FINAL REPORT

Cushing's Point Transportation Study

Prepared for:
City of South Portland and
Greater Portland Council of Governments (GPCOG)

Submitted by: T.Y. Lin International | February 24, 2022

City of South Portland

GPCOG
GREATER PORTLAND COUNCIL OF GOVERNMENTS

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Executive Summary

This serves as a summary of recommendations for the study and supporting details and analysis can be found later in the report.

Water-Transit

The intent of this analysis is to "explore the feasibility of providing water-based transit between South Portland and Portland, to reduce individual vehicular traffic volumes along Broadway, and to provide for the redevelopment of Cushing's Point." These issues are all interrelated, adding to the complexity of the study. While specific redevelopment plans were not made available for key parcels in Cushing's Point, which would have allowed for more granular analysis of the role of water-based transit in area-wide mobility efforts, the study does provide key insights into the feasibility of service and the potential role such service could play in reducing vehicle trips along Broadway. The Summary of Method and Findings include:

- The service will be more of an amenity than an overall transit solution, potentially displacing 150 to 200 vehicle trips a day from Broadway with a projected 1,000 new homes within the Cushing's Point seven-minute drive commuter shed.
- Water transit has the potential to break even or generate a small profit at 400 projected new homes within the seven-minute drive commuter shed of Cushing's Point.
- The analysis does not include subsidies, which would help offset the cost of the service.
- Assumes a 5% capture of existing commuters from within a seven-minute drive of Cushing's Point going to the Downtown/Old Port.
- Trips originate in South Portland with little current demand for water transit trips to South Portland from Portland. As this asymmetrical demand model becomes more balanced, the service becomes more sustainable and has a more significant role in the overall transit network.

Bicycle And Pedestrian Facilities

Existing bicycle facilities within the study area include on-road bike lanes from the Casco Bay Bridge to Waterman Drive. Bike lanes begin east of Cottage Road and continue to Sawyer Street and begin again at Spring Street and end at Breakwater Drive. The Greenbelt Pathway provides safe off-road connectivity for most of the study area from the Broadway and Waterman Drive intersection to Bug Light Park. The study investigated and identified strategies for expanding and enhancing facilities and recommendations include:

Bike Lanes

To accommodate bike lanes on Broadway between Sawyer Street and Spring Street, the roadway should be widened by 10 feet. There is a 60-foot right-of-way in this section, so the widening would not require any property acquisition. However, the widening would impact landscaping and trees within the right-of-way.

Shared Use Paths

Widen the existing sidewalk on the east side of Route 77 between Erskine Drive and Waterman Drive to a shared-use path providing connectivity between the Greenbelt Pathway and Casco Bay Bridge.

Along Broadway between Waterman Drive and Cottage Road it is recommended that the sidewalk be widened on the south side to 12 feet for a shared use path. The south side is suggested given that the Greenbelt pathway provides east-west travel on the north side.

Widen the existing Greenbelt Pathway to a minimum of 10 feet and relocate the pathway at Breakwater Drive to avoid a roadway crossing.

Provide a path along the Portland Pipeline property frontage on Preble Street. This path would provide connectivity from the Greenbelt pathway to Sawyer Street and could be integrated with future development plans.

Neighborhood Byways

To improve bicycle connectivity in the study area some streets should be retrofitted with enhanced treatments that ensure slow vehicle speeds and safe sharing of the roadway. It is recommended that Sawyer Street to the east, Pine Street north of Broadway, Preble Street, Mussey Street and High Street to the south be retrofitted to Neighborhood Byways.

Sidewalks

Streets recommended for new sidewalks include:

- North Richland Street.
- Walnut Street.
- Clemons Street.
- Mussey Street from Broadway to High Street.
- Mussey Street from Cobb Street to Pine Street.
- Pine Street from Broadway to Mosher Street.
- Pine Street from Broadway to Taylor Street.
- Front Street from High Street to Sawyer Street.
- Stanford Street from Preble Street to Front Street.
- Front Street from Stanford Street to Webster Court.

Crosswalks

New crosswalks are recommended at the following locations:

- Clemons Street, where there is an existing bus stop.
- Mussey Street, to provide crosswalks on all legs of the intersection.
- Stanford Street, to provide access to the Boys and Girls Club.
- At the existing bus stop between Preble Street and Breakwater Drive.

Transit

The Broadway corridor from the Casco Bay Bridge to Cushing's Point is primarily served by South Portland Bus Service (SPBS) Route 21, which runs in an east-west direction from Pickett Street to Cottage Road. Route 21 runs every 30 minutes on weekdays and every 60 minutes on weekends, with the highest ridership at 3:00 PM on weekdays with approximately 23 passengers on the bus. The highest number of on-offs is 16 on a typical weekday in front of the South Portland Housing Authority, but the majority of stops have 0-5 total on-offs.

An evaluation of the physical conditions at bus stops was completed, which identified issues including poor lighting and signage, poor sidewalk conditions, lack of ADA-compliant curb ramps at crosswalks, conflicts between bicycle facilities and parking, and the majority of stops lacking amenities such as benches.

Despite these challenges, there is opportunity to improve bus service on Broadway. Community services, as well as nearby Southern Maine Community College and the marine industrial area at the eastern end of the corridor, demonstrate the potential for expanding transit use in this neighborhood with denser land uses to better support transit service. Additionally, stops identified with low ridership may provide opportunities for stop consolidation to ensure the areas with the highest ridership—or potential for high future ridership based on land use, development, and improved multimodal connectivity—are better served. This could enable both faster and more reliable bus travel times, as well as more cost-effective installation of amenities such as shelters, real-time information, and bicycle parking and upgrades in pedestrian infrastructure serving bus stops.

Transit improvements recommended as part of this plan include:

- A routing and stop optimization plan for Route 21 to help decrease travel time, enhance service reliability, increase ridership, and provide safe and accessible bus stops with connectivity to other modes. A primary goal of this improvement is to improve bus service to the Ferry Village neighborhood through a centralized transit hub at Stanford Street and Broadway.
- Adjusting the schedules of Route 21 and Route 24A and 24B for afternoon and evening trips to provide better options for residents of Cushing's Point using transit service to travel within different neighborhoods of South Portland.
- Evaluate five proposed locations for transit signal priority (TSP) based on SBPS on-going plans to expand its TSP system for Routes 24A and 24B and implement TSP for Route 21.
- Improve multimodal connectivity by designing bus stops to be safe and accessible for all ages and abilities, implementing transit mobility hubs at Broadway and Stanford Street and Breakwater Drive and Madison Street, and utilizing transportation demand management strategies.

Adaptive Traffic Signal Technology

Based upon analysis from the Smart Corridor Study and data collect from the travel time surveys, congestion currently exists and is expected to worsen in the future particularly at the Broadway and Waterman Drive intersection. Traffic modeling estimates a reduction in vehicle travel time of approximately 11 percent along the Broadway Corridor if an adaptive signal system was implemented (this could reduce travel time between Highland/Cottage and Erskine Drive by about 20 seconds). Field travel time measurements indicate a much greater reduction of 50 percent in travel time as a best case scenario under perfect conditions (this would reduce travel time by about 90 seconds-from a 180 second drive through the corridor). Implementation of an Adaptive Signal System is recommended as future growth occurs. It will be a particularly important strategy for ensuring traffic flows well at the Waterman Drive intersection.

Public Engagement

The public engagement program for the study took place during November 2020 through June of 2021, during which time the Covid-19 pandemic was building, and public gatherings were either prohibited or discouraged. Given this, a heavy emphasis was placed on the internet both for disseminating information and gathering input.

The public engagement program began with an aggressive media and social media communications campaign, which launched both the study and an online survey designed to solicit commentary on existing conditions in the study area. In the online survey, people were asked if they believed that traffic congestion was a problem, and what the best solutions might be. This provided information into whether and why respondents biked, walked, or took the bus in the study area, as well as what changes would make them more likely to increase their use of those transportation modes. The survey also included questions about potential ferry usage, fare cost, and how respondents might travel to a ferry terminal.

Detailed graphs and response summaries are included in the full report, but in summary, respondents do feel congestion is a problem in the study area and want to solve it by improving traffic signal timing and shifting travel to non-vehicular modes. They also want to walk and bike more safely in the study area and would like the Greenbelt Pathway to have more capacity and be more comfortable/safe for multiple modes (walking and biking). They like the idea of a ferry but are concerned that it will attract more vehicular traffic from outside the study area and do not expect to use it for commuting.

The survey was available online for five weeks and was extensively publicized in several local print media outlets and via social media with the help of many community partners. These partners included the South Portland school system, the Portland Regional Chamber of Commerce, SMCC, Hannaford, the Bicycle Coalition of Maine, South Portland Housing Authority, SPBS, Casco Bay Lines, and more. Additional outreach was conducted by GPCOG and the City of South Portland. There were 1,135 respondents, many of whom provided valuable feedback via open-ended questions.

Public Meeting #1

The first of two virtual public meetings took place on November 9, 2020, publicized via the methodology noted above, as well as within the survey itself. Sixty-eight people registered for the meeting and 39 attended. Comments came in both online and via the audio function, and generally paralleled the open-ended comments from the survey.

3.2 Public Meeting #2

The second public meeting took place on June 28, 2021. Seventy-five people registered and 45 attended. In this meeting, specific ideas, and suggestions for transportation changes in the corridor and surrounding neighborhoods were presented, and the comments included many questions regarding the details of these, as well as additional suggestions.

Land Use Growth and Vehicle Trip Reductions

The analysis in this study indicates that the Broadway corridor can support additional growth (estimated in the range of 500 to 1,000 additional dwelling units in the study area), with system improvements that include improved traffic signal efficiency; expanded and improved bus service, bicycle and pedestrian facilities and by offering ferry transportation to and from Portland. Roadway/intersection improvements to create a roundabout or an equivalently-effective design, will be required at Sawyer Street. Capacity improvements at the Waterman Drive intersection are limited, however the intersection has a large footprint, and both the regional (GPCOG/PACTS) and municipal goals, do not support broadening the intersection with lane augmentation. Therefore, the best available improvement option at Waterman Drive/Broadway is to implement adaptive traffic signal technology to increase vehicle bandwidth without severely congesting the intersection. Lastly, the City should explore and implement an on-going Transportation Demand Management (TDM) program, to be implemented by local employers and developers, that supports and requires proven interventions that targets reduction levels to be identified in conjunction with their land use makeup and trip generation estimates.

1.0 Introduction

In 2018, the Greater Portland Council of Governments, in partnership with the Cities of South Portland and Portland, conducted a study—the Smart Corridor Plan—that focused on identifying improvements to a 7-mile corridor connecting the two municipalities. The Plan provided a series of recommendations for the corridor and, specifically, guidance for eastern Broadway in South Portland leading to Cushing's Point (Bug Light). Among the recommendations, the Plan called for pedestrian improvements along eastern Broadway that were funded by a bond passed in the fall of 2019.

1.1 Purpose and Need Statement

This study, the Mill Creek to Cushing's Point Multimodal Priority Corridor Study, goes beyond the 2018 Smart Corridor Plan to consider several specific ways of increasing circulation capacity on the Broadway corridor, an environment where road widening is not an option. The study explores integrated circulation system improvements to help move people through the corridor, enhanced transit service, improved traffic signal operations, bicycle and pedestrian accommodations, and the feasibility of a marine transportation link between South Portland and Portland. The circulation system improvements are intended to improve mobility for all travelers, accommodate and respond to potential future development, and be functional for residents, commuting employees, and visitors.

The study is funded by the Greater Portland Council of Governments in partnership with the City of South Portland.

This section of Broadway is significant to the region's transportation network. At its western end, it connects to the Casco Bay Bridge, carrying travelers from South Portland and Cape Elizabeth over the Fore River to Portland and points north. It is part of the primary east-west route across South Portland, linking the waterfront, SMCC, Fort Williams Park in Cape Elizabeth, and several residential neighborhoods with the downtown Mill Creek neighborhood and points west. It is also an important multimodal corridor, served by transit and running parallel to the popular Greenbelt Walkway.

This was accomplished by:

1. Reviewing the existing transportation system along the Broadway corridor between the Casco Bay Bridge and Cushing's Point.
2. Identifying opportunities to improve safety, mobility, and access for all users in the area, including people walking, biking, taking transit, and driving.
3. Prioritizing transportation system improvements that balance anticipated growth in the area with the existing character of surrounding neighborhoods.

This report concludes with a set of actionable items to improve Broadway circulation flow from Casco Bay Bridge to Cushing's Point. The study considers buildout along the corridor as well as quantifiable impacts from identified improvements.

1.2 Project Approach

Document Review, Field Work, and Assessment

GPCOG assembled and reviewed relevant plans and documents from PACTS, the City of South Portland, MaineDOT, and others. A summary of all documents obtained to ensure a comprehensive base line of existing information was performed and is presented in Section 2.2.

Public Outreach

Despite the challenges of the Covid-19 pandemic, which was in effect throughout the entire study period, residents provided over 1,100 responses to an online survey—including responses to multiple open-ended questions—and participated in two virtual public meetings, which are higher numbers than experienced in previous South Portland study meetings such as the Portland-South Portland Smart Corridor Plan (about a dozen people attended in 2018). Section 4 describes the public engagement process and how public input helped inform the recommended actions.

Recommendations Process

Recommendations for the study were developed considering base line information, planning and engineering analysis, public feedback, the study's Purpose and Need Statement.

1.3 Study Area

Figure 1.1 depicts the study area from the Casco Bay Bridge to Spring Point and generally from the Fore River to Cottage Road.

1.4 Study Personnel

The following personnel helped guide the study:

- Milan Nevajda – City of South Portland
- Doug Howard – City of South Portland
- Josh Reny – City of South Portland
- Justin Gove – City of South Portland
- Donna Tippett – City of South Portland
- Andrew Clark - GPCOG
- Tony Plante - GPCOG
- Tom Errico – T.Y. Lin International
- Carol Morris – Morris Communications
- Mitchell Rasor – Rasor LA
- David Versel – Rasor LA
- Sandra Clarey – McMahon Associates
- Natalie Raffol – McMahon Associates

1.5 Related Studies

This study was informed by several local, regional, and state studies and policies:

- Destination 2040
- 2018 Smart Corridor Plan
- South Portland Comprehensive Plan
- 2018 South Portland City Council Goals
- 2015 Mill Creek Master Plan
- 2018 Active Transportation Plan
- MaineDOT's Complete Streets Policy
- South Portland's Complete Streets Policy
- Transit Tomorrow
- 2018 Moving Southern Maine Forward
- PACTS' Transit Stop Access Project

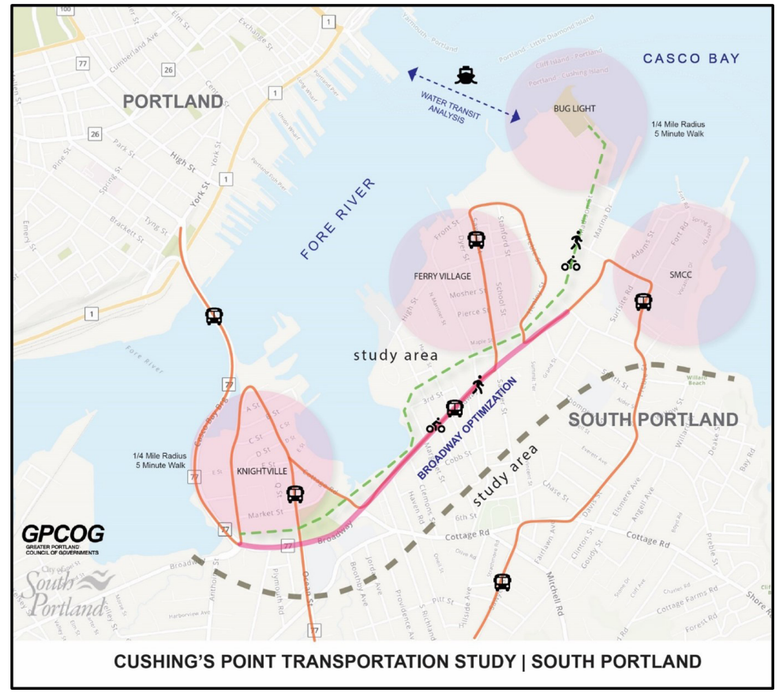


Figure 1.1 - Study Area

2.0 Existing Conditions

The Casco Bay Bridge leads to the South Portland mixed-use neighborhood of Knightville. The study corridor runs along Broadway from the intersection with Waterman Drive in the west, through the neighborhood of Ferry Village to Bug Light Park and Southern Maine Community College (SMCC) in the east. The corridor generally has a suburban feel due to the presence of single-family residential homes, along with commercial or civic buildings that are set back from the street.

West of Cottage Road on the western end of the study area, there are larger parcels of commercial, open space, residential, public facilities, and institutional uses. Commercial activity predominantly includes national retail and restaurant chains that are on large parcels surrounded by surface parking. Based on prevailing land use patterns, the western end of the study area is auto-centric and does not have a comprehensive pedestrian and bicycle infrastructure system. This area is also part of the Mill Creek land use plan, which aims to increase the diversity and intensity of land uses and activities, create a mixed-use downtown neighborhood, and encourage the development of multi-story, mixed-use buildings in this area.

Where Broadway intersects with Cottage Road and moving east, land uses transition into predominately residential, public facilities, and institutional uses, with smaller commercial parcels at some intersections along the corridor. Continuing along Broadway further east of Preble Street to the waterfront near SMCC, industrial and manufacturing uses are common.

2.1 Planning Background and Regional Priorities

Regional Context

This corridor has been the subject of numerous planning and policymaking efforts in recent years. The following section details relevant policy goals and recommendations from recent regional, local, and state planning efforts.

Destination 2040

Destination 2040 is PACTS' long-range transportation plan, which establishes a long-term vision for the region's transportation network and guides high-level decision making and policy direction. Among other goals and priorities, Destination 2040 established the framework of priority corridors and priority centers to help focus funding resources into growing the most productive and emerging areas in the region. The Broadway corridor is identified as a priority corridor, connecting the two priority centers of Knightville/Mill Creek and Bug Light/SMCC. An update to PACTS' long-range transportation plan, Connect 2045, is underway. Broadway's status as a priority corridor is not anticipated to change.

2018 Smart Corridor Plan

The 2018 Portland-South Portland Smart Corridor Plan studied a seven-mile corridor along Forest Avenue through downtown Portland, over the Casco Bay Bridge, and along Broadway to SMCC. The corridor-wide goals of the study were to encourage high-quality development, improve safety for all modes, manage traffic access and congestion, and improve travel options and multimodal access for people walking, biking, and riding transit.

Key findings along the Broadway segment that overlaps with the Cushing's Point Transportation Study included:

- Persistent congestion at the intersections with Waterman Drive, Ocean Street, and Cottage Road.
- Unsignalized intersections with minor streets causing unsafe conditions for people walking and driving, made worse by heavy industrial traffic near SMCC.
- A substandard width of only 7–8 feet for the Greenbelt Walkway, an important link for people walking and biking.

Recommendations included:

- Improving and installing crosswalks east of Cottage Road, including raised and shortened crosswalks.
- Developing consistent on-street bike lanes along the entire corridor.
- Widening the Greenbelt Walkway as an alternative for people walking and biking where right-of-way constraints did not limit opportunities for widening.
- Consolidating vehicular curb-cuts and reducing surface parking.
- Encouraging small-scale development that promotes walkable and bikeable neighborhoods.

One Climate Future

The Cities of South Portland and Portland partnered to develop a shared vision for reducing greenhouse gas emissions and improving the resiliency of both cities. The plan lays out several aggressive climate goals, including several that relate to the study area, including:

- Reducing community-wide greenhouse gas emissions by 80 percent by 2050, which requires a significant shift in the way residents, visitors, and employees move through the corridor.
- Promoting infill and intensifying mixed-use development
- Enhancing walking and cycling infrastructure
- Expanding transit use and service quality

Local Context

South Portland Comprehensive Plan

The City of South Portland's 2012 Comprehensive Plan identifies eight policy areas within the study area as shown in the map below. The plan outlines several strategies for the Broadway corridor to manage growth in the area. Balancing walkable and bikeable neighborhoods with higher density, mixed-use development was identified as critical, as well as the need to safely and efficiently move people along the major transportation corridor. Specific recommendations vary along the corridor, with an expectation of dense mixed-use development at the east end, limited development along the core of the corridor, and higher density again in the Mill Creek area.

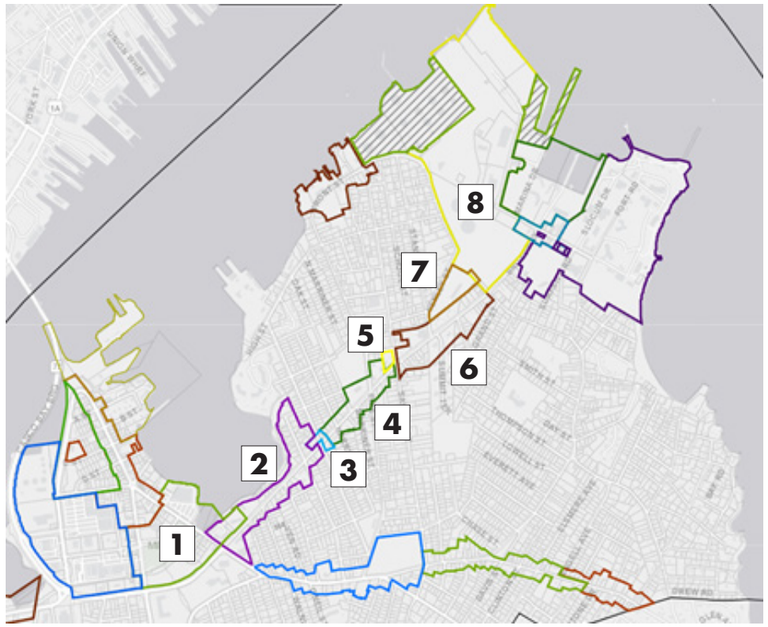


Figure 2.1 - Policy Areas

The plan also recognizes growth areas for increased residential, mixed-use, and marine-industrial development. The plan recommends:

- Improving access management and pedestrian safety by reducing curb cuts and driveways.
- Channeling traffic from the residential neighborhoods along Broadway to signalized intersections to reduce congestion, improve safety, and minimize delays.
- Implementing complete streets treatments to improve safety for people walking and biking, and to encourage multimodal transportation use.
- Developing and implementing a long-range plan for pedestrian improvements, including access and safety enhancements to and around the Knightville/Mill Creek area, links between residential neighborhoods and adjacent commercial centers, and improved safety and access to public facilities, schools, recreational areas, and other activity centers.
- Undertaking a study of possible traffic improvements in the Broadway corridor.

At the Eastern Waterfront, the plan anticipated a significant development opportunity on what is currently an underutilized industrial area. The plan promotes marine land uses and access to the water as part of this redevelopment and is sensitive to circulation impacts on Broadway as a result of large-scale development. To mitigate traffic impacts, future development is encouraged to incorporate infrastructure for transit, walking, and biking. A network of open space should also be integrated into planning efforts.

To enhance transit service along the corridor, the plan recommends:

- Increasing service frequencies, especially where higher-density development is proposed.
- Encouraging the City of South Portland, as operators of the South Portland Bus Service (SPBS), to work with other transit providers in the region to develop a more regional and integrated system.
- Exploring the future use of fixed-guideway vehicles and infrastructure.

These recommendations are underscored by land use goals that support moderate-density housing and professional uses, a walkable neighborhood character, buildings fronting Broadway with reduced parking to the rear or side, and the redevelopment of the Eastern Waterfront as a mixed-use area with continued marine use.

2021 South Portland City Council Goals

On February 23, 2021, South Portland City Council held its annual goal-setting workshop. The workshop yielded a "2021 Statement of Priorities," including three items to hold paramount in Council's deliberations and decisions: 1) The climate crisis is upon us and we need to prepare, 2) Diversity, equity, and inclusion is the new norm, and 3) Fiscal responsibility is critical for future opportunities. The statement then recognizes six priority areas, each with its own sub-goals. These six areas include (in no particular order):

1. Actively addressing the climate crisis;
2. Improving diversity, equity, and inclusion;
3. Keeping housing affordable and available;
4. Supporting public health and human services;
5. Advocacy; and
6. Maintaining fiscal responsibility.

