
# North Shore Mobility Study

**November 2017**

Prepared by
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Prepared for
North Shore Coalition

# ACKNOWLEDGEMENTS

This study was completed by the Metropolitan Area Planning Council (MAPC). MAPC is Greater Boston's regional planning agency whose mission is to promote smart growth and regional collaboration.

Professional technical assistance provided MAPC was led by Travis Pollack AICP, with support from Eliza Wallace, PhD, Ryan Melendez, Sam Cleves, and Eric Bourassa.

MAPC would like to thank its project partner Andrea Leary of the North Shore Transportation Management Association for her valuable assistance and input throughout the entirety of this project.

This study was completed for the North Shore Coalition, a group of 18 cities and towns on the North Shore. The Coalition is a voluntary forum where municipal leaders share information and solutions to common problems particular to the North Shore region. The municipal officials in this group represent nearly 400,000 residents from Beverly, Danvers, Essex, Gloucester, Hamilton, Ipswich, Lynn, Manchester, Marblehead, Middleton, Nahant, Peabody, Rockport, Salem, Saugus, Swampscott, Topsfield, and Wenham. MAPC would like to thank the Coalition for its guidance during this study.

### North Shore Coalition Members

Mayor Michael Cahill, Beverly
Town Manager Steve Bartha, Danvers
Town Administrator Brendhan Zubricki, Essex
Mayor Sefatia Romeo Theken, Gloucester
Town Manager Michael Lombardo, Hamilton
Town Manager Robin Crosbie, Ipswich
Mayor Judith Kennedy, Lynn
Town Administrator Greg Federspiel, Manchester
Town Administrator John McGinn, Marblehead
Town Administrator Andrew Sheehan, Middleton
Town Administrator Jeffrey Chelgren, Nahant
Mayor Edward Bettencourt, Peabody
Town Administrator Linda Sanders, Rockport
Mayor Kim Driscoll, Salem
Town Manager Scott Crabtree, Saugus
Town Administrator Sean Fitzgerald, Swampscott
Town Administrator Kellie Hebert, Topsfield
Town Administrator Peter Lombardi, Wenham

## Executive Summary

The Metropolitan Area Planning Council (MAPC), the regional planning agency that serves the 101 communities of Metro Boston, collaborated with the towns and cities in the North Shore Coalition (NSC) to conduct a suburban mobility study. The study concentrated on non-single-occupancy-vehicle options for serving suburban transit needs, including the "first and last mile" of transit work trips in the study area. These options can include better coordination of existing transit services, employer-sponsored shuttles, new locally operated public transportation services, partnerships with private sector transportation network companies, and improved pedestrian and bicycle connections among transit, residences, and employment centers.

The NSC area consists of 18 municipalities -- Beverly, Danvers, Essex, Gloucester, Hamilton, Ipswich, Lynn, Manchester-by-the-Sea, Marblehead, Middleton, Nahant, Peabody, Rockport, Salem, Saugus, Swampscott, Topsfield, and Wenham – that are between 20 and 35 miles northeast of central Boston. The study area is served by two public transit agencies – the Massachusetts Bay Transportation Authority (MBTA) and the Cape Ann Transit Authority (CATA) - with bus and commuter rail, as well as by the North Shore Transportation Management Association (TMA). Major highway access include Route 128, US-1 and I-95. The study area consists of both suburban and rural areas, and experiences both commuter traffic to and from central Boston as well as tourism traffic around the shore. Employment areas are primarily concentrated along Route 128, US-1, and within the downtowns.

This study consisted of four steps.

1. Inventory of **existing demographics and transit services** in the study area, as well as a review of previous studies, and a review of **emerging trends** in how communities are serving suburban areas and creating first and last mile connections for transit trips.
2. **Outreach** to town staff, employers, non-profits, and other institutions to discuss the challenges of accessing jobs in the region with transit and other modes.
3. Using data from the above steps, Identification of areas more suitable for transit, and development **of recommendations for possible services**
4. After review of the recommendations, identification of **pilot programs to meeting the transportation needs** of the study area.

The **study findings** include the following:

- There are far more work trips of residents commuting within the North Shore area than there are work trips commuting to Boston. In fact, no single municipality has more than 17 percent of the work trips within the study area, showing that employment has become distributed within the Metro region.
- Transit carries more work trips into Boston's core than reverse commute trips or commute trips within the North Shore area. This shows that the existing transit network is more suited to commuting in and out of Boston than in meeting the more localized and east/west work trips. CATA, however, provides an important regional transit service for the northern communities of Gloucester, Rockport and Ipswich.
- Existing commuter rail and bus services are clustered within the areas with greater population and employment densities. However, there are significant areas with limited transit services in Danvers, Beverly, Salem and Peabody.
- Discussions with developers and employers in the area have shown that younger workers are less likely to consider living and working in suburban areas without walkable and connected street network and without good transit service.

- Others employers noted the difficulty of workers in the retail, hospitality and restaurant sector using the existing transit services, which are designed more for commuting into Boston and which may not always adequately serve second and third shift workers.

The suitability analysis and needs assessment found areas that could support either improvements to the existing transit services, and/or new transit shuttles or other transit partnerships. To help with these unmet needs, the **study recommendations** include the following options.

- **Improvements to existing MBTA Service** – Recognizing that the MBTA is limited in its ability to increase frequencies for existing bus and rail services, this study nevertheless suggests extended service hours and additional frequencies on MBTA bus routes 465 and 451. The MBTA is also currently undertaking a complete review of its entire bus network and has started a major plan review of its commuter rail network. The municipalities in North Shore served by the MBTA should actively engage with the agency in these major planning efforts to help ensure these services better meet their evolving transit needs. CATA has also recently completed a regional transit plan and some of proposed service will be implemented in the coming years including streamlining existing services.
- **New Local Shuttles** -- Four potential routes for local shuttles were identified to better connect the study area. Shuttles can provide critical "last mile" connections from commuter rail stations to employment, and connect local residents and jobs. They can also provide additional connections for residents to commuter rail and bus services. These shuttles can be operated and funded through employer and town partnerships via a TMA (with more limited stops and services), or operated by municipalities with several local stops.
- **Ride Hailing/TNC Partnerships** -- Another option to improve connections is to enter into a partnership with a transportation network company (TNC) such as Uber or Lyft for subsidized rides to/from select locations. The trips could be limited to serving employers or developments who are members of a TMA, and who enter an agreement. This option could be a first step to determine the demand for a new shuttle local transit service, and can be an option for serving locations that may not have the densities for more traditional bus or shuttle services.
- **Mobility Hubs** –Mobility hubs are a single location where patrons can find a variety of transportation services as a type of "one stop shopping" for mobility. Services available typically include transit, taxi stands and ride hailing pick up/drop off zones, bicycle sharing stations, car sharing stations, good connections to sidewalks and bicycle amenities (including regional trails), as well as functional signage and maps showing destinations and connections. These mobility hubs are typically located at major transit centers (such as commuter or heavy rail stations) or at major activity areas such as downtowns.
- **Dial-a-Ride and On-Demand Services** – Those areas that have lower densities and that do not have fixed route bus or even paratransit should explore a dial-a-ride service.. The RTA would then invoice the towns for the rides. CATA could implement a similar service in the communities of Hamilton and Manchester, if they join CATA and if CATA were willing provide the service. Similarly, municipalities with existing bus and rail service could implement a municipal dial-a-ride service to help fill the gaps for areas or times when bus or rail service is not available. This service could be part of a larger regionalization and restructuring of municipal senior and veterans transportation services, possibly creating new on-demand transit services (also known as microtransit).
- **Complete Streets, Pedestrian and Bicycle Infrastructure, and Land Uses** – Municipalities can help with first and last mile connections through better integration of land use and

transportation decision-making, and through better multimodal street design. Corridors that could support better transit at times have inadequate sidewalks, limited crosswalks, and buildings separated by large parking lots – all which make pedestrian access, and thus effective transit, more difficult. Streets identified for improved transit services, and streets that connect mobility hubs or other transit services to concentrations of employment and housing should have priority for complete street improvements such as pedestrian scale lighting, bicycle routes, more visible and frequent crosswalks, and wider sidewalks. Municipalities can also allow bicycle sharing providers to establish services in their cities and towns, and should coordinate these services with surrounding municipalities to create more seamless mobility options for workers and residents.

- **Pilot Projects** – Upon review of the draft findings and recommendations of this mobility study, multiple municipalities of the North Shore Coalition decided to implement a local shuttle and regional bike share program to test the feasibility of a program before implementing a larger group of projects. A pilot project will allow the development of measurements to determine whether the pilot is meeting the needs of the community, and possible improvements for further projects.

Because of the varied geography, resident and employment density and existing transit service availability in the North Shore area, the list to the right shows the recommendations for each municipality.

The local shuttle recommendations, locations for possible mobility hubs and possible RTA dial-a-ride service areas are shown in **Figure ES-1**. A summary of possible pilot projects and their implementation steps are provided in **Table ES-1**.

| Municipalities | Mobility Study Recommendations |
|---|---|
| Rockport, Gloucester, Essex and Ipswich | • Coordinate with CATA on proposed fixed route enhancements<br>• Evaluate expanded RTA or new municipal on-demand transit services<br>• Mobility hubs in downtowns and at commuter rail stations (Gloucester, Ipswich, Rockport)<br>• Construct complete streets and investigate bicycle sharing |
| Middleton, Topsfield, Hamilton, Wenham and Manchester | • Evaluate municipal or regional on-demand transit services (CATA dial-a-ride for Hamilton and Manchester)<br>• Mobility hubs at commuter rail stations (Hamilton/Wenham, Manchester)<br>• Construct complete streets and investigate bicycle sharing |
| Beverly, Danvers, Salem, Peabody | • Evaluate municipal or regional on-demand transit services<br>• Mobility hubs at commuter rail stations, downtowns, retail centers, and ferry landings<br>• Local shuttles<br>• Construct complete streets and implement regional bicycle sharing system<br>• Coordinate with Water Transportation Study currently underway (Salem)<br>• Provide input to MBTA on bus network service plan |
| Marblehead, Swampscott, Nahant, Lynn, Saugus | • Evaluate municipal or regional on-demand transit<br>• Mobility hubs at commuter rail stations, downtowns<br>• Construct complete streets and consider regional bicycle sharing system<br>• Coordinate with Water Transportation Study currently underway (Lynn)<br>• Provide input to MBTA on bus network service plan |

