

South End Transportation Study

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prepared for:



GENERAL DYNAMICS
Bath Iron Works



prepared by:

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1.0 INTRODUCTION

1.1 Study Background

The City of Bath partnered with Bath Iron Works and the Maine Department of Transportation to find ways to reduce conflicts between vehicles and pedestrians in Bath's South End neighborhood.

This transportation study is a response to changes in traffic patterns associated with the BIW's workforce, creating large volumes of vehicles coming and going, increasing pressure on parking, and contributing to vehicle speeds not in line with pedestrian-friendly neighborhoods. The study objective is noted as follows:

Study Objectives

- Improve the safety of pedestrians.
- Reducing the impact of vehicular traffic on neighborhood streets.
- Identifying strategies that will improve the availability of parking and/or reduce parking demand.
- A significant number of pedestrians walk along the Washington Street corridor and between off-site BIW parking facilities and the main production areas. This has led to conflicts between the needs of pedestrians and those of motor vehicles.
- The need for more parking has been accelerated by new development in Bath's Historic Downtown, as previous parking lots have transitioned into new uses.

Data was collected to find methods to address the following challenges:

- How can motor vehicle movements be made safer and more efficient?
- The study will assess potential changes in infrastructure and city policies.
- What opportunities exist to create additional parking?
- What is the best way to create a balance between neighborhoods and employee parking needs?

1.2 Study Area

The study area, as depicted in **Figure 1.1**, covers from Centre Street to Webber Street and from State Road near Richardson Street to Washington Street.

1.3 Advisory Committee

An Advisory Committee has been formed to help guide the Study and the members include:

- Peter Owens, City of Bath
- Marc Meyers, City of Bath

- Nate Howard, MaineDOT
- Patrick Adams, MaineDOT
- Phyllis Bailey, City Councilor
- Sean Paulhus, City Councilor
- Jon Fitzgerald, BIW
- Chris Main, BIW
- Tom Errico, T.Y. Lin International
- Todd Serbent, T.Y. Lin International
- Mitchell Rasor, MRLD
- Carol Morris, Morris Communications

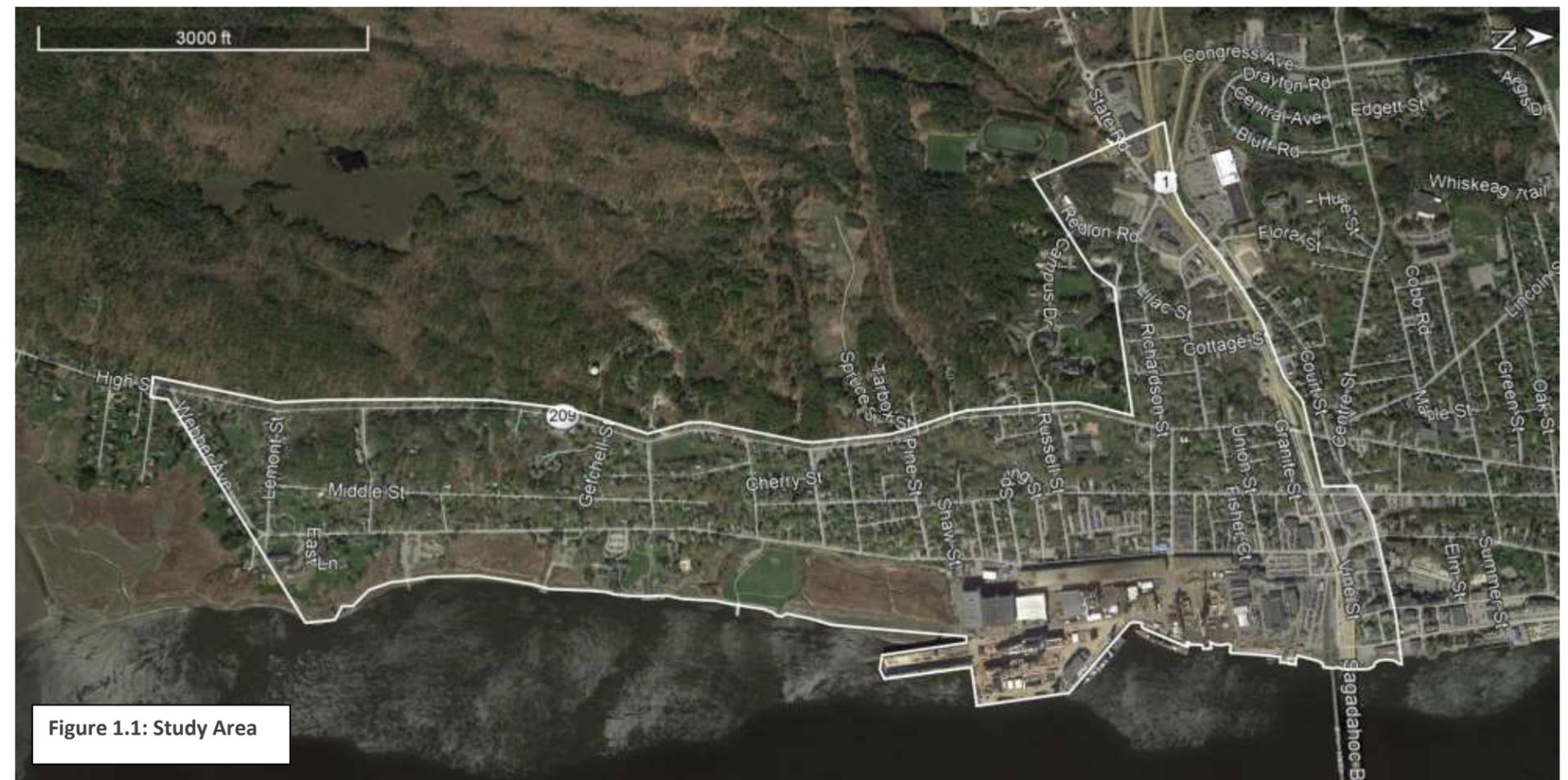


Figure 1.1: Study Area

2.0 EXISTING TRANSPORTATION CONDITIONS

2.1 Existing Transportation Data Sources

The following studies were reviewed for relevant data.

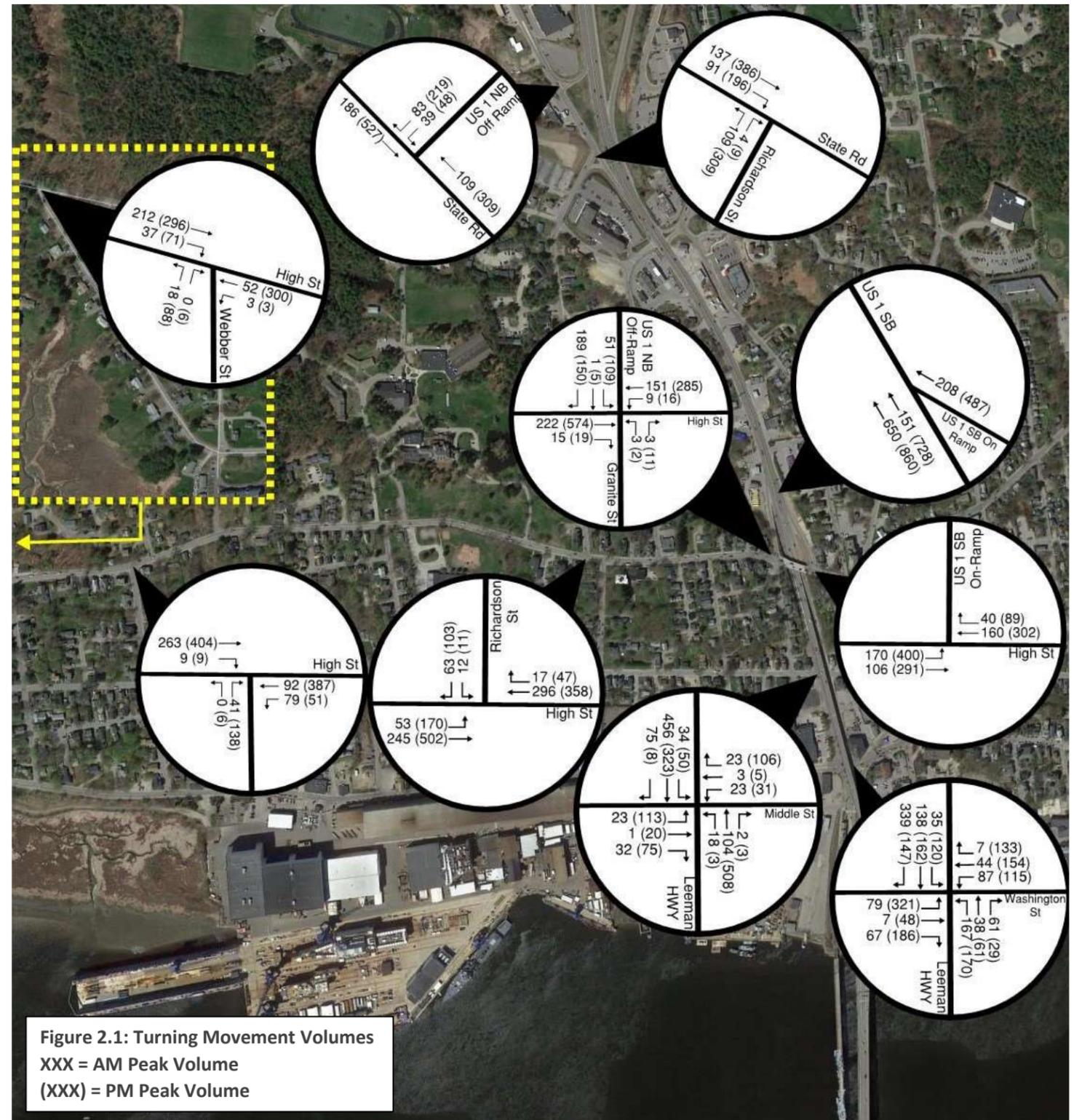
- West Approach Bridge Replacement, Maine 2015
- Maine Department of Transportation Count Cards, 2016
- Richardson Street and Western Avenue Traffic Calming Study, 2018
- Route 209 By-Pass Feasibility Study, 1995
- Crosswalk Evaluation, Washington Street – Bath, Maine, 2017

2.2 Traffic Volumes

Intersection Turning Movement Traffic Volumes

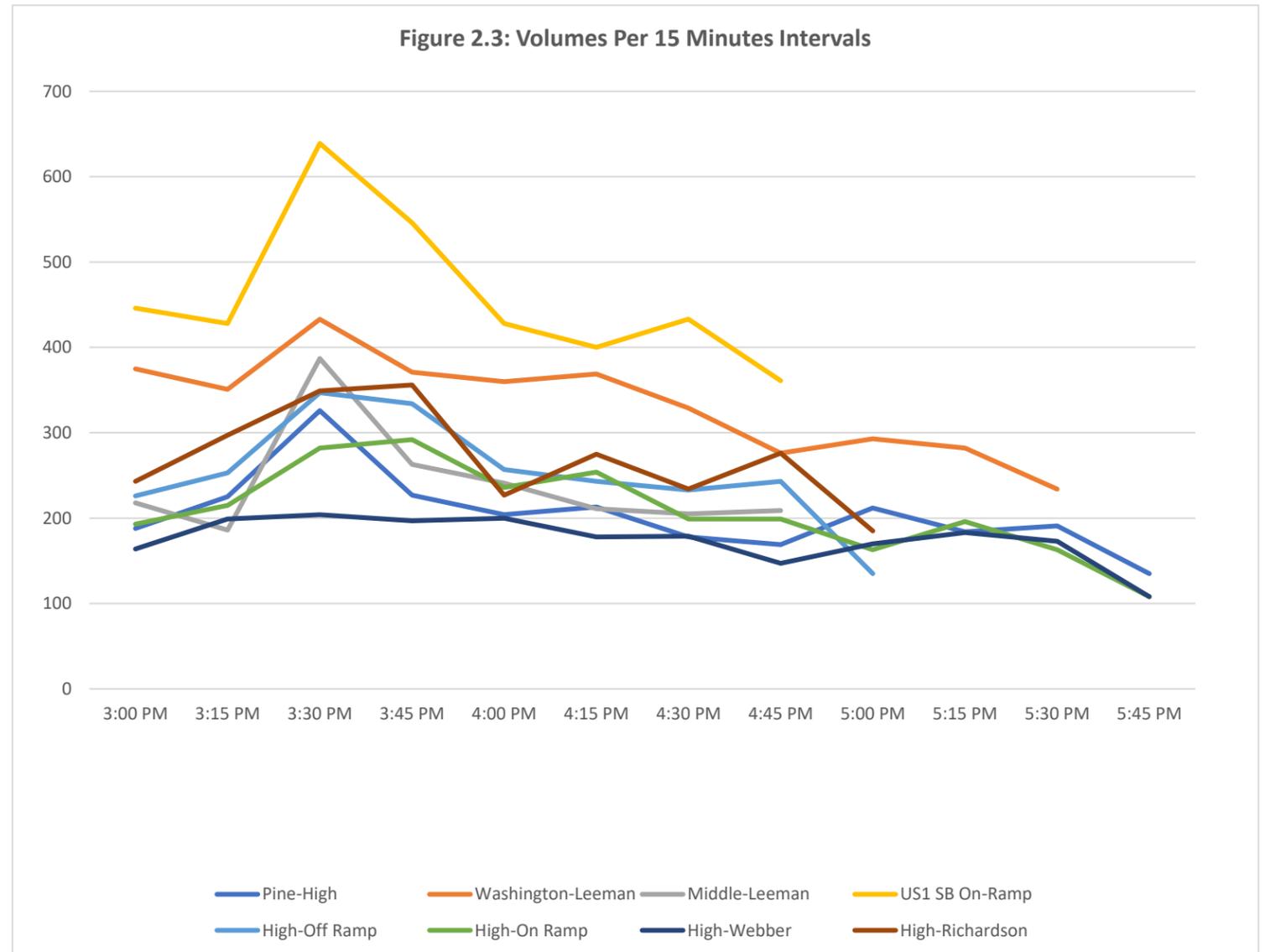
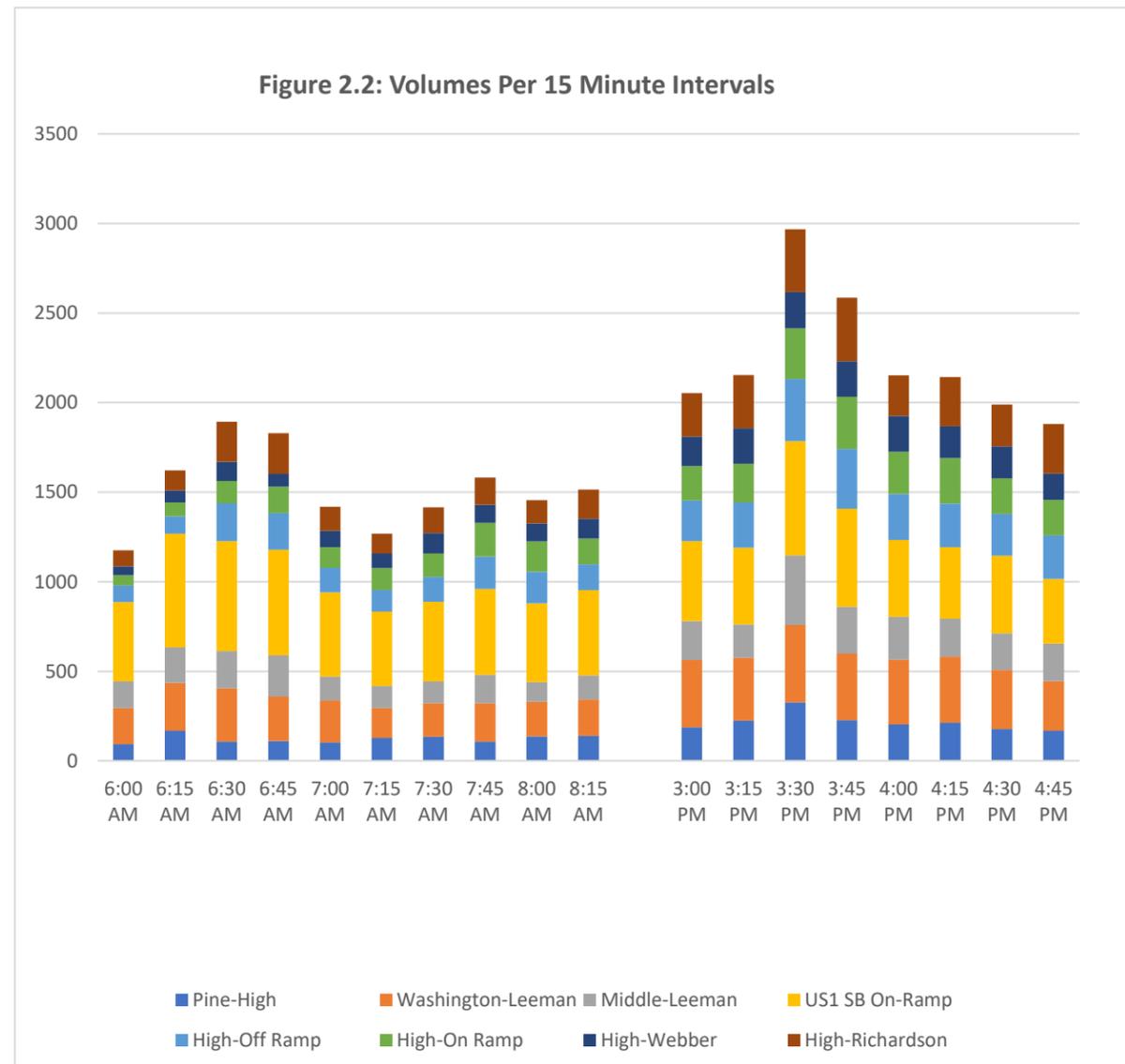
Intersection turning movement counts were conducted at key locations in the study area in 2016 and 2018. The intersections on State Road and the US Route 1 Northbound Off-Ramp and State Road and Richardson Street intersection were counted in August of 2016 by MaineDOT. The intersection of High Street and Webber Street, High Street and Richardson Street, High Street and the US Route 1 Northbound Off-Ramp, and High Street and the US Route 1 Southbound On-Ramp were counted using video cameras processed by MioVision in August of 2018. The intersections of High Street and Pine Street, Leeman Highway and the US Route 1 On-Ramp, Leeman Highway and Middle Street, and Leeman Highway and Washington Street were counted by hand using JAMAR count boards. The Existing Weekday AM and PM peak volumes are shown in **Figure 2.1**.

The turning movements show heavy movements headed toward Route 1 southbound in the afternoon.



Hourly Traffic Volume Variation

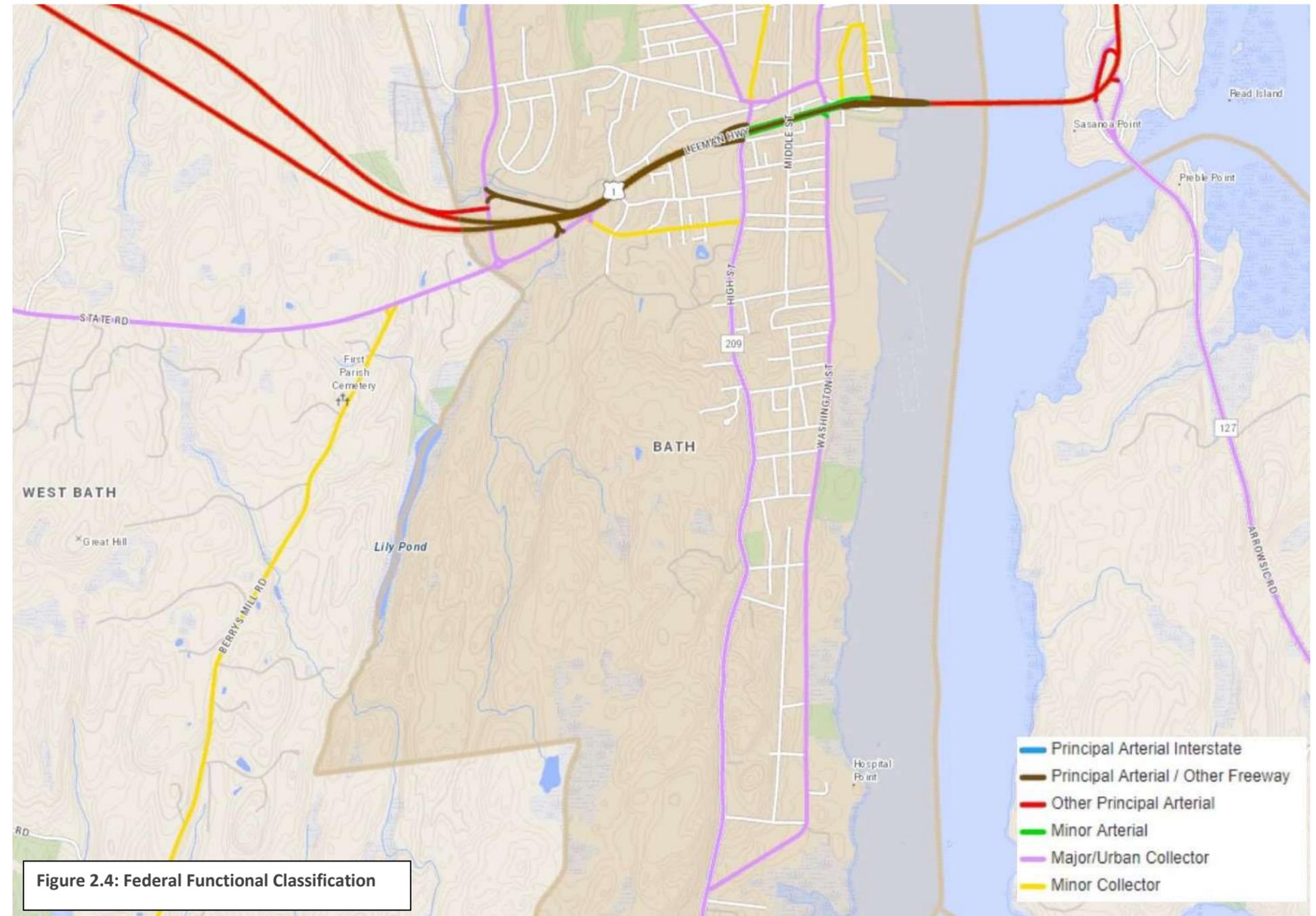
The study area traffic volumes peak in the morning from 6:15 to 7:15AM as BIW employees arrive to work. **Figure 2.2** shows a smaller morning peak from 7:30 to 8:30AM as traditional commuters head to work. Traffic volumes are highest in the afternoon. **Figure 2.3** shows a significant spike in traffic at 3:30PM when BIW employees get out. Traffic volumes decrease from this point on. Smaller peaks from local commuters are also shown in the afternoon but are not consistent across all locations and are of a significantly smaller magnitude.