2015 Mill Creek Master Plan

The City of South Portland completed the Mill Creek Master Plan in 2015, laying out a vision for a Mill Creek to better serve as South Portland's downtown: a high-density, pedestrian-focused, commercial and residential hub. The plan outlines several important objectives. Especially relevant to the Cushing's Point Transportation Study is making the area more pedestrian-focused by improving access for people walking and biking, both within the neighborhood and for those visiting the neighborhood from elsewhere.

Specific recommendations include:

- Reconstructing the intersection of Broadway and Ocean Street to eliminate the free right turn lane and to make it easier for pedestrians to cross.
- Developing a plan for improvements at the intersection of Broadway and Waterman Drive to make it easier and safer for people walking and biking to cross this intersection, including the investigation of a pedestrian bridge.
- Requiring walkway connections from sidewalks and/or public open spaces to the front entrance of any new buildings.
- Installing bicycle parking at key destination points and requiring new developments to incorporate appropriate bicycle facilities.
- Reconstructing the intersection of Broadway and Cottage Road to eliminate the free right turn lanes and to make it easier for pedestrians to cross.
- Working with property owners to improve the Greenbelt streetscape between Waterman Drive and Ocean Street to avoid locating waste receptacles adjacent to the Greenbelt.

Pedestrian and Bicycle Planning

2018 Active Transportation Plan

To advance the regional goals of improved safety, equity, health, economic vibrancy, connectivity, and resilience, PACTS' active transportation plan underscores the importance of improving transportation options for people walking, biking, and riding transit. This is consistent with a few key transportation trends:

- From 2004 to 2014, the percentage of people with a driver's license decreased by 17 percent in the US and 23 percent in Maine.
- From 2012 to 2018, annual public transit ridership increased from 3.3 million to 3.8 million in the PACTS region.
- Since 2000, the share of commuters driving alone has decreased, and the share of people walking and biking to work has increased in York and Cumberland Counties.

PACTS supports multimodal transportation through a number of strategies, including integrating bicycle, pedestrian, and transit improvements into PACTS-funded projects, and supporting efforts to expand and improve local and regional active transportation networks. Projects should incorporate elements from PACTS' regional bicycle and pedestrian facility design guide. It is also a priority of PACTS to work with its member communities to develop tools for transit-supportive land use at key locations and to encourage smart growth. Opportunities to improve access for people walking and biking along the Broadway corridor include improved or new sidewalks and crosswalks, improved or new on-street bicycle facilities, roadway diets and safety improvements, and maximizing the use of the parallel Greenbelt Walkway.

MaineDOT's Complete Streets Policy

The Maine Department of Transportation (MaineDOT) Complete Streets policy applies to new construction, reconstruction, rehabilitation, or maintenance projects funded partially or in full through MaineDOT. It also includes projects programmed by Metropolitan Planning Organizations, like GPCOG, or through the department's Local Project Administration Program.

It is the policy of MaineDOT to consider the needs of all users in the planning and development of street and highway improvement projects. Examples of applicable projects include bridge, highway, intersection, safety, transit, lane and shoulder widths or markings during paving, privately-initiated projects, and new-capacity street and highway projects.

South Portland's Complete Streets Policy

South Portland's Complete Streets Policy is rooted in approaching every transportation project and program as an opportunity to improve public streets and the transportation network for all users. Appropriate treatments include:

- sidewalks
- bicycle lanes and parking
- curb extensions
- crosswalks
- transit signal priority
- traffic-calming devices
- narrow vehicle lanes
- raised medians
- dedicated transit lanes
- stormwater improvements
- street trees

The City is currently preparing a road classification system to integrate complete streets requirements into roadway design standards.

2021 Pedestrian safety Action Plan, MaineDOT/BCM/City of South Portland

A recent planning effort identified short-, medium-, and long-term mitigation strategies to improve pedestrian safety and reduce crashes in several locations throughout South Portland, including two in this project's study area.

Along Broadway between Spring and Stanford Streets, the plan recommends increasing crosswalk visibility and better defining unsignalized crossings. At the intersection of Broadway and Ocean Street, the plan recommends traffic calming measures for right-turning vehicles and increasing crosswalk visibility.

Transit Planning

Transit Tomorrow

PACTS' Transit Tomorrow Plan—the region's long-range transit plan—defines a long-term vision for transit throughout the region. The four key strategies are 1) making transit easier, 2) creating frequent connections, 3) introducing rapid transit, and 4) creating transit-friendly places. The plan's "smart land use map" identifies the Broadway corridor as a priority corridor for future rapid transit. The City's Comprehensive Plan underscores this designation, calling for more intense, compact development along the corridor to provide the necessary population densities to support transit.

The Broadway corridor is currently served by the South Portland Bus Service, a City-owned and operated service. This study investigates opportunities to ensure transit service along the corridor is aligned with regional goals, including scheduling or routing changes, improved stop locations and amenities, or transit signal prioritization.

2018 Moving Southern Maine Forward

While Transit Tomorrow focuses on the long-term vision for transit in the region, 2018's Moving Southern Maine Forward provides an overview of the existing transit network and strategies to improve it in the short-term.

Critical to the success of transit service is residential density, employment density, and a high number of important origins and destinations nearby. The Broadway corridor is among the region's densest in terms of residences and employment, and existing transit service connects several schools, libraries, City Hall, shopping and service opportunities, and to the wider regional network. The plan recommends an improved Mill Creek Terminal at the corridor's western end and working with planning staff throughout the region to ensure zoning for mixed uses and higher density around transit infrastructure.

PACTS' Transit Stop Access Project

In 2017, PACTS undertook an initiative to improve accessibility at the region's high-priority bus stops. From over 600 regional stops, the project team prioritized approximately 120 stops for improvements including curb ramps, landing pads, and crosswalks. The project, now in its design phase, will improve several stops along the Broadway corridor, including near SMCC and Ferry Village.

2.2 Traffic Volumes

Broadway carries a significant volume of traffic as noted in Table 2.1 with the greatest volume entering the City from the Casco Bay Bridge and declining significantly as it approaches the eastern end. Table 2.1 also provides volumes on side streets within the eastern part of the study area and as noted, volumes are very low.

Table 2.1
Annual Average Daily Traffic Volume

Location	2019 Existing Volume (unless otherwise noted)
Broadway e/o Waterman Drive	28,060
Broadway e/o Ocean Street	20,050
Broadway e/o Cottage Road	14,380
Broadway w/o Mussey	15,400 (2016)
Broadway w/o Sawyer	10,540
Broadway e/o Preble	7,650 (2016)
Stanford n/o Broadway	1,450 (2016)
Sawyer s/o Broadway	1,490
Sawyer n/o Broadway	1,950
Pine Street n/o Broadway	630 (2016)
Mussey n/o Broadway	2,380 (2016)

2.3 Traffic Signals

One focus of this study is to evaluate the benefits of an Adaptive Traffic Signal system, to improve mobility without increasing roadway capacity. Adaptive traffic signals use pre-programmed, daily signal timing schedules that monitor system performance and adjust automatically to accommodate changing traffic patterns.

Along the study corridor there are five signalized intersections: Casco Bay Bridge and Erskine Drive, Broadway and Waterman Drive, Broadway and Ocean Street, Broadway and Cottage Road, and Broadway and Mussey Street. The signal at the intersection of Cottage Road and Highland Avenue may need to be considered as well. The City and PACTS are currently upgrading signals from Waterman Drive to Cottage Road to improve pedestrian and bicycle facilities. The traffic signals currently operate with a GridSmart detection system that allows for coordination and optimization of operations. The City's traffic consultant noted the following regarding the system:

- The Cottage Road and Highland Avenue intersection is operating independently of other nearby traffic signals. Based on field data and no complaints from citizens, the intersection is running well without traffic signal coordination.
- During peak periods of the day at the Broadway and Waterman Drive intersection eastbound traffic volumes from the bridge create congestion. Any modification to the traffic signal timings that improve the capacity of the eastbound approach should also consider the resulting impacts to other movements, including pedestrians, at the intersection.
- Broadway at Erskine Drive, Waterman Drive, Ocean Street, and Cottage Road all have transit signal priority (TSP), which extends the green phase to allow an approaching bus to pass the intersection. However, based on public outreach, the City has determined that green phase times shorter than 10 seconds for any approach on this corridor would be too short.
- Due to the long pedestrian crossing distances at the Broadway and Waterman Drive intersection, and the required walk crossing times, the intersection falls out of coordination with nearby traffic signals and the corridor loses mobility efficiencies.

2.4 Transit Service

The Broadway corridor from the Casco Bay Bridge to Cushing's Point is primarily served by SPBS' Route 21, which runs in an east-west direction from Pickett Street to Cottage Road. Route 21 travels in the inbound direction from Willard Square and SMCC, westbound along Broadway, and across the Casco Bay Bridge to Portland. Routes 24A and 24B provide service from Mill Creek to downtown Portland and the Maine Mall. A summary of bus routing and bus stops in the Mill Creek area of South Portland is provided in Figure 2.1.

Route 21 operates every 30 minutes on weekdays and every hour on weekends, carries nearly 500 passengers per weekday, and has the longest span of service on weekends. Ridership for a typical weekday is shown in Figure 2.2 and Table 2.2. Overall, there is low on-off activity at stops on the Broadway corridor within the study area, with three stops seeing zero to one rider on a typical weekday, which may be attributed to the low density environment or a lack of significant trip generators. The predominant land use along Broadway within the study area and in the Ferry Village neighborhood is single-family residential, with pockets of commercial areas[1]. The highest number of boardings and alightings on the corridor within the study area occur at the stop near the Broadway and Cottage intersection, in front of the South Portland Housing Authority and the Broadway and Stanford Street stop, near the South Portland Boys and Girls Club. These stops see 14-16 boardings/ alightings during the weekdays, which is high relative to the rest of the study area. These two stop locations coincide with relatively higher density and mixed land use, compared to single family residential, which suggests that expanding transit use in the study area will in part rely on denser development in the future. The linkage between density and transit ridership in general has been well explored through traffic and transportation research and is documented in the local and regional transit planning document cited in the background documents overview above.

Despite the low number of riders boarding and alighting at stops along Broadway in the study area, many riders travel on buses through the corridor and access transit outside the corridor to reach the SMCC and eastern terminus of Route 21. The peak passenger load for Route 21 on the Broadway corridor within the study area occurs midday at 3:00 PM at Broadway and Benjamin Pickett Street and at Broadway and Preble Street with 23 passengers. This may be due to the proximity of both stops to SMCC and use by the college's students. The Broadway and Preble Street stop is adjacent to the Betsy Ross House, a 123-unit complex (with a proposed 55-unit expansion) of affordable and market rate units for older adults. The peak total daily passenger load on the Broadway corridor within the study area occurs at Broadway and Stanford Street, totaling 205 passengers, though the total daily load continues to increase on the route until reaching Sawyer and Front Street, then falls again as the route continues inbound[2].

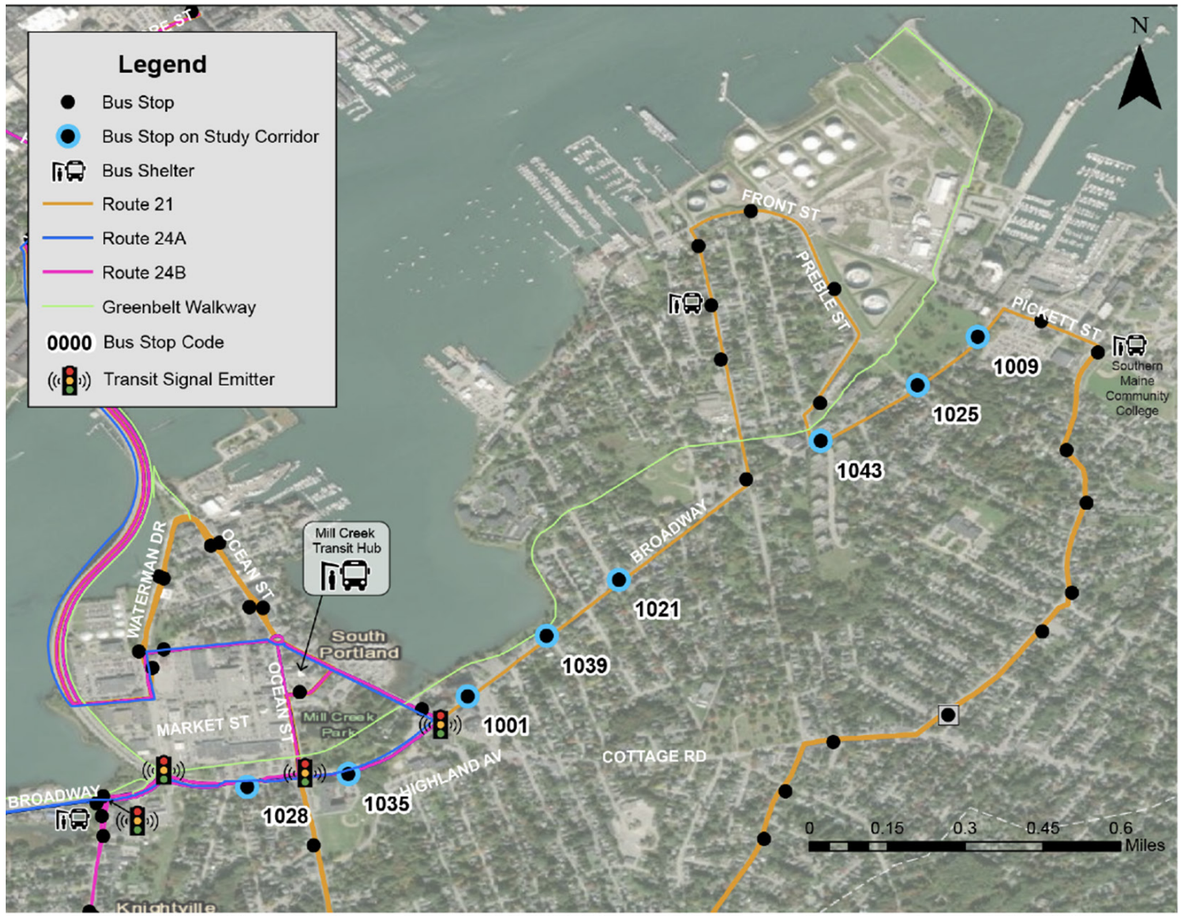


Figure 2.2 - Ferry Village

[1] https://southportland.maps.arcgis.com/apps/webappviewer/index.html?id=3c82c619da2f4d02ae3960adab2db764

[2] 2017 SPBS passenger on/off data provided by GPCOG

Table 2.2
Bus Route Summary (Fall 2019)

	21	24A	24B
Route Origin	SMCC	Maine Mall	Maine Mall
Route Destination	Forest & Congress	Forest & Congress	Forest & Congress
Span of Service (Weekday)	6:37 AM – 11:15 PM	5:20 AM – 11:15 PM	6:20 AM – 9:50 PM
Span of Service (Saturday)	6:37 AM – 11:15 PM	7:00 AM – 7:15 PM	-
Span of Service (Sunday)	6:40 AM – 6:35 PM	7:00 AM – 6:35 PM	-
Frequency	30 minutes weekday; 1 hour weekend day	60 minutes or more, everyday	60 minutes or more, weekdays
Daily Trips (2017)	30	13	10
Average weekday ridership[3]	477	N/A	N/A
Average weekend day ridership[4]	109	N/A	N/A

Table 2.3
Typical Weekday Bus Stop Ridership (2017) [5]

Stop at Broadway and…	Stop ID	Typical Weekday Boardings & Alightings			Typical Weekend Ridership	
		Ons	Offs	Weekday Total	Saturday Total	Sunday Total
Route 24A/24B Service Direction: West to East						
Scamman	1028	1	4	5	2	1
Mahoney Middle School	1035	0	0	0	0	0
Route 21 Service Direction: East to West						
Benjamin Pickett	1009	0	1	1	2	0
Preble	1025	7	2	9	2	1
Stanford	1043	4	10	14	1	5
Mussey	1021	2	3	5	2	0
Clemons	1039	0	0	0	1	0
425 Broadway	1001	9	7	16	2	0

[3] Typical weekday ridership derived from daily ridership totals (excluding holidays and weekend days) for Route 21 in October 2019

[4] Typical weekend ridership derived from daily ridership totals for Saturdays and Sundays for Route 21 in October 2019

[5] 2017 stop ridership data provided by GPCOG; most recent stop level ridership data available at time of study

Issues and Opportunities

The existing ridership and spacing for bus stops in the study area is illustrated in Figure 2.3. Understanding ridership and spacing for stops both on and off the Broadway corridor will help identify opportunities for route optimization to improve service efficiency. Optimal bus stop spacing is a balance between facilitating reasonable bus travel times and the distance riders must walk to access a stop. There is a trade-off between the two, with longer spacing leading to a more efficient service, but shorter spacing providing shorter walking distances. Generally, the recommended spacing between stops is based on the surrounding context and development. Typical spacing ranges from 750 feet in urban areas to 1,250 feet in rural areas. As the study area has varying degrees of density and urban or rural character, it is important to consider the surrounding context for identifying the appropriate stop spacing.

As shown in Figure 2.3, there are several areas with stop spacings closer than typical minimums, notably either side of the corner of Benjamin Pickett Street and Broadway and at the corner of Preble Street and Sawyer Street, in the Ferry Village neighborhood. Stops with low ridership, especially in these locations, may provide opportunities for stop consolidation to ensure the areas with the highest ridership—or potential for high future ridership based on land use, development, and improved multimodal connectivity—are better served. This could enable both faster and more reliable bus travel times, as well as more cost-effective installation of amenities such as shelters, real-time information, and bicycle parking.

It is equally important to evaluate the physical conditions at bus stops to identify existing issues and inform future opportunities. The graphics on Pages 11 and 12 summarize the conditions at bus stops on the Broadway corridor within the study area. The factors evaluated at each stop include the following:

1. Location: Identification of the stop as far-side, near-side, or mid-block and if there is a curbside or pull-out stop configuration. Evaluation of conflicts within the bus stop zone, including driveways, on-street parking, and bicycle facilities.
2. Sidewalk Condition: Identification of the sidewalk width and presence of an 8-foot deep landing area for bus stop accessibility. Evaluation of the sidewalk condition rated on a scale of good, fair, or poor, based on pavement condition, presence of obstructions limiting accessibility, levelness of surface, and the height of the curb above the road surface.
3. Pedestrian Crossing: Identification of marked crosswalks and signalized intersections closest to the stop. Evaluation of crossing conditions including quality of pavement markings and the presence and condition of curb ramps.
4. Bicycle Facility: Identification of the presence of a bicycle facility connecting to the stop.
5. Signage: Evaluation of visibility issues (sign too low, cluttered with other signs, located at the back of the sidewalk), multiple signs that have conflicting regulations in the same curb space (for example, a parking sign within a bus stop), and if the location of the sign is likely to cause confusion as to where the bus actually stops.
6. Amenities: Identification of amenities including benches, shelters, trash and recycling receptacles, route schedules and maps, and bicycle parking.
7. Lighting: Identification of lighting provided at the stop; pedestrian-scale lighting at the stop was rated the highest, while overhead lighting on the opposite side of the street was rated the lowest.

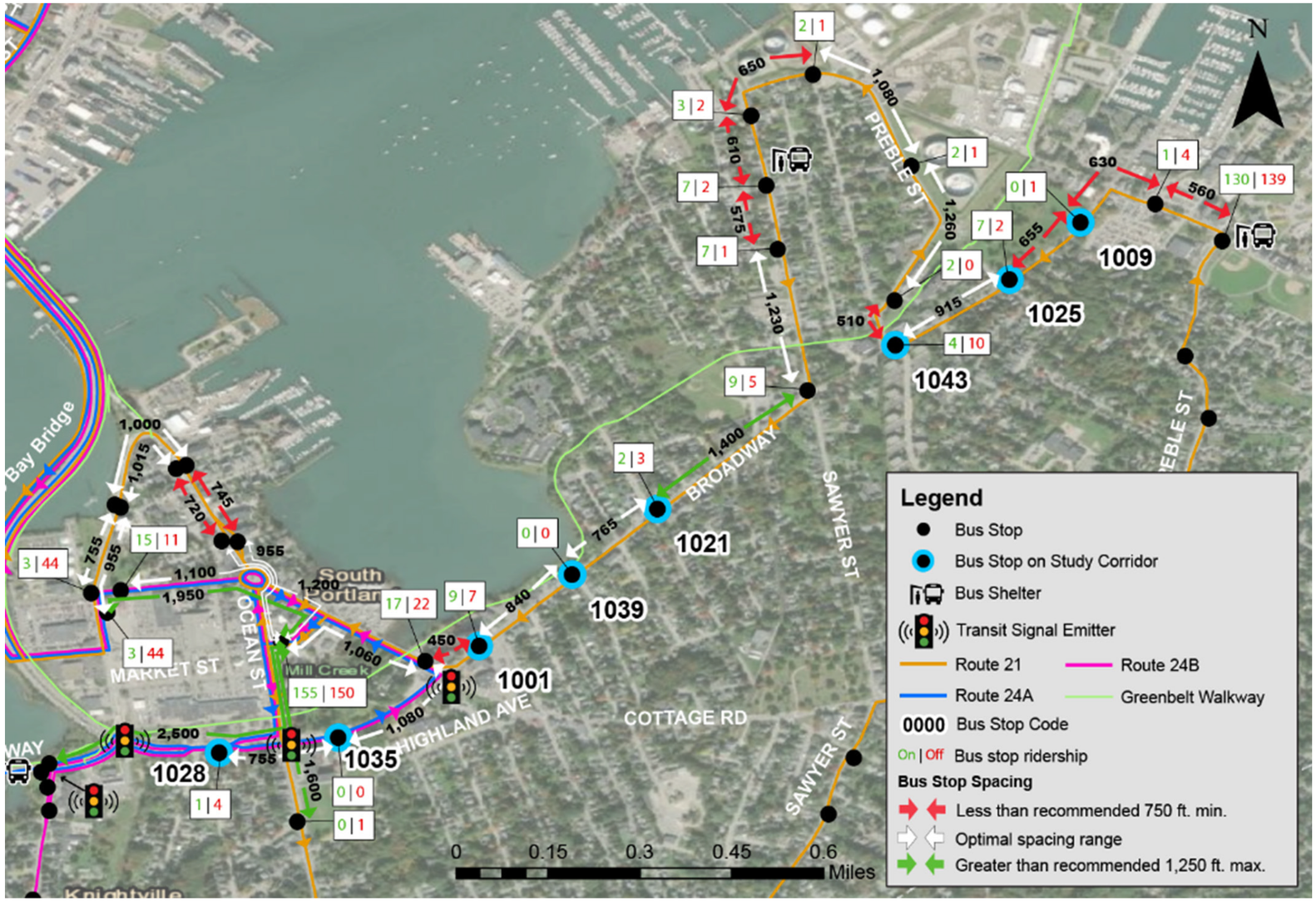


Figure 2.3 - Ridership and Bus Stop Spacing

Each factor was rated on a three-tiered scale, and color-coded accordingly:

Orange signifies a poor condition in need of improvement.

Grey signifies a fair condition and that improvements would be beneficial or may be required for ADA accessibility standards.

Green signifies a good condition and that improvements are not necessarily needed.

Figure 2.4 summarizes the evaluation results for all eight stops.