**Figure ES-1. Mobility Study Recommendations**

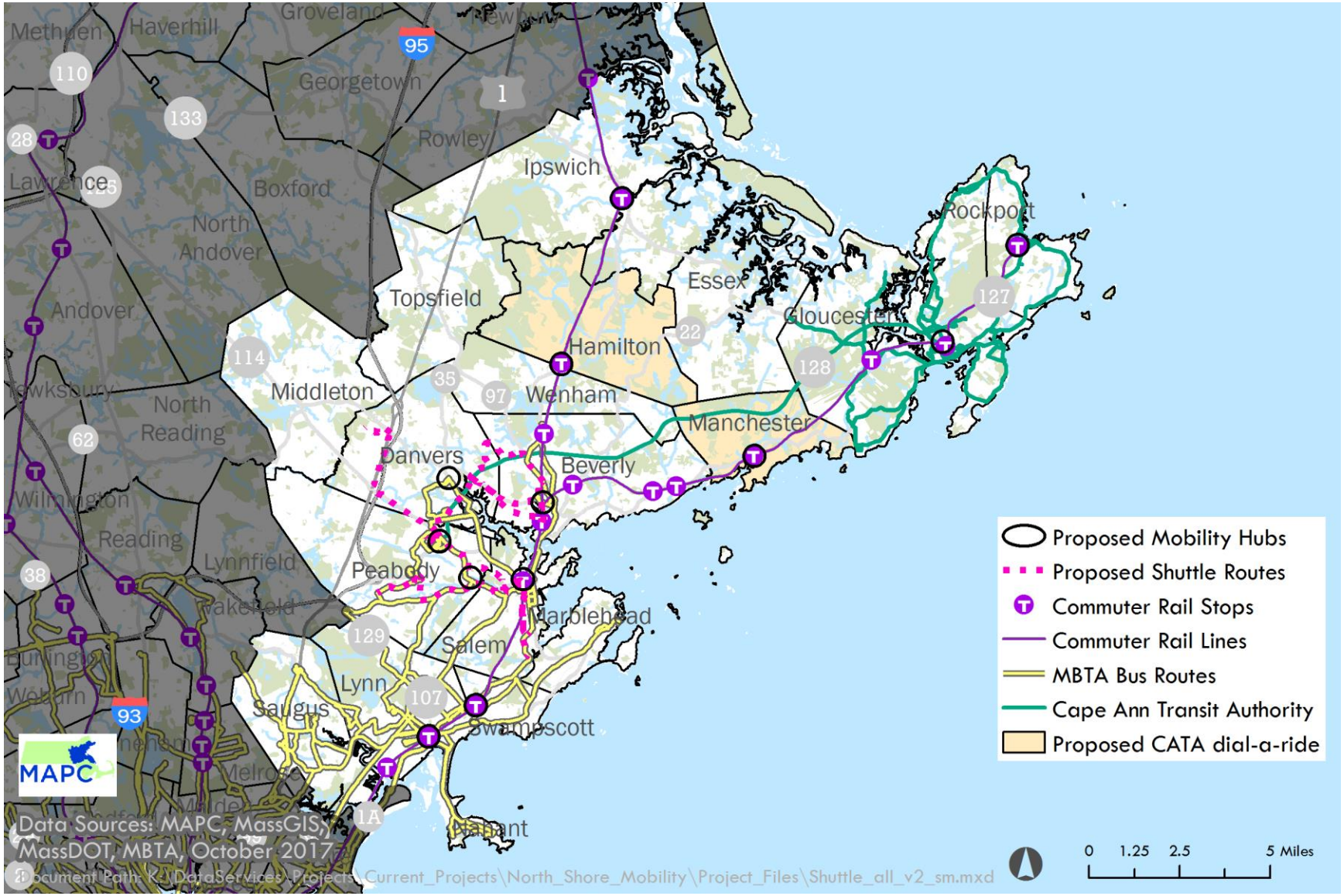

Table ES-1: Implementation Steps for Mobility Pilot Programs

| Potential Project/Pilot | Description | Implementation | Notes |
|---|---|---|---|
| Local Shuttles | Locally operated and funded shuttles running between commuter rail stations and concentrations of employment and/or housing | • Employers and municipalities join TMA and implement more detailed study of routing, operating hours and participants<br>• TMA conducts request for proposals to operate shuttles<br>• Annual costs typically $100,000-$150,000<br>• Funded through TMA dues, employer and municipalities<br>• Community Transportation Funding or Community Compact funding can help with developing operating and implementation plan | • Examples of similar employer-sponsored shuttles include the Middlesex 3 TMA, 128 Business Council<br>• Examples of joint municipal/ TMA shuttles include the Crosstown Connect in Acton and the REV in Lexington |
| TNC/Ride Hailing Partnership | Municipality and/or employers subsidize individual Uber, Lyft or taxi rides within a set geography and time of day and week | • Interested municipalities and employers join TMA, determine potential operating parameters<br>• Examples of operating parameters include setting geography, time of day, number of rides per day or week<br>• TMA conduct request for proposals, enters agreement with companies<br>• Annual costs typically $14,000-$63,000<br>• Operating agreements and subsidy limits per rider, etc. can help limit potential costs<br>• Community Transportation and/or Community Compact funds can be used for planning and pilot | • Examples of similar programs include North Shore Community College, MBTA/The Ride, City of Altamonte Springs, FL<br>• Federal law (ADA) requires offering accessible rides (such as wheelchair lift capable vehicle)<br>• Area must have drivers and ride hailing services available<br>• Can be the first step in determining market for local shuttle |
| Mobility Hubs | Designated area with multiple mobility services, including transit, ride hailing, shuttles, car and bicycle sharing, ped/bike connections, signage, placemaking | • Conduct more detailed planning and design to determine services and improvements<br>• Improvements can range from minor enhancements at commuter rail stations to new hubs in a downtown<br>• Funding sources include Community Transportation<br>• Costs depend on level of infrastructure selected and needed on site and can be up to $2 million or more | • Examples include San Diego and Micro Transit Hubs proposed in Go Boston 2030 Plan<br>• Typically within an activity center (transit station, downtown, etc.) |
| Dial-a-Ride/ Microtransit | Municipality offers dial-a-ride service through RTA or via municipal service; could include newer on-demand technology option (microtransit) | • Municipality joins RTA, or determines to operate service on its own, and establishes eligibility and geographic parameters via operating study<br>• Could be part of a larger effort on regional efficiency for other transportation services (seniors, veterans)<br>• Annual costs vary, depending on eligibility and demand (MVRTA average costs are $25 one-way) | • Example is Ring & Ride service offered by Merrimack Valley RTA<br>• Current dial-a-ride services typically require minimum 24 hour advance reservation; microtransit pilots would operate similar to ride hailing on-demand service |

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# 1 Existing Conditions and Emerging Trends

## 1.1 Introduction

### 1.1.1 Overview

The Metropolitan Area Planning Council (MAPC), the regional planning agency that serves the 101 communities of Metro Boston, is collaborating with the North Shore Coalition (NSC) to conduct a suburban mobility study. The study concentrates on options –specifically non-single-occupancy-vehicle options -- for serving suburban areas and the "first and last mile" of transit work trips in the study area. These options can include better coordination of existing transit services, employer-sponsored shuttles, new locally operated public transportation services, partnerships with private sector transportation network companies, and improved pedestrian and bicycle connections among transit, residences, and employment centers.

### 1.1.2 Project Study Area and Study Participants

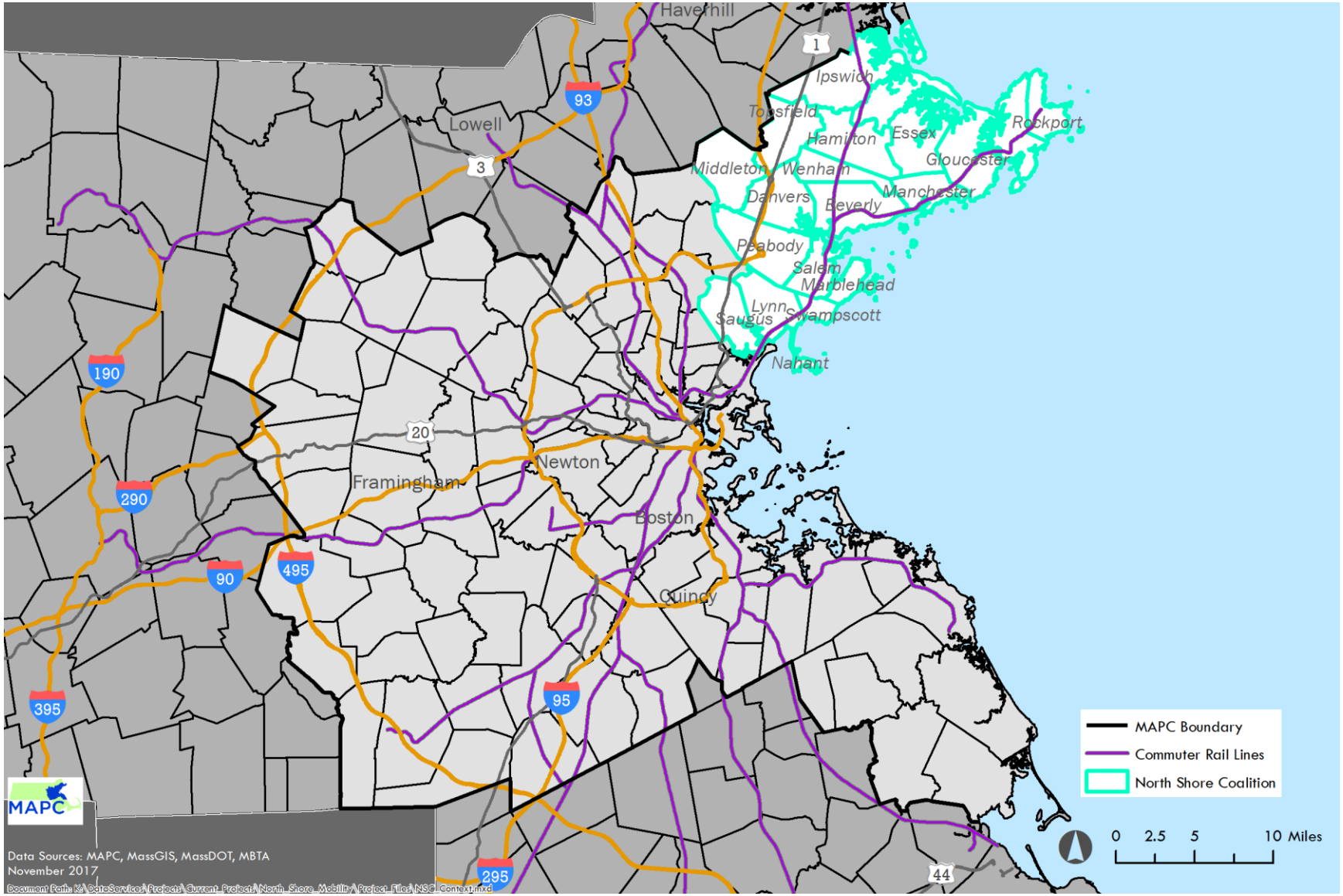
The NSC area consists of 18 municipalities -- Beverly, Danvers, Essex, Gloucester, Hamilton, Ipswich, Lynn, Manchester-by-the-Sea, Marblehead, Middleton, Nahant, Peabody, Rockport, Salem, Saugus, Swampscott, Topsfield, and Wenham – that are between 10 and 40 miles northeast of central Boston. The study area is served by two public transit agencies, including bus and commuter rail, and by two Transportation Management Associations (TMAs). The study area also has access to major highways Route 128 and US-1, as well as several state routes.

The study area consists of both suburban and rural areas, and experiences local commuter traffic, traffic to and from central Boston as well as tourism traffic around the shore. Employment areas are primarily concentrated along Route 128, US-1, and within the downtowns.

**Figure 1.1** on the following page shows the North Shore study area within the larger MAPC region.

Each municipality participated in the mobility study through coalition meetings and via completion of a survey of existing transit services and transit development practices.

Figure 1.1: North Shore Coalition (NSC) Location Map



### 1.1.3 Project Tasks

The study was divided into four tasks.

1. *Inventory of Existing Conditions and Emerging Trends* -- MAPC collected data on existing populations, automobile ownership and use, employment, development, and journey-to-work data for each census tract and town in the study rea. MAPC also inventoried the existing transit services in the study area, including MBTA commuter rail and bus service, other regional transit authorities (RTAs), and senior and other local shuttles. This inventory included a quality-of-service analysis of the availability and accessibility of public transportation. This analysis provided a snapshot of the various transit needs, and how the existing transit services are meeting that need.

   Moreover, MAPC reviewed the area's previous transit and transportation studies to review past recommendations and implementation. MAPC also reviewed innovative ways communities and transit agencies in Massachusetts and the nation have met the challenge of serving suburbs and the first/last mile connections for transit trips.

2. *Outreach* – MAPC conducted focus group discussions with town staff, employers, non-profits, and other institutions to review the study findings to-date and discuss the challenges of accessing jobs in the region with transit.

3. *Needs Assessment and Recommendations* – Using the data collected in the first three phases, MAPC mapped areas more suitable for transit, and developed recommendations for possible services and pilot programs.

4. *Development of Pilot Projects* – Based upon the recommendations from this study, MAPC met with the Mayors representing the North Shore Coalition and selected pilot projects to implement.

## 1.2 Existing Demographics

As an early step in the mobility study, MAPC analyzed municipal and study area demographics to look for trends and patterns in population, employment and travel. MAPC compiled data, where available, for the MAPC region and the Commonwealth for comparison against the NSC study area.

### 1.2.1 Population

The North Shore population increased by approximately one percent between 2000 and 2010, smaller than the growth in the MAPC region and the Commonwealth for the same time period. However, the growth was not even across the municipalities in the study area. For example, Wenham grew by nearly 10 percent and Middleton grew by over 16 percent, while half of the municipalities lost population during this decade. Lynn is the most populous municipality (over 90,000 residents in 2010), with Salem, Peabody and Beverly also being the largest cities. **Table 1.1** lists the population for the study area as measured by the US Census.

