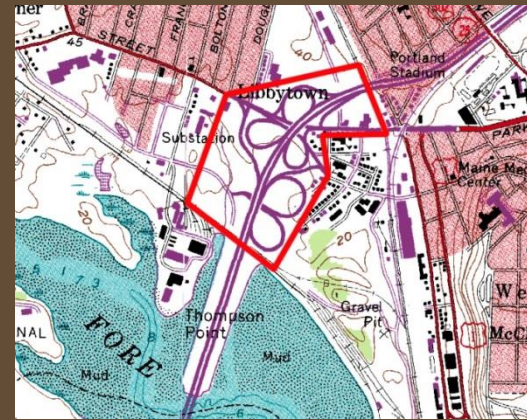
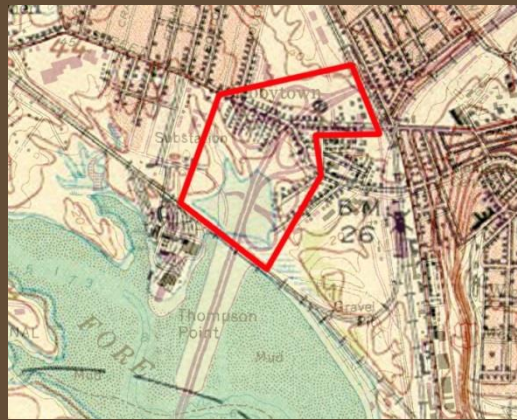
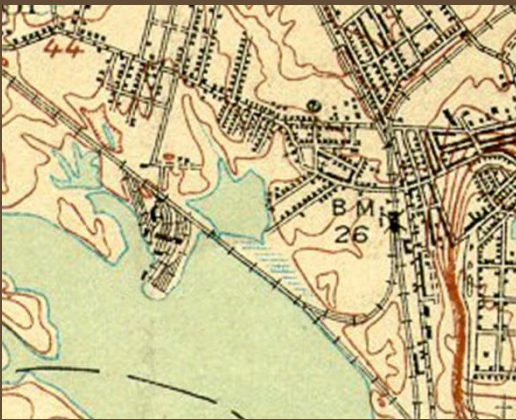


Libbytown Traffic Circulation and Streetscape Study

Final Report



Prepared for:
The City of Portland
PACTS MPO

Prepared by:



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November, 2013

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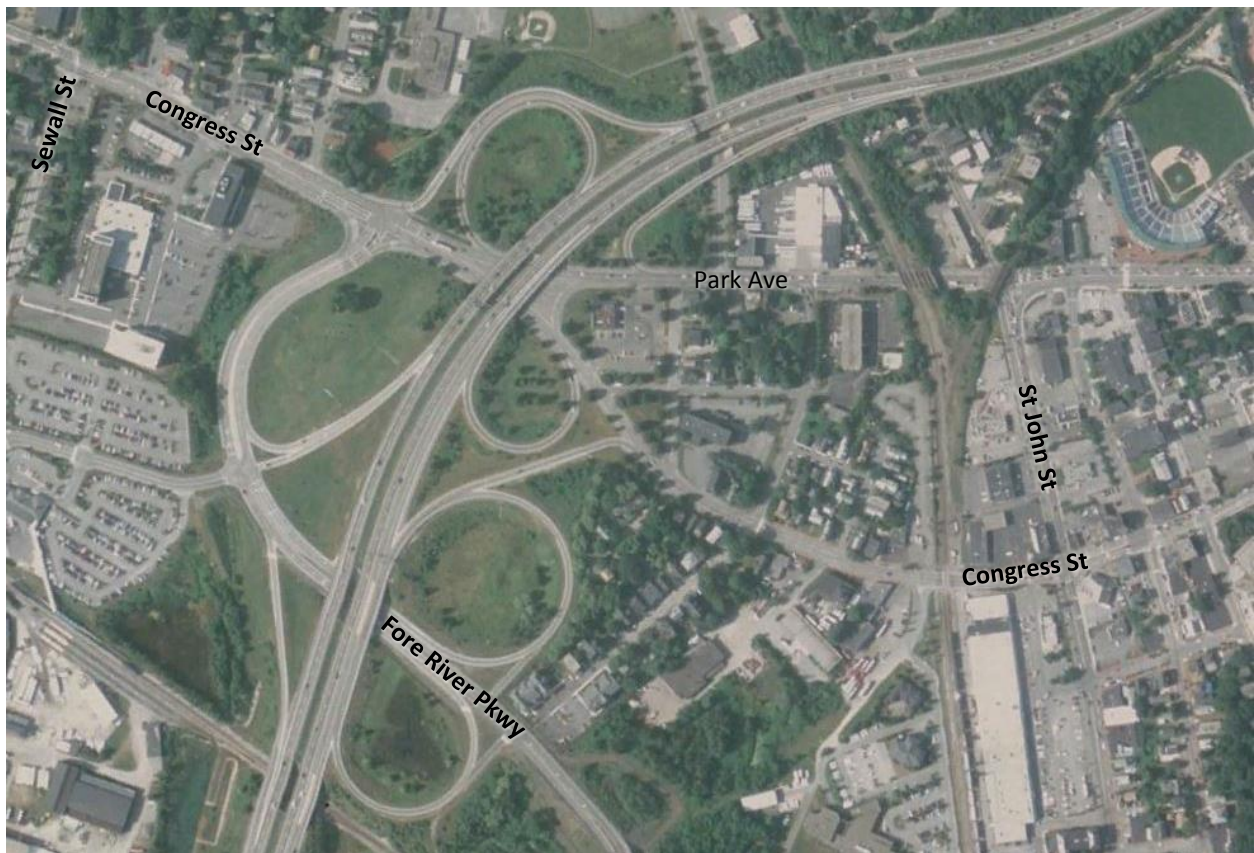
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Executive Summary

The Portland Area Comprehensive Transportation System (PACTS) and the City of Portland recognize the need to address the numerous safety, transportation and community challenges and opportunities related to the poorly functioning I-295 Congress Street interchange (exit 5), and the surrounding street network in the eastern Libbytown neighborhood. The *Libbytown Traffic Circulation and Streetscape Study* was initiated to address these concerns in a comprehensive and holistic manner, considering all modes of transportation and the economic vitality of this important part of the City. The primary area of focus for this study is shown below.



Among the specific issues that have been identified:

- Numerous motor vehicle high crash locations, as reported by Maine Department of Transportation (MaineDOT).

- A challenging environment for pedestrians, including inadequate pedestrian crossings, infrastructure gaps in the pedestrian network, and high speeds in the vicinity of the I-295 ramps.
- A challenging environment for bicyclists, including lack of bicycle lanes or paths, high speeds, and one-way streets requiring inefficient travel routes.
- A challenging environment for transit users due to the one-way street network that prevent important transit stops and transfer locations to be located on opposite sides of the street.
- A history of disinvestment and underutilization of land in the study area, despite its highly accessible and important location in the City.

An important consideration is the history of the interchange 5 development. The aerial photographs below show the interchange with Congress Street as originally constructed on the left, and after the new Fore River Parkway interchange was completed on the right. It is typically very undesirable to allow essentially two interchanges in such close proximity, as it introduces additional conflict point on a high speed highway. It is also evident that the older interchange loop ramps are much smaller than those on the Fore River Parkway, which meet modern engineering standards. These smaller ramps on the old Congress Street interchange do not provide for adequate acceleration for traffic entering the freeway lanes, nor a good interface with the local street network on Park Avenue and Congress Street.



Study Process

The City of Portland appointed a project advisory committee of neighborhood residents, businesses and other stakeholders, and hired a team of consultants to explore alternatives and make recommendations for addressing these needs. From the outset, the intent was to develop a plan for improvements that would benefit all modes of transportation, and result in a street network that would be more conducive to investment and attractive for appropriate development. The following summarizes the study process, conducted from July 2012 through July 2013.

- 1) Review existing conditions in the study area.
- 2) Define goals for the area.
- 3) Explore alternatives, including reconfiguration and removal of the redundant I-295 exit 5 ramps and converting Park Avenue and Congress Street to two-way operation. The alternatives were developed and tested as follows:
 - a. Potential traffic to be generated by full build-out of the development proposal at the time for Thompson's Point was included in all analysis.
 - b. The regional travel demand model was used to determine potential changes or increases in travel time.
 - c. Multimodal level of service analysis was conducted for each alternative to allow understanding of the trade-offs between vehicular traffic conditions and those of other modes.
- 4) Develop recommendations on design and implementation strategy for a preferred alternative.

The project advisory committee met four times, to review each of the above milestones. At several points during the study process, meetings were held with key stakeholders, including MaineDOT, FHWA, and H.P. Hood, which operates a bottling plant in the study area. All businesses in and near the study area were invited to a meeting to review the alternatives and get input.

Goals

The following are among the primary goals that were developed with input from the Project Advisory Committee and other stakeholders:

- Provide safe, comfortable, and convenient transportation for all modes between the Portland Transportation Center and the St. John/Congress Street/Park Avenue area.
- Address the delays resulting from more frequent trains at the Congress Street crossing, particularly for emergency response vehicles.
- Reduce the impact of high speed interstate traffic entering the Libbytown and St John-Valley neighborhoods by reinforcing transitions to neighborhood streets.
- Support local businesses and the economic vitality of the study area through street design changes that provide greater visibility and accessibility for all modes of transportation.

Findings

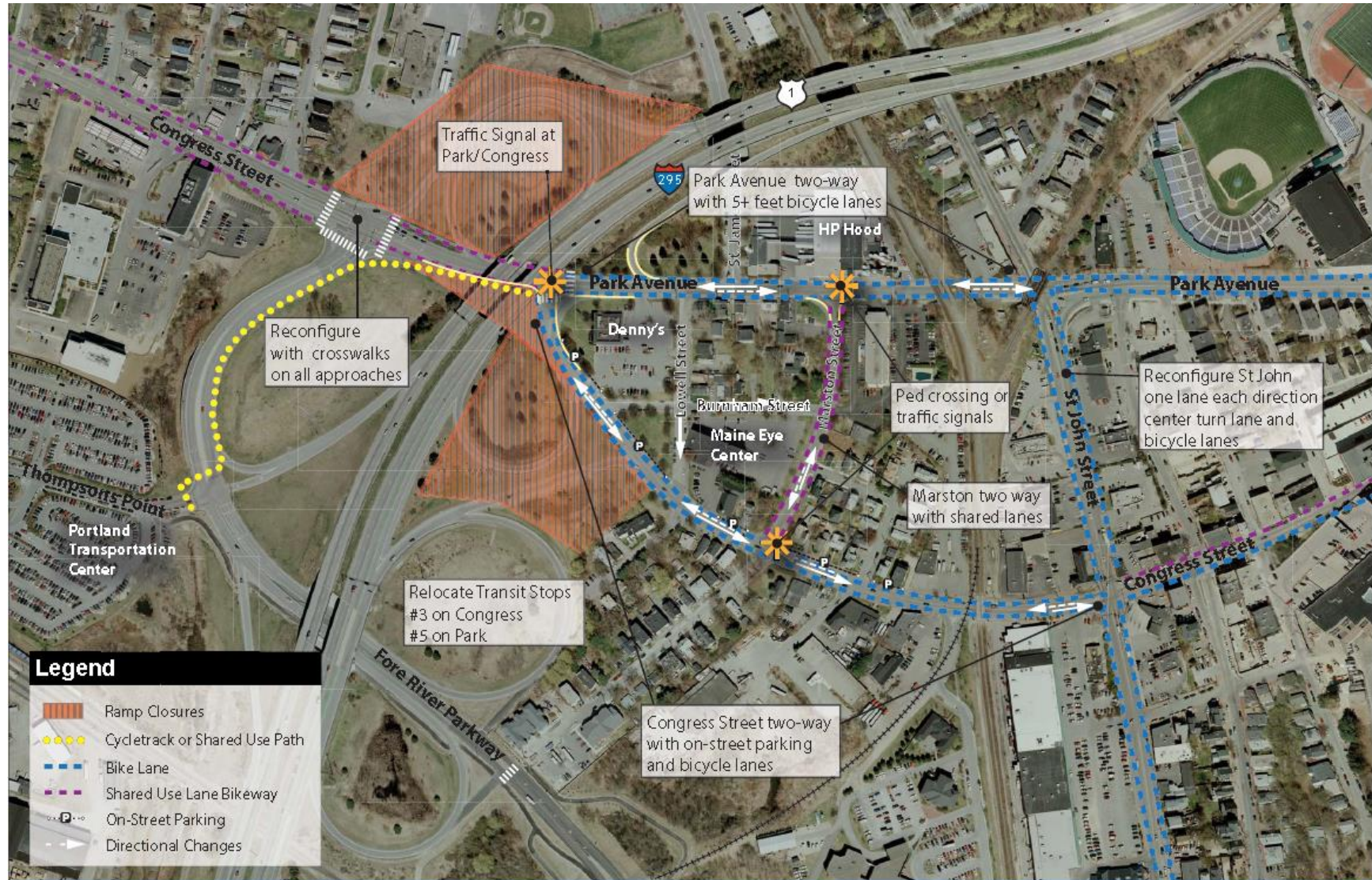
The Project Advisory Committee and team considered a wide range of alternatives, including ramp closures and two-way conversions, to achieve the goals of the project. Modeling using the PACTS regional travel demand model was used to assess the traffic redistribution. The key findings of the analysis are:

- Closing four of the redundant exit 5 ramps will have great benefit to safety in the study area for all modes of transportation with very limited effect on the regional transportation network.
- Converting Congress Street and Park Avenue to two-way operation will significantly benefit accessibility to the area and bicycle travel and reduce trip lengths.
- The area's road network will be able to absorb the redistribution of traffic that would result from the closure of the redundant interstate ramps and still maintain acceptable conditions for traffic with some improvements of modest cost.
- Detailed traffic operations analyses were conducted to determine changes to intersection design and operations to accommodate the redistribution of traffic with the ramp closures for both near term (2015) and long term (2035) scenarios.
- There will be substantial improvements to the safety, appearance, and functionality of the study area street network and will be of great benefit to pedestrians, bicyclists and local businesses.
- Most high crash locations in the study area will have conflicts eliminated, reduced volumes or lower speeds (see below). High crash segments on Park Avenue east of St. John, and on St. John south of Congress Street are currently the subjects of construction projects that should reduce crash frequencies.
- Some of the ramp closures will result in a modest increase in traffic volumes at the Forest Avenue interchange, which has high crash rates and several high crash locations. There are ongoing efforts to address safety at the Forest Avenue interchange, and it is recommended that improvements be implemented before or concurrently with the permanent exit 5 ramp closures.

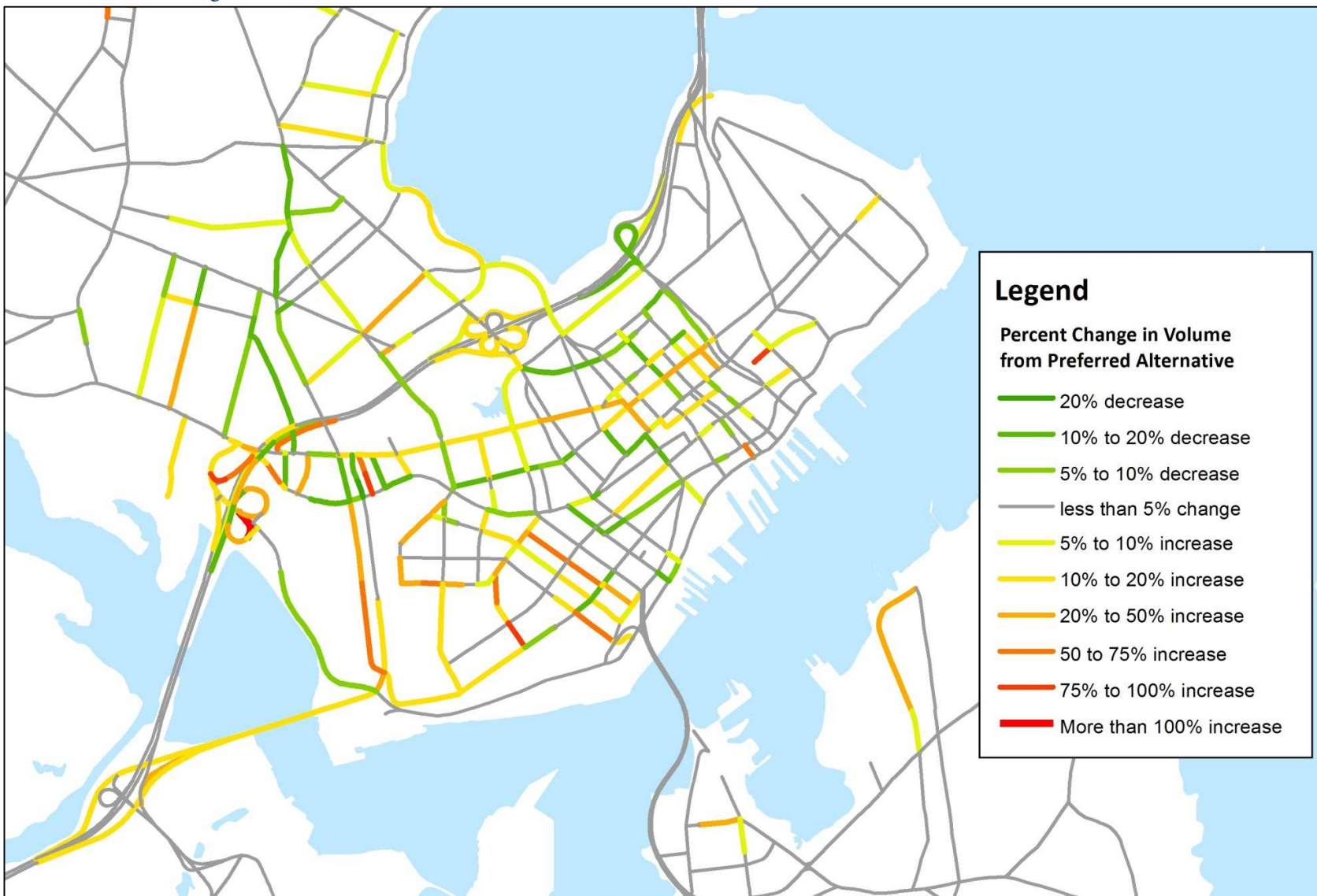
Recommendations

This study's recommendations, shown in the figure on the next page, were developed after a careful process of evaluation, testing and analysis for safety and quality for all modes of transportation. The closure of the interstate ramps was tested with the regional travel demand model, and found to have minimal effects in regional travel times. Tradeoffs of lower, but still acceptable, automobile levels of service are offset by dramatic improvements in the safety and quality of the bicycle and pedestrian network.