Stop Name	Stop Code	Location	Sidewalk Condition	Pedestrian Crossing	Bicycle Facility	Signage	Amenities	Lighting/ Safety
Route 24A/24B Service Direction: West to East								
Broadway + Scamman St.	1028					BUS STOP		
Broadway + Mahoney Middle School	1035					BUS STOP		
Route 21 Service Direction: East to West								
Broadway + Benjamin Pickett St.	1009					BUS STOP		
Broadway + Preble St.	1025					BUS STOP		
Broadway + Stanford St.	1043					BUS STOP		
Broadway + Mussey St.	1021					BUS STOP		
Broadway + Clemons St.	1039					BUS STOP		
425 Broadway	1001					BUS STOP		

Figure 2.4 - Bus Stop Condition Summary Matrix

Route 24A/24B Service Direction: West to East

Broadway + Scamman St. Stop Code: 1028	
Location	Farside Scamman St., potential issues with bus blocking residential driveways.
Sidewalk Condition	Fair to good, ~7ft. wide.
Pedestrian Crossing	Faded crosswalk across Scamman St. Nearest crosswalks across Broadway are ~350ft. east at Ocean House St. and ~600ft. west at Waterman Dr.
Bicycle Facility	None
Signage	Visibility issues due to bus stop sign on utility pole shared with other signs and low to the ground.
Amenities	Bench
Lighting/ Safety	Fair

Broadway + Mahoney Middle School Stop Code: 1035	
Location	Midblock with a pullout bus stop configuration.
Sidewalk Condition	Landing in fair condition. Sidewalk and crosswalk adjacent to stop landing in good condition. The PACTS Transit Stop Access Project identified the connection between the landing and the sidewalk as needing improvement.
Pedestrian Crossing	Crosswalk at the entrance to Mahoney Middle School with curb ramps. The closest marked crossing across Broadway is ~300ft. to the west at Ocean House St.
Bicycle Facility	None
Signage	The placement of the bus stop sign in the middle of the pull out area may cause confusion as to where the bus serves the stop.
Amenities	None
Lighting/ Safety	Fair

Route 21 Service Direction: East to West

Broadway + Benjamin Pickett St. Stop Code: 1009	
Location	Midblock between Benjamin Pickett St. and Preble St., with the bus stopping in the curbside bike lane.
Sidewalk Condition	5ft. wide in good condition. Curb is low and cracking, providing poor definition between the roadway and the sidewalk.
Pedestrian Crossing	Nearest crosswalks are at Broadway and Benjamin Pickett St. and have faded almost entirely across all approaches, with curb cuts lacking at some corners. Nearest crosswalks to the west are at Preble St., at the next bus stop, nearly 700ft. away.
Bicycle Facility	Curbside bike lanes on either side of Broadway.
Signage	Post shared with one other sign.
Amenities	None
Lighting/ Safety	Poor

Broadway + Preble St. Stop Code: 1025	
Location	Nearside Preble St., with the bus stopping in the bike lane.
Sidewalk Condition	~5ft. wide in fair condition.
Pedestrian Crossing	Adjacent crosswalks across Broadway and the southern approach of Preble St. are faded and have curb ramps without detectable warning panels.
Bicycle Facility	Curbside bike lanes on either side of Broadway, with the westbound lane running through the stop. The lanes extend only to the east, with a marked shoulder continuing to the west.
Signage	Visibility issues due to location outside the sidewalk amid tall grass.
Amenities	None
Lighting/ Safety	Poor

Route 21 Service Direction: East to West (continued)

Broadway + Stanford St. Stop Code: 1043	
Location	Nearside Stanford St., with the bus stopping in the travel lane.
Sidewalk Condition	~4ft wide sidewalk and 6ft. wide grass buffer. The sidewalk is in fair condition with some cracking. Lacks an accessible landing area.
Pedestrian Crossing	Faded crossing of Stanford St. with detectable warning panels. Nearest marked crossing of Broadway is 250ft east and has both signage and curb ramps with detectable warning panels.
Bicycle Facility	None
Signage	Post shared with one other sign.
Amenities	None
Lighting/ Safety	Fair

Broadway + Preble St. Stop Code: 1025	
Location	Nearside Preble St., with the bus stopping in the bike lane.
Sidewalk Condition	~5ft. wide in fair condition.
Pedestrian Crossing	Adjacent crosswalks across Broadway and the southern approach of Preble St. are faded and have curb ramps without detectable warning panels.
Bicycle Facility	Curbside bike lanes on either side of Broadway, with the westbound lane running through the stop. The lanes extend only to the east, with a marked shoulder continuing to the west.
Signage	Visibility issues due to location outside the sidewalk amid tall grass.
Amenities	None
Lighting/ Safety	Poor

Broadway + Mussey St. Stop Code: 1021	
Location	Nearside Mussey St., potential conflicts with signed parking area (though shoulder is not wide enough to accommodate parking).
Sidewalk Condition	~6ft. wide in poor condition.
Pedestrian Crossing	Marked crossings at the intersection of Broadway and Mussey St. immediately adjacent to the stop, with detectable warning panels that could be upgraded to align better with crosswalks.
Bicycle Facility	None
Signage	Shares sign post with two other signs, one of which indicates 15-minute parking, creating confusion over curbside uses.
Amenities	None
Lighting/ Safety	Poor

Broadway + Clemons St. Stop Code: 1039	
Location	Midblock opposite Clemons St.
Sidewalk Condition	~5ft. wide in fair condition. Pedestrian access issues, including a utility pole that necessitates pedestrians encroaching on private property to navigate around.
Pedestrian Crossing	Closest marked crossings across Broadway are ~350ft. to the west at Walnut St. and 750ft. to the east at Mussey St.
Bicycle Facility	Bicycle lane through stop. An informal pedestrian path from the stop to the Greenbelt Walkway illustrates desire for improved connection.
Signage	Sign set low and relatively far from curb.
Amenities	None
Lighting/ Safety	Fair

In evaluating the condition of the bus stops on Broadway, several issues are apparent throughout the corridor while others affect certain areas more than others.

In general, issues with signage and lighting are widespread: for both factors, half of the stops on the corridor were rated as poor. Signage issues vary from poor sign placement to crowded sign posts, while lighting in general is not at a pedestrian scale. Often, street lighting is only located on one side of the roadway and may not cast sufficient light at bus stops.

Issues with pedestrian crossings are similarly prevalent. While only two stops were rated as poor, improvements could be made to crossings at each stop along the corridor. Crosswalks are widely spaced on Broadway, and many crosswalks lack ADA-compliant curb ramps with detectable warning panels. Bicycle facilities throughout the corridor are inadequately marked and conflict with parking and bus stops. At these locations, pavement markings could better indicate the conflicts, for example by dashing the bike lane markings.

Amenities such as benches are largely lacking at all stops except for two on the western end of the corridor. This end of the corridor is characterized by suburban strip commercial development, where connectivity between bus stops and access points to development is lacking, leading to accessibility issues and an auto-oriented environment. Improving pedestrian and transit infrastructure along this part of Broadway could have a positive effect on ridership, as this area is close to major destinations like shopping opportunities, the Mill Creek Transit Hub for bus connections to the Maine Mall and other commercial centers, and the Greenbelt Walkway.

The middle part of the corridor has the poorest sidewalk conditions. In this area, Broadway transitions into a neighborhood street, with buildings closer to the street edge, more residential uses, and a reduction in travel lanes. Improvements in this segment could therefore have a significant impact on residents. In a residential area, safe connections between modes for all ages and abilities are necessary to make transit a feasible option for families and older adults, especially as residents are likely to walk or bike at the start or end of their transit trip.

Bus stops on the western end of the corridor generally have less amenities and surrounding infrastructure, though there is an on-street bike lane. Due to development potential in the Liberty Shipyard area, which is roughly ¼ to ½ mile from the existing stops on Broadway, there is opportunity to link transit improvements, including bike-bus connections to development opportunities.

Route 21 Service Direction: East to West (continued)

425 Broadway Stop Code: 1001	
Location	Midblock between Cottage Rd. and N Richland St., with a pull-out area.
Sidewalk Condition	~5ft. wide and in good condition at the stop location, though uneven in adjacent areas.
Pedestrian Crossing	Nearest marked crossings at the signalized intersection of Cottage Rd. and Broadway, ~275ft. from the stop. These crossings are in good condition.
Bicycle Facility	None
Signage	Visibility issues due to sharing post with two other signs, including one much larger sign.
Amenities	Two benches in the bus stop area.
Lighting/ Safety	Pedestrian-scale lighting at the stop.

2.5 Bicycle and Pedestrian

The following section documents existing conditions and general issues and concerns.

Bicycle Conditions

Figure 2.5 presents existing bicycle facilities within the study area. On-road bike lanes are provided from the Casco Bay Bridge to Waterman Drive. Bike lanes begin just east of Cottage Road and continue to Sawyer Street and begin again at Spring Street and end at Breakwater Drive. The Greenbelt Pathway provides safe off-road connectivity for most of the study area from the Broadway and Waterman Drive intersection to Bug Light Park. PACTS and the City of South Portland are currently designing improvements to the corridor, including a shared lane for vehicle and bike use between Cottage Road and Waterman Drive and a bike lane from Casco Bay Bridge to Broadway with a bike exit ramp to allow direct access to the Greenbelt Pathway.

Issues:

- Gaps in the bike lane network along Broadway between Sawyer Street and Spring Street.
- There are no bicycle facilities on Broadway from Waterman Drive to Cottage Road.
- Lack of connectivity between the Greenbelt Pathway, SMCC, and the Spring Point Shoreway Trail.
- Insufficient width of the Greenbelt Pathway. It is currently 7 to 8 feet wide and, given demand, a 10 to 12 foot path is recommended.
- No bicycle facilities exist on adjacent streets feeding to and from Broadway and the Greenbelt Pathway.
- On-street parking, for example on the west side of Mussey Street requires bicyclists to shift into the travel lanes.

Figure 2.5 - Existing Bicycle Facilities

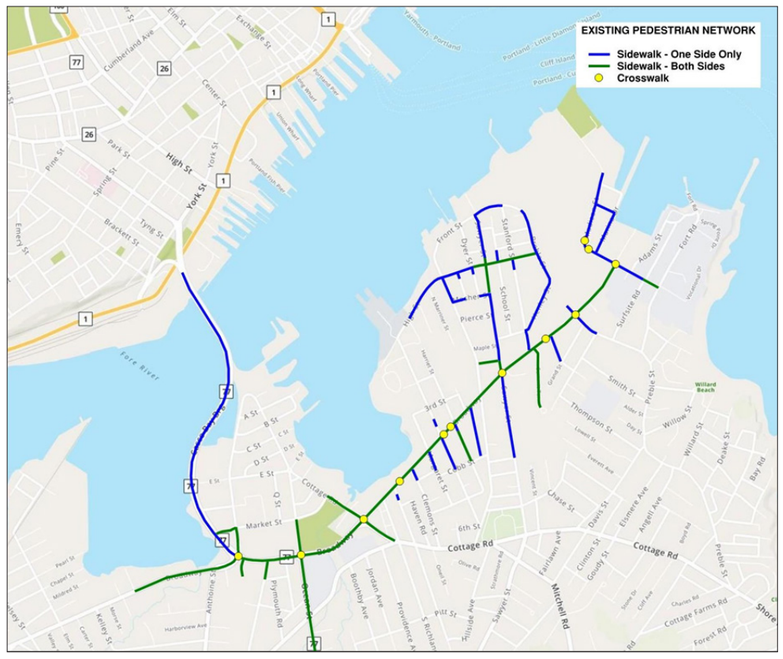


Figure 2.6 - Existing Pedestrian Facilities

Pedestrian Conditions

Figure 2.6 presents existing pedestrian facilities within the study area. Sidewalks are provided for most of Broadway on both sides of the roadway, with the exception of the west side of the approach to the Casco Bay Bridge. Few sidewalk facilities are provided on side streets and crosswalks on Broadway are limited.

Issues:

- Gaps in the sidewalk system on streets leading to Broadway.
- Crosswalks on Broadway are spread out, which may contribute to unsafe crossings at unmarked locations.
- The Broadway and Mussey Street intersection is the only signalized intersection in the study area that does not have crosswalks on all four approaches.
- The Greenbelt is a heavily used bike and pedestrian facility, but the narrow width may lead to points of conflict.
- Broadway at Waterman Drive is a wide roadway with heavy traffic volumes that make crossing difficult for Greenbelt users.
- Right-turn vehicle conflicts, particularly for free flowing (slip lane) movements at signalized intersections, create pedestrian safety issues due to high vehicle speeds and lack of yielding compliance.
- Several bus stops do not have crosswalks nearby.
- Turning islands and wide radii encourage high travel speeds at the Broadway intersections with Waterman Drive, Ocean Street and Cottage Road.
- High volume intersections like at Waterman Drive, Ocean Street and Cottage Road have traffic signal timing requirements that result in long wait times and limited opportunities for pedestrians to cross.
- Right-Turn-On-Red movements are permitted at the Waterman Drive intersection, creating conflict with Greenbelt trail users.

Vehicle Speeds

Vehicle speeds negatively impact pedestrian and bicycle safety. The South Portland Police Department has collected vehicle speed data on Broadway near the Mussey Road intersection. The data was collected for seven days the last week of October 2020. The data indicates the average speed was 31.5 miles per hour with an 85th percentile speed of 35.8 miles per hour. The posted speed limit is 35 miles per hour. While the data indicates vehicle speeds are not excessive overall and would not meet criteria for MaineDOT to reduce the speed limit, there were a number of high speeding vehicles during the survey period. The maximum speed recorded for every hour of the day is noted in Table 2.4. Also noted is the number of speed violators per hour which is spread out over the day.

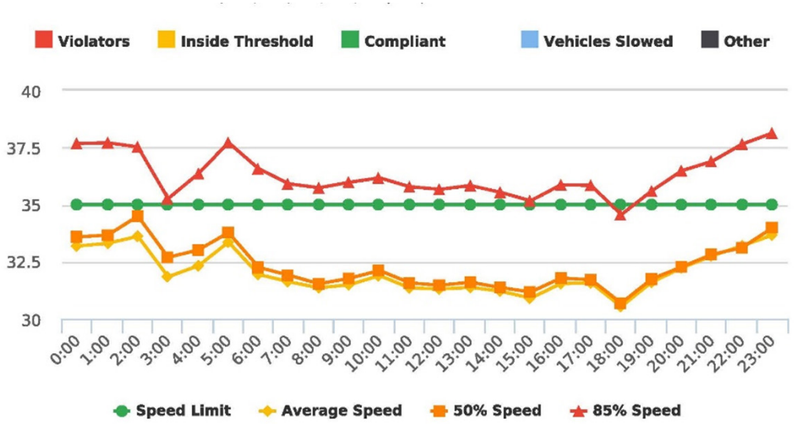


Table 2.4
Maximum Recorded Speeds

Start of hour	Max Speed (MPH)	# of Violators
Midnight	50	3
1AM	45	0
2AM	62	3
3AM	47	1
4AM	46	1
5AM	47	1
6AM	47	7
7AM	49	4
8AM	53	5
9AM	55	6
10AM	50	4
11AM	50	6
Noon	53	4
1PM	47	2
2PM	50	7
3PM	48	5
4PM	48	2
5PM	54	4
6PM	50	3
7PM	58	4
8PM	51	6
9PM	63	9
10PM	54	3
11PM	59	3

3.0 Public Engagement

Public interest in this study was high, even in the midst of the COVID-19 pandemic. And while all public engagement activities were virtual, participation was strong.

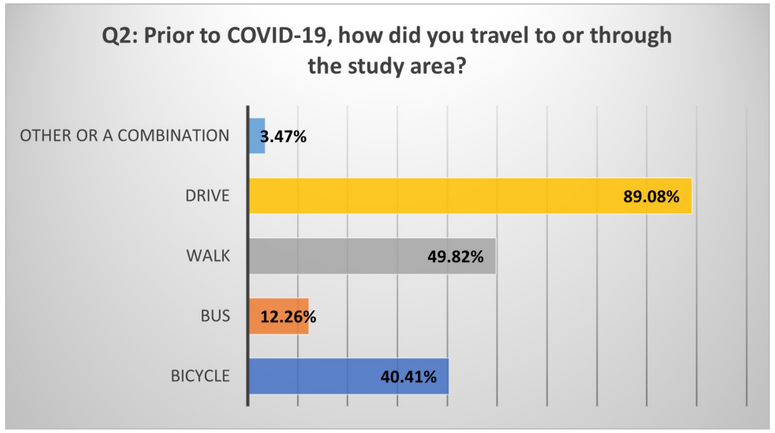
3.1 Online Survey

Public engagement began with an active media and social media communications campaign, which launched both the study and an online survey designed to solicit commentary on existing conditions in the study area. In the survey, people were asked if they believed that traffic congestion was a problem, and what the best solutions might be. This provided information into whether and why respondents biked, walked, or took the bus in the study area, as well as what changes would make them more likely to increase their use of those transportation modes. The survey also included questions about potential ferry usage, fare cost, and how respondents might travel to a ferry terminal.

The survey was available online for five weeks and was extensively publicized in several local print media outlets and via social media with the help of many community partners. These partners included the South Portland school system, the Portland Regional Chamber of Commerce, SMCC, Hannaford, the Bicycle Coalition of Maine, South Portland Housing Authority, SPBS, Casco Bay Lines, and more. Additional outreach was conducted by GPCOG and the City of South Portland. There were 1,135 respondents, many of whom provided valuable feedback via a number of open-ended questions. Full results of the survey can be found in the Appendix of this report; a summary of highlights follows.

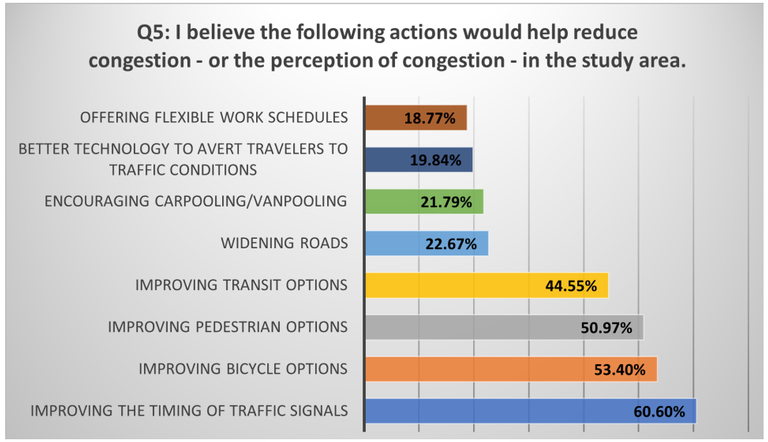
Relationship with the Study Area – 2 Questions

Summary: A high percentage of respondents had close ties to the study area, almost all drive in the study area, but almost half walk and/or bike as well.



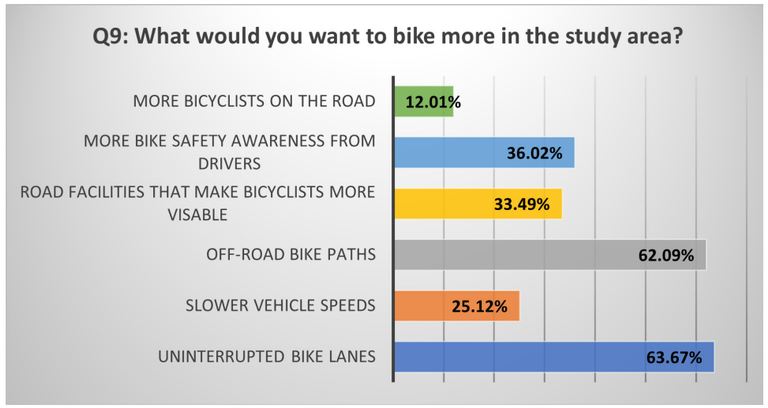
Attitudes on Traffic Congestion – 4 Questions/1)pen Ended

Summary: Respondents felt that SMCC, Bug Light Park, and the increasing residential growth in the area are key drivers of traffic congestion. They supported improving the timing of traffic signals, as well as encouraging drivers to switch to alternative travel modes by improving service and/or amenities.



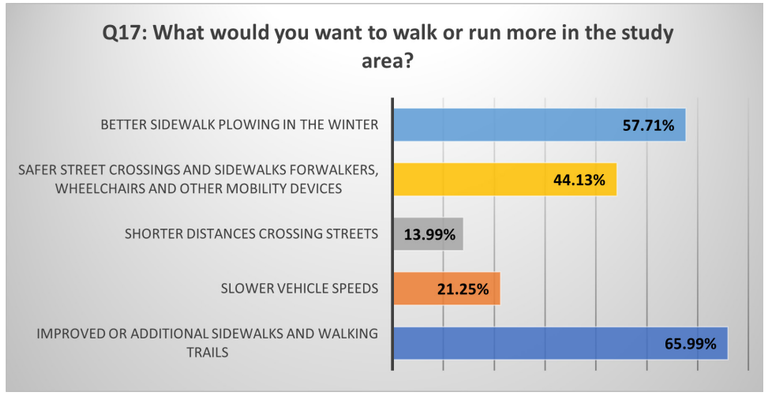
Attitudes on Biking - 5 Questions/1 Open Ended

Summary: Many respondents ride a bike recreationally and were vocal about the study area being unsafe to do so. All would prefer more and safer venues for riding. There is a preference for off-road bike paths and uninterrupted on-street bike lanes. The most common reason for a respondent to choose not to bike (38 percent) or walk (62 percent) in the study area is that their destinations are "typically too far." Many respondents' destinations are outside the study area.



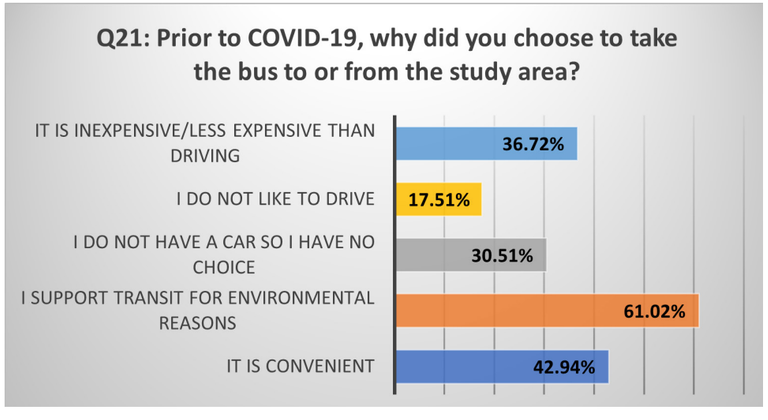
Attitudes on Walking– 5 Questions/1 Open Ended

Summary: Like biking, walking and running in the study area is primarily for recreational and exercise purposes. Comments from people who walk in the study area included a desire for destination shops and restaurants, along with better sidewalks and walking paths, and slower traffic.



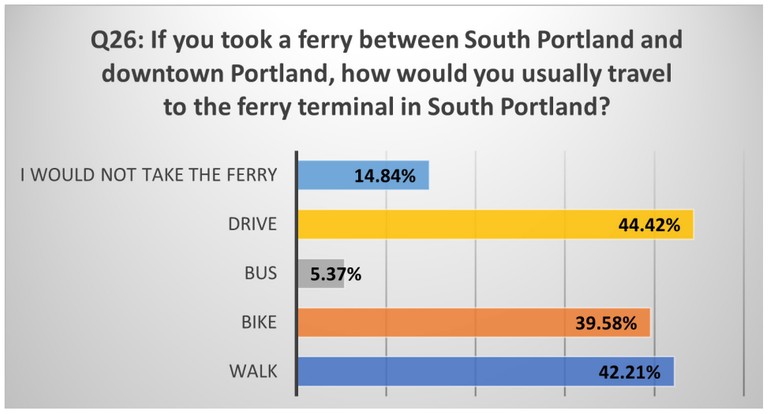
Attitudes on Taking the Bus – 5 Questions/1 Open Ended

Summary: People in the study area seem enthusiastic about the idea of transit. However, respondents felt that service can be impractical in terms of travel times, schedules, and access to destinations. Many of the open-ended comments on transit welcomed improvements to make transit more convenient.



Attitudes on Ferry Service – 3 Questions/1 included Open-Ended Option

Summary: There is strong interest in a ferry, though some respondents expressed doubts as to its feasibility and whether it should be prioritized over other transit services such as expanded bus service. To the extent that new ferry passengers would choose to drive to a new ferry terminal, some respondents expressed concerns that this would ultimately add more vehicle traffic in the study area. The percentages of respondents who said they would walk, bike, or drive to a ferry terminal were roughly equal in the survey (See Q26 for details). Respondents were asked in an open-ended question how much they would be willing to pay for round-trip service including parking. Responses ranged from as low as free to a high of $25, but the average was around $5-$7.



Open-Ended Question: Is there anything else you'd like to tell us about transportation in the study area?

One-third of the answers focused on reactions to the ferry, which included enthusiastic and positive interest balanced with concerns about increased traffic in the study area. There was also commentary on who might be likely to ride the ferry and if it would be possible for ferry service to be financially viable. With regard to general traffic and congestion, SMMC is perceived to have a significant impact on the area, with many comments on speed and distracted drivers. Comments about residential and commercial growth were mixed, with most respondents assuming that more growth would mean more vehicle traffic, which was generally unpopular.

Respondent Demographics

- 85% of respondents live in South Portland, 39% in the study area
- Respondents' age was a bell curve peaking at 35-44 years, slightly weighted toward the older end of the curve, EXCEPT for the 18% of respondents who were under 18. College-age people (not necessarily students) comprised 7.5%.
- More than half are employed full time, 16% employed part time, 9% retired, 8% unemployed. The "Other' category was about half students and half people unemployed due to COVID-19.
- Household income primarily fell into the $50k-$150k range, weighted slightly toward the $100-$150K category.
- Respondents were 85% white, with the second highest category at 9% "I prefer not to answer." Following that, 97% of people most commonly spoke English at home, with under 1% noting that French, Spanish and Somali were spoken.
- 52% of respondents were female, 40% were male, the rest were split between other and preferring not to answer.