Table 1.1: NSC Population

| Municipality | Population, 2000 | Population, 2010 | Percent Change 2000-2010 |
|---|---|---|---|
| Beverly | 39,862 | 39,502 | -0.9% |
| Danvers | 25,212 | 26,493 | 5.1% |
| Essex | 3,267 | 3,504 | 7.3% |
| Gloucester | 30,273 | 28,789 | -4.9% |
| Hamilton | 8,315 | 7,764 | -6.6% |
| Ipswich | 12,987 | 13,175 | 1.4% |
| Lynn | 89,050 | 90,329 | 1.4% |
| Manchester | 5,228 | 5,136 | -1.8% |
| Marblehead | 20,377 | 19,808 | -2.8% |
| Middleton | 7,744 | 8,987 | 16.1% |
| Nahant | 3,632 | 3,410 | -6.1% |
| Peabody | 48,129 | 51,251 | 6.5% |
| Rockport | 7,767 | 6,952 | -10.5% |
| Salem | 40,407 | 41,340 | 2.3% |
| Saugus | 26,078 | 26,628 | 2.1% |
| Swampscott | 14,412 | 13,787 | -4.3% |
| Topsfield | 6,141 | 6,085 | -0.9% |
| Wenham | 4,440 | 4,875 | 9.8% |
| Totals - NSC | 393,321 | 397,815 | 1.1% |
| MAPC Region | 3,066,394 | 3,161,712 | 3.1% |
| Massachusetts | 6,349,097 | 6,547,629 | 3.1% |

Source: US Census, compiled by MAPC

Because this study is examining improvements for transit work trips, MAPC also looked at the change in population for those aged 25 and 64, the population most likely to be employed. As seen in **Table 1.2**, the NSC study area has seen less population growth in the 25 to 64 age range, and a greater increase in those older than 65. Moreover, the population under 25 years old has decreased slightly in the study area. This indicates that the some parts of the study area are seeing growth in the number of retirees and working seniors, which may include some who require transit for continued mobility. New transit options should also accommodate users of various mobility and technology skill levels, especially for an aging work force.

Table 1.2: NSC Population Change 2000-2010

| Municipality | Percent Change, 2000-2010 | | | |
|---|---|---|---|---|
| | Total Population | 25-64 years old | Under 25 years old | Over 65 years old |
| Beverly | -0.9 | -0.9 | 2.3 | -7.2 |
| Danvers | 5.1 | 7.2 | -1.8 | 10.4 |
| Essex | 7.3 | 7.4 | 5.5 | 10.6 |
| Gloucester | -4.9 | -3.8 | -14.3 | 8.2 |
| Hamilton | -6.6 | -10.4 | -4.9 | 8.4 |
| Ipswich | 1.4 | -0.3 | -3.1 | 15.8 |
| Lynn | 1.4 | 5.1 | 0.1 | -9.4 |
| Manchester | -1.8 | -7.1 | -2.4 | 17.5 |
| Marblehead | -2.8 | -8.7 | 4.6 | 5.9 |
| Middleton | 16.1 | 10.3 | 12.4 | 63.5 |
| Nahant | -6.1 | -7.6 | -10.4 | 3.4 |
| Peabody | 6.5 | 4.4 | -1.1 | 25.3 |
| Rockport | -10.5 | -11.2 | -19.2 | 2.4 |
| Salem | 2.3 | 2.9 | 5.3 | -6.5 |
| Saugus | 2.1 | 2.7 | 1.5 | 1.1 |
| Swampscott | -4.3 | -4.2 | -4.8 | -4.0 |
| Topsfield | -0.9 | -2.4 | -4.2 | 11.1 |
| Wenham | 9.8 | 2.5 | 18.0 | 4.0 |
| Totals - NSC | 1.1 | 1.2 | -0.4 | 4.1 |
| Massachusetts | 3.1 | 4.1 | 0.8 | 4.9 |

Source: US Census, compiled by MAPC

### 1.2.2 Employment

There are greater variances among the NSC municipalities in employment than in population. Danvers, Peabody, Beverly, Salem and Lynn are the largest employment centers, with nearly 70 percent of the study area's jobs in 2015. **Table 1.3** shows employment snapshots in 2001, 2010 and 2015.

Table 1.3: NSC Employment

| Municipality | 2001 | 2010 | 2015 |
|---|---|---|---|
| Beverly | 19,467 | 20,891 | 23,130 |
| Danvers | 23,026 | 24,573 | 26,393 |
| Essex | 1,383 | 1,318 | 1,416 |
| Gloucester | 11,701 | 10,390 | 11,376 |
| Hamilton | 1,444 | 1,345 | 1,457 |
| Ipswich | 3,912 | 4,986 | 5,689 |
| Lynn | 25,258 | 22,523 | 24,574 |
| Manchester | 1,496 | 1,673 | 1,614 |
| Marblehead | 4,931 | 4,811 | 5,010 |
| Middleton | 4,867 | 4,558 | 4,949 |
| Nahant | 407 | 450 | 429 |
| Peabody | 26,877 | 23,585 | 24,302 |
| Rockport | 1,492 | 1,257 | 1,257 |
| Salem | 18,579 | 19,270 | 19,628 |
| Saugus | 11,040 | 10,342 | 11,011 |
| Swampscott | 3,351 | 3,365 | 3,112 |
| Topsfield | 2,449 | 2,439 | 2,808 |
| Wenham | 1,294 | 941 | 967 |
| Totals - NSC | 162,974 | 158,717 | 169,122 |
| Massachusetts | 3,276,103 | 3,111,633 | 3,428,259 |

Source: Massachusetts Executive Office of Labor and Workforce Development (EOLWD), compiled by MAPC

### 1.2.3 Automobile Ownership and Use

Lynn and Salem have lower vehicle ownership than the statewide average, while several towns further north have household vehicle ownership rates higher than the statewide average. Several towns further away from central Boston have significantly higher automobile use, likely to the more dispersed development. **Table 1.4** shows a snapshot of vehicle use and ownership.

Table 1.4: NSC Vehicle Ownership and Use

| Municipality | Vehicles Per Household | Household Miles per Day | CO2 per Day per Household |
|---|---|---|---|
| Beverly | 1.6 | 43.0 | 0.019 |
| Danvers | 1.9 | 49.3 | 0.022 |
| Essex | 2.1 | 67.1 | 0.031 |
| Gloucester | 1.7 | 50.0 | 0.022 |
| Hamilton | 2.1 | 66.5 | 0.030 |
| Ipswich | 2.0 | 60.9 | 0.028 |
| Lynn | 1.4 | 35.7 | 0.016 |
| Manchester | 2.0 | 60.7 | 0.028 |
| Marblehead | 1.8 | 42.0 | 0.019 |
| Middleton | 2.1 | 63.1 | 0.030 |
| Nahant | 1.8 | 45.1 | 0.020 |
| Peabody | 1.7 | 43.9 | 0.019 |
| Rockport | 1.8 | 51.4 | 0.023 |
| Salem | 1.4 | 32.7 | 0.014 |
| Saugus | 1.9 | 46.6 | 0.021 |
| Swampscott | 1.7 | 40.3 | 0.018 |
| Topsfield | 2.3 | 71.8 | 0.034 |
| Wenham | 2.1 | 61.5 | 0.027 |
| Massachusetts | 1.7 | 48.9 | 0.022 |

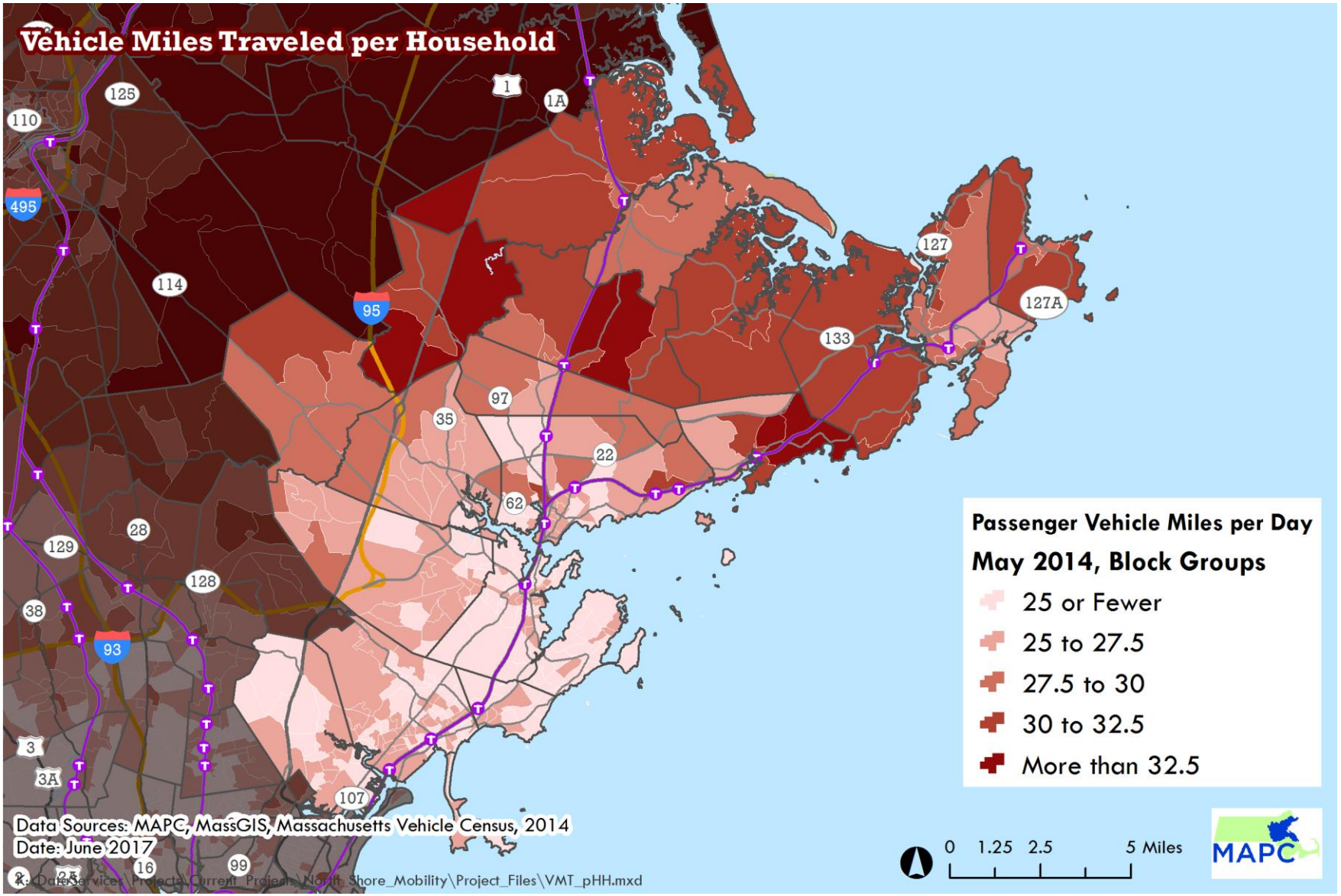
Source: Massachusetts Vehicle Census (2014) compiled by Massachusetts Registry of Motor Vehicles and MAPC

To get a better idea on the number of households without access to an automobile, MAPC reviewed the American Community Survey (ACS) data on households without vehicles in each municipality. Due to the relatively small number of households in some smaller towns, the data were not statistically significant. (For example, the ACS data show that 3.1 percent of households in Essex have no vehicles, but the margin of error is 3.3 percent, meaning that the number could be as low as zero and as high as 6.4 percent.) However, several municipalities have a significant percent of households without automobiles, including:

- Beverly – 10 percent
- Gloucester – 9 percent
- Lynn – 22 percent
- Peabody – 11 percent
- Salem – 15 percent

MAPC then used the Massachusetts Vehicle Census to look at Census Block Groups to see which areas had lower vehicle use. As seen in **Figure 1.2**, several areas in Saugus, Lynn, Swampscott, Marblehead and Salem have lower daily vehicle use, likely due to the more compact development patterns and the greater availability of transit when compared to other municipalities in the study area. However, there are several census block groups in Peabody, Danvers, Beverly and Gloucester that also have relatively lower of household vehicle miles per day. These data, combined with the relatively high percent of zero vehicle households in these areas, may show the need for additional transit services.

Figure 1.2: NSC Vehicle Miles Traveled per Household



### 1.2.6 Journey to Work

A vast majority of the study area's workers drive to work, with only six percent using transit. Only Nahant, Salem and Swampscott, Lynn and Manchester have transit use close or higher than the commonwealth average, likely due to their close proximity to the Boston core and high frequency bus and commuter rail. **Table 1.5** shows the breakdown for commuting in the study area.

