Element	Required Standard	Required Standard	Required Standard	Required Standard
	Section 1	Section 2	Section 3	Section 4
Design Speed	25 mph (posted speed)			
Lane Width	11'-12'	11'-12'	11'-12'	11'-12'
Shoulder Width	3'-5'	3'-4'	3'-4'	1'-3'
Horizontal Curve Radius	154	154	154	154
Superelevation Rate	4%	4%	4%	4%
Stopping Sight Distance	155	155	155	155
Maximum Grade	8%	8%	8%	8%
Cross Slope (Travelway)	2%	2%	2%	2%
Vertical Clearance	N/A	N/A	N/A	N/A
Clear Zone	10'	10'	10'	10'

## Typical Section

Element	Proposed Value	Proposed Value	Proposed Value	Proposed Value
	Section 1	Section 2	Section 3	Section 4
Lane Width	12' (Match Existing)	N/A Existing	12' & 2-11' (Match Existing)	N/A Existing
Shoulder Width	8'	N/A Existing	N/A Existing	N/A Existing
Cross Slope (Travelway)	2%	N/A Existing	N/A Existing	N/A Existing
Side Slopes*	3:1 or flatter	3:1 or flatter	3:1 or flatter	3:1 or flatter

\*If side slope standards cannot be met, no Design Exception will be required. If not meeting side slope standards results in clear zone standards not being met, a clear zone design exception will be required.

## DESIGN EXCEPTION SUMMARY

No design exceptions are required.

## Controlling Criteria

Element	Required Standard	Proposed Value	Date Approved

# Preliminary Design Report - Locally Administered Project

Project Name: Intersection of Mason Street, Federal Street & Water Street   Draft Distribution Date: 8-22-23  
WIN: 026326.00   Final Distribution Date: 4-19-24

N/A	N/A	N/A	N/A

## Drives and Entrances

Station	Maximum Grade	Grade Change	Date Approved
N/A	N/A	N/A	N/A

## PAVEMENT STRUCTURE

Pavement Assessment Report (Title and Location): NA

Design Review Date: NA

Design Guidance Subgrade Soil Type (1-3): NA

### Pavement Structure Design

Design Method	Design Guidance		DARWin		
	Layer	Thickness	Type	Thickness	Type
Hot Mix Asphalt Pavement	NA	NA	NA	NA	NA
Recycled Layer	NA	NA	NA	NA	NA
Base Course Gravel	NA	NA	NA	NA	NA
Subbase Course Gravel	NA	NA	NA	NA	NA
Shoulder Pavement	NA	NA	NA	NA	NA

Pavement Design Coachpoint Date: NA

### Final Pavement Structure Design

Design Method	Design Guidance	
Layer	Thickness	Type
Hot Mix Asphalt Pavement	N/A	N/A
Recycled Layer	N/A	N/A
Base Course Gravel	N/A	N/A
Subbase Course Gravel	N/A	N/A
Shoulder Pavement	N/A	N/A

### Comments:

The preliminary design consists of a 2' wide cut from face of existing curb to install 24" Aggregate Subbase Course Gravel (ASCG)-Type D and 6" HMA to set proposed granite curb Type 1. The proposed sidewalks will have 2" of HMA over 12" of ASCG-Type D. 6" of HMA over 24" ASCG-Type D is proposed at the trenching location for electrical conduit associated with the installation of RRFB's, and the travel way area were the existing island on the easterly leg of Mason Street will be removed.

# Preliminary Design Report - Locally Administered Project

Project Name: Intersection of Mason Street, Federal Street & Water Street   Draft Distribution Date: 8-22-23  
WIN: 026326.00   Final Distribution Date: 4-19-24

## COMPLETE STREETS COMPLIANCE

A Complete Street provides safe and efficient access to the transportation system to all users. Each element of a Complete Street shall be considered according to the guidelines in the [MaineDOT Complete Streets Policy](#).

### Select the Complete Streets elements incorporated into the project:

**Sidewalks**

The project will include new ADA compliant sidewalks and curb ramps along all 4 corners of the intersection.

**Crosswalks**

The existing crosswalks will be maintained with minor shifts for geometry changes.

**Lighting (street or pedestrian scale)**

**Pedestrian Signals**

Rectangular Rapid Flashing Beacons will be located on each side of the Mason Street at the crosswalk.

**Streetscaping (benches, landscaping, etc.)**

**Shoulder Improvements**

**Bike Lanes/Shared Use Paths**

**Public Transit (bus stops, etc.)**

**Other (explain)**

**Summarize:** The project will include approximately 338 LF sidewalk reconstruction encompassing all four corners of the intersection. The sidewalk on the northeasterly leg of Mason Street will be extended to accommodate the new crosswalk location. Pedestrian safety improvements include moving the Federal Street Crossing Closer to the intersection and installation of RRFB's on both sides of the Mason Street Crossing, and tree clearing in the northeast corner of the intersection to improve site distances. ADA compliant curb ramps will be built on both sides of all crosswalks.

### Select the most applicable reason(s) these elements may not be incorporated into the project:

**Use by pedestrians, bicyclists, and others is prohibited by law.**

**The cost is disproportionate to the need or probable use.**

**Components are outside the scope, due to the nature of the project.**

### **Summarize:**

Additional Complete Street improvements are outside the scope of this project.

# Preliminary Design Report - Locally Administered Project

Project Name: Intersection of Mason Street, Federal Street & Water Street  
WIN: 026326.00

Draft Distribution Date: 8-22-23  
Final Distribution Date: 4-19-24

## ADA COMPLIANCE

Pedestrian facilities shall be upgraded to comply with the [MaineDOT ADA Compliance Policy for Construction and Maintenance](#) and the [Minimum ADA Requirements for Pedestrian Facilities Design Guidance](#).

Select all that apply:

- No pedestrian facilities exist on the project and none will be installed.
- Existing pedestrian facilities will not be upgraded to ADA compliance based on project scope.
- New pedestrian ADA compliant facilities will be installed where none previously existed.
- Existing pedestrian facilities will be upgraded to ADA compliance unless technically infeasible.
- Pedestrian signals will be installed or upgraded if required.

Summarize:

The project will include approximately 338 feet of ADA sidewalk reconstruction. The ADA compliant sidewalks are at the following locations: along the north westerly and northeasterly sides of Mason Street and following around the corners and along Water Street to the pedestrian crosswalk, and along both corners of Federal and Mason Streets. Rectangular Rapid Flashing Beacons are proposed at the crosswalk across the easterly leg of Mason Street.

Pedestrian curb ramps with detectable warning fields on both sides of all three crosswalks will be constructed to meet ADA requirements. Pedestrian ramps will be constructed at the commercial entrance on Water Street.

*If a new or upgraded curb ramp cannot fully comply with the [MaineDOT ADA Compliance Policy for Construction and Maintenance](#) and the [Minimum ADA Requirements for Pedestrian Facilities Design Guidance](#), an [ADA Technical Infeasibility Form](#) must be submitted for approval for each location identified.*

- No technical infeasibility forms are required to be completed at this time.
- Technical infeasibility forms have been submitted as indicated in the table below.

Curb Ramp ID/Location	Reason Full Compliance Infeasible	Date Approved

Summarize:

# Preliminary Design Report - Locally Administered Project

Project Name: Intersection of Mason Street, Federal Street & Water Street   Draft Distribution Date: 8-22-23  
WIN: 026326.00   Final Distribution Date: 4-19-24

## ENVIRONMENTAL COORDINATION

(To be completed by the Environmental Office)

Team Member: LAP State Funded – ENV by Town

Project Scope/Description	Approximately 388 total lineal feet of sidewalk reconstruction along all four corners of the intersection of Mason Street, Federal Street and Water Street. Installation of Rectangular Rapid Flashing Beacons at the Mason Street Crossing. Clearing of the northeast corner of the intersection (MaineDOT owned) to improve site distances.
NEPA Determination	No Federal Action
STIP Date	
Section 106	
Section 4(f)	
Section 6(f)	
Federal Endangered Species	None Identified
State Endangered Species	None Identified
Essential Fish Habitat	Not Applicable:
Fish Passage Design Review	Not Applicable: no instream work
In-Stream Work Window/Other Construction Restrictions	Not Applicable: no instream work
Hazardous Material	No areas identified
Dredge Material	No dredge anticipated
Stormwater/MS4	Not Applicable
DEP/LUPC	No impacts – project is within built urban environment
ACOE	N/A
Mitigation	N/A
Other	N/A

## RIGHT-OF-WAY COORDINATION

Team Member:

	Section 1	Section 2	Section 3	Section 4
Total Existing Width:	Varies	Varies	Varies	Varies
Total Proposed Width:	Same as Existing	Same as Existing	Same as Existing	Same as Existing
<b># of Abutters:</b> 4 (including the State of Maine)				
<b># of Acquisitions:</b> 3 - Temporary Construction Easements				
<b># of Relocations:</b> None				
<b>Building Availability:</b>				
<b>Reserved Limits:</b>				

# Preliminary Design Report - Locally Administered Project

Project Name: Intersection of Mason Street, Federal Street & Water Street   Draft Distribution Date: 8-22-23  
WIN: 026326.00   Final Distribution Date: 4-19-24

---

## UTILITY COORDINATION

---

Utility Coordinator: Michael Barden, Kleinfelder

Above Ground Utilities: Central Maine Power Co., Consolidated Communications, FirstLight Fiber

Below Ground Utilities: Brunswick Sewer, Town of Brunswick, Maine Natural Gas, Brunswick & Topsham Water District

	Necessary for this Project? (Yes or No)	Coordination Still Needed? (Yes or No)
Pole List:	No	No
Utility Agreements:	Yes	Yes
RR PRTS:	No	No
Railroad Agreement:	No	No

ROW issues related to utilities:

None identified.

## GEOTECHNICAL COORDINATION –

---

*(To be completed by the Geotechnical Section)*

Team Member:

Available Soils Information: None

Additional Borings Required? (Y/N) No

Additional Geotechnical Analysis Required? (Y/N) No

Comments by Geotechnical Engineer:

Are foundations for Overhead Sign Structures, Traffic Signals or Lighting Required? (Y/N) Y

(If yes, one boring per foundation is required.)

Install 2- RRFB's. 20" foundations are precast and do not require borings.

## PUBLIC PROCESS

---

Proposed Public Contact Method and Date(s): Public Meeting held at 5:00 PM on November 30, 2023, in the Brunswick Town Hall and virtually.

# Preliminary Design Report - Locally Administered Project

**Project Name: Intersection of Mason Street, Federal Street & Water Street** **Draft Distribution Date: 8-22-23**  
**WIN: 026326.00** **Final Distribution Date: 4-19-24**

**Concerns Identified at Preliminary Public Meeting:** Primary questions and concerns were focused on the scope of the project being limited to pedestrian and ADA improvements. There is local interest in having a signalized intersection or traffic circle, lower speed limit (currently 25 mph), more traffic calming measures and separate bike lanes and signals for bicycles. There appeared to be overall support for the proposed pedestrian improvements presented.

## M&O ISSUES /CONCERNS

There are no known maintenance and operations issues.

## CONSTRUCTION SCHEDULE

<b>PS&amp;E Date</b>	5/28/2025
<b>Advertise Date</b>	6/25/2025
<b>Construction Begin Date</b>	4/16/2026
<b>Construction Complete</b>	8/28/2026

## **TAME RESULTS** (*Transfer results from returned Tame Request Form*)

<b>Morning Restrictions</b>	TBD
<b>Evening Restrictions</b>	TBD
<b>Maximum Closure Length</b>	TBD
<b>Minimum Lane Width</b>	TBD

### **Additional Comments:**

## BUDGET

	Programmed	Available	PDR Estimate
<b>Date</b>	8/24/2022	7/17/2023	7/31/2023
<b>Preliminary Engineering</b>	\$40,000	\$40,000	\$55,000
<b>Right of Way</b>	\$5,000	\$5000	\$5000
<b>Construction</b>	\$84,000	\$84,000	\$265,000
<b>Construction Engineering</b>	\$20,000	\$20,000	\$27,000
<b>Other</b>			
<b>TOTAL</b>	\$149,000	\$149,000	\$352,000
<b>Total Cost per Mile:</b>	N/A	N/A	N/A
<b>Funding Strategy (Sources):</b>	State and Local Funding		

## **SUMMARY OF PRELIMINARY ENGINEERING**

## **Alternatives Analysis**

# Preliminary Design Report - Locally Administered Project

**Project Name: Intersection of Mason Street, Federal Street & Water Street** **Draft Distribution Date: 8-22-23**  
**WIN: 026326.00** **Final Distribution Date: 4-19-24**

*(This may only be applicable to some projects, such as Large Culverts, Rehabilitations, and Roundabouts.)*

## **Design Variances**

*(Discuss design elements that do not meet standard but do not require a formal design exception)*

## **Proposed Design Elements**

*(Discuss existing vs. proposed condition)*

The existing 3-way stop condition will be changed to a 2-way stop condition to help reduce driver confusion. Mason Street will become free flowing.

### **Horizontal Alignment:**

The proposed horizontal alignment will match existing.

### **Vertical Alignment:**

The proposed vertical alignment will not be changed.

### **Typical Section:**

The existing roadway typical within the project limits will not change. The sidewalk reconstruction will be 5.5' wide measured from face of curb. The curb will be Type 1 to match existing. The sidewalk will be 2" of hot mix asphalt and 12" aggregate subbase course gravel.