3.1 Public Meeting #1

The first of two virtual public meetings took place on November 9, 2020, publicized via the methodology noted above, as well as within the survey itself. Sixty-eight people registered for the meeting and 39 attended. A presentation on existing conditions in the study area was followed by an hour-long open comment session. It was explained in a response to a question that while the study took place during the COVID pandemic, pre-pandemic data was used on the assumption that transportation usage would ultimately revert back to more "normal" patterns. And while this may not end up being entirely true, it is impossible to predict at this point to what degree patterns will change. Comments came in both online and via the audio function, and generally paralleled the open-ended comments from the survey. Common topics included concern about growing vehicle traffic in the study area and how more development would affect this, desire for a more robust bus transit service, desire for improvements on the existing Greenbelt (for example, by widening it), possible effects on Bug Light Park if a ferry terminal was built adjacent, and safety concerns for pedestrians (especially children) and cyclists on Broadway. For details of the meeting, refer to the Appendix.

3.2 Public Meeting #2

The second public meeting took place on June 28, 2021. Seventy-five people registered and 45 attended. In this meeting, specific ideas and suggestions for transportation changes in the corridor and surrounding neighborhoods were presented, and the comments included many questions regarding the details of these, as well as additional suggestions. Topics included transit route changes, how housing development affects transit, bus regionalization, the need to clear sidewalks in winter, if property acquisition would be necessary to add sidewalks, bicycle and pedestrian infrastructure and safety needs on the Casco Bay Bridge, pedestrian overpasses, education on the Greenway, vehicle speed, the accuracy of projected development numbers, and unintended consequences of a ferry (more traffic). Comments were thoughtful and civil. For details of the meeting, refer to the Appendix.

4.0 Ferry Service Analysis

The intent of this analysis as outlined in the RFP is to "explore the feasibility of providing water-based transit between South Portland and Portland, to reduce individual vehicular traffic volumes along Broadway, and to provide for the redevelopment of Cushing's Point." These issues are all interrelated, adding to the complexity of the study. While specific redevelopment plans were not made available for Cushing's Point, which would have allowed for more granular analysis of the role of water-based transit in area-wide mobility efforts, the study does provide key insights into the feasibility of service and the potential role such service could play in reducing vehicle trips along Broadway

4.1 Demographic and Commuter Overview

A ferry service from Cushing's Point to downtown Portland differs from the existing ferries that serve the Casco Bay islands in that it would be used by choice, rather than by necessity. Island residents depend on the ferry service for transportation to the mainland. By contrast, residents who live near Cushing's Point can already travel to Portland via automobile, bus, or bicycle. For a ferry service to succeed it will need to be convenient, affordable, and comfortable enough to convince passengers to choose it over other modes of transportation.

Those who are likely to make use of a potential ferry service include multiple categories of riders:

- Everyday commuters, who would use the service on most workdays throughout the year and may be likely to purchase monthly passes.
- Occasional commuters, who would use the service intermittently, assumed to be an average of one day per week for the ferry service analysis.
- Recreational users, who would use the service for leisure trips to Portland, most likely on weekends.
- Additional users, including those coming from outside of the study area to take the ferry to Portland or those coming from Portland to visit Bug Light Park, SMCC, or other nearby destinations.

To determine how much ridership is expected from each category it is critical to understand the characteristics of residents within the potential ferry catchment area, which is larger than the general Broadway corridor study area, and their commuting habits. For the ferry service analysis, this catchment area is defined as the portions of South Portland and Cape Elizabeth shown in Figure 4.1. Residents of this catchment area are located within a 10-minute drive of Cushing's Point and rely on the Casco Bay Bridge to travel into Downtown Portland. This population is therefore the most likely to choose ferry service over surface transportation for work or leisure trips.

According to the US Census, the current population of the catchment area is estimated to be 24,135 residents. Of these, an estimated 48.7 percent (11,748 residents) are employed. Figure 4.1 shows the density of employed residents within the catchment area. These residents are heavily concentrated along the Broadway corridor, particularly in neighborhoods to the east of Ocean Street.

Among these employed residents, 22.2 percent (2,612 total) are employed in downtown Portland, with most of these jobs concentrated in the Old Port and Waterfront area. This population represents the primary target group for potential ferry commuters. The survey, discussed above, asked local residents specifically about their interest in making use of a potential ferry service. The ferry-related survey findings included:

- 44 percent of respondents were open to using the ferry service for commuting purposes.
- Just 5 percent said they would use the ferry service every day.
- Many respondents stated that they would use the ferry for recreational purposes.

These responses were used to determine potential ridership in the next section.

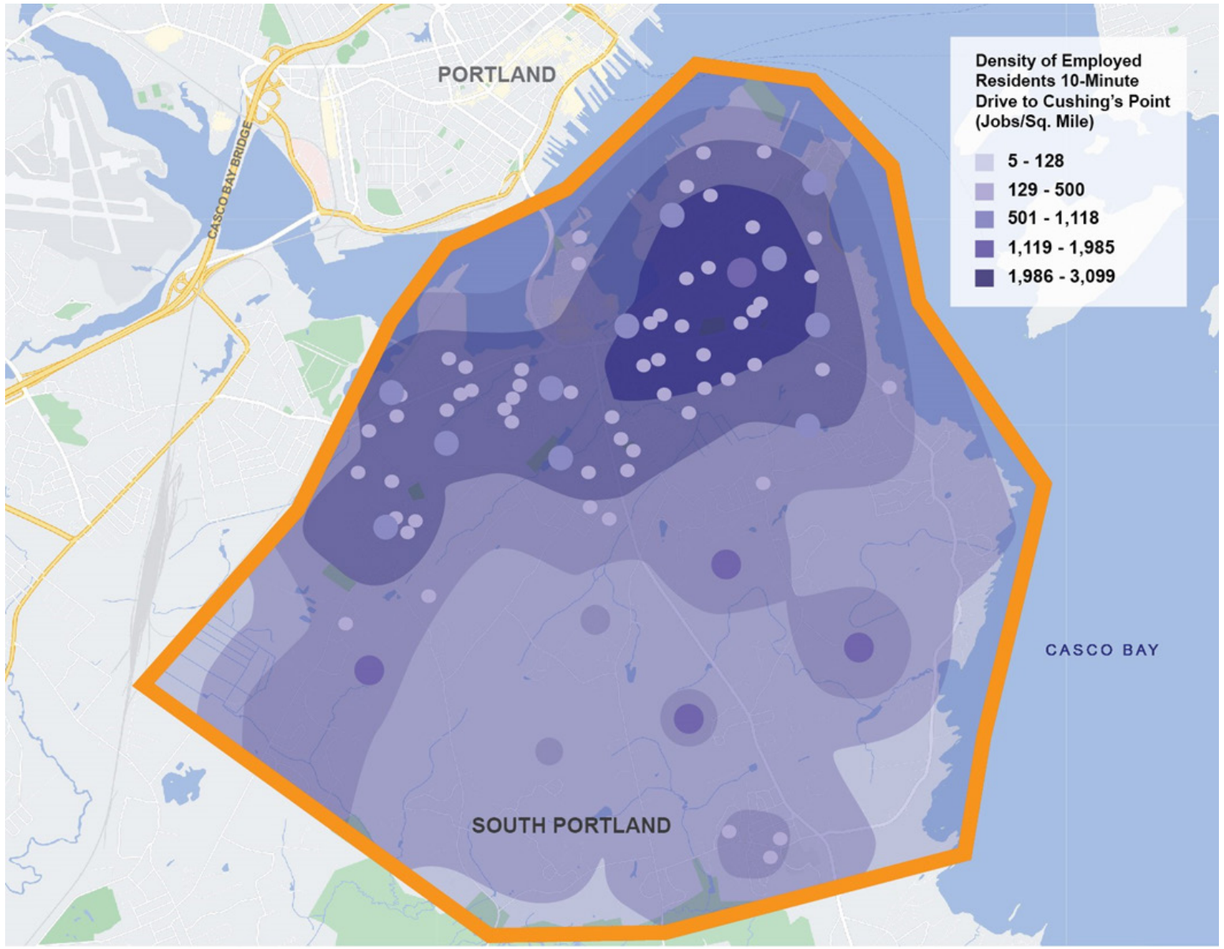


Figure 4.1 - Density of Employed Residents

4.2 Ferry Service Demand Analysis

Two scenarios were prepared for ferry service from Cushing's Point to evaluate the feasibility of a ferry service:

1. Current demand, based on potential ridership from existing populations, and;
2. Potential future demand assuming full future buildout scenarios within the catchment area.

Estimated Current Demand

Table 4.1 shows estimates for ferry ridership based on existing populations. Potential ridership of daily commuters, occasional commuters, and recreational users was adapted from the results of the resident survey. These estimates were increased by 10 percent to account for additional potential ridership from those living outside the catchment area. Based on these projections, the proposed ferry service is projected to generate a total of 75,585 passenger-trips annually, averaging about 200 passenger-trips per day.

Projected Future Demand

Additional future demand (2020-2030) for ferry service was estimated under three alternative growth scenarios for the Broadway corridor:

- A "Low Growth" scenario with 200 additional residential units added within the study area, indicative of development on the most opportune sites at prevailing densities.
- A "Medium Growth" scenario with 468 additional residential units over an 10-year period—this scenario reflects development within the study area on all opportunity sites at the prevailing densities for the Ferry Village and Willard neighborhoods.
- A "High Growth" scenario with 1,000 additional residential units—this would include incremental development throughout the study area at prevailing densities, as well as a small number of higher-density projects on opportunity sites as anticipated in the City's Comprehensive Plan.

The analysis includes the following assumptions regarding new housing and residents:

- The average household size of new units is assumed to be 1.75 persons. This is a reflection of the expectation that many of the new units are likely to be multifamily.
- The percentage of residents that are employed is assumed to be equal to the current percentage of 48.7 percent.
- Given the proximity to downtown Portland, the percentage of new residents that would commute to jobs there is assumed to increase to 40 percent (compared with 22.2 percent of current residents).
- Since any new residents of the corridor would be choosing to live in an area that is slated to have ferry service, it is assumed that a higher percentage of new residents would make use of a ferry service compared with current residents. The demand capture rates for daily, occasional, and recreational ferry riders from South Portland to Portland are therefore increased for these residents as follows:
  - Daily commuters: 10 percent (5 percent for current residents based on survey responses).
  - Occasional commuters: 30 percent (28 percent for current residents).
  - Recreational users: 25 percent (11 percent for current residents).

Table 4.2 applies these assumptions to project future ridership. According to the Low, Medium, and High Growth buildout scenarios, the ferry service is estimated to attract an additional 2,600 to 13,000 trips per year.

Table 4.1
Estimated Current Demand, 2021

Estimated Population in Ferry Catchment Area, 2020				24,135
Estimated Employed Population in Ferry Catchment Area, 2020			48.7%	11,748
Residents Employed on Portland Peninsula, 2020			22.2%	2,612
	Daily Ferry Commuters	Occasional Commuters	Recreational Users*	TOTAL
Total Commuters/Population	2,612	2,612	24,135	
Estimated Capture	5.0%	28.0%	11.0%	
Estimated Size of Group	131	731	2,655	
Average Annual Roundtrips by Group	200	40	5	
Projected Annual Roundtrips	26,200	29,240	13,274	68,714
Additional Trips Originating from Outside Study Area			10.0%	6,871
Total Projected Annual Roundtrips				75,585
*Recreational users include commuters, as they are candidates to use the service on non-work days.				

Source: US Census and resident survey findings

Table 4.2
Future Demand Projections, 2020-2030

Scenario	Low Growth	Medium Growth	High Growth
Additional Daily Commuter Roundtrips	1,360	3,180	6,820
Additional Occasional Commuter Roundtrips	816	1,908	4,092
Additional Recreational Roundtrips	438	1,024	2,188
Total Additional Roundtrips	2,614	6,112	13,100
Total Projected Future Roundtrips (includes 75,585 roundtrips from current projects)	78,199	81,697	88,685
% Increase in Roundtrips from New Residents	3.5%	8.1%	17.3%
Source: US Census and resident survey findings			

4.3 Operations Analysis

This section evaluates the potential operations and profit and loss projections for the proposed ferry service. This evaluation includes an examination of the three alternative growth scenarios outlined above.

Revenue Assumptions

The following assumptions are made regarding revenue from the ferry service. These costs were determined by reviewing national best practices for daily commuter ferry services:

- Cost of daily pass is $6.00.
- Cost of monthly pass with unlimited rides is $90.00.
- No additional revenues are assumed for parking, concessions, or other sources.

Applying these figures to the current demand estimates in Table 4.1, the expected annual revenue would be as follows:

- Revenue from monthly commuter passes: $141,480.
- Revenue from daily passes: $296,311.
- Total gross annual revenue: $437,791.

Cost Assumptions

Assumptions regarding capital and operating costs were determined through conversations with representatives of multiple public and private agencies involved in marine transportation in Portland and the Casco Bay region. The core assumption in this analysis is that the vessels used for the proposed ferry service will be for passengers only, with a seating capacity of about 50 passengers. Since the service would be year-round, all vessels would need to be heated. In order to conduct daily, year-round operations, two vessels would need to be purchased, with the assumed purchase price of each vessel being $250,000. These costs do not include any improvements to docks, terminals, parking, or landside facilities. In speaking with operators, it was found that existing infrastructure is sufficient to support the vessel size in Portland and that a future marina in South Portland could integrate this function into the operations.

Table 4.3 displays all capital and operating cost assumptions used in the analysis:

Table 4.3
Cost Assumptions

Acquisition of Vessels			**Financing of Vessels**		
Number of Vessels	2		Loan Term	10	years
Cost per Vessel	$250,000		Interest Rate	6.0%	
Total Acquisition Cost	$500,000		Annual Payment	$67,934	
Fuel Usage and Cost	**Weekday**	**Weekend**	**Maintenance Cost Assumptions**		
Fuel Usage per Hour (Gallons)	6	6	Annual Cost per Vessel	$25,000	
Operating Hours	10	8	Number of Vessels	2	
Gallons Used per Day	60	48	Total Annual Maintenance Cost	$50,000	
Fuel Cost per Gallon	$2.75	$2.75	**Annual Operating Days**		
Total Daily Fuel Cost	$165	$132	Weekdays	240	
Staffing Assumptions	**Weekday**	**Weekend**	Weekends/Holidays	120	
Captain: Hourly Rate	$35.00	$35.00	No Service	5	
Deckhand: Hourly Rate	$17.25	$17.25			
Combined Hourly Rate	$52.25	$52.25			
Hours per Day	12	10			
Total Daily Cost	$627.00	$522.50			

Source: Interviews with Portland area marine operators

Profit and Loss Analysis

Table 4.4 aggregates information from the demand analysis and the above revenue and cost assumptions into an expected profit and loss statement for the proposed ferry service. Including the cost of servicing debt on the purchase of the vessels, the annual cost of operating the ferry service is estimated to be $456,554 (in current year dollars).

Based on demand from current residents and commuters, a ferry service is estimated to produce $437,791 in annual revenue. This would result in an operating loss of $18,763 annually. Under the Low Growth scenario, the ferry service would still produce a small operating loss of $3,898 annually. However, under the Medium or High Growth scenarios, the ferry service would be able to generate a modest annual operating profit of $16,000 and $55,742 respectively.

Summary of Method and Findings

- The service will be more of an amenity than an overall transit solution, potentially displacing 150 to 200 vehicle trips a day from Broadway with a projected 1,000 new homes within the Cushing's Point seven-minute drive commuter shed.
- Water transit has the potential to break even or generate a small profit at 400 projected new homes within the seven-minute drive commuter shed of Cushing's Point.
- The analysis does not include subsidies, which would help offset the cost of the service.
- Assumes a 5% capture of existing commuters from within a seven-minute drive of Cushing's Point going to the Downtown/Old Port.
- Trips originate in South Portland with little current demand for water-transit trips to South Portland from Portland. As this asymmetrical demand model becomes more balanced, the service becomes more sustainable and has a more significant role in the overall transit network.

Table 4.4
Operating Statement for Ferry Service
Stabilized Year Analysis

	SCENARIO			
	Current	Low Growth	Medium Growth	High Growth
Additional Units	0	200	468	1,000
REVENUES				
Monthly Commuters	$141,480	$148,824	$158,652	$178,308
Daily Passengers	$296,311	$303,832	$313,901	$333,988
Total Annual Revenue	$437,791	$452,656	$472,553	$512,296
EXPENSES				
Staff Salaries	$213,180	$213,180	$213,180	$213,180
Fuel Costs	$55,440	$55,440	$55,440	$55,440
Vessel Maintenance	$50,000	$50,000	$50,000	$50,000
Debt Service	$67,934	$67,934	$67,934	$67,934
Insurance	$30,000	$30,000	$30,000	$30,000
Capital Reserve	$25,000	$25,000	$25,000	$25,000
Administration	$15,000	$15,000	$15,000	$15,000
Total Annual Expenses	$456,554	$456,554	$456,554	$456,554
NET PROFIT OR LOSS BEFORE TAXES	($18,763)	($3,898)	$16,000	$55,742

Source: Interviews with Portland Marine Operators

5.0 Adaptive Traffic Signal Evaluation

The variability and unpredictability of traffic volumes on corridors like Broadway often outpace the ability of local and State agencies to analyze and update traffic signal timings so that signalized intersections operate efficiently and do not cause congestion and delays to motorists and pedestrians. The current system is not able to adjust according to field conditions outside of pre-programmed controller settings. The City updates traffic signal timing plans periodically. However, congestion may be improved by implementation of a system that recognizes changes in traffic patterns and reacts to minimize wait times for vehicles and pedestrians.

An evolving technology, adaptive traffic signals use pre-programmed, daily signal timing schedules that monitor system performance and adjust automatically to accommodate changing traffic patterns. Adaptive signal control technologies adjust when green lights start and end to accommodate current travel patterns to promote smooth flow and ease traffic congestion. The main benefits of adaptive signal control technology over conventional signal systems are the ability to:

- Automatically adapt to unexpected changes in traffic conditions
- Improve travel time reliability
- Reduce congestion and fuel consumption
- Prolong the effectiveness of traffic signal timing
- Reduce the complaints that agencies receive in response to outdated signal timing
- Make traffic signal operations proactive by monitoring and responding to gaps in performance
- Adaptive signal control contributes to better quality of life in cities by reducing traffic congestion, improving air quality, and increasing the reliability and punctuality of public transport services through prioritization

5.1 Traffic Volumes

A review of traffic volume data was performed to determine how volumes vary throughout the day and when are volumes the greatest. According to MaineDOT data the PM peak hour is consistently the highest volume time period of the day. Figures 5.1 to 5.3 plot traffic volumes over a 24-hour period for Broadway at Ocean Street, Ocean Street south of Broadway and Cottage Road south of Broadway. The red circles highlight the highest volumes which correspond to the PM time period.

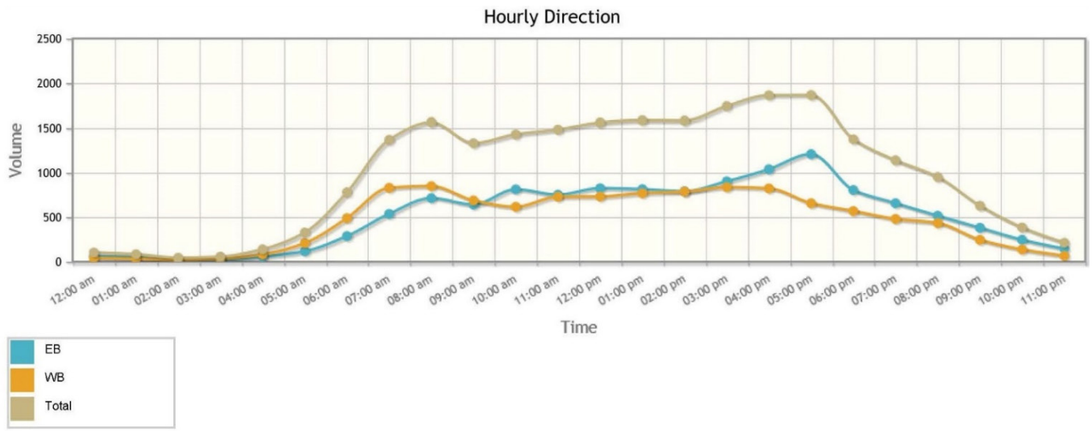


Figure 5.1 - 2019 Volumes on Broadway at Ocean Street

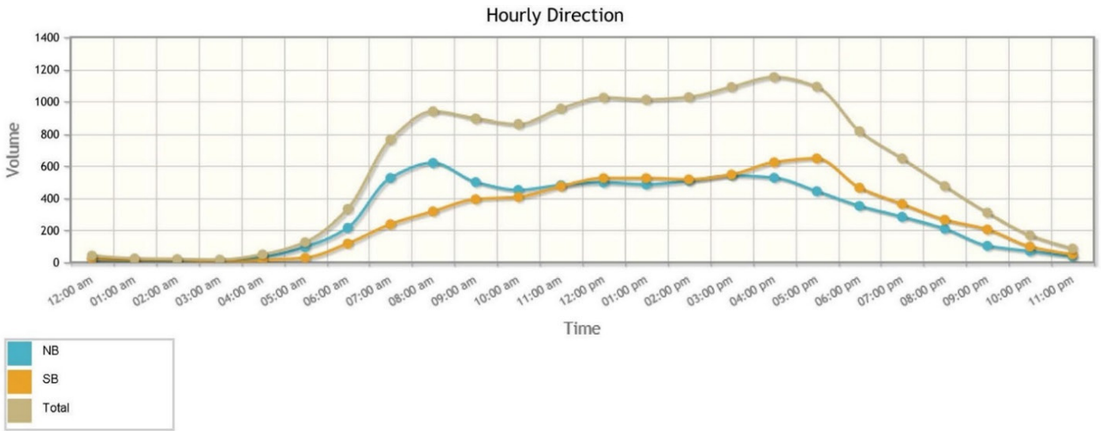


Figure 5.2 - 2019 Volumes on Ocean Street south of Broadway

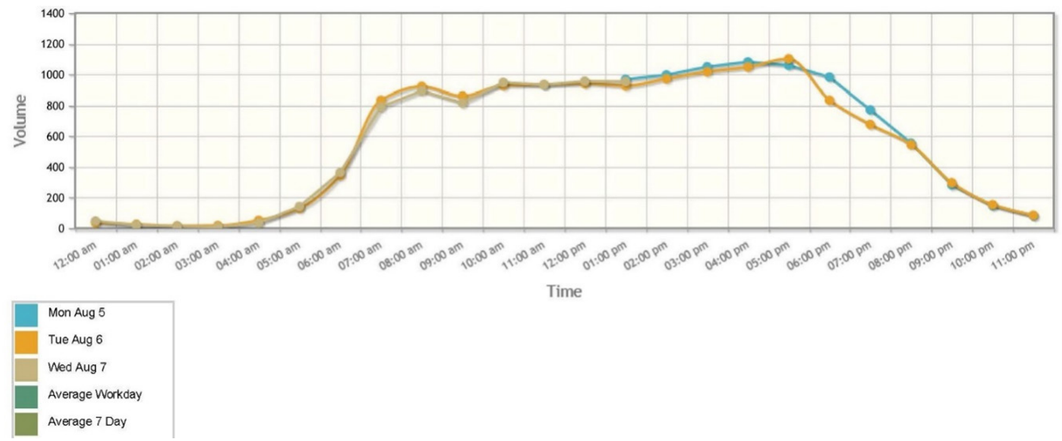


Figure 5.3 - 2019 Volumes on Cottage Road south of Broadway

In addition to the MaineDOT data, a review of traffic volume information during the AM, mid-day and PM peak hours was reviewed at the Waterman Drive intersection. For total entering volumes, there were 2,295 vehicles during the AM peak hour, 2,521 vehicles mid-day and 2,643 vehicles during the PM peak hour. The PM peak hour represents the highest volume and is significantly higher than the AM peak hour and slightly higher than the mid-day peak hour. Traffic impact studies typically focus on the morning and evening commute time periods and the types of future developments envisioned in the eastern waterfront area would not likely require a midday analysis.