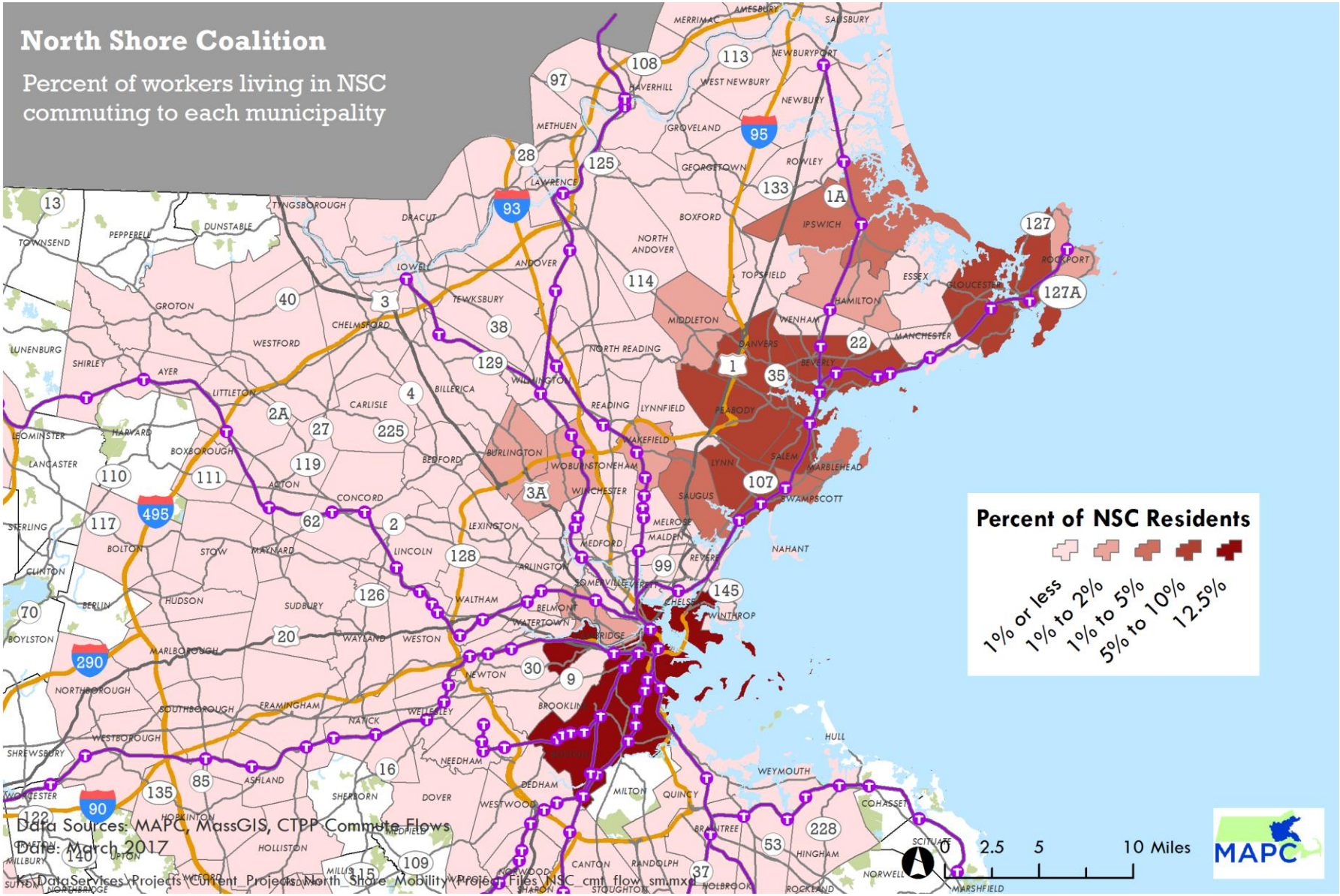
In 2010, the total number of North Shore residents who commuted into Boston or Cambridge for work was approximately 28,200. **Figure 1.3** shows the percentage of residents in each NSC municipality who commute to surrounding municipalities. As seen in the figure, the commuting patterns are not Boston centric, but also include a significant number of workers in Salem, Peabody and Beverly. There is a far greater number of residents who work within the study area (119,600) than who commute to Boston and Cambridge (28,200), illustrating how both housing and employment is now dispersed in the Metro region.

Table 1.5: NSC Journey to Work

| Municipality | Workers | Percent Drive | Percent Transit | Percent Other |
|---|---|---|---|---|
| Beverly | 20,827 | 81.1 | 6.6 | 12.3 |
| Danvers | 13,731 | 91.9 | 2.5 | 5.5 |
| Essex | 1,969 | 84.1 | 5.3 | 10.7 |
| Gloucester | 13,958 | 83.6 | 3.9 | 12.5 |
| Hamilton | 3,640 | 79.5 | 4.3 | 16.2 |
| Ipswich | 6,802 | 82.7 | 6.0 | 11.3 |
| Lynn | 40,643 | 79.8 | 9.2 | 11.0 |
| Manchester | 2,357 | 71.5 | 9.3 | 19.2 |
| Marblehead | 9,611 | 78.3 | 4.4 | 17.4 |
| Middleton | 3,782 | 89.7 | 3.3 | 7.0 |
| Nahant | 1,805 | 81.8 | 11.0 | 7.2 |
| Peabody | 25,222 | 92.1 | 2.2 | 5.7 |
| Rockport | 3,270 | 77.9 | 6.6 | 15.5 |
| Salem | 21,549 | 76.6 | 10.8 | 12.7 |
| Saugus | 13,550 | 88.5 | 6.7 | 4.8 |
| Swampscott | 7,103 | 80.3 | 11.7 | 8.0 |
| Topsfield | 2,961 | 87.9 | 2.3 | 9.8 |
| Wenham | 2,430 | 69.8 | 3.3 | 26.9 |
| Totals - NSC | 195,210 | 83.1 | 6.4 | 10.5 |
| MAPC Region | 1,617,434 | 71.0 | 16.0 | 13.0 |
| Massachusetts | 3,231,819 | 80.3 | 9.2 | 10.5 |

"Other" includes taxi, motorcycle, walk, working from home, and other means. Source: American Community Survey 5-year averages, 2008-2012, compiled by MAPC

Figure 1.3: NSC Workers Commute by Municipality



## 1.3 Existing Transit Services

To better understand the transit needs for the study area, MAPC collected information on the existing transit services (public and private) in the 18 NSC municipalities. MAPC also surveyed planners in the municipalities and searched online resources to develop an inventory of services.

### 1.3.1 Regional Transit Authorities

A regional transit authority (RTA) is an agency tasked with providing transit services and programs to a group of municipalities under its jurisdiction. Each municipality pays an annual assessment to the RTA in return for the provision of transit services. Eleven of the eighteen municipalities in the NSC study area are served by the Massachusetts Bay Transportation Authority (MBTA), with nine of those receiving fixed-route bus service and nine receiving commuter rail service. Other municipalities receive bus service through the Cape Ann Transportation Authority (CATA), either year round or seasonally.

### 1.3.2 North Shore Transportation Management Association

Four of the communities in the study area are also in part served by the North Shore Transportation Management Association (TMA). The North Shore TMA, one of fourteen in the Commonwealth, is a membership based, public-private partnerships of businesses, institutions and municipalities joined together under a legal agreement for the purpose of providing and promoting transportation solutions for commuters. The North Shore TMA promotes transportation solutions such as carpool and vanpool matching, emergency ride home for transit riders, and incentives for those who choose green commuting (cycling, walking, transit, carpooling, etc.).

### 1.3.3 Other Transit Services

Each municipality offers shuttle services or mileage reimbursements for seniors, through volunteers, the local Council on Aging, or via Greater Lynn Senior Services. These services are in addition to paratransit service provided by the MBTA (the RIDE) or CATA. It should be noted that neither Hamilton nor Manchester have paratransit service through the MBTA or CATA, as they do not have fixed-route bus service.

These senior and paratransit services are not used for work trips, but instead are provided to ensure seniors and others with mobility challenges have transportation to medical appointments, shopping, banking, etc.

### 1.3.4 Water Transportation

Currently both Lynn and Salem have water transportation to Boston. Salem contracts with Boston Harbor Cruises to operate the five daily trips between May and October. Regular fares are $25 one-way, with a discounted rate ($19/one-way) for Salem residents and an $8 commuter rate for select departures. Lynn also contracts with Boston Harbor Cruises to operate a daily service, funded by MassDOT and the City. Regular one-way fares are $7. This ferry initially operated in 2014 and 2015, but ceased operations in 2016. The Lynn ferry was offered again in the summer of 2017 as a pilot and as mitigation for construction on the commuter rail system.

### 1.3.5 Transit Quality of Service

In addition to collecting information on existing transit services, MAPC performed a “quality of service” evaluation to better understand how well existing transit serves the North Shore, in

terms of service availability.[1] The quality of service evaluation was performed by examining metrics using the following available data for the transit service providers in the study area:

- Frequency – average weekday headways
- Service Span – hours and days of service
- Access –employment within 45 minutes of transit

MAPC reviewed the posted schedules for the bus and rail service in the region to determine the number of days and hours services are available. Service span (number of hours transit service available per day) and frequency (average time in minutes between trains or buses) are important measures since the transit riders use them to determine if, and how often, service is available to them. Because schedules vary widely between peak and off-peak commute times, an average weekday headway (in minutes) was calculated by dividing the hours of weekday service by the number of one-way trips at stops.

**Tables 1.6 and 1.7** lists the existing transit services for each of the municipalities in the NSC study area including the transit quality of service metrics. (Please note that a bus or train line may have different schedules, frequencies, etc., in different towns.) **Figure 1.4** shows the fixed-route bus service and commuter rail line/stations in the study area.

[1] For more detail on the possible transit quality of service measures, see *Transit Capacity and Quality of Service Manual, 3rd Edition*, TCRP Report 165, Transportation Research Board, 2013.

Table 1.6: Existing Fixed Route Bus Services in NSC Study Area

| Municipality | Provider/ Route | Route Service Endpoints | Stop or Service Locations (within municipality) | Service Days; Service Hours | Weekday Service Trips | Weekday Hours of Service | Average Headway (minutes) | Ridership (entire route)* |
|---|---|---|---|---|---|---|---|---|
| Beverly | MBTA Route 451 | North Beverly-Salem | North Beverly commuter rail station, downtown, Cabot Street, Cummings Center | M-F, 6:40 am - 7 pm | 8 | 11.0 | 83 | 72 |
| | Local Bus (operated by CATA) | Beverly (in-town service) | Downtown, Cummings Center, Beverly and Montserrat commuter rail stations, Beverly hospital | M-Sa, 7 am - 5 pm | 8 | 9.0 | 68 | 42 |
| Danvers | MBTA Route 435 | Danvers-Lynn | Liberty Tree Mall (occasional service loop through Danvers) | M-F, 8 am - 10:45 pm, Sa, 9:30 am - 11 pm | 14 | 15.0 | 64 | 731 |
| | MBTA Route 465 | Danvers-Salem | Liberty Tree Mall, Danvers Square, Endicott Plaza (occasional service along Water St) | M-F, 7 am-7 pm; Sa, 9 am - 7 pm | 13 | 12.0 | 55 | 352 |
| | CATA Mall Shuttle | Peabody-Danvers-Gloucester | Liberty Tree Mall | Sa, 10:30 am - 5 pm | 4 | 5.5 | 83 | Approx. 90 |
| Essex | CATA Ipswich-Essex-Crane Beach | Ipswich-Essex-Crane Beach | Essex/ Gloucester town limits | Saturday, Sunday and Holidays, 10 am - 5 pm (summer only) | 8 | 8.0 | 60 | Approx. 130 (Sat) and 210 (Sun) |

| Municipality | Provider/ Route | Route Service Endpoints | Stop or Service Locations (within municipality) | Service Days; Service Hours | Weekday Service Trips | Weekday Hours of Service | Average Headway (minutes) | Ridership (entire route)* |
|---|---|---|---|---|---|---|---|---|
| Gloucester | CATA Red Line | Gloucester-Rockport via Thatcher Road | Downtown, Gloucester High School, East Main Street, Niles Beach, Bass Rocks, Good Harbor Beach | M-F, 7 am - 7 pm; Sa, 6:15 am - 5:30 pm | 6 | 12.0 | 120 | 66 |
| | CATA Blue Line | Gloucester-Rockport via Lanesville | Downtown, Gloucester High School, Commuter Rail station, Addison Gilbert Hospital, Washington Street, Lanesville Post Office | M-F, 7:30 am - 8 pm; Sa, 9:30 am - 10 pm | 10 | 12.5 | 75 | 125 |
| | CATA Green Line | Gloucester - Rockport via Eastern Avenue | Downtown, Rogers St, Bass Avenue, Eastern Avenue | M-F, 7:30 am - 5:15 pm; Sa, 9:30 am - 3:30 pm | 8 | 9.5 | 71 | 49 |
| | CATA Orange Line | Gloucester Crossing and Business Loop | Downtown, Gloucester High School, Addision Gilbert Hospital, Mill Pond Medical, Gloucester Crossing, Blackburn Industrial Park | M-F, 8 am - 8:45 pm; Sa, 9 am - 9:45 pm | 10 | 12.5 | 75 | 186 |
| | CATA Purple Line | West Gloucester to Essex town Line | Downtown, Gloucester commuter rail station, Gloucester High School, West Gloucester | M-F, 5:45 am - 4 pm; Sa, 6 am - 4:30 pm | 4 | 10.0 | 150 | 24 |
| | CATA Yellow Line | Downtown Gloucester and Magnolia | Downtown, Stage Fort Park, Hammond Castle, Gloucester High School, Magnolia Square | M-F, 7 am - 3:45 pm; Sa, 9 am - 4:15 pm | 3 | 9.0 | 180 | 21 |
| | CATA Mall Shuttle | Gloucester-Peabody/ Danvers malls | Downtown, Gloucester Commuter Rail station, Liberty Tree Mall (Danvers), Northshore Mall (Peabody) | Sa, 10 am - 4:30 pm | 4 | 5.5 | 83 | 91 |
| | CATA Stage Fort Shuttle | Stage Fort Park-downtown | Stage Fort Park, downtown, East Main Street /Atlantic Road loop | Daily, hourly service from 10 am to 5 pm | 8 | 8.0 | 60 | Approx. 50 |
| | CATA Ipswich-Essex-Crane Beach | Ipswich-Essex-Crane Beach | Essex/Gloucester town limits | Saturday, Sunday and Holidays, 10 am - 5 pm (summer only) | 8 | 8.0 | 60 | Approx. 130 (Sat) and 210 (Sun) |