**Pavement Structure:** The preliminary design is for a 2' wide cut from face of existing curb to remove and replace curb granite curb and construct the sidewalks and pedestrian ramps. HMA will be 6" in shoulder area. Removal of existing island on easterly leg of Mason Street consists of a 2' wide cut around the perimeter of the island and complete removal of the island and 2' of subbase. Replace with 2' aggregate subbase course gravel and 6" HMA. The proposed sidewalks will have a HMA depth of 2" with 12" aggregate subbase course gravel.

### **Drainage/Hydrology:**

There is existing closed roadway drainage within the project area. The existing catch basins on the corners of Mason and Federal Street will be removed. New catch basins will be installed outside of the proposed cross walk on Federal Street. The proposed catch basins will connect to the existing drainage system with 15" RCP. This will help reduce water and eliminate the catch basin grates within the proposed cross walk.

### **Guardrail:**

There is existing guardrail along both sides of Water Street and along the northerly side of the easterly leg of Mason Street. Sections of the guardrail on the easterly side of Water Street will be removed and reset to construct the ADA sidewalk. Sections of guardrail on the westerly side of Water Street will be removed and a new section of 15' radius guardrail (including terminal end) will be installed around the pole at the northerly edge of the paved lot. A section of guardrail on the easterly leg of Mason Street will also be removed and reset to accommodate the sidewalk and ADA pedestrian ramp reconstruction and existing light pole

### **Intersection Geometry:**

# Preliminary Design Report - Locally Administered Project

**Project Name: Intersection of Mason Street, Federal Street & Water Street** **Draft Distribution Date: 8-22-23**  
**WIN: 026326.00** **Final Distribution Date: 4-19-24**

The proposed intersection geometry will be slightly modified along the northeast corner of the intersection to improve the turning radius and to better accommodate the sidewalk reconstruction. Otherwise, new curb on the intersection radii will be placed at roughly the same location and radius as the existing edge of pavement in other locations.

## **Right-of-Way:**

The existing Right-of-Way varies throughout the intersection project limits.

Corners of Mason and Water Streets - The property in the northeasterly corner of Mason and Water Street is owned by the State. All proposed work on this corner and easterly along the northern side of Mason Street is within the ROW. The property in the northwesterly corner of Mason and Water Street is owned by the State and Scott A. Caparratto. The property owner and business at this location is currently using the State-owned property for parking. All proposed work on this corner is within the existing ROW.

Corners of Mason and Federal Street – The property on the Easterly corner of Mason and Federal Streets: proposed work is within the existing ROW. Temporary construction easement may be required for sidewalk removal and to match in lawn. Westerly corner of Mason and Water Streets: Proposed work is within the existing ROW except to remove a stump and to match the walkway in front of the 2-story building on Federal Street. Temporary Construction easement may be required for sidewalk removal/reconstruction, stump removal and to match proposed sidewalk to existing entrance walkway and lawn.

## **Utilities:**

There following utilities are within the project area:

- Aboveground - Central Maine Power, Consolidated Communications, and Firstlight Fiber.
- Underground - Brunswick Sewer District, Maine Natural Gas, and Brunswick & Topsham Water District.

## **Other Design Issues:**

*(Discuss any issues that have been identified but have not yet been resolved.)*

## **DRAFT PDR DISTRIBUTION TEAM COMMENTS AND RESPONSE**

*(Minor edits and corrections can be made to the body of this document above without reference in this section. More significant comments that result in design or other changes should be noted in this section before the Final Distribution.)*

### **Comments:**

Comment Deadline	Date:

## **APPROVALS**

# Preliminary Design Report - Locally Administered Project

Project Name: *Intersection of Mason Street, Federal Street & Water Street* Draft Distribution Date: 8-22-23  
WIN: 026326.00 Final Distribution Date: 4-19-24

## Local Agency Approval

Preliminary Design Report Complete		Date:
LPA certified official		

## MaineDOT Approval

Preliminary Design Report Complete		Date:
------------------------------------	--	-------

*For Large Culvert Projects, Preliminary Design Report Complete also signifies Plan Impacts Complete.*

## APPENDIX



December 22, 2022

Ms. Peggy Duval  
Senior Client Account Manager  
Kleinfelder  
16 Commerce Drive, Suite 2  
Augusta, Maine 04330

**RE: MASON, WATER & FEDERAL STREET TRAFFIC STUDY  
BRUNSWICK**

## INTRODUCTION

As requested, James W. Sewall Company (Sewall) has performed traffic and safety analyses for the intersection of Mason, Water, and Federal Streets in Brunswick, Maine. The intersection is shown in Figure 1. This analysis is being performed as part of a pedestrian and bicycle intersection improvement design.

This analysis will evaluate alternative options for stop control, crosswalk locations and amenities for improvement to pedestrian and bicycle safety crossings. The intersection is currently three-way stop controlled with Mason Street being the free-flowing leg. It is important to note that none of the stop signs have supplemental plaques advising of the 3-way stop condition so this may result in motorist confusion regarding right-of-way. The intersection is a high crash location, based upon 2019 to 2021 data, which will be evaluated later in this memorandum.

The speed limit is unposted on all four legs according to the Maine Department of Transportation's (MaineDOT) Map Viewer but given the urban designation 25 mph is assumed. While Map Viewer indicates Mason Street is unposted there is a 25 mph speed limit sign in the southeast corner at Federal Street. Given observed speeds on Mason Street approaching the Route 1 on ramp this sign was likely placed to try to slow traffic on this approach. There are also 25 mph speed limit signs on Water Street and Federal Street departing the intersection.

## SAFETY ANALYSIS ACCIDENT REVIEW

The Maine Department of Transportation uses two criteria to determine high crash locations (HCLs). The first is the critical rate factor (CRF), which is a measure of the accident rate. A CRF greater than one indicates a location which has a higher than expected crash rate. The expected rate is calculated as a statewide average of similar facilities. The second criterion, which must also be met, is based upon the number of accidents that occur at a particular location. Eight or more accidents must occur over the three-year study period for the location to be considered a high crash location.

The intersection is a high crash location with a CRF of 2.87 and 14 reported crashes over the most recent 3-year period, 2019 to 2021. A collision diagram for the intersection was obtained from MaineDOT, which is attached. This diagram is evaluated as follows:

There were 6 crashes in 2019, 2 in 2020 and 6 in 2021. There was a single rear-end crash on the eastbound Mason Street approach, attributed to following too closely. There was also a single sideswipe on the eastbound Mason Street approach, due to a lane change and failure to yield. There were 10 angle collisions, most involving either Water Street or Federal Street movements colliding with eastbound Mason Street vehicles. Sewall believes many of these collisions may be due to motorist confusion as to who has the right-of-way, given the unusual 3-way stop condition without supplemental advisory plaques on the stop signs. Additionally, there was one pedestrian crash in the Mason Street crosswalk and one bicycle crash in the Federal Street crosswalk. Given that the focus of this study is improvements of bicycle and pedestrian safety, individual police reports were obtained for the pedestrian and bicycle crashes.

The pedestrian accident occurred in the Federal Street crosswalk. The driver did not see the pedestrian crossing and the pedestrian put out their arm to stop the vehicle. The pedestrian was not actually struck by the vehicle but may have had bruising on their hand. The bicycle accident occurred after a bicycle came down Federal Street, then crossed Federal Street in the crosswalk and then crossed Mason Street. The accident was attributed to bicyclist error.

If the 3-way stop is to be retained, then Sewall recommends that the 3 stop signs be equipped with the appropriate advisory plaques to give motorists additional guidance:

- Traffic From Left Does Not Stop
- Traffic From Right Does Not Stop
- Oncoming Traffic Does Not Stop

If the stop control is altered to a different configuration than the current 3-way stop, then it will be important that “New Traffic Pattern Ahead” signs be installed on all four approaches for a period of up to six months.

## TRAFFIC COUNTS

Turning movement/classification counts were performed by Sewall on Tuesday, September 27, 2022 at the intersection during the following peak hour periods:

<u>Count Period</u>	<u>Count Times</u>	<u>Peak Hour</u>
AM	6:30 – 10:00 AM	8:45 – 9:45 AM
Mid-Day	11:00 AM – 2:00 PM	12:00 – 1:00 PM
PM	3:00 – 6:00 PM	3:30 – 4:30 PM

The count records are attached to this memorandum. The late September counts were factored to peak summer conditions, which generally occur in late July or early August in Maine, utilizing MaineDOT Urban Group Mean Factors. This seasonal adjustment factor was 1.035. The existing 2022 volume results are summarized in Figure 2.

## PEDESTRIANS & BICYCLES

Pedestrian and bicycle crossings were recorded during the turning movement counts. That data is summarized below:

<u>Time Period</u>	<u>Water St SB</u>	<u>Mason St WB</u>	<u>Federal St NB</u>	<u>Mason St EB</u>	<u>Total</u>
AM 6:30 – 10:00	7	13	28	21	69
Mid-Day 11:00 – 2:00	3	23	24	7	57
PM 3:00 – 6:00	11	38	34	14	97

As seen above, during the 9 ½ hours of counts, there were 223 crossings or an average of 24 per hour. It is interesting to note that the one approach without crosswalks, Mason Street eastbound, also had a significant number of crossings. Forty-two crossings occurred on this approach with the vast majority being bicycles.

## AUXILIARY TURN LANE WARRANTS

Currently, the Water Street and westbound Mason Street approaches are single lane approaches. The Mason Street approach consists of a dedicated left-turn lane and a through-right lane. The Federal Street approach provides a left-through lane and a right-turn lane. Since the goal of this project is to improve pedestrian and bicycle safety, auxiliary turn lane warrants were reviewed to assure the turn lanes are needed for safety and operational purposes since pedestrian and bicycle safety would be improved with single lane approaches and shorter crossings. Additionally, removal of lanes would reduce conflict points, reducing crash potential at this high crash intersection. The left-turn lane warrant analysis was performed utilizing the warrant charts in NCHRP 457. The results show that the existing left-turn lane on Mason Street is not warranted in 2022 during any of the three peak hour periods, but it is approaching the warrant during the higher volume PM peak hour.

Since there are not warrants for right turn lanes on stop approaches, the need for the Federal Street dedicated right-turn lane will be evaluated based upon the following operational analysis and level of service results.

## TRAFFIC SIGNAL WARRANTS

One of the safest ways to accommodate pedestrians is at signalized intersections equipped with pedestrian signals at crosswalks. Traffic signal warrants are outlined in the “Manual on Uniform Traffic Control Devices, 2009 Edition (MUTCD)”. In order for a traffic signal installation to be justified, it must meet at least one of the warrants outlined in the MUTCD. Meeting a warrant alone does not justify installing a signal since it will introduce additional delays to the intersection.

The MUTCD warrants are as follows:

- Warrant 1, Eight-Hour Vehicular Volume
- Warrant 2, Four-Hour Vehicular Volume
- Warrant 3, Peak Hour
- Warrant 4, Pedestrian Volume
- Warrant 5, School Crossing
- Warrant 6, Coordinated Signal System
- Warrant 7, Crash Experience
- Warrant 8, Roadway Network
- Warrant 9, Intersection Near a Grade Crossing

A quick review of existing volumes was performed to evaluate the volume warrants # 1 – 3. The traffic count results were input to a spreadsheet and compared to the warrant requirements. None were met so signalization based upon volumes is not warranted. Additionally, Warrant 7, Crash Experience, is not met so signalization is currently not an option.

While signalization is not an option, one of the challenges of this intersection is that two adjacent legs are high-volume (Mason Street eastbound and Federal Street) while the remaining two adjacent legs are low volume. Hence, under stop control, there will always be a high-volume leg trying to find sufficient gaps in a high-volume roadway approach(s).