5.2 Traffic Modeling

Traffic signals reviewed included Route 77 at Erskine Drive and at the intersections of Broadway and Waterman Drive, Ocean Street, and Cottage Road. Traffic signals at the intersections of Cottage Road and Highland Avenue, Ocean Street and Highland Avenue, and Broadway and Mussey Street operate independently and thus were not included. A VISSIM model was used to evaluate the benefits of implementing adaptive traffic signals. VISSIM is a microscopic multi-modal traffic flow simulation software package. Two measures of effectiveness were considered in the modeling evaluation, travel time and intersection delay, and focused on the higher volume weekday PM peak hour as discussed in Section 5.1. Travel time reductions would be expected in the eastbound direction during the PM peak hour if adaptive signal technology was implemented. The analysis estimated an 11 percent reduction in travel time under adaptive traffic signal control. This level of delay reduction would help to offset traffic increases from future growth.

5.3 Field Travel Time Analysis

Tables 5.1 and 5.2 present travel time runs conducted along Broadway in December 2020 during the AM and PM peak hours in eastbound and westbound directions. In general, the average speed through the corridor is less than the posted speed limit of 30 MPH, which may indicate the corridor is congested. As an example, when leaving Portland the time to travel from Erskine Drive through the Waterman Drive intersection was 41 seconds in the morning and 80.4 second in the afternoon.

Table 5.1
Broadway Eastbound AM Peak Hour (PM Peak Hour)

Intersection	Travel Time between Intersections (seconds)	Average Speed between Intersections (miles per hour)
Begin at Erskine Drive	0.0 (0.0)	0.0 (0.0)
Waterman Drive	41.0 (80.4)	18.1 (9.2)
Ocean Street	40.6 (37.7)	18.3 (19.7)
Cottage Road	28.8 (33.1)	25.5 (22.2)
End at Highland Avenue and Cottage Road and	38.9 (45.3)	12.9 (11.1)
Total Time	149.2 (196.6)	18.2 (13.8)

Table 5.2
Broadway Westbound AM Peak Hour (PM Peak Hour)

Scenario	Travel Time between Intersections (seconds)	Average Speed between Intersections (miles per hour)
Begin at Highland Avenue and Cottage Road Ave	0.0 (0.0)	0.0 (0.0)
Cottage Road	49.0 (68.0)	9.8 (7.1)
Ocean Street	62.2 (71.3)	13.4 (11.7)
Waterman Drive	43.0 (40.6)	16.6 (17.6)
End at Erskine Drive	27.2 (30.0)	24.7 (22.4)
Total Time	181.4 (209.9)	14.9 (12.9)

Figure 5.4 depicts a time/space diagram and helps to identify opportunities for improving traffic signal efficiency. The diagram is for the PM peak hour in the eastbound direction (the peak direction in the evening commute time period). The colored lines plot travel time through the corridor with the total time to drive from Erskine Drive to the Highland Ave and Cottage Road intersection . The black line represents a traffic signal system where a motorist could travel through the entire corridor without stopping at a red signal at a vehicle speed of 30 MPH. Based upon this data, there are opportunities for improved traffic signal timing and coordination efficiencies that could result in reduced travel times by about 50%. There have been before and after studies conducted in Maine following the implementation of an adaptive signal system. At Dunstan Corner in Scarborough the Town has reported a 40 percent reduction in overall intersection delay.

FINDINGS AND RECOMMENDATIONS

Based upon analysis from the Smart Corridor Study and data collect from the travel time surveys, congestion currently exists and is expected to be problematic in the future particularly at the Broadway and Waterman Drive intersection. VISSIM modeling estimates a reduction in vehicle travel time of approximately 11 percent along the Broadway Corridor if an adaptive signal system was implemented (this could reduce travel time between Highland/Cottage and Erskine Drive by about 20 seconds). Field travel time measurements indicate a much greater reduction of 50 percent in travel time as a best case scenario under perfect conditions (this would reduce travel time by about 90 seconds- from a 180 second drive through the corridor). Examples in Maine communities support a higher delay reduction. It is likely that the improvement in travel time and delay will be somewhere between the two, particularly considering traffic may need to stop for pedestrians and transit signal priority phasing. Implementation of an Adaptive Signal System is recommended as future growth occurs, and in combination with other transportation improvements (including transit, bicycle, pedestrian, and ferry). It will be a particularly important strategy for ensuring traffic flows well at the Waterman Drive intersection.

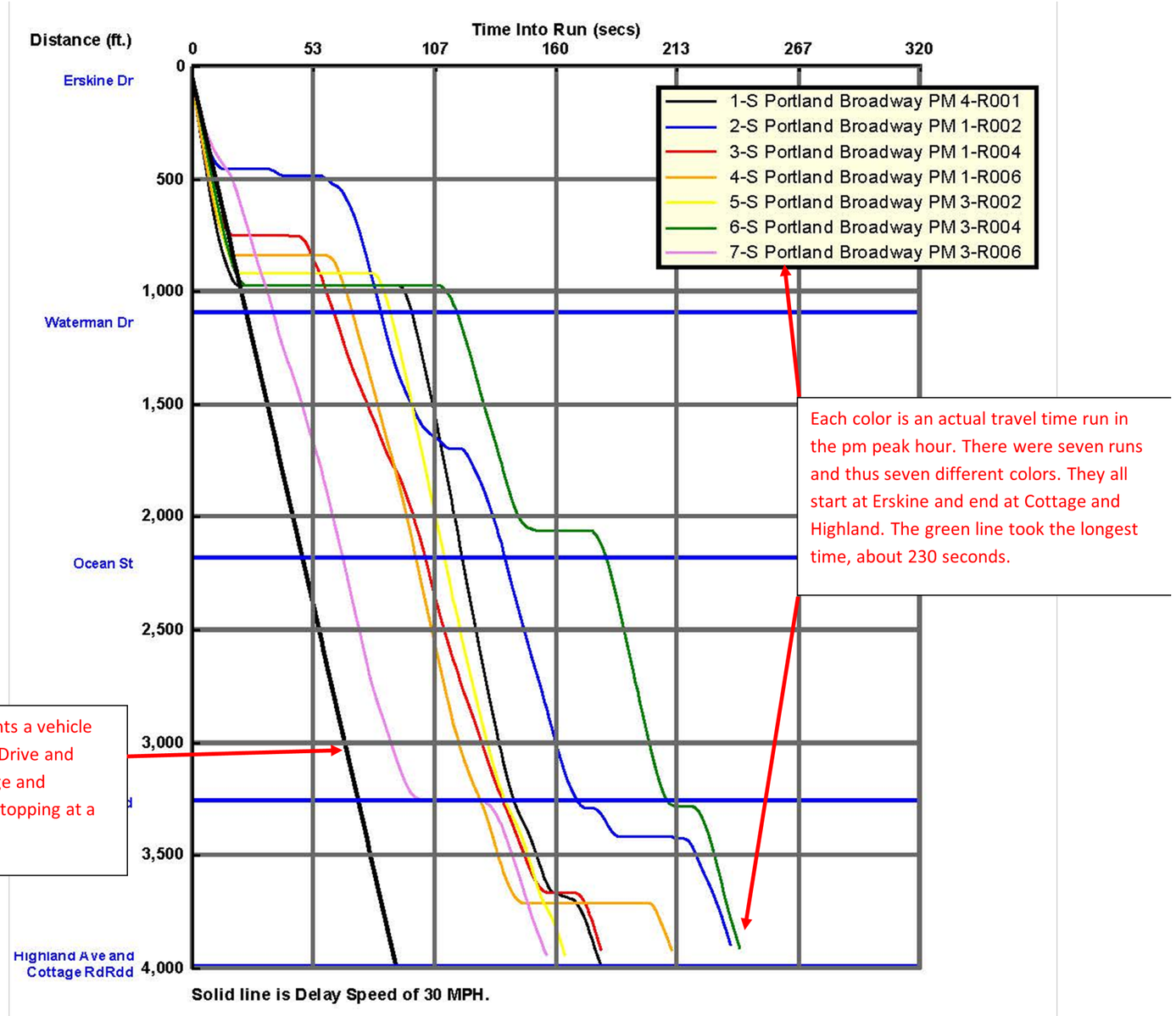


Figure 5.4 - Time/Space Diagram

6.0 Examine Methods for Increasing Bicycle and Pedestrian Trips

Cities across the country have been adjusting local policies and ordinances to promote walking and biking as viable modes of travel. Ultimately, to promote active transportation as an option along the Broadway corridor, policies and designs should be put in place to increase safety for people walking and biking and to make the environment more appealing to them. This section provides a summary of relevant policies currently in place in South Portland, and the key policy guidance the City can act on to promote walking and biking.

South Portland's Comprehensive Plan establishes a vision of the city as one of livable, walkable neighborhoods. One key local objective to advance that vision is to expand the range of non-automotive transportation alternatives available to the city's residents, workforce, and visitors. The plan highlights a number of actions to support the safety, convenience, and viability of walking and biking, including a review of access management opportunities, adjusting on- and off-street parking requirements, and promoting a dense and mixed-use pattern of development along major transportation corridors.

Another major policy document that promotes walking and biking is Portland and South Portland's One Climate Future. The two cities' joint climate action plan outlines strategies regarding land use, expanded bike infrastructure, safety, and other topics. The plan encourages the development of bicycle network plans, changes to on- and off-street parking regulations, and creating denser mixed-use nodes so people can live closer to where they work.

In 2017, the South Portland City Council adopted a Complete Streets policy. Under the policy, streets should be designed and built in a way that enables safe access for pedestrians, bicyclists, motorists, and transit riders of all ages and abilities. The Council has directed planning, engineering, and other staff to make complete streets guidelines the default approach when designing, building, and maintaining transportation infrastructure.

6.1 Key Policy Guidance from the Comprehensive Plan

The South Portland Comprehensive Plan lays out several strategies to improve the bicycle and pedestrian environment in the city, all of which may ultimately help to increase the use walking and biking as a viable transportation option along the Broadway corridor.

Page 5-9: The City should undertake a program to manage curb cuts, including reviewing and revising development standards to limit new curb cuts and working with property owners to close up poorly defined points of access.

Access management has been shown to both improve safety for people walking and biking and improve traffic flow on busy corridors. Key strategies include restricting the number of curb cuts into parcels, requiring a minimum spacing between curb cuts, locating curb cuts away from intersections, and encouraging shared driveways with internal connections between neighboring parcels.

Page 5-10: The City should apply the Complete Streets concept to the construction of new streets and to the reconstruction of existing streets.

In 2017, the South Portland City Council adopted a Complete Streets policy. A complete streets implementation guidebook by Smart Growth America[6] recommends steps municipalities can take to move policy into process. Broadly, it requires bringing together many departments, reviewing and updating the procedures that have guided transportation decision making in the past, and creating new systems to incorporate the holistic thinking needed for successful multi-modal corridors.

Page 5-13: The City should provide improved bicycle facilities, including designated bike lanes, shared lanes, and bike parking at public facilities, schools, recreational areas, and other activity centers.

Increased and improved bicycle facilities is critical to encouraging travel by bike. One important consideration is to design facilities in a way that are comfortable and inviting for people of all ages and abilities. For example, people who are unwilling to ride in a shared lane may be willing to ride in a protected lane. In coordination with the City's complete streets policy, space for biking can come from underutilized on-street parking or by removing a general travel lane on multi-lane roadways. Continuity along corridors, and especially through intersections, improves safety and visibility.

Lack of secure bike parking is a concern among many would-be riders. The City should designate durable bike parking areas at public facilities, and work with major businesses and other attractions to do the same. Removing one or two car parking spaces can provide parking space for ten to twenty bicycles. The City should also require bike parking at all new developments, ranging from racks to secure storage areas depending on the impact of the development. The City could allow a portion of required off-street parking to be satisfied by bike parking instead.

Page 5-12: The City should review the intersections with free right-turn lanes to determine if these lanes can be removed or modified to improve pedestrian movement and safety.

Closing slip lanes improves safety for people walking by forcing drivers to slow down when turning and shortens the crossing distance. The space once used by the roadway can now be used for public space, wider sidewalks, or landscaping. In some cases, designers closed the slip lane to cars but continued a bike lane through instead. Closing a slip lane can be done for relatively low cost—requiring only materials like paint, bollards, or planters—as a trial.

Page 5-13: The City should work with property owners and developers to explore ways to provide improved off-street parking that is available to the public or is shared by a group of businesses. … The City should allow reduced off-street parking and flexibility for buildings to share spaces for multiple uses if the time of use is relatively exclusive.

Shared off-street parking has a number of benefits. It reduces development costs by reducing the area of a parcel dedicated to parking. It frees up space for additional buildings or public space. It encourages visitors who drove to park once and walk to multiple places. Ultimately, reduced parking requirements creates a more enjoyable place to visit and spend time. To qualify for shared parking, cities typically require that the spaces be within a certain distance of the building, and that the expected time of use of the spaces not conflict with that of other users.

Page 5-13: The City should review its on-street parking limitations to maximize the availability of on-street parking and to manage its use to assure its availability for customers and visitors.

Unlike off-street parking, on-street parking is inherently shared. Reducing reliance on off-street parking in favor of on-street parking frees up more space for development or public space, both of which increase the activity of an area and attract people walking and biking. Along the Broadway corridor, any roadway width in excess of two general travel lanes may better advance the corridor's mobility goals if it is used for bike infrastructure rather than on-street parking. Nearby side streets, however, provide an opportunity to increase parking capacity and encourage people to walk to their final destination.

To encourage turnover, many cities have implemented demand-based pricing for on-street parking. Under a demand-based pricing system, the hourly rate for parking changes according to demand. When demand is low, and many spaces are available, the price is reduced. When demand is high, and empty spaces are scarce, the price is increased. This encourages turnover and incentivizes people to park farther away where prices are lower, and more space is available.

[6] Smart Growth America. "Complete Streets Implementation: A Brief Guidebook". September 2016

6.2 Infrastructure Assessment and Improvements

This section includes specific bicycle and pedestrian improvement concept alternatives for consideration. The feasibility assessment was performed for Broadway, side streets from Cottage Road to Breakwater Drive, and the Greenbelt Pathway.

Bicycle

Three bicycle infrastructure types were considered as options to improve conditions in the study area: On-road bike lanes, shared-use paths (similar to the Greenbelt Pathway), and shared streets (also known as neighborhood byways – streets that are retrofitted with enhanced treatments that ensure slow vehicle speeds and safe sharing of the roadway). Figure 6.1 shows a summary of recommendations.

On-Road Bike Lanes

Broadway was evaluated according to general context characteristics and presented in three distinct sections as follows.

Casco Bay Bridge to Waterman Drive

This section of Broadway includes 8-foot bike lanes on the both sides (see Figure 6.2). The existing sidewalk on the east side could be widened to a shared-use path providing connectivity with the Greenbelt Pathway and Casco Bay Bridge. This would allow bikers safe separation from vehicles. Given that there is sufficient available right-of-way, widening the sidewalk to 10-feet to provide a protected shared-use facility linking the Greenbelt to the pathway on the Casco Bay Bridge is recommended. Figure 6.3 presents the concept.

Figure 6.1 - Proposed Bicycle Facilities

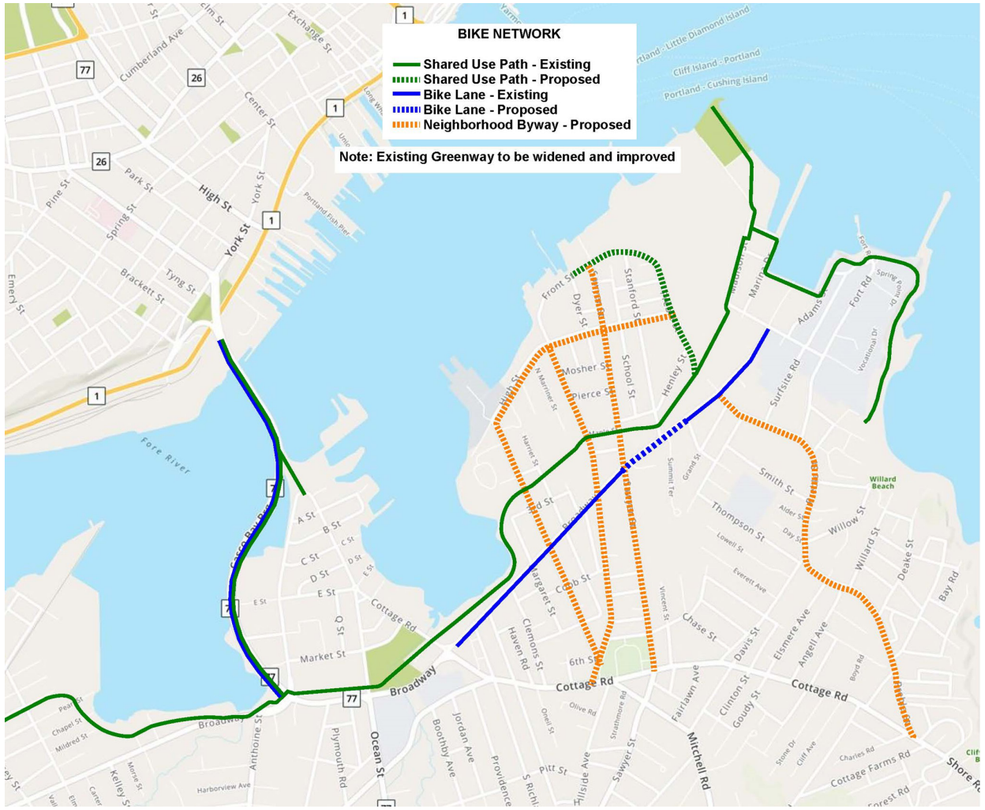


Figure 6.2 - Existing Conditions

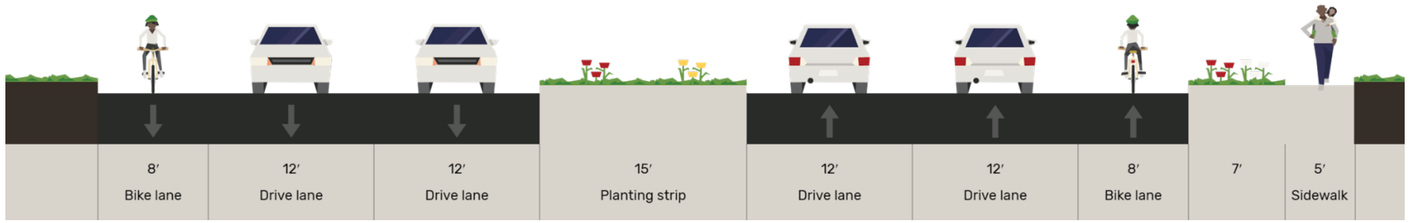
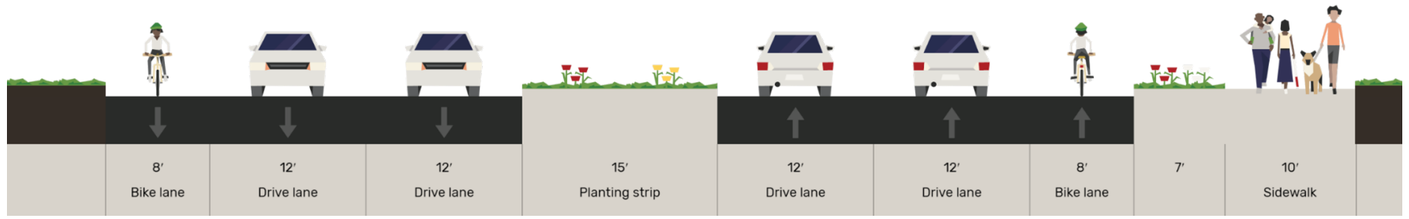


Figure 6.3 - Shared Use Path Concept



Waterman Drive to Cottage Road

Opportunities to improve bicycle infrastructure along this section of Broadway are limited due to high traffic volumes and limited right-of-way width. This section carries an average volume of approximately 25,000 vehicles per day. Removing one or more vehicle lanes to free up space for bike lanes or a shared-use path is not recommended as a short-term recommendation. As documented in the Smart Corridor Study, the Waterman Drive intersection is prone to congestion, and lane reductions would worsen mobility. Travel lanes in this section are generally 12-feet wide. While reducing the lanes to 11-feet in width is possible, it would only free up three to four feet for shoulder space, which is too narrow for a dedicated bike lane. The right-of-way varies but is about 70 feet wide. Figure 6.4 presents existing conditions. Figure 6.5 presents the bike lane option which requires about 3 feet of widening and/or right-of-way acquisition. This assumes lanes are narrowed to 11-feet. Figure 6.6 presents a concept where the sidewalk is widened on the south side to 12 feet for a shared use path. The south side is suggested given that the Greenbelt pathway provides east-west travel on the north side. This concept would not require right-of-way acquisition but would require relocation of the curb line on the south side. It also requires narrowing of existing travel lane widths.

Figure 6.4 - Existing Conditions

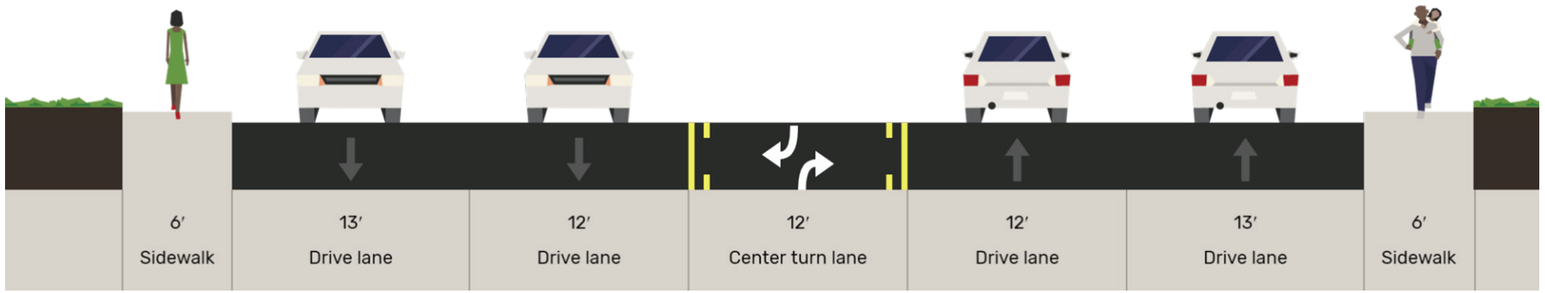


Figure 6.5 - Bike Lane Concept

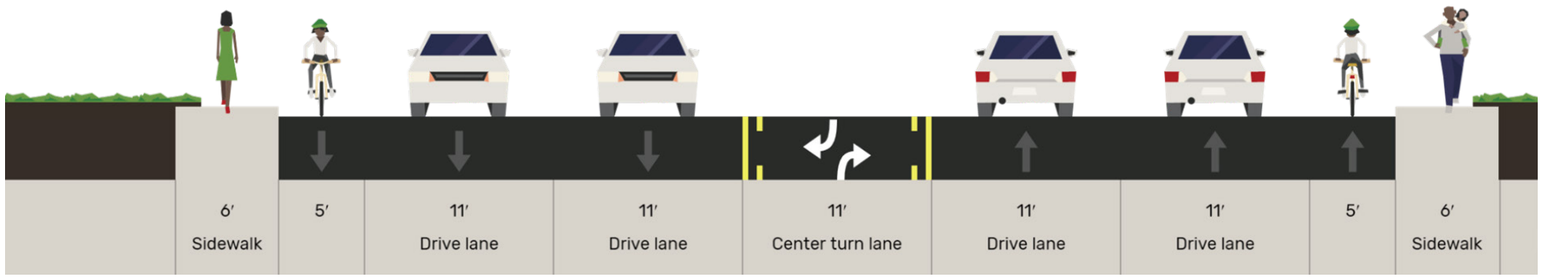
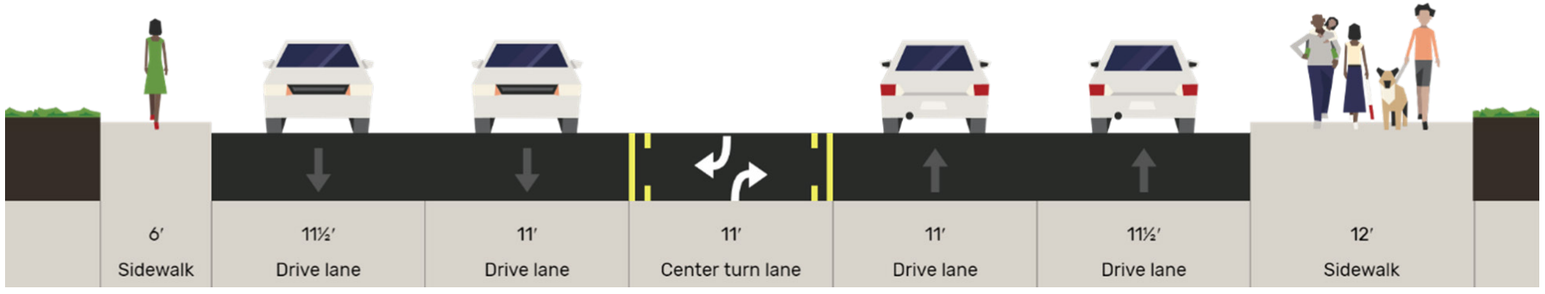


Figure 6.6 - Shared Use Path Concept



Cottage Road to Breakwater Drive

The key deficiency along Broadway in this section is the lack of bike lanes between Sawyer Street and Spring Street, a distance of approximately 1,000 feet. This occurs as the curb to curb width of Broadway narrows from approximately 42 feet to approximately 33 feet (see Figure 6.7). East of Sawyer Street, Broadway includes a center turn lane for access to Virginia Avenue (a minor dead-end street), the Boys and Girls Club, Stanford Street, Summit Terrace, and a residential complex. Three options were investigated to improve bike conditions along this section.