Recommendations



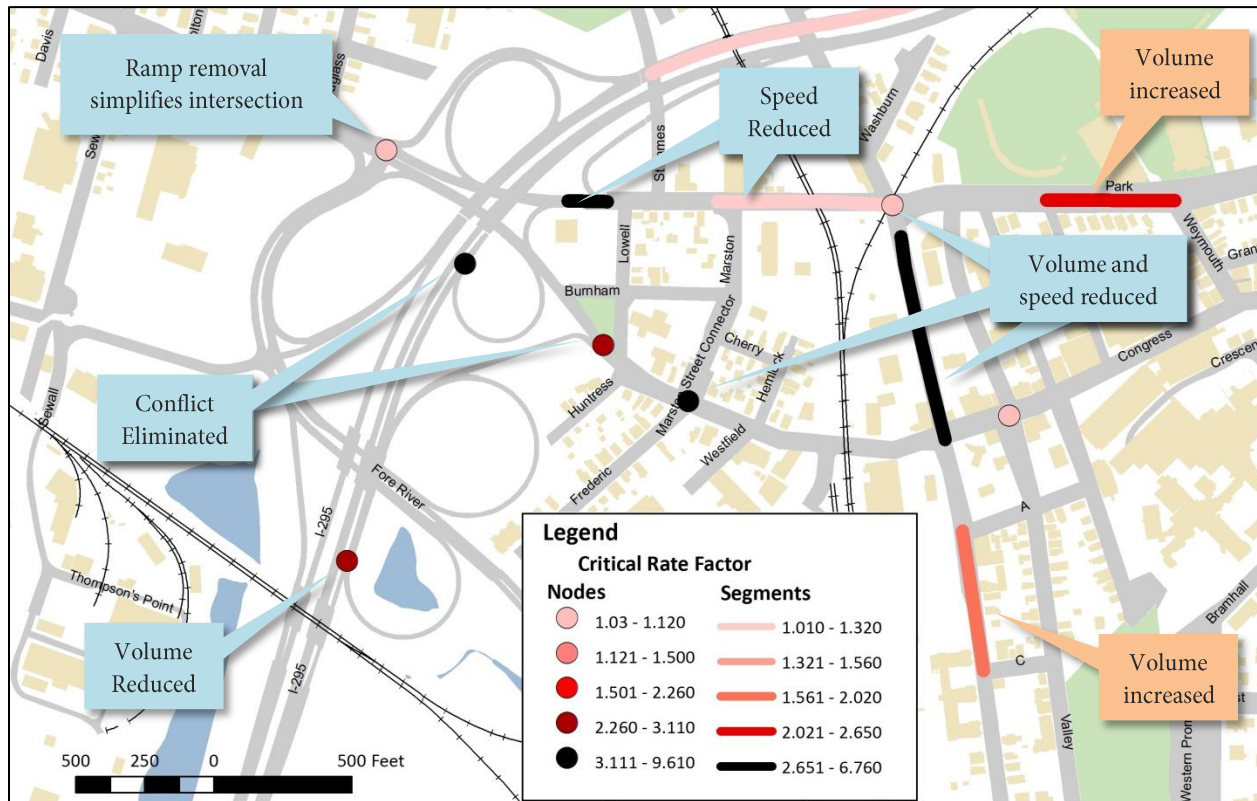
Modeled Traffic Changes from Recommended Plan



Safety

The recommendations in this report have been particularly focused on improving safety in the study area. The current street network has numerous motor vehicle high crash locations, which have a significantly higher crash rate than average. The figure below shows the high crash locations in the study area, and also indicates the crash rate by percentile. The Preferred Alternative will address the great majority of these locations by reducing the volumes, reducing speeds, removing conflicts, or simplifying intersections.

Effect of Recommendations on Motor Vehicle High Crash Locations in the Study Area



There are several safety-related issues that require further consideration:

- The preferred alternative will increase traffic volumes on some legs of the Forest Avenue/I-295 interchange. This interchange has well-documented safety issues, and each ramp terminal is a high crash location. The City of Portland has been coordinating with the MaineDOT to address these issues, and several reconfiguration options are under discussion. Implementation of improvements at Forest Avenue should be underway before the Libbytown area ramp closures are implemented.
- Park Avenue has a high crash location east of St. John that will see increased traffic. The City of Portland is currently in the process of reconfiguration of this segment to have three lanes and a center left turn lane, which should significantly reduce speeds and the crash rate in this location.

- St. John Street has a high crash location south of Congress Street that will also see an increase in traffic volume. The City of Portland is undertaking streetscape improvements in this area which should reduce crash rates.

Implementation Plan

The improvements described in this report can be implemented incrementally over many years, as funding and local priorities indicate. The following is suggested as an initial phasing order:

- Conversion of Park Avenue to 2-way operation (has great benefits for emergency response to Maine Medical Center) and accompanying streetscape enhancements.
- Convert Congress Street to 2-way operation with streetscape enhancements and temporary changes to northbound off-ramp terminal to reduce speeds and clarify yield condition.
- Coordination with MaineDOT to conduct temporary ramp closures and traffic monitoring to determine any additional impacts or concerns with ramp closures.
- Closure of the I-295 northbound off- and on- ramps at Congress Street (ramps A and C).
- Closure of the I-295 southbound off- and on-ramp to Congress Street (ramps B and D).

The information generated with the PACTS regional travel demand model on the effects of the ramp closures can be verified by experimental, temporary closures with traffic volume monitoring before closures are made permanent.

Construction costs for these improvements have been estimated as follows at a conceptual level, and are summarized in the table below. Details for each phase of implementation are provided later in this report.

Item	Phase	Component	Cost
1	Phase I: Conversion of Park Avenue to Two-way		\$414,000
2	Phase II: Restripe Outer Congress Street		\$111,000
3	Phase III: Conversion of Congress Street to Two-Way		\$1,132,000
4	Phase IV: Ramp Closures	Ramp A	\$57,000
5		Ramps B & D	\$230,000
6		Ramp C	\$35,000
7	Ongoing: Streetscape Improvements	Park Avenue	\$399,000
8		Congress Street	\$1,832,000
		Total:	\$4,210,000

Additional improvements may be required to accommodate possible future traffic growth, including roundabouts at the intersections of Fore River Parkway/Congress Street and Fore River Parkway/ Thompson's Point/I-295 SB Ramp. Costs for these are estimated to be on the order of \$6,000,000.

1 Introduction

Libbytown is at a crossroads of several important corridors: I-295, the PanAm railroad, Congress Street, Park Avenue and the Fore River Parkway. The Libbytown neighborhood has been fragmented by these facilities, which make travel through the area on foot or bicycle challenging. The one-way operations of Congress Street and Park Avenue between St. John Street and Park Avenue further contribute to difficult travel by bicyclists and transit services.

“Libbytown is currently one of the most difficult areas in Portland to navigate as a pedestrian or bicyclist. Though there have been recent improvements, and more are in the works, the city would do well to invest in significant improvements in the area to re-connect Libbytown to its surroundings.”

Connecting Libbytown-2009

Libbytown has seen tremendous change in the past 50 years, largely related to the construction of I-295. The historic center of Libbytown is coincident with the center of the Congress Street-I-295 interchange.

1.1 Goals of the Study

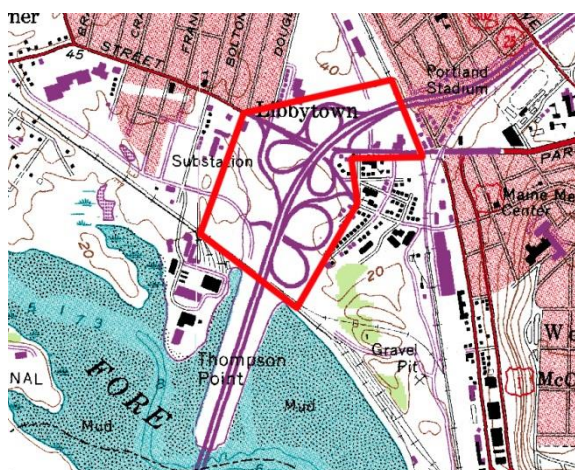
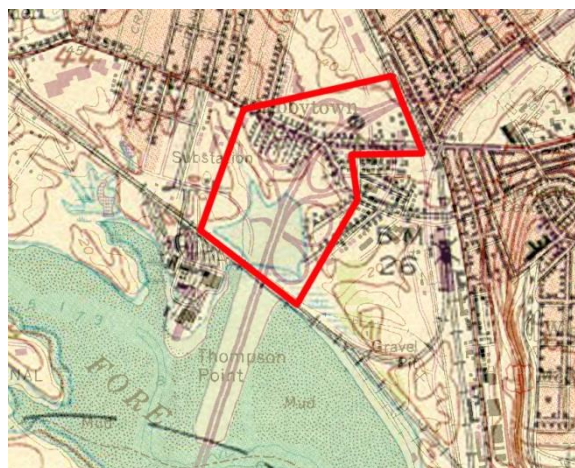
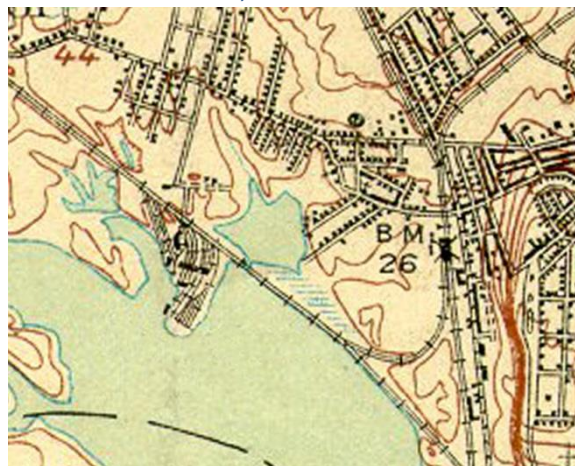
“The goal of the study is to comprehensively assess and make recommendations regarding the multi-modal transportation network, circulation pattern and supporting streetscape within the eastern portion of the Libbytown Neighborhood.”

Libbytown Streetscape and Traffic Circulation Study RFP-2012

The following are additional considerations for this study.

- Build on the work in *Connecting Libbytown*,

Libbytown in Transition



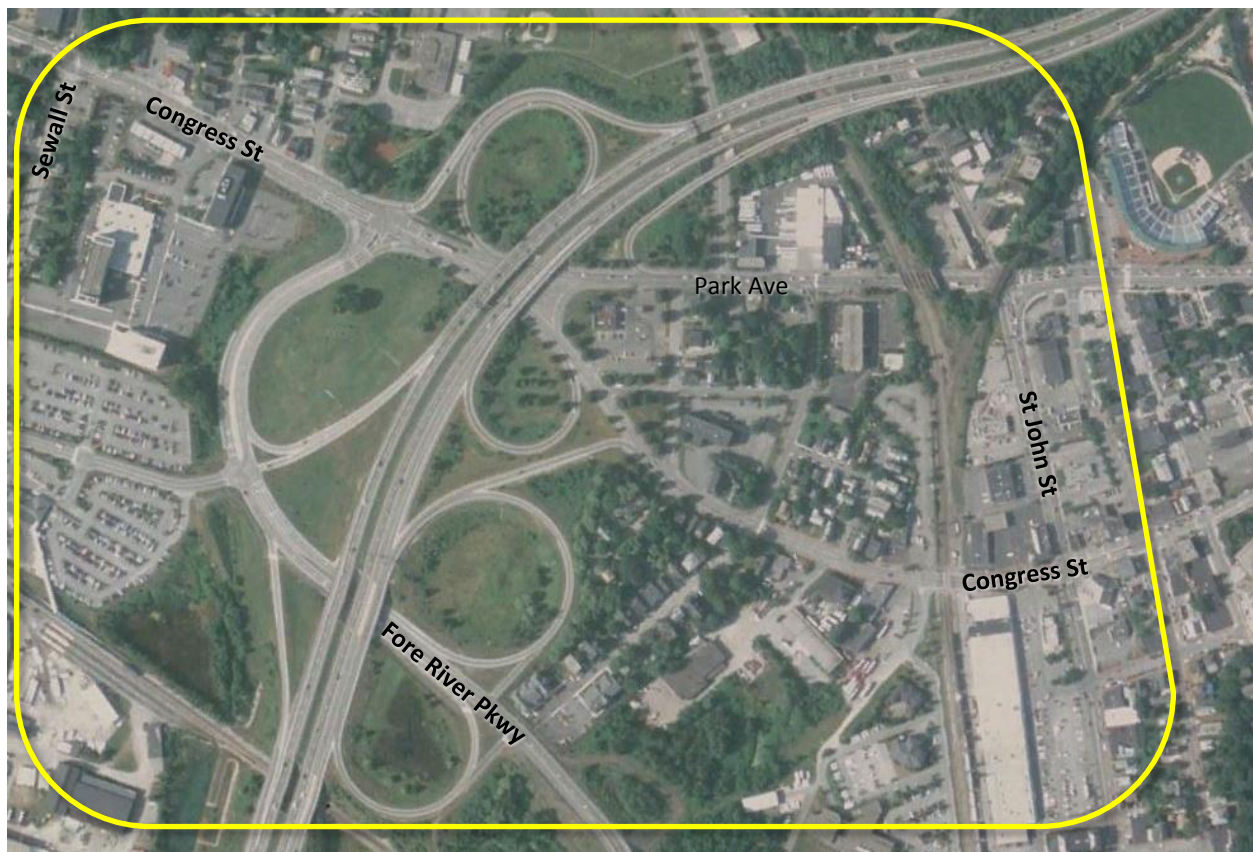
to improve neighborhood connectivity, safety and function for all modes and users.

- Consider the opportunities to re-think traffic circulation arising from the completion of the Fore River Parkway.
- Create a more attractive, inviting and accessible streetscape.
- Identify investments that support economic development and growth that is compatible with the community's vision and viable

1.2 Study Area

The primary study area for the traffic circulation component is shown in Figure 1.1, which is the area of focus for the traffic design recommendations. However, the entire Portland region is considered in the transportation modeling. The community and stakeholder involvement also included numerous residents, businesses and institutions from both inside and outside the study area below who may be affected by the proposed changes.

Figure 1.1: Project Study Area



1.3 Study Approach

This study utilizes current transportation planning practices that encourage more choices and options to meet the demand for travel, and takes into account recent trends in travel behavior. The following approaches have guided this effort.

- **Plan for success, not failure.** The City has goals of increasing use of non-auto transportation and reducing the rates of driving per capita. Transportation projects should not presume failure to achieve these goals, but rather should seek to advance them.
- **Plan for all modes and all users of the street.** A *Complete Streets* approach considers all modes of travel and all users of the street network. Multimodal level-of-service analysis is used to evaluate conditions across all applicable modes to compare alternative design scenarios.
- **Context Sensitive Solutions.** Neighborhoods are profoundly affected by their surrounding street network and its roadway and intersection design. The recommendations in this report should seek to create the environment envisioned by the City of Portland and neighborhood residents through appropriate investments in the public right-of-way.
- **Consider the risks and benefits of changes.** There are risks of maintaining status quo, which include high frequency of crashes, a poor economic climate resulting from limited accessibility, and challenging conditions for many modes of transportation. There are also risks inherent in any changes in the transportation system, but appropriate use of transportation modeling techniques can inform us about these risks and identify possible solutions. The risks and rewards of change should be weighed against those of doing nothing.
- **Public and stakeholder involvement** is essential for effective transportation planning and design. Public involvement can help inform the planners and designers about local conditions, and contribute valid ideas for design solutions. Stakeholder involvement also provides valuable information, and their support will be necessary for implementation. Those who will be highly affected by the project outcomes should have a prominent role in the planning process.
- **Consider observed trends in travel behavior.** Traffic volumes and auto ownership in Portland have been declining, even as population and economic activity increases. As we plan for the future, high rates of vehicular traffic growth are both unlikely and undesirable. Further, the City of Portland has aspirations to increase the share of non-auto modes and to reduce the need for vehicular travel by implementing more compact, mixed use types of development.