## CAPACITY ANALYSIS

Traffic operations are evaluated in terms of level of service (LOS). Level of service is a qualitative measure that describes operations by letter designation. The levels range from A - very little delay to F - extreme delays. Level of service "D" is generally considered acceptable in urban locations while LOS "E" is generally considered the capacity of a facility and the minimum tolerable level. The level of service for unsignalized intersections is based upon average control delay per vehicle for each minor, opposed movement, as defined in the following table excerpted from the 2010 "Highway Capacity Manual":

<b>Unsignalized Intersection Level of Service</b>	
<u>LOS</u>	<u>Delay Range</u>
A	< = 10.0 seconds
B	> 10.0 and <= 15.0
C	> 15.0 and <= 25.0
D	> 25.0 and <= 35.0
E	> 35.0 and <= 50.0
F	> 50.0

## EXISTING CONDITIONS ANALYSIS

The level of service (LOS) was determined for the unsignalized intersection for existing 2022 volumes under the current 3-way stop control using Synchro and SimTraffic. Additionally, analysis was also performed for the intersection under alternative two-way stop control (Mason Street free-flowing)

and all-way stop control. Since all-way stop control is typically used for single lane approaches, the all-way analysis assumed single lane approaches. The results are provided in the appendix and are summarized in the following tables for the three peak hour analysis periods:

#### Mason Street, Federal Street & Water Street

##### 2022 AM Peak Hour Levels of Service

<u>Approach/Movement</u>	<u>Existing</u> <u>3-Way</u>	<u>Alt.</u> <u>2-Way</u>	<u>Alt.</u> <u>All-Way</u>
Eastbound Mason St Lefts onto Water St	A (0.3)	A (1.6)	--
Eastbound Mason St Thrus/Rights	A (0.9)	A (0.9)	--
Eastbound Mason St Lefts/Thrus/Rights	--	--	A (7.0)
<b>Eastbound Mason St Approach Overall</b>	<b>A (0.8)</b>	<b>A (1.0)</b>	<b>A (7.0)</b>
<b>Westbound Mason St Approach Overall</b>	<b>A (6.5)</b>	<b>A (1.6)</b>	<b>A (5.1)</b>
Northbound Federal St Lefts/Thrus	A (9.7)	A (10.0)	--
Northbound Federal St Rights	A (3.0)	A (3.0)	--
Northbound Federal St Lefts/Thrus/Rights	--	--	A (6.1)
<b>Northbound Federal St Approach Overall</b>	<b>A (7.3)</b>	<b>A (7.5)</b>	<b>A (6.1)</b>
<b>Southbound Water St Approach Overall</b>	<b>A (7.1)</b>	<b>A (7.4)</b>	<b>A (4.6)</b>
<b>Intersection Overall</b>	<b>A (3.9)</b>	<b>A (4.1)</b>	<b>A (6.5)</b>

##### 2022 Mid-Day Peak Hour Levels of Service

<u>Approach/Movement</u>	<u>Existing</u> <u>3-Way</u>	<u>Alt.</u> <u>2-Way</u>	<u>Alt.</u> <u>All-Way</u>
Eastbound Mason St Lefts onto Water St	A (0.3)	A (1.6)	--
Eastbound Mason St Thrus/Rights	A (0.9)	A (0.9)	--
Eastbound Mason St Lefts/Thrus/Rights	--	--	A (7.6)
<b>Eastbound Mason St Approach Overall</b>	<b>A (0.8)</b>	<b>A (1.0)</b>	<b>A (7.6)</b>
<b>Westbound Mason St Approach Overall</b>	<b>B (13.5)</b>	<b>A (3.5)</b>	<b>A (4.9)</b>
Northbound Federal St Lefts/Thrus	A (9.5)	A (9.5)	--
Northbound Federal St Rights	A (3.4)	A (3.4)	--
Northbound Federal St Lefts/Thrus/Rights	--	--	A (6.5)
<b>Northbound Federal St Approach Overall</b>	<b>A (7.0)</b>	<b>A (7.0)</b>	<b>A (6.5)</b>
<b>Southbound Water St Approach Overall</b>	<b>A (6.4)</b>	<b>A (6.4)</b>	<b>A (4.3)</b>
<b>Intersection Overall</b>	<b>A (3.9)</b>	<b>A (3.9)</b>	<b>A (6.9)</b>

<u>Approach/Movement</u>	<b>2022 PM Peak Hour Levels of Service</b>		
	<u>Existing</u> <u>3-Way</u>	<u>Alt.</u> <u>2-Way</u>	<u>Alt.</u> <u>All-Way</u>
Eastbound Mason St Lefts onto Water St	A (0.5)	A (2.0)	--
Eastbound Mason St Thrus/Rights	A (1.3)	A (1.3)	--
Eastbound Mason St Lefts/Thrus/Rights	--	--	C (16.4)
<b>Eastbound Mason St Approach Overall</b>	<b>A (1.2)</b>	<b>A (1.4)</b>	<b>C (16.4)</b>
<b>Westbound Mason St Approach Overall</b>	<b>A (9.9)</b>	<b>A (2.8)</b>	<b>A (6.1)</b>
Northbound Federal St Lefts/Thrus	C (22.6)	C (24.5)	--
Northbound Federal St Rights	A (5.0)	A (4.9)	--
Northbound Federal St Lefts/Thrus/Rights	--	--	B (14.4)
<b>Northbound Federal St Approach Overall</b>	<b>C (15.4)</b>	<b>C (16.4)</b>	<b>B (14.4)</b>
<b>Southbound Water St Approach Overall</b>	<b>B (10.1)</b>	<b>B (10.2)</b>	<b>A (5.6)</b>
<b>Intersection Overall</b>	<b>A (8.0)</b>	<b>A (8.4)</b>	<b>B (14.6)</b>

As seen above, under existing 2022 summer volumes there are no capacity constraints at the intersection under any stop control option. Overall operations and all lanes operate at LOS "A" during both the AM and mid-day peak hours. The greatest volumes and lowest levels of service occur during the PM peak hour. However, all lanes would operate at a good LOS "C" or better under all alternatives.

Since LOS and delay are not the only considerations, 95<sup>th</sup> percentile queues were also evaluated for the three alternatives using Synchro and SimTraffic since the Town expressed concern with any potential back up on Mason Street towards Main Street. The results for 2022 are summarized in the following tables for the three peak hours.

#### **Mason Street, Federal Street & Water Street** **2022 AM Peak Hour 95<sup>th</sup> Percentile Queues**

<u>Approach/Lane</u>	<u>Available</u>	<u>Existing</u>	<u>Alt.</u>	<u>Alt.</u>
	<u>Storage</u>	<u>3-Way</u>	<u>2-Way</u>	<u>All-Way</u>
Eastbound Mason St Lefts onto Water St	--	4'	11'	--
Eastbound Mason St Thrus/Rights	--	8'	8'	--
Eastbound Mason St Lefts/Thrus/Rights	--	--	--	121'

<u>Approach/Lane</u>	<u>Available Storage</u>	<u>Existing 3-Way</u>	<u>Alt. 2-Way</u>	<u>Alt. All-Way</u>
Westbound Mason St Lefts/Thrus/Rights	--	40'	14'	36'
Northbound Federal St Lefts/Thrus	--	98'	98'	--
Northbound Federal St Rights	75'	64'	64'	--
Northbound Federal St Lefts/Thrus/Rights	--	--	--	102'
Southbound Water St Lefts/Thrus/Rights	--	52'	52'	47'

#### 2022 Mid-day Peak Hour 95<sup>th</sup> Percentile Queues

<u>Approach/Lane</u>	<u>Available Storage</u>	<u>Existing 3-Way</u>	<u>Alt. 2-Way</u>	<u>Alt. All-Way</u>
Eastbound Mason St Lefts onto Water St	--	0'	4'	--
Eastbound Mason St Thrus/Rights	--	13'	13'	--
Eastbound Mason St Lefts/Thrus/Rights	--	--	--	126'
Westbound Mason St Lefts/Thrus/Rights	--	17'	7'	16'
Northbound Federal St Lefts/Thrus	--	88'	88'	--
Northbound Federal St Rights	75'	75'	76'	--
Northbound Federal St Lefts/Thrus/Rights	--	--	--	103'
Southbound Water St Lefts/Thrus/Rights	--	42'	42'	38'

#### 2022 PM Peak Hour 95<sup>th</sup> Percentile Queues

<u>Approach/Lane</u>	<u>Available Storage</u>	<u>Existing 3-Way</u>	<u>Alt. 2-Way</u>	<u>Alt. All-Way</u>
Eastbound Mason St Lefts onto Water St	--	0'	14'	--
Eastbound Mason St Thrus/Rights	--	6'	11'	--
Eastbound Mason St Lefts/Thrus/Rights	--	--	--	277'
Westbound Mason St Lefts/Thrus/Rights	--	37'	21'	37'
Northbound Federal St Lefts/Thrus	--	236'	252'	--
Northbound Federal St Rights	75'	115'	115'	--
Northbound Federal St Lefts/Thrus/Rights	--	--	--	234'
Southbound Water St Lefts/Thrus/Rights	--	61'	62'	47'

There are no significant queueing concerns during the AM or mid-day peak hours, under any option, as expected given the LOS "A" results. Again, the PM peak hour has the greatest queues, as expected, based upon the LOS results. The queues on Federal Street are longest for the 3-way and 2-way stop controls and slightly less for the all-way with single lane approaches. The Mason Street queues would be approximately 11 vehicles long during the PM peak hour, which is likely unacceptable given the Town's concern regarding potential backups to Main Street.

Strictly, to provide for pedestrian and bicyclist safety, and to reduce crash potential, Sewall would recommend the All-way stop control based upon the 2022 results, with single lanes on all approaches. But expected traffic growth and potential queue concerns need to also be assessed under future volumes. The longevity of the three alternatives was assessed for a ten-year window by reevaluation under projected 2032 volumes.

## FUTURE CONDITIONS ANALYSIS

### PROJECTED TRAFFIC GROWTH

In order to assure long-term viability of the options, they were reevaluated under projected 2032 volumes. Average annual daily traffic data was obtained from the MaineDOT Interactive Map and "Traffic Volume Counts, 2014 Annual Report", published by MaineDOT. This historical data is summarized in the following table:

<u>Location</u>	<b>Average Annual Daily Traffic</b>					
	<u>2010</u>	<u>2013</u>	<u>2016</u>	<u>2017</u>	<u>2019</u>	
Federal Street, South of Mason Street	5680	5370	5650	---	6930	2.45%
Mason Street, between Maine & Federal	8080	7290	7430	7760	8890	1.11%

As seen above, traffic at the intersection has averaged annual growth of approximately 1.8 % over the period 2010 to 2019. Based upon this historical traffic growth, a 2 % annual traffic growth rate was utilized to project the 2022 intersection volumes to 2032 conditions. These projected 2032 volumes are shown in Figure 3.

## AUXILIARY TURN LANE WARRANTS

Since the goal of this project is to improve pedestrian and bicycle safety, the auxiliary left-turn lane warrant was reassessed for the projected 2032 volumes. The left-turn lane on Mason Street is not warranted by the AM or mid-day peak hour volumes but it is warranted under the projected 2032 PM peak hour volumes. Hence, given the warrant and the Towns' concern with potential Mason Street queuing it is recommended that the dedicated left-turn lane on Mason Street be retained.

## PROJECTED CONDITIONS ANALYSIS

The analysis was repeated for projected 2032 volumes for the three stop control alternatives and the results are summarized as follows:

Mason Street, Federal Street & Water Street 2032 AM Peak Hour Levels of Service			
<u>Approach/Movement</u>	Existing <u>3-Way</u>	Alt. <u>2-Way</u>	Alt. <u>All-Way</u>
Eastbound Mason St Lefts onto Water St	A (0.4)	A (1.8)	--
Eastbound Mason St Thrus/Rights	A (1.2)	A (1.2)	--
Eastbound Mason St Lefts/Thrus/Rights	--	--	A (9.3)
<b>Eastbound Mason St Approach Overall</b>	<b>A (1.1)</b>	<b>A (1.3)</b>	<b>A (9.3)</b>
<b>Westbound Mason St Approach Overall</b>	<b>A (7.7)</b>	<b>A (1.4)</b>	<b>A (5.9)</b>
Northbound Federal St Lefts/Thrus	B (12.3)	B (12.6)	--
Northbound Federal St Rights	A (3.5)	A (3.5)	--
Northbound Federal St Lefts/Thrus/Rights	--	--	A (7.5)
<b>Northbound Federal St Approach Overall</b>	<b>A (9.3)</b>	<b>A (9.5)</b>	<b>A (7.5)</b>
<b>Southbound Water St Approach Overall</b>	<b>A (8.4)</b>	<b>A (8.4)</b>	<b>A (5.0)</b>
<b>Intersection Overall</b>	<b>A (4.8)</b>	<b>A (4.9)</b>	<b>A (8.2)</b>

### 2032 Mid-Day Peak Hour Levels of Service

<u>Approach/Movement</u>	Existing <u>3-Way</u>	Alt. <u>2-Way</u>	Alt. <u>All-Way</u>
Eastbound Mason St Lefts onto Water St	A (0.4)	A (1.8)	--
Eastbound Mason St Thrus/Rights	A (1.1)	A (1.1)	--
Eastbound Mason St Lefts/Thrus/Rights	--	--	A (9.2)
<b>Eastbound Mason St Approach Overall</b>	<b>A (1.0)</b>	<b>A (1.2)</b>	<b>A (9.2)</b>
<b>Westbound Mason St Approach Overall</b>	<b>A (8.6)</b>	<b>A (3.0)</b>	<b>A (4.6)</b>
Northbound Federal St Lefts/Thrus	B (13.2)	B (13.4)	--
Northbound Federal St Rights	A (4.0)	A (4.0)	--
Northbound Federal St Lefts/Thrus/Rights	--	--	A (8.1)
<b>Northbound Federal St Approach Overall</b>	<b>A (9.6)</b>	<b>A (9.7)</b>	<b>A (8.1)</b>
<b>Southbound Water St Approach Overall</b>	<b>A (8.2)</b>	<b>A (8.3)</b>	<b>A (5.0)</b>
<b>Intersection Overall</b>	<b>A (5.1)</b>	<b>A (5.3)</b>	<b>A (8.4)</b>

### 2032 PM Peak Hour Levels of Service

<u>Approach/Movement</u>	Existing <u>3-Way</u>	Alt. <u>2-Way</u>	Alt. <u>All-Way</u>
Eastbound Mason St Lefts onto Water St	A (0.7)	A (2.2)	--
Eastbound Mason St Thrus/Rights	A (1.7)	A (1.7)	--
Eastbound Mason St Lefts/Thrus/Rights	--	--	F (66.1)
<b>Eastbound Mason St Approach Overall</b>	<b>A (1.6)</b>	<b>A (1.8)</b>	<b>F (66.1)</b>
<b>Westbound Mason St Approach Overall</b>	<b>B (12.4)</b>	<b>A (4.2)</b>	<b>A (6.4)</b>
Northbound Federal St Lefts/Thrus	F (92.0)	F (90.9)	--
Northbound Federal St Rights	A (7.5)	A (7.6)	--
Northbound Federal St Lefts/Thrus/Rights	--	--	F (56.8)
<b>Northbound Federal St Approach Overall</b>	<b>F (57.8)</b>	<b>F (56.9)</b>	<b>F (56.8)</b>
<b>Southbound Water St Approach Overall</b>	<b>C (16.4)</b>	<b>C (17.1)</b>	<b>A (6.6)</b>
<b>Intersection Overall</b>	<b>D (26.1)</b>	<b>D (25.7)</b>	<b>F (56.8)</b>

As seen in the preceding tables, there are no LOS concerns during either the AM or mid-day peak hours under any alternative for projected 2032 volumes. There are LOS concerns with all three alternatives during the higher volume PM peak hour. Given these results, the PM peak hour is the critical period. The PM peak hour results will be the focus of the remainder of this study and will govern the recommendations.