Option 1 – Roundabouts at Sawyer and Stanford Streets (see Fig. 6.8)

Implement a single-lane roundabout at the Broadway and Sawyer Street intersection. This would eliminate the need for a westbound turn lane onto Sawyer Street. This was recommended in the Smart Corridor Study. Implement an additional single-lane roundabout at the Broadway and Stanford Street intersection. This would eliminate the need for an eastbound turn lane onto Stanford Street. Reconfiguring the Summit Terrace and Stanford Street approaches to create a four-legged roundabout would be necessary. The combination of the two roundabouts would reduce the need for a center turn lane along this segment and would provide the necessary width to install 5-foot bike lanes on both sides of the road. This option would require property acquisition and have a high construction cost.

Option 2 – Eliminate Turn Lanes on Broadway

Similar to Option 1, this option would eliminate the turn lanes on Broadway and reduce the vehicle travel lanes to one in each direction. This will likely create delays to vehicles waiting for left-turning vehicles. This could also degrade safety along the corridor. This option is not recommended.

Option 3 - Widen Broadway (see Fig. 6.9)

As noted previously, this segment of Broadway is approximately 33 feet wide. To accommodate bike lanes, the roadway would need to be widened by 10 feet. There is a 60-foot right-of-way in this section, so the widening would not require any property acquisition. However, the widening would impact landscaping and trees within the right-of-way. It is suggested that Option 3 be considered for implementation.

Figure 6.7 - Existing Conditions

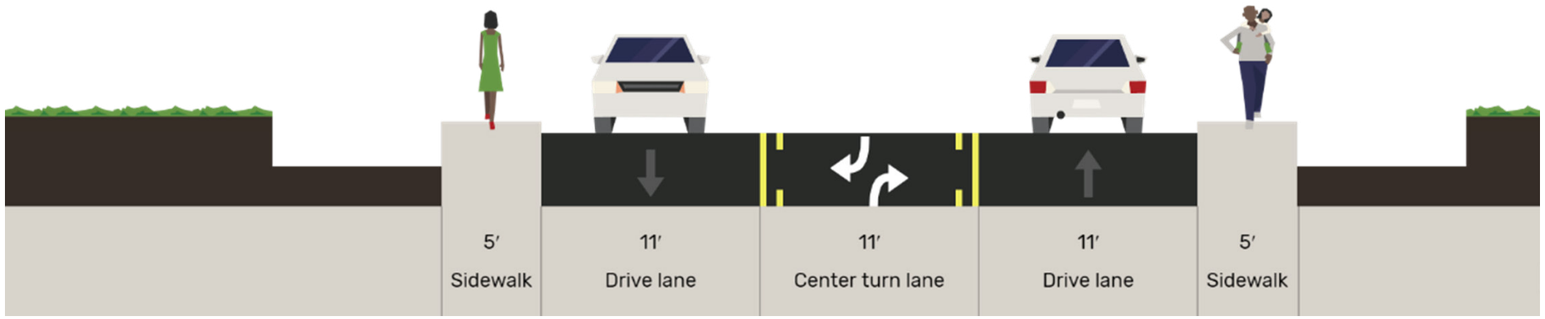


Figure 6.8 - Bike Lane Concept with Elimination of Turn Lane

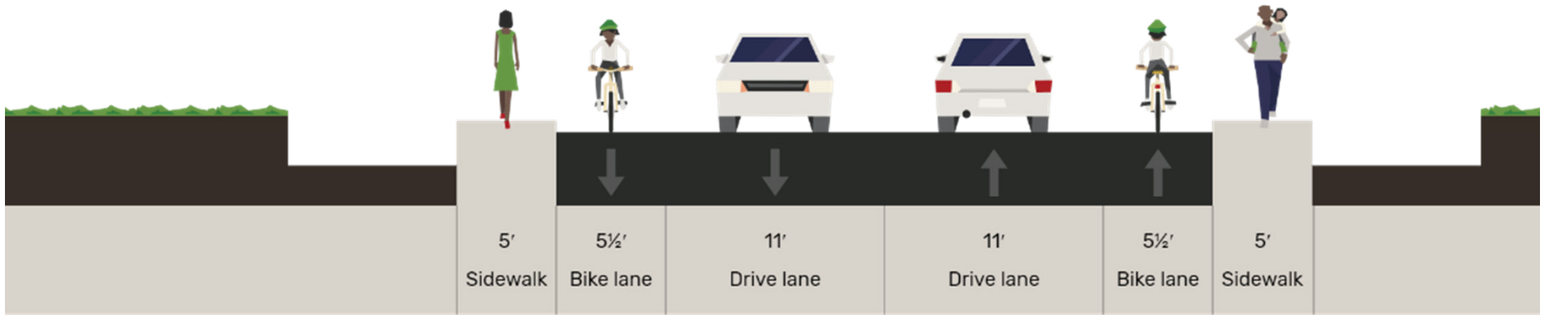
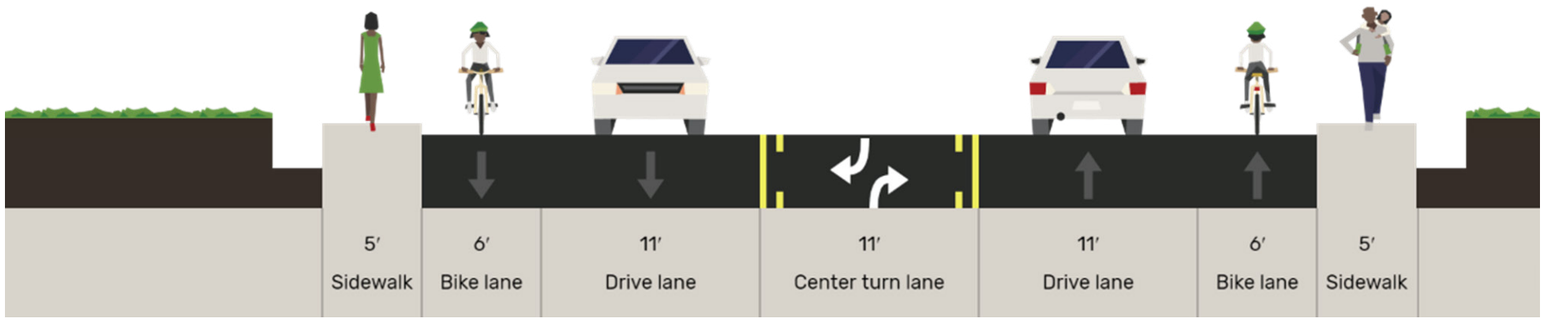


Figure 6.9 - Bike Lane Concept Maintaining Turn Lane



Shared Use Pathways (Greenbelt Pathway)

South Portland's Greenbelt Pathway is a significant asset to the region's off-road bicycle and pedestrian network. However, there are locations where the 8-foot width and high use can create points of conflict, particularly for the mix of users (bikers, walkers, runners, etc.). To meet minimum national standards, it is recommended that the path be widened to a minimum of 10 feet. According to the City's GIS database, sufficient public right-of way exists for widening the path with the exception of the following locations:

- The right-of-way narrows to about 14 feet west of Mussey Street for about 125 feet, and while it can accommodate a wider path width, it is constrained, and constructability will need to be determined.
- Between Pine Street and Sawyer Street, the path is similar to a sidewalk on the south side of Maple Street. The total right-of way is 50 feet. It is suggested that the roadway be repurposed for a minimum 8-foot wide shared-use pathway, which would reduce the existing travel lane width from about 28 feet to 25 feet.
- The path east of Cottage Road is located along the gas right-of-way. Construction activities may be restricted along this easement.
- Portland Pipeline Property from Preble Street to Breakwater Drive may limit widening.
- Sewer and Stormwater infrastructure located in the Greenbelt will need to be considered as part of improvements.

To improve mobility for path users, it is also recommended that pathway users may be given the right-of-way at low volume roadway crossings (vehicles must STOP). The determination would be evaluated on a case-by-case basis. At roadway crossings it is recommended that raised crosswalks be installed in the Ferry Village neighborhood. At the path's eastern end at Breakwater Drive, the path should be relocated so trail users do not need to cross the roadway to and from Bug Light Park.

<u>Other Shared Use Path</u>

Figure 6.1 depicts the location of a proposed path along the Portland Pipeline property frontage on Preble Street. This path would provide connectivity from the Greenbelt pathway to Sawyer Street and could be integrated with future development plans. As noted earlier in this section, it is suggested that the sidewalk between Waterman Drive and Casco Bay Bridge be widened to function as a shared use path.

Neighborhood Byway

To improve bicycle connectivity in the study area some streets can be retrofitted with enhanced treatments that ensure slow vehicle speeds and safe sharing of the roadway. These treatments include vehicle traffic calming devices and pavement markings and signage. The suggested streets tend to have higher traffic volumes or land uses that attract bike trips. They also tend to be narrow and allow on-street parking, thus making it difficult to fit bike lanes. Nonetheless, such treatments will help provide good accessibility to and from the Greenbelt Pathway. An example of a neighborhood byway project in Portland is depicted on Figure 6.10.

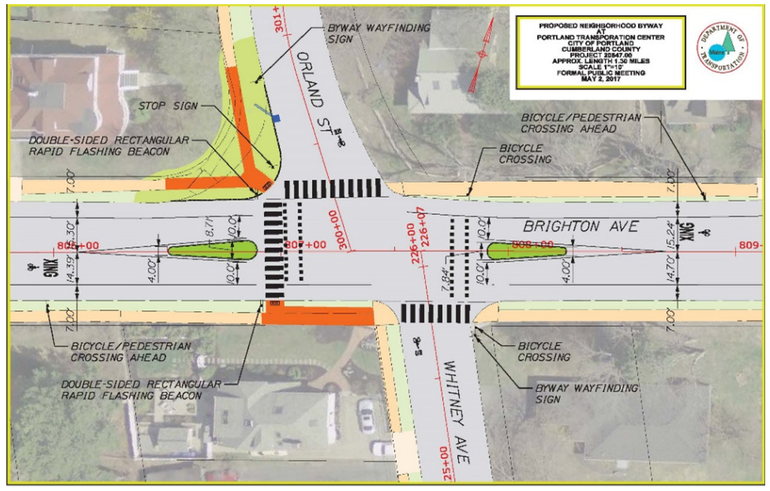


Figure 6.10 - Neighborhood Byway Example

There are a number of streets that are good candidates for being neighborhood byways. These streets tend to be low volume streets that don't have available pavement width for bike lanes. Sawyer Street has low traffic, with a daily volume of 1,490 vehicles south of Broadway and 1,950 vehicles north of Broadway. It is the only cross-street that provides cross-town connectivity from the waterfront to Route 77 and beyond. Bike lanes do not appear to be feasible given 28 feet of pavement width and the provision of on-street parking (Cars were observed parking on the street). Figure 6.11 depicts the street north of Broadway.

Figure 6.11 - Sawyer Street east of Broadway

Pine Street has very low traffic, with a daily volume of 200 vehicles south of Broadway and 630 vehicles north of Broadway. It provides connectivity from the waterfront to Cottage Road and to a baseball and recreation complex. Pine Street is as narrow as 21 feet and cannot support bike lanes without widening. Figure 6.12 depicts the street north of Broadway.

Figure 6.12 - Pine Street north of Broadway

Preble Street has low traffic, with a daily volume of 1,900 vehicles south of Broadway. It serves a dense residential neighborhood and is the most direct route to the Greenbelt and toward Willard Beach. Figure 6.13 depicts the street south of Broadway.

Figure 6.13 - Preble Street south of Broadway

Mussey Street has a daily volume of 610 vehicles south of Broadway and 2,340 vehicles north of Broadway. It serves dense residential neighborhoods from Ferry Village to Cottage Road. A byway is suggested south of Broadway. Figure 6.14 depicts the street south of Broadway.

Figure 6.14 - Mussey Street south of Broadway

High Street has a daily volume of 1,460 vehicles south of Broadway; data is not available to the north. It provides connectivity among the waterfront's varying land use types. A neighborhood byway would connect Mussey Street and Front Street. Figure 6.15 depicts the street south of Broadway.

Figure 6.14 - High Street south of Broadway

Pedestrian

This report assesses two pedestrian infrastructure types: new sidewalks and improved or new crosswalks (See Figure 6.16).

The recommendations for new sidewalks were based on existing conditions and closing gaps in the system. Streets recommended for new sidewalks include:

- North Richland Street.
- Walnut Street.
- Clemons Street.
- Mussey Street from Broadway to High Street.
- Mussey Street from Cobb Street to Pine Street.
- Pine Street from Broadway to Mosher Street.
- Pine Street from Broadway to Taylor Street.
- Front Street from High Street to Sawyer Street.
- Stanford Street from Preble Street to Front Street.
- Front Street from Stanford Street to Webster Court.

Based on pedestrian patterns and existing bus stops, new crosswalks are recommended at the following locations:

- Clemons Street, where there is an existing bus stop.
- Mussey Street, to provide crosswalks on all legs of the intersection.
- Stanford Street, to provide access to the Boys and Girls Club.
- At the existing bus stop between Preble Street and Breakwater Drive.

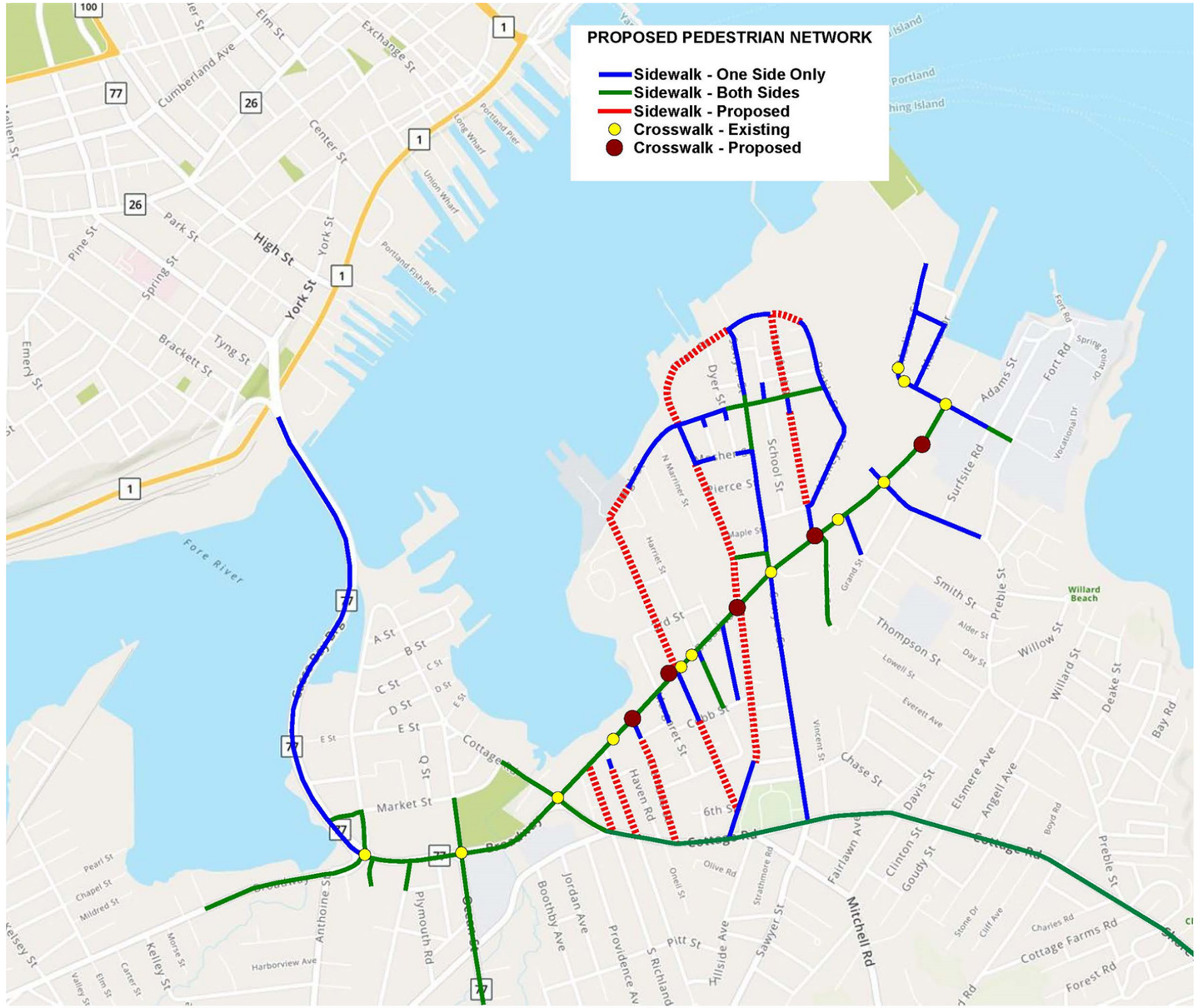


Figure 6.16 - Proposed Pedestrian Facilities

Findings and Recommendations

Bicycle Facilities

Bike Lanes

To accommodate bike lanes on Broadway between Sawyer Street and Spring Street, the roadway should be widened by 10 feet. There is a 60-foot right-of-way in this section, so the widening would not require any property acquisition. However, the widening would impact landscaping and trees within the right-of-way.

Shared Use Paths

Widen the existing sidewalk on the east side of Route 77 between Erskine Drive and Waterman Drive to a shared-use path providing connectivity between the Greenbelt Pathway at Waterman Drive and Casco Bay Bridge.

Along Broadway between Waterman Drive and Cottage Road it is recommended that the sidewalk be widened on the south side to 12 feet for a shared use path. The south side is suggested given that the Greenbelt pathway provides east-west travel on the north side.

Widen the existing Greenbelt Pathway to a minimum of 10 feet and relocate the pathway at Breakwater Drive to avoid a roadway crossing.

Provide a path along the Portland Pipeline property frontage on Preble Street. This path would provide connectivity from the Greenbelt pathway to Sawyer Street and could be integrated with future development plans.

Neighborhood Byways

To improve bicycle connectivity in the study area some streets can be retrofitted with enhanced treatments that ensure slow vehicle speeds and safe sharing of the roadway. It is recommended that Sawyer Street to the east, Pine Street north of Broadway, Preble Street, Mussey Street and High Street to the south be retrofitted to Neighborhood Byways.

Pedestrian Facilities

Sidewalks

Streets recommended for new sidewalks include:

- North Richland Street
- Walnut Street
- Clemons Street
- Mussey Street from Broadway to High Street
- Mussey Street from Cobb Street to Pine Street
- Pine Street from Broadway to Mosher Street
- Pine Street from Broadway to Taylor Street
- Front Street from High Street to Sawyer Street
- Stanford Street from Preble Street to Front Street
- Front Street from Stanford Street to Webster Court

Crosswalks

New crosswalks are recommended at the following locations:

- Clemons Street, where there is an existing bus stop
- Mussey Street, to provide crosswalks on all legs of the intersection
- Stanford Street, to provide access to the Boys and Girls Club
- At the existing bus stop between Preble Street and Breakwater Drive

7.0 Bus Transit

7.1 Broadway Corridor Ridership Projections

A key element of this study is understanding the impact of future development in the study area on the existing transit system in order to determine a service that best fits the needs of both existing and future riders. As documented in Section 2.4, current ridership on the Broadway corridor is low, with fewer than 10 boardings per stop on a typical weekday and a maximum of 23 passengers per trip.[7] To evaluate the capacity of the transit system to serve increased ridership, the analysis assumes:

- Residential growth will continue according to the "High Growth" development scenario as detailed under Section 4.2 (1,000 new residential units by 2050).
- Future transit mode share will increase from the current 3.5 percent to 4.5 percent by 2050 This is informed by observed annual growth in transit ridership regionally from 3.3 to 3.8 million, and an assumption that improvements to transit will accelerate that growth.

The evaluation illustrates that Route 21 has the capacity to serve additional new riders from the highest development scenario, as well as new riders from the existing commute shed, especially if it is likely these new riders will be working professionals using the service during typical commute hours. As the analysis shows that the existing service can meet future needs, frequency upgrades are not recommended at this time, as additional buses would be likely to run even further under capacity and not justify additional operating and maintenance costs. Recommendations for service and infrastructure improvements that can continue to attract new riders and better meet developing needs, are detailed in Section 2.

Existing Ridership Trends

A ridership profile for a typical weekday for Route 21 on the Broadway corridor is shown in Figure 7.1.[8] The passenger load represents the number of people on the bus when it is on the Broadway corridor. The highest load occurs between approximately 2:30 PM and 4:30 PM.

Figure 7.1 shows the bus capacity for each trip based on the seated bus capacity of 32. Even on the most crowded trip (2:30 PM), there are 9 available seats on the bus. This illustrates that there is sufficient capacity to accommodate more transit riders, especially during typical commuter peak periods.

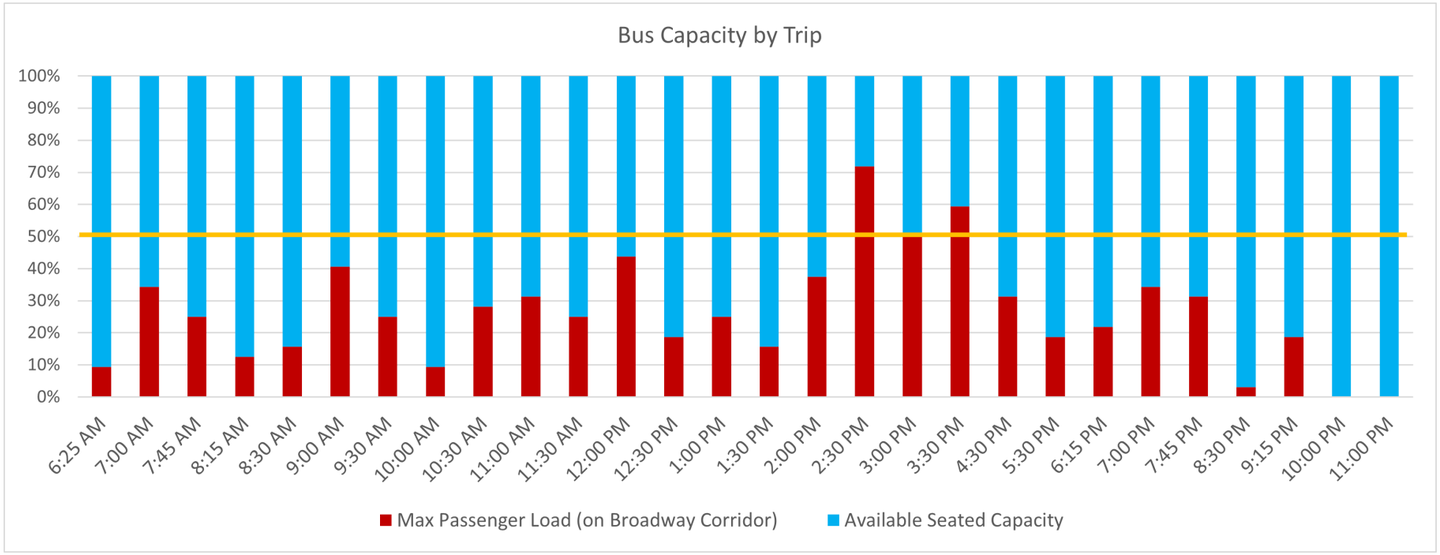


Figure 7.1 - Route 21 Bus Capacity by Trip

[7] Route 21 peak passenger load for 2:30 PM trip, SPBS 2017 Passenger On Off Survey

[8] SPBS 2017 Passenger On Off Survey. Trip times represent the time the bus leaves Congress St +Street and Forest Avenue outbound

Projected Ridership

The following assumptions were used to project the number of new transit riders with new development and service improvements:

Existing Population in Commute Shed	24,135[9]
New Residential Units	1,000
People Per Unit	1.75
Future Transit Mode Share	4.5%
New Riders – Existing Population[10]	241
New Riders – New Population[11]	79
Total New Riders	320

To understand the capacity of the existing Route 21 service to accommodate increased ridership on the Broadway corridor, new riders were distributed across trips for a typical weekday. Figure 7.2 shows the distribution of new riders following the existing ridership distribution. With this distribution, seated capacity on the bus is exceeded on the 2:30 PM trip, with a projected 36 passengers on board, though there is still standing capacity on the bus.