| Municipality | Provider/ Route | Route Service Endpoints | Stop or Service Locations (within municipality) | Service Days; Service Hours | Weekday Service Trips | Weekday Hours of Service | Average Headway (minutes) | Ridership (entire route)* |
|---|---|---|---|---|---|---|---|---|
| Hamilton | None | | | | | | | |
| Ipswich | CATA Ipswich-Essex-Crane Beach | Ipswich-Essex-Crane Beach | Ipswich commuter rail station, Main Street, Essex, Crane Beach | Saturday, Sunday and Holidays, 10 am - 5 pm (summer only) | 8 | 8.0 | 60 | Approx. 130 (Sat) and 210 (Sun) |
| Lynn | MBTA Routes 441, 442 | Marblehead-Wonderland Station | Downtown Lynn, Lynn Central Square | M-F, 5:45 am - 12 am; Sa, 6:30 am - 12 am; Su, 8 am - 12:30 am | 53 | 17.5 | 20 | Route 441: 1,338 Route 442: 2,059 |
| | MBTA Routes 448, 449 | Marblehead-Downtown Crossing (Boston) via Logan | Downtown Lynn, Lynn Central Square (outbound only) | M-F, 7:45 pm - 7 pm (outbound only) | 6 | 12.0 | 120 | Route 448: 160 Route 449: 176 |
| | MBTA Routes 424/424W | Eastern Avenue and Essex Street - Haymarket Station or Wonderland Station | Western Avenue | M-F, 6 am - 8 am (inbound to Boston), 4:30 pm - 6:15 pm (outbound to Lynn/Salem) | 5 | 2.0 | 24 | 241 |
| | MBTA Routes 450/450W | Salem Depot - Haymarket Station or Wonderland Station | Western Avenue | M-F, 6 am - 1:30 am; Sa, 7 am - 12:45 am (450W); Su, 9 am - 12:15 am (450W) | 26 | 17.0 | 39 | 1526 |
| | MBTA Routes 455, 459 | 455: Salem Depot - Wonderland Station; 459 Salem Depot - Downtown Boston | Western Avenue, Common Street, Union Street, Essex Street, downtown Lynn, Central Square | M-F, 5 am - 1 am; Sa, 5:15 am - 12:15 am; Su, 7:30 am - 12 am | 37 | 20.0 | 32 | Route 455: 2334 Route 459: 928 |

| Municipality | Provider/ Route | Route Service Endpoints | Stop or Service Locations (within municipality) | Service Days; Service Hours | Weekday Service Trips | Weekday Hours of Service | Average Headway (minutes) | Ridership (entire route)* |
|---|---|---|---|---|---|---|---|---|
| Lynn (cont.) | MBTA Route 429 | Northgate Shopping Center-Central Square (Lynn) | Western and Central Lynn | M-F, 6:15 am - 11 pm ; Sa, 8:30 am - 1:30 pm; Su, 11:30 am - 7:30 pm | 27 | 16.0 | 36 | 1469 |
| | MBTA Route 434 | Peabody Square - Haymarket Station | Lynnfield Street, Western Avenue | M-F, 6:45 am and 6:15 pm (1 trip each direction) | 1 | 1.0 | 60 | 39 |
| | MBTA Route 435 | Liberty Tree Mall-Central Square, Lynn or Neptune Towers (via Peabody Square) | Broadway, Euclid Avenue, Boston Street, Washington Street, downtown Lynn, Central Square | M-F, 7 am - 11:15 pm; Sa, 7 am - 11:45 pm; Su, 11:45 am - 8:30 pm | 15 | 17.0 | 68 | 731 |
| | MBTA Route 436 | Liberty Tree Mall-Central Square, Lynn (via Goodwin Circle) | Lynnfield Street, Chestnut Street, Central Square, Downtown Lynn | M-F, 6:45 am - 7 pm | 17 | 12.0 | 42 | 675 |
| | MBTA Route 439 | Nahant-Wonderland Station | Loop through Nahant | M-F, 6:30 am - 7 pm | 5 | 12.0 | 144 | 92 |
| | MBTA Route 456 | Salem Depot - Lynn Central Square | Downtown Lynn, Central Square, Eastern Avenue, Western Avenue | M-F, 6:45 am - 5 pm | 6 | 11.0 | 110 | 278 |
| Manchester | None | | | | | | | |
| Marblehead | MBTA Routes 441/442 | Marblehead-Wonderland Station | Downtown Marblehead, Pleasant Street, Humphrey Street | M-F, 5:45 am - 12 am; Sa, 6:30 am - 12 am; Su, 8 am - 12:30 am | 37 | 17.5 | 28 | Route 441: 1,338 Route 442: 2,059 |
| | MBTA Routes 448/448W & 449/449W | Marblehead-Downtown Crossing (Boston) | Downtown Marblehead, Pleasant Street, Humphrey Street | M-F, 6 am - 8 am (to Lynn); 7:15 am - 6:15 pm (from Boston); Sa, 6:30 am - 12:30 am; Su, 8 am - 12:30 am | 5 | 2.5 | 30 | Route 448: 160 Route 449: 176 |

| Municipality | Provider/ Route | Route Service Endpoints | Stop or Service Locations (within municipality) | Service Days; Service Hours | Weekday Service Trips | Weekday Hours of Service | Average Headway (minutes) | Ridership (entire route)* |
|---|---|---|---|---|---|---|---|---|
| Middleton | None | | | | | | | |
| Nahant | MBTA Route 439 | Nahant-Wonderland Station | Loop through Nahant | M-F, 6:30 am - 7 pm | 5 | 12.0 | 144 | 92 |
| Peabody | MBTA Route 434 | Peabody Square - Haymarket Station | Lynnfield Street, Washington Street | M-F, 6:45 am and 6:15 pm (1 trip each direction) | 1 | 1.0 | 60 | 39 |
| | MBTA Route 435 | Liberty Tree Mall-Central Square, Lynn or Neptune Towers (via Peabody Square) | Lynn Street, Washington Street, Main Street, Central Street, Northshore Mall | M-F, 6:45 am - 11 pm; Sa, 9:45 am - 11:45 pm; Su, 11:15 am - 8 pm | 16 | 17.0 | 64 | 731 |
| | MBTA Route 436 | Liberty Tree Mall-Central Square, Lynn (via Goodwin Circle) | Lynnfield Street, Centennial Drive, Northshore Mall | M-F, 7:15 am - 7 pm; Sa, 10:30 am - 6: 45 pm | 14 | 12.0 | 51 | 675 |
| | MBTA Route 465 | Danvers-Salem | Northshore Mall, Central Street, Main Street | M-F, 10 am-7:45 pm; Sa, 7:30 am - 4:45 pm | 11 | 10.0 | 55 | 352 |
| | CATA Mall Shuttle | Gloucester-Peabody/ Danvers malls | Northshore Mall | Sa, 10:45 am - 5:15 pm | 4 | 5.5 | 83 | 91 |
| Rockport | CATA Red Line | Gloucester-Rockport via Thatcher Road | Thatcher Road, Cape Hedge Inn, South Street, downtown Rockport | M-F, 8:45 am - 5 pm; Sa, 10:45 am - 5 pm | 4 | 8.0 | 120 | 66 |
| | CATA Blue Line | Gloucester-Rockport via Lanesville | Granite Street, Rockport Station, downtown Rockport | M-F, 7 am - 4 pm (to Gloucester); 8 am - 7 pm (from Gloucester) | 6 | 11.0 | 110 | 125 |
| | CATA Green Line | Gloucester - Rockport via Eastern Avenue | Main Street, downtown Rockport | M-F, 7:45 am - 5:30 pm; Sa, 9:45 am - 3:45 pm | 8 | 9.5 | 71 | 49 |

| Municipality | Provider/ Route | Route Service Endpoints | Stop or Service Locations (within municipality) | Service Days; Service Hours | Weekday Service Trips | Weekday Hours of Service | Average Headway (minutes) | Ridership (entire route)* |
|---|---|---|---|---|---|---|---|---|
| Salem | MBTA Route 451 | North Beverly-Salem | Downtown Salem, Salem Depot, Salem North | M-F, 6:40 am - 7 pm | 8 | 11.0 | 83 | 72 |
| | MBTA Route 455 | Salem Depot - Wonderland Station | Downtown Salem, Salem Depot, Salem South | M-F, 5 am - 12:30 am; Sa, 6 am - 11:30 pm; Su, 7 am - 11:30 pm | 24 | 18.0 | 45 | 2334 |
| | MBTA Route 459 | Salem Depot - Downtown Boston | Downtown Salem, Salem Depot, Salem South (Lafayette Street/Long Avenue) | M-F, 6 am - 6 pm | 11 | 12.0 | 65 | 928 |
| | MBTA Route 450/450W | Salem Depot - Haymarket Station or Wonderland Station | Salem Depot, Downtown Salem, South (Highland Avenue) | M-F, 5:40 am - 1 am; Sa, 6:30 am - 12:30 am; Su, 8:30 am - 12 pm | 25 | 19.5 | 47 | 1526 |
| | MBTA Route 456 | Salem Depot - Central Sq Lynn | Salem Depot, Downtown Salem, South (Highland Avenue) | M-F, 9:40 am - 4:20 pm | 7 | 8.0 | 69 | 278 |
| | MBTA Route 465 | Danvers-Salem | Downtown Salem, Salem Depot, West Salem | M-F, 7 am-7 pm; Sa, 9 am - 7 pm | 13 | 12.0 | 55 | 352 |

| Municipality | Provider/ Route | Route Service Endpoints | Stop or Service Locations (within municipality) | Service Days; Service Hours | Weekday Service Trips | Weekday Hours of Service | Average Headway (minutes) | Ridership (entire route)* |
|---|---|---|---|---|---|---|---|---|
| Saugus | MBTA Route 428 | Oaklandvale-Haymarket Station | Saugus Center, Main Street, Lincoln Avenue, Salem Street, Cliftondale Square | M-F, 6:45 am - 8 am | 3 | 1.5 | 30 | 144 |
| | MBTA Route 429 | Northgate Shopping Center-Central Square (Lynn) | West and Northern Saugus, Saugus Plaza | M-F, 6 am - 10:30 pm; Sa, 8 am - 11 pm; Su, 11 am - 7 pm | 27 | 16 | 36 | 1469 |
| | MBTA Route 426/ 426W | Central Square (Lynn)-Haymarket Station or Wonderland Station | Lincoln Avenue, Salem Street (Cliftondale Square) | M-F, 5:20 am - 11 pm; Sa, 6 am - 10 pm; Su, 7 am - 10 pm (weekend service on 426W/ Wonderland Station only) | 33 | 18 | 33 | 1883 |
| | MBTA Route 430 | Malden Center Station - Saugus Center | Saugus Center and west Saugus | M-F, 6:20 am - 10: 30 pm; Sa, 9:30 am - 7:30 pm | 20 | 18 | 54 | 1109 |
| | MBTA Route 434 | Peabody Square - Haymarket Station | Ballard Street and Salem Turnpike (MA Hwy 107) - only stop for these MBTA routes within Saugus town limits | M-F, 6:45 am and 6:15 pm (1 trip each direction) | 1 | 1.0 | 60 | 39 |
| | MBTA Route 450/450W | Salem Depot - Haymarket Station or Wonderland Station | Ballard Street and Salem Turnpike (MA Hwy 107) - only stop for these MBTA routes within Saugus town limits | M-F, 5:40 am - 1 am; Sa, 6:30 am - 12:30 am; Su, 8:30 am - 12 pm | 25 | 19.5 | 47 | 1526 |
| | MBTA Route 455 | Salem Depot - Wonderland Station | Ballard Street and Salem Turnpike (MA Hwy 107) - only stop for these MBTA routes within Saugus town limits | M-F, 5 am - 12:30 am; Sa, 6 am - 11:30 pm; Su, 7 am - 11:30 pm | 24 | 18.0 | 45 | 2334 |
| | MBTA routes 424/424W | Eastern Avenue and Essex Street - Haymarket Station or Wonderland Station | Ballard Street and Salem Turnpike (MA Hwy 107) - only stop for these MBTA routes within Saugus town limits | M-F, 6 am - 8 am (inbound to Boston), 4:30 pm - 6:15 pm (outbound to Lynn/Salem) | 5 | 2.0 | 24 | 241 |