Roadway Federal Functional Classification

Functional classification is the process by which public streets and highways are grouped into classes according to the character of service they are intended to provide based on mobility (arterials provide greater mobility) and access to the highway (local roads provide greater access, but much less mobility). Classifications include Principal Arterial Interstate, Principal Arterial Other Freeways and Expressways, Other Principal Arterials, Minor Arterials, Major/urban Collectors, Minor Collectors and Local Roads.

Figure 2.4 shows the Federal Functional Classification of roadways in the study area. The main arterial through Bath is Route 1. Leeman Highway under the viaduct acts as a minor arterial, feeding into Route 1. High Street, State Road, Washington Street, and Congress Street are major collectors, carrying traffic from the local streets to Route 1. Richardson Street is a minor collector.



Average Annual Daily Traffic Volumes

Average Annual Daily Traffic Volumes (AADT) were obtained from MaineDOT as depicted on **Figure 2.5**. AADT is the total volume of vehicle traffic on a roadway for a year divided by 365 days. AADT is a useful and simple measurement of how busy a road is. Route 1 is the busiest road in the study area.

The highest volumes are on High Street near Richardson Street. The volume increases then decrease on each side of Richardson Street, which supports the concerns of vehicles cutting through the neighborhood. Increases between points 1 and 2, and points 9 and 10 suggest Pine Street is also a primary cut through route to get to and from BIW. In general, volumes increase as you approach Leeman Highway.

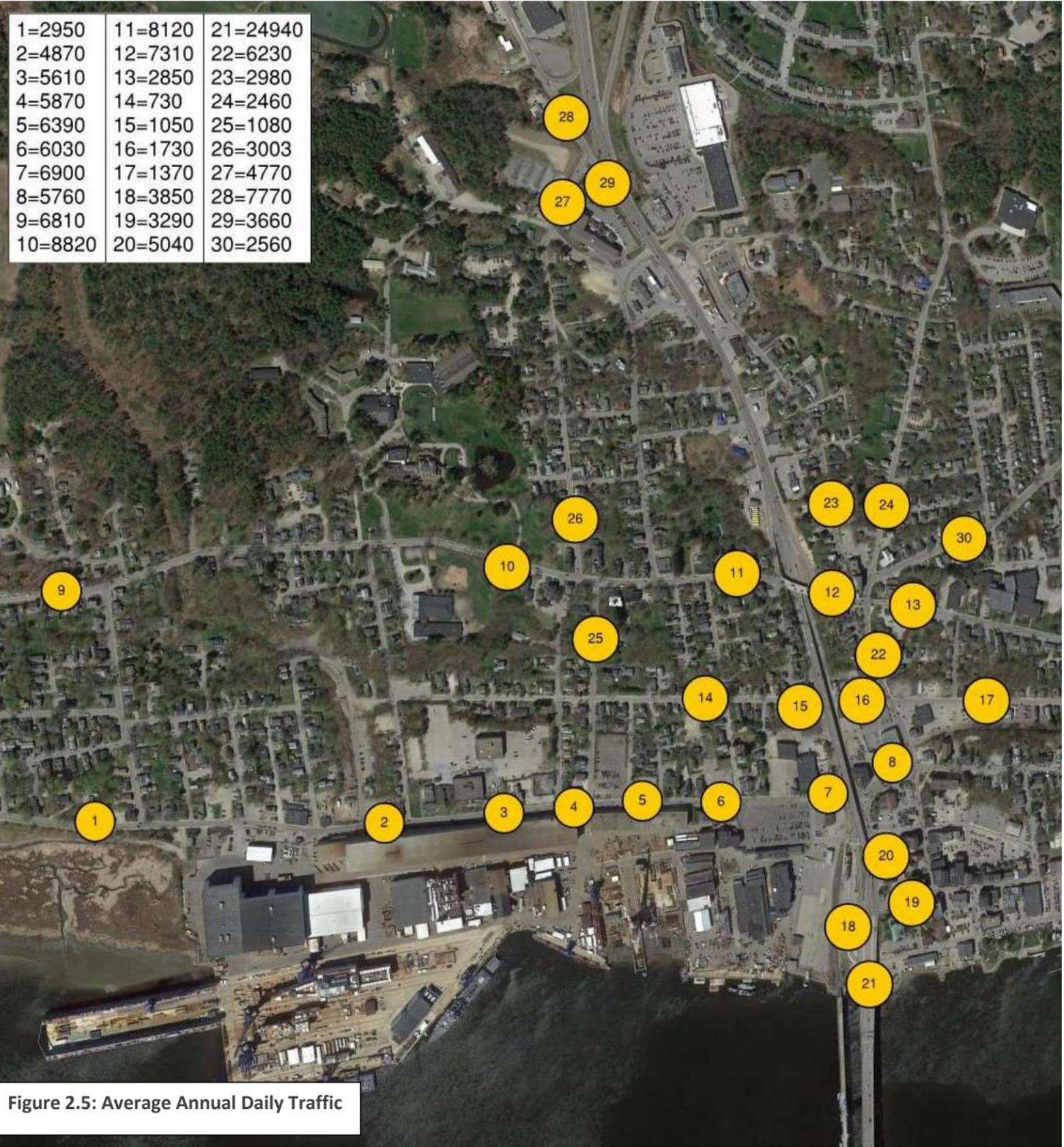


Figure 2.5: Average Annual Daily Traffic

Vehicle Classification

Vehicle classification data provides information on the types of vehicles traveling on roadways in the study area. Heavy vehicles, such as trucks and buses, have a greater impact on traffic mobility than passenger cars and require roadway design considerations, particularly turning space and pavement design. **Table 2.1** shows truck data that was collected at the intersection of Washington Street and Leeman Highway. This data is representative of the conditions on Leeman Highway. **Table 2.2** shows truck data collected from a video count conducted at Richardson Street and High Street. This data is representative of the conditions on High Street in the study area. Truck volumes are similar to average state-wide conditions and do not reflect high or unusual conditions.

Table 2.1 Vehicle Classification at Washington Street and Leeman Highway		
	AM Peak	PM Peak
% Light Vehicles	97.2%	97.8%
% Single Unit Heavy Vehicles	2.8%	1.9%
% Articulated Trailers	0.0%	0.3%

Table 2.2 Vehicle Classification at Richardson Street and High Street		
	AM Peak	PM Peak
% Light Vehicles	97.3%	97.6%
% Single Unit Heavy Vehicles	2.4%	2.1%
% Articulated Trailers	0.3%	0.3%

Safety

Crash data was obtained from MaineDOT for the most recent three-year period (2015-2017). MaineDOT has established criteria for establishing High Crash Locations (HCL) where an intersection or road segment has 8 or more crashes and a Critical Rate Factor (CRF) greater than or equal to 1.0 over a three-year period. The CRF is a comparison of the study location with other comparable locations in the State. A summary of each location is presented as follows.

Leeman Highway/State Road On-Ramp

This merge point had 20 crashes between 2015 and 2017 with a Critical Rate Factor of 2.87. At this merge, Leeman Highway has the right of way over State Road, which is yield controlled. All 20 crashes were rear-end collisions on State Road. In all crashes, the lead vehicle was waiting for a gap to merge

onto Leeman Highway and the trailing vehicle collided from the rear. This intersection is being redesigned by the MaineDOT to improve safety. Construction will begin 2020.

Leeman Highway/High Street On-Ramp

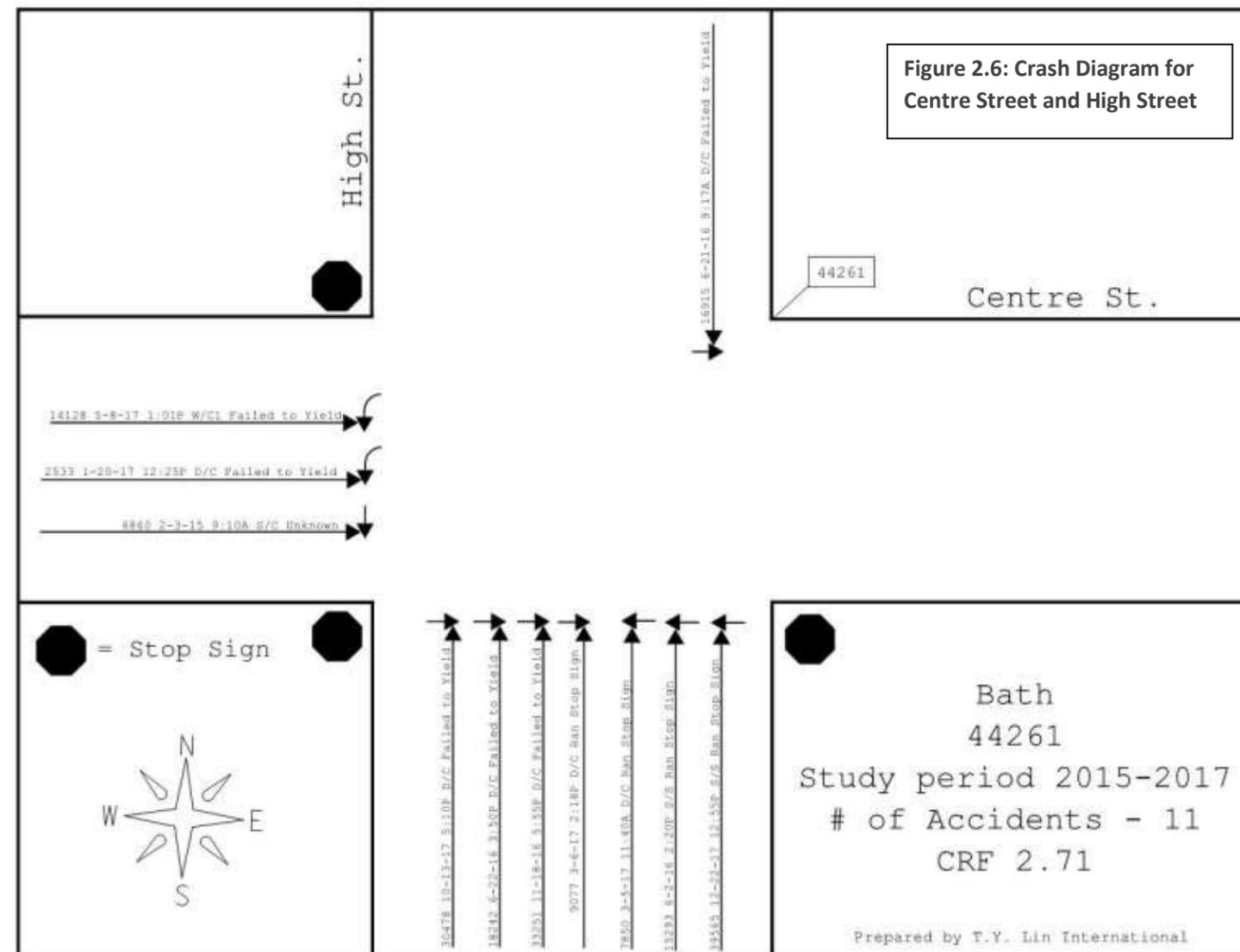
This intersection had 49 crashes between 2015 and 2017 with a Critical Rate Factor of 7.18. At this intersection, Leeman Highway operates freely, and the On-Ramp is stop controlled. This intersection acts as a merge point onto Route 1 Southbound. All 49 crashes were rear-end collisions on the On-Ramp with the lead vehicle stopped waiting to merge being collided with from behind. This ramp was reconfigured in September 2017 to extend the merge lane and change control from stop to yield. The sample

size for the reconfigured ramp is insufficient say the ramp has been improved, but early results are positive with only 3 crashes in 2018.

High Street/Centre Street

This intersection had 11 crashes between 2015 and 2017 with a Critical Rate Factor of 2.77. This four-way intersection has stop control on all approaches except the westbound Centre Street approach which is free moving. Five of these crashes were caused by drivers not yielding to the free moving approach. The crashes at this intersection are shown in **Figure 2.6**.

Figure 2.7 summarizes the High Crash Locations or locations with significant crash numbers for intersections and roadway segments for the three-year period 2015-2017.





2.3 Traffic Mobility

Intersection Capacity Analysis

The standard used to evaluate traffic operating conditions of the transportation system is referred to as the Level of Service (LOS). This is a qualitative assessment of the quantitative effect of factors such as speed, volume of traffic, geometric features, traffic interruptions, delays, and freedom to maneuver.

Level of Service provides a measurement of the delay experienced at an intersection because of traffic operations at that intersection. In general, there are six levels of service: Level of Service A to Level of Service F. The highest, Level of Service A, describes a condition of free-flow operations where the effects of incidents are easily absorbed. Level of Service B describes a state in which maneuverability and speed limits are beginning to be restricted by other motorists although level of comfort is still high. In Level of Service C, experienced drivers are still comfortable, but maneuverability is noticeably restricted. Level of Service D brings noticeable congestion and driver comfort levels decrease. In Level of Service E, roadway capacity is reached, and disruptions are much more prevalent – driver comfort has declined. Finally, Level of Service F is the results of volumes greater than roadway capacity with congestion and possible stopped conditions. MaineDOT has determined that Levels of Service A-D are acceptable conditions for intersections.

The measures of delay for each Level of Service rating for unsignalized and signalized intersections are found in **Table 2.3**.

Table 2.3 Level of Service Criteria		
LOS	Signalized Intersection	Unsignalized Intersection
A	≤10 sec	≤10 sec
B	10–20 sec	10–15 sec
C	20–35 sec	15–25 sec
D	35–55 sec	25–35 sec
E	55–80 sec	35–50 sec
F	>80 sec	>50 sec

Queue represents the distance of vehicles waiting at the stop bar. Most commonly reported is the 95th percentile queue, in other words the queue that will not be exceeded 95% of the time. A vehicle length of 20 feet can be used to visualize the number of vehicles in a queue. While it does not

impact the level of service directly, it is another measure of the performance of the intersection.

SimTraffic computer models were used to analyze the study intersections. For SimTraffic, the Trafficware version 10 standard output was used, based on 5 runs of 60 minutes of simulation. It should be noted that the analysis is based upon an optimized signal timing scenario as intersections are currently being retimed. The results are seen in the **Table 2.4**.

The model cannot include outside influences such as pedestrians darting into the road. These factors will add to the delay and queue lengths for Washington Street northbound lanes.

Table 2.4 Intersection Level of Service and 95 th Percentile Queue in 2018				
	AM LOS	PM LOS	AM Queue (ft)	PM Queue (ft)
State Road/Route 1 NB Off-Ramp				
State Road NB	A	A	0	0
State Road SB	A	A	0	0
Route 1 NB Off-Ramp Left	A	A	42	52
Route 1 NB Off-Ramp Right	A	A	38	64
State Road/Richardson Street				
State Road NB	A	A	0	0
State Road SB	A	A	0	0
Richardson Street WB	A	C	66	237
High Street/Richardson Street				
High Street NB	A	A	99	259
High Street SB	A	A	7	16
Richardson EB	A	A	47	78
High Street/Pine Street				
High Street NB	A	A	44	56
High Street SB	A	A	53	126
Pine Street WB	A	A	45	91
High Street/Granite Street/Off-Ramp				
High Street NB	A	A	0	284

Table 2.4 Intersection Level of Service and 95 th Percentile Queue in 2018				
	AM LOS	PM LOS	AM Queue (ft)	PM Queue (ft)
High Street SB	A	A	13	40
Granite Street WB	A	E (45)	25	43
Off-Ramp EB	A	F (107)	94	381
Route 1 Southbound/On-Ramp				
Route 1 Southbound	A	A	0	0
On-Ramp SB	A	D	54	429
High Street at the On-Ramp				
High Street NB	A	A	102	174
High Street SB	A	A	0	22
High Street/Webber Street				
High Street NB	A	A	0	0
High Street SB	A	A	10	10
Webber Street WB	A	B	36	77
Leeman Highway/Middle Street				
Leeman Highway EB	A	A	35	69
Leeman Highway WB	A	A	9	0
Middle Street NB	A	D	43	140
Middle Street SB	A	B	34	86
Leeman Highway/Washington Street				
Leeman Highway EB Left	B	D	42	161
Leeman Highway EB Through	C	D	153	207
Leeman Highway EB Right	A	A	154	149
Leeman Highway WB Left	C	D	150	162
Leeman Highway WB Through	C	D	70	182
Leeman Highway WB Right	A	A	0	58

Table 2.4 Intersection Level of Service and 95 th Percentile Queue in 2018				
	AM LOS	PM LOS	AM Queue (ft)	PM Queue (ft)
Washington Street NB Left-Through	D	F (186)	94	949
Washington Street NB Right	A	B	48	194
Washington Street SB Left	D	F (156)	106	1193
Washington Street SB Through-Right	C	F (159)	27	1197

State Road and Route 1 Northbound Off-Ramp

This intersection operates at an acceptable level of service. Neither the delay nor the queues are an issue.

State Road and Richardson Street

This intersection operates well. The westbound approach does experience a lower level of service in the afternoon, but still operates acceptably.

High Street and Richardson Street

This intersection works acceptably. Neither the delay nor the queues are an issue.

High Street and Webber Street

This intersection works acceptably. Neither the delay nor the queues are an issue.

High Street and Pine Street

This intersection works acceptably. Neither the delay nor the queues are an issue.

Middle Street and Leeman Highway

This intersection works very well during the morning peak hour. During the afternoon peak hour, the Leeman Highway approaches experience little delay. The southbound Middle Street approach experiences minor delays. The northbound approach sees significant delays but still operates acceptably.

Washington Street and Leeman Highway.

This intersection sees delays in both the morning and afternoon peak hours. The northbound and the southbound left-turn movements experience the worst delay, including a LOS F in the afternoon.

High Street, Granite Street, and Route 1 Northbound Off-Ramp

The major approaches experience very little delay at this intersection. The minor approaches experience severe delay during the afternoon peak hour. The major approach volumes are too high to allow a proper gap. The model is overestimating the delay on the Off-Ramp, but the approach operates below an acceptable level of service.

Route 1 and Route 1 Southbound On-Ramp

This intersection works very well during the morning peak hour. During the afternoon peak hour, the high left-turn volume headed northbound lowers the level of service. It still operates at an acceptable level of service.

High Street and Route 1 Southbound On-Ramp

This intersection works at an acceptable LOS. The delay at the intersection is not a concern, but the queue can affect the Off-Ramp intersection to the south.

2.4 2038 Future Traffic Volumes / Analysis

Traffic volumes were adjusted to a 20-year design year (2038) using a 1.10 growth factor. **Table 2.6** compares the 2018 peak hour volumes to the 2038 peak hour volumes. **Table 2.5** presents level of service, delay and queue information in 2038.

State Road and Route 1 North Off-Ramp

This intersection will work very well. Neither the delay nor the queues are an issue.

State Street and Richardson

This intersection will operate well during the morning peak hour. During the afternoon peak hour, the Richardson Street approach will operate on the fringe of acceptable LOS.

High Street and Richardson Street

This intersection will work acceptably during the morning peak hour. During the afternoon peak hour, the Richardson Street approach will operate on the fringe of acceptable LOS.

High Street and Pine Street

This intersection will work very well during both the morning and the afternoon peak hours.

High Street, Granite Street, and the Route 1 Northbound Off-Ramp

This intersection will work acceptably during the morning peak hour. During the afternoon peak hour, the stop-controlled movements will operate at LOS F because vehicles cannot find an adequate gap onto High Street.

Route 1 Southbound On-Ramp

This intersection will work acceptably during the morning peak. During the afternoon peak hour, the ramp will have moderate delays as vehicles look to merge.

High Street and Route 1 Southbound On-Ramp

This intersection will work at an acceptable LOS.

High Street and Webber Street.

This intersection will work well during the morning peak hour. During the afternoon peak hour, the Webber Street approach has moderate delays.

Middle Street and Leeman Highway

This intersection will work well during the morning peak hour. During the afternoon peak hour, both Middle Street approaches experience moderate delays.

Washington Street and Leeman Highway

During the morning peak hour, the left and through movements on all approaches will operate with moderate delays. In the afternoon, the left and through movements on the Washington Street approaches will operate at an unacceptable LOS. The queues on these approaches extend beyond eyesight of the intersection. The queue on the southbound approach will spill into the Washington Street and Centre Street intersection. The Leeman Highway left and through movements will operate on the fringe of acceptable LOS.