Under the two-way and the existing 3-way stop control, the Federal Street approach is expected to fail with long delays projected for the left-through movement. Under all-way stop, both Mason Street and Federal Street are projected to operate at LOS "F". Based upon the LOS results, the all-way stop option is not a long-term solution to improve pedestrian safety given that Mason Street eastbound has a poor vehicular LOS as well as previously cited queueing concerns.

## PROJECTED QUEUES

Projected 95<sup>th</sup> percentile queues for 2032 volumes are presented in the following tables:

### Mason Street, Federal Street & Water Street 2032 AM Peak Hour 95<sup>th</sup> Percentile Queues

Approach/Lane	Available Storage	Existing 3-Way	Alt. 2-Way	Alt. All-Way
Eastbound Mason St Lefts onto Water St	--	6'	13'	--
Eastbound Mason St Thrus/Rights	--	30'	33'	--
Eastbound Mason St Lefts/Thrus/Rights	--	--	--	169'
Westbound Mason St Lefts/Thrus/Rights	--	40'	17'	43'
Northbound Federal St Lefts/Thrus	--	136'	130'	--
Northbound Federal St Rights	75'	85'	88'	--
Northbound Federal St Lefts/Thrus/Rights	--	--	--	119'
Southbound Water St Lefts/Thrus/Rights	--	54'	54'	52'



### 2032 Mid-day Peak Hour 95<sup>th</sup> Percentile Queues

<u>Approach/Lane</u>	<u>Available Storage</u>	<u>Existing 3-Way</u>	<u>Alt. 2-Way</u>	<u>Alt. All-Way</u>
Eastbound Mason St Lefts onto Water St	--	0'	7'	--
Eastbound Mason St Thrus/Rights	--	19'	18'	--
Eastbound Mason St Lefts/Thrus/Rights	--	--	--	162'
Westbound Mason St Lefts/Thrus/Rights	--	21'	11'	18'
Northbound Federal St Lefts/Thrus	--	131'	135'	--
Northbound Federal St Rights	75'	91'	92'	--
Northbound Federal St Lefts/Thrus/Rights	--	--	--	131'
Southbound Water St Lefts/Thrus/Rights	--	48'	49'	46'

### 2032 PM Peak Hour 95<sup>th</sup> Percentile Queues

<u>Approach/Lane</u>	<u>Available Storage</u>	<u>Existing 3-Way</u>	<u>Alt. 2-Way</u>	<u>Alt. All-Way</u>
Eastbound Mason St Lefts onto Water St	--	3'	18'	--
Eastbound Mason St Thrus/Rights	--	13'	12'	--
Eastbound Mason St Lefts/Thrus/Rights	--	--	--	524'
Westbound Mason St Lefts/Thrus/Rights	--	42'	24'	41'
Northbound Federal St Lefts/Thrus	--	652'	637'	--
Northbound Federal St Rights	75'	121'	120'	--
Northbound Federal St Lefts/Thrus/Rights	--	--	--	635'
Southbound Water St Lefts/Thrus/Rights	--	90'	92'	58'

Indicative of the LOS results, there are no queue concerns for any alternative during the AM and mid-day peak hours. As expected, the all-way stop is not an option for projected future volumes given the Mason Street queueing, extending to beyond Main Street during the PM peak hour. Based upon the analysis results, the most feasible alternatives are either the existing 3-way stop condition or an alternative two-way stop.

The LOS and queues for the options for the critical PM peak hour volumes are summarized graphically in Figures 4 through 6. A review of these diagrams for the 2-way and 3-way stop options shows the only concern is the delay and queuing on Federal Street. There is on-street parking on Federal Street that could be eliminated to extend the existing right-turn lane in the future. This lane currently provides approximately 75' of storage. Sewall reran the 2032 volumes evaluating potential lengthening of the right-turn lane on Federal Street. Increased right-turn lengths of 150', 200', 300' and 400' were evaluated to see if the overall queues on Federal Street could be reduced. None of these options reduced the projected Federal Street queue significantly demonstrating that the delay and associated queuing are due to the high number of left turns trying to find gaps in the Mason Street stream. Hence, other options for improvement may be necessary in ten years if the historical traffic growth rate, utilized for the analysis, is sustained.

While the intersection of Maine Street and Mason Street was not included in this study, it was noted that Mason Street safety could be improved with a single lane from Maine Street, going into a left-turn pocket at Water Street. Currently, there are dual left-turn lanes from Main Street and then vehicles may need to change lanes to enter the appropriate lane prior to the Water/Federal Street intersection, in a short distance (less than 250'). One of the crashes on the Mason Street approach was a sideswipe type crash due to a sudden lane change, from the left-turn lane to the through-right lane. This crash would likely not have occurred if all traffic turned into a single lane on Mason Street and then left-turns entered a left-turn pocket.

TY Lin studied several alternatives for MaineDOT in the “Brunswick Maine Street Bridge Feasibility Study - Alternative Evaluation”. This study was completed in December of 2019. The preferred alternative signalizes the intersection of Maine Street and Mason Street. As part of that design process, when the project is funded, it is recommended that MaineDOT evaluate the feasibility of a single-left turn lane on Maine Street. Without turning volume information and analysis of that intersection, it is impossible to determine if a single lane on Mason Street, near Maine Street, is feasible or not.



## SUMMARY AND RECOMMENDATIONS

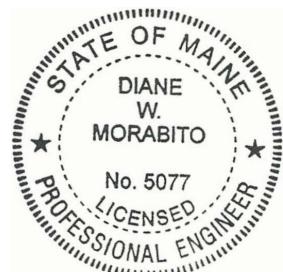
To summarize, turning movement counts were conducted at the intersection during the AM, mid-day and PM peak hour periods. Analysis was performed for the existing 2022 and projected 2032 volumes for all three periods for existing and alternative stop control options since signalization is not warranted. There are no LOS concerns or queue concerns during the AM or mid-day peak hours. The only period of concern is the PM peak hour period so it will govern the recommendations.

Based upon the PM peak hour results for both existing 2022 volumes and projected 2032 volumes, Sewall recommends:

- The intersection be converted to traditional two-way stop with Mason Street free-flowing. This will give motorists clarity as to right-of-way and is expected to reduce the number of crashes that are currently occurring. With a change to two-way stop, “New Traffic Pattern Ahead” signs should be installed for up to six months on all four approaches.
- The crosswalk across Mason Street should remain in its current location since it is only crossing two single lanes, versus the eastbound approach with three-lanes. With Mason Street free-flowing, installation of Rectangular Rapid Flash Beacons (RRFB’s) at the Mason Street crosswalk is recommended to increase attention and visibility.
- Additionally, given observed Mason Street eastbound speeds additional traffic calming on that approach is recommended prior to the intersection. The 25 mph Speed Limit sign could be relocated further west, prior to the intersection. A flashing LED border or a speed feedback sign is recommended on the sign to call greater attention to the sign and speed limit.
- There is some signage clutter in the southeast corner of the intersection. As above, it is recommended that the 25-mph sign be relocated closer to Main Street. The two-way flow sign could be relocated a little closer to Route 1 given that centerline is clearly marked with a double yellow centerline and there is an island separating the flows. With these signs relocated away from the intersection, the only sign at the crosswalk will be the pedestrian crossing signs with RRFBs, eliminating all competing signage.

- Based upon Google Earth, the travel way for the eastbound leg, for traffic heading towards Route 1, is approximately 20' wide. This excessive width may be encouraging faster speeds. It is recommended that a larger (longer and wider) island be provided at the crosswalk, reducing the travel way width, to provide greater pedestrian refuge and to slow eastbound Mason Street vehicles.
- Squaring up and reducing the width of the Water Street approach using a curbed bump out or pavement markings is also recommended. Currently, the width of this opening is over 60' for just two lanes. This is likely why the Water Street crosswalk was set back from the intersection, to reduce the crossing distance. By reducing the opening width this crosswalk could be relocated to the immediate intersection for improved visibility and safety.
- A single lane should be considered on Mason Street, from Maine Street, going into a left-turn pocket prior to Federal/Water Streets, if it is determined to be feasible, to reduce the current dual left-turn lanes on Maine Street to a single left-turn lane.

Let me know if you or the Town of Brunswick have any questions or concerns regarding the count results, the analysis or our recommendations.