2 Process and Participants

The project was guided by a project management team including staff from the City of Portland Departments of Public Services and Planning, the PACTS MPO, and the consultant team led by DuBois & King with Ransom Consulting Engineers, Terence DeWan & Associates, Morris Communications, and Smart Mobility.

A Project Advisory Committee (PAC) was established by the Portland City Council, and included the following members and organizations. Minutes of the PAC meetings can be found in Attachment 1.

Table 2.1: Libbytown Project Advisory Committee Members

Name	Constituency
Maria Macdougall	Libbytown Resident
Harlan Baker	Libbytown Resident
Jackie Thompson	Libbytown Resident
Ed Suslovic	Libbytown Resident/City Councilor
Zachary Barowitz	Libbytown Resident/Business owner
Fred Dillon	Libbytown Resident/Former LNA
Skip Woods	HP Hood
Ruth Mlotek	IRIS Network
Richard Buchanan	Logan Place
Mary Didonato	Maine Eye Center
Dan Dougherty	Maine Medical Center
Karen Perry	Norway Savings Bank
Christian MilNeil	Portland Bicycle-Pedestrian Committee
Jaime Parker	Portland Trails
Channing Capuchino	SJVNA Representative

There were two public meetings held for the project: an alternatives presentation and workshop on May 8, 2013, and a final presentation on June 10, 2013. Meeting notes and handouts are also included in Attachment 1. In addition, all local businesses and institutions were invited to a separate meeting on March 22, 2013 to allow for an opportunity to learn about the project, and provide the team with input and concerns.

Additional meetings were held with officials from the Maine Department of Transportation (MaineDOT), Federal Highway Administration (FHWA), the Portland Public Safety Departments and H.P Hood to obtain further input and guidance.

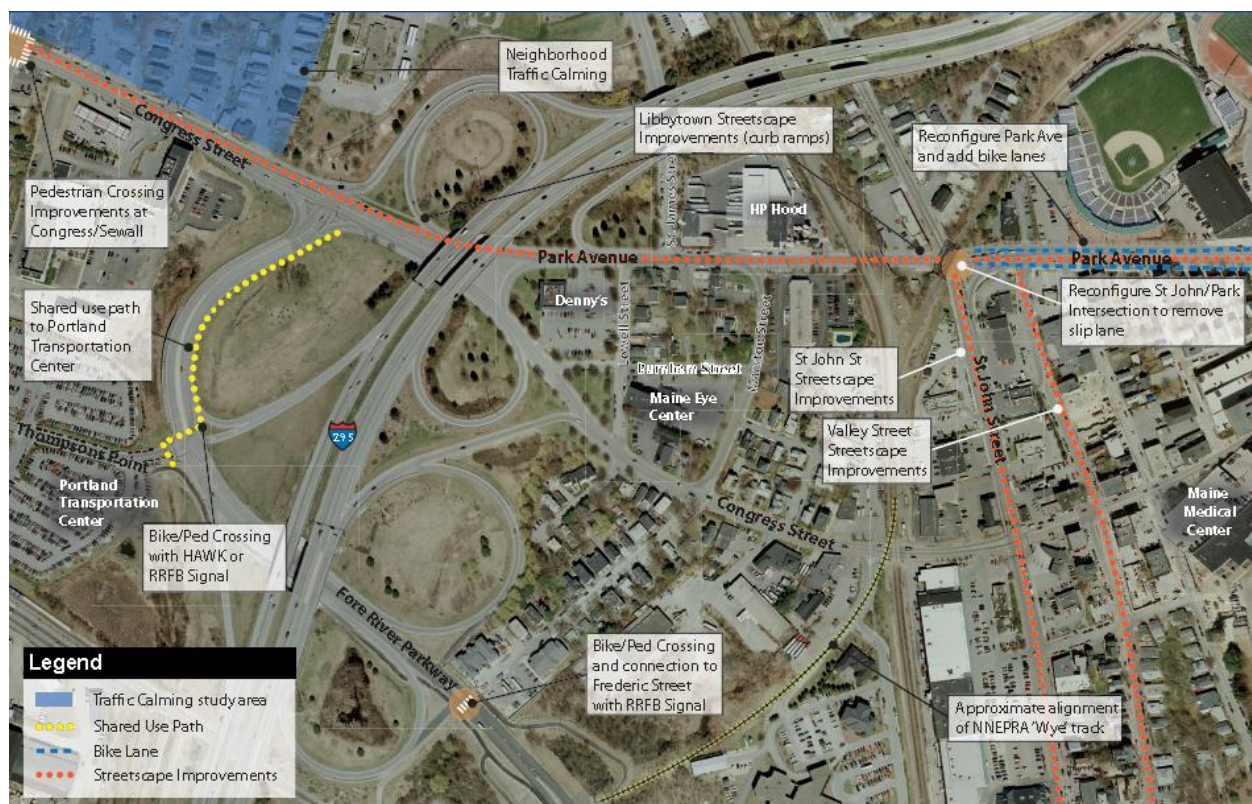
3 Existing Conditions

An inventory and analysis of existing conditions for all modes of transportation was conducted at the outset of this study, and can be found in Attachment 2.

3.1 Ongoing Projects

As transportation and streetscape needs are considered for Libbytown, it is important to recognize a large number of ongoing initiatives and projects that are currently underway by the City of Portland and MaineDOT, which are shown on Figure 3.1.

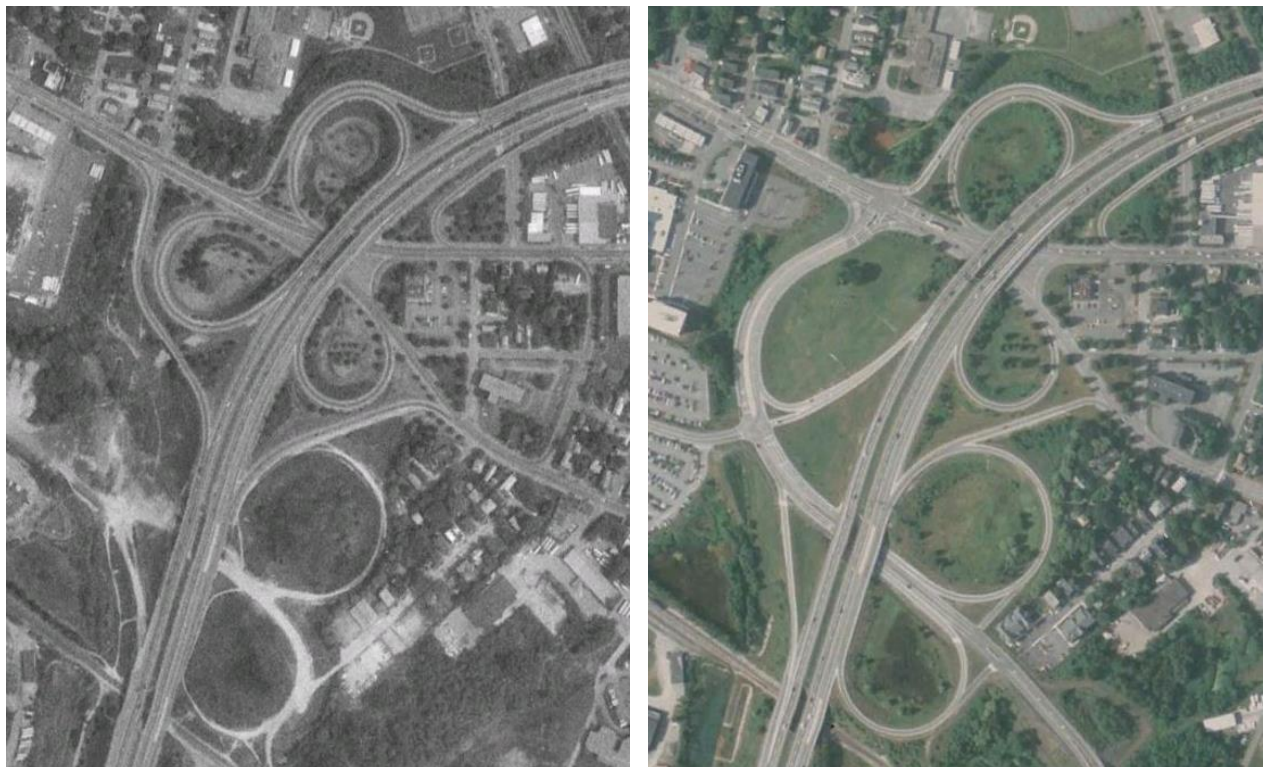
Figure 3.1: Planned Transportation Projects in the Libbytown Area



3.2 Ramp Geometry

The I-295 Exit 5 interchange is very complex, reflecting a history of changes and adaptations. When the interstate was first constructed, there was a three-quarters cloverleaf interchange with Congress Street and Park Avenue that provided uncontrolled, high speed access to the city street network, shown below on the left. By around 2000, a new interchange was constructed to serve the Thompson's Point area and the future Fore River Parkway. These newer ramps have much larger radii and provide adequate length for acceleration and deceleration. The original Congress Street interchange ramps, despite their antiquated geometry, were retained even after the Thompson's Point/Fore River Parkway interchange was completed. Typically such close spacing of interstate ramps is not desirable and does not meet modern design guidelines. The current safety record in the area is evidence of poor interchange design.

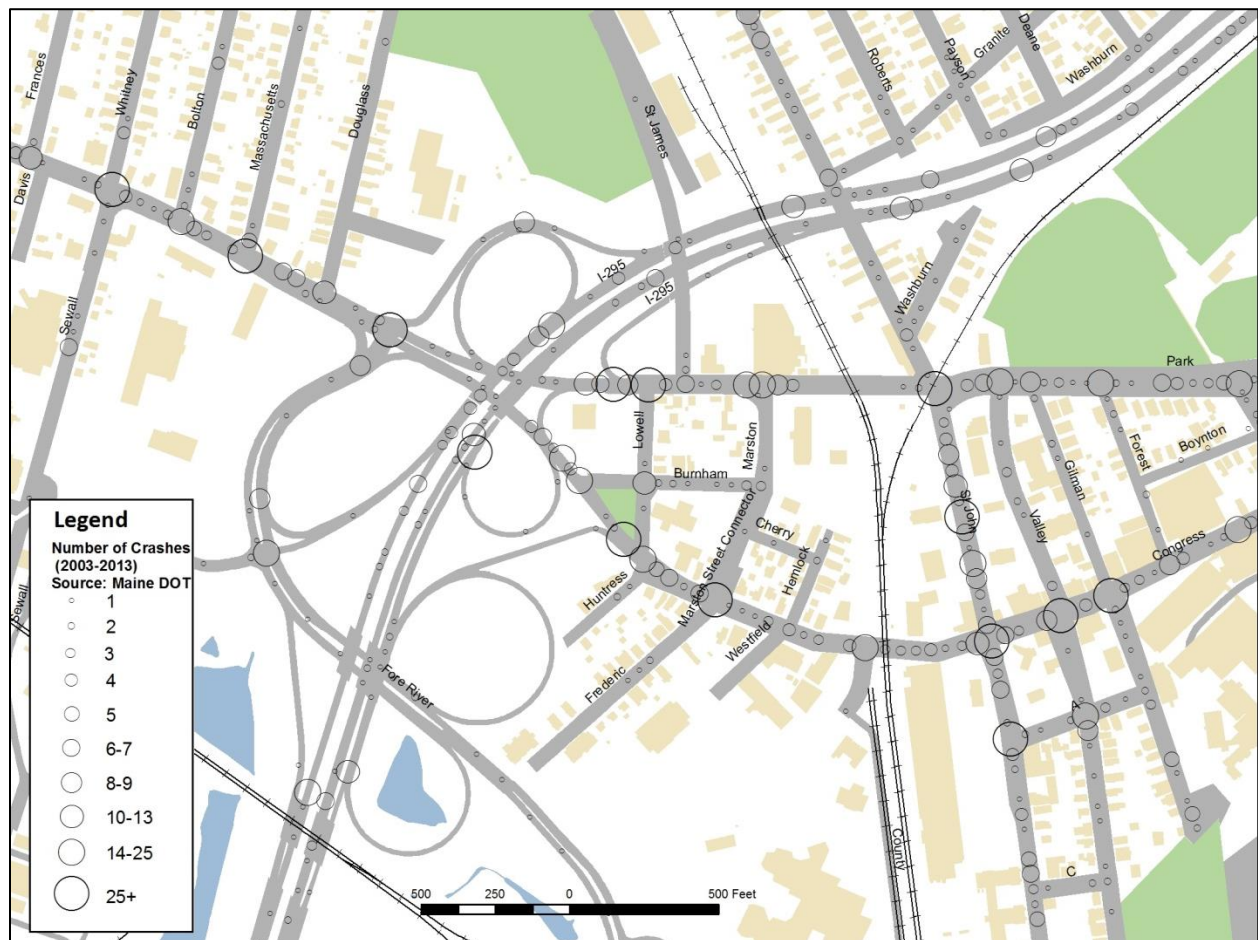
Figure 3.2: Aerial Views of Libbytown Study Area Ramps- 1997 (left) and 2008 (right)



3.3 Vehicular Safety

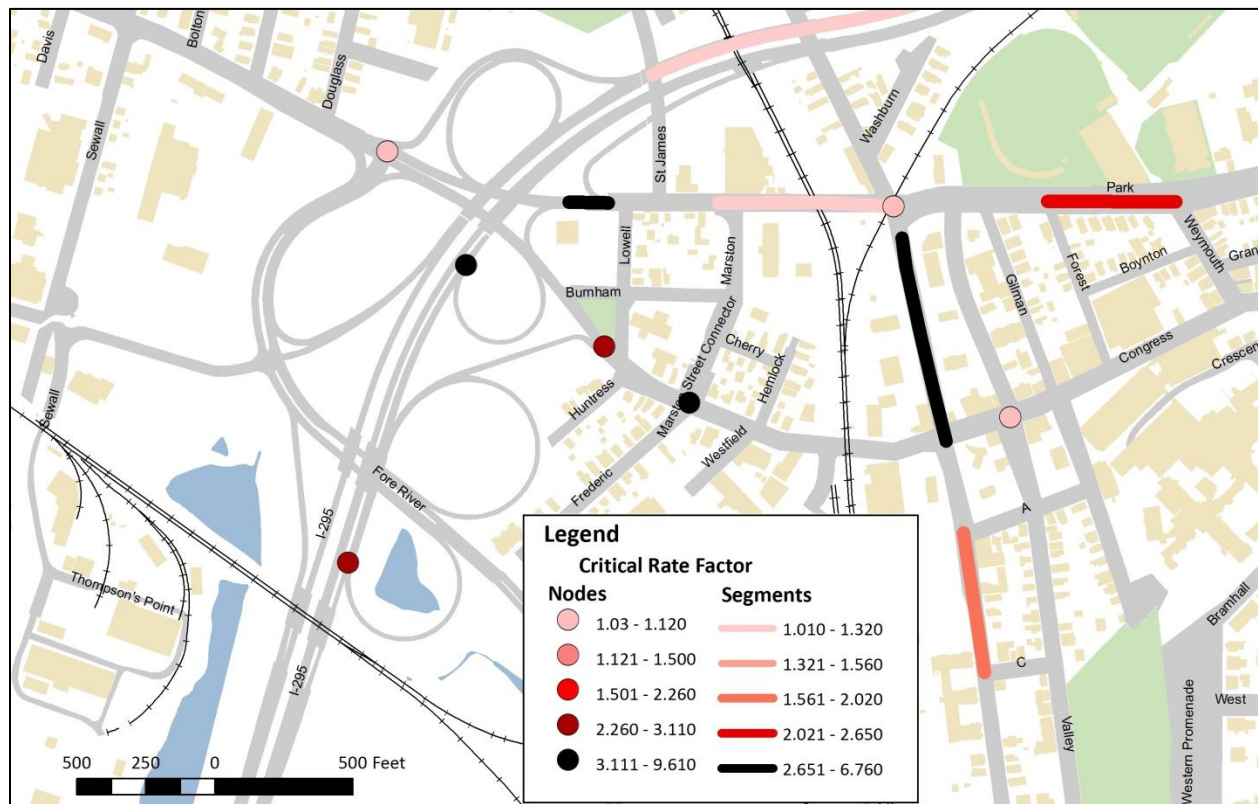
The study area has many safety deficiencies as indicated by a review of vehicular crash data. Figure 3.3 shows the crash frequency in the study area, which provides insights on the safety of the study area street network. More information on safety of the project area is provided in Attachment 2.

Figure 3.3: Crash Frequency in the Libbys Town Study Area (MaineDOT)



The Maine Department of Transportation (MaineDOT) indicates that there are numerous “high crash locations” in the study area, shown in Figure 3.4. The Crash Rate Factor provides the rate of crashes relative to the traffic volumes using that intersection or segment. Ramps A, C and D all have high crash locations at their termini. Currently, the City of Portland and MaineDOT are undertaking several improvement projects that will address several of the locations with high crash frequencies.