Table 2.5 2038 Intersection Level of Service and 95 th Percentile Queue				
	AM LOS	PM LOS	AM Queue (ft)	PM Queue (ft)
State Road/Route 1 NB Off-Ramp				
State Road NB	A	A	0	0
State Road SB	A	A	0	0
Route 1 NB Off-Ramp Left	A	B	44	44
Route 1 NB Off-Ramp Right	A	A	40	67
State Road/Richardson Street				
State Road NB	A	A	0	0
State Road SB	A	A	0	0
Richardson Street WB	A	D	63	295
High Street/Richardson Street				
High Street NB	A	A	92	318
High Street SB	A	A	0	7
Richardson EB	A	D	65	221
High Street/Pine Street				
High Street NB	A	A	27	46
High Street SB	A	A	54	111
Pine Street WB	A	B	50	93
High Street/Granite Street/Off-Ramp				
High Street NB	A	A	0	256
High Street SB	A	A	9	69
Granite Street WB	A	F (53)	23	34
Off-Ramp EB	A	F (290)	105	374
Route 1 Southbound/On-Ramp				
Route 1 Southbound	A	A	0	0
On-Ramp SB	A	C	80	380
High Street at the On-Ramp				
High Street NB	A	A	102	160

Table 2.5 2038 Intersection Level of Service and 95 th Percentile Queue				
	AM LOS	PM LOS	AM Queue (ft)	PM Queue (ft)
High Street SB	A	A	0	41
High Street/Webber Street				
High Street NB	A	A	0	0
High Street SB	A	A	10	45
Webber Street WB	A	C	333	73
Leeman Highway/Middle Street				
Leeman Highway EB	A	A	27	102
Leeman Highway WB	A	A	0	9
Middle Street NB	A	C	54	178
Middle Street SB	A	C	40	76
Leeman Highway/Washington Street				
Leeman Highway EB Left	C	D	67	162
Leeman Highway EB Through	C	D	124	205
Leeman Highway EB Right	A	A	132	133
Leeman Highway WB Left	C	D	182	171
Leeman Highway WB Through	C	D	70	204
Leeman Highway WB Right	A	A	0	52
Washington Street NB Left-Through	C	F (469)	106	2937
Washington Street NB Right	A	B	57	207
Washington Street SB Left	C	F (223)	107	1532
Washington Street SB Through-Right	C	F (217)	89	1551

Table 2.6 Existing and Future Traffic Volumes																										
Intersection	Year	AM Peak Hour												PM Peak Hour												
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
High Street/Webber Avenue		Webber Avenue						High Street						Webber Avenue						High Street						
	2018	-	-	-	18	-	0	-	212	37	3	52	-	-	-	-	89	-	6	-	300	72	3	304	-	
	2038	-	-	-	20	-	0	-	233	41	3	57	-	-	-	-	98	-	7	-	330	79	3	334	-	
High Street/Pine Street		Pine Street						High Street						Pine Street						High Street						
	2018	-	-	-	0	-	41	-	263	9	79	92	-	-	-	-	6	-	138	-	404	9	51	387	-	
	2038	-	-	-	0	-	45	-	289	10	87	101	-	-	-	-	7	-	152	-	444	10	56	426	-	
High Street/Richardson Street		Richardson Street						High Street						Richardson Street						High Street						
	2018	12	-	63	-	-	-	53	245	-	-	296	17	11	-	103	-	-	-	170	502	-	-	358	47	
	2038	13	-	69	-	-	-	58	270	-	-	326	19	12	-	113	-	-	-	187	552	-	-	394	52	
State Road/Richardson Street		Richardson Street						State Street						Richardson Street						State Street						
	2018	-	-	-	109	-	4	-	137	91	-	-	-	-	-	-	313	-	9	-	386	196	-	-	-	
	2038	-	-	-	120	-	4	-	151	100	-	-	-	-	-	-	344	-	10	-	425	216	-	-	-	
State Road/US 1 NB Off-Ramp		State Road						US 1 NB Off-Ramp						State Road						US 1 NB Off-Ramp						
	2018	-	186	-	-	109	-	-	-	-	83	-	39	-	533	-	-	313	-	-	-	-	-	219	-	48
	2038	-	205	-	-	120	-	-	-	-	91	-	43	-	586	-	-	344	-	-	-	-	-	241	-	53
High Street/US 1 NB Off-Ramp		US 1 NB Off-Ramp			Granite Street			High Street						US 1 NB Off-Ramp			Granite Street			High Street						
	2018	51	1	189	3	-	3	-	222	15	9	151	-	109	5	150	2	-	11	-	574	19	16	285	-	
	2038	56	1	208	3	-	3	-	244	17	10	166	-	120	6	165	2	-	12	-	631	21	18	314	-	
High Street/US 1 SB On-Ramp		US 1 SB On-Ramp						High Street						US 1 SB On-Ramp						High Street						
	2018	-	-	-	-	-	-	170	106	-	-	160	40	-	-	-	-	-	-	404	291	-	-	89	302	
	2038	-	-	-	-	-	-	187	117	-	-	176	44	-	-	-	-	-	-	444	320	-	-	98	332	
Leeman Highway/Middle Street		Leeman Highway						Middle Street						Leeman Highway						Middle Street						
	2018	34	456	75	18	104	2	23	1	32	23	3	23	50	323	8	3	508	3	113	20	75	23	5	106	
	2038	37	502	83	20	114	2	25	1	35	25	3	25	55	355	9	3	559	3	124	22	83	25	6	117	
Leeman Highway/Washington Street		Leeman Highway						Washington Street						Leeman Highway						Washington Street						
	2018	35	138	339	167	38	61	79	7	67	87	44	7	120	162	147	170	61	29	321	48	186	115	154	133	
	2038	39	152	373	184	42	67	87	8	74	96	48	8	132	178	162	187	67	32	353	53	205	127	169	146	

2.5 Vehicle Speed Surveys

Speed Surveys were conducted throughout the study area using a radar gun. **Table 2.7** and **Figure 2.8** summarize the results of the surveys. Speeds were taken between Tuesday and Thursday during off-peak hours at all locations except South Street and Middle Street at Fisher Court which were collected during peak hours. Off-peak hours were selected as the roads are less congested, allowing for higher speeds. The two other locations were collected at peak hours because the volumes were too low off peak and because peak hour speeds were a specific complaint at these locations. The speed survey indicates speeding problems on Washington Street and High Street.

Table 2.7 Vehicle Speed Surveys				
Location	Direction	85th Percentile (mph)	Average Speed (mph)	Speed Limit (mph)
High Street at Hyde School NB	Northbound	32.5	29.0	25
High Street at Hyde School SB	Southbound	35	30.7	25
Washington Street at Maritime Museum NB	Northbound	39.5	34.4	25
Washington Street at Maritime Museum SB	Southbound	38.5	33.8	25
Middle Street at Fisher Court NB	Northbound	26.5	20.9	25
Middle Street at Fisher Court SB	Southbound	25	21.0	25
High Street at Webber Street NB	Northbound	39	35.7	30
High Street at Webber Street SB	Southbound	40	34.4	30
South Street at Middle Street EB	Eastbound	26	22.2	25
South Street at Middle Street WB	Westbound	28	23.9	25



2.6 Bicycle and Pedestrian Facilities

The study area has an expansive network of sidewalks, as shown in **Figures 2.9 and 2.10**. Many of the sidewalks in the study area are less than 5 feet wide with the narrowest being 3 feet on Bath Street. Crosswalks are used for all crossings on side streets. The intersection of Leeman Highway and Washington Street features an exclusive pedestrian activated signal phase, which permits pedestrian crossings in all directions for approximately 25 seconds. However, pedestrians rarely wait for this phase to activate. At the 3:30PM BIW shift release, pedestrians cross Leeman Highway along the railroad east of Washington Street and cross mid-block between Franklin Street and Washington Street. At 3:30PM, pedestrians control the intersections of Washington Street and King Street, Washington Street and South Street, and Washington Street and Spring Street as they exit from the north, west, and south gates respectively. There are no shoulders wide enough to accommodate bicycles. Bike Route 1A does run through the northern part of the study area. Bike Route 1A runs along Commercial Street, onto Lambard Street, onto Front Street, then onto the Sagadahoc Bridge. In order to head south on Bike Route 1A from BIW, cyclists must bike several miles out of the way to the north. **Figure 2.11** shows the bicycle routes designated by the City of Bath Bicycle and Pedestrian Plan.

Deficiencies:

- Sidewalks are too narrow.
- Sidewalks are poorly maintained.
- Roads are too narrow for proper shoulders.
- Pedestrians are not well controlled.



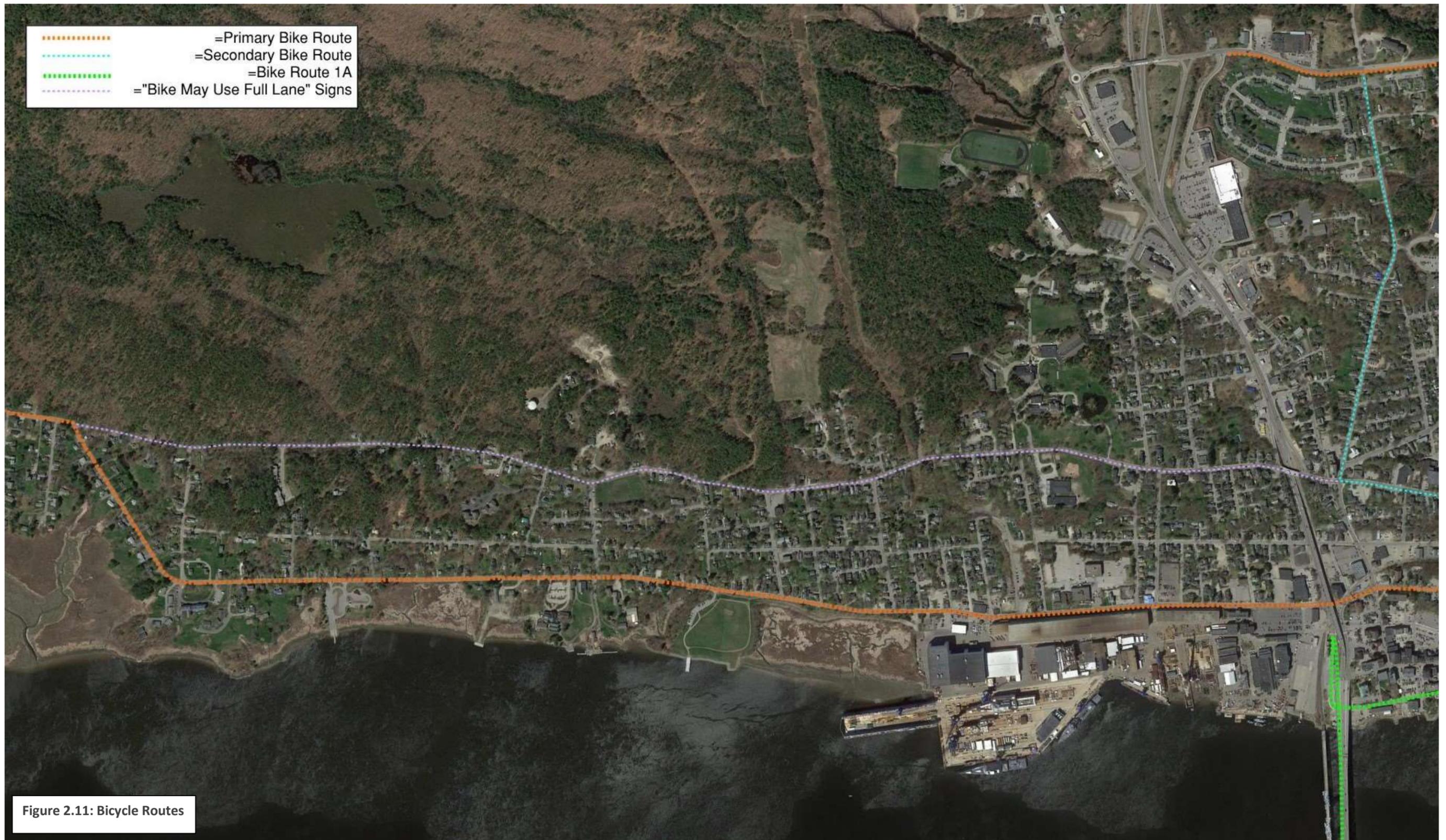


Figure 2.11: Bicycle Routes

2.7 Parking

Bath Iron Works Parking

BIW utilizes 1,604 parking spaces spread over 16 parking lots. This includes three satellite lots; the Taste of Maine parking lot in Woolwich, the MaineDOT Park and Ride lot in Bath, and the Maine Gravel parking lot in West Bath. The parking facilities are needed to accommodate 3,300 employees on the first shift. The West Bath satellite lot features a separate wing for third shift employees. The parking lots in the study area are shown in **Figure 2.12**.

The satellite lots are currently underutilized. **Table 2.8** shows the number of vehicles parked in each lot, the capacity of each lot, and the percent utilization of each lot based on data collected on a typical weekday.

Table 2.8 Satellite Lot Utilization				
Lot	Vehicles	Capacity	Available	Percent Utilization
West Bath	70	240	170	29%
VIP	66	70	4	94%
Woolwich	90	150	60	60%

Rental Spaces Parking

There are many public and private parking spaces available for rent. The City of Bath owns parking lots under the Sagadahoc Bridge on Commercial Street and on Water Street next to the Police Department. There is currently a wait list to receive a parking permit. BIW also lists private parking facilities at Middle Street and Russell Street, Russell Street, Castine Street and Middle Street, Stacey Street and Washington Street, Stacey Street, Middle Street and Fisher Court, Franklin Street and Leeman Highway, and Pleasant Street and Washington Street. The rental parking lots are shown in **Figure 2.10**. These spaces cost between \$75-\$125 per week and feature waitlists.

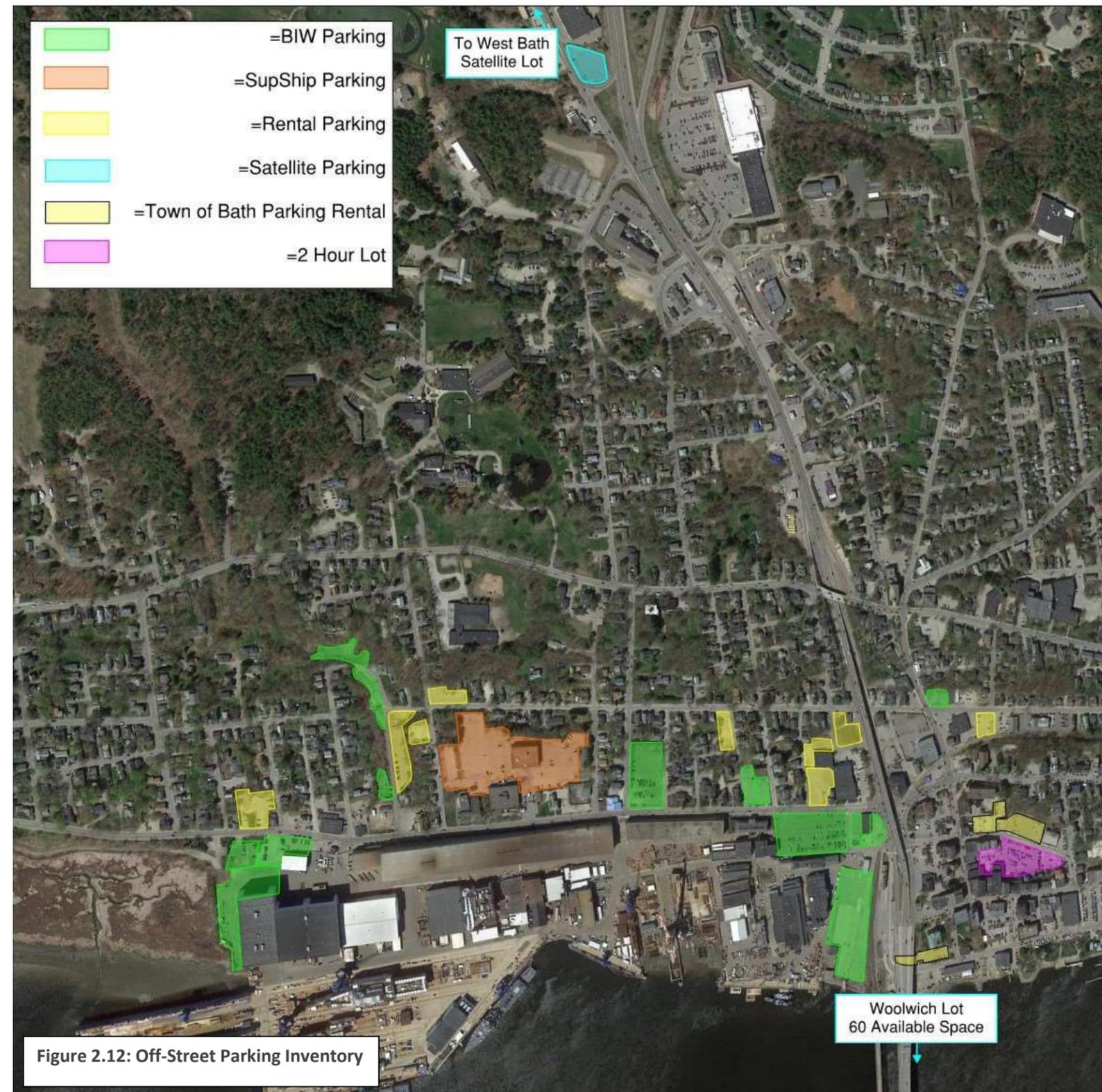


Figure 2.12: Off-Street Parking Inventory

On-Street Parking

There is no unrestricted on-street parking north of Pine Street in the study area. The increased employee presence at the South Gate of BIW has increased the number of BIW employees parking on street. Bath has parking restrictions in this area as summarized below:

Restricted to 2-hour parking from 6:00AM to 8:00PM

- Pine Street on both sides.
- Middle Street northbound from Pine Street to Pleasant Street.
- Hinkley Street both sides.
- Spring Street westbound.
- Russell Street on the north side.
- Middle Street southbound from Russell Street to Granite Street.
- Bath Street on the north side.
- South Street eastbound from Middle Street to Washington Street and westbound from Middle Street to High Street.
- Shepard Street westbound.
- Wesley Street westbound.
- Granite Street from High Street to Middle Street westbound.

Union Street has 2-hour parking 6:00AM to 3:00PM and no parking 3:00PM to 8:00PM on the north side.

Washington Street has 2-hour parking 6:00AM to 2:00PM and no parking other times from Hinkley to Pleasant Street, 2-hour parking 6:00AM to 8:00PM from Castine to Bath Street, 30-minute parking 6:00AM-1:00AM from Bath Street to South Street, permit parking 6:00AM to 6:00PM from South Street to Fisher Court, and 2-hour parking from Fisher Court to Union Street heading northbound. Southbound Washington Street has 1-

hour parking from Russell Street to Castine Street and 2-hour parking from Hinkley Street to Pine Street. BIW employees will park in these restricted parking areas and move their cars when on break. These vehicles are often ticketed. **Figures 2.13 and 2.14** shows the on-street parking in the Study Area.



Figure 2.13: Southern On-Street Parking



Figure 2.14: Northern On-Street Parking

2.8 Other Projects

Richardson Street Traffic Calming

The Richardson Street/Western Avenue Neighborhood recently tested traffic calming measures with the aim of slowing down and reducing through traffic from State Road to High Street. A gateway choker was set up on both ends of Richardson Street and Western Avenue using bollards. A median island was created on Western Avenue extending from the west of Elsinore Avenue to east of Cottage Street, creating a right-in/right-out at those intersections. Temporary speed bumps were installed on Richardson Street between Reldon Road and Pine Hill Drive, between Pine Hill Drive and Evergreen Street, and between West Street and Matty Way. Temporary speed bumps were installed on Western Avenue between the Citgo Station and Lilac Street and between Cottage Street and Farrin Street. Temporary speed bumps were also installed on Lilac Street, Farrin Street, Elsinore Ave, and Cottage Street. These traffic calming features are temporary installations.

State Street/Route 1 Northbound On-Ramp Reconfiguration

As noted previously, this On-Ramp is a High Crash Location with 20 rear-end crashes in the most recent three-year period. Currently, there is little to no acceleration lane distance available on the ramp to allow traffic to safely merge. There were also concerns about sight lines on this ramp, with people feeling they had to turn their necks too far to be able to see oncoming traffic. This ramp is being reconfigured to allow a safer merge. Construction is scheduled to begin in September of 2020.

3.0 TRANSIT

3.1 Bus Facilities

The City of Bath operates two bus loops, the North loop and the South loop. The bus will make pick-ups anywhere along its route, but it is recommended riders board at one of the check points. Riders should tell the bus driver their destination upon boarding the bus. The south loop extends from Route 1 to Lemont Street. The bus operates hourly but does not operate during the 3:30PM run due to the BIW run.

The BIW Employee Shuttle Service will pick up BIW employees at their homes, take them to work, and return them home in the afternoon. BIW employees can call the City to be added to the route. All Bath CityBus rides are \$1 each way.

3.2 Bath Iron Works Parking Shuttle

BIW rents shuttles from BO-MAR Transportation to bring employees to and from designated satellite parking facilities. The shuttles run from lots at The Taste of Maine in Woolwich, West Bath Shuttle Lot at 333 State Road, West Bath, and the MaineDOT Park and Ride on State Road in Bath. The shuttles operate on a morning, mid-day, afternoon run, and a night run with a stand by shuttle (see Tables 3.1 through 3.4). BIW recently upgraded their mid-day run to a continuous 30-minute loop. This improvement was implemented based on the advice of BIW employees in an anonymous survey.

Table 3.1 BIW Parking Shuttle Morning Run			
Bus #	Departure Location	Departure Time	Drop Off Gate
1	MaineDOT	6:00 AM	South Gate, West Gate, North Gate
		6:15 AM	South Gate, West Gate, North Gate
		6:32 AM	North Gate, West Gate, South Gate
2	West Bath	6:05 AM	North Gate, West Gate, South Gate
	Taste of Maine	6:30 AM	North Gate, West Gate, South Gate
3	Taste of Maine	6:00 AM	South Gate
	Taste of Maine	6:25 AM	North Gate, South Gate
4	Taste of Maine	6:10 AM	West Gate, South Gate
		6:35 AM	North Gate, West Gate, South Gate
5	West Bath	6:22 AM	North Gate, West Gate, South Gate
6	West Bath	5:40 AM	North Gate
		7:10 AM	North Gate
		7:40 AM	North Gate
7	South Gate	7:05 AM	West Bath Lot
	West Gate	7:06 AM	West Bath Lot

Table 3.2 BIW Parking Shuttle Mid-Day Run		
Departure Location	Departure Time	Drop Off Location
South/West Gate	7:35 AM	All Parking Lots
North Gate	7:36 AM	All Parking Lots
South/West Gate	8:05 AM	All Parking Lots
North Gate	8:06 AM	All Parking Lots
South/West Gate	8:35 AM	All Parking Lots
North Gate	8:36 AM	All Parking Lots
South/West Gate	9:05 AM	All Parking Lots
North Gate	9:06 AM	All Parking Lots
South/West Gate	9:35 AM	All Parking Lots
North Gate	9:36 AM	All Parking Lots
South/West Gate	10:05 AM	All Parking Lots
North Gate	10:06 AM	All Parking Lots
South/West Gate	10:35 AM	All Parking Lots
North Gate	10:35 AM	All Parking Lots
South/West Gate	11:05 AM	All Parking Lots
North Gate	11:06 AM	All Parking Lots
South/West Gate	11:35 AM	All Parking Lots
North Gate	11:36 AM	All Parking Lots
South/West Gate	12:05 PM	All Parking Lots
North Gate	12:06 PM	All Parking Lots
South/West Gate	12:35 PM	All Parking Lots
North Gate	12:36 PM	All Parking Lots
South/West Gate	1:05 PM	All Parking Lots
North Gate	1:06 PM	All Parking Lots
South/West Gate	1:35 PM	All Parking Lots
North Gate	1:36 PM	All Parking Lots
South/West Gate	2:05 PM	All Parking Lots
North Gate	2:06 PM	All Parking Lots
South/West Gate	2:35 PM	All Parking Lots
North Gate	2:36 PM	All Parking Lots
North Gate	3:05 PM	West Bath Lot

3.3 Carpooling

GOMaine offers rewards to commuters who make environmentally friendly commuting choices such as carpooling. GOMaine’s online Carpool match finding tool lists 35 people looking to carpool to Bath Iron Works or

nearby businesses. These people are commuting from as far as Saco, Lewiston, Rockport, and Belgrade.