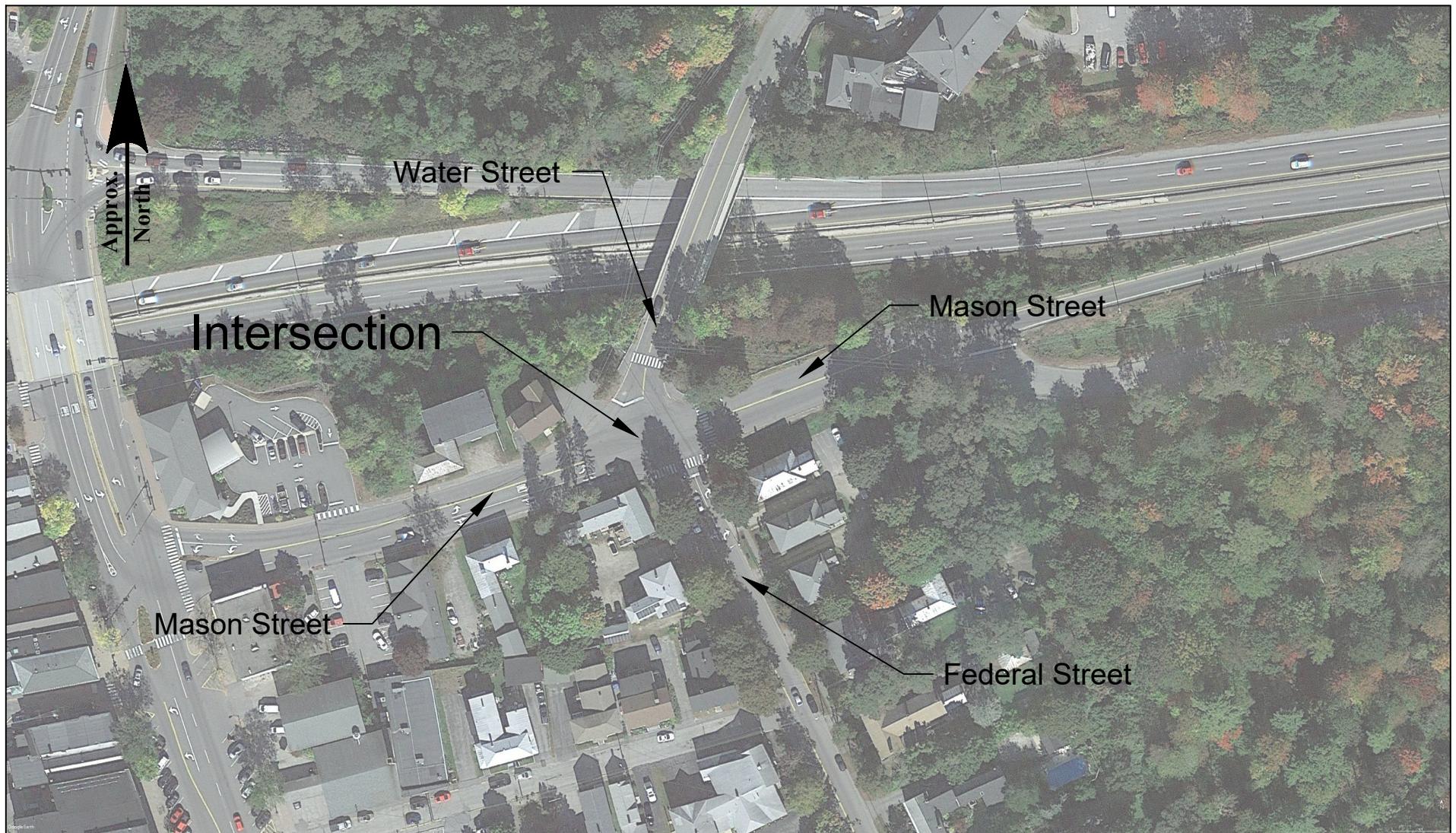


Sincerely,



Diane W. Morabito, P.E. PTOE  
Vice President Traffic Engineering





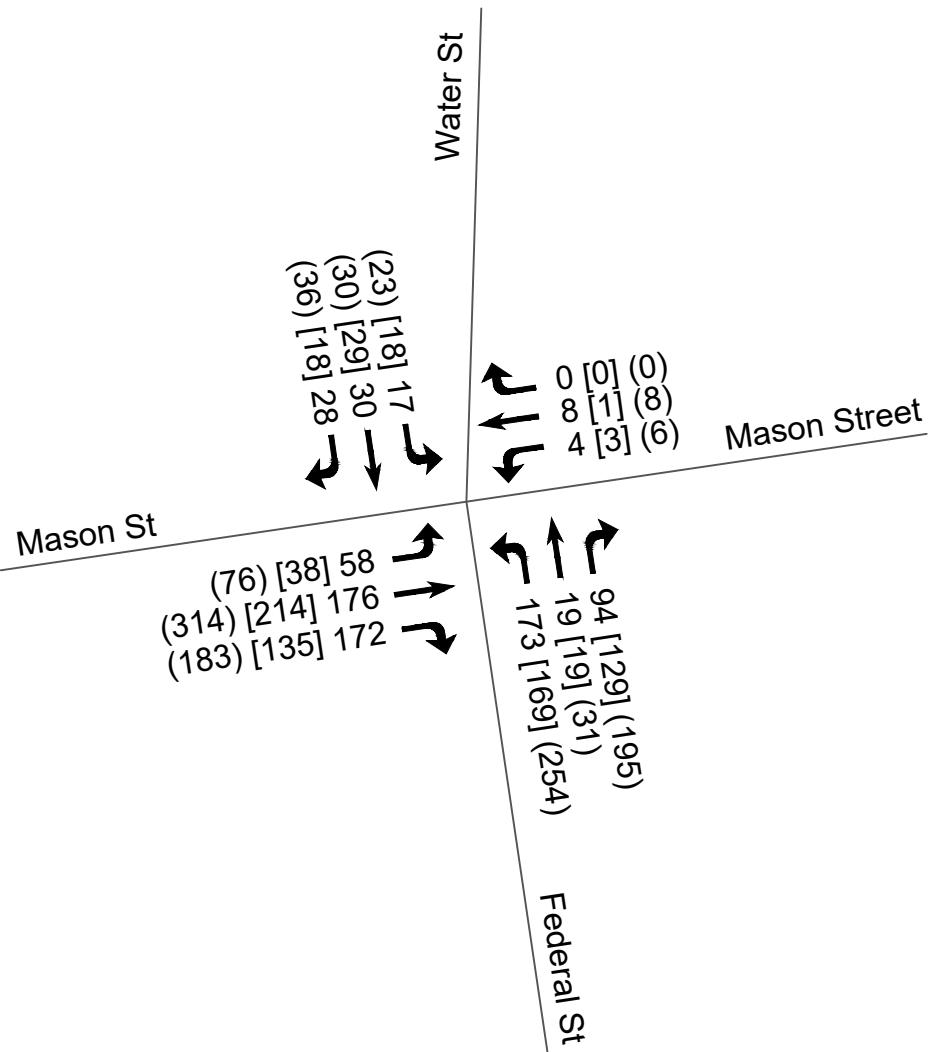
**Figure 1**  
**Site Location Map**  
**Mason, Federal, & Water Street**  
**Brunswick, Maine**

**Sewall**  
The evolution of expertise  
A TFC Company

Approx.  
North

-- AM Peak Hour  
[--] Midday Peak Hour  
(--) PM Peak Hour

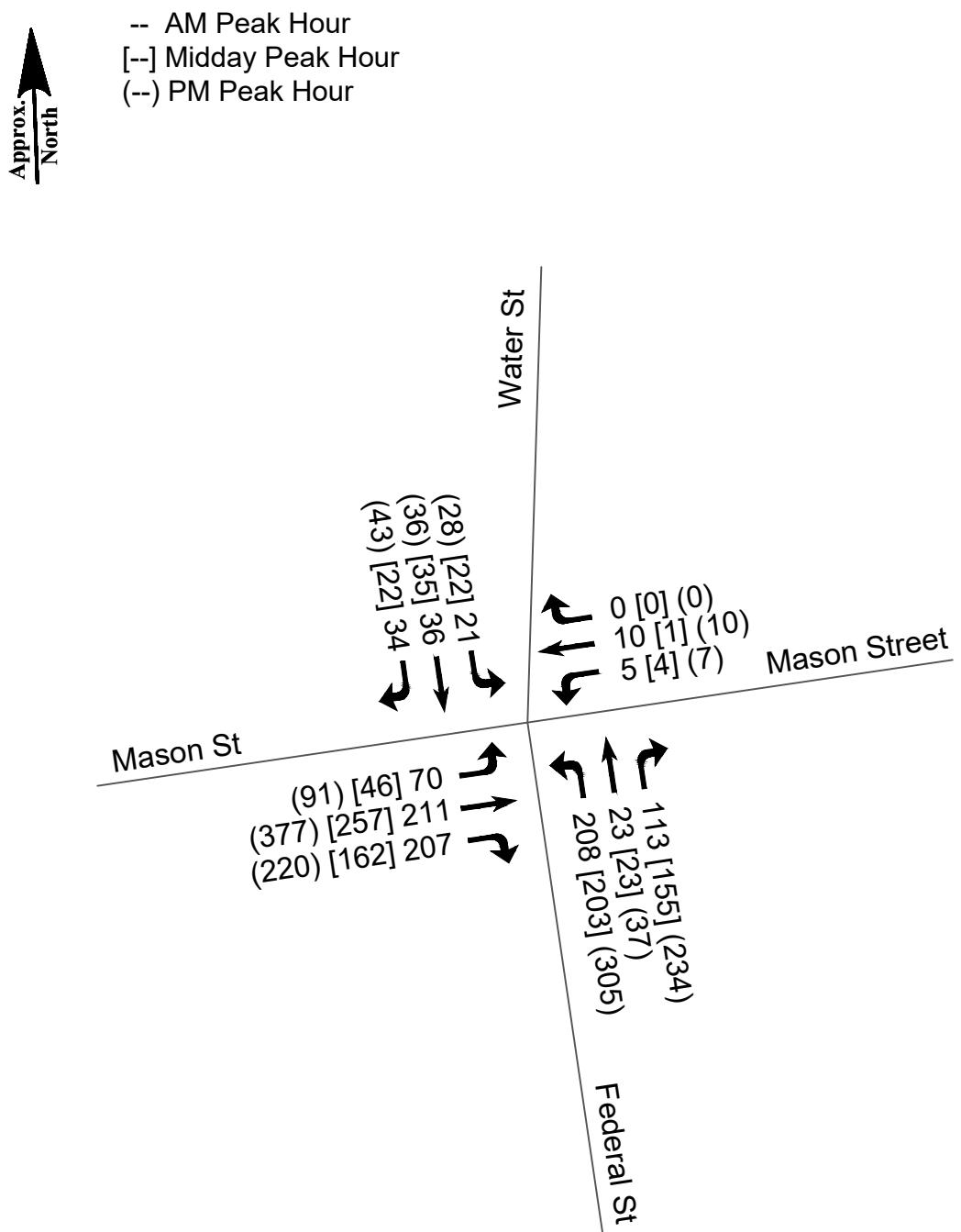
AM Peak Hour: 8:45-9:45 AM  
[Midday Peak Hour: 12:00-1:00 PM]  
(PM Peak Hour: 3:30-4:30 PM)



**Figure 2**

**2022 Existing Peak Hour Volumes**  
**Mason, Federal, & Water Street**  
**Brunswick, Maine**

**Sewall**  
The evolution of expertise  
AFC Company



**Figure 3**

**2032 Projected Peak Hour Volumes**  
**Mason, Federal, & Water Street**  
**Brunswick, Maine**

**Sewa**   
*The evolution of expertise*  
ATPC Company



**Figure 4**

**3-Way Stop: PM LOS & 95th Percentile Queues**

**Mason, Federal, & Water Street**

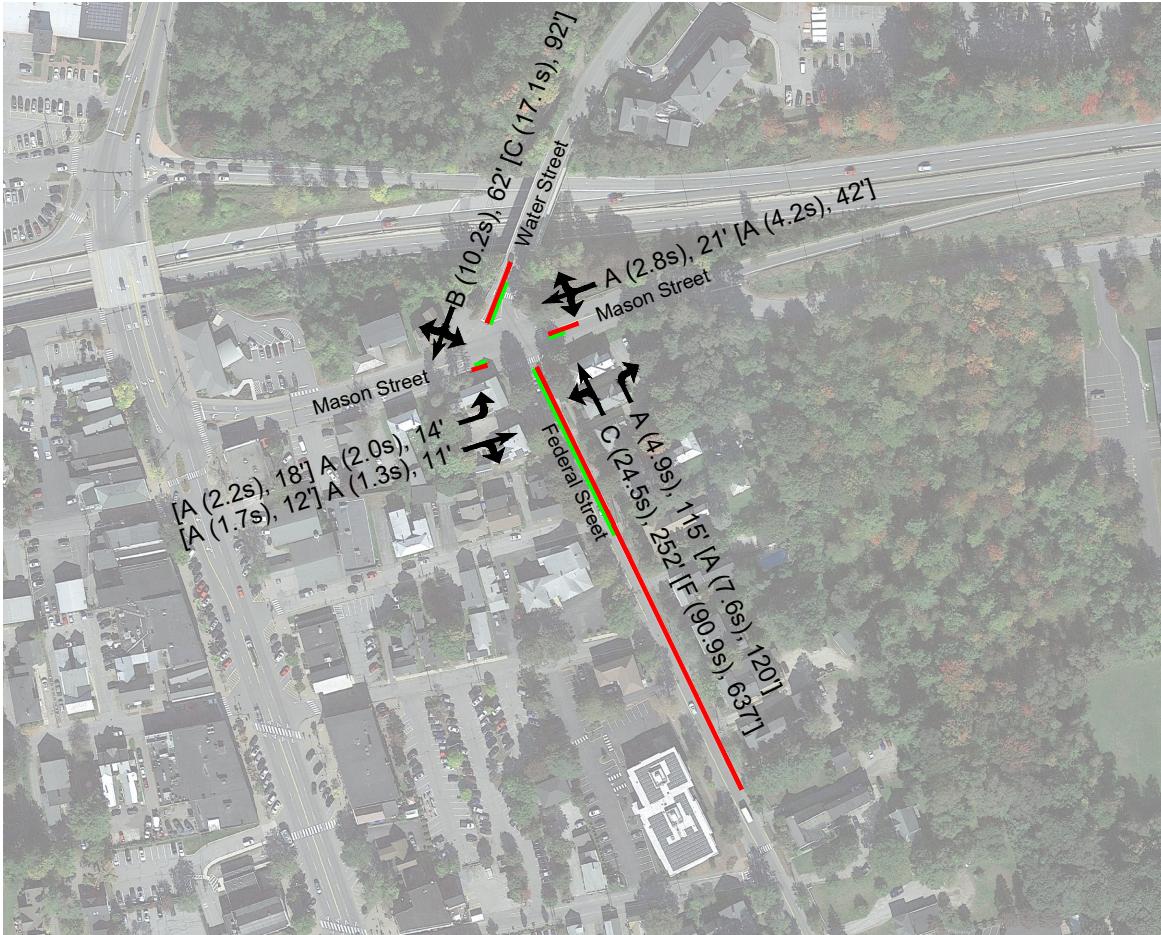
**Brunswick, Maine**

**Sewall**  
The evolution of expertise  
A TFC Company

Approx.  
North

— 2022 95th Percentile Queue  
— 2032 95th Percentile Queue

-- 2022  
[-] 2032



**Figure 5**

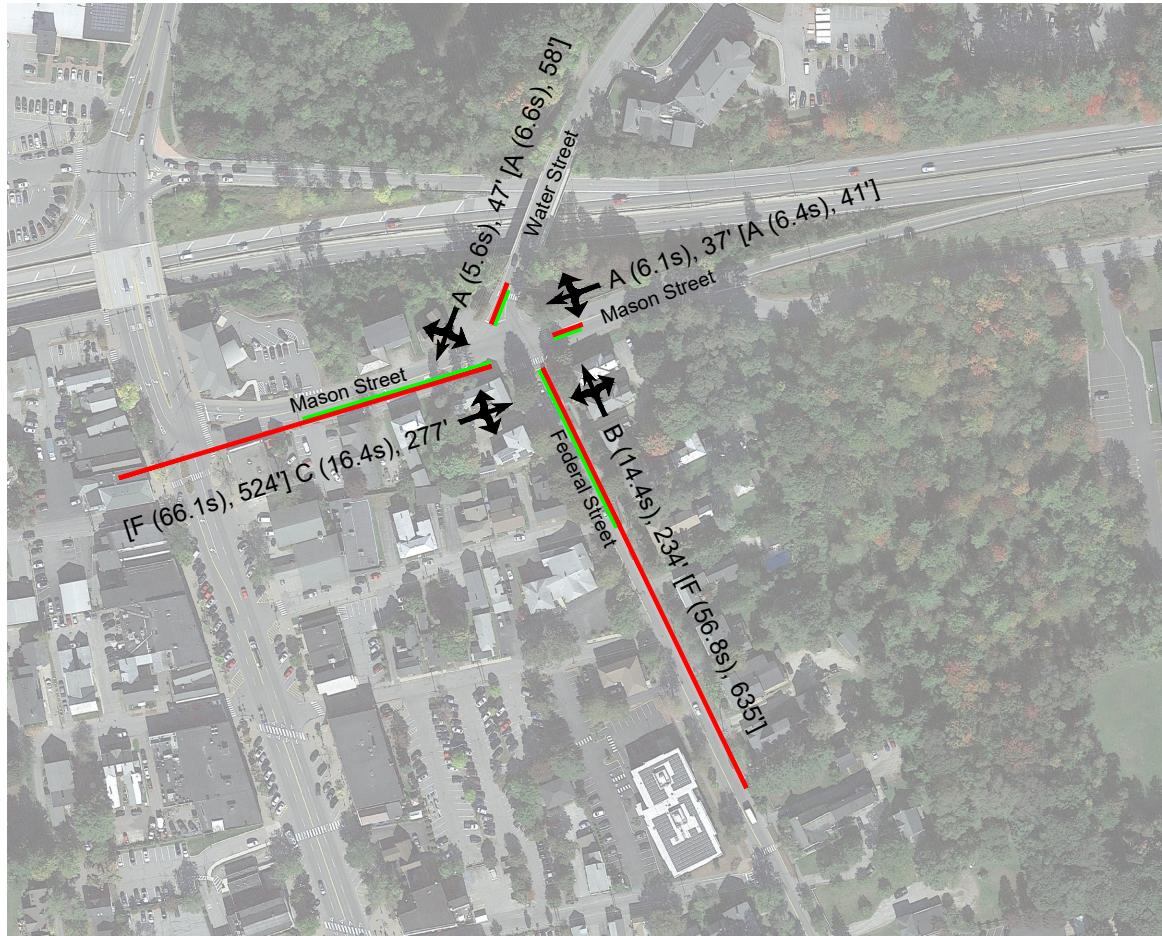
**2-Way Stop: PM LOS & 95th Percentile Queues**  
**Mason, Federal, & Water Street**  
**Brunswick, Maine**