Figure 3.4: MaineDOT High Crash Locations in the Libbys Town Area (as of August, 2013)



3.4 Traffic Volumes

Recent traffic counts in the study area were adjusted to the year 2012. The resulting a.m. and p.m. peak hour volumes are shown in Figure 3.5 and Figure 3.6.

More information on traffic volumes for the study area included in Attachment 2.

Figure 3.5: 2012 A.M. Peak hour turning movement volumes

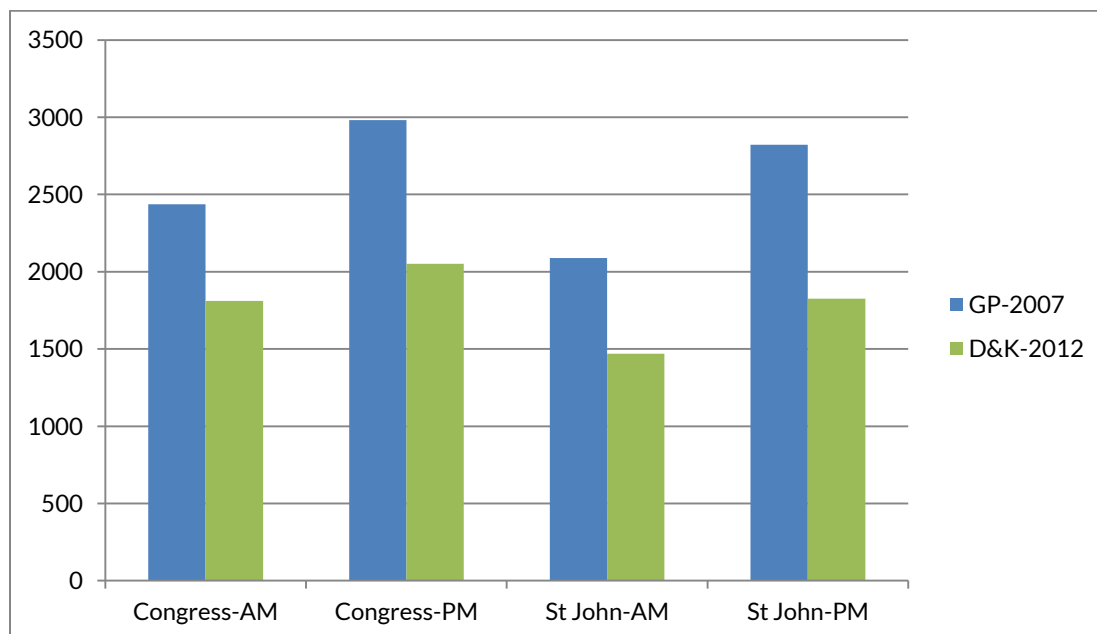


Figure 3.6: 2012 P.M. Peak hour turning movement volumes



Traffic circulation patterns in the study area have changed considerably since 2008, when the Fore River Parkway (FRP) was completed. This is particularly notable on St. John Street, which has lower volumes on each of its legs of the intersection now than it did in 2007. Figure 3.7 shows the p.m. peak hour volumes at Park Avenue/St. John and Congress Street/St. John intersections before and after the completion of FRP in 2008. Other recent counts by MaineDOT were reviewed and verify this change, which provides an opportunity to reconsider the intersections' design and layout to be more responsive to current users.

Figure 3.7: Traffic Volume History at Congress Street/St John and Park Avenue/St John



3.5 Bicycle and Pedestrian Conditions

Travel through Libbytown on foot or bicycle can be challenging and intimidating. High vehicular traffic speeds are prevalent, as there are no stops or yields at the termini of several of the I-295 ramps to reinforce a transition to a lower speed environment. There are few crosswalks on Park Avenue or Congress Street, and often vehicles do not yield to pedestrians for fear of being rear-ended by approaching high speed traffic. The one-way, two-lane configuration puts pedestrians at risk once there is a car yielding to them, as the stopped vehicle blocks visibility from oncoming traffic in the next lane. There are also numerous deficiencies in lighting, sidewalk condition and curb ramps in the study area, many of which are being addressed in current City projects.

Bicycle travel is particularly challenging with the one-way street network, which requires very circuitous routes to ride safely through the area. The high speeds near the interchange make bicyclists feel highly exposed and at risk while riding across Libbytown.

Attachment 2 provides a detailed assessment of the infrastructure and conditions for bicyclists and pedestrians.

3.6 Project Purpose and Need

The following statement of Purpose and Need has been developed in consideration of the existing conditions and community and stakeholder input:

This purpose is the transformation of Libbytown into a cohesive and livable neighborhood by:

- improving safety and connectivity for all users of the area's transportation network;
- improving the business and economic environment with
 - better traffic circulation,
 - a more coherent street network,
 - easier access and
 - higher visibility; and
- creating a more attractive and inviting streetscape.

The needs exist due to high crash rates on the street network, and unsafe and unwelcoming environment on many streets for pedestrians, bicyclists and transit users, and an inconvenient one-way traffic circulation system that does not provide a high level of accessibility for local businesses.

The primary issue facing the study area is modernizing the safety and function of the streets and the circulation pattern to meet important regional traffic needs while simultaneously designing the transportation infrastructure and streetscapes of the area to serve the neighborhood.

Libbytown Traffic Circulation and Streetscape Study RFP

4 Goals and Objectives

Goals and objectives were established after a review of the existing conditions and through discussion with the PAC, City staff and other stakeholders. The goals for this study are:

- Provide safe, comfortable, and convenient transportation for all modes between the Portland Transportation Center and the St. John/Congress Street/Park Avenue area.
- Address the increasingly frequent railroad crossings of Congress Street, particularly for emergency response vehicles.
- Reduce the impact of high speed interstate traffic entering the Libbytown and St John-Valley neighborhoods by reinforcing transitions to neighborhood streets.
- Support local businesses and the economic vitality of the study area through street design changes that provide greater visibility and accessibility for all modes of transportation.

The following design objectives were considered in the development of alternatives:

- Avoid exacerbating operational problems on I-295 (i.e. weaving and merging).
- Reinforce the transition from freeway to urban street environment by providing positive traffic control (traffic signal, stop sign, or yield) at every ramp terminal on Park Avenue and Congress Street.
- Provide increased opportunities for pedestrians to safely cross Park Avenue and Congress Street.
- Provide a bicycle route between the Peninsula and the Portland Transportation Center along Park Avenue that is accessible to the average bicyclist.
- Improve the street environment for public transit services, including more attractive waiting areas and a more coherent and “legible” network.

5 Regional Traffic Analysis

From the outset, this study was charged with evaluating the possibility of closing of redundant ramps and converting Park Avenue and/or Congress Street to 2-way operation as a means to meet the above goals and objectives. The closure of the ramps will, for some users, increase their travel time for trips using I-295. Table 5.1 summarizes the increase of travel time and distance that would be incurred by diverting to the Fore River Parkway interchange. The travel time change at 25 mph represents an estimate of off-peak conditions, and at 15 mph represents peak hour conditions. Because most interstate travelers are making long distance trips, these increases are small relative to the total travel time of an interstate trip.

Table 5.1: Increased Travel Time from diverting to the Fore River Park Avenue interchange

Ramp		Change in distance (Miles)	Change in travel time (Min:Sec) at 25 mph	Change in travel time (Min:Sec) at 15 mph
A	NB Exit to EB Congress St	0.62	1:29	2:28
B	SB Entry from WB Park Ave	-0.14	-0:20	-0:34
C	NB Entry from EB Congress	0.49	1:11	1:57
D	SB Exit to WB Congress St	0.27	0:39	1:05
F	NB Entry from Park Ave	0.97	2:20	3:53

The PACTS Travel Demand Model can simulate how changes in road capacity or configuration would likely affect regional traffic patterns, and was used to test the ramp closures and one-way to two-way conversions. The model provides p.m. peak hour volumes for all of the region’s roads and major streets. It also provides regional measures such as Vehicle-Miles Traveled (VMT) and Vehicle Hours Traveled (VHT), which are useful to provide measures of overall network performance for different

scenarios. A set of model runs was conducted where each ramp was removed individually so that it could be determined the effects of the traffic circulation changes under consideration. Conversion of Park Avenue and Congress Street to two-way operation was also evaluated. The results of these runs are provided in Table 5.2, and show that these changes in traffic circulation have very small changes in regional VMT or VHT, within the accuracy level of the model.

Table 5.2: Regional Traffic Model results for Ramp Closures and Two-way Conversions

Reconfiguration	% Change in Vehicle-Miles Traveled (VMT)	% Change in Vehicle-Hours Traveled (VHT)
Close Ramp A NB Exit to EB Congress St	0.0279%	0.0006%
Close Ramp B SB Entry from WB Park Ave	0.0003%	-0.0146%
Close Ramp C NB Entry from EB Congress St	0.0211%	-0.0030%
Close Ramp D SB Exit to WB Congress St	0.0053%	-0.0162%
Close Ramp F NB Entry from Park Ave	0.0175%	0.0270%
Convert Park Ave to 2-Way	0.0074%	0.0003%
Convert Park Ave and Congress St to 2-Way	-0.0076%	-0.0033%

The results above show that none of the proposed changes would lead to noticeable increases in congestion and travel time, as the changes are not significant and within the model error range. Therefore, these possible changes in traffic circulation were considered among the alternatives, as described in the following section.

6 Alternatives

The following steps were followed in the process of developing, evaluating and refining alternatives.

- Brainstorm alternatives with input from PAC.
- Screen through preliminary modeling, review with FHWA/MaineDOT.
- Refine into four alternatives, analyze with PACTS model and Synchro
- Select preferred alternative, refine design through SimTraffic modeling

Table 6.1 summarizes the four refined/screened alternatives, which are illustrated in the attached maps.

Table 6.1: Alternatives Summary

	Interchange Configuration	a) Park Avenue-2 way Congress Street 1-way	b) Park Avenue-2 way Congress Street 2-way
Alternative 1	- Close 5 ramps: A,B,C,D,F - Directs all interstate traffic to Fore River Parkway Interchange	- Park Avenue is major route into downtown - Congress Street is major bicycle route	- Both routes serve traffic - Park Avenue is major bicycle route - Congress Street provides on-street parking
Alternative 2	- Close 4 ramps: A,B,C,D - Eastbound access to Ramp F is provided - Less traffic on Fore River Parkway Interchange than Alternative 1.	- Congress Street 2-way between Marston and St. John, and provides on-street parking - Park Avenue is traffic and bicycle route	- Equal emphasis for traffic, bicycles and parking on Congress Street and Park Avenue - Larger signal at Congress Street/Park Avenue/I-295 NB

Figure 6.1 through Figure 6.4 show the alternative concepts. Additional illustrations, including proposed street cross sections, are available in **Attachment 3**.

Figure 6.1: Alternative 1a



Figure 6.2: Alternative 1b



Figure 6.3: Alternative 2a

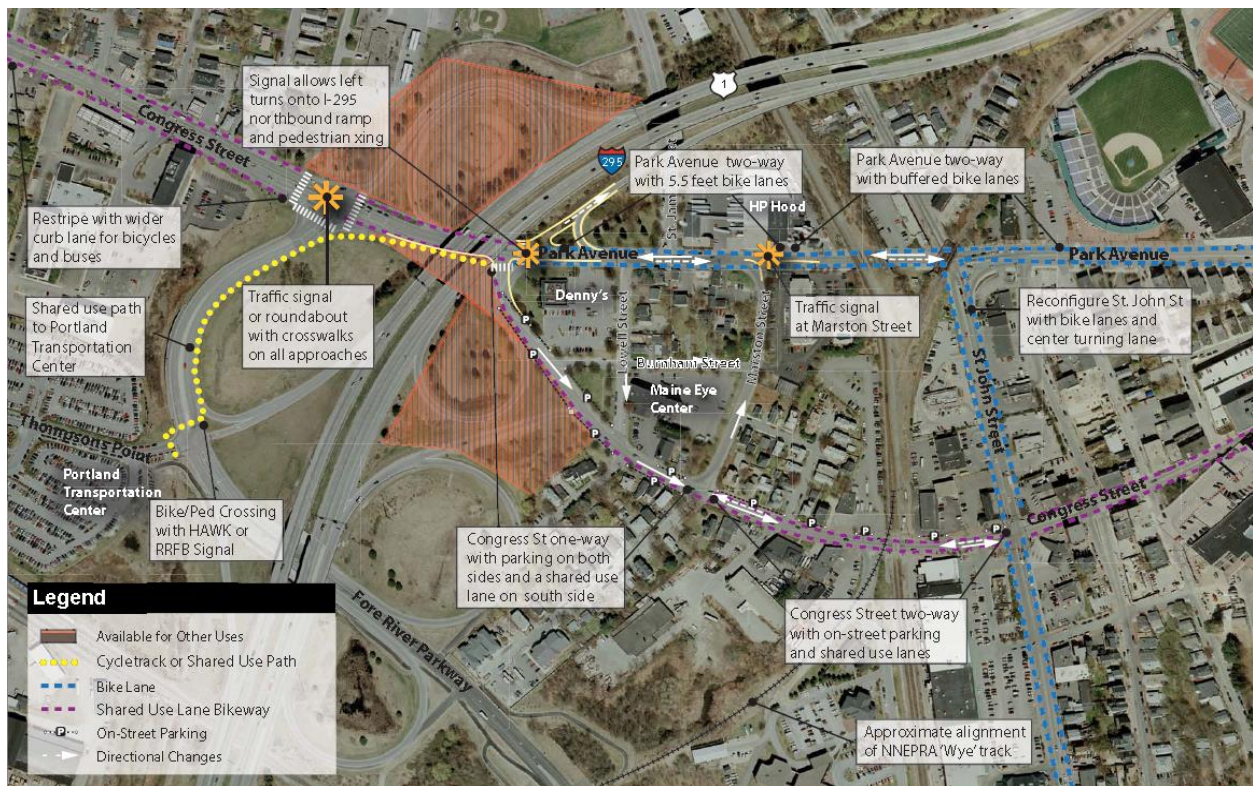
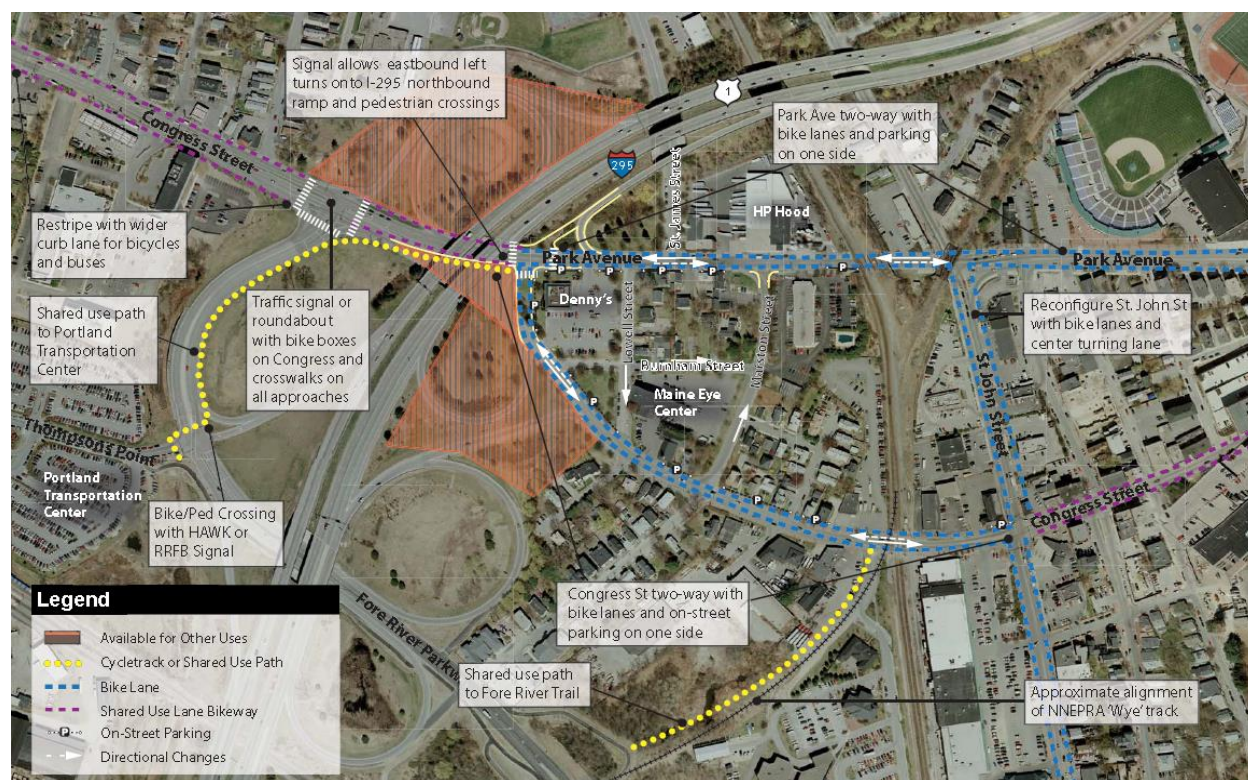


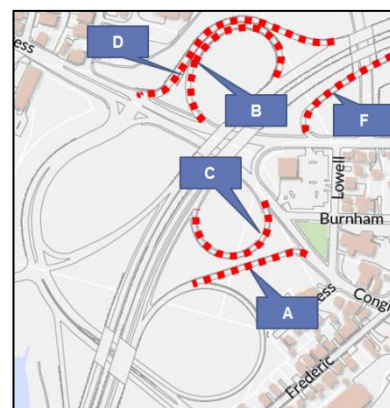
Figure 6.4: Alternative 2b



6.1 Rationale for Interchange Ramp Closures

Ramps A through D each have either vehicular safety deficiencies and/or create problems for other users of the street network. The following summarize the key considerations for each ramp:

- A. High crash location at junction with Congress Street; and design encourages high speeds for traffic entering Congress Street.
- B. High crash frequency at the junction with I-295 SB, and problematic weaves on I-295 due to inadequate radius for acceleration.
- C. High crash location at junction with I-295 NB and inadequate radius for acceleration.
- D. High crash location at the junction with Congress Street; and results in frequent U-turns along outer Congress Street for drivers seeking to get towards downtown Portland.
- F. High incidence of crashes at ramp's junction with northbound lanes of I-295. Relatively low volume of use indicates that closure would inconvenience relatively few travelers.