Table 3.3 BIW Parking Shuttle Afternoon Run			
Bus #	Departure Location	Departure Time	Drop Off Location
1	South Gate	3:36 PM	Taste of Maine
	South Gate	3:45 PM	All Parking Lots
2	South Gate	3:35 PM	Taste of Maine
	West Gate	3:37 PM	
	North Gate	3:39 PM	
3	South Gate	3:35 PM	Taste of Maine
	West Gate	3:37 PM	
	North Gate	3:39 PM	
4	South Gate	3:35 PM	West Bath Lot
	West Gate	3:37 PM	
	North Gate	3:39 PM	
5	South Gate	3:35 PM	VIP & West Bath Lots
	West Gate	3:37 PM	
	North Gate	3:39 PM	
6	South Gate	3:35 PM	VIP
	West Gate	3:37 PM	
	North Gate	3:39 PM	
7	North Gate	4:05 PM	West Bath Lot
		4:35 PM	West Bath Lot

Table 3.4 BIW Parking Night Run			
Bus #	Departure Location	Departure Time	Drop off Location
1	West Bath Lot	10:40 PM	West Gate, South Gate

*There is a shuttle available at the South Gate to take employees to and from the satellite lot between the hours of 10:00PM and 6:00AM

3.4 Vanpooling

BIW does not run a formal vanpool program, however employees who organize their own vanpool typically receive a permit to park in the North Gate lots. These vanpools are operated independently.

4.0 EXISTING ZONING AND LAND USE

4.1 Existing Zoning

The Study Area, shown in **Figure 4.1**, is comprised of 12 districts, ranging from established residential neighborhoods in the R1 District, BIW in the Industrial District, and the downtown in the C1 District. For the purposes of this Study, the adjacency of the R1 District to the I District creates the most incompatibilities with parking and vehicular circulation.

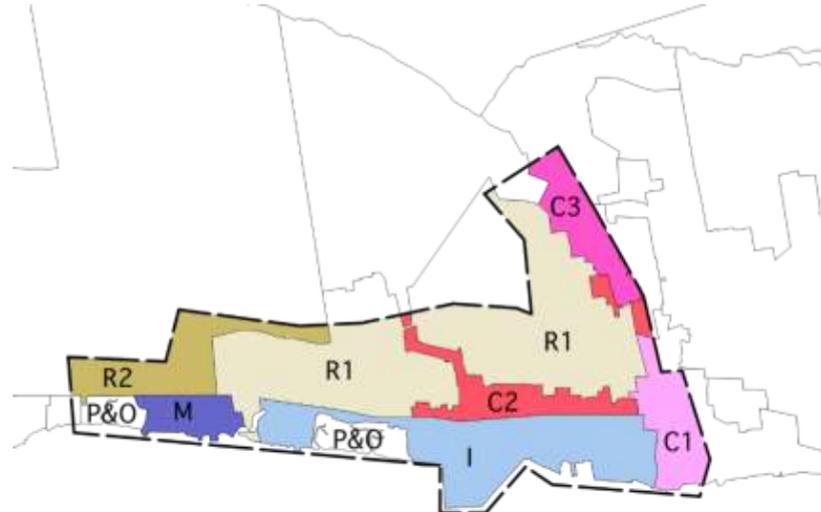


Figure 4.1: Existing Zoning Districts

4.2 Zoning with Roads

Figure 4.2 shows the relationship of the street network with zoning. In the R1 District, for example, there are streets with the same zoning on both sides of the street, helping shape a cohesive feel to the street in terms of character and use. The street is integral to the character of the neighborhood. In the R1 there are also edge conditions, such as along Washington Street, where one side of the street is zoned Industrial and one side Residential 1. Edge condition streets often have a street designed to meet the capacity needs of the district with the more intense use. In this case, the street can become a type of divide in the community, like Route 1 creates a divide between different neighborhoods. These divides are areas where pedestrian safety can become an issue, vehicular congestion can impact the district with less intensive uses, the street can become a dominant visual/use aspect that is not integrated into the fabric of the community

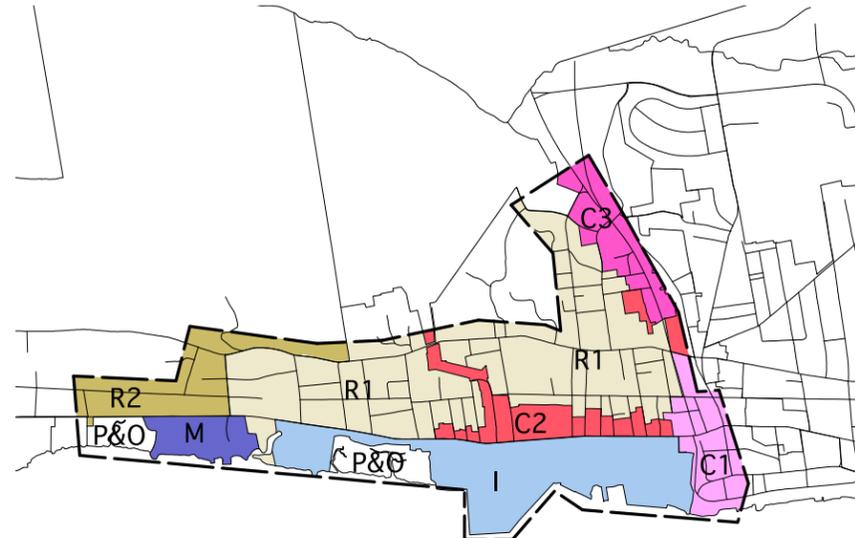


Figure 4.2: Zoning Districts with Roads

4.3 Figure Ground with Study Area Boundary

Figure ground studies (**Figure 4.3**) depict the scale and pattern of development by only showing building footprints. It is like an x-ray, showing the bones of a city. In the figure ground, a few things are evident: the scale and pattern of development in the R1 District is distinct from the



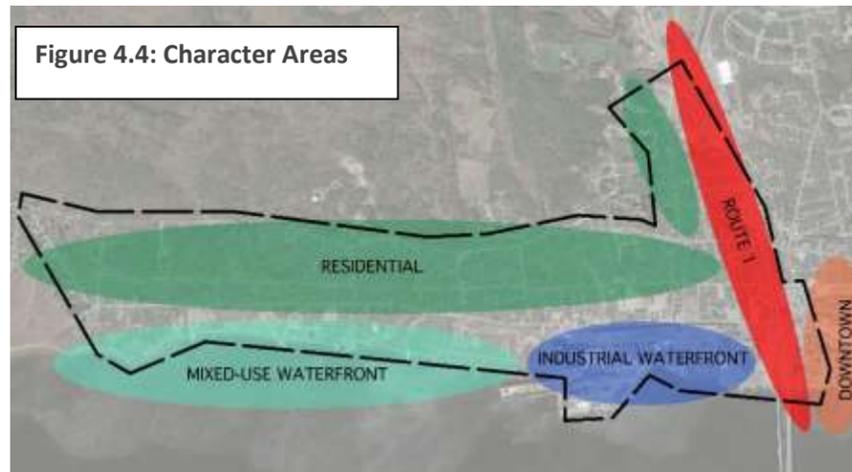
Figure 4.3: Figure Ground

scale and pattern of the BIW buildings. You can see the street network as defined by the building footprints in R1. It is a pedestrian scale layout. The BIW facilities are much large in scale, with footprints that could absorb entire R1 neighborhoods. In fact, two to three historic downtown areas can clearly fit inside the BIW facilities. Adjacent development patterns at such extremes indicate that incompatibilities may exist. One of these potential incompatibilities is inferred by what is not seen on the figure ground. To the east of the BIW facilities are blank white spaces. These are typically parking lots – and from historic trends – these gaps in the city fabric were most likely once residences and are now part of the expanded impact of the BIW facilities into the adjacent neighborhood.

4.4 Character Areas

Unlike the zoning map or the figure ground analysis, it is helpful to look at the character of the community for general trends of development, not specifics. In **Figure 4.4**, there is a swath of residential running north south, the industrial area of BIW, Route 1 running east/west and to the north the traditional downtown. Each of the character areas are located for logical reasons. BIW needs to be on the water, Route 1 is part of a regional transportation system that happens to cut through Bath as it does through many coastal communities, and the downtown is focused in the center of Bath on the waterfront, balancing out the use of BIW to the south. In looking at this diagram of character areas, it would seem that BIW is only partially constrained and there is direct access to Route 1. However, it is known at a more granular level that the character area of BIW partially saturates the other character areas in terms of parking facilities and that vehicles pass through the other character areas to access parking and BIW. It is a general goal during the process of planning to look for recommendations that help reinforce the character of an area. For example, find solutions that make the residential character area more residential in nature in terms of compatibility of uses, including the compatibility of the use of use of the streets to support neighborhood

parking and circulation and not serve the needs of competing adjacent uses.



4.5 Street Character

This is not a classification of streets according to MaineDOT or even transportation engineering and planning standards, but from a land use and planning and perspective. **Figure 4.5** shows Route 1 clearly dominating the character of the area running east west. Running south from the downtown the South End are Washington, Middle and High Streets. These Streets are all key connections under Route 1 – historic connections between the South End and the downtown. However, Washington and High are also streets that connect to greater uses and areas. For the purposes of the study, Washington is the eastern edge condition street



connecting BIW with the regional transportation network. High Street is a western edge condition (not a local condition street shown in gray as thin lines), but a key connection between Route 1, downtown and points south. Middle Street acts as a central spine running through the heart of the residential districts south of downtown. It is not always called Middle Street and the street jogs now and then, but it is the most local of the street networks running the length of the study area. Where these streets of different character intersect are often points of potential conflict for pedestrian safety, congestion, and community character.

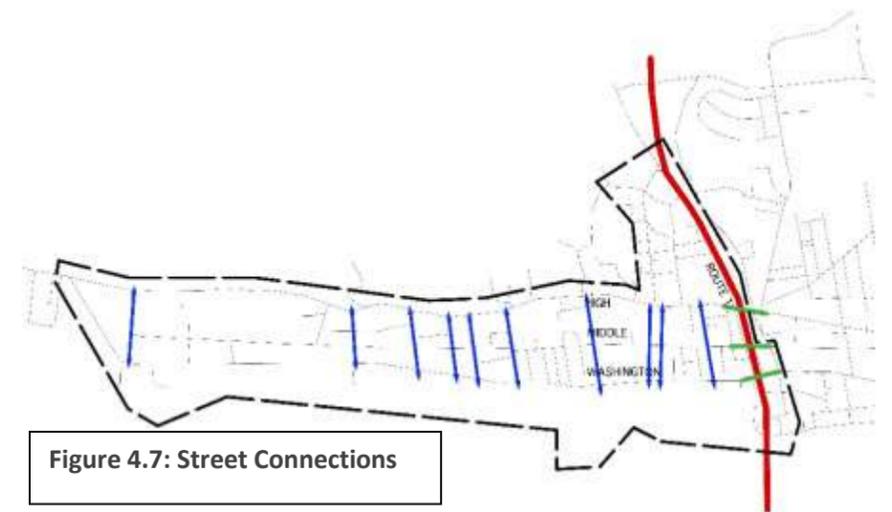
4.6 Gateways

Figure 4.6 depicts edge condition gateways, typically defined by the vehicle thresholds as primary and secondary gateways. These are not defined by traffic counts and turning movements – although there may be a correlation – but more by the transition from one condition into the condition of the study area. By recognizing these gateway points, the community can begin to determine if that neighborhood is an appropriate place for a gateway into the study area or should the gateways be shifted through changes to design and policy standards. Additional questions can be asked such as should there only be gateways on the edge of the study area? Where should they be located? Should some gateways be more local in nature and others more regional in nature?



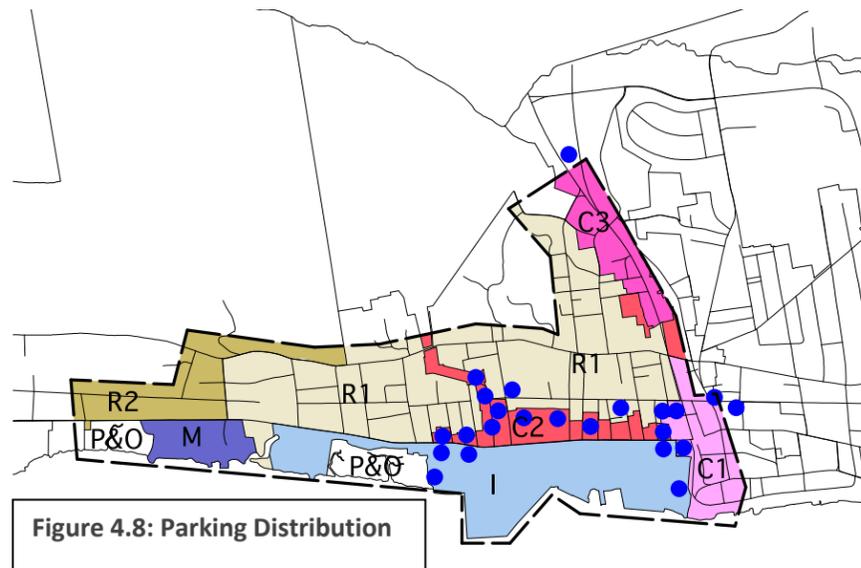
4.7 Street Connections

Figure 4.7 shows the general street connectivity and flow of vehicles through the study area and neighborhoods. More detailed analysis is provided in the transportation portion of this report. In general, from a traditional downtown planning perspective, the higher degree of connectivity, the more networked the urban street grid, the better for walkability and quality of life. However, in the case of this study area, it is recognized that there is a waterfront use of great intensity – and this use does impact the local street network. Therefore, the degree of connectivity and the recommended patterns of circulation may be different than a traditional two-way connectivity in order to help attenuate BIW's impact on the community.



4.8 Parking Distribution

The intent of **Figure 4.8** is to show the general distribution of BIW parking, inside and outside of the facility. It demonstrates that the “footprint” of the BIW facilities extends beyond the actual buildings into the surrounding neighborhoods. BIW parking in the C2 District is currently permitted as “Shared Parking.” BIW parking in the R1 District is currently “Legally Nonconforming” as shared parking. As the community provides input on the impact of parking and options are explored for parking and transportation recommendations, recommendations for the underlying zoning and status of these facilities might change.



5.0 TRANSPORTATION RECOMMENDATIONS

The following summarizes recommendations identified for the study area. Planning-level cost and an implementation timeframe is provided. Short-term is within 5-years; Mid-term is 5 to 8 years; and Long-term is greater than 8-years. **Table 5.10** presents a summary of Transportation Recommendations and is provided at the end of this Section. Table 5.11 provides a summary of Performance as it relates to key objective measures.

5.1 High Street/Centre Street

This intersection is a High Crash Location. All approaches are stopped controlled except for the westbound Centre Street approach. Converting this intersection to a four-way STOP intersection may mitigate the safety deficiency as well as improve performance at the Route 1 Ramp intersections along High Street (by limiting the vehicle queuing on High Street). There is currently no available traffic volume information and it is recommended that a study be conducted that will include conducting traffic counts.

- Consider converting this intersection to a four-way STOP intersection. (improves safety and performance at the Route 1 intersections). See **Figure 5.1**.
- Conduct traffic counts during summer to determine final recommendation.
- Winter maintenance will be required to address vehicles stopping on the grade.

Short-Term Implementation
Cost: \$10,000.00

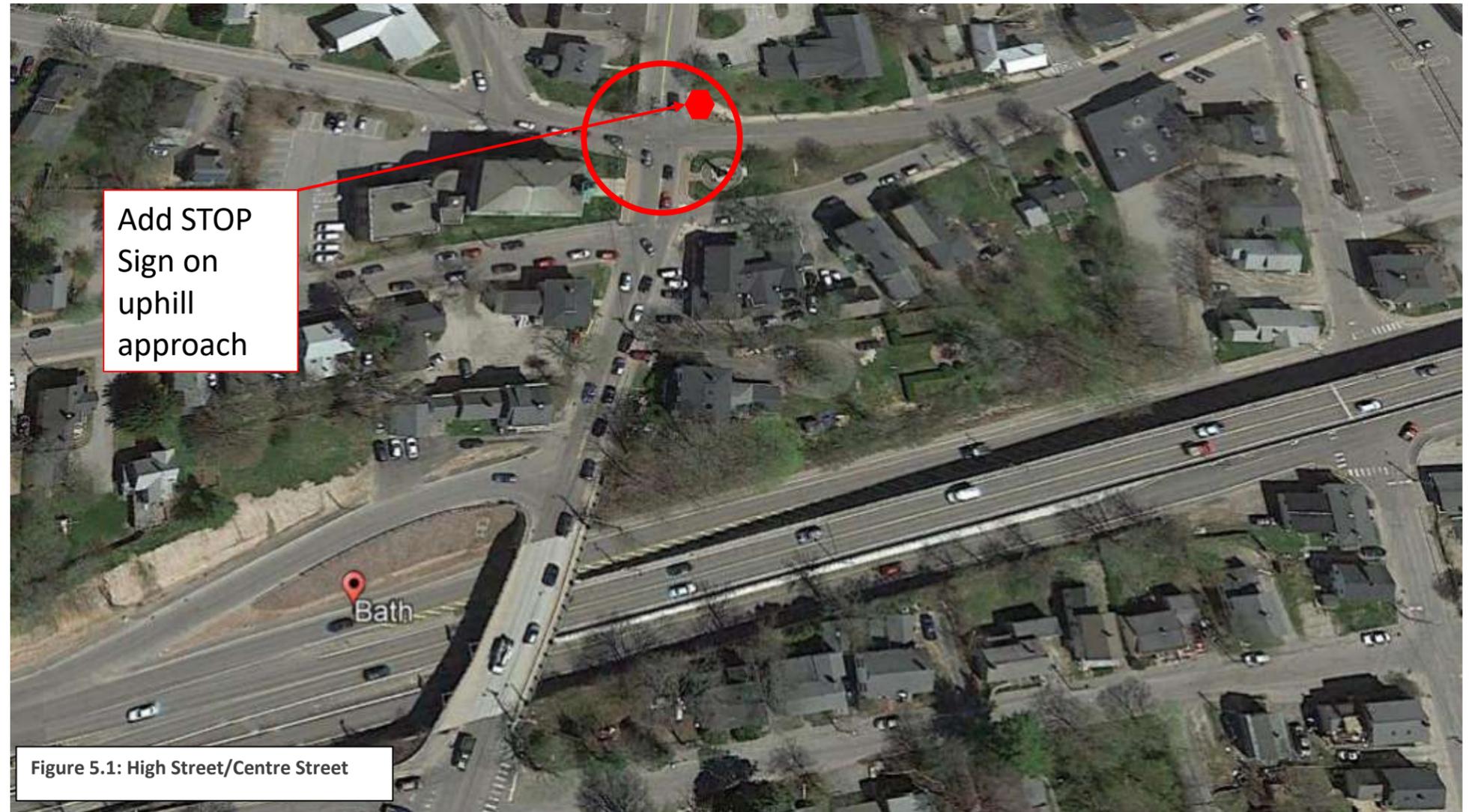


Figure 5.1: High Street/Centre Street

5.2 High Street and Route 1 Ramps

- The Route 1 Northbound Off-Ramp currently experiences significant delay for the left-turn movements. The intersection does not warrant a traffic signal, but it should be monitored.
- Improve sight distance by removing vegetation and sign obstructions.
Short-term Implementation
Cost: \$5,000.00
- Consider changing the lane assignment on the Off-Ramp to a left/through and a right lane configuration. Although this will not reduce delays for left-turn movements, it will allow right-turns to proceed without waiting. This is not expected to improve conditions significantly.
Short-term Implementation
Cost: \$2,000.00
- When the High Street bridge is replaced, consider:
 - Adding an additional lane on High Street.
 - Provide sidewalks and bicycle lanes.

A level of service comparison of the bridge with the turn lane was compared to the 2038 No-Build in **Table 5.1**. This alternative allows through traffic to slip around the left turning queue at the on-ramp, preventing the queue from reaching the off-ramp. The approach still operates below an acceptable LOS, but the delay is significantly lower than the current configuration. **Figure 5.2** shows what this would look like.

Long-term Implementation
Cost: Not Estimated

- Vehicle queues from Centre Street impact Route 1 Ramp intersections. Investigate capacity improvements at Centre Street. See **Section 5.1**.
Short-Term Implementation
Cost: \$10,000.00
- Circulation changes on Washington Street, proposed later in this section, would have positive impacts on these intersections. A 30% reduction in High Street northbound left-turning traffic was assumed. The eastbound left turning movement still operates below an acceptable LOS (See **Table 5.1**)
Mid-term/Long-term Implementation
Cost: Not Estimated
- Strategies that direct BIW traffic to Washington Street or to Satellite Parking lots will ease congestion and should be considered.



Table 5.1 Delay (Sec/Veh) at High Street/Granite Street/Route 1 NB Off-Ramp						
	Route 1 NB Off-Ramp			Granite Street	High Street	
	EBL	EBT	EBR	WBLR	NBTR	SBTL
2038 No-Build	1695	106		808	15	0.2
Change Lane Assignment	968		73	402	13	0.5
Add Turn Lanes	73		5	11	0	1
One-Way on Washington Street	322		18	29	1	1

5.3 Washington Street and Leeman Highway

This intersection experiences significant queues and delays at the end of the BIW first shift on weekdays at 3:30PM. The longest vehicle queues occur on the northbound Washington Street approach. The following alternatives were evaluated for reducing congestion. It should be noted that any improvement would need to meet MaineDOT’s Policy of 10 to 12-foot lanes and 2 to 6 foot shoulders.