**Sewall**  
The evolution of expertise  
A TFC Company

Approx.  
North

2022 95th Percentile Queue  
2032 95th Percentile Queue

-- 2022  
[-] 2032



**Figure 6**

**All-Way Stop: PM LOS & 95th Percentile Queues**  
**Mason, Federal, & Water Street**  
**Brunswick, Maine**

**Sewall**  
The evolution of expertise  
A TFC Company

---

# H. C. L.

## CRASH COLLISION DIAGRAM

### DATA PACKAGE

---

COUNTY: CUMBERLAND

TOWN: BRUNSWICK

LOW NODE: 18578 HIGH NODE: 0000 REGION: 1 U/R: URBAN

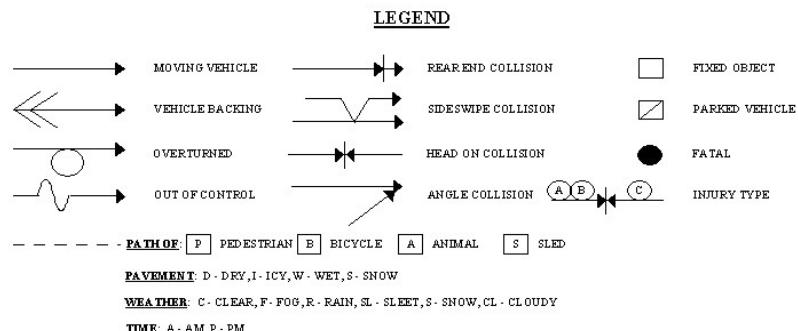
DESCRIPTION: Int of Federal St and Mason St

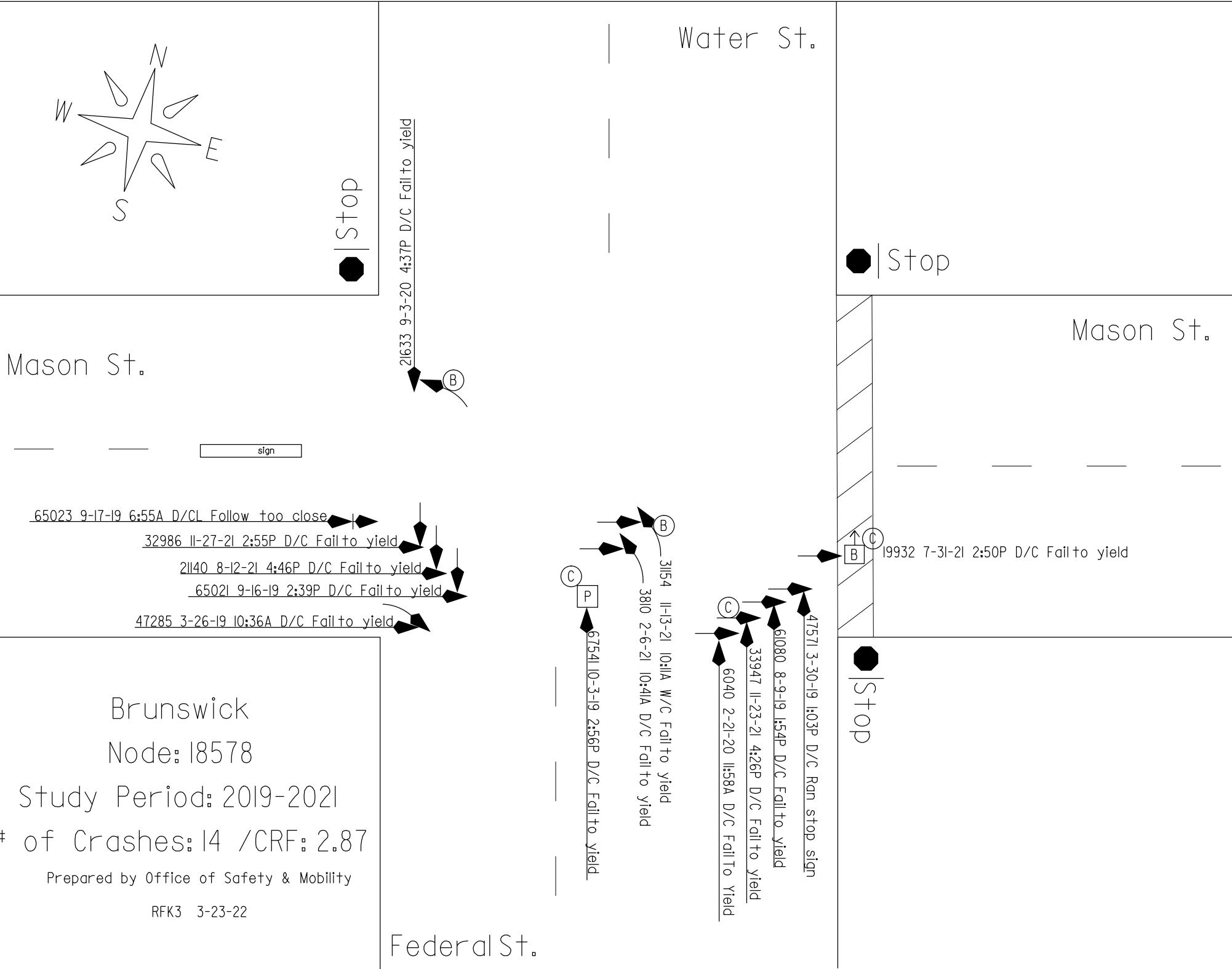
RTE # / RD #: 0510044 DATE DRAWN: 3/23/2022 DRAWN BY: BOB K

STUDY FROM: 1/1/2019

STUDY TO: 12/31/2021

CRASH RATE: 1.05 CRF: 2.87 % INJURY: 35.7 TOTAL CRASHES: 14







## Crash Summary Report

### Report Selections and Input Parameters

#### REPORT SELECTIONS

Crash Summary I - Single Node       Section Detail       Crash Summary II       1320 Public       1320 Private       1320 Summary

#### REPORT DESCRIPTION

Brunswick  
Jct Federal St & Mason St/Water St

#### REPORT PARAMETERS

Year 2019, Start Month 1 through Year 2021 End Month: 12

Route: **0510044**

Start Node: **18578**

Start Offset: **0**

Exclude First Node

End Node: **18578**

End Offset: **0**

Exclude Last Node

**Crash Summary I**

Node	Route - MP	Node Description	Nodes											
			U/R	Total Crashes	K	Injury Crashes			Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF	
18578	0510044 - 0	Int of FEDERAL ST MASON ST WATER ST	2	14	0	0	2	3	9	35.7	4.429	1.05	0.37	2.87
<b>Study Years:</b> 3.00		<b>NODE TOTALS:</b>		14	0	0	2	3	9	35.7	4.429	1.05	0.37	2.87

**Crash Summary II - Characteristics****Crashes by Day and Hour**

Day Of Week	AM											Hour of Day											PM					Un	Tot
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	Un	Tot			
SUNDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
MONDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1		
TUESDAY	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3		
WEDNESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
THURSDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	3		
FRIDAY	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2		
SATURDAY	0	0	0	0	0	0	0	0	2	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	5		
<b>Totals</b>	0	0	0	0	0	0	1	0	0	3	1	0	2	4	0	3	0	0	0	0	0	0	0	0	0	0	<b>14</b>		

**Vehicle Counts by Type**

Unit Type	Total	Unit Type	Total
1-Passenger Car	15	23-Bicyclist	1
2-(Sport) Utility Vehicle	5	24-Witness	1
3-Passenger Van	0	25-Other	0
4-Cargo Van (10K lbs or Less)	0	26-Construction	0
5-Pickup	4	27-Farm Vehicle	0
6-Motor Home	0	<hr/>	
7-School Bus	1	<hr/>	
8-Transit Bus	0	<hr/>	
9-Motor Coach	0	<hr/>	
10-Other Bus	0	<hr/>	
11-Motorcycle	0	<hr/>	
12-Moped	0	<hr/>	
13-Low Speed Vehicle	0	<hr/>	
14-Autocycle	0	<hr/>	
15-Experimental	0	<hr/>	
16-Other Light Trucks (10,000 lbs or Less)	0	<hr/>	
17-Medium/Heavy Trucks (More than 10,000 lbs)	1	<hr/>	
18-ATV - (4 wheel)	0	<hr/>	
20-ATV - (2 wheel)	0	<hr/>	
21-Snowmobile	0	<hr/>	
22-Pedestrian	1	<hr/>	

**Maine Department Of Transportation - Office of Safety, Crash Records Section**  
**Crash Summary II - Characteristics**

Crashes by Driver Action at Time of Crash							Crashes by Apparent Physical Condition And Driver								
Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total	Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	2	11	0	0	0	0	13	Apparently Normal	14	12	0	0	0	2	28
Ran Off Roadway	0	0	0	0	0	0	0	Physically Impaired	0	0	0	0	0	0	0
Failed to Yield Right-of-Way	10	1	0	0	0	0	11	Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ran Red Light	0	0	0	0	0	0	0	Ill (Sick)	0	0	0	0	0	0	0
Ran Stop Sign	1	0	0	0	0	0	1	Asleep or Fatigued	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0	Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0	Other	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	0	0	0	0	0	0	Total	14	12	0	0	0	2	28
Drove Too Fast For Conditions	0	0	0	0	0	0	0	Driver Age by Unit Type							
Improper Turn	0	0	0	0	0	0	0	Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total	
Improper Backing	0	0	0	0	0	0	0	09-Under	0	0	0	0	0	0	
Improper Passing	0	0	0	0	0	0	0	10-14	0	0	0	0	0	0	
Wrong Way	0	0	0	0	0	0	0	15-19	3	0	0	0	0	3	
Followed Too Closely	1	0	0	0	0	0	1	20-24	2	0	0	0	0	2	
Failed to Keep in Proper Lane	0	0	0	0	0	0	0	25-29	1	0	0	0	0	1	
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	0	0	0	0	0	0	0	30-39	3	0	0	0	0	3	
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0	40-49	7	0	0	0	0	7	
Over-Correcting/Over-Steering	0	0	0	0	0	0	0	50-59	2	0	0	0	0	2	
Other Contributing Action	0	0	0	0	0	0	0	60-69	3	0	0	0	0	3	
Unknown	0	0	0	0	0	0	0	70-79	2	0	0	0	0	2	
Total	14	12	0	0	0	0	26	80-Over	3	0	0	0	0	3	
								Unknown	0	1	0	1	0	2	
								Total	26	1	0	1	0	28	

Maine Department Of Transportation - Office of Safety, Crash Records Section

## Crash Summary II - Characteristics

Most Harmful Event			
Most Harmful Event	Total	Most Harmful Event	Total
1-Overtake / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	0
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0		
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	0		
9-Pedestrian	1		
10-Pedalcycle	1		
11-Railway Vehicle - Train, Engine	0		
12-Animal	0		
13-Motor Vehicle in Transport	24		
14-Parked Motor Vehicle	0		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	0		
30-Other Traffic Barrier	0		
31-Tree (Standing)	0		
32-Utility Pole / Light Support	0		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	0		
37-Other Post, Pole, or Support	0		
		<b>Total</b>	<b>26</b>
		<b>Traffic Control Devices</b>	
		Traffic Control Device	Total
		1-Traffic Signals (Stop & Go)	0
		2-Traffic Signals (Flashing)	0
		3-Advisory/Warning Sign	0
		4-Stop Signs - All Approaches	0
		5-Stop Signs - Other	13
		6-Yield Sign	0
		7-Curve Warning Sign	0
		8-Officer, Flagman, School Patrol	0
		9-School Bus Stop Arm	0
		10-School Zone Sign	0
		11-R.R. Crossing Device	0
		12-No Passing Zone	0
		13-None	1
		14-Other	0
		<b>Total</b>	<b>14</b>

Injury Data		
Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	0	0
B	2	2
C	3	3
PD	9	0
<b>Total</b>	<b>14</b>	<b>5</b>