Figure 7.3 shows a possible distribution of riders based on the assumption that the majority of new riders will use transit service during typical peak commuting hours. The "High Growth" development scenario assumes a significant number of single-person households (based on an average occupancy of 1.75 people), likely to be young professionals, attracted to the mixed-use development anticipated for the area. With this distribution, riders are more evenly spread out over all trips. The highest estimated ridership reaches 30 riders at the 2:30 PM trip, which is less than the seated capacity of the bus.

This analysis demonstrates that the Broadway corridor has the capacity to accommodate increased ridership according to the "High Growth" development scenario, as well as additional riders from the existing population who may start to choose transit due to service and infrastructure improvements. There is capacity to accommodate twice as many riders with the existing schedule and vehicle fleet. Due to this, frequency upgrades through the addition of new buses to the existing fleet is not recommended at this time as an effective strategy to accommodate the anticipated growth in ridership, or to attract new riders to the SPBS.

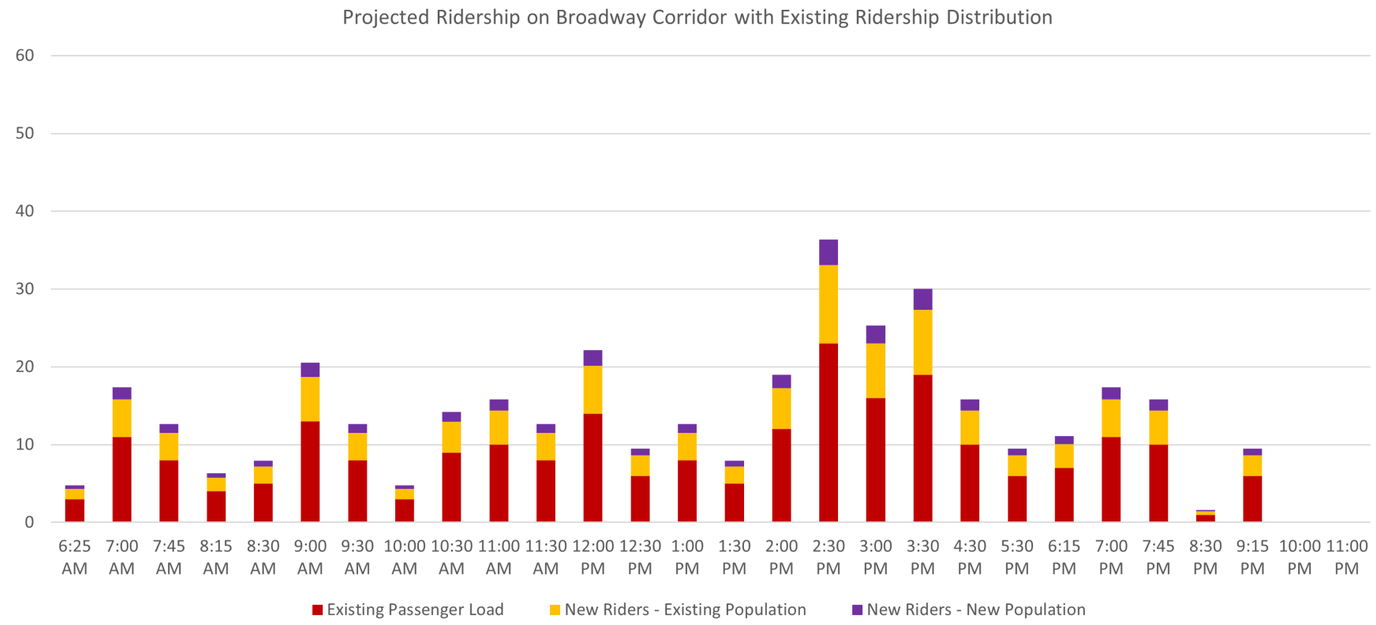


Figure 7.2 - Projected Ridership on Broadway Corridor with Existing Ridership Distribution

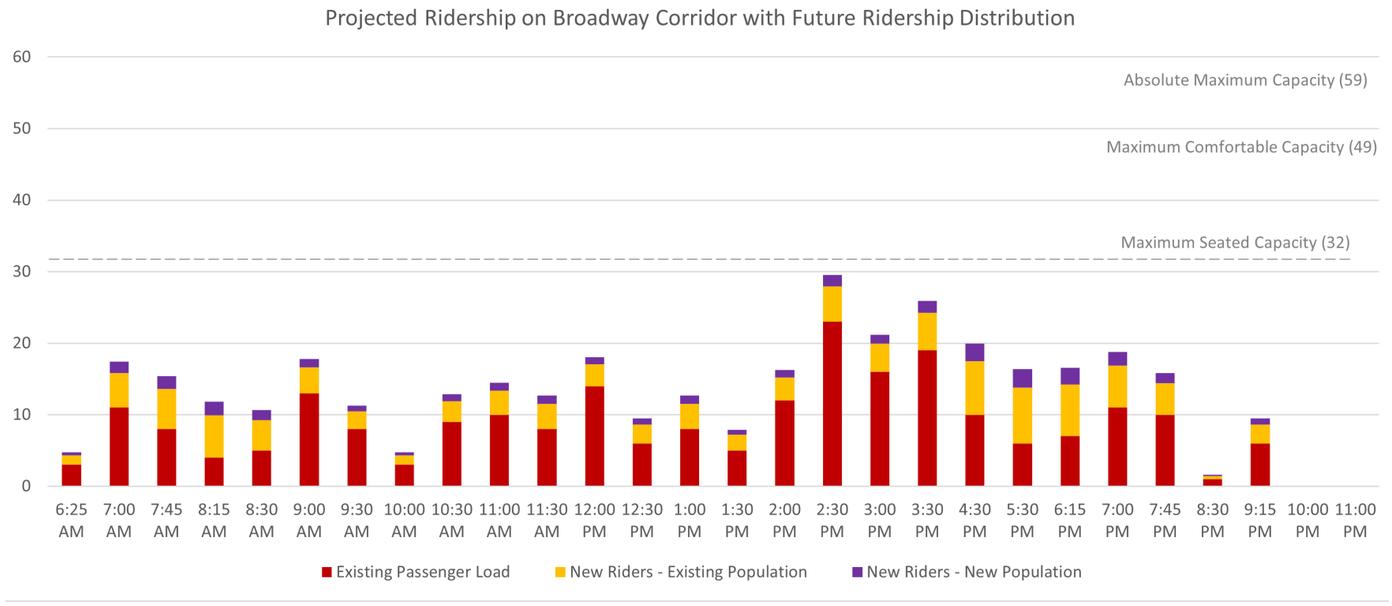


Figure 7.3 - Projected Ridership on Broadway Corridor with Future Ridership Distribution

[9] US Census

[10] 1% of existing population in commute shed with the increased transit mode share from 3.5% to 4.5%

[11] 4.5% future transit mode share applied to residents of new 1,000 units

7.2 Recommended Actions

Optimized Route 21 Stop Placement and Routing

Figure 7.4 shows recommended changes to the routing and stop locations of Route 21, with the goal of enabling the route to operate more efficiently, faster, and reliably. A more direct route could set SPBS up to run more frequent service in the future. While higher ridership would demand more frequent headways, proactively providing more frequent headways may help to attract more choice transit riders (i.e., those who do not have to, but choose to take transit). The recommendations consider the existing stop spacing, stop conditions, ridership, and adjacent land uses to identify stop locations that will best serve the needs of current and future riders. The proposed routing plan will help the South Portland Bus Service (SBPS) continue to work towards regional transit goals documented in Destination 2040, Transit Tomorrow, Moving Southern Maine Forward, and the South Portland Comprehensive Plan for decreasing travel time, increasing service frequencies, and increasing ridership.

The most notable changes are the restructuring of the loop through Ferry Village and the addition of service to the proposed ferry launch point.

This plan proposes improving bus service to the Ferry Village neighborhood by creating a centralized transit hub at Stanford Street and Broadway. The transit hub would provide an enhanced passenger waiting area, which could range from a transit shelter with covered seating, to a fully enclosed area such as the Mill Creek Transit Hub. Other features of a transit hub could include bike parking (also potentially covered) and real-time arrival information. Improved amenities make transit more appealing and feasible and may help offset the increased walking distance to access the service. The existing Ferry Village routing serves approximately 20 riders daily. For most of these riders, the walk to Broadway is about 0.25 miles, which is the typical catchment area for a bus stop. However, for some riders, for example north of High Street, the walk could be up to 0.5 miles. This recommendation also supports the proposed design of Preble Street and Sawyer Street as neighborhood by-ways. Incorporating traffic calming strategies to promote walking and biking would make the roadway less appropriate for buses.

The City and SPBS will need to engage with the community if there is further consideration and desire to restructure Route 21 in the Ferry Village neighborhood. As this neighborhood has a history of being directly served by transit and has a significant transit-dependent population, an equity analysis will also need be conducted to ensure safe, comfortable, and convenient access to transit for all populations.

In the event that a ferry service to downtown Portland is implemented, service should be extended to the ferry launch point to support bus-ferry connections. Having a direct connection between these two modes is critical for promoting use of both the ferry and bus services. Plans for transit service in the Cushing's Point area should be integrated with the Eastern Waterfront Development Master Plan. Bus service through the area will be supported by a mix of commercial and residential uses and bring activity to a new Cushing's Point transit hub throughout the day. Depending on demand and future development, bus service in this area could run either only when connections to the ferry are needed, or full-time. Funding options to support increased service are discussed in the next section.

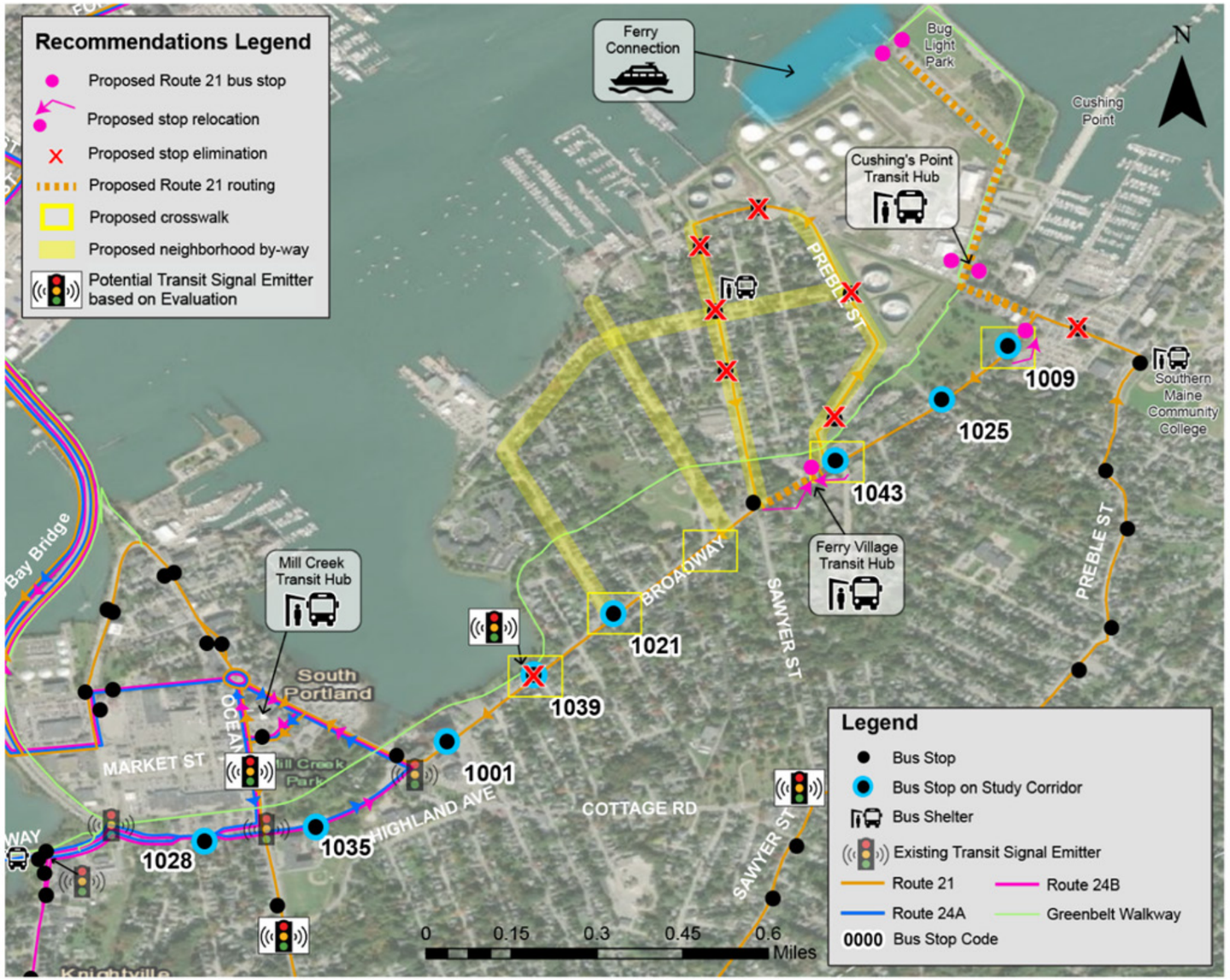


Figure 7.4 - Recommended Changes to Routing and Stop Locations of Route 21

Schedule Adjustments

Having convenient and quick connections between services is a key goal of the regional transit network. Connecting services should be located as close to each other a possible and wait times should be less than 10 minutes.

Connections between Route 21 inbound towards Mill Creek and Routes 24A or 24B outbound towards the Maine Mall are shown in Table 7.1. These connections serve trips beginning in the eastern neighborhoods of South Portland and ending in the Maine Mall area. Based on November 2019 schedules, connections during the morning hours to midday are less than 10 minutes. Connection times exceed 15 minutes for all trips between 1:00 PM and 9:00 PM. The afternoon peak hour trips between 4:00 PM and 6:00 PM—during the peak afternoon travel period—experience the worst connection times, with passengers having to wait at least 50 minutes. Adjusting the schedules of Route 21 and Routes 24A and B for afternoon and evening trips is recommended to provide better options for travel within different neighborhoods of South Portland.

Should the Route 21 service be adjusted to support a future ferry service to Cushing's Point, it is vital that schedules align and clear wayfinding signage be provided between the bus stop and the ferry boarding location.

In addition, SPBS should continue to pursue strategies to improve on-time performance and frequencies through scheduling and service adjustments. It will be important for SBPS to work with METRO and other regional transit partners to identify opportunities where service and schedules can be streamlined.

Transit Signal Priority

SPBS currently utilizes a GPS-based transit signal priority (TSP) system on Routes 24A and 24B. The TSP system extends the green time to TSP-enabled buses through special programming activated within a traffic signal controller.[12] There are 13 TSP-enabled intersections in South Portland, four of which are within the Mill Creek area:

- Broadway at Anthoine Street (eastbound)
- Broadway at Waterman Drive (westbound)
- Broadway at Ocean Street (eastbound and southbound)
- Broadway at Cottage Road (eastbound)

An evaluation completed in 2018 found that TSP at these intersections resulted in a travel time savings of 7.6 minutes at signalized intersections per trip. Citywide, this represents a 44 percent reduction in the time spent at red lights for bus Routes 24A and 24B.[13]

SPBS is evaluating the expansion of its TSP system for Routes 24A and 24B, as well as implementing TSP for Route 21 using CARES Act FTA funding. To reduce bus travel times and delay on Route 21, it is recommended that SPBS evaluate TSP at the following locations:

- Broadway at Mussey Street
- Cottage Road at Sawyer Street
- Ocean Street at Sawyer Street
- Ocean Street at Highland Ave
- Ocean Street at Market Street

Table 7.1
Trip Times Arriving at Mill Creek Transit Hub

Rt 21 Inbound to Portland	Rt 24A Outbound to Maine Mall	Route 24B Outbound to Maine Mall via Community Center	Wait Time between Connections
	5:55 AM		No connection
		6:40 PM	No connection
7:35 AM	7:45 AM		10 minutes or less
8:40		8:45 PM	10 minutes or less
9:40 AM	9:45 AM		10 minutes or less
10:40		10:45 PM	10 minutes or less
11:40 AM	11:45 AM		10 minutes or less
12:40		12:45 PM	10 minutes or less
1:40 PM	1:55 AM		15 to 20 minutes
2:40		3:00 PM	15 to 20 minutes
3:40 PM	4:00 PM		15 to 20 minutes
4:10		5:00 PM	More than 30 minutes
5:10 PM	6:05 PM		More than 30 minutes
6:50		7:10 PM	15 to 20 minutes
7:30 PM	7:55 PM		25 to 30 minutes
8:05		8:35 PM	25 to 30 minutes
9:15 PM	9:20 PM		10 minutes or less
9:50 PM	9:58 PM		10 minutes or less
10:55	11:15 PM		15 to 20 minutes

[12] Transit Signal Priority Implementation and Evaluation, South Portland, Maine (2018), Sebago Technics

[13] Transit Signal Priority Implementation and Evaluation, South Portland, Maine (2018), Sebago Technics

Expand use of On-demand Microtransit Services

Microtransit, also known as Mobility On-Demand (MOD), offers a more flexible alternative to traditional fixed-route systems by operating on-demand in response to ride requests. On-demand services can provide effective service in areas that are difficult to serve with fixed-route services, or in areas of low density with widely dispersed trip origins and destinations. SPBS currently provides on-demand service for trips to and from the South Portland Food Cupboard. The service could be expanded to the Cushing's Point area of South Portland. Microtransit is also a strategy supported by the region's long-range transit plan, Transit Tomorrow, and will be investigated further in GPCOG's upcoming Transit Together study.

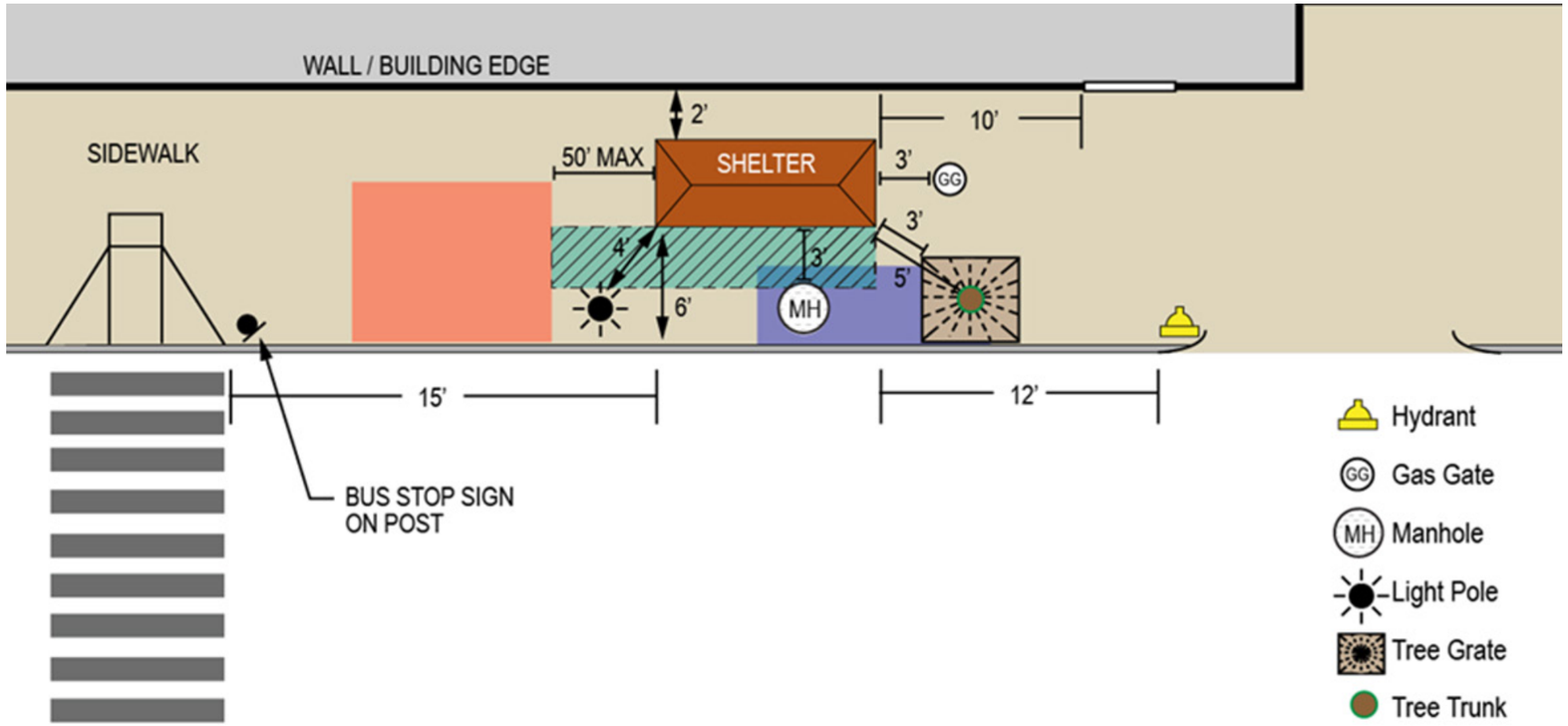


Figure 7.5 - The ideal bus stop design with amenities, connectivity, and appropriate clearances to provide ADA accessibility.

Source: Rhode Island Bus Stop Design Guide

Multimodal Connectivity Improvements

Bus stop design

Designing bus stops to be safe and accessible for all ages and abilities is a critical element of providing an effective transit service. GPCOG's ongoing Transit Stop Access Project (TSAP) is evaluating accessibility at the region's bus stop and is prioritizing stops for improvement, including upgraded boarding areas, sidewalks, crosswalks, and curb ramps. Making additional connections between transit infrastructure and walking and biking infrastructure will continue to be an important regional strategy.

In addition to the recommended improvements identified as part of the TSAP, the City is encouraged to pursue the implementation of in-lane bus stops on Broadway where right-of-way allows. In-lane bus stops place the stop at a curb extension. With this configuration, the bus stops in the travel lane, eliminating the need for the bus to pull in and out of the travel lane, which reduces travel time and improves reliability.

If present, a bike lane can be routed behind the bus stop, eliminating conflicts between people biking and buses. In this configuration, the bike lane should be brought up to the level of the sidewalk, and crosswalks or other treatments to clearly distinguish the bike lane from both the sidewalk and bus stop waiting area should be included.

Transit Mobility Hubs

Identifying locations within the region for transit mobility hubs is a recommendation of GPCOG's Transit Tomorrow. Mobility hubs are places where people can access services or amenities as they transfer between modes of transportation, such as transit, walking, bicycling, or driving. Mobility hubs are typically located where different bus routes converge, or a connection to another mode, offering a safe, secure waiting area, and serve areas with high average daily riders. The major features of a mobility hub are connectivity, safety and security, multimodal connections, and design and amenities. Likely locations for mobility hubs are downtowns or neighborhood centers, hospitals or medical buildings, shopping centers or malls, college campuses, and large business parks.

To improve the overall transit experience on the Broadway corridor and in Cushing's Point, transit mobility hubs are proposed at Broadway at Stanford Street and Breakwater Drive at Madison Street. These locations are recommended for transit mobility hubs because stops with better amenities typically attract riders from a larger catchment area than the traditional quarter mile catchment area of unimproved stops. With additional improvements such as a connected sidewalk network, bike lanes, traffic calming, and connectivity to and within new development in the area, walking and biking to these stops can be more convenient and connections to the transit network can be more seamless. Amenities can include an enhanced waiting area with seating and protection from the elements, bicycle parking, and real time arrival information. The Mill Creek Transit Hub currently has a screen displaying real time bus information, setting a precedent for future hubs to follow.