Alternative 1 - Optimize Traffic Signal Timing

Optimize traffic signal timing during the afternoon BIW shift release time to add additional green time to northbound Washington Street. **Table 5.2** shows the mobility benefit of optimizing the signal. Given the complicated configuration of the intersection, the traffic signal system does have limitations on efficiently managing traffic (and controlling pedestrian movements). Police control (or Adaptive Traffic Signal Strategies) may be a better method for improving operations between 3:30 and 4:00PM. As shown in **Figure 5.3**, the delay on Washington Street can be reduced by optimally distributing green time. Doing so will increase delay on Leeman Highway approaches, which should be carefully managed to ensure back-ups onto Route 1 do not occur.

Short-term Implementation

Cost:

- Timing Adjustments - \$5,000.00
- Adaptive Traffic Signal Control - \$150,000.00

Table 5.2 Washington Street and Leeman Highway Delays (seconds/vehicle)				
	Leeman Highway		Washington Street	
	Eastbound	Westbound	Northbound	Southbound
2038 No-Build	28.9	34.5	346	219
Alternative 1 – Optimized Signal Timing	45.9	50.0	106	152



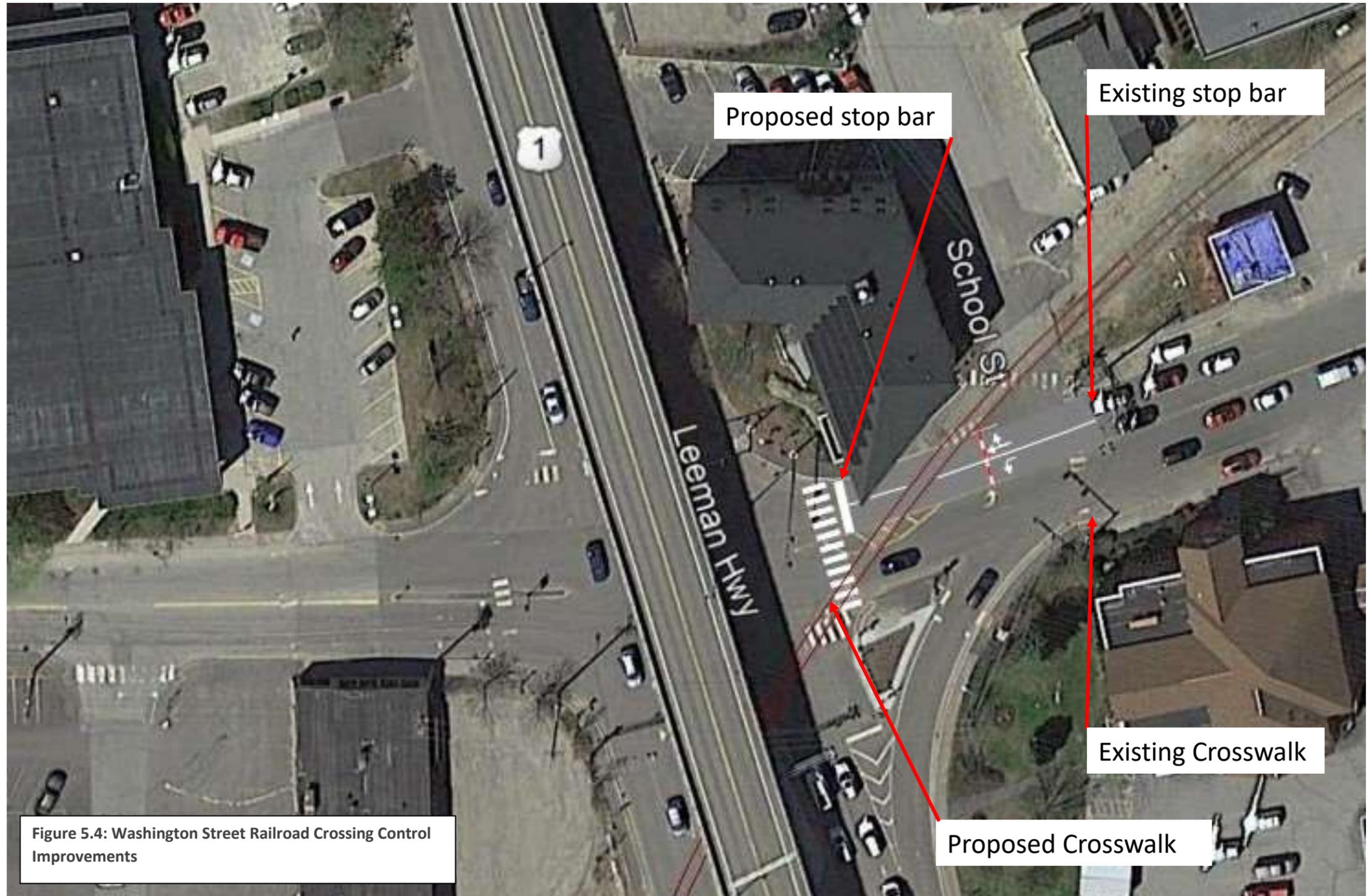
Alternative 2 - Rail Crossing Modifications

Moving the stop bar on the Washington Street southbound approach closer to the intersection would reduce yellow and all-red clearance times, allow right-turn-on-red movements and increase the distance to the Centre Street intersection thus minimizing blockage. Railroad gates would be required to prevent traffic from stopping on the tracks if a train was approaching. Another benefit is that the crosswalk could be located in a traditional location at the intersection.

Figure 5.4 shows the improved concept.

Mid-term Implementation

Cost: Not Estimated but could be \$500,000.00 or greater.



Alternative 3 - Part-Time One-Way Washington Street

Convert Washington Street to one-way northbound from Leeman Highway to Pine Street between 3:30PM and 4:00PM. This alternative adds approach capacity. The approach to the intersection was evaluated with three approach lanes and two approach lanes. There are several constraints to this alternative including:

- Requires police control or ITS technologies.
- The Viaduct pier restricts left-turning movements onto southbound Leeman Highway.
- Second-shift traffic headed to BIW must use neighborhood streets, likely Middle Street.

The queuing at the intersection is significant and police control (or ITS technologies) would be the optimum strategy to flush out Washington Street without backing traffic onto Route 1. Police control offers the dynamic control to manage the queues. This alternative will require signs at the end side streets prohibiting right-turns from 3:30PM to 4:00PM.

Figure 5.5 shows the extent of the Part Time One-Way. It is recommended that a “test” of the One-Way Plan be conducted to assess its benefit should Alternatives 1 and 2 not adequately address issues. This would require significant coordination but would allow the City/BIW/MaineDOT some level of confidence before investing funds for final implementation.

If side streets are converted to one-way toward Washington Street, 426 vehicles are estimated to be added to the intersection. In order to accommodate this volume increase, the Washington Street northbound approach needs to be one-way. Vehicle delay both with and without the circulation changes are shown in Table 5.3.

Mid-term/Long-Term Implementation

Cost:

- Test Monitoring- \$20,000.00
- Final Implementation – Not Estimated but could be \$500,000.00 or greater.



Figure 5.5: Proposed Part-Time One-Way on Washington Street

Table 5.3 Washington Street/ Leeman Highway Delays/Vehicle with Washington Street Becoming One-Way									
	Leeman Highway				Washington Street				All
	EBL	EBT	WBT	WBR	NBTL	NBR	SBL	SBT	
No-Build	41.4	50	39.4	4.3	483.5	14.8	317.8	316.5	127.2
Existing Circulation	43.4	38.4	56.8	6	292.1	65.7	9	347.4	347
One-Way Side Streets	55.2	59.4	95.6	4.4	593.9	1129.1	19.2	273.4	96.3

Circulation Changes Associated with the Short Term One-Way on Washington Street

To mitigate traffic impacts to the South End Neighborhood, a review of converting side streets to one-way was performed. Given current long delays at the Washington Street/Leeman Highway intersection, it is not recommended that streets are converted to one-way under current two-way Washington Street. If Washington Street is converted to the Part-Time One-Way Plan, streets can be converted to one-way (See **Figure 5.6**). These circulation changes would be permanent and not short-term like Washington Street. The following street widths are rounded to the nearest foot.

- Stacey Street Eastbound: This street is adjacent to two private parking lots. Making this street one-way would prevent the private lots from moving up to Middle Street and into the neighborhood. The roadway width is 20 feet. There are no sidewalks on this street.
- Fisher Court Eastbound: This street is adjacent to a private lot on the corner of Middle Street and Fisher Court. Making this street one-way forces five rows of parking onto Washington Street. Fisher Court is only 15 feet wide. The narrow width supports making the street one-way. There is no sidewalk on either side of the street.
- Wesley Street Eastbound: This street is not adjacent to parking facilities, but if two-way traffic is permitted, it would likely become a cut-through route to avoid the Washington Street/Leeman Highway intersection. The street is 20 feet wide. There is a 4.5-foot sidewalk on the north side of the street. Parking is permitted on the north side of the street.
- Shepard Street Eastbound: This street is adjacent to a private parking lot. Making this street one-way will force vehicles from the parking lot onto Washington Street. The street is 22 feet wide with a 3.5-foot sidewalk on the north side of the street. Parking is permitted on the north side of the street.
- South Street from Middle Street to Washington Street Eastbound: This street is adjacent to a private parking lot. Making this street one-way will force vehicles from this parking lot onto Washington Street. The road is 27 feet wide. There is a 5 feet sidewalk on the south side and a 4.5 feet sidewalk on the north side. There is parking on the south side of the street.
- Bath Street from Middle Street to Washington Street Eastbound: This street is already one-way westbound. Reversing the direction will

prevent BIW traffic from entering the neighborhood and going to Middle Street.

- Castine Street Eastbound and Spring Street Westbound: These streets are adjacent to the BIW CMP parking lots. Making these streets one-way creates a loop that prevents the vehicles from using Middle Street to Pine Street. Spring Street is 20 feet wide. The road is only 18 feet around the curve. Castine Street is 21 feet. There is two-hour parking on the north side of Spring Street and no parking from 6am-8pm on the south side. There is no parking on Castine Street.
- Middle Street from Russell Street to Castine Street Southbound: This street connects the CMP lots to the neighborhood. Making this segment one-way prevents BIW traffic from moving down Middle Street. The street is 20 feet wide. There is no parking or sidewalk on either side of the road.

These circulation changes will direct traffic to the Washington Street/Leeman Highway intersection. **Table 5.3** shows the impact on the intersection. The added traffic volumes have a negative impact on the intersection performance, but the benefit of the changes comes from the decreased volumes traveling through the neighborhood. Many of the side street are too narrow to be two-way streets so the changes would likely improve safety.

These circulation changes would impact the Middle Street and Leeman Highway intersection. There would be significantly less volume leaving Middle Street during the afternoon peak hour.

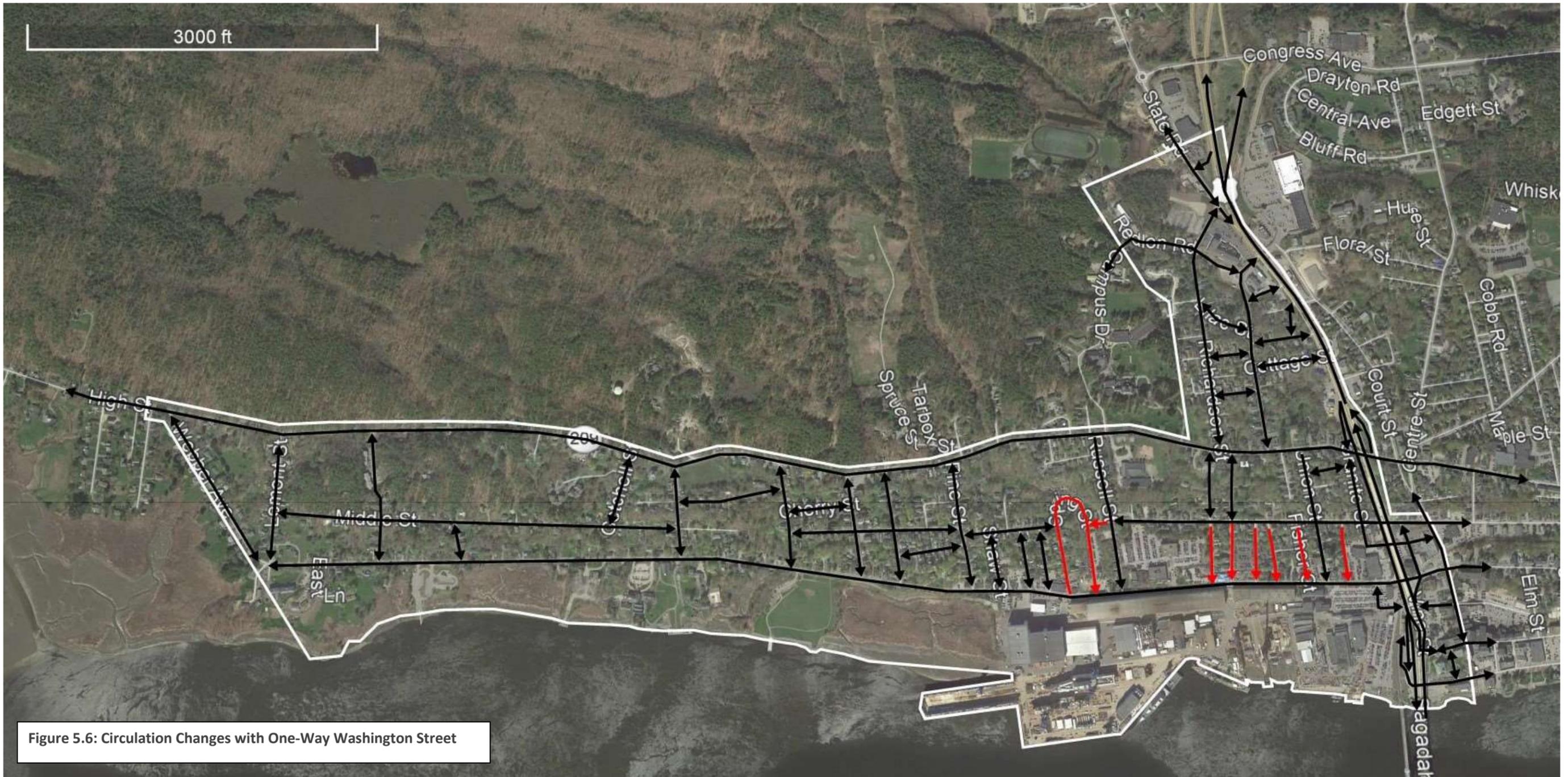


Figure 5.6: Circulation Changes with One-Way Washington Street

Alternative 4 - Extend Washington Street Northbound Right-Turn Lane

During the September public meeting there were comments about extending the right-turn lane on the northbound Washington Street approach. According to a SimTraffic analysis, extending the right-turn lane has minimal effect on intersection operations. No change is suggested. The results are shown in **Table 5.4**.

Table 5.4 Washington Street/Leeman Highway Delays with Extended Right-Turn Bay(seconds/vehicle)										
	Leeman Highway						Washington Street			
	EBL	EBT	EBR	WBL	WBT	WBR	NBTL	NBR	SBL	SBT
No-Build	41.4	50	9.9	42.3	39.4	4.3	483.5	14.8	317.8	316.5
Extended Right Turn Bay	40	45.6	6.8	37.9	32.1	3.6	456	12.8	344.4	334.3
No-Build with Circulation Changes	39.2	36.9	7.7	38.6	39	5.3	897.8	6.7	306.5	299.9
Extended Right-turn Lane with Circulation Changes	40.8	36.9	9.5	40.1	41.6	3.7	1089.7	15.0	337.9	330.9

Alternative Comparison

Table 5.5 compares the delay of each approach. Delays listed under both the NBL and the NBT header signify a northbound left-through lane as existing while separate delays in Alternative 3 signify a left-turn and a through lane. The southbound through-right lane acts only as a southbound right in Alternative 3. The westbound queue can not exceed 550 feet without creating safety concerns on the Route 1 Southbound Off-Ramp. No alternative exceeds this standard.

Table 5.5 Alternative Delay Comparison													
Alternative	Leeman Highway							Washington Street					Overall
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBTR	
A0-No Build	Delay	41.4	50	9.9	42.3	39.4	4.3	483.5		14.8	317.8	316.5	213.0
	LOS	D	D	A	D	D	A	F		B	F	F	F
	Queue	181	240	167	170	249	88	2800		205	1681	308	
A1-Optimize the Signal	Delay	67.7	101	12.4	57.3	92.4	4.4	139		10.4	179.5	73.9	104.4
	LOS	E	F	B	E	F	A	F		B	F	E	F
	Queue	197	735	196	172	315	113	1269		206	1392	349	
A2-Rail Crossing Modification with Signal Optimization	Delay	59.7	115.8	13.2	57.0	60.6	4.4	138.1		12.0	149.6	77.6	82.3
	LOS	E	F	B	E	E	A	F		B	F	E	F
	Queue	196	733	195	173	307	107	1267		207	801	360	
A3-Part-Time One-Way Washington	Delay	43.4	38.4	-	-	56.8	6	292.1	65.7	9	347.4	347	118.9
	LOS	D	D	-	-	E	A	F	E	A	F	F	F
	Queue	185	224	-	-	304	137	1429	724	118	1213	351	
A3b-Part-Time One-Way with Circulation Changes	Delay	55.2	59.4	-	-	95.6	4.4	593.9	1129.1	19.2	273.4	96.3	294.9
	LOS	E	E	-	-	F	A	F	F	B	F	F	F
	Queue	190	287	-	-	441	175	2712	2906	166	1197	350	
A4- Extend Washington NB Right-Turn Bay	Delay	40	45.6	6.8	37.9	32.1	3.6	456		12.8	344.4	334.3	193.6
	LOS	D	D	A	D	C	A	F		B	F	F	F
	Queue	183	303	172	170	247	81	2744		338	1680	308	

5.4 Traffic Calming

- Consider traffic calming strategies along Webber Street and Washington Street between High Street and Pine Street. This area has pedestrian generators such as parks, the Maine Maritime Museum, and a retirement community. Traffic calming will lower speeds and make crossings safer for pedestrians. No changes are suggested at this time.
- Consider traffic calming strategies on Pine Street. Pine Street is a primary cut-through for BIW traffic to get to High Street. The residential nature of the street means noise needs to be considered when designing traffic calming. No changes are suggested at this time.

5.5 Bicycle Improvements

- Install Shared Lane markings and signs along Webber Street and Washington Street from High Street to Pine Street. The current pavement width is 27 feet which is not wide enough for two travel lanes and bicycle lanes. Additionally, “Share the Road” or “Bike May Use Full Lane” signs should be installed.

Short-term Implementation

Cost: \$5,000.00

5.6 Pedestrian Improvements

Sidewalks

- The City has several sidewalks that are not ADA compliant. Updating sidewalks should be programmed. Connecting sidewalks on Union Street closes a gap in the pedestrian network. Adding a sidewalk on Castine Street would improve pedestrian safety as cars exit parking lots. Adding a sidewalk on Washington Street for use in non-winter seasons. Adding a sidewalk on the north side of Western Avenue from Elsinore Avenue to the Citgo Entrance closes a gap in the system. Proposed sidewalks are shown in **Figure 5.7**.

Short-term/Mid-term Implementation

Cost:

- Union Street: \$20,000.00
 - Castine Street: \$40,000.00
 - Washington Street: \$50,000.00
 - Western Street: \$15,000.00
- There is demand for a sidewalk on the east side of High Street south of Webber Street. This is outside of the study area but should be considered.
Implementation To be determined
Cost: Not determined for this study

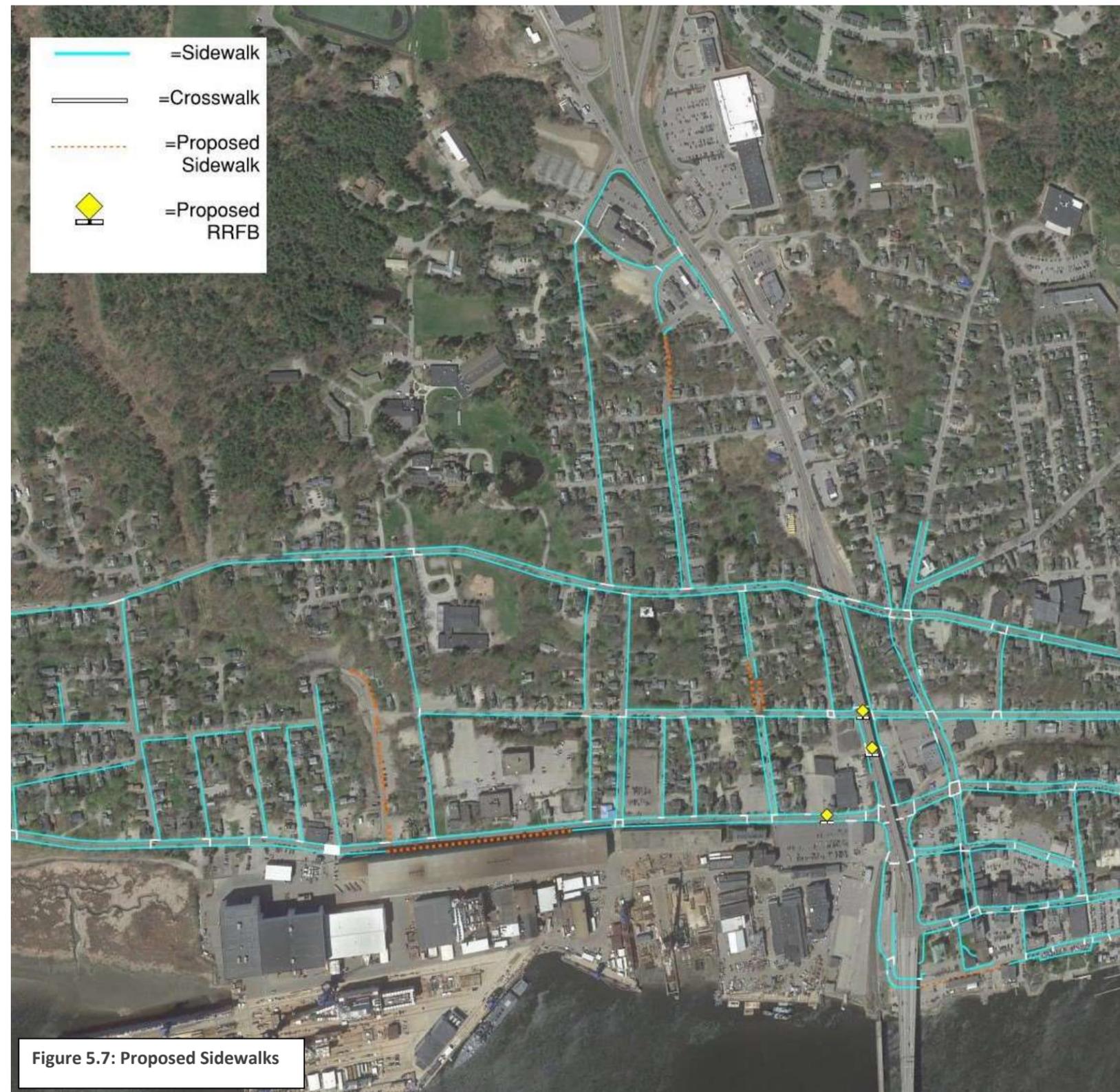


Figure 5.7: Proposed Sidewalks

Uncontrolled Pedestrian Crossings

The following improvements are associated with improving safety at existing or proposed crosswalks.