The closure of ramps A, B, C and D was included in all alternatives. Ramps A and C have the greatest negative impact to the safety and character of the Congress Street neighborhood, although their closure will result in some delay and potentially slower emergency vehicle response times. The closure of

ramps B and D have only a minor effect on travel times and distance. Ramp D's closure will significantly improve the function of the Congress Street/Fore River Parkway intersection by simplifying the geometry and signal phasing. Ramp B traffic can easily be accommodated at the Fore River Parkway southbound on-ramp.

6.2 Rationale for Two Way Street Conversion

In all scenarios, Park Avenue is proposed to be converted to 2-way operation, due to the following significant benefits:

- Emergency response time reliability by avoiding the at-grade railroad crossing.
- Providing an important link in the City's bicycle network by allowing westbound bicycle lanes on Park Avenue.
- Greater visibility and accessibility for local businesses, such as HP Hood and La Quinta.

Congress Street is proposed to have two-way operation in two of the scenarios. There are significant benefits in local accessibility and in the operations of Park Avenue if Congress Street is two-way.

6.3 Regional Model Results

The regional model was used to test the alternatives for their potential effects on the regional transportation network, with the in Table 6.2. A set of maps showing the regional redistribution of traffic are provided in Attachment 4.

Table 6.2: Regional Model Results for Alternatives

Scenario	Regional VMT	Change in VMT
2009 Base	1,075,928	
Alternative 1a	1,076,292	0.0339%
Alternative 1b	1,076,127	0.0186%
Alternative 2a	1,076,197	0.0251%
Alternative 2b	1,075,921	-0.0006%

All of the alternatives had only very small effects on VMT. The alternatives with both Park Avenue and Congress Street operating as two-way streets had lower VMT than those with just Park Avenue operating as one-way. Alternatives 2a and 2b were each lower than 1a and 1b due to the shorter travel distances afforded by the northbound on-ramp being used by eastbound traffic. Overall, it can be concluded that the regional transportation network will see only minor effects from the ramp closures, and that the street network can absorb the redistribution of traffic.

6.4 Multimodal Analysis

A multimodal level-of-service evaluation was conducted to determine how well each alternative meets the project goals to improve conditions for all modes and users. The primary factors for each mode are as follows:

- **Vehicles:** Considers peak hour level of service (LOS) and vehicle delay at intersections.
- **Pedestrians:** Considers streetscape comfort (i.e. trees, buildings or on-street parking), distance between protected crosswalk, delays at crosswalks, and exposure to travel lanes when crossing.
- **Bicycles:** Considers traffic volumes, traffic speed and facility types: shared lane, bicycle lane, or separated facility (cycle track or shared use path).

The types of bicycle facilities that were incorporated into the alternatives are shown in Figure 6.5. A shared lane is most suitable on a low volume/low speed street. On higher speed streets, facilities with more protection are needed to accommodate less confident and skilled riders, such as a bicycle lane or cycletrack.

Figure 6.5: Bicycle Facility Types



Multimodal level of service (LOS) is reported on a scale of A through F, with A representing ideal conditions, and F representing challenging, unsafe, inconvenient or uncomfortable environment. Table 6.3 summarizes the results of the pedestrian and bicycle analysis for key street segments within the study area, which follow current methodology published in *Sustainable Transportation Planning*, by Jeffrey Tumlin in 2012. The Fore River Parkway is not included, as no significant changes are proposed among the alternatives. It should be noted that a multiuse path is planned to connect Congress Street with the Portland Transportation Center. More detail on the analysis is provided in Attachment 4.

Table 6.3: Pedestrian and Bicycle Level of Service for Libbytown Alternatives

Segment	Pedestrian LOS					Bicycle LOS				
	Existing	1A	1B	2A	2B	Existing	1A	1B	2A	2B
Outer Congress Street	E	C	C	C	C	F	E	E	E	E
Congress Street	E	B	C	B	C	F	B	C	D	C
Park Avenue	D	C	B	C	B	E	C	B	C	C

Transit level of service was not analyzed as no significant changes to transit services are proposed. However, alternatives 1b and 2b would best support transit due to both Park Avenue and Congress Street being two-way streets, which allow bi-directional routes and for stops to be located across the street from each other.

Vehicular LOS was conducted for key study area intersections that would see significant changes in traffic volume. Vehicular LOS is a measure of peak hour intersection delay on a scale of A through F. Typically D is considered a target for the peak traffic hour, but lower levels are typically acceptable in urban areas, upon consideration of the cost, socio-economic and environmental impacts, conditions desired for other modes, and willingness of the community to tolerate congestion. Vehicular LOS analysis was conducted for the study area's major intersections for the 2015 PM peak hour, with results shown in Table 6.4. The analysis assumed the full build-out of the Thompson's Point development as currently permitted by the City of Portland and MaineDOT.

Table 6.4: 2015 PM Peak Vehicular Level of Service for Libbystown Alternatives

	Vehicular LOS				
Intersection	Existing	1A	1B	2A	2B
Fore River Parkway/ Thompsons Point	D	D	D	D	D
Congress Street/ Fore River Parkway	C	D	D	D	D
Congress Street/St John	C	C	D	C	D
Park Avenue/St John	C	D	D	D	D

The LOS at Fore River Parkway/ Congress Street is reduced from C to D due to significantly higher volumes turning onto Fore River Parkway with the ramp closures. The intersections of St. John/Park Avenue and St John/Congress Street would have lower volumes, and accordingly have fewer travel lanes, resulting in little change in level of service. These results indicate that all of the alternatives meet the target of LOS D or better during the PM peak hour.

The multimodal analysis of alternatives allows the following conclusions:

- Bicycle and Pedestrian level of service improves significantly for all alternatives.
- Intersection (vehicular) level of service is lower at some locations due to higher traffic volumes with the ramp closures, but remains at acceptable levels.
- Transit operations will improve most under Alternatives 1B and 2B.

6.5 Vehicular Traffic Design Considerations

The alternatives were reviewed with MaineDOT, and several issues emerged with the proposed design of alternatives 2a and 2b. There were concerns about increasing northbound traffic increasing the incidence of crashes at the ramp's junction with the mainline of I-295. For Alternative 2B, the design of the Congress Street/Park Avenue/Northbound Ramp intersection was awkward, and could require

substantial right-of-way impacts to properly align Congress Street with the northbound on-ramp. These concerns resulted in alternatives 2a and 2b being eliminated from further consideration.

7 Recommendations: The Preferred Alternative

After consideration of the public input and a review the modeling and analysis results against the goals and objectives, a refined alternative is recommended, as shown in Figure 7.1. This preferred alternative is based on Alternative 1b, but keeps Ramp F open due to public and stakeholder support. It is recommended that the need for Ramp F be re-evaluated in the future, as it may not prove to be essential for traffic, and it could be converted to a useful trail connection as described in Alternative 1b.

This preferred alternative scenario was also tested in the PACTS regional travel demand model. Figure 7.2 shows the projected changes in volume on City streets and highways in terms of percent increase or decrease. There are projected traffic increases on the Fore River Parkway interchange, on St John Street south of Congress Street, Veteran's Bridge, and Park Avenue east of St. John. Volumes on Park Avenue, Congress Street and St. John within study area have lower traffic volumes.

The following sections describe the proposed changes to each major street segment in the study area, and then provide more details on proposed intersection design.

Figure 7.1: Recommended Alternative

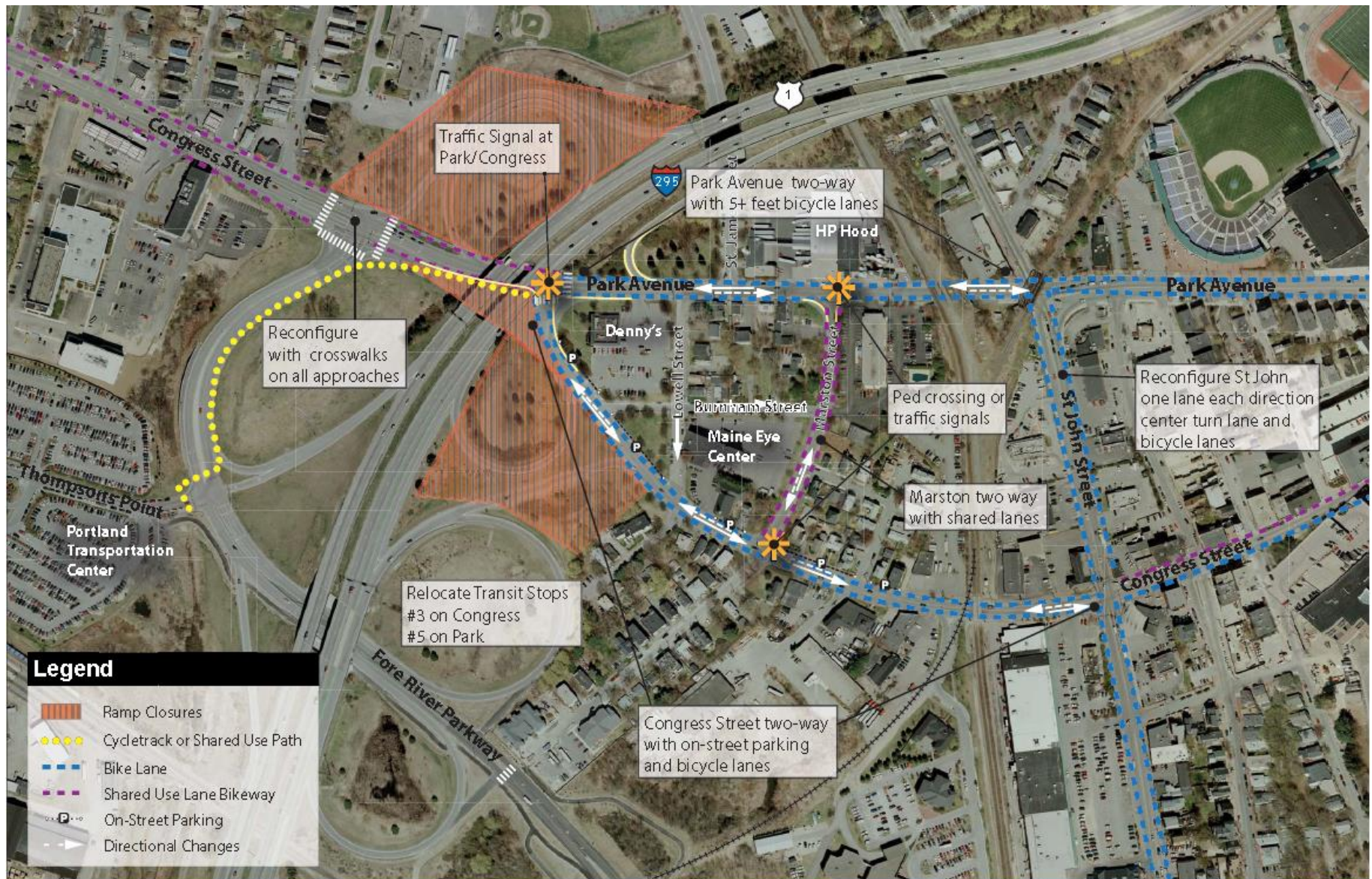
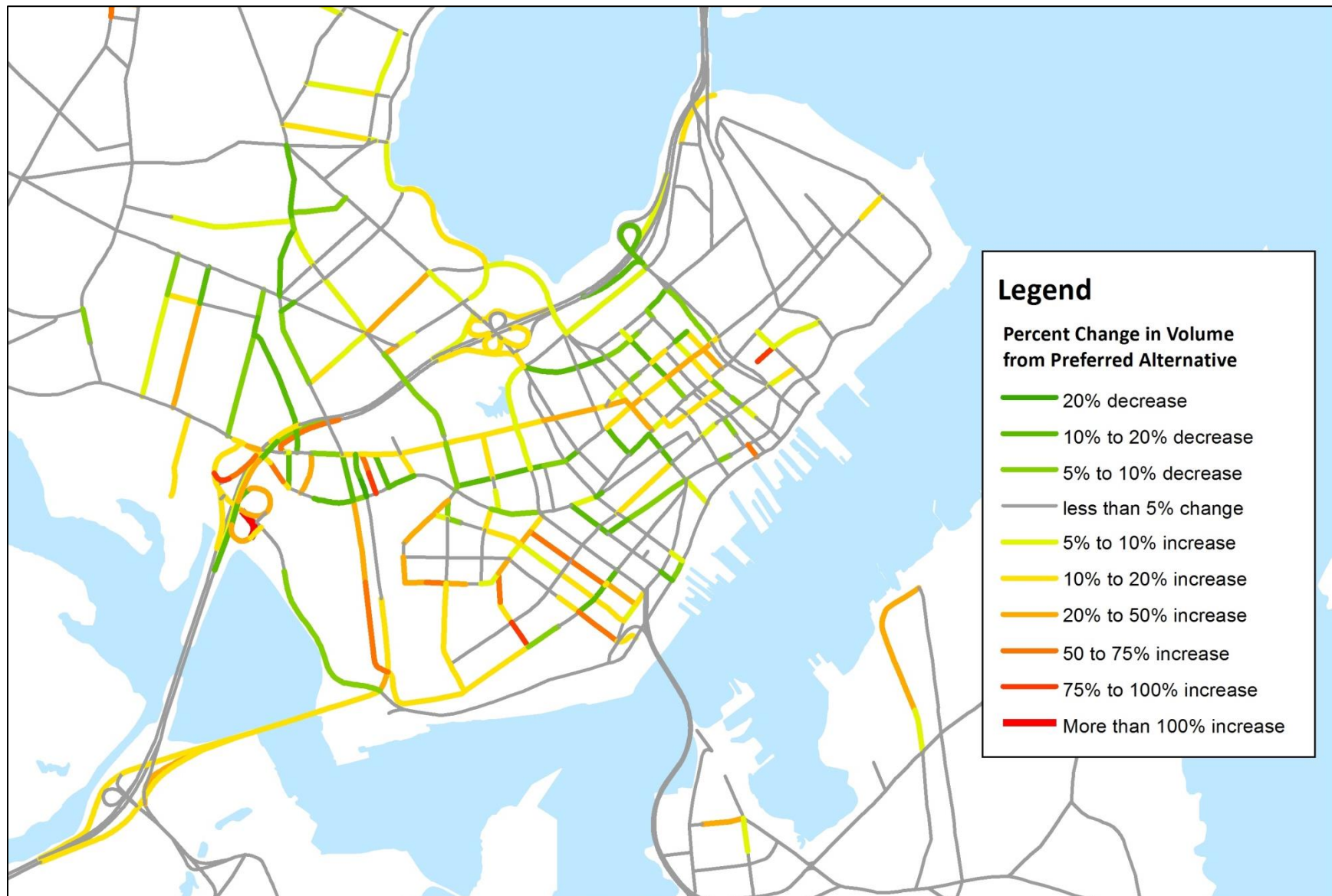


Figure 7.2: Regional Model Results for the Preferred Alternative (2015 PM Peak Hour)



7.1 Park Avenue: Two-Way with Bicycle Lanes

Among the most significant reasons for converting Park Avenue to 2-way operation is to provide a major route onto the Peninsula that does not have an at-grade railroad crossing. Freight and passenger trains crossing Congress Street creates significant congestion, and this will become more frequent. The railroad crossing congestion is particularly a problem for emergency responders accessing the Maine Medical Center emergency room.

The proposed cross section for Park Avenue has bicycle lanes in both directions, although the configuration and dimensions will vary between I-295 and St John Street. As Park Avenue approaches Congress Street and I-295, there will be two eastbound lanes and one westbound. Figure 7.3 shows the existing and proposed conditions in front of HP Hood on Park Avenue, at Marston Street. A curb extension and improved pedestrian crossing will be provided.