| Municipality | Provider/ Route | Route Service Endpoints | Stop or Service Locations (within municipality) | Service Days; Service Hours | Weekday Service Trips | Weekday Hours of Service | Average Headway (minutes) | Ridership (entire route)* |
|---|---|---|---|---|---|---|---|---|
| Swampscott | MBTA Route 441 | Marblehead-Wonderland Station | Paradise Road, Salem Street | M-F, 5:45 am - 12 am; Sa, 6:30 am - 12 am; Su, 8 am - 12:30 am | 21 | 18.0 | 51 | 1338 |
| | MBTA Route 442 | Marblehead-Wonderland Station | Humphrey Street | M-F, 5:45 am - 12 am; Sa, 6:30 am - 12 am; Su, 8 am - 12:30 am | 24 | 18.0 | 45 | 2059 |
| | MBTA Route 448/448W | Marblehead-Downtown Crossing (Boston) | Paradise Road, Salem Street | M-F, 6 am - 8 am (to Lynn); 7:15 am - 6:15 pm (from Boston); Sa, 6:30 am - 12:30 am; Su, 8 am - 12:30 am | 5 | 2.5 | 30 | 160 |
| | MBTA Route 449/449W | Marblehead-Downtown Crossing (Boston) | Humphrey Street | M-F, 6 am - 8 am (to Lynn); 7:15 am - 6:15 pm (from Boston); Sa, 6:30 am - 12:30 am; Su, 8 am - 12:30 am | 5 | 2.5 | 30 | 176 |
| | MBTA Route 455 | Salem Depot - Wonderland Station | Essex Street, Loring Avenue | M-F, 5 am - 12:30 am; Sa, 6 am - 11:30 pm; Su, 7 am - 11:30 pm | 24 | 18.0 | 45 | 2334 |
| | MBTA Route 459 | Salem Depot - Downtown Boston | Essex Street, Loring Avenue | M-F, 6 am - 6 pm | 11 | 12.0 | 65 | 928 |
| Topsfield | None | | | | | | | |
| Wenham | None | | | | | | | |

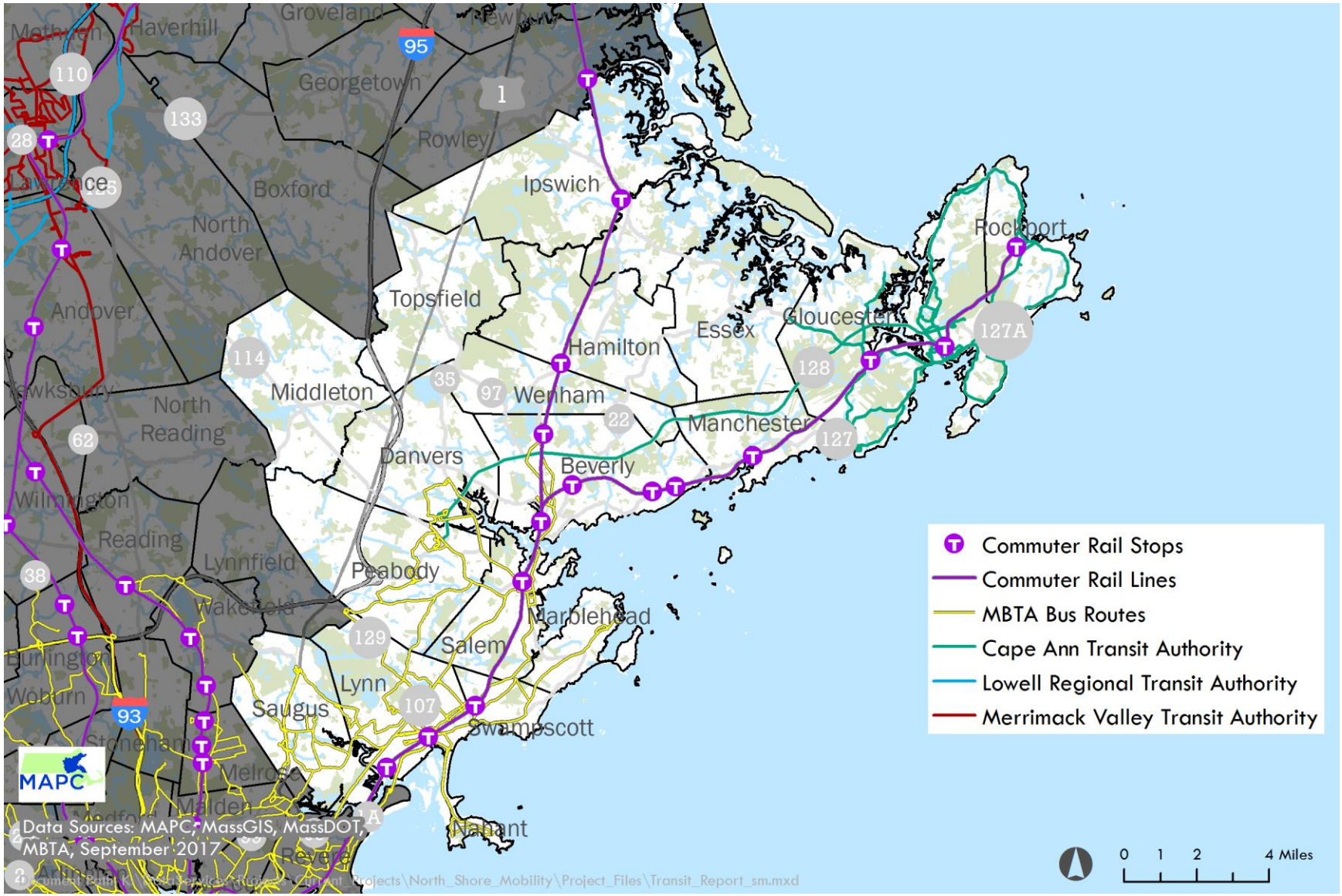
*Number of weekday trips at typical bus stop within municipality, inbound (to Boston).
Sources: MAPC, canntrann.com; mbta.com; ridership for routes from CTPS staff and CATA 2015 Regional Transit Plan

Table 1.7: Existing Commuter Rail Services in NSC Study Area

| Municipality | Line | Stop Locations (within Town) | MBTA Parking Spaces | Bus Route Connections | To Boston Trips | From Boston Trips | Hours of Service (Weekdays) | Average Weekday Headways (minutes) | Ridership* |
|---|---|---|---|---|---|---|---|---|---|
| Beverly | Rockport/ Newburyport | Beverly | 500 | 2 | 34 | 33 | 18.0 | 32 | 2058 |
| Beverly | Rockport | Beverly Farms | 500 | 0 | 15 | 15 | 18.0 | 72 | 207 |
| Beverly | Rockport | Montserrat | 117 | 1 | 15 | 15 | 18.0 | 72 | 356 |
| Beverly | Newburyport | North Beverly | 194 | 1 | 16 | 15 | 18.0 | 70 | 292 |
| Beverly | Rockport | Prides Crossing | 0 | 0 | 3 | 5 | 3.0 | 45 | 20 |
| Gloucester | Rockport | Gloucester | 88 | 5 | 15 | 15 | 18.0 | 72 | 590 |
| Gloucester | Rockport | W. Gloucester | 44 | 1 | 15 | 15 | 18.0 | 72 | 94 |
| Hamilton | Newburyport | Hamilton/ Wenham | 194 | 0 | 17 | 16 | 18.0 | 65 | 436 |
| Ipswich | Newburyport | Ipswich | 170 | 0 | 17 | 16 | 18.0 | 65 | 579 |
| Lynn | Rockport/ Newburyport | Lynn | 965 | 10 | 27 | 28 | 18.0 | 39 | 662 |
| Manchester | Rockport | Manchester | 71 | 0 | 15 | 15 | 18.0 | 72 | 307 |
| Rockport | Rockport | Rockport | 87 | 2 | 15 | 15 | 18.0 | 72 | 323 |
| Salem | Rockport/ Newburyport | Salem | 700 | 6 | 34 | 33 | 18.0 | 32 | 2122 |
| Swampscott | Rockport/ Newburyport | Swampscott | 133 | 4 | 28 | 18 | 18.0 | 47 | 884 |
| Wenham | Rockport/ Newburyport | *See Hamilton* | | | | | | | |

*2013, Weekday, Boston Bound
There is no commuter rail service in Danvers, Essex, Marblehead, Middleton, Nahant, Saugus, and Topsfield
Source: MBTA.com *Ridership and Service Statistics, Fourteenth Edition 2014*

Figure 1.4: Existing Fixed Route Transit in NSC Study Area



Hours of service range from 18 hours (for nearly all rail services and a few bus routes) to two to four hours for some bus routes. Any service that operates fewer than 12 hours per day can hinder the ability of a traditional worker to have flexible hours and run errands after work. Service less than seven hours per day can be effective for some work trips, if the service is provided in the peak morning and afternoon commutes. Service at four or fewer hours a day requires riders to plan their days around the service schedule.[2]

Frequency (headways) is another metric that helps measure the availability or convenience of a transit service. As seen in **Tables 1.6** and **1.7**, most headways in the study area are between 30 minutes to an hour or more. Such headways suggests that passengers will (at a minimum) check the schedule to minimize their wait time, and may need to adapt their arrival or departure times to be less than optimal for their personal schedules.[4]

The final measure for transit availability is to measure the spatial coverage and access of the transit service. MAPC evaluated this by measuring the number of jobs that are within a 45 minute commute by morning peak-period transit.[3] **Figure 1.5** shows those areas that are within a 45 minute travel time for transit. Areas in white are locations that have transit service, but where the average commute is over 45 minutes, whereas grey areas have no transit service whatsoever. As a comparison, **Figure 1.6** shows the geographic coverage of the existing transit services compared with the intensity of residential use and employment in the study area. As seen in these maps, transit routes in the study area operate primarily north-south and are designed mostly to serve workers who commute to the inner core of the Boston region. Moreover, concentrations of residential and employment in areas of Peabody, Saugus, and Danvers have little to no available transit service. This shows that most of the transit service in the study area is not established to serve local work trips, which make up a majority of the commute trips in the study area.

The North Shore area continues to grow in population and has developed significant concentrations of employment. While some of the area has suitable transit geographic coverage, nearly all of the bus and rail routes operate along a north-south network built to serve commuters to and from the inner core of Boston. This transit network does not adequately meet the growing number of localized work trips within the study area. A more detailed, localized assessment of transit needs, along with recommendations for new services to meet those needs, are explored in chapter 3.

[2] Exhibits 5-2 and 5-3, *Transit Capacity and Quality of Service Manual 3rd Edition* (2013).