Road Character		Total
	Road Grade	
1-Level		14
2-On Grade		0
3-Top of Hill		0
4-Bottom of Hill		0
5-Other		0
<b>Total</b>		14

Light Condition	Total
1-Daylight	12
2-Dawn	1
3-Dusk	1
4-Dark - Lighted	0
5-Dark - Not Lighted	0
6-Dark - Unknown Lighting	0
7-Unknown	0
<b>Total</b>	<b>14</b>

>Maine Department Of Transportation - Office of Safety, Crash Records Section  
**Crash Summary II - Characteristics**

**Crashes by Year and Month**

Month	2019	2020	2021	Total
JANUARY	0	0	0	0
FEBRUARY	0	1	1	2
MARCH	2	0	0	2
APRIL	0	0	0	0
MAY	0	0	0	0
JUNE	0	0	0	0
JULY	0	0	1	1
AUGUST	1	0	1	2
SEPTEMBER	2	1	0	3
OCTOBER	1	0	0	1
NOVEMBER	0	0	3	3
DECEMBER	0	0	0	0
<b>Total</b>	<b>6</b>	<b>2</b>	<b>6</b>	<b>14</b>

**Report is limited to the last 10 years of data.**

**Crash Summary II - Characteristics****Crashes by Crash Type and Type of Location**

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Head-on - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intersection Movement	0	0	0	10	0	0	0	0	0	0	0	0	0	0	10
Pedestrians	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14</b>

## Maine Department Of Transportation - Office of Safety, Crash Records Section

**Crash Summary II - Characteristics****Crashes by Weather, Light Condition and Road Surface**

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
<b>Blowing Sand, Soil, Dirt</b>												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
<b>Blowing Snow</b>												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
<b>Clear</b>												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	11	0	0	0	0	0	0	0	0	1	12	
Dusk	1	0	0	0	0	0	0	0	0	0	1	
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
<b>Cloudy</b>												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	1	0	0	0	0	0	0	0	0	0	0	1
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

**Crash Summary II - Characteristics****Crashes by Weather, Light Condition and Road Surface**

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
<b>Fog, Smog, Smoke</b>												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
<b>Other</b>												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
<b>Rain</b>												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
<b>Severe Crosswinds</b>												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

**Crash Summary II - Characteristics****Crashes by Weather, Light Condition and Road Surface**

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
<b>Sleet, Hail (Freezing Rain or Drizzle)</b>												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
<b>Snow</b>												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>13</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>14</b>

# Sewall

40 Forest Falls Drive  
Yarmouth, ME 04096

TITLE: Mason, Federal & Water AM  
TOWN: Brunswick  
COUNTER: JM  
WEATHER: Sun/clouds

File Name : MasonFederalWater2022AM  
Site Code : 09276321  
Start Date : 9/27/2022  
Page No : 1

### Groups Printed- Passenger Vehicles - Light Trucks - Heavy Trucks

	Water Street Southbound					Cressey Road Westbound					Federal Street Northbound					Mason Street Eastbound					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
06:30 AM	3	3	0	0	6	0	0	0	0	0	13	0	29	3	45	22	34	3	0	59	110
06:45 AM	6	3	6	1	16	0	0	1	2	3	8	1	24	5	38	38	33	13	3	87	144
Total	9	6	6	1	22	0	0	1	2	3	21	1	53	8	83	60	67	16	3	146	254
07:00 AM	3	3	8	0	14	0	0	0	2	2	18	4	28	1	51	33	27	8	3	71	138
07:15 AM	5	3	1	0	9	0	1	0	1	2	29	4	32	1	66	39	31	2	0	72	149
07:30 AM	4	5	8	1	18	0	0	0	0	0	19	5	53	2	79	40	43	15	1	99	196
07:45 AM	7	3	1	0	11	0	2	1	2	5	19	5	38	0	62	51	34	12	0	97	175
Total	19	14	18	1	52	0	3	1	5	9	85	18	151	4	258	163	135	37	4	339	658
08:00 AM	10	3	5	1	19	0	0	0	0	0	18	3	32	1	54	41	36	9	1	87	160
08:15 AM	9	11	2	3	25	0	6	0	1	7	11	6	39	0	56	55	35	12	0	102	190
08:30 AM	7	10	3	0	20	0	3	1	1	5	26	4	39	1	70	43	31	12	0	86	181
08:45 AM	6	4	0	1	11	0	2	2	0	4	28	5	46	3	82	52	45	20	2	119	216
Total	32	28	10	5	75	0	11	3	2	16	83	18	156	5	262	191	147	53	3	394	747
09:00 AM	8	6	3	0	17	0	2	1	1	4	21	6	38	4	69	35	43	13	8	99	189
09:15 AM	5	10	9	0	24	0	1	0	1	2	20	6	42	3	71	37	34	11	0	82	179
09:30 AM	8	9	4	0	21	0	3	1	1	5	22	1	41	3	67	42	48	12	1	103	196
09:45 AM	6	5	2	0	13	1	3	0	1	5	22	9	28	1	60	33	37	8	2	80	158
Total	27	30	18	0	75	1	9	2	4	16	85	22	149	11	267	147	162	44	11	364	722
Grand Total	87	78	52	7	224	1	23	7	13	44	274	59	509	28	870	561	511	150	21	1243	2381
Apprch %	38.8	34.8	23.2	3.1		2.3	52.3	15.9	29.5		31.5	6.8	58.5	3.2		45.1	41.1	12.1	1.7		
Total %	3.7	3.3	2.2	0.3	9.4	0	1	0.3	0.5	1.8	11.5	2.5	21.4	1.2	36.5	23.6	21.5	6.3	0.9	52.2	
Passenger Vehicles	78	65	50	0	193	0	15	5	0	20	253	51	501	1	806	535	475	141	0	1151	2170
% Passenger Vehicles	89.7	83.3	96.2	0	86.2	0	65.2	71.4	0	45.5	92.3	86.4	98.4	3.6	92.6	95.4	93	94	0	92.6	91.1
Light Trucks	9	13	2	5	29	1	7	2	7	17	20	8	8	7	43	26	31	9	10	76	165
% Light Trucks	10.3	16.7	3.8	71.4	12.9	100	30.4	28.6	53.8	38.6	7.3	13.6	1.6	25	4.9	4.6	6.1	6	47.6	6.1	6.9
Heavy Trucks	0	0	0	2	2	0	1	0	6	7	1	0	0	20	21	0	5	0	11	16	46
% Heavy Trucks	0	0	0	28.6	0.9	0	4.3	0	46.2	15.9	0.4	0	0	71.4	2.4	0	1	0	52.4	1.3	1.9

Gr. I = 0.90/0.87 = 1.035

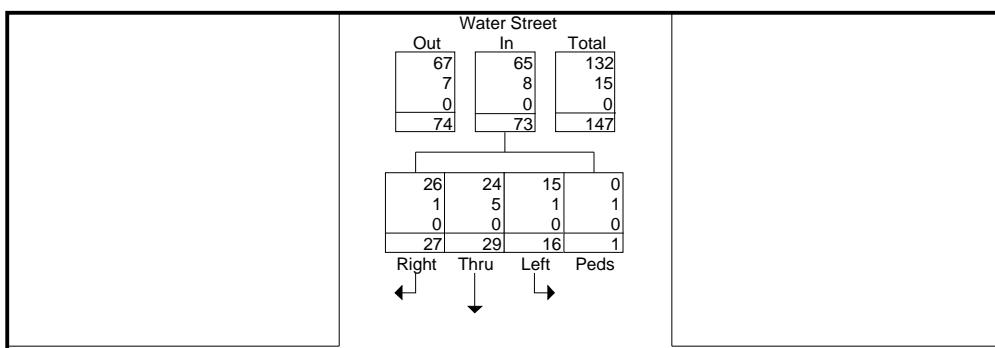
# Sewall

40 Forest Falls Drive  
Yarmouth, ME 04096

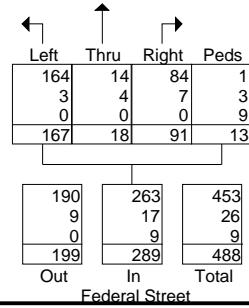
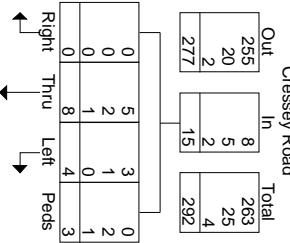
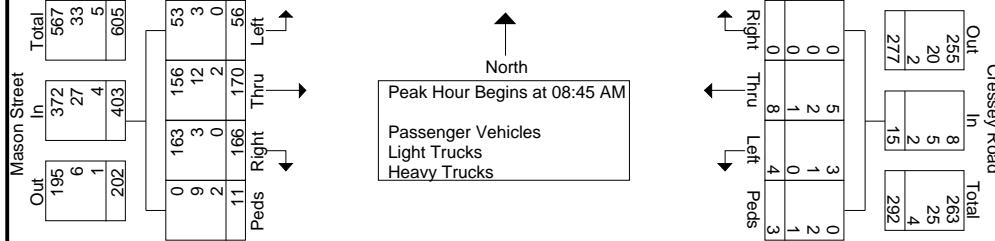
TITLE: Mason, Federal & Water AM  
TOWN: Brunswick  
COUNTER: JM  
WEATHER: Sun/clouds

File Name : MasonFederalWater2022AM  
Site Code : 09276321  
Start Date : 9/27/2022  
Page No : 2

Start Time	Water Street Southbound					Cressey Road Westbound					Federal Street Northbound					Mason Street Eastbound					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:45 AM																					
08:45 AM	6	4	0	1	11	0	2	2	0	4	28	5	46	3	82	52	45	20	2	119	216
09:00 AM	8	6	3	0	17	0	2	1	1	4	21	6	38	4	69	35	43	13	8	99	189
09:15 AM	5	10	9	0	24	0	1	0	1	2	20	6	42	3	71	37	34	11	0	82	179
09:30 AM	8	9	4	0	21	0	3	1	1	5	22	1	41	3	67	42	48	12	1	103	196
Total Volume	27	29	16	1	73	0	8	4	3	15	91	18	167	13	289	166	170	56	11	403	780
% App. Total	37	39.7	21.9	1.4		0	53.3	26.7	20		31.5	6.2	57.8	4.5		41.2	42.2	13.9	2.7		
PHF	.844	.725	.444	.250	.760	.000	.667	.500	.750	.750	.813	.750	.908	.813	.881	.798	.885	.700	.344	.847	.903
Passenger Vehicles	26	24	15	0	65	0	5	3	0	8	84	14	164	1	263	163	156	53	0	372	708
% Passenger Vehicles	96.3	82.8	93.8	0	89.0	0	62.5	75.0	0	53.3	92.3	77.8	98.2	7.7	91.0	98.2	91.8	94.6	0	92.3	90.8
Light Trucks	1	5	1	1	8	0	2	1	2	5	7	4	3	3	17	3	12	3	9	27	57
% Light Trucks	3.7	17.2	6.3	100	11.0	0	25.0	25.0	66.7	33.3	7.7	22.2	1.8	23.1	5.9	1.8	7.1	5.4	81.8	6.7	7.3
Heavy Trucks	0	0	0	0	0	0	1	0	1	2	0	0	0	9	9	0	2	0	2	4	15
% Heavy Trucks	0	0	0	0	0	0	12.5	0	33.3	13.3	0	0	0	69.2	3.1	0	1.2	0	18.2	1.0	1.9
	28	30	17			8	4			94	19	173			172	176	58				



## Peak Hour Data



# Sewall

40 Forest Falls Drive  
Yarmouth, ME 04096

TITLE: Mason, Water & Federal Streets  
TOWN: Brunswick  
COUNTER: JM  
WEATHER: Sun/clouds

File Name : MasonFederalWater2022Midday  
Site Code : 29271122  
Start Date : 9/27/2022  
Page No : 1