Figure 7.3: Park Avenue Cross Section – Existing and Proposed



7.2 Congress Street: Two-Way with Bicycle Lanes and On-Street Parking

There are a number of benefits for Congress Street to have 2-way operation. The traffic evaluation with Park Avenue 2-way and Congress Street 1-way indicated the potential for long queues and delays on St. John Street, which currently receives most of the westbound traffic on Congress Street, in addition to increased traffic from the ramp closures. This situation is alleviated with Congress Street operating as a 2-way street, which also creates a more favorable environment for local businesses due to the greater accessibility and visibility. Traffic speeds are generally lower on 2-way streets, which make them safer for pedestrians. Transit service will be improved, as stops on Congress Street can serve transit routes in both directions.

Figure 7.4 shows the changes that are proposed for Congress Street at Marston. Congress Street will have bicycle lanes in both directions and parallel parking on the north side. Curb extensions are provided for shorter pedestrian crossing distances, and to narrow the appearance of the road. This proposed configuration fits within the existing right-of-way. Street trees and a green buffer will create a more attractive speed and shelter pedestrians. Traffic speeds should be significantly reduced from current levels due to the two-way operation.

Figure 7.4: Inner Congress Street between Marston and Lowell Streets: Existing and Proposed Conditions



7.3 Saint John Street: Reconfiguration and Bicycle Lanes

Reconfiguration of St. John St. is recommended after Park Avenue and Congress Street are converted to two-way operation, as traffic volumes on St. John St. between Congress Street and Park Avenue, will be significantly lower. Because of the very high incidence of crashes on St. John St., it is recommended that it be reconfigured as shown in Figure 7.5, with one travel lane in each direction, a center left turn lane, and bicycle lanes. This will provide ample vehicular capacity after the two-way conversions of Park Avenue and Congress Street, and will function much more safely for all users, particularly bicyclists. If desired, mid-block crosswalks can be established where needed with a raised median to protect pedestrians. These changes can be implemented through re-striping of the pavement at the time of the next resurfacing of the street.

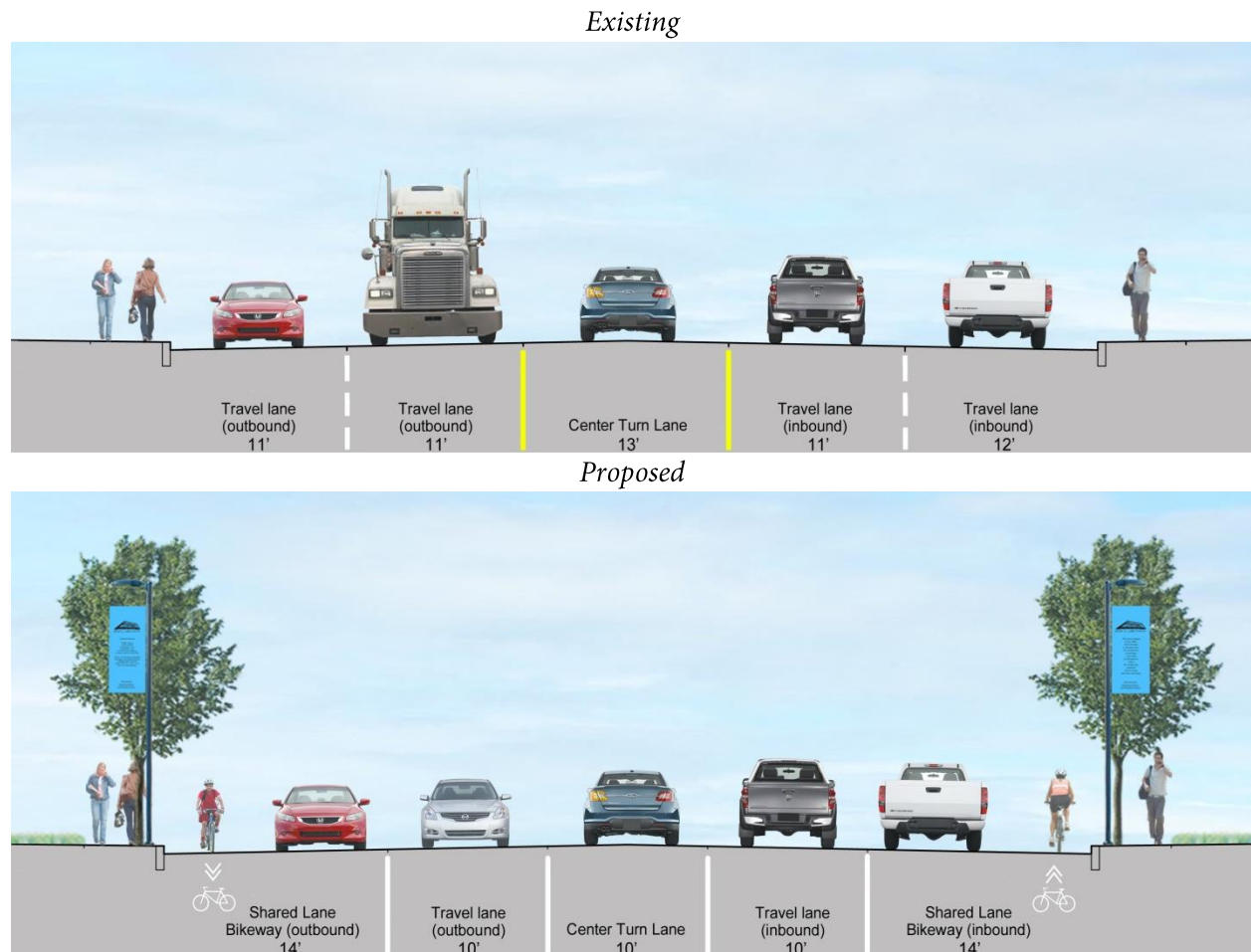
Figure 7.5: Proposed Reconfiguration of St. John Street



7.4 Outer Congress Street

Because of high traffic volumes and limited right-of-way, there are few options for significant improvements to Outer Congress Street. It is proposed to be re-stripped with narrower inside travel lanes that will allow for a wider curb lane for shared use with bicycles. The curb lane width will also be beneficial for buses. Proposed cross sections are shown in Figure 7.6.

Figure 7.6: Outer Congress Street Cross Section



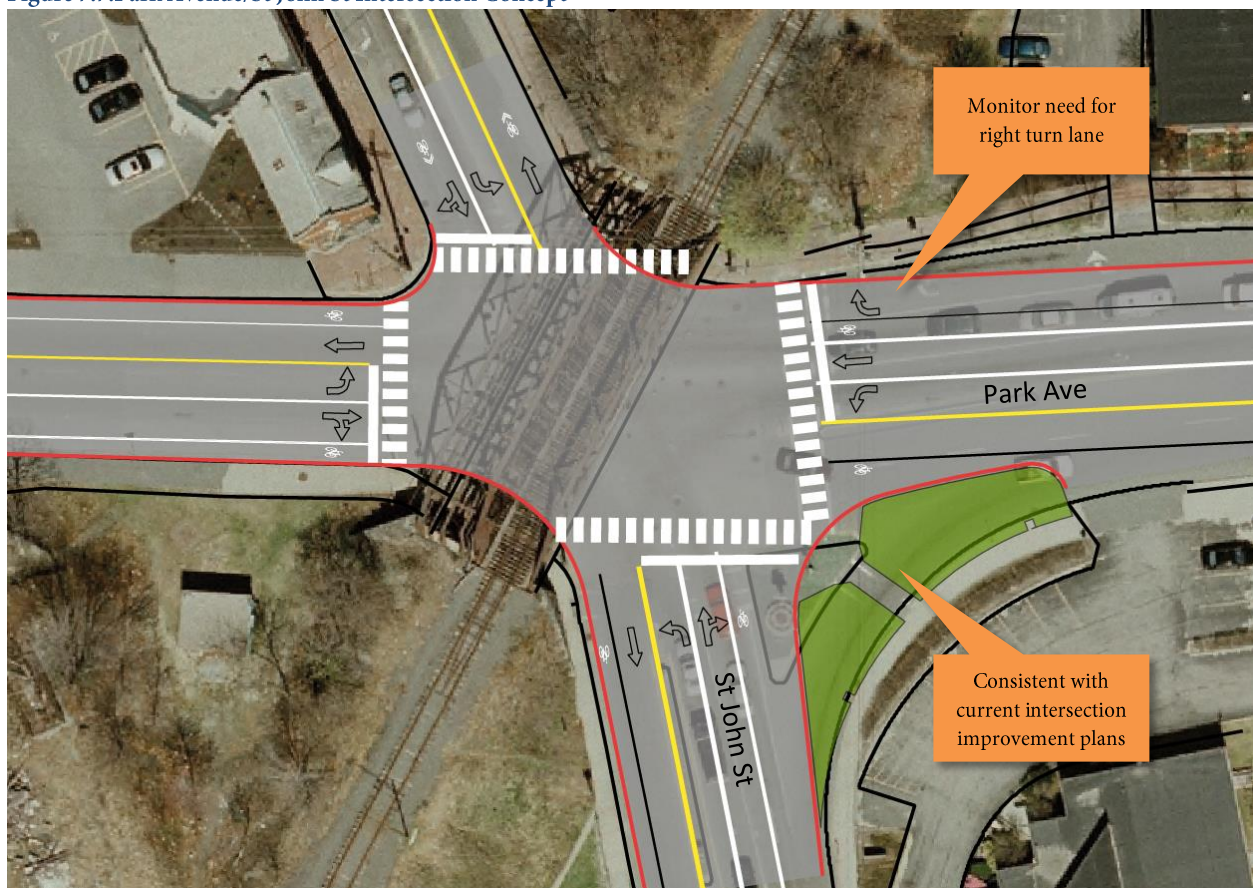
7.5 Intersection Improvements

The alternative requires changes at many of the study area intersection, which were considered in the vehicular LOS analysis. The following sections show the proposed concepts for the main study area intersections, and identify some of the features and opportunities created.

7.5.1 Park Avenue/St John

This intersection will be substantially reconfigured with two way operation of Park Avenue. There are planned improvements that will result in changes to the southeast quadrant of the intersection, which are shown below and compatible with these changes.

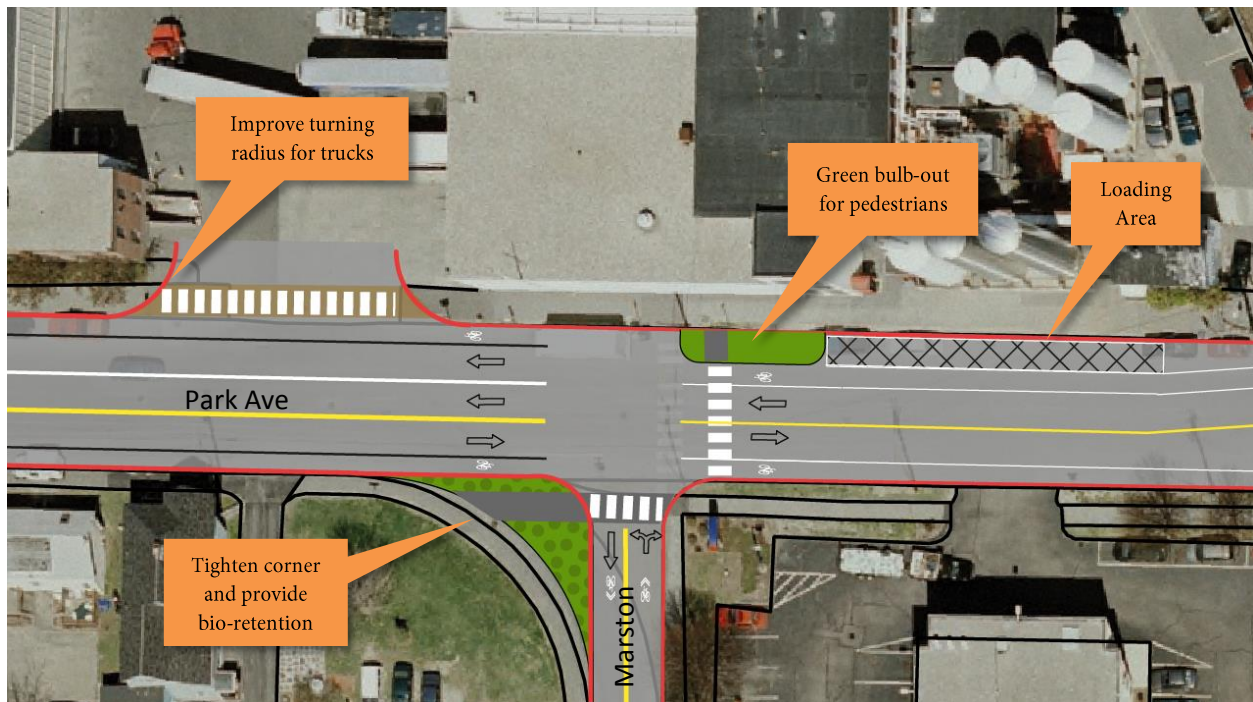
Figure 7.7: Park Avenue/St John St Intersection Concept



7.5.2 Park Avenue/Marston

This intersection is at a transition point along Park Avenue. East of this point, Park Avenue will have one lane in each direction. West of this point, Park Avenue will transition to have two westbound lanes approaching the Congress Street intersection. Marston Street may become a two-way street, and the wide corner will be tightened to reduce the pedestrian crossing distance. The corner may require a mountable surface as HP Hood trucks may need to use the corner as they access their site.

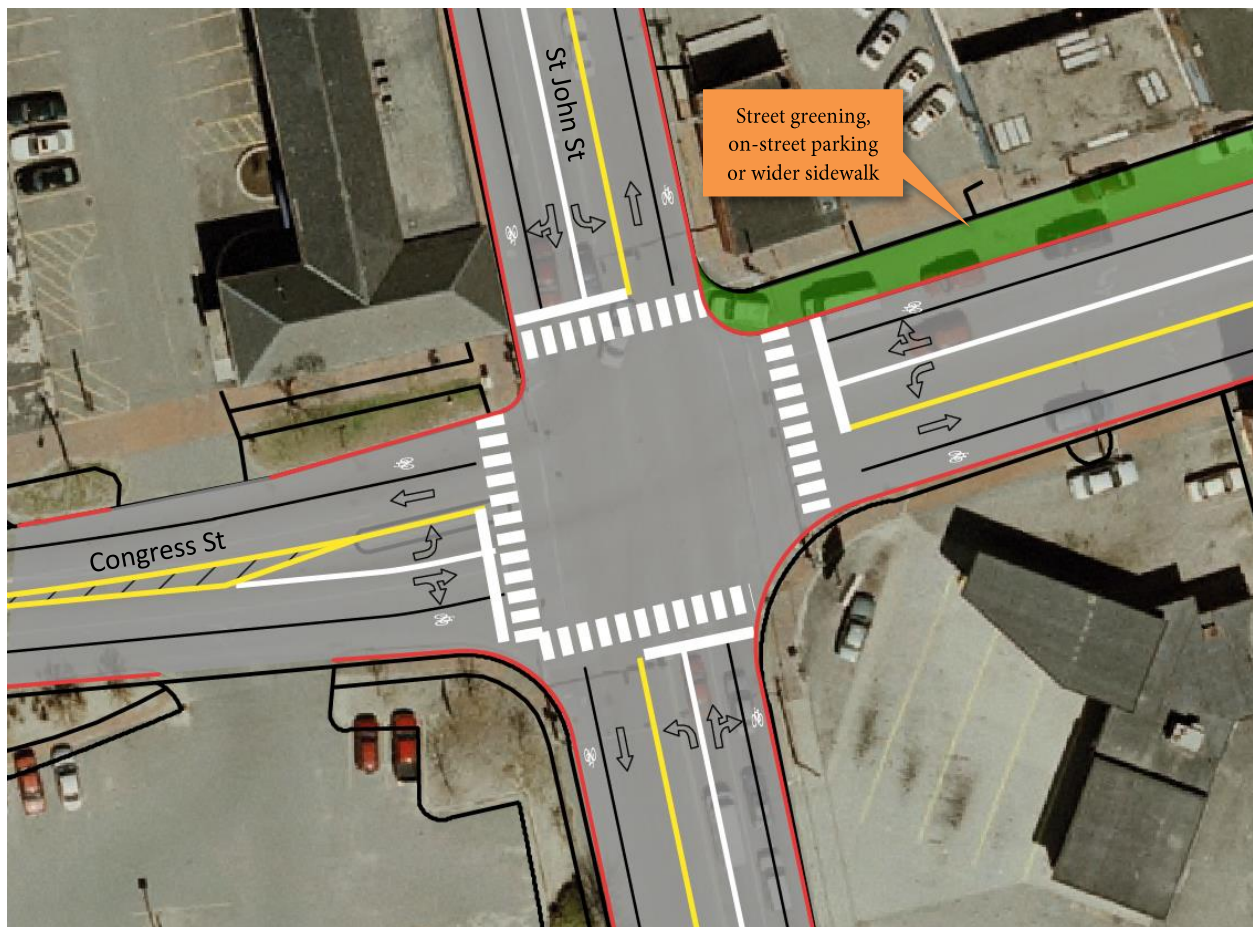
Figure 7.8: Park Avenue/Marston St Intersection Concept



7.5.3 Congress Street/St. John

This intersection will be substantially reconfigured with Congress Street having two-way operations. Each leg of the intersection will have no more than one through lane. There is room for a wider sidewalk, parallel parking or street greening along Congress Street between Valley and St. John.