[3] This concept was developed by the U.S. EPA Office of Sustainable Communities. *See Access to Jobs and Workers via Transit*, https://www.epa.gov/smartgrowth/smart-location-mapping#Trans45

Figure 1.5: Intensity of Employment with a 45 Minute Transit Commute in NSC Study Area

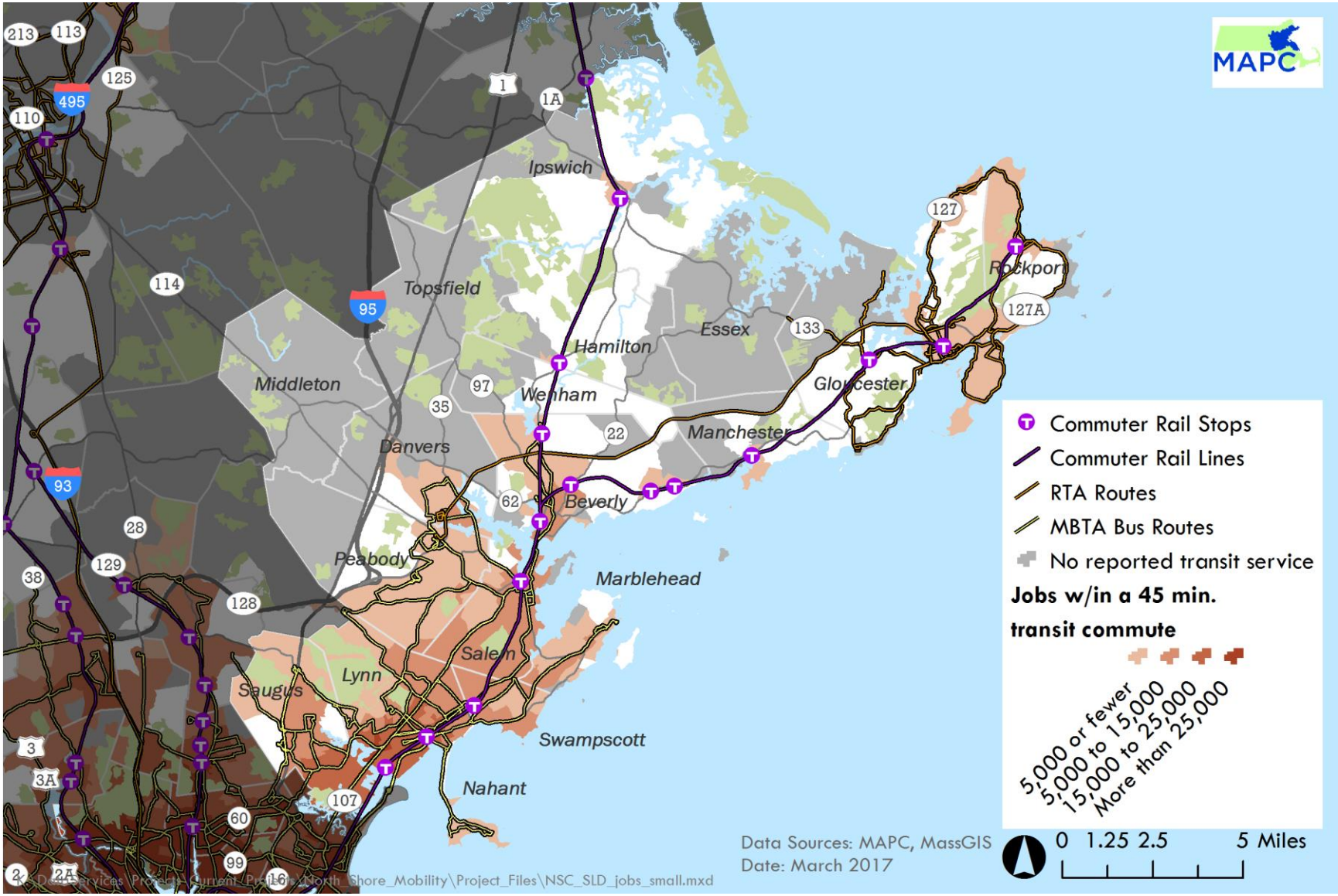
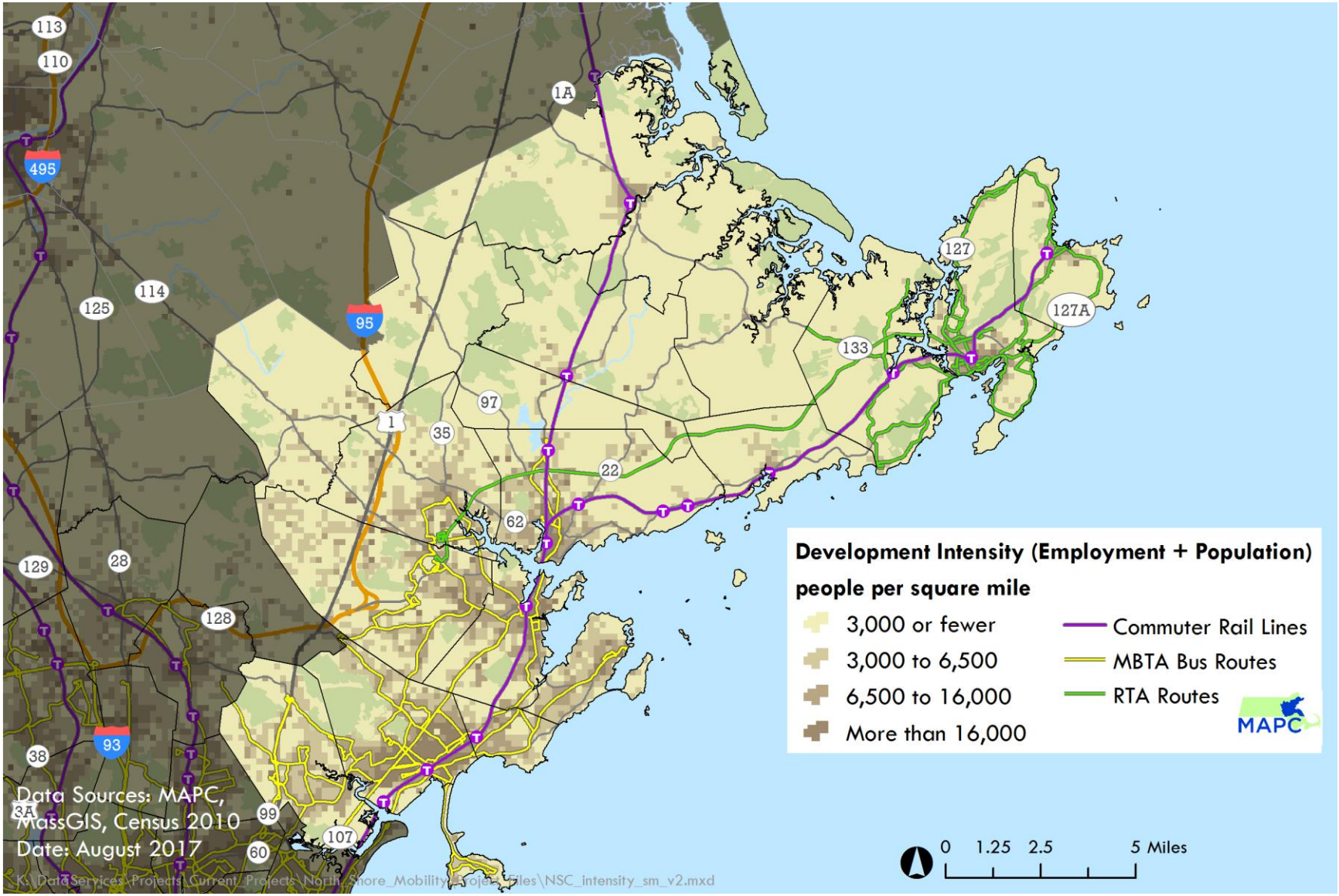


Figure 1.6: Transit Coverage and Development Intensity in NSC Study Area



## 1.4 Previous Planning Studies

MAPC reviewed recent transportation and master planning studies to find what transit needs and possible solutions had been previously identified for the NSC study area. The studies listed in **Table 1.8** include recent studies for the North Shore area, as well as a recent study on the Boston region's transit travel and a review of MAPC's vision for a regional greenway network.

Table 1.8: List of Previous Planning Studies

| Study Title | Year Completed |
|---|---|
| Lower North Shore Transportation Improvement Study | 2000 |
| Danvers Transportation Plan | 2003 |
| Master Plan for Downtown Rockport | 2011 |
| Downtown Ipswich Plan/ Ipswich Community Development Plan | 2013/ 2003 |
| Downtown Peabody Brownfield Revitalization and Economic Development Plan | 2014 |
| Beverly Bass River District Vision Action Plan | 2014 |
| Cape Ann Transportation Authority Regional Transit Plan | 2015 |
| Peabody North River Neighborhood District Master Plan | 2016 |
| Imagine Salem | Underway |
| Manchester Vision Plan and Master Plan (in development) | Underway |
| MBTA Bus Assessment and MBTA Service Delivery Policy | Ongoing |
| MBTA 2040 Commuter Rail Vision Plan | Underway |
| LandLine Vision | Ongoing |
| Exploring the 2011 Massachusetts Travel Survey: Barriers and Opportunities Influencing Mode Shift | 2016 |

The study area's previous transportation and master plan studies share these common themes:

- Much of the existing MBTA service does not support local and commutes to area businesses
- Better pedestrian and bicycle connections from neighborhoods and downtowns to commuter rail stations are needed
- Improved transit, bicycle and pedestrian connections are needed between North Shore communities

Short summaries of each study are provided below.

### 1.4.1 Lower North Shore Transportation Improvement Study (2000)

This study investigated mostly transit service improvements in the Revere and Lynn areas. Recommended changes included extending the Blue Line to Lynn, and more express service from downtown Lynn to Wonderland station (Blue Line).

### 1.4.2 Danvers Transportation Plan (2003)

The plan recommends a new commuter rail service to Danvers via Salem and Peabody, as well as bicycle and trail connections from Danvers and Wenham and other locations in Danvers.

### 1.4.3 Master Plan for Downtown Rockport (2011)

The Master Plan for Downtown Rockport recommended expanded parking at and improved pedestrian connections to the downtown Rockport commuter rail station, making the station more of a "gateway" with better signage, and bicycle rentals and bike connections. The plan also recommended better shuttle connections between downtown and the commuter rail station.

### 1.4.4 Ipswich Community Development Plan (2003) Downtown Ipswich Plan (2013)

The specific recommendations from these two plans are that the station should include better pedestrian and signage components to better connect the station and downtown businesses. The plans also recommend better sidewalks and trail connections around town to encourage more walking and cycling. The 2003 plan notes that the free parking is often at capacity by early morning, and recommended that the Town charge for parking (parking at the lot is still without charge as of July 2017). Finally the plans recommend more visible bus stops in downtown to encourage more use of the seasonal bus service that serves the town in the summer months.

### 1.4.5 Downtown Peabody Brownfield Revitalization and Economic Development (2014) and North River Neighborhood District Master Plans (2016)

These two plans recommended a riverwalk to be developed along the North River connecting downtown Peabody and Salem. It also recommended more complete streets to better serve transit connections. Long-term, the plan recommends light rail or other fixed guideway transit connecting downtown Peabody to the commuter rail station in Salem. The report also recommends additional coordinated planning between Peabody and Salem to make these connections.

### 1.4.6 Beverly Bass River District Vision and Action Plan (2014)

This plan was centered on the area around the Beverly Depot commuter rail station and the Bass River that runs west of the station. Among the plan's recommendations are better bus connections, dedicated taxi stands and placemaking components at the station, as well as trails along the Bass River and a more complete street network to better connect the station with downtown Beverly.

### 1.4.7 CATA Regional Transit Plan (2015)

The regional transit plan recommended changes to existing CATA services as well as expanded service areas. Recommendations included more simplified schedules and routes, as well as expanded fixed route and flexible (dial-a-ride) service in Ipswich.

### 1.4.8 Imagine Salem (underway)

Imagine Salem is a 10-year plan being developed for Salem. Among the first findings in the study area is an assessment of existing transportation conditions. These findings so far note that many neighborhoods in Salem are not within a 10 minute walk of transit, and that much of the existing transit network does not adequately connect the neighborhoods with major employers in Salem. The study also notes that the four largest employment sectors in Salem have lower to middle average incomes, which may indicate the need for more cost effective transportation alternatives for these employees. As part of Imagine Salem, the City is also evaluating several potential municipal shuttle routes connecting the downtown, Salem State University, the ferry, and other activity centers.

### 1.4.9 MBTA Bus Assessment and MBTA Service Policy (ongoing)

The MBTA is undertaking a comprehensive assessment of all of the existing transit modes as well as adopting service policies to review the performance of existing bus services. Starting in 2017, the MBTA is undertaking a comprehensive review of each bus route to determine if they meet minimum service standards, and what changes might be needed to improve the performance of below-standard bus services.