## Groups Printed- Passenger Vehicles - Light Trucks - Heavy Trucks

	Water Street Southbound					Cressey Road Westbound					Federal Street Northbound					Mason Street Eastbound						
	Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
11:00 AM	4	5	7	0	16		0	1	0	2	3	21	3	43	0	67	30	57	9	0	96	182
11:15 AM	12	4	5	1	22		2	0	4	5	11	29	7	38	0	74	28	47	11	1	87	194
11:30 AM	7	3	2	0	12		0	0	1	2	3	23	1	41	1	66	24	70	12	0	106	187
11:45 AM	9	4	3	0	16		0	1	1	2	4	21	2	36	2	61	33	38	9	1	81	162
Total	32	16	17	1	66		2	2	6	11	21	94	13	158	3	268	115	212	41	2	370	725
12:00 PM	5	10	6	0	21		0	0	1	2	3	35	5	48	4	92	25	48	7	0	80	196
12:15 PM	9	5	3	1	18		0	0	0	0	0	32	4	30	5	71	38	54	14	0	106	195
12:30 PM	1	7	6	0	14		0	0	2	1	3	26	5	40	1	72	37	50	8	0	95	184
12:45 PM	2	6	2	0	10		0	1	0	3	4	32	4	45	4	85	30	55	8	1	94	193
Total	17	28	17	1	63		0	1	3	6	10	125	18	163	14	320	130	207	37	1	375	768
01:00 PM	7	6	2	0	15		0	1	0	0	1	26	7	41	2	76	38	53	8	1	100	192
01:15 PM	6	11	2	0	19		0	0	2	3	5	24	5	40	2	71	36	48	11	1	96	191
01:30 PM	2	6	3	0	11		0	2	0	0	2	21	5	46	2	74	35	56	9	2	102	189
01:45 PM	6	8	1	1	16		0	1	0	3	4	26	6	37	1	70	37	44	10	0	91	181
Total	21	31	8	1	61		0	4	2	6	12	97	23	164	7	291	146	201	38	4	389	753
Grand Total	70	75	42	3	190		2	7	11	23	43	316	54	485	24	879	391	620	116	7	1134	2246
Apprch %	36.8	39.5	22.1	1.6			4.7	16.3	25.6	53.5		35.9	6.1	55.2	2.7		34.5	54.7	10.2	0.6		
Total %	3.1	3.3	1.9	0.1	8.5		0.1	0.3	0.5	1	1.9	14.1	2.4	21.6	1.1	39.1	17.4	27.6	5.2	0.3	50.5	
Passenger Vehicles	69	62	41	0	172		2	5	11	0	18	302	49	475	1	827	385	591	106	1	1083	2100
% Passenger Vehicles	98.6	82.7	97.6	0	90.5		100	71.4	100	0	41.9	95.6	90.7	97.9	4.2	94.1	98.5	95.3	91.4	14.3	95.5	93.5
Light Trucks	1	13	0	2	16		0	1	0	8	9	14	5	10	7	36	6	23	9	1	39	100
% Light Trucks	1.4	17.3	0	66.7	8.4		0	14.3	0	34.8	20.9	4.4	9.3	2.1	29.2	4.1	1.5	3.7	7.8	14.3	3.4	4.5
Heavy Trucks	0	0	1	1	2		0	1	0	15	16	0	0	0	16	16	0	6	1	5	12	46
% Heavy Trucks	0	0	2.4	33.3	1.1		0	14.3	0	65.2	37.2	0	0	0	66.7	1.8	0	1	0.9	71.4	1.1	2

Gr. I = 0.90/0.87 = 1.035

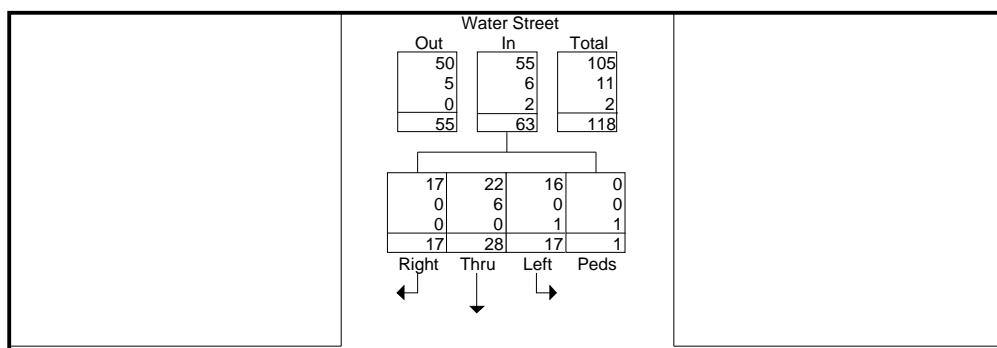
# Sewall

40 Forest Falls Drive  
Yarmouth, ME 04096

TITLE: Mason, Water & Federal Streets  
TOWN: Brunswick  
COUNTER: JM  
WEATHER: Sun/clouds

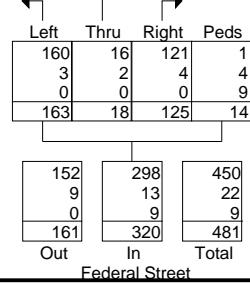
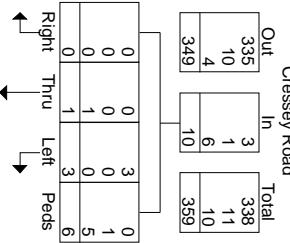
File Name : MasonFederalWater2022Midday  
Site Code : 29271122  
Start Date : 9/27/2022  
Page No : 2

Start Time	Water Street Southbound					Cressey Road Westbound					Federal Street Northbound					Mason Street Eastbound					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 11:00 AM To 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 PM																					
12:00 PM	5	10	6	0	21	0	0	1	2	3	35	5	48	4	92	25	48	7	0	80	196
12:15 PM	9	5	3	1	18	0	0	0	0	0	32	4	30	5	71	38	54	14	0	106	195
12:30 PM	1	7	6	0	14	0	0	2	1	3	26	5	40	1	72	37	50	8	0	95	184
12:45 PM	2	6	2	0	10	0	1	0	3	4	32	4	45	4	85	30	55	8	1	94	193
Total Volume	17	28	17	1	63	0	1	3	6	10	125	18	163	14	320	130	207	37	1	375	768
% App. Total	27	44.4	27	1.6		0	10	30	60		39.1	5.6	50.9	4.4		34.7	55.2	9.9	0.3		
PHF	.472	.700	.708	.250	.750	.000	.250	.375	.500	.625	.893	.900	.849	.700	.870	.855	.941	.661	.250	.884	.980
Passenger Vehicles	17	22	16	0	55	0	0	3	0	3	121	16	160	1	298	127	198	34	0	359	715
% Passenger Vehicles	100	78.6	94.1	0	87.3	0	0	100	0	30.0	96.8	88.9	98.2	7.1	93.1	97.7	95.7	91.9	0	95.7	93.1
Light Trucks	0	6	0	0	6	0	0	0	1	1	4	2	3	4	13	3	6	3	1	13	33
% Light Trucks	0	21.4	0	0	9.5	0	0	0	16.7	10.0	3.2	11.1	1.8	28.6	4.1	2.3	2.9	8.1	100	3.5	4.3
Heavy Trucks	0	0	1	1	2	0	1	0	5	6	0	0	0	9	9	0	3	0	0	3	20
% Heavy Trucks	0	0	5.9	100	3.2	0	100	0	83.3	60.0	0	0	0	64.3	2.8	0	1.4	0	0	0.8	2.6
	18	29	18			1	3				129	19	169			135	214	38			



## Peak Hour Data

North  
Peak Hour Begins at 12:00 PM  
Passenger Vehicles  
Light Trucks  
Heavy Trucks



# Sewall

40 Forest Falls Drive  
Yarmouth, ME 04096

TITLE: Mason, Water & Federal Streets  
TOWN: Brunswick  
COUNTER: JM  
WEATHER: Sun/clouds

File Name : MasonFederalWater2022PM  
Site Code : 03927326  
Start Date : 9/27/2022  
Page No : 1

## Groups Printed- Passenger Vehicles - Light Trucks - Heavy Trucks

	Water Street Southbound					Cressey Road Westbound					Federal Street Northbound					Mason Street Eastbound							
	Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total	
03:00 PM	5	11	8	2	26		0	3	3	2	8	30	9	60	1	100	43	43	13	1	100	234	
03:15 PM	8	8	6	0	22		0	1	0	4	5	34	3	54	7	98	46	61	33	0	140	265	
03:30 PM	9	6	6	0	21		0	1	3	6	10	52	7	72	4	135	43	97	13	0	153	319	
03:45 PM	12	5	8	0	25		0	3	1	4	8	40	10	58	4	112	45	72	19	1	137	282	
Total		34	30	28	2	94		0	8	7	16	31	156	29	244	16	445	177	273	78	2	530	1100
04:00 PM	7	9	4	2	22		0	1	2	4	7	53	3	60	3	119	40	68	20	2	130	278	
04:15 PM	7	9	4	1	21		0	3	0	5	8	43	10	55	2	110	49	66	21	0	136	275	
04:30 PM	14	13	13	0	40		0	6	0	3	9	48	5	48	3	104	39	83	15	1	138	291	
04:45 PM	8	8	7	1	24		0	1	3	2	6	44	7	52	4	107	46	93	19	1	159	296	
Total		36	39	28	4	107		0	11	5	14	30	188	25	215	12	440	174	310	75	4	563	1140
05:00 PM	9	10	8	0	27		0	2	2	1	5	53	4	53	0	110	37	79	12	3	131	273	
05:15 PM	6	4	3	2	15		0	0	2	0	2	47	9	34	3	93	47	66	21	0	134	244	
05:30 PM	13	3	4	2	22		0	6	3	2	11	37	5	52	0	94	32	44	12	2	90	217	
05:45 PM	20	7	8	1	36		0	1	1	5	7	15	5	36	3	59	32	55	14	3	104	206	
Total		48	24	23	5	100		0	9	8	8	25	152	23	175	6	356	148	244	59	8	459	940
Grand Total		118	93	79	11	301		0	28	20	38	86	496	77	634	34	1241	499	827	212	14	1552	3180
Apprch %		39.2	30.9	26.2	3.7			0	32.6	23.3	44.2		40	6.2	51.1	2.7		32.2	53.3	13.7	0.9		
Total %		3.7	2.9	2.5	0.3	9.5		0	0.9	0.6	1.2	2.7	15.6	2.4	19.9	1.1	39	15.7	26	6.7	0.4	48.8	
Passenger Vehicles		117	82	78	0	277		0	27	20	0	47	479	70	629	0	1178	489	801	200	0	1490	2992
% Passenger Vehicles		99.2	88.2	98.7	0	92		0	96.4	100	0	54.7	96.6	90.9	99.2	0	94.9	98	96.9	94.3	0	96	94.1
Light Trucks		1	11	0	5	17		0	1	0	17	18	16	7	5	9	37	10	25	12	7	54	126
% Light Trucks		0.8	11.8	0	45.5	5.6		0	3.6	0	44.7	20.9	3.2	9.1	0.8	26.5	3	2	3	5.7	50	3.5	4
Heavy Trucks		0	0	1	6	7		0	0	0	21	21	1	0	0	25	26	0	1	0	7	8	62
% Heavy Trucks		0	0	1.3	54.5	2.3		0	0	0	55.3	24.4	0.2	0	0	73.5	2.1	0	0.1	0	50	0.5	1.9

Gr. I = 0.90/0.87 = 1.035

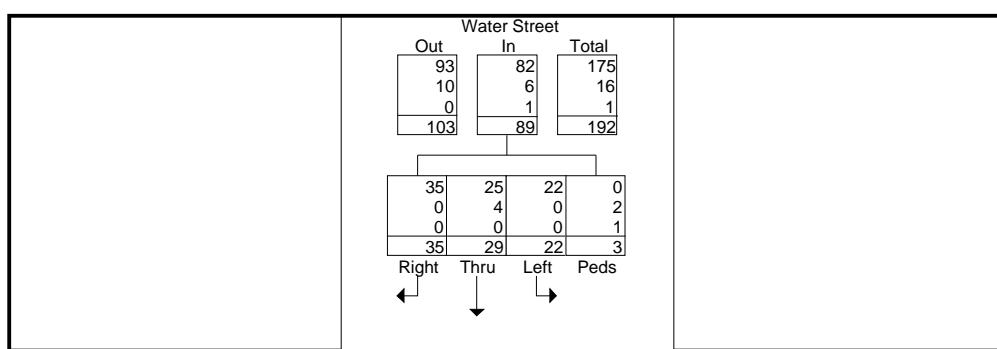
# Sewall

40 Forest Falls Drive  
Yarmouth, ME 04096

TITLE: Mason, Water & Federal Streets  
TOWN: Brunswick  
COUNTER: JM  
WEATHER: Sun/clouds

File Name : MasonFederalWater2022PM  
Site Code : 03927326  
Start Date : 9/27/2022  
Page No : 2

Start Time	Water Street Southbound					Cressey Road Westbound					Federal Street Northbound					Mason Street Eastbound					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	9	6	6	0	21	0	1	3	6	10	52	7	72	4	135	43	97	13	0	153	319
03:45 PM	12	5	8	0	25	0	3	1	4	8	40	10	58	4	112	45	72	19	1	137	282
04:00 PM	7	9	4	2	22	0	1	2	4	7	53	3	60	3	119	40	68	20	2	130	278
04:15 PM	7	9	4	1	21	0	3	0	5	8	43	10	55	2	110	49	66	21	0	136	275
Total Volume	35	29	22	3	89	0	8	6	19	33	188	30	245	13	476	177	303	73	3	556	1154
% App. Total	39.3	32.6	24.7	3.4		0	24.2	18.2	57.6		39.5	6.3	51.5	2.7		31.8	54.5	13.1	0.5		
PHF	.729	.806	.688	.375	.890	.000	.667	.500	.792	.825	.887	.750	.851	.813	.881	.903	.781	.869	.375	.908	.904
Passenger Vehicles	35	25	22	0	82	0	8	6	0	14	180	26	244	0	450	176	288	67	0	531	1077
% Passenger Vehicles	100	86.2	100	0	92.1	0	100	100	0	42.4	95.7	86.7	99.6	0	94.5	99.4	95.0	91.8	0	95.5	93.3
Light Trucks	0	4	0	2	6	0	0	0	8	8	8	4	1	4	17	1	15	6	1	23	54
% Light Trucks	0	13.8	0	66.7	6.7	0	0	0	42.1	24.2	4.3	13.3	0.4	30.8	3.6	0.6	5.0	8.2	33.3	4.1	4.7
Heavy Trucks	0	0	0	1	1	0	0	0	11	11	0	0	0	9	9	0	0	0	2	2	23
% Heavy Trucks	0	0	0	33.3	1.1	0	0	0	57.9	33.3	0	0	0	69.2	1.9	0	0	0	66.7	0.4	2.0
	36	30	23			8	6			195	31	254			183	314	76				



## Peak Hour Data