- Install Rectangular Rapid Flashing Beacons (RRFB) on Leeman Highway at Middle Street and Franklin Street. This is intended to improve pedestrian safety.
Short-term Implementation
Cost: \$50,000.00
- In 2017, Gorrill Palmer was retained by BIW to evaluate crosswalks on Washington Street adjacent to BIW. The evaluation recommended removing parking within 20 feet of a crosswalk.
Short-term Implementation
Cost: \$5,000.00
- Upgrade crosswalks to meet ADA standards
Short-term/Mid-term/Long-term Implementation
Cost: Not Estimated



Pedestrian Barriers

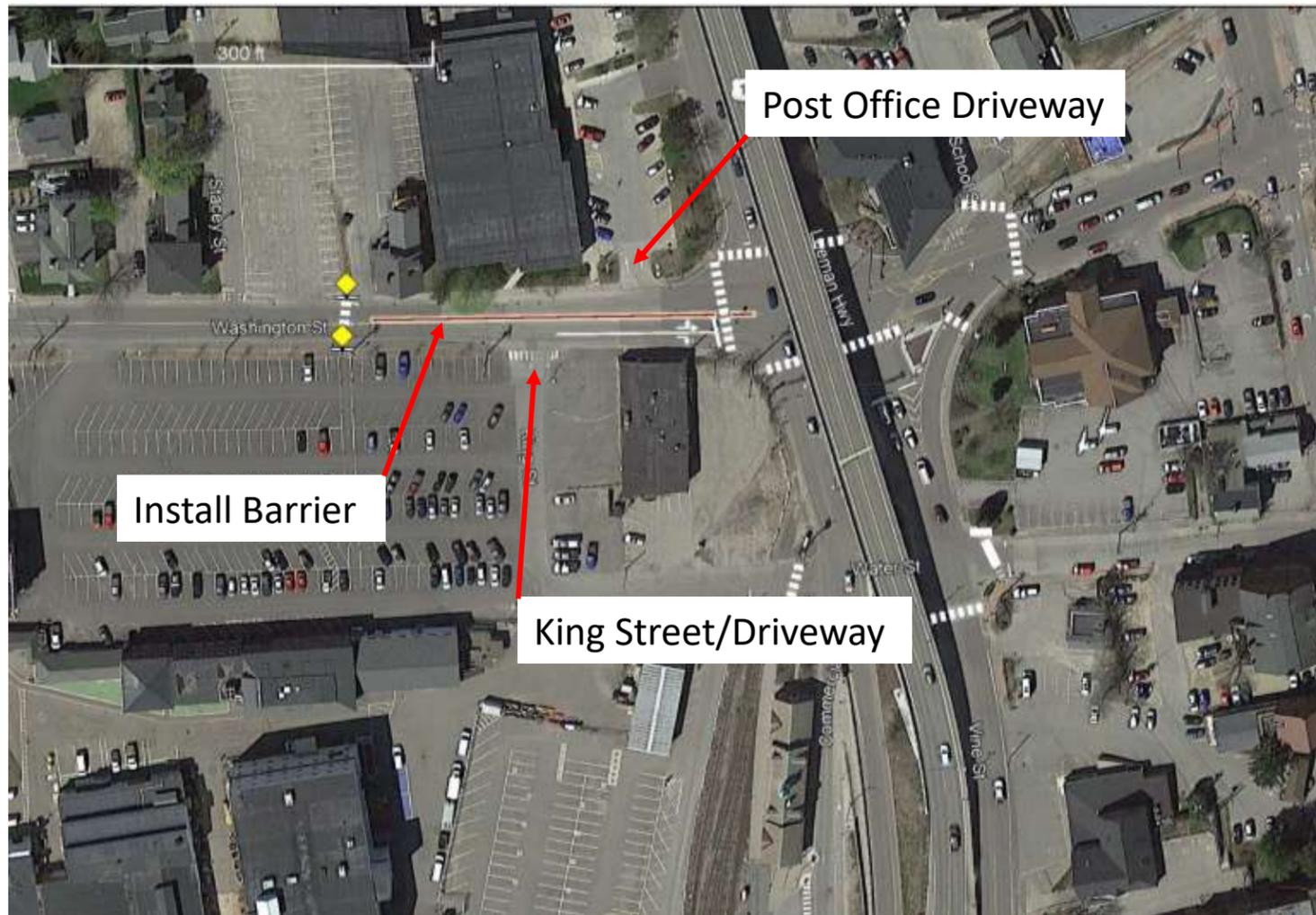
Pedestrian movements during shift changes have an impact on traffic flow as use of designated controlled crosswalks are not utilized. This has a negative impact on level of service and pedestrian safety. To address this, barrier fences to corral pedestrians to safe crossing areas is suggested.

Washington Street

Install a pedestrian fence on the Washington Street northbound approach to Leeman Highway to prevent pedestrians from crossing mid-block and impacting vehicle flow. Eliminate the crosswalks at King Street and the Post Office. Pedestrians would have the choice of crossing at a formalized crossing near Stacey Street or at the signalized intersection. Left-turn access into the Post Office and King Street would be prohibited.

Short-term Implementation

Cost: \$35,000.00



Leeman Highway

Install a fence under the Leeman Highway Viaduct to prevent unsafe crossings on Leeman Highway. Pedestrians would have the choice of crossing at the Washington Street traffic signal or at the proposed RRFB crossing at Franklin Street.

Short-term Implementation

Cost: \$85,000.00



Pedestrian Traffic Signal Phase Modifications
Changing the pedestrian traffic signal phase to concurrent would reduce delays for both pedestrians and vehicles. Pedestrians currently push the button, but do not wait to cross due to long delays. This causes an exclusive pedestrian (no traffic moves) phase to activate with no crossing pedestrians. Reducing the delay for pedestrians will likely increase compliance and increase pedestrian safety as well. However, there are potential safety concerns with right turning vehicle conflicts. Accordingly, supplemental warning devices are suggested. The pedestrian phasing is demonstrated in **Figure 5.8**.

Short-term Implementation
Cost: \$25,000.00



Figure 5.8: Proposed Pedestrian Traffic Signal Phasing

5.8 Parking Improvement Strategies

The following recommendations are intended to address parking management enhancements and minimize neighborhood impacts (see **Figure 5.9**).

BIW Improvement Program

- The goal is to create safe and organized parking for all employees.
- Investment and expansion are underway in the Brunswick facility, which has opportunities to shift current or future employees out of Bath.
- 800 new employees are expected in 2019.
- BIW will locate employees who don't need to be in the shipyard to other locations. **On-Going Implementation**
- Is committed to no new parking supply in neighborhood.
- New expanded access to satellite lots includes all-day shuttle service. **Implemented**
- Satellite lots and other BIW properties have the capacity to handle additional parking needs.
- Will consider schedule changes to reduce congestion. As workforce grows, consider minimizing impacts by utilizing off-site parking whenever practical. **Mid-term/Long-term**
- Will coordinate with SUPSHIP on satellite lot use for Navy crews. **Short-term Implementation**
- Change the 2-Hour Parking in front of BIW to permit parking for vanpools/carpools only. **Short-term Implementation**
- BIW owns property at the top of Tarbox Hill that could become a satellite lot. Access to the lot will be challenging due to extreme grades and poor sight lines. The lot would also be challenging because the lot may have environmental permitting challenges. The benefit of this lot would be creating satellite parking within walking distance of the BIW. This lot is not considered feasible and not under consideration.

- A parking garage on the BIW north parking lot is not recommended given the increased parking supply will likely intensify traffic impacts on Washington Street; long delays departing the garage are likely which may lead to lack of use; and high construction/maintenance cost.

City Improvement Program

- Implement a residential parking program for the South End neighborhood. On-street parking without a residential permit would be limited to 1-Hour. Residents with a permit would have no time restrictions for parking on-street (outside of usual ordinances and parking bans). Doing so will prevent BIW employees from being able to move their vehicles during breaks to avoid fines. **Mid-term Implementation**
- Increase the fines for parking violations (See **Table 5.6**). Consider towing vehicles after the first violation within six months. Increase enforcement. **Mid-term Implementation**

Table 5.6: On-Street Parking Violation Fines		
Number of Violations in half year	Existing Fines	Proposed Fines
First Violation	\$15	\$50
Second Violation	\$20	\$75 + Vehicle Towed
Third Violation	\$25	\$100 + Vehicle Towed
Fourth Violation	\$30	\$150 + Vehicle Towed
Fifth Violation	\$35	\$300 + Vehicle Towed



Figure 5.9: Proposed On-Street Parking Changes

5.9 BIW Transportation Demand Management Strategies

The following recommendations are intended to address the number of employee vehicles traveling to the Shipyard. Many are directly related to parking management strategies.

- BIW should implement a van/bus service all day as overwhelmingly requested via online employee survey. **Implemented in December 2018**
- Increase the number of satellite parking shuttle buses at shift change. Many BIW employees stated concern over missing the buses. **Mid-term implementation following monitoring**
- BIW should coordinate with GOMaine as a significant number of employees showed interest in the program. **Short-term implementation**
- Offer incentives for non-single occupancy vehicles and use of satellite parking lots. **To be considered in the future**
- Manage parking lots for origin/destination patterns and traffic flow benefits. **On-Going**
- Consider changes to Shift 2 start time to avoid peak traffic problems at 3:30PM. Designate parking for Shift 2 to accomplish this. **Mid-term/Long-term recommendation**
- Stagger Work Hours for BIW professional/administrative employees and consider not offering them premium parking unless they must use their vehicle during the day as part of their jobs. **Mid-term/Long-term recommendation**
- Require deliveries to BIW to use Route 1 to Washington Street and not utilize local streets. **Implemented**
- Install flashing warning signs stating “Shift Change When Flashing” on Leeman Highway and High Street to advise motorists to seek an alternate route. **Mid-term/Long-term recommendation**

Table 5.7

SUMMARY OF TRANSPORTATION RECOMMENDATIONS

ROADWAY / INTERSECTION	
High Street/Centre Street	<ul style="list-style-type: none"> ▪ Consider converting this to a four-way STOP intersection. ▪ Conduct traffic counts during summer to determine final recommendation. <p>Short-Term Implementation Cost: \$10,000.00</p>
High Street and Route 1 Ramps	<ul style="list-style-type: none"> ▪ Improve sight distance by removing vegetation and sign obstructions. Short-term Implementation Cost: \$5,000.00 ▪ Change the lane assignment on the Off-Ramp to a left/through and a right lane configuration. Short-term Implementation Cost: \$2,000.00 ▪ When the High Street bridge is replaced, consider: <ul style="list-style-type: none"> ○ Adding an additional lane on High Street. ○ Provide sidewalks and bicycle lanes. <p>Long-term Implementation Cost: Not Estimated</p>
Washington Street and Leeman Highway	<ul style="list-style-type: none"> ▪ Alternative 1 - Optimize Traffic Signal Timing Short-term Implementation Cost: <ul style="list-style-type: none"> ○ Timing Adjustments - \$5,000.00 ○ Adaptive Traffic Signal Control - \$150,000.00 ▪ Alternative 2 - Rail Crossing Modifications Mid-term Implementation Cost: Not Estimated but could be \$500,000.00 or greater. ▪ Alternative 3 - Part-Time One-Way Washington Street Mid-term/Long-Term Implementation Cost: <ul style="list-style-type: none"> ○ Test Monitoring- \$20,000.00 ○ Final Implementation – Not Estimated but could be \$500,000.00 or greater.
BICYCLE	
Bicycle Facility Improvements	<ul style="list-style-type: none"> ▪ Install Shared Lane markings and signs along Webber Street and Washington Street from High Street to Pine Street. Short-term Implementation Cost: \$5,000.00
PEDESTRIAN	
Sidewalks	<ul style="list-style-type: none"> ▪ Short-term/Mid-term Implementation Cost: <ul style="list-style-type: none"> ○ Union Street: \$20,000.00 ○ Castine Street: \$40,000.00 ○ Washington Street: \$50,000.00

Table 5.7

SUMMARY OF TRANSPORTATION RECOMMENDATIONS

	<ul style="list-style-type: none"> ○ Western Street: \$15,000.00 ▪ There is demand for a sidewalk on the east side of High Street south of Webber Street. This is outside of the study area but should be considered. Implementation To be determined Cost: Not determined for this study
Crosswalks	<ul style="list-style-type: none"> ▪ Install Rectangular Rapid Flashing Beacons (RRFB) on Leeman Highway at Middle Street and Franklin Street. Short-term Implementation Cost: \$50,000.00 ▪ Removing parking within 20 feet of a crosswalk. Short-term Implementation Cost: \$5,000.00 ▪ Upgrade crosswalks to meet ADA standards Short-term/Mid-term/Long-term Implementation Cost: Not Estimated
Barrier Fence	<ul style="list-style-type: none"> ▪ Install a pedestrian fence on the Washington Street northbound approach to Leeman Highway to prevent pedestrians from crossing mid-block and impacting vehicle flow. Eliminate the crosswalks at King Street and the Post Office. Short-term Implementation Cost: \$35,000.00 ▪ Install a fence under the Leeman Highway Viaduct to prevent unsafe crossings on Leeman Highway. Short-term Implementation Cost: \$85,000.00
Pedestrian Signal Phasing	<ul style="list-style-type: none"> ▪ Washington Street and Leeman Highway - Change the pedestrian traffic signal phase to concurrent operation. Install supplemental warning devices. Short-term Implementation Cost: \$25,000.00
PARKING	
BIW Program	<ul style="list-style-type: none"> ▪ The goal is to create safe and organized parking for all employees. ▪ Investment and expansion are underway in the Brunswick facility, which has opportunities to shift current or future employees out of Bath. ▪ BIW will locate employees who don't need to be in the shipyard to other locations. On-Going Implementation ▪ Is committed to no new parking supply in neighborhood. ▪ New expanded access to satellite lots includes all-day shuttle service. Implemented ▪ Satellite lots and other BIW properties have the capacity to handle additional parking needs. ▪ Will consider schedule changes to reduce congestion. As workforce grows, consider minimizing impacts by utilizing off-site parking whenever practical. Mid-term/Long-term ▪ Will coordinate with SUPSHIP on satellite lot use for Navy crews. Short-term Implementation ▪ Change the 2-Hour Parking in front of BIW to permit parking for vanpools/carpools only. Short-term Implementation
City Program	<ul style="list-style-type: none"> ▪ Implement a residential parking program for the South End neighborhood. On-street parking without a residential permit would be limited to 1-Hour. Residents with a permit would have no time restrictions for parking on-street (outside of usual ordinances and parking bans). Doing so will prevent BIW employees from being able to move their vehicles during breaks to avoid fines. Mid-term Implementation ▪ Increase the fines for parking violations (See Table 5.9). Consider towing vehicles after the first violation within six months. Increase enforcement. Mid-term Implementation
Transportation Demand Management (TDM)	
BIW Program	<ul style="list-style-type: none"> ▪ BIW should implement a van/bus service all day as overwhelmingly requested via online employee survey. Implemented in December 2018 ▪ Increase the number of satellite parking shuttle buses at shift change. Many BIW employees stated concern over missing the buses. Mid-term implementation following monitoring

Table 5.7

SUMMARY OF TRANSPORTATION RECOMMENDATIONS

	<ul style="list-style-type: none"> ▪ BIW should coordinate with GOMaine as a significant number of employees showed interest in the program. Short-term implementation ▪ Offer incentives for non-single occupancy vehicles and use of satellite parking lots. To be considered in the future ▪ Manage parking lots for origin/destination patterns and traffic flow benefits. On-Going ▪ Consider changes to Shift 2 start time to avoid peak traffic problems at 3:30PM. Designate parking for Shift 2 to accomplish this. Mid-term/Long-term recommendation ▪ Stagger Work Hours for BIW professional/administrative employees and consider not offering them premium parking unless they must use their vehicle during the day as part of their jobs. Mid-term/Long-term recommendation ▪ Require deliveries to BIW to use Route 1 to Washington Street and not utilize local streets. Implemented ▪ Install flashing warning signs stating “Shift Change When Flashing” on Leeman Highway and High Street to advise motorists to seek an alternate route. Mid-term/Long-term recommendation
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Table 5.8
Performance Comparison Matrix

		Improve Pedestrian Safety	Reduce the impact of vehicular traffic on neighborhood streets	Improve the availability of parking and/or reduce parking demand	Improved Vehicular Mobility	Cost
ROADWAY/INTERSECTION						
High Street/Centre Street	Conduct traffic counts to determine the feasibility of a four-way STOP intersection	Pending	No	No	Pending	Low
						\$10,000
High Street/Route 1 Ramps	Improve sight distance by removing vegetation and sign obstructions	Yes	No	No	Yes	Low
		Improved sightlines allow drivers to more easily see pedestrians			Gaps will be easier to identify	\$10,000
	Change the lane assignment on the Off-Ramp to a left/through and a right lane configuration	No	No	No	Yes	Low
					Prevents through movements from blocking right turns	\$2,000
Widen the bridge when replaced to include a turn lane on High Street, sidewalks, and bicycle lanes	Yes	No	No	Yes	N/A	
	Removes poles from the sidewalk			Allows through movements past queued left-turn movements	Not Estimated	
Washington Street/Leeman Highway	A1-Optimize Traffic Signal Timing	No	Yes	No	Yes	High
			Reduced traffic delay should help to keep traffic out of neighborhoods		Reduces delay per vehicle from 94s to 83s	\$5,000 for Timing \$150,000 for Adaptive Traffic Signal Control
	A2-Rail Crossing Modifications	Yes	Yes	No	Yes	High
Moves the crosswalk closer to the intersection where vehicles are traveling slower			Reduced traffic delay should help to keep traffic out of neighborhoods		Increases storage room and allows right-turn on red on the southbound approach	Not Estimated but could be \$500,000 or greater
A3-Part-Time One-Way Washington Street	No	Yes	No	Maybe	High	

Table 5.8 Performance Comparison Matrix						
		Improve Pedestrian Safety	Reduce the impact of vehicular traffic on neighborhood streets	Improve the availability of parking and/or reduce parking demand	Improved Vehicular Mobility	Cost
			Reduced traffic delay should help to keep traffic out of neighborhoods		Reduces delay per vehicle from 94s to 79s with no circulation changes but increases to 174 with circulation changes	\$20,000 for Test Monitoring. Final Implementation is not estimated but could be \$500,000 or greater
	A4-Change the pedestrian phasing from exclusive to concurrent	Yes	No	No	Yes	Medium
		Reduces the delay for pedestrians and may increase compliance			Eliminates delay from the exclusive pedestrian phase	\$25,000
BICYCLE						
Bicycle Facility Improvements	Install Shared lane markings and signs along Webber Street and Washington Street from High Street to Pine Street	No	No	No	No	Low
						\$5,000
PEDESTRIAN						
Sidewalks	Union Street Sidewalk	Yes	No	No	No	Medium
						\$20,000
	Castine Street Sidewalk	Yes	No	No	No	Medium
						\$40,000
	Washington Street Sidewalk	Yes	No	No	No	Medium
						\$50,000
	Western Street Sidewalk	Yes	No	No	No	Medium
						\$15,000
	There is demand for a sidewalk on the east side of High Street south of Webber Street. This is outside the study area but should be considered.	Yes	No	No	No	Not Estimated
Crosswalks	Install Rectangular Rapid-Flashing Beacons on Leeman Highway at Middle Street and Franklin Street	Yes	No	No	No	Medium
						\$50,000
	Remove Parking within 20 feet of a crosswalk	Yes	No	No	No	Low
				Removes availability		\$5,000
	Upgrade crosswalks to meet ADA standards	Yes	No	No	No	Not Estimated
PARKING						
BIW Program	Investment and expansion are underway in the Brunswick facility, which has opportunities to shift current or future employees out of Bath	No	Yes	Yes	Some	Not Estimated
			Removes vehicles from the neighborhood	Reduces demand in the neighborhood	Reduces the volumes in the neighborhood	
		No	Yes	Yes	Some	Not Estimated

**Table 5.8
Performance Comparison Matrix**

		Improve Pedestrian Safety	Reduce the impact of vehicular traffic on neighborhood streets	Improve the availability of parking and/or reduce parking demand	Improved Vehicular Mobility	Cost
	BIW will locate employees who don't need to be in the shipyard to other locations.		Removes vehicles from the neighborhood	Reduces demand in the neighborhood	Reduces the volumes in the neighborhood	
	Stay committed to no new parking supply in neighborhood	No	No	No	No	Not Estimated
	New Expanded access to satellite lots includes all-day shuttle service	No	Yes	Yes	Some	Not Estimated
			Encourages employees to park outside the neighborhood	More employees will be likely to park outside the neighborhood	Reduces the volumes in the neighborhood	
	Consider schedule changes to reduce congestion	No	Some	No	Yes	Not Estimated
			Decreased delays at the signal will encourage people to stay on Washington		Reduces the volumes leaving at once	
	Coordinate with SUPSHIP on satellite lot use for Navy crews	No	Yes	Some	Some	Not Estimated
			Removes the Navy personnel vehicles from the neighborhood	Frees on-street parking for residents	Reduces volumes in the neighborhood	
Change the 2-Hour parking in front of BIW to permit parking for vanpools/carpools only	No	No	No	No	Not Estimated	
City Program	Implement a residential parking program for the South End neighborhood. On-street parking without a residential permit would be limited to 1-Hour. Residents with a permit will have no time restrictions (outside of usual ordinances and parking bans)	No	Yes	Some	Some	Not Estimated
			Discourages employees from parking in the neighborhood	Frees on-street parking for residents	Reduces volumes in the neighborhood	
	Increase the fines for parking violations	No	Yes	Some	Some	Not Estimated
			Will reduce volumes approximately 3% for every 10% increase in fines	Discourages BIW employees from parking in the neighborhood	Reduces volumes in the neighborhood	
TRANSPORTATION DEMAND MANAGEMENT (TDM)						
BIW Program	Continue the all-day bus service	No	Yes	Yes	Some	Not Estimated
			Reduces the number of vehicles in the neighborhood	Reduces the number of vehicles in the neighborhood	Reduces the number of vehicles in the neighborhood	
		No	Yes	Yes	Some	Not Estimated