Figure 7.6 - Example of a floating bus stop in Boston, Massachusetts

Figure 7.6 - The existing Mill Creek Transit Hub sets an example for future transit hubs in South Portland to Follow

Transportation Demand Management (TDM) Strategies

Transportation and land use are fundamentally linked with the location of housing, services, public facilities, and job centers. South Portland can continue to be proactive in creating land use and development policies that not only incentivize transit use but reduce drive-alone trips. Building a robust system of TDM strategies through transit incentives, reduced parking requirements, and development regulations are the first steps in shifting the culture of South Portland to be more transit-oriented.

Several policy level TDM strategies are recommended to further encourage the use of transit and reduce driving in South Portland. These recommendations are supported by the recommendations of Moving Southern Maine Forward for providing transit incentives for students ensuring the region's parking management strategy encourages transit over driving and supporting transit-oriented development.

First, the City should work with SMCC, currently the largest source of Route 21 ridership[14], to offer incentives for taking transit instead of driving. Although students can currently ride SPBS and METRO for free by showing their SMCC ID, SPBS is interested in developing a system that allows student IDs to serve as a scannable card for electronic fare payment. The current system used by METRO integrates student IDs and transit fare passes for SMCC, the University of New England and the University of Southern Maine. The Rhode Island Public Transit Authority (RIPTA) has a robust University Pass Program (U-PASS) and can serve as an example for integrating transit benefits for multiple universities into a centralized system.[15]

Additionally, as pointed out by one survey respondent, all SMCC students are required to pay a Parking & Transportation Fee of $40 per semester.[16] The school, in partnership with the City, could reduce or waive the Parking & Transportation Fee for students who forgo a parking pass and choose to only use alternative modes of transportation to commute to campus.

Second, the City should consider regulatory changes to parking standards in the zoning code to avoid over-supplying parking and to encourage the use of transit, walking, and biking. Changes may include eliminating parking minimums, implementing parking maximums instead of parking minimums, allowing or requiring shared parking between adjacent land uses, requiring bicycle parking as a portion of vehicle parking spaces, and dedicating spaces for carsharing or carpooling.

For on-street parking, the City should consider designated short-term drop-off/pick-up zones for ridehail services, enable curbside management and pursue the integration of new technologies for dynamic curbside management in the future, and allow more flexible use of curb space in desirable areas. For example, these spaces could also be used for an on-demand microtransit service as a way to integrate shared trips at consolidated drop-off/pick-up points.

Finally, the City should provide developer incentives and/or requirements to encourage transit-oriented development, such as walking and biking paths that provide connections to transit and require internal site connectivity to further encourage walking and biking at the start or end of a transit trip. If new development occurs adjacent to an existing bus stop, the City should provide incentives for the developer to make accessibility improvements and/or provide enhanced amenities at the stop as part of a traffic mitigation strategy.

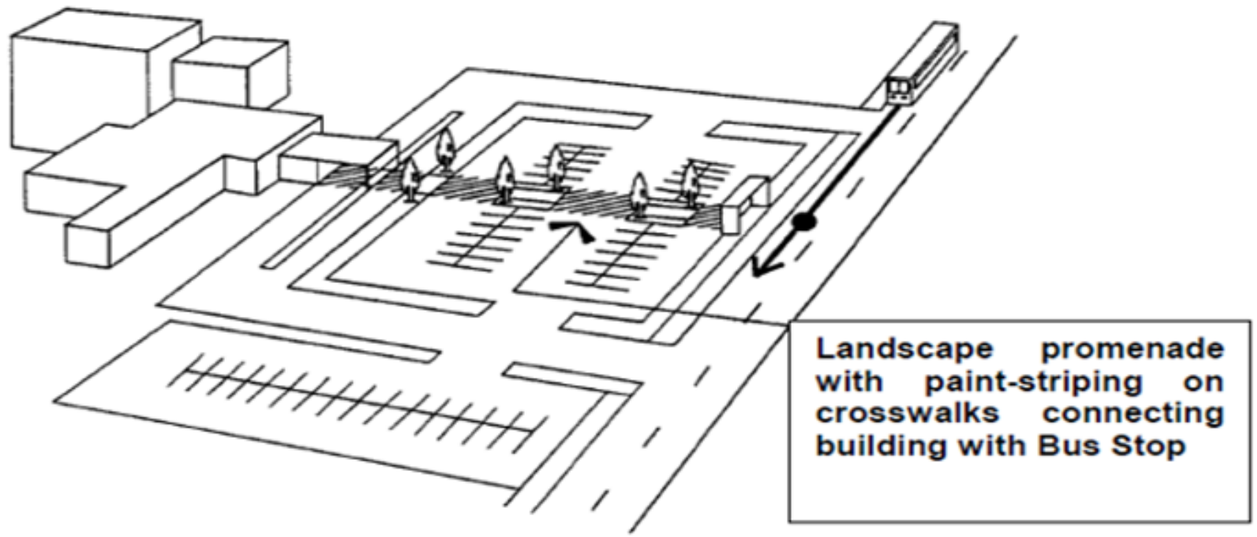


Figure 7.8 - Providing a clear path with plantings and crossings between a bus stop and the front door of a destination makes transit easier to use and keeps the bus on the most efficient, linear route.

[14] Interview with Donna Tippett, SPBS, April 5, 2021

[15] https://www.ripta.com/students/

[16] https://www.smccme.edu/admissions-aid/tuition-fees/

8.0 Potential Funding Sources

The implementation of the recommended transportation improvements related to this plan will require innovative approaches to financing. A review of available funding sources at the local, regional, and state level was performed and is presented as follows. Tax-increment financing is expected to be a source of project funding. Background information on the existing TIF district around Liberty Shipyard is presented in order to understand how much funding is available from this source and what uses are permitted with those funds. We also considered the economic and fiscal factors that will determine the viability of establishing a new complementary TIF district for the Liberty Shipyard site.

8.1 Local Funding

Capital Investment Plan (CIP)

A CIP establishes the funding priorities for capital investments in a community. In South Portland, the CIP serves as a roadmap for projects in the upcoming six fiscal years. The CIP guides investments in safe and efficient road and transportation systems; capital-intensive environmental infrastructure projects, such as wastewater collection and treatment facilities; and public safety equipment through a planned and continuous investment program. The CIP also establishes a plan to purchase, construct, and maintain public land and buildings that house educational, governmental, cultural, or recreational activities to serve residents and students.

South Portland's CIP is funded via seven different sources:

- General Obligation (GO) Bonds/Lease (long-term debt or leasing)
- Tax Increment Financing (TIF) (public infrastructure fund reserves for eligible capital projects)
- General Fund Reserves (planned savings and investment program contained within the operating budget)
- Other Fund Reserves/Surplus (such as reserves in the sewer user budget, cable franchise capital reserve, etc.)
- Grants (including State and Federal, as well as other private sources)
- Prior Years' CIP Balances and Interest (dollars remaining from previous CIP projects that can be reprogrammed for new capital needs)
- General Fund Balance (funded through the General Fund)

There may be transportation projects that could fall into the category of a CIP type improvement, for example, improvements to the Greenbelt Pathway. However, the CIP is not expected to have widespread use for transportation improvements.

Transportation Impact Fees

Municipalities often adopt impact fees for various purposes, including the construction of off-site capital improvements such as roads and traffic control devices. Impact fees are charges paid by a proposed development to fund the cost of providing municipal facilities to serve that development. This idea is premised on the concept that when development occurs, it can bring many benefits, but it also affects the existing infrastructure around it by adding more cars, bikes, and pedestrians to the streets, increasing sewer flows into City systems, and infusing additional visitors into the City's parks and open spaces. In order to accommodate this growth in demand, these facilities require additional capital investment. An impact fee ordinance is fundamentally about planning for smart and sustainable growth, a way to ensure that new development pays its fair share of infrastructure costs and that there is adequate infrastructure capacity to allow the city to grow. Pursuant to 30-A M.R.S.A. 4354, a municipality may enact an ordinance under its home rule authority requiring the implementation of off-site capital improvements or the payment of impact fees instead of the direct improvements. A municipality may impose an impact fee either before or after completing the infrastructure improvement. The imposition of impact fees is a preferred method of ensuring that new development bears a proportionate share of the cost of capital investments necessary to accommodate such development.

To fund the recommendations of this study, the City could develop an impact fee area that generally includes the study area. A study would be required to identify the improvements to be funded and the fee or cost structure, typically vehicle trip based, to be charged. There are several examples of programs in Maine, including nearby Scarborough and Portland.

TIF

The City of South Portland has utilized Tax Increment Financing (TIF) to fund the public improvements necessary to support redevelopment in strategic locations, and already has 10 TIF districts around the city. The future availability of funds from a prospective TIF in support of redevelopment of the Eastern Waterfront as identified in the Comprehensive Plan. Since specific development plans for a number of key properties have not been presented to the public, it is not clear how much funding would potentially be diverted into a TIF district.

According to data reported in the City's 2020 Comprehensive Annual Financial Report, the annual captured tax revenue from existing TIF districts comes to $19,100 per $1 million captured value. Table X provides the hypothetical TIF-based revenue for infrastructure projects that could be derived from redevelopment investment at varying scales:

- $10 million
- $30 million
- $100 million
- $150 million

These funds could be used for many purposes, including reimbursement of infrastructure costs incurred by the developer or to service the debt for public improvements on or around the site. An in-depth analysis would be needed to determine the exact amount of bonding capacity that could be generated by a redevelopment project; regardless a TIF instrument within a land use development policy strategy from the City could be highly effective way to finance major public improvements on and around the site.

Another approach is to establish a public-private partnership to capture the future value of development. In this type of arrangement, a local government enters into a profit-sharing agreement with a developer, whereby the two parties split the project's profits up to a certain margin, and then all profits above the margin flow to the private party. This arrangement requires the local government to share in the upfront risk of a project but, if it is successful, can produce far greater financial benefits in the long-term.

Specific to the possible water transportation component of this project, most ferry and public water taxi services around the country receive some sort of public subsidies, either from local or state sources. There are also multiple federal programs available to support expansions or improvements to local water transportation services. The most prominent is the Federal Transit Administration's Passenger Ferry Grant Program, which awarded a $3.2 million grant in 2020 to Casco Bay Lines to fund a diesel-hybrid engine on its newest vessel. The FTA announced in August 2021 that $38 million would be available from this program for the next fiscal year. Eligibility is limited to state governments and "eligible direct recipients of Urbanized Area Formula funds." $4 million of the $38 million was earmarked for electric/zero emission vessels. These funds would be potentially applicable to ferry service and related operations.

8.2 State and Federal Funding

BPI

MaineDOT's Business Partnership Initiative (BPI) is a one-third state, two-thirds business, and municipal demand response program, designed to respond to business and municipal entity requests, such as responding to changing local transportation needs on State and State-Aid highways, developing economic opportunities, and relieving safety concerns on or adjacent to these highways. The program is designed to promote public-private partnerships between MaineDOT and municipalities, public utilities, private businesses, and other entities by leveraging additional resources on a voluntary basis to match limited state resources. In order to be eligible, each project must meet specific criteria:

- Economic Development & Job Creation: Preference will be given to projects that increase roadway capacity and allow for job growth and facilitate economic development.
- Safety: The improvement will impact a direct safety need such as infrastructure improvements that address an area with a high crash history or potential for hazardous conditions.
- Customer Benefit: Preference will be given to projects based on the amount and degree of benefit that travelers will realize from the benefit.
- Degree of Betterment: Projects that provide a greater infrastructure benefit than others such as increasing capacity/mobility and reducing maintenance costs will be given a higher priority.
- Percentage of Local Match: The greater the percentage of non-MaineDOT funding, the greater the likelihood the project will be selected.
- Prior BPI Awards: MaineDOT will seek to fund eligible projects in all interested municipalities prior to issuing multiple grants to the same one.

The criteria most relevant to this project likely "Betterment to the State Transportation System". The proposed project must provide future capacity beyond the traffic generated by the business entity that is spurring the project and those improvements must demonstrate positive effects beyond the immediate area of the business entity. The legal structure of the operating entity will have to be eligible to receive this funding or other FTA funding.

MaineDOT BPI funding contribution for a project is capped at 33.3% of the total project cost, not to exceed $1,000,000. The remaining 66.7% comes from some combination of private and/or public funding, often split between the municipality and the business entity, but may not include state or federal transportation funding (this includes TCSP, T-HUD or FHWA earmark monies). Business entities and municipalities may use impact fees, TIFS, CDBG and non-FHWA and non-MaineDOT grants to match the BPI funds. Extra consideration is given to projects that involve multiple entities, create extra capacity to allow future economic development in the area, and leverage matches above the required levels. Municipalities and business entities may propose shifting long-term maintenance responsibilities as part of their share.

The BPI grant program may be a good funding fit for the study area given opportunities to partner with a private developer.

MPI

MaineDOT's Municipal Partnership Initiative (MPI) is a program to address municipal requests that deal with transportation infrastructure issues on state and state-aid highways, encourage economic opportunities, and make improvements to infrastructure to increase its life or correct safety deficiencies. The program is designed to promote partnerships between MaineDOT and municipalities by leveraging additional resources on a voluntary basis to match limited state resources. The goal is to make improvements to state and state-aid highways by utilizing more flexible project delivery methods. Broadway meets this criteria. The intent of the Municipal Partnership Initiative is to make improvements to the core of a road through various pavement preservation treatments, highway rehabilitation, or reconstruction. In order to be eligible, each project must also meet many criteria, including "Betterment of the State Transportation System" as referenced above. The MPI is not intended to fund improvements required as a condition to a Highway Opening Permit or mitigation for a Traffic Movement Permit (TMP). (Improvements required by a Traffic Movement permit may be eligible for MaineDOT's Business Partnership Initiative funding.). This is an important requirement as projects would need to relate to non-TMP improvements.

Maximum funding shares are based on the municipal valuation. For South Portland, the share is a 50-50 split with MaineDOT's contribution capped at $625,000. MPI funding is not available to supplement funding for any other published capital project in MaineDOT's work plan.

This funding program may not be a good option given that it is not eligible for projects associated with a Traffic Movement Permit. Like the CIP, it may be a good opportunity to correct an existing deficiency but would have limitations on large scale projects.

8.3 PACTS Collector Paving Program

PACTS Collector Paving Program provides federal funding to support projects that prolong the functional lifespan of the region's collector roads through preservation paving treatments. The local match requirement 25 percent. As of Fall 2018, this section of Broadway is classified as "satisfactory", so is unlikely to be a candidate for funding in the near future.

8.4 Funding for Complex Projects through PACTS

PACTS provides federal funding for transformational, regionally significant capital projects, known as "complex projects". These are funded in two phases: 1) preliminary design report (PDR), and 2) construction. Municipalities and other eligible organizations apply for the funding, which is awarded according to the PACTS Transportation Funding Framework. PACTS issues a call for projects every one to two years, usually in the winter.

9.0 Land Use Growth and Vehicle Trip Reductions

The section qualitatively assesses the potential impact that two growth scenarios may have on the Broadway corridor and the influence of increased multi-modal activity. A "Medium Growth" scenario assumes an increase of 500 residential units and the "High Growth" scenario assumes an increase of 1,000 units by 2050 in the study area.

9.1 Trip Generation

Trip generation was estimated for future growth according to methods contained in the Institute of Transportation Engineer's (ITE) Trip Generation Manual. Table 9.1 summarizes trip estimates during the weekday AM and PM peak hours assuming a mix of single-family and multi-family housing types.

Future growth under these two scenarios could increase traffic volumes by between 600 and 800 vehicles during peak hours, assuming no changes to percent share of users that travel via personal vehicle, transit, biking, and walking.

The Smart Corridor Study evaluated major intersections along Broadway for a significant future growth scenario in the eastern waterfront area. It assumed 615 residential units, 56,200SF of retail space, a hotel and marina. Table 9.3 shows the results of the traffic analysis provided in the Smart Corridor Study. 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 as a result 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.

Based upon the future traffic modeling within the study area, accommodating increased traffic in the study corridor can be accomplished with the following considerations:

- As noted in Table 9.3 Broadway at Sawyer Street already experience congestion. A roundabout (recommended in the Smart Corridor Study) at the Sawyer Street intersection would improve capacity significantly and would be able to accommodate future development. (The estimated Level of Service changes from an F to an A).
- Table 9.3 also notes that the Broadway and Waterman Drive intersection experience some congestion and that will be exacerbated by the projected growth to reduce Level of Service by a grade from D to E. Given that this intersection has heavy traffic volumes and currently is a barrier to walking and biking, roadway widening is not a desirable solution to the congestion issue. There are limited opportunities for capacity expansion as detailed below:
  - The Ocean Street approach has a left-turn lane, two through lanes, and an exclusive right-turn lane. Adding a third through lane would be disruptive and is not recommended.
  - The eastbound Broadway approach has one left lane, one shared left/through lane, and one right-turn lane. A possible improvement would be to widen the approach and provide two left-turn lanes, one through lane and one right-turn lane. Peak hour volumes do not to support additional widening.
  - The Waterman Drive approach has a shared left/through lane and a shared through-right lane. Volumes are relatively low and do not support additional widening.
  - The westbound Broadway approach has two left-turn lanes, a through lane and a through/right lane. Adding a third through lane would not provide much benefit given that Casco Bay Bridge only has two lanes in each direction.
  - The only improvement that may have any benefit in reducing congestion on Waterman/Broadway would be providing additional through lanes to and from the Casco Bay Bridge. This would require extensive widening and is not feasible.

Table 9.1
Future Trip Generation

	AM single-family	AM multi-family	AM Total	PM single-family	PM multi-family	PM Total
Medium Growth Scenario	185	150	335	248	140	636
High Growth Scenario	370	230	600	495	280	775

Table 9.3
Level of Service

Intersection	Existing	Future
Route 77 and Erskine Drive	B	B
Broadway and Waterman Drive	D	E
Broadway and Ocean Street	C	D
Broadway and Cottage Road	D	D
Broadway and Sawyer Street	F	F (A, assuming a roundabout is installed)
Broadway and Breakwater Drive	C	C

- Adaptive Traffic Signals are expected to improve the efficiency of the corridor and will help to avoid severe congestion at key intersections in the study area. Vehicle delay could be reduced with Adaptive Traffic Signals technologies combined with bus, ferry, and bicycle and pedestrian system improvements. Traffic Movement Permit Applications should include requirements for implementation of an Adaptive Signal system.
- As reported in Section 7.0 improvements to transit service can reduce vehicle traffic by six percent. Increased walking and biking trips can yield a similar six percent reduction in vehicle traffic.
- As reported in Section 4.0 marine transit will not significantly offset traffic levels on Broadway but can expect to reduce area traffic by between 100 to 200 vehicles per day.
- Given that the analysis in this study was conducted relative to marine transit, bus transit, and walk and bike trips, Table 9.2 estimates how personal vehicle trips may be affected in the future due to the availability of other modes of travel. Volumes could be reduced by about 15 percent, which is a meaningful reduction and would help to minimize traffic impacts.

Table 9.2
Future Trip Reductions

Mode Share	Trips/Reduction Medium Growth Scenario	Trips/Reduction High Growth Scenario
PM Peak Hour	280 vehicles	560 vehicles
Marine Transit	-30 vehicles	-40 vehicles
Bus Transit (6% mode share)	-17 vehicles	-34 vehicles
Walk/Bike (6% model share)	-17 vehicles	-34 vehicles
Net Result	216 vehicles	452 vehicles

9.2 Conclusion

The analysis in this section indicates that the Broadway corridor can support additional growth (estimated in the range of 500 to 1,000 additional dwelling units in the study area), with system improvements that include improved traffic signal efficiency; expanded and improved bus service as outlined in Section 7.0, bicycle and pedestrian facilities upgrades as detailed in Section 6.0, and by offering ferry transportation to and from Portland as outlined in Section 4.0. Roadway/intersection improvements to create a roundabout or an equivalently-effective design, will be required at Sawyer Street. Capacity improvements at the Waterman Drive intersection are limited, however the intersection is quite extensive, and both the regional (GPCOG/PACTS) and municipal goals, do not support broadening the intersection with lane augmentation. Therefore, the best available improvement option at Waterman/Broadway is to implement adaptive traffic signal technology to increase vehicle bandwidth without severely congesting the intersection. Lastly, the City should explore and implement an on-going Transportation Demand Management (TDM) program, to be implemented by local employers and developers, that supports and requires proven interventions that targets reduction levels to be identified in conjunction with their land use makeup and trip generation estimates.

APPENDIX

FERRY AND WATER TAXI MODELS

Name	Beacon-Newburgh Ferry	Canal Street Ferry	Harbor Connector	Riverwalk Water Trolley	Charlestown Ferry	West Seattle Water Taxi	Channel Cat Water Taxi
Location	Beacon-Newburgh, NY	New Orleans-Algiers, LA	Baltimore, MD	Ft. Lauderdale, FL	Boston, MA	Seattle, WA	Quad Cities, IL/IA
Operator Name	MTA	NORTA	Baltimore Water Taxi	Sun Trolley	MBTA	King County DOT	MetroLink
Operator Type	Regional Transit Agency	Regional Transit Agency	Private	Local Transportation Management Association	Regional Transit Agency	Local Government	Regional Transit Agency
Description	Weekday commuter ferry connecting Metro North RR station in Beacon with Downtown Newburgh	Passenger ferry connecting Canal Street in Downtown New Orleans with Algiers Point	Two separate cross-harbor commuter routes, connecting: 1) Fells Point to Locust Point, and 2) Federal Hill to Harbor East	Free water trolley service along the New River through Downtown Ft. Lauderdale that supplements the larger trolley system	Commuter service from Charlestown Navy Yard to Long Wharf in Downtown Boston	Commuter service from Alki Beach in West Seattle to Pier 50 in Downtown Seattle	Family and tourist oriented route along Mississippi River, connecting downtowns of Moline, IL, Davenport, IA, and Bettendorf, IA
Route Length	1 mile	0.5 miles	0.25-0.50 miles	1 mile loop	1 mile	2 miles	6 miles total, segments are 0.5 to 2.0 miles
Route Time	10 minutes	15 minutes	7 minutes	20-30 minutes for entire route	10 minutes	10 minutes	75 minutes total, 10-15 minutes per segment
Stops	2	2	2 per route	8	2	2	4
Trips per Weekday	14	30	40	Continuous, 10AM-10PM	39	12	8
Trips per Weekend Day	0	30	NA	Continuous, 10AM-10PM	16	0	15
Daily Fare (Round Trip)	$3.50 Age 12-64 $2.00 Age 6-11 or 62+	$4.00 Age 2+ $2.00 Age 65	Free	Free	$7.40 for one roundtrip $12.75 for unlimited trips	$11.50 Age 6+ $5.00 Seniors	$8.00 Adults $4.00 Children
Monthly Pass Cost	N/A	$65 for ferry $105 for ferry plus bus and streetcar service	NA	NA	$80 for ferry $90 for ferry plus bus and subway service	NA	NA
Parking	Free parking provided by City of Newburgh	Yes, $5 daily parking at adjacent private lot	None	No dedicated parking, uses nearby lots and decks	None available	Limited on-street parking, encourages using bus, bike, pedestrian connections	No dedicated parking, uses nearby lots and decks
Season	Year Round	Year Round	Year Round	Year Round	Year Round	Year Round	Memorial Day-October
Ridership	60,000	400,000	200,000	50,000	250,000	444,000	44,000
Comments	MTA contracts with NY Waterway, a private provider. Weekend and mid-day service has been discussed but not implemented.	NORTA contracts with private provider to operate system; it used to operate 18 hours per day but only goes 15 hours now.	Mid-day, late night and weekend service is available through water taxi service. Commuter service is subsidized by city.	Subsidized by city and Downtown Development Authority	Charlestown Ferry is most successful of MBTA's ferry lines	New bus route connecting terminal to other downtown locations opened in early 2020	Ticket purchase allows unlimited trips on that day
Contact number	800-533-3779	504-248-3900	410-563-3900	(954) 494-9680 Robyn Chiarelli	617-222-3200	206-477-3979	309-788-3360
Vessels in Fleet	1		3		3	3	3
Passenger Capacity	149				149	2 vessels: 278 1 vessel:149	49