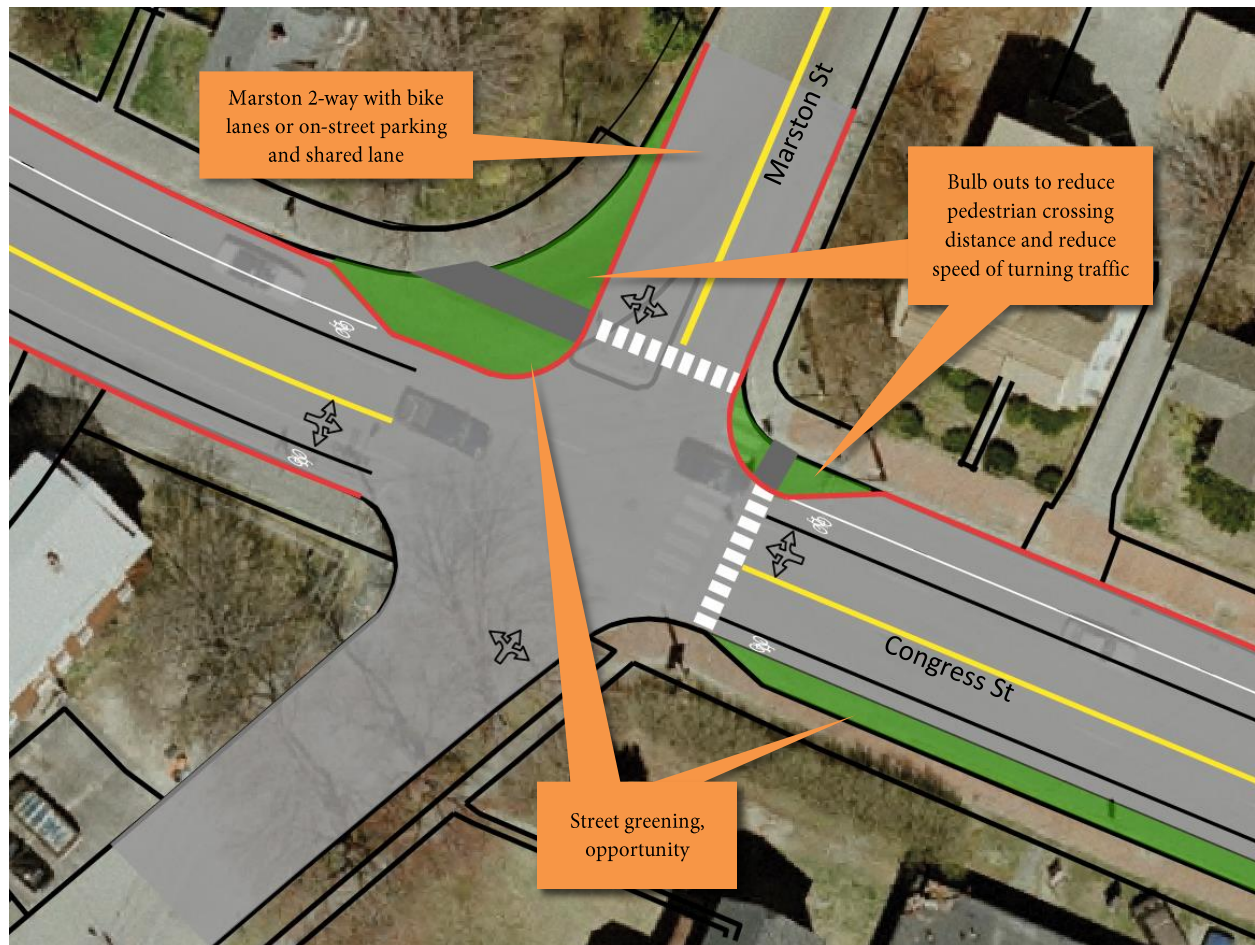
Figure 7.9: Congress Street/St John St Intersection Concept



7.5.4 Congress Street-Marston Street-Frederic Street

Congress Street will have one lane in each direction plus bicycle lanes, and parallel parking on the north side. Marston is proposed to be two-way, with a tighter radius for reduced pedestrian exposure while crossing. There is also room to establish a planting strip on the south side of Congress Street, east of this intersection.

Figure 7.10: Congress Street/Marston Street/Frederic Street Intersection Concept

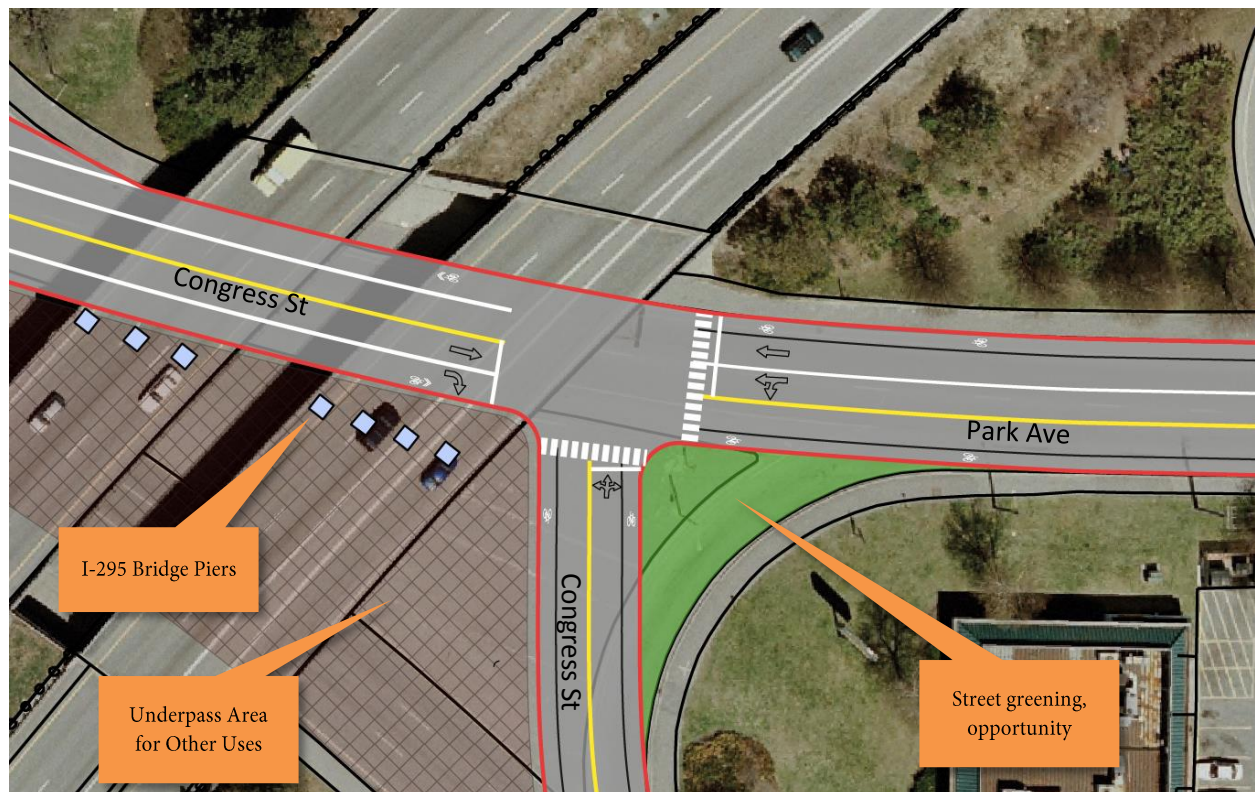


7.5.5 Congress Street/Park Avenue

This intersection has substantial changes in this plan:

- The intersection is proposed to be signalized.
- Park Avenue is designed as the primary travel corridor, and has the straight through movements at the signal.
- Outer Congress Street is realigned to be north of the interstate bridge piers, which creates a better designed intersection that emphasizes Park Avenue.
- There are numerous opportunities to consider other uses of the area under I-295, including a multi-use path connection to Fore River Parkway, and public space designs.

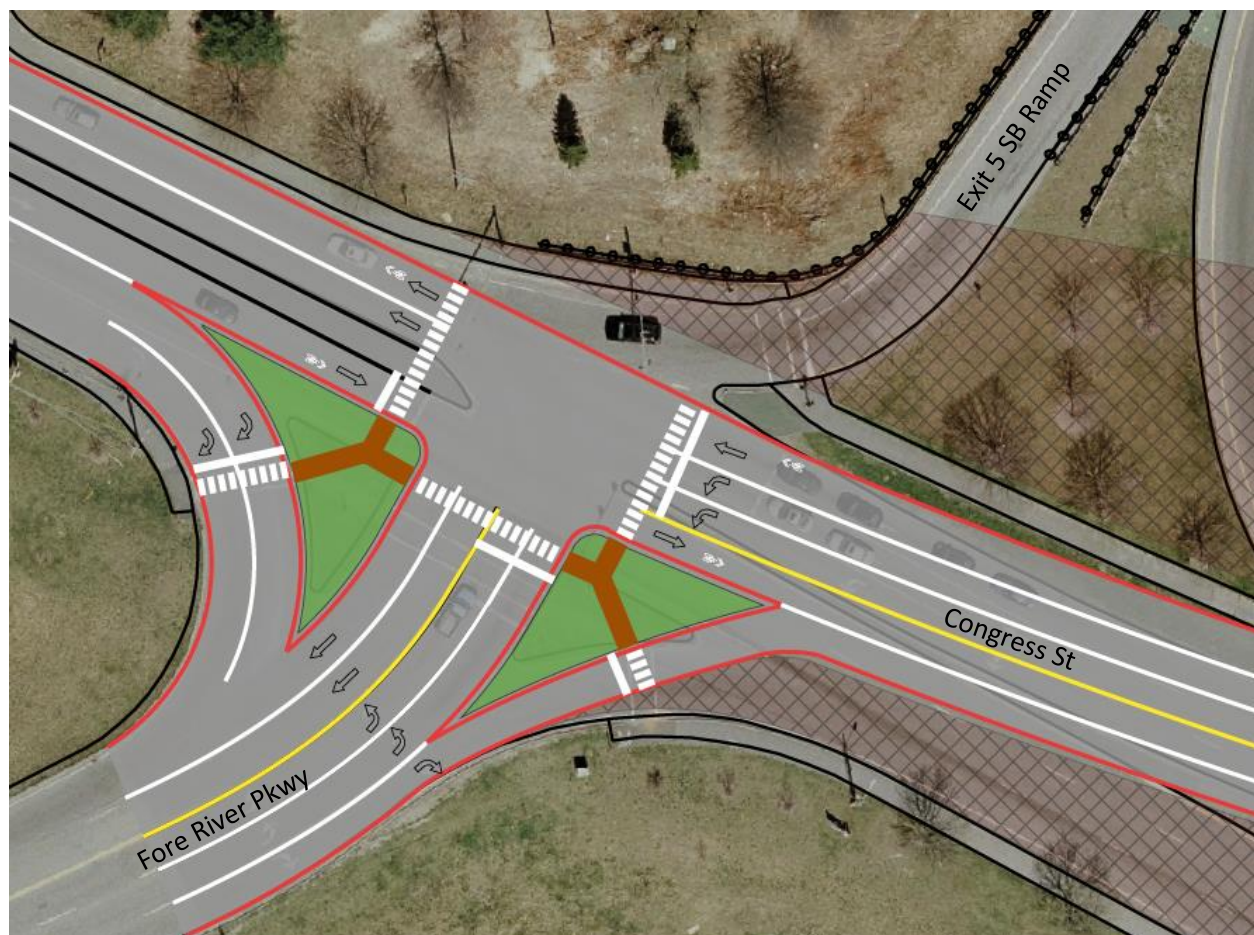
Figure 7.11: Congress Street/Park Avenue Intersection Concept



7.5.6 Congress Street/Fore River Parkway

This intersection would be reconfigured generally within its current footprint as shown below. There would be two westbound left turn lanes and two eastbound right turn lanes to address the growth in these turning movements resulting from the ramp closures. The eastbound approach is realigned to allow Congress Street to be north of the bridge piers. There would be ample spaces for other uses both north and south of Congress Street.

Figure 7.12: Congress Street/Fore River Parkway Intersection Concept



The above configuration provides adequate levels of service through the year 2015. The analysis of 2035 traffic volumes suggests that additional improvements to the Congress Street-Fore River Parkway and Thompsons Point-Fore River Parkway intersections may be needed if traffic volumes grow as indicated in the regional model. However, this is far from certain, as traffic has been declining in this area for years. The traffic volumes and operations at this should be monitored. If congestion increases to levels that are not tolerable, additional improvements can be implemented at that time, which could include a

modern roundabout, or additional through-traffic lanes. More analysis and design discussion is included in Attachment 4.

7.5.7 Fore River Parkway/Thompson's Point Rd

This intersection is currently planned for significant improvements associated with the Thompsons Point development. The vehicular LOS analysis found that the planned improvements will adequately serve the redistributed traffic from the Preferred Alternative through the year 2015, including all the traffic projected from a full build-out of Thompsons Point. The future volumes are highly uncertain with the variety of development proposals under consideration, but if additional capacity is required, a two-lane modern roundabout could be constructed, which would provide ample traffic capacity. More information is provided in Attachment 4.

7.6 Streetscape Improvements

Streetscape improvements are key components for creating a Complete Streets network in Libbytown, and to improving the environmental, economic, and social well-being of the neighborhood. These can be implemented gradually, as overall implementation proceeds through the Libbytown network. Some streetscape recommendations from the *Connecting Libbytown* (2009) have been carried over and used in this report, modified and improved upon where necessary. More discussion on the relationship between these recommendations and *Connecting Libbytown* is available in Attachment 5. Some overarching elements from the *Connecting Libbytown* include:

- Provide pedestrian scale lighting under the highway and Pan Am Railroad overpasses.
- Add signage and other visual clues, such as colored or grooved pavement, narrower roadways, on street parking, curb extensions, street furniture . . . to alert autos that they are in an urban setting and should expect the presence of bicyclists and pedestrians
- Extend some of the thematic elements of Park Avenue east of St. John such as esplanades and wider sidewalks to the length of Park Avenue
- Provide more opportunities for public art along the corridor

The following sections address the various streetscape elements in more detail, as they pertain to the various locations within the study area. Many if not all of the streetscape elements, size, color, type, locations, etc. will need to be coordinated with numerous stakeholders to decide what facilities are most appropriate. There is also a future transit study which will likely address the issues in much greater detail.

Lighting- Currently, the pedestrian scale lighting being used in Libbytown comes from a 2007 committee recommendation.

These are lights that are provided and installed by Central Maine



Power (CMP) under a leased lights agreement with the City, whereas the City pays a monthly fee that covers the costs of the lights, the electricity, and the maintenance. The current specification for the Libbytown pedestrian light is the CMP Radial Wave Fixture on a Hallbrook Pole.

Within the last several years, the City has been trying to reduce street and pedestrian lighting power consumption and associated costs by incorporating LED light fixtures, some of which could be supplied by CMP, some purchased and installed under separate contracts. Solar-powered LED streetlights have seen significant technological advancement in the last few years and are another option the City could consider for the Libbytown Streetscape.

A short term, immediate improvement to the pedestrian lighting environment will be the installation of sidewalk light bollards underneath the Pan Am overpass. This location was noted early on in the Libbytown Study as the most at need location for lighting. *Similar bollard lighting should be considered on Congress Street Avenue and Saint James Street under the highway bridges of I-295.*



Greening the Streets – Street trees can be

effective in providing shade, color, scale, texture, contrast, defining spaces, separating land uses, and giving individual character to special places in the urban environment. Wherever possible, the use of raised planting beds should be used. Raised planter beds serve multiple functions for the streetscape and pedestrian environment. Raised planting beds protect trees and shrubs from compaction, accidental damage, and winter salting; and have proven to significantly increase the

health, longevity, and size of street trees in Portland. Where there is sufficient width, placing the plantings three to five feet inside the curb can help define different zones within the pedestrian realm. The curbside zone outside of the planters allows people to open car doors and access the sidewalk, and provides a clear “pedestrian only” realm. The use of hardy native perennials and grasses should be incorporated in the tree planters to provide color and seasonal interest. The inner sidewalk, separated physically and visually from the street, can function in many ways, including outdoor seating for restaurants and cafés, space for food carts or other vendors, or bikes, if space allows. Spaces between planters can be used for street furniture, i.e., benches, bike racks, recycling/trash receptacles; keeping it in-line with the planters helps maintain clear paths for pedestrians on either side of the streetscape elements.

Replacing trees that die because of insufficient soil is costly. Structural soils have been proven to solve this common problem. Structural Soil is a mix of aggregate and soil, with a small amount of polymer gel to hold the mix together. This mix can be compacted to 95% of dry density to support paving while still allowing for tree root growth. Studies have shown that trees growing in structural soils vastly outperform trees growing in typical urban conditions, live much longer, become larger, and provide many more environmental benefits. Structural soils can facilitate the growth of much larger trees, providing increased shade and visually reducing the scale of large monotonous buildings.