Table 5.8 Performance Comparison Matrix						
		Improve Pedestrian Safety	Reduce the impact of vehicular traffic on neighborhood streets	Improve the availability of parking and/or reduce parking demand	Improved Vehicular Mobility	Cost
	Increase the number of satellite parking shuttle buses at shift changes.		Reduces the number of vehicles in the neighborhood	Reduces the number of vehicles in the neighborhood	Reduces the number of vehicles in the neighborhood	
	Coordinate with GOMaine	No	Yes	Yes	Some	Not Estimated
			Reduces the number of vehicles by encouraging carpooling	Reduces the number of vehicles by encouraging carpooling	Reduces the number of vehicles by encouraging carpooling	
	Offer incentives for non-single occupancy vehicles and use of satellite lots	No	Yes	Yes	Some	Not Estimated
			Reduces the number of vehicles by encouraging carpooling	Reduces the number of vehicles by encouraging carpooling	Reduces the number of vehicles by encouraging carpooling	
	Manage parking lots for origin/destination patterns and traffic flow benefits	No	No	No	Yes	Not Estimated
					Limits trips through town	
	Consider changes to Shift 2 start time to avoid peak traffic problems at 3:30PM. Designate Shift 2 parking to accomplish this	No	No	No	Yes	Not Estimated
				Decreases supply for shift 1	Eliminates the conflicting flow inbound for shift 2	
	Stagger work hours for BIW professional/administrative employees and consider not offering them premium parking unless they must use their vehicle during the day as part of their jobs	No	Yes	Yes	No	Not Estimated
			Reduces the number of vehicles in the neighborhood	Frees up parking spaces (preferably for carpool/vanpool)		
	Require deliveries to BIW use Route 1 and not use local streets	No	Yes	No	No	Not Estimated
	Install flashing warning signs stating "Shift Change When Flashing" on Leeman Highway and High Street to advise motorists to seek an alternate route	No	No	No	Some	Not Estimated
					Advises those unfamiliar with the area to stay away during the peak hour	

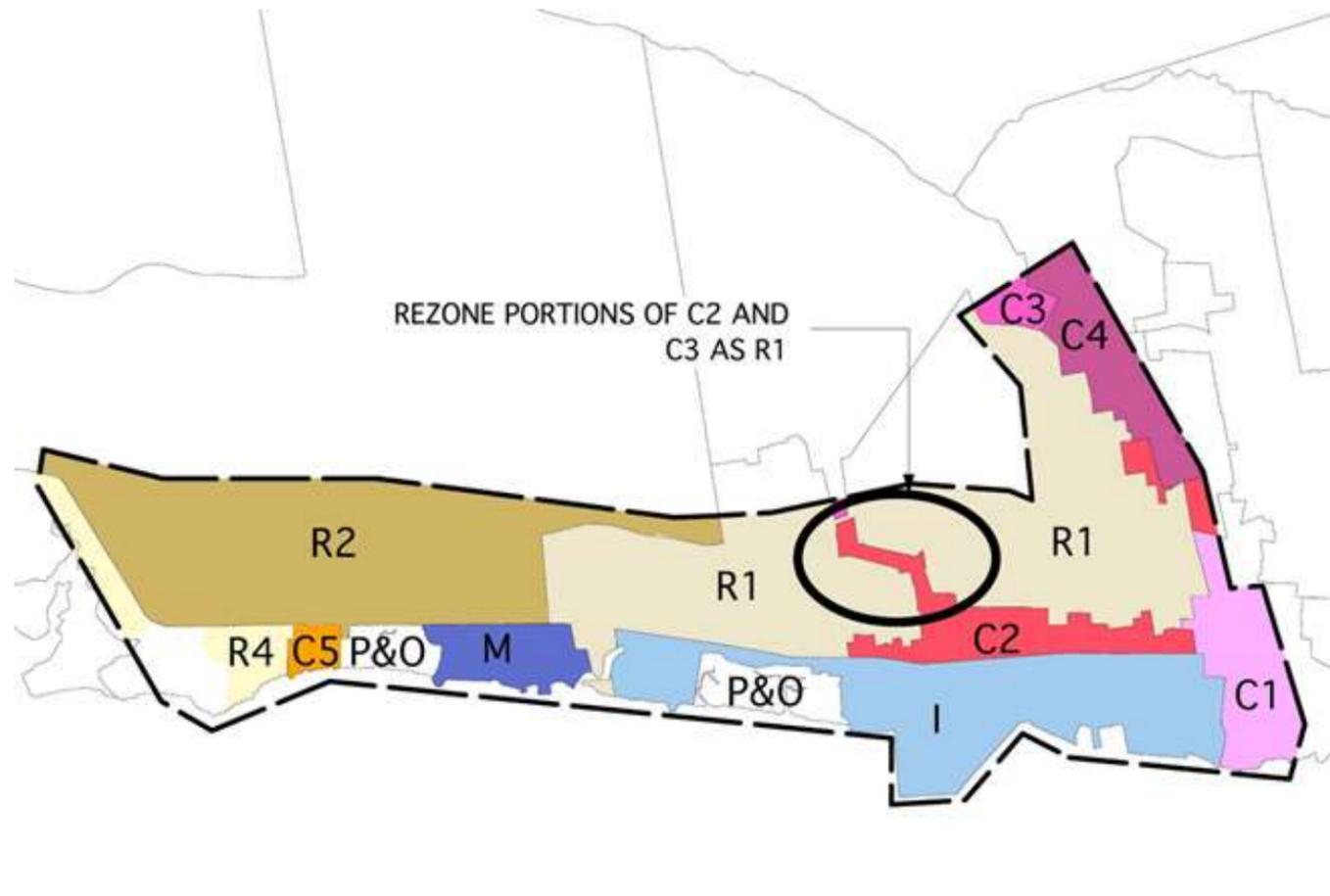
6.0 ZONING RECOMMENDATIONS

Work to stabilize the South Bath residential neighborhoods, particularly the R1 and C2 zones, by not allowing parking lots as a land use.

- All parking lots or parking spaces that are not an accessory use to the primary use of the parcel are not allowed.
- Residents are not allowed to rent parking space in their driveway.
- All freestanding parking lots are legally nonconforming and can lose their legal status per nonconforming standards of Land Use Ordinance.

Article 9 of the Land Use Ordinance appears to reflect the above recommendations regarding parking represented in the Land Use Tables but as a point of conversation it is worth including in this report:

In an effort to reweave the fabric of the R1 Zone. It is recommended that a portion of the C2 and C3 Zones dividing the R1 to encourage future residential scale development and uses:



LAND USE CATEGORY	ZONING DISTRICT S																			
	R1	R2	R3	R4 & R6	R5	C1	C2	C3	C4	C5	NC	I	GC	PH	M	RP	NRPO	TMC	S	
13.0 Storage and Parking																				
13.1 Automobile parking lot not located on a lot on which there is another principal use to which the parking is accessory	N	N	N	N	N	S	N	N	N	N	N	N	S	N	N	N	N	N	N	N
13.2 Parking garage not located on a lot on which there is another principal use to which the parking is accessory	N	N	N	N	N	S	S	N	N	N	N	N	S	N	N	N	N	N	N	N
13.3 Shared Parking	N	N	N	N	N	S	S	S	S	S	S	S	S	N	N	S	N	N	N	S
13.4 Storage in a fully enclosed building of goods not related to sale or use of those goods on the same lot where they are stored	N	N	N	N	N	N	N	S	N	N	N	N	S	N	N	N	N	N	N	N
13.5 Storage in a fully enclosed building or outdoors of goods not related to sale or use of those goods on the same lot where they are stored	N	N	N	N	N	N	N	N	N	N	N	N	S	N	N	N	N	N	N	N
13.6 Storage combined with wholesale items	N	N	N	N	N	N	N	S	N	N	N	N	S	N	N	N	N	N	N	N
14.0 Scrap Materials Storage, Salvage yards, Junkyards, or Automobile Graveyards																				
15.0 Service and Businesses Related to Animals																				
15.1 Animal-care facility	N	N	N	N	N	N	N	S	N	N	N	N	N	N	N	N	N	N	N	N
15.2 Kennel	N	N	S	N	N	N	N	S	N	N	N	N	N	N	N	N	N	N	N	N
LAND USE CATEGORY	R1	R2	R3	R4 & R6	R5	C1	C2	C3	C4	C5	NC	I	GC	PH	M	RP	NRPO	TMC	S	

To improve pedestrian safety, reduce congestion, and enhance the streetscape environment, there are opportunities to introduce elements into the built environment that will improve the urban experience without impacting the historic character of Bath.

Fences and other features can be considered as part of the urban landscape or forms of public art. Following are examples of artful solutions that could be reconfigured to serve the needs of Bath.



Specific consideration for streetscape improvements that would enhance the built environment while guiding pedestrians to signals and controlled crossings include:

- The Washington Street northbound approach to Leeman Highway
- Underneath the Route 1 viaduct between Washington Street and Middle Street (see sketch below)



Existing Conditions: Leeman Highway between Middle and Washington Street



Concept Improvements: Leeman Highway between Middle and Washington Street

7.0 PUBLIC OUTREACH PROCESS

Bath South End Transportation Study: Public Outreach Program

The objectives for the study were to improve the safety of pedestrians in the study area, reduce the impact of vehicular traffic on neighborhood streets, and identify strategies to improve the availability of parking and/or reduce the demand for parking from BIW employees. To help achieve that, the public outreach program focused on two key stakeholder groups: residents of the South End neighborhood and Bath Iron Works (BIW) employees. It is these two groups that would be most affected by any final recommendations that changed the way BIW employees travel to work and/or change the way traffic and parking operated in the neighborhood.

Steering Committee

A steering committee was formed to help guide the study and provide feedback throughout in terms of data findings, public outreach, and final recommendations. Steering committee members included representatives from the City of Bath, the city councilors representing the South End Neighborhood, the Maine Department of Transportation, and BIW. This committee met five times during the 10-month study, and also received information and provided feedback via email throughout the study period.

Creating Awareness of the Study: Media, Social Media, Web Page, Postcard

A detailed press release was sent to local media announcing the first public meeting in September 2008. The release included information about study objectives, partners, timing and data inputs, as well as directing people to a customized web page on the City web site, which included detailed study information and where interested parties could sign up for email updates.

The City also employed social media to increase awareness of the study and the meeting. The press release appeared in the *Times-Record*, the *Bangor Daily News*, the *Forecaster* and *MaineBlz*.

Additionally, a postcard (at right) was mailed to every residence in the South End Neighborhood in an effort to assure strong attendance at the meeting from this key stakeholder group.

First Public Meeting

The first of two public meetings took place on September 13 at 6 pm at Bath City Hall Auditorium. The purpose was to provide attendees with information about existing conditions in the study area and more importantly, hear from them about their perceptions of the challenges in terms of safety, parking and quality of life around shift changes at BIW. The meeting was well attending; while not everyone signed in, there were

over 80 individuals in the audience with many standing in the foyer to listen. The details of the meeting are included in the meeting report in the appendix of this report; however, audience participation was very strong, with many people reporting frustration with the lack of action on traffic congestion, the parking free-for-all, and general negative attitudes of some BIW workers. The study team assured them that their comments had been heard and encouraged additional comments via the Internet, as well as to make specific suggestions on provided aerial maps of the study area. Most attendees were from the South End neighborhood; a handful were BIW employees who lived locally.



Do you care about SAFETY and QUALITY OF LIFE?

If so, please come talk to us on:

SEPTEMBER 20th - 6-8 pm - Bath City Hall

The City of Bath, BIW and MaineDOT want to improve parking, safety, and quality of life in the South End neighborhoods.

FMI www.cityofbath.com/southendstudy/
or Carol Morris, Morris Comm, at 207-329-6502

Hearing from BIW Employees: Online Survey

BIW employees were a challenging audience to reach, and the study team met with BIW management from Facilities, HR and Communications to talk about the best way to reach out. BIW agreed to help publicize an online survey regarding employees' attitudes towards parking, specifically how many would be willing to consider satellite parking. BIW made clear that the survey would have to be smart phone-friendly, as most employees did not have access to a computer at work.

BIW mailed notices to employees' homes with a link to the survey encouraging employees to participate and put up posters in break areas (see at right). The study team worked with the steering committee and BIW to finalize the survey, which was made available to employees for slightly over two weeks during the first part of November 2018. A total of 485 employees provided comments, including many open-ended responses.

Details of the survey are included in the appendix, but in summary, 37% of respondents would carpool if they could get a better parking space. More than 50% would park in the satellite lots if there were an all-day shuttle.

When it was explained what the *GoMaine* program offers, 26% said they had never heard of it but would like to know more. All these data points indicated that there was potential for more carpooling and more satellite car parking at BIW.

GOT OPINIONS ON PARKING?



Take an anonymous online survey about parking at BIW.

Your feedback will help guide future BIW decisions about parking lots, shuttles and more. Survey live through Nov. 7.

www.surveymonkey.com/r/BIWparking

Creating Awareness of the Second Public Meeting

The second public meeting, scheduled for late January, employed all of the earlier communications tactics (press release to local media, update on City web page and social media, postcard mailing to all South End residents) with the addition of an email alert to the 89 individuals who had either signed up online for updates or attended the first public meeting.

Second Public Meeting: January 31, 2019

The second public meeting took place at the end of January. Approximately 60 individuals attended. As in the first meeting, a presentation was made first, which detailed the many potential solutions identified by the study team. The team made it clear that 1) No decisions had been made as public input was needed, and 2) There was no single solution that would address all the issues; many smaller solutions, however, would go far in improving conditions in the study area. A BIW representative was available to talk about the changes BIW had already made to improve the parking situation and reduce some of the conflicts. The audience asked clarifying questions throughout and once all potential solutions had been presented, indicated that they were enthusiastic about almost all. Many also noted that they were very pleased to see how much progress had been made in thinking through solutions and how much they appreciated having BIW take an active role both in the study and at the meeting. Detailed meeting notes are included in the Appendices.

Final Recommendations

Based on feedback at the January 2019 public meeting and from the Steering Committee at their April 2019 meeting, study recommendations were finalized and made available to the public via a post on the city web page and Facebook page, email to those who had attended meetings or signed up for updates, and a final press release directing interested parties to the City web page for details

Appendix

Public Outreach

First Press Release: September 4, 2018

Bath, BIW, MaineDOT Partnering on South End Transportation Study

First Public Meeting Scheduled for September 20

The City of Bath is partnering with Bath Iron Works and the Maine Department of Transportation to find ways to reduce conflicts between vehicles and pedestrians in Bath's South End neighborhoods.

The City will host a public meeting September 20 to hear from residents as the study begins to identify improvements.

According to Peter Owen, city manager, "This transportation study is a response to changes in traffic patterns associated with the shipyard's workforce, with large volumes of vehicles coming and going, added pressures on parking, and vehicle speeds that do not contribute to pedestrian-friendly neighborhoods. Because the success of BIW is important to all of us in Bath, we are optimistic that good solutions to these challenges can be found."

The study will focus on three key objectives: improving the safety of pedestrians, reducing the impact of vehicular traffic on neighborhood streets, and identifying strategies to improve the availability of parking and/or reduce the demand for parking.

There are a significant number of pedestrians walking along the Washington Street corridor and between BIW off-site parking and the main productions area. This has led to conflicts between the needs of pedestrians and those of motor vehicles.

The need for more parking has been accelerated by new development in Bath's Historic Downtown, as previous parking lots have transitioned into new uses.

A significant amount of data will be collected to find solutions to the following challenges:

- How can motor vehicle movements be made safer and more efficient? The study will assess potential changes in infrastructure and city policies.

- What opportunities exist to add additional parking?
- What is the best way to create a balance between neighborhood and employee parking needs?

Hearing residents' concerns and ideas is an important part of the study. The first public meeting will be held at 6 p.m. on September 20 at Bath City Hall to hear residents' concerns, with another meeting taking place in December to get feedback on draft improvements.

The City has dedicated a page on their website (www.cityofbath.com/southendstudy/) to post meeting updates and study data. Residents who would like to receive email updates and meeting notices can sign up for these on the website.

Web Copy for City of Bath SETS Web Page

Sign up for Study Updates [HERE](mailto:cmorris@morriscomm.net) (Link to cmorris@morriscomm.net)

Bath's South End Transportation Study

Background: The City of Bath is partnering with Bath Iron Works and the Maine Department of Transportation to find ways to reduce conflicts between vehicles and pedestrians in Bath's South End neighborhood.

This transportation study is a response to changes in traffic patterns associated with the shipyard's workforce, creating large volumes of vehicles coming and going, increasing pressures on parking, and contributing to vehicle speeds not in line with pedestrian-friendly neighborhoods.

The study will focus on three key objectives: improving the safety of pedestrians, reducing the impact of vehicular traffic on neighborhood streets, and identifying strategies that will improve the availability of parking and/or reduce parking demand.

A significant number of pedestrians walk along the Washington Street corridor and between off-site BIW parking and the main productions area. This has led to conflicts between the needs of pedestrians and those of motor vehicles.

The need for more parking has been accelerated by new development in Bath's Historic Downtown, as previous parking lots have transitioned into new uses.

Challenges:

Data will be collected to find methods to address the following challenges:

- How can motor vehicle movements be made safer and more efficient? The study will assess potential changes in infrastructure and city policies.
- What opportunities exist to create additional parking?
- What is the best way to create a balance between neighborhoods and employee parking needs?

Public Input: Hearing residents' concerns and ideas is an important part of the study. The first public meeting will be held at **6 pm on September 20 at Bath City Hall**. This meeting will provide an opportunity to hear an overview of the study, air residents' concerns and answer questions. A second public meeting will take place in December.

Residents who would like to receive email updates and meeting notices can sign up [here](mailto:cmorris@morriscomm.net). (Link to cmorris@morriscomm.net)

Study Data: Not everyone is familiar with the information needed to identify solutions in a transportation study. Below are examples of data that will be gathered and updated:

- Intersection turning movement counts
- Traffic counts
- Bicycle and pedestrian volumes
- Truck volumes and patterns
- Geometric roadway conditions including width
- Transit and BIW vans and buses
- On and off-street parking supply and regulations
- Current business types and other non-single family uses and their locations
- Seasonal traffic volume information
- Public right of way information
- Speed data
- Crash data for the most recent three-year period
- Parking capacity in areas not identified by parking signage
- Regulatory signage and pavement markings

- Sidewalks and crosswalks (including ADA compliance, material, condition and width)
- Bicycle facilities
- Traffic signal equipment, phasing and timing

Bath South End Neighborhood Transportation Study

Public Meeting Notes

September 20, 2018

Attending: Tom Errico and Todd Serbent, T.Y. Lin; Mitchell Rasor, MRLD LLC; Carol Morris, Morris Communications

NOTE: To see the presentation slides, click on the [Public Meeting Presentation](#) link on the Study Page.

Carol Morris introduced the Study Team and explained that Tom Errico and Mitchell Rasor would be talking about current conditions in the study area. She encouraged the audience to ask clarifying questions during the presentation, and noted that there would be plenty of time for general feedback afterwards. She also noted that the steering committee for the study includes representatives from the City of Bath, BIW, MaineDOT and the relevant City Councilors.

She explained that the objectives of the study are to:

- Improve the safety of pedestrians
- Reduce the impact of vehicular traffic on neighborhood streets, and
- Identify strategies that will improve the availability of parking and/or reduce parking demands.

Carol explained that multiple aerial maps were displayed on tables at the side of the room, and that the audience, by writing comments on sticky notes or directly on the map, would provide the study team with clear feedback. She asked that the audience do this at the end of the presentation and general Q&A.

Tom Errico then presented the study tasks and the conditions that currently exist in the study area. Slides to illustrate the commentary below are available at (insert weblink).

- *Roadway Classification-Federal Functional Class:* A resident asked if road classifications can be changed, as she believes some of them are obsolete and is interested in a change on Richardson Street. Tom said, yes, they can be changed.

- *Peak Hour Volume:* These are turning movement volumes, and give the study team an idea of demand, of where the traffic is moving, where there are problems.
- *Traffic Volumes:* Usually the peak in Maine is at 7:30-8:30 am, but here it is earlier. Tom noted that the afternoon traffic volumes are higher than the morning, where people coming in at slightly different times, businesses are closed, etc. This is important to take into consideration as recommendations are developed.
- *High Crash Locations:* There are three high crash locations in the study area. Route 1 southbound and High Street On-ramp, Route 1 northbound and State Road On-Ramp and the Centre Street/High Street intersection.
- *Afternoon Level of Service and Queue Length:* Tom discussed in detail the areas where there is back-up (queuing): Washington Ave., areas of High Street and getting on and off Rte. 1 by High Street, as well as where Richardson meets Route 1.
- *Speed Survey:* Speed was tested at five locations, both northbound and southbound: High Street at Hyde School, Washington at the Maritime Museum, Middle Street at Fisher Court, High Street at Webber, and South Street at Middle Street, Washington at Maritime Museum, and High Street at Webber both show speed levels significantly above speed limit.
- *Northern Pedestrian Facilities and Southern Pedestrian Facilities:* Tom showed maps that detailed where sidewalks are located throughout the study area. Most streets do have some level of sidewalk, with one obvious gap at the southern half of Middle Street. Comments indicated some of these sidewalks are inadequate.
- *Off Street Parking Locations and On-Street Parking:* All the BIW parking, including private and on-street, has been inventoried and mapped. Tom showed the mapping noting that this level of detail allows the study team to drill down to understand how pedestrian and vehicle traffic is flowing.
- *BIW Shuttle Schedule:* Tom explained that adding additional shuttles and van pools so that fewer people have to park near BIW would help the situation. This is called Travel Demand Management. The team will be working to find out why more BIW employees aren't taking advantage of this by surveying employees.
- *Land Use:* Mitchell Rasor, a landscape architect who will be creating the visualizations to illustrate study recommendations, talked about how his work complements T.Y. Lin's. Safety, parking, community character are all things he will look at, and he noted that often changing a City policy can help to make an area more livable.

Mitchell showed a zoning map, which indicated that land uses were generally conforming with City zoning: Industrial Waterfront, Mixed Use Waterfront, Residential, and Route 1, anchored by Downtown. Mitchell then added the buildings to the map, showing quite a bit of density, and also identified four primary and two secondary gateways to the study area. He showed the distribution of BIW surface parking to zoning. He prepared a street hierarchy, looking at the character of the streets as opposed to the functional classification that Tom displayed, and also analyzed the street network for connectivity.

Mitchell also reminded the audience that the team will be looking at cross streets, considering whether a one-way configuration would help traffic movements. He emphasized that this is a neighborhood plan, not a BIW study.

Study Schedule

June 22:	Kickoff Meeting
July:	Collect Traffic Data
July 31:	Complete Initial Conditions Report
Sept. 10:	Steering Committee Meeting #2
Sept. 20:	Public Meeting #1
October:	Develop Draft Recommendations
October:	Steering Committee Meeting #3
November:	Public Meeting #2
November:	Prepare Draft Report
December:	Final Report Due

General Commentary *(Please note: If a comment was made on the maps and in the meeting, in most cases we have used the map commentary.)*

- It was noted that the school buses drop off schoolchildren close to when BIW's first shift ends (3:15 pm). If the bus is late, multiple people talked about how dangerous it is for the kids to be in the middle of this intense crush of people and vehicles. One solution to this would be one-way streets. Another would be for BIW to change their shift time.

- Union Street is one way, Washington to Middle is one way, and people are always going up these the wrong way – every day. “Do not enter” signage is in place.
- Residents should be allowed to park for long periods – there should be a resident parking pass.
- There are no sidewalks being plowed in the winter, and you can barely get one car down the side roads. Kids are forced to walk in the street.
- Getting the city council to go with a parking garage will be challenging. It was tried before. It was not perceived as historic. But it would probably help a lot.
- There is no BIW shuttle bus that travels in the middle of the day if you need to get to your car during that time. A few buses in the middle of the day would be very helpful.
- BIW should provide training for their employees that shows them it is important to respect the neighborhood. The State of Maine does provide that training and it really helped employee attitudes.
- It was also suggested that BIW should teach anger management to their employees
- Studies won’t change the attitude of those who only care about getting the closest parking space. This is not a traffic issue as much as an impact issue.
- BIW does not do enough to provide for parking for employees. They give you a map. The waitlist for private spaces is very long.
- I used to work at BIW. There are a lot of good people who work there. We need to work with them and with each other to solve this or nothing will happen. Everyone is angry but we need to chill out some if this is going to work (*applause*). A second person made the point that anger brought everyone here. And that is good. But it is important to work together to find common ground so these problems can be solved.
- Can the City require BIW employees to park only in designated areas?
- A parking ticket is not expensive enough to stop BIW employees from parking illegally.
- It was asked who requested the study and who was paying for the study. Answer: It was requested by the City and is being paid for by the City, MaineDOT and BIW.

Written Comments on Aerial Maps

- Why doesn’t BIW bus in more workers from their parking lots on old Bath Rd. in Brunswick? Why not limit the number of workers allowed to park in Bath? We are paying for road maintenance. BIW was just given a huge tax relief benefit under a jobs bill. I think they are culpable for helping solve the problem.

- Suggest pedestrian bridge over Washington at BIW
- Limit smoking to inside BIW at lunch – 3-400 smokers
- Actual speed table along Pine Street would be great
- There is 2-hour parking on south side of Spring St. – make it no parking
- BIW needs parking garage – could be built in green area near power line as it is not historic there
- Build two parking garages, one along Washington St at Leeman Highway, one perpendicular along Leeman
- Put in some parking garages
- Put parking garage on north side of BIW property, with retail on first floor
- Increase bus routes
- At 133 Washington, fast speeds - 60-70 mph 11 pm-1 am
- People driving too fast on Washington and don’t respect pedestrian crosswalks (near Southend Park/museum)
- Create Bath Island)?
- Need more satellite parking
- At 51 Richardson St.: Sit at any house, look and listen
- Put a bypass through Hyde
- Recode parking for resident use
- One way streets at Union / Granite to help with parking and winter congestion
- Add crosswalk lights at each BIW gate
- Stagger BIW parking times ½ hour
- Change BIW first shift back to 7:30-4: eliminate issue with school children
- Re-check speeds on South Street please
- People coming out of North Gate: 200 people in bunches of 50
- Blind corner at right on red at Leeman / Washington intersection
- Retime the Washington Leeman light
- People do not yield on Rte. 1 going under underpass. Perhaps a large flashing yield sign?
- Middle under bridge at BIW time (3:30), my brother almost was hit entering crosswalk. A big truck rammed the back of a car that had stopped for him.
- Union/Middle – people don’t stop at intersection. Up Union to Middle, one-way not being obeyed.
- Union and Middle visual obstruction heading east (downhill) by resident’s retaining wall

BIW Employee Parking Survey: November 30, 2018

Methodology:

The objective of the survey was to get a better understanding of BIW employees’ attitudes toward BIW parking: parking in general, parking at satellite lots, and vanpooling/carpooling. The online survey was created on *SurveyMonkey* and made available for slightly over two weeks during the first part of November 2018. BIW sent a postcard to all employees at their homes alerting them to the survey, and posters were placed in prominent locations within the facility. The survey was designed to be easily accessible by smartphone. A total of 486 individuals participated.

Summary:

Almost 30% of respondents regularly carpool to work; another 10% do occasionally. About 60% never carpool. Of those that do, about 40% do it to save money, and 40% do it to get a better parking space. In the comment section, the most common response for why people carpool is that there is not enough onsite/free parking – designated carpool lots are easier to park in. This underlines the high value of parking spaces among BIW employees. Almost all who carpool say they have set up the carpool themselves, among friends.

About 60% of respondents have parked in a satellite lot. Of those who haven’t, the biggest reason was the need to get to their car during the day. Another 35% simply said, “It takes too long.” The majority of comments here included explanations of other parking arrangements as well as the inconvenience of existing bus schedules, both in the middle of the day and at the start of the workday.

Conclusion:

Thirty-seven percent of respondents would carpool if they could get a better parking space. More than fifty percent would park in the satellite lots if there were an all-day shuttle. When it was explained what the *GoMaine* program offers, 26% said they had never heard of it but would like to know more. All these data points indicate that there is potential for more carpooling and more satellite car parking at BIW.

Survey Responses:

1. Do you ever carpool or vanpool to work?

Always or usually	27.16%
Occasionally	10.91%
Never	61.93%

2. In your opinion, what is the biggest reason you and other BIW employees choose to carpool or vanpool? (Choose one)

Saves money	42.75%
Easier than driving	16.08%
More enjoyable than driving alone	0.78%
Car is not reliable	0.39%
Can park closer to work	40.00%

3. How did you set up your carpool?

Informal among friends	89.76%
Through BIW	9.64%
Through GoMaine	.60%

4. Have you ever parked in a BIW satellite lot?

Yes	61.04%
No	38.96%

5. Why have you never parked in a BIW satellite lot?

It takes too long	34.92%
I need access to my car during the day	65.08%

6. Have you ever heard of GO MAINE, a free commuter program that offers online carpool and vanpool matching, as well as Emergency Rides Home, and ongoing discounts at local businesses

Yes, I have used it	1.68%
Yes, I have heard of it but don't use it	24.11%
Yes, I have heard of it and would like to know more	1.26%
No, I have never heard of it but would like to know more	26.21%
I am not interested	46.75%

6. What would make you or other BIW employees choose to carpool more often? (Choose all that apply)

A more convenient carpool	19.10%
A less expensive carpool	13.92%
A better parking space close to BIW	36.79%
Nothing. I prefer to drive myself	53.77%

7. What would make you or other BIW employees choose to park in satellite lots more often?	
A shuttle service available at mid-day	5.44%
A shuttle service available all day	53.89%
More convenient lot locations	35.75%
Shuttles that arrive more frequently so I don't have to wait	38.34%

Second Press Release: January 14, 2019

Final Public Meeting for South End Transportation Study Scheduled for January 31

The City of Bath, Bath Iron Works (BIW) and the Maine Department of Transportation (MaineDOT) are exploring ways to reduce conflicts between vehicles and pedestrians in Bath’s South End neighborhoods, which are adjacent to BIW.

A well-attended public meeting in September kicked off the study, providing many comments, ideas and concerns about the impact of vehicles on South End neighborhoods. The final public meeting, which will take place at 5:30 pm on Thursday, January 31 in Bath City Hall auditorium, will highlight what was learned and spell out the wide range of actions being proposed to address these concerns.

According to Peter Owen, Bath city manager, “What became increasing clear over the past months is that there is no single action that would quickly address everyone’s concerns. And while the exodus of BIW workers every afternoon is certainly a challenge, other concerns with speeding and traffic patterns also need to be addressed.”

Jon Fitzgerald, BIW vice president, says the company is working to balance the need for additional employee parking with the concerns of neighbors and the study findings. “BIW will continue to support ride-sharing, which reduces traffic as well as demand for parking, and is making other changes to improve safety and to ease congestion.” The shipyard has recently increased its offsite parking and shuttle bus service, but also anticipates taking additional future steps in conjunction with any changes or recommendations from this study.

The study has focused on three key objectives: improving the safety of pedestrians in the neighborhoods, reducing the impact of vehicular traffic on neighborhood streets, and identifying strategies to improve the availability of parking and/or reduce the demand for parking.

A significant amount of data has been collected in order to find solutions to the following challenges: How can motor vehicle movements be made safer and more efficient by potential changes in infrastructure and in city policies. What opportunities exist to add additional parking? ^[1] And, what is the best way to create a balance between neighborhood and employee parking needs?

The City has dedicated a page on their website (www.cityofbath.com/southendstudy/) to post meeting updates and study data. In advance of the January 31st meeting, information collected on existing traffic and other conditions in the study area, as well as the minutes and presentation from the September meeting, are available on the website and at the Patten Free Library. Residents who would like to receive email updates and meeting notices can also sign up for these on the website.

Bath South End Neighborhood Transportation Study

Public Meeting Notes

January 31, 2019

Presenting: Peter Owen, Bath City Manager; Nathan Howard, MaineDOT; Andrew Bond, BIW; Tom Errico, T.Y. Lin; Mitchell Rasor, MRLD LLC; Carol Morris, Morris Communications

The meeting was attended by more than 50 members of the general public, and the Steering Committee of the South End Transportation Study.

NOTE: To see presentation slides, click on *January Public Meeting Presentation*, which includes maps and graphics.

The meeting began at 5:30 pm.

Peter Owen thanked everyone for attending and explained that what would be presented this evening are ideas that have been developed based on the conditions in the study area. He stated that a final plan would be developed centered on what is heard from residents tonight. He then introduced Carol Morris, Morris Communications, who added that in the work that has been done since September, there was no single action – no silver bullet – that solved all the problems. She explained that many small actions showed promise, and that these all together would make a big difference. Some can be implemented in the short term and some would take longer. She encouraged the audience to ask clarifying questions during the presentation, and noted that there would be plenty of time for general feedback afterwards. She also noted that the steering committee for the study includes representatives from the City of Bath, BIW, MaineDOT and the City Council.

She explained that the objectives of the study are to:

- Improve the safety of pedestrians
- Reduce the impact of vehicular traffic on neighborhood streets, and
- Identify strategies that will improve the availability of parking and/or reduce parking demands.

Finally, she reviewed what had been covered at the September public meeting.

Tom Errico, T.Y. Lin, then began to review the work that had been done and ideas generated since September. He first noted that people had asked about an older study that examined a bypass/new road. He showed a graphic from the study, noting that this idea was not part of today’s study, and it will not be considered because it includes the need to take land, has environmental impacts, is very expensive, and further, it did not solve the traffic problems.

Tom then began to go over potential solutions developed as part of this study.

Transportation Solutions

Centre Street/High Street: This is a high-crash location. During peak time periods, cars back up at this intersection, which affects Route 1. It used to be that intersections that are on a grade (hill) did not include stop signs because of the danger of cars slipping in winter; Tom said we are finding now that with so many all-wheel-drive vehicles, this is not a problem. The team suggests adding a stop sign at this location. This would be a short-term implementation.

High Street/Route 1 Northbound Off-Ramp: Again, there is traffic back-up here, so the team is recommending adding an additional lane on High Street when the bridge is rebuilt. At this time, sidewalks and bike lanes could also be added. This is a long-term fix. On the short term, the sight distance can be improved by removing vegetation and sign obstructions. We can also direct BIW traffic to Washington Street, which should help to relieve traffic delays, we can look at capacity improvements at Centre Street, and we can also change the lane assignment on the Route 1 off-ramp to a left/through and right lane configuration. All these will help traffic flow.

Washington Street/Leeman Highway: Tom had a number of suggestions here:

- Change the signal to extend green time on northbound Washington during the BIW’s afternoon shift release. This would be a short-term fix.
- Consider relocating the stop bar and crosswalk on the railroad crossing on southbound Washington Street and install railroad crossing gates. This would make this signal much more efficient, moving more traffic through. It would take some work, so this is a mid-term time frame.
- Consider making Washington Street northbound a one-way street from 3:30 pm to 4:00 pm. This alternative would reduce delay for the Washington Street northbound left-turn and through movements. This is the same approach used at concerts and sporting events – do everything possible to flush as much traffic out as quickly as possible. It would slightly impact the queue on the Washington Street southbound approach. Traffic destined to BIW for the second shift would use Middle Street or other streets. This is a mid to long-term implementation.

Tom noted that fixing the Washington and Leeman intersection goes a long way towards improving traffic flow as directed by the study goals.

Street Traffic Circulation Changes: Tom said that here we are looking at making the neighborhood streets that exit onto Washington one way in order to stop BIW traffic from filtering through the neighborhood. The goal is for all vehicles to stay on Washington Street. This would include:

- Stacey Street eastbound
- Fisher Court eastbound
- Wesley Street eastbound
- Shepard Street eastbound
- Bath Street – change direction to eastbound
- South Street from Middle Street to Washington Street eastbound

- Castine Street eastbound
- Spring Street westbound
- Middle Street from Russell Street to Castine Street southbound.

With Washington one-way and the above changes made, modeling shows that 426 vehicles would shift to Washington Street. Tom cautioned that making these streets one-way without making Washington one-way during the shift change would make the traffic situation much, much worse than it is now. He also noted that they would make sure that no traffic could slip through to the South End. This would be a mid-term implementation.

Pedestrian Enhancements

Sidewalks: Tom noted that there were sidewalks in the neighborhood that are not ADA compliant, and some that needed upgrading. He also suggested adding sidewalks on Castine Street, Union Street, Washington Street (not in winter due to falling ice hazards), and Western Avenue. This is a short to long-term implementation period.

Leeman Highway at Middle and King Crosswalks: Tom suggested a Rectangular Rapid Flash Beacon here as these do a very good job stopping traffic for pedestrians.

Washington Street and Leeman Highway: Tom noted that the traffic signal here now covers all the crossings and allows pedestrians to push a button and stop traffic. But he added that most people push the button and don't wait, but dash across when they think they can. Then, when the signal does respond, there are stopped cars but no pedestrians. Tom suggested separating out the signal for each crossing, making the signal more efficient.

Route 1 Viaduct Crossing and Washington Street: Install a barrier under the Route 1 Viaduct to prevent pedestrians from crossing Leeman Highway between the intersections, as well as along Washington Street to forestall the same problem. These are challenging areas where pedestrians flow through at shift changes and really affect traffic negatively. There are some negatives in doing this along Washington Street, as it would impact access to the Post Office. This could be a relatively short-term implementation.

Parking Improvement Strategies

BIW Parking: Tom noted that BIW's goal is to create safe and organized parking for all employees. They are looking at 800 new workers in 2019 and will locate employees who don't need to be in the shipyard to other locations. Investment and expansion are underway at BIW Brunswick facilities. They do not intend to add new parking in the neighborhood; the satellite lots and other BIW properties have the capacity to handle

additional parking needs. They have expanded access to their satellite lots with an all-day ^[SEP]shuttle service, something employees said they wanted. They will be working with SupeShip to offer this auxiliary capacity to their visiting Navy employees. Finally, the team is suggesting that the 2-hour parking in front of BIW be changed to permit parking for vanpools and carpools only.

Parking Garage: Tom stated that they are not recommending a parking garage. Adding 600+ additional parking spaces would not help the situation and would likely intensify traffic impacts on Washington Street. From a BIW employee point of view, the long delays in departing the garage would not be popular. Tom noted that he has worked with the City of Portland on the Maine Medical Center garage, ^[SEP]and many employees are not using it, but parking on the street for that very reason. He added that a garage would also have high construction and maintenance costs. ^[SEP]

Neighborhood Parking: Tom said that the study is suggesting that the City implement a one-hour time limit on area streets and at the same time increase parking fines and enforcement significantly to discourage BIW employee parking on neighborhood streets. At the same time, he recommended the city implement a Residential Parking Permit program for the South End neighborhood to allow residents to park on the street without restrictions. Both these would take some time to organize and find resources, so he sees a Mid-Term Implementation for these.

Transportation Demand Strategies

GoMaine: BIW is encouraging employees to use GoMaine, a program that coordinates carpools and vanpools and provides a free rental car should an emergency occur.

BIW Deliveries: BIW has requested that deliveries to BIW use Route 1 to Washington Street as opposed to local streets.

Flashing Warning Signs: Another idea is to install "Shift Change When Flashing" signage on Leeman Highway and High Street, advising motorists to seek an alternate route.

Tom turned the presentation over to Mitchell Rasor to talk about how zoning could over time change the character of the neighborhood.

Zoning Changes

Mitchell said that these recommendations are about how parking could be stabilized or phased out in the neighborhood over time. He said that the

goal would be to stabilize the South Bath residential neighborhoods, particularly the R1 and C2 zones, by not allowing parking lots as a standalone land use. Right now, it is legal to have a standalone parking lot in the C2 and C3 Zones. If they are rezoned as R1, parking is no longer a legal use.

This does not mean that the parking lots would automatically go away – they would be grandfathered – but it means that all current freestanding parking lots would become legally nonconforming. This means if a parking lot is discontinued for year or more, it would lose its legal nonconforming status and would have to become something else, such as a park, or even a lot for new housing.

All parking lots or parking spaces that are not an accessory use to the primary use of the parcel would not be allowed. That means each parcel would have parking only for those living there. Over time, this rezoning will allow the neighborhood to creep back in instead of parking creeping in.

There were several questions on the details about how this would work, how this works under the CMP power line. In response to a question, Mitchell noted that the parking lots in the neighborhood are owned by an array of individuals and by BIW. It was asked if it would help if residents went to City Hall and asked to remove neighborhood parking lots. Mitchell said he believed that would not be feasible for the City to take action, given the current zoning law.

Carol then turned the meeting over to Andrew Bond, BIW Human Resources, to provide more detail about BIW activities in recent months. Andrew made the point that BIW wants to be a good neighbor, as well as providing the following updates:

- All deliveries now go down Washington Street.
- Shuttlebuses now drop off only on the shipyard side of Washington.
- There is new Shuttlebus service that runs every half hour, with 54 shuttles each day. As ridership increases, they will add more. They are looking to make offsite parking as convenient as possible, and to expand it as needed.
- There are 112 carpools, which have at least four passengers each, and 84 commuter vans with 12-15 passengers each.
- BIW has about 1200 parking spaces within the city. Also have 600 off-site spots, of which 200 were added last year.
- They have made a commitment to provide free of charge parking for all employees, although it may not be as convenient as some would like. This was not always the case.

- In answer to a question, Andrew said the employees who used to park at the James Lot are now parking at the West Bath Satellite lot.
- BIW intends to do more work with GoMaine to encourage more vanpools.
- He appreciates everyone's patience in dealing with these issues.

There were several questions asked regarding parking and BIW:

- A resident asked if transport of employees by train was possible. Andrew responded that they could consider it, but had not at this point.
- A resident asked if there are other incentives for parking in the satellite lots? Andre responded that we will evaluate everything, but any change has consequences and he was not ready to commit to any at this point.
- A resident asked if employees who carpool could be allowed to leave early. Andrew replied that giving priority departure to those who park in a satellite lot could be considered.
- It was asked if people could work from home, and Andrew replied that for a defense contractor, that would be difficult.

At this point Carol opened the meeting to other questions.

- What is the status of construction on Richardson Street? Peter

Owen responded that the Richardson Street work is separate from this study, but that the consensus is that most people did not like the traffic calming measures tested last fall. The City is looking at other solutions.

- A resident commented that flushing out Washington is an interesting idea. But she is concerned with lack of access to Post Office. Another resident asked, what about blocking that access off all the time and adding it somewhere else? Tom responded that, if people think this is a good idea, we would look at other access points.
- A resident asked about a low tech solution of letting BIW add an extra 30 seconds to the Washington Street traffic light when the shift lets out. Tom responded that the adaptive signal we suggested will do that, give Washington traffic more time, but there could be delays for the other approaches, which could potentially cause safety issues. We think a balance is possible though.
- A resident asked \ about eliminating the bump outs on Washington Street? They are supposed to be traffic calming but they make the road narrow. Tom said he would take a look at this.
- A suggestion was made to have police on site at the shift change? Tom noted that this had been done in the past and he thinks police would do a better job than the signal. But he added that this is a resource issue for the City.
- It was noted that people are parking in front of the Cabin and

when they do cars can't get by, Tom said he would look at this as well.

- There were concerns expressed about driving behavior, people don't know who has the right of way, and this turned into a discussion of the potential of police presence in terms of controlling behavior during the shift change,
- There was concern that pedestrians walking on Washington to Leeman just will not stop and will cross the street regardless. Tom said the solutions are not perfect, but they will help. He added that police would be especially helpful here.
- Andrew added that with the recent pedestrian/vehicle incident, he wanted to underline that the issues are not just at 3:30 pm, but that the morning shift, with darkness as a factor, is also of major concern. Tom noted that lighting is an important factor to think about. A resident added that it is especially bad in the rain, and reflective gear would be helpful.
- A resident said she understood the reasons why a parking garage would not work for the shipyard, but wondered if there could be one built for downtown.

Carol thanked everyone for coming and noted that the PowerPoint, meeting minutes and updates would be on the City of Bath website.

The meeting was adjourned at 7:45 pm

NEED TO ADD FINAL PRESS RELEASE