Raingardens and Bioretention cells -A combination of rain gardens or bioretention cells can help to decrease peak stormwater flows during storm events, which can in turn help mitigate combined sewer overflows (CSO's). They also improve water quality and beautify the streetscape. Typically a rain garden or a bioretention cell is a small planted area located at a low point that has been designed with a specific engineered soil mixture and plants that are capable of withstanding the extremes of moisture and concentrations of nutrients, particularly Nitrogen and Phosphorus.



Urban rain gardens and/or bioretention design can come in many shapes, sizes, and forms; typically they may include stormwater planters, stormwater tree pits and stormwater curb extensions. In an urban environment, rain gardens or bioretention cells are designed to fit into containers, and typically located within the median or edges of a street right-of-way, planting beds, tree pits, and plazas. Rain gardens are usually open-bottomed to allow some infiltration of stormwater, but are more often designed with an underdrain that connects to a closed stormwater system.



Benches-A well-built bench in the right location can help to encourage pedestrian activity along a sidewalk or in a Park Avenue. In Libbytown, there should be benches at every bus stop and within the public Park Avenues, or where people watch other people, i.e., the future public space under the highway overpass. Benches should be constructed of durable materials that are resistant to weather, vandalism, and rusting. Installation should be inexpensive, time efficient, and as durable as possible.

Installation plans should allow for experimentation with location, and bench arrangement. Sometimes benches are vandalized. One way of preventing vandalism in a downtown area is locating benches where adjacent businesses can see them and assume some responsibility for their use and maintenance.

Bus Shelters-It is important that bus stops are easily identifiable, safe, accessible, and a comfortable place to wait for the bus. Well-designed bus stops encourage ridership, making the transit system more profitable, while also decreasing vehicular traffic on the local roads. The City should seek to make bus stops a positive contribution to the community streetscape and a place where riders can obtain transit related information and are encouraged to use the provided services. Guidelines should identify

and encourage partnerships with transit riders, METRO, the City, local businesses, residents, and property owners. The City may need to work with abutters to improve access to bus stops, including



sidewalks, safe street crossings, accessible curb ramps and bicycle lanes. The quality of the streetscape is critical to the success of the bus stop development program.

While bus shelters should have low maintenance requirements and be vandal-resistant, other perspectives are also important. From the rider's point of view, an ideal shelter is one that allows visibility and easy access to the bus, is comfortable and convenient, provides clear information, and is safe.

Both viewpoints are equally important to consider, because an unused shelter is a waste of money and an unnecessary maintenance problem. A well-designed, comfortable shelter can make waiting for a bus a pleasant — and even interesting — experience. Based on the existing conditions evaluation, the recommended shelter locations within the Libbytown Study area include: Park Avenue & St. John by the old Fire House (easements may be required for proper siting), at St. John & A Street in front of D'Angelo sandwich shop, and at Congress Street & Massachusetts Avenue in front of the Mobil Gas Station.

Lowell Street Park Avenue-The existing City park at Lowell Street is very underutilized, mostly due to lack of safe access. Several members of the Public Advisory Committee expressed a strong desire to make the Park Avenue more accessible and install elements that will attract neighbors, i.e., benches and a small playground. The Park Avenue is small but is large enough for small children to run, jump, swing, and play, and has a location that can act as a neighborhood social hub/meeting spot. Its location also provides some safety challenges with traffic circulation on all sides. A short perimeter fence should be considered to keep children contained and engaged within the Park Avenue. The more complex the playground, the greater the choice and the more enriched the learning experience. Mounds, peaks, climbing poles, a network of tunnels, ladders, slides, climbing surfaces, and multiple ways of ascending, descending, and getting from here to there can be part of the playground. Increased use at the Park Avenue, as well as a highly visible play structure, can act as another visual cue or a “gateway” into the Congress Street residential neighborhood.



Public Art is integral to a community's fabric by recognizing the potential of art to create livable cities, enhance neighborhood identity, strengthen economic development and tourism, educate children and adults and enrich the spirit and pride of its citizens. Streets represent an exciting opportunity to incorporate art throughout their length. Artworks can take many forms: whimsical re-use of cast-off industrial pieces; benches, drinking fountains, and railings that capture and express a design aesthetic while also serving a defined function; landforms that ripple and excite the eye; sculptural pieces that are animated by the wind; paving patterns that reflect the patterns of the city; water features that help cleanse runoff. The list is only limited by the imagination of the arts community.



Bicycle parking on the sidewalks will be challenging in the Libbytown Study area due to their narrow width. Bike parking on sidewalks should be parallel to the street, with the sidewalk width of at least 8 feet to allow 5 feet for the pedestrian route. The City should work with business owners to augment bike parking required by ordinance, and avoid redundancy.

Recycling and Trash Receptacles- The Department of Public Services is working to deploy “Big Belly Solar Powered Trash and Recycling Compactors” where appropriate throughout the City. These units have advantages over traditional trash cans, including:

- Larger capacity.
- They send a text when they are full, so City crews only empty when needed, reducing unnecessary visits.
- Mounted to sidewalk for security.
- Built to withstand vandalism.
- Restrict the use of graphic panels for fund raising or advertising.
- Specify blue to match “Libbytown” streetscape amenities.



In addition to the general streetscape guidelines, several specific opportunity areas are described below.

- **I-295 Underpass Future**-The eventual removal of the ramps and the conversion of Park Avenue and Congress Street to two-way traffic will open up a significant amount of land around and under the 295 overpass. Several members of the Public Advisory Committee expressed a strong desire to convert the area under 295 to a public space, i.e., a public market, weekend craft fairs, small playgrounds, or athletic courts.



- **Bolton Street at Congress Street:** Sidewalks are in poor condition, utilities create obstacles and there is no clear delineation between pedestrian and vehicular space. This is the location of Tony's Donut Shop, a social hub for the Libbytown neighborhood. Improved sidewalks and a better delineation of pedestrian space could create more of a neighborhood experience for residents and visitors alike and potentially spur economic development.
- **Saint James Street, East Side:** Traveling from Park Avenue, this sidewalk becomes progressively narrower and then just ends under the I-295 overpass. This sidewalk could be continued north to a crosswalk, which would be installed to create a connection to the Dougherty Field Trail.
- **Granite Street.** Although Granite Street has the potential to connect the Oakdale and USM Neighborhoods to Libbytown by way of Saint John Street, there are no sidewalks on Granite Street between Roberts and Saint John. The absence of this sidewalk would encourage those traveling towards Libbytown, Hadlock Field, downtown or other locations to drive rather than walk.

- **Saint John Street:** While there are streetscape improvements planned for the area, the plans do not include the sidewalk on the east and west side of St John, in front of the Greyhound bus station and Union Station Plaza. These should be improved.

7.7 Implementation Strategy

This study sets out a long range strategy to achieve the goals set forth earlier. Elements of this plan can be implemented incrementally in stages, and the design proposals can be adapted as needed to fit any changes in design constraints, traffic volumes, multimodal use patterns and new or emerging goals. The plan does not require every element to be complete. The following implementation priority is recommended:

- 1) Convert Park Avenue to 2-way, which will require signal changes at Park Avenue/St. John, and modifications at the intersection of Congress Street and Park Avenue (see attached sketch). This will have immediate benefits of accessibility to the City and address the increasingly frequent railroad crossings. The cost for this is estimated to be \$414,000.
- 2) Restripe Outer Congress Street to have narrower inside travel lanes and wider outside lanes for shared use and transit. The cost for this is estimated to be \$111,000.
- 3) Convert Congress Street to 2-way. This will be easier after Ramps A and C are closed, but could be done earlier with adjustments to the terminus of Ramp C (I-295 NB off-ramp). The cost for this is estimated to be \$1,132,000. St. John St. should be reconfigured with the implementation of this phase.
- 4) Coordinate with MaineDOT and FHWA on testing and monitoring of ramp closures. While MaineDOT does not currently support ramp closures, the City and PACTS may continue to advance this concept due to their substantial benefits. Permanent closures will likely require interchange modification studies, and should also be subsequent to improvements at the Forest Avenue interchange. A possible ramp elimination order is proposed below, based on which closures would provide the greatest benefit and have the least impact on traffic operations:

1. Close Ramp A - I-295 northbound to Congress Street eastbound off- ramp
2. Close Ramp D - I-295 southbound to Congress Street westbound off- ramp
3. Close Ramp C - Congress Street eastbound to I-295 northbound on- ramp
4. Close Ramp B - Congress Street westbound to I-295 southbound on- ramp

Costs for ramp closures are estimated to be \$322,000.

- 5) When ramp closures have been tested and implemented, consider long term redevelopment of interchange area lands. Revenue from the redevelopment could fund any additional improvements that are needed, including the following.
- 6) Monitor traffic volumes and operations at the Fore River Parkway/Congress Street intersection, and consider improvements as indicated. Improvement alternatives include a roundabout or additional through lanes on Congress Street.

7.8 Cost estimate

A conceptual cost estimate based on suggested construction phasing has been prepared, and can be found in Attachment 6. Table 7.1 shows a summary of the costs, based on proposed project phasing.

Table 7.1: Cost Summary

Item	Phase	Component	Cost
1	Phase I: Conversion of Park Avenue to Two-way		\$414,000
2	Phase II: Restripe Outer Congress Street		\$111,000
3	Phase III: Conversion of Congress Street to Two-Way		\$1,132,000
4	Phase IV: Ramp Closures	Ramp A	\$57,000
5		Ramps B & D	\$230,000
6		Ramp C	\$35,000
7	Ongoing: Streetscape Improvements	Park Avenue	\$399,000
8		Congress Street	\$1,832,000
		Total:	\$4,210,000

* Note: Costs above do not include changes to the Congress Street. railroad crossing associated with the City's quiet zone work.

Below is an overview of how the cost estimate has been organized and the assumptions on construction phasing. It is assumed that streetscape improvements would be incorporated into each project phase as appropriate.

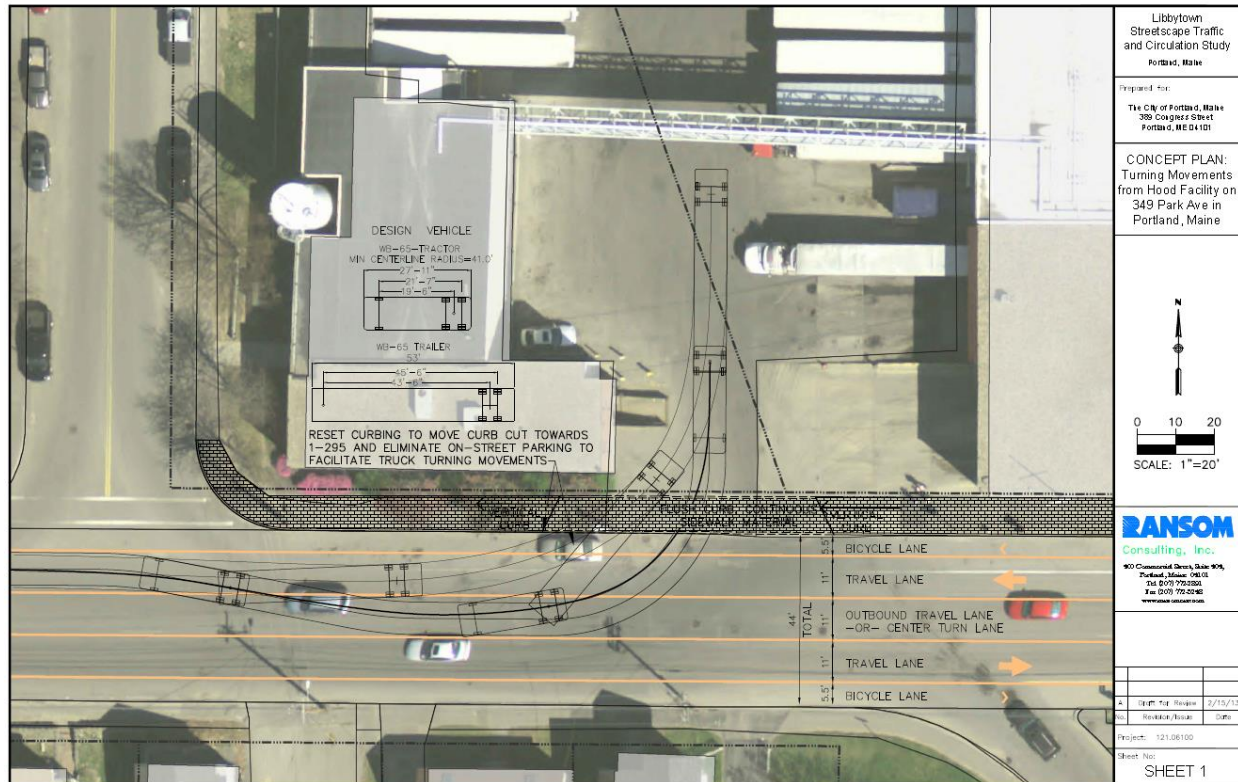
7.8.1 Phase I: Conversion of Park Avenue to Two-Way

Based on our analysis, it appears that Park Avenue could be converted to two-way traffic in the near term with minimal adjustments to existing infrastructure based on the following assumptions.

- Two outbound Park Avenue lanes would be retained from Saint John Street to Congress Street.
- From Marston to Saint John Street, the Park Avenue section would consist of 3 travel lanes. The two outer lanes would be wider and striped with shared roadway stencils. This is a temporary solution which would be replaced with the configuration described on page 21 when Congress Street is converted to two-way and traffic demands on Park Avenue decrease. On-street parking would not be provided in this section.
- From Marston Street to Congress Street, the Park Avenue section would consist of 3 travel lanes and two bike lanes. On-street parking would not be provided in this section, resulting in a loss of approximately 10 parking spaces.
- Signal adjustments at Park Avenue/St John would be required.
- Reconfiguration of the intersection of Marston and Park Avenue would be included.

- Adjustments to Hood's access from Park Avenue, including improving the drainage and reconstructing sidewalk in this area. (See Figure 7.13)
- Reconfiguration of the Park Avenue/Congress Street intersection as shown in the *Near Term Transition of Park Avenue to Two-Way Traffic* sketch would be included.

Figure 7.13: Improvements to HP Hood Entrance



A pavement overlay of Park Avenue is not proposed for the following reasons.

- Underground conduit may need to be installed for street lighting. This should be done before paving.
- The pavement in this area is in reasonable condition
- The stormdrain/sewer in this area appears to be combined and it may make sense to assess opportunities for separation first.

7.8.2 Phase II: Restriping of Outer Congress Street

This phase includes restriping Outer Congress Street (between the FRP and Sewall Street) to provide wider curbside travel lanes along with improvements to existing sidewalks and the intersection of Congress Street and Massachusetts Avenue. This phase is not sequentially dependent on other phases and could be done as funding and other ongoing projects allow.

7.8.3 Phase III: Conversion of Congress Street to two-way

Converting Congress Street to two-way will require adjustments to the Congress Street/St John, Congress Street/Park Avenue and Congress Street/FRP intersections as well as curb extensions, curb adjustments and restriping along Congress Street as outlined in the preferred alternative. During this phase, the remaining improvements that are proposed for Park Avenue would be completed.

7.8.4 Phase IV: Ramp Closures

While the MaineDOT does not support implementation of ramp closures at this time, the City and PACTS will continue to evaluate this option due to its substantial benefits to safety in Libbytown. For cost estimating purposes, it is assumed that ramp closures would be achieved by installing guardrail where the ramps intersect I-295 and by installing sidewalk where the ramps intersect Congress Street. Restriping, signage and other factors are also considered. Costs for permanently removing ramp infrastructure have not been estimated. We suggest that these costs could be part of the future land use discussion if it is decided to make the ramp closures permanent.

Each of the ramps A through D could potentially be closed on a trial basis by using methods for temporary traffic diversions such as jersey barriers and appropriate warnings for a very minimal cost. Impacts on traffic flow at other locations could be monitored, and provide information to determine if a longer term or permanent closure is warranted.

Ramps A and C on Inner Congress Street: The curbline on the south side of Congress Street in this area is irregular due to the ramp merging. Also, the existing curbing is sloped granite. As such, it may make sense to reconstruct the entire curb line from Park Avenue to Huntress Street when Congress Street is converted to two-way traffic. This should be carefully considered when designing sidewalk segments to close these ramps.

Ramps B and D on Outer Congress Street: I-295 southbound is 3 lanes north of Ramp D and 3 lanes south of ramp B but the interstate currently has only 2 lanes between these two ramps. Therefore, in order to maintain capacity, closing ramps B and D will likely require installing a third interstate travel lane between these ramps. For this reason, we have provided a single cost for closing Ramps B and D. Separate costs are provide for Closing Ramps A and C.

7.8.5 Phase V: Construction of Modern Roundabouts on Fore River Parkway intersections

Traffic monitoring should be conducted to determine the possible future need for conversion of Congress Street/Fore River Parkway and Thompsons Point/Fore River Parkway to two-lane modern roundabouts. The total cost for this has not been estimated in detail, but could easily exceed \$5 million. The analysis shows that these intersections would have ample capacity to serve high rates of future traffic growth.