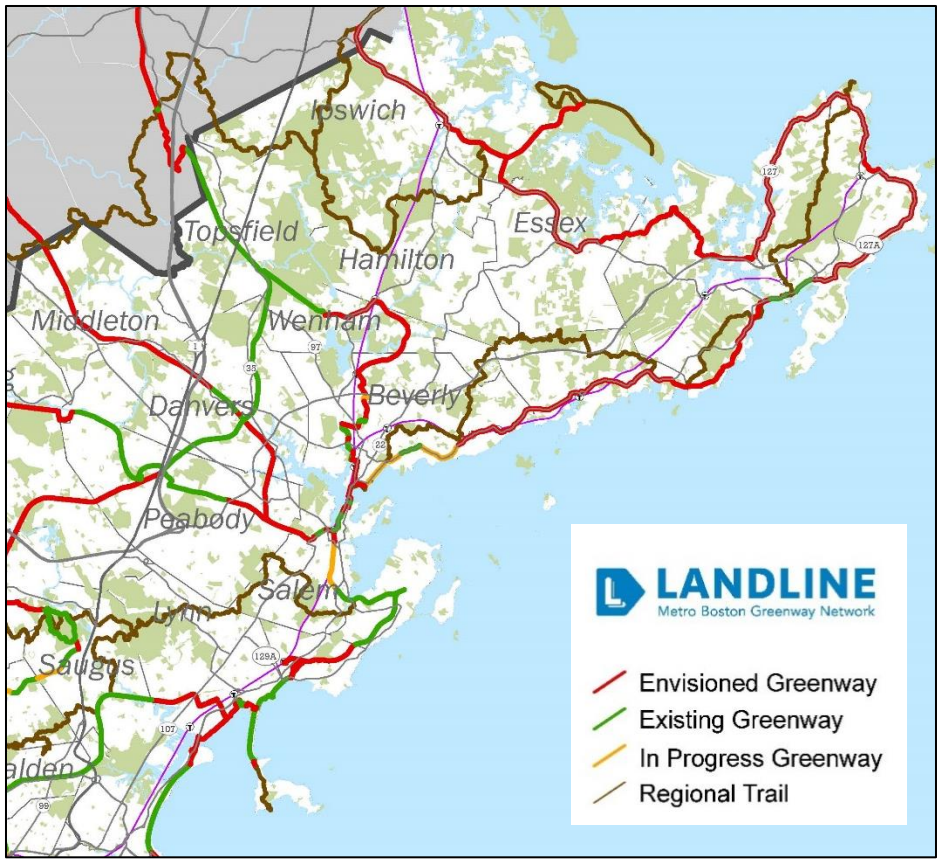
### 1.4.10 MBTA 2040 Commuter Rail Vision (underway)

In 2017 the MBTA has begun a review of the entire commuter rail system to determine what the future needs will be. Known as the 2040 Commuter Rail Vision, the study will evaluate service alternatives, analyze rail operations, and determine the capital needs to support the alternatives. The study will decide if the commuter rail to evolve into a "suburb to suburb" service with fare and schedules to serve more of the employment areas located near commuter rail.

### 1.4.11 LandLine (Metro Boston Greenway Network)

LandLine is MAPC's vision to connect the region's greenways and trails into a seamless network. The plan has been developed in coordination with the LandLine Coalition, a group of 40 volunteers representing a number of local agencies and advocacy groups. The vision is updated regularly, based upon revised pedestrian and bicycle plans for towns and subregions. Several existing and proposed greenways connect with commuter rail stations and employment and residential areas in the North Shore area, and can be a key component of serving the first/last mile connections. **Figure 1.7** shows the North Shore portion of the LandLine Vision. As seen in the figure, only portions of the LandLine trail have been built in the North Shore.

Figure 1.7: Portion of LandLine Greenway Network



### 1.4.12 2016 Exploring the 2011 Massachusetts Travel Survey: Barriers and Opportunities Influencing Mode Shift

The Boston Regional Metropolitan Planning Organization (MPO) in November 2016 completed a draft comprehensive analysis of data from the 2011 Massachusetts Travel Survey. The purpose of the 2016 study is to determine what factors most influence mode choice, and thus determine the types of work trips that are most competitive for transit in the Boston region. The study found that distance – specifically distance from work and/or home to a rail stop – and density – specifically, at the worksite and the availability of parking – were the two factors that best determined the attractiveness for using transit. Other factors, including income, had a lower impact on mode choice. The study also found that work trips to the Boston inner core and reverse commute trips had the highest choice for transit. However, the analysis also found that new transit services that are developed to serve work trips to the Boston inner core can also serve the reverse commute trips and other work trips, if designed appropriately. The study recommendations include:

- Implement better bus service to commuter rail stations; this service can also serve additional employment centers in the suburban areas
- Implement a number of small but measurable transit improvements, especially within the markets most competitive for transit
- Municipalities should encourage employment and residential development convenient to transit
- Make "encouragement for non-automobile travel" a condition for new development, particularly in areas with attractive transit service

The recommendations and findings from all of these transportation studies were reviewed again during the needs assessment this mobility study, as well as during development of the recommendations and pilot projects.

## 1.5 Emerging National Trends on Shared Mobility, Transit Integration and New Transportation Technology

A review was undertaken of US transit agencies and governments that are finding ways to better integrate multiple transit services and ways to partner with transportation network companies to improve connections (a practice also known as "shared mobility").

MAPC reviewed the following studies to find examples of recent trends on shared mobility, transit integration, and future technology.

- 2010 Guide for Planning and Operating Flexible Public Transportation Services (TCRP Report 140)
- 2015 Improving Transit Integration Among Multiple Providers, Volumes I and II (TCRP Report 173)
- 2015 Transportation Demand Management Case Studies and Regulations (MAPC)
- 2016 Shared Mobility and the Transformation of Public Transit (APTA)
- 2016 Private Mobility, Public Interest (Transit Center)
- 2016 Fast Forward: The Technology Revolution in Transportation and What it Means for Massachusetts (Transportation for Massachusetts)
- 2017 Disruptive Transportation: The Adoption, Utilization, and Impacts of Ride-Hailing in the United States (Institute for Transportation Studies, University of California, Davis)
- Various news reports on Microtransit pilots

MAPC's review of these reports found the following emerging trends:

- **Flexible route and deviated fixed route:** Several transit providers have used this as a way to serve lower density

areas where traditional fixed route bus service might not be cost effective. The services could work when agencies need to reduce the costs of full demand-responsive services, and/or eliminate the need to operate ADA-complementary paratransit services in select geographic areas, and can be a way to provide an introduction to public transportation to areas not previously served by fixed-route transit. An example of this flexible service is Denver's Call-n-Ride service, which operates in multiple areas in the region where demand does not warrant fixed-route bus service. Riders can schedule the service two hours in advance and frequent users can subscribe to the service for daily or weekday trips. A 2009 study found that nearly 74 percent of the riders are work trips, and about one-third of riders are new to transit. The service costs more per ride and carries far fewer riders per hour than traditional fixed route bus service.

- Integration: Integration can run from several providers communicating about service changes, travel patterns, etc., to coordinating service connections, to more formal agreements for collaboration and even consolidation. Valley Metro in the Phoenix region has a single "brand" and marketing among several providers. GoTriangle in the Raleigh-Durham-Chapel Hill region has a regional call center and regional fare structure, a single integrated transit-trip-planning website, as well as consolidated marketing and branding across several providers. In the Puget Sound region, the ORCA (One Regional Card for All) is a contactless smart card that allows riders one fare medium on any of the region's seven transit providers. The MBTA and other transit operators also work with third-party applications to ensure transit services are included in mobility apps, so that users can see transit, ride-hailing, bike sharing and car sharing services available within their area. Future apps will include integrated payment options across all transit and other mobility providers within a single app.

- Shared Mobility with transportation network companies (TNCs)/Ride Hailing companies: Several transit providers in the US have formed partnerships with ride hailing companies such as Lyft and Uber. It should be noted that these TNC partnerships are very new, so that trends and lessons learned are difficult for possible application for other communities.

  Examples of these include:

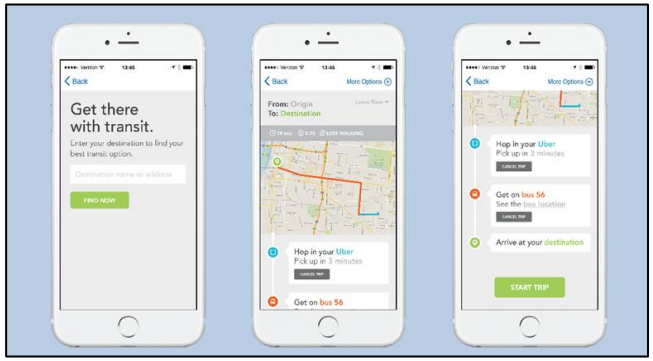
  - Pinellas Suncoast Transit Authority (PTSA) in Florida will subsidize up to $3 Uber, taxi or paratransit trips for select underserved zones to a designated PTSA transit stop or transit center. This service began in early 2016 and is now being expanded to other areas with "unlimited, on-demand" Uber and Taxi rides for $1.

  - PTSA is also now offering TD Late Shift, a pilot program demonstration aimed at helping low-income, unemployed residents overcome transportation barriers to employment. With this new program, riders can request up to 23 free rides per month between the hours of 9 PM and 6 AM. Rides must be to a place of employment or residence.

  - The City of Altamonte Springs, FL in 2016 began offering discounted Uber rides within the city limits and deeper discounted rides to the SunRail commuter rail station in the city. In 2017, the program was expanded to four additional cities - Lake Mary, Longwood, Maitland and Sanford – and now offers a 20 percent discount on rides

within the five cities and a 25 percent discount on rides to or from SunRail stations.[4]

- Riders using the GoTriangle (North Carolina) website and app can book with Uber for a portion of their trip through the transit agency's trip-planning apps and software (TransLoc). North Carolina recently began a joint Amtrak/Uber trip planning and ticketing option for intercity rail trips booked online to stations in North Carolina.[5]




GoTriangle (NC) recently partnered with Uber allowing customers to book both transit and ridesharing trips within a single application (Graphic: TransLoc)

- **MicroTransit** is demand-driven flexible transit service, with the goals to optimize vehicle efficiencies and improve the rider's experience. Microtransit is an attempt to bring the flexibility of ride hailing services (Uber, Lyft) to transit.

Presently there are pilot services being tested by the private sector, including Chariot in San Francisco, and previously Bridj, a defunct microtransit operator in Boston. In the public sector, transit agencies are testing microtransit operations to make transit more efficient and flexible while maintaining the goals of equitable service for the entire community, particularly those with limited access to automobiles, lower-income communities, riders with disabilities, and residents and workers with limited access to credit cards and smart phones. As of 2017 there are pilot microtransit services being operated by Capital Metro in Austin, TX, and new pilots are being developed in Los Angeles and Orange County in California. A microtransit service in Kansas City, operated as a partnership of Bridj, Ford and KC Transit, was discontinued in 2017 due to low ridership.

Microtransit public operations are typically on demand transit within a set geography, with riders hailing the service via a smart phone app or by calling a dispatcher. Vehicles are usually smaller buses, and riders must share rides with others hailing the service. The service is a 21st century version of dial-a-ride transit, where rides can be hailed within a few minutes instead of the typical 24- to 48-hour advance reservation requirement of most dial-a-ride transit today. Because these pilots are new, there are limited data on their cost-effectiveness.

[4] Dovey, Rachel. "5 Florida Cities Team Up to Subsidize Uber Rides." Next City. August 22, 2017. https://nextcity.org/daily/entry/five-florida-cities-subsidize-uber-rides accessed September 10, 2017.

[5] "How NCDOT, TransLoc and Uber plan to solve the last-mile problem' with Raleigh-to-Charlotte rail" Triangle Business Journal. November 3, 2016. http://www.bizjournals.com/triangle/news/2016/11/03/how-ncdot-transloc-and-uber-plan-to-solve-the.html.

Summaries of these studies are included to this report in Appendix A.

## 1.6 Local Best Practices

In addition to the national emerging trends, there are several local and regional transit initiatives that could be best practices for meeting the first and last mile connections.

Local fixed route public transportation: The town of Acton, through its partnership with other adjacent towns, is now operating four distinct fixed route services to the South Acton Commuter Rail station that connect to various parts of Acton and to other nearby towns.

The **Cross-Acton Transit** connects the commuter rail station with local shopping, schools, town hall, and residential areas. The route runs hourly from 8 AM to 6 PM on weekdays. According to news reports, the service costs the Town approximately $130,000 annual to operate and averages 250 rides a month. The costs are split between the Lowell Regional Transit Authority (LRTA) and the Town. The local funding is from a local prepared-meal tax. LRTA provided the vehicles and drivers. Fares are $1.00. The Town notes that the service helps with three types of trips. First, it provides access to the South Acton Commuter Rail Station: the station's parking lot often fills up before 8 AM. Second, the all-day service will help seniors and others access to shopping and other daily needs trips. Finally, the service can connect students to after-school activities.[6]

Acton also operates a public transportation morning and evening shuttle service to the South Acton Commuter Rail station, called the **MinuteVan Rail Shuttle**. This commuter shuttle runs from the West Acton Fire Station and the Mt. Calvary Church lot to the


CrossTown Connect, a Transportation Management Association partially funded by the towns of Acton, Boxborough, Littleton, Maynard, and Westford, operates public transportation shuttles connecting the crowded South Action commuter rail station to area employment and residential centers. (Photo source: Google)

MBTA Commuter Rail Station in South Acton. The service runs between 6:45 AM and 9:00 AM and then again between 5:12 PM and 7:30 PM. Riders have options to purchase combination parking/bus passes or just bus passes (single rider or day

[6] "Acton Introducing New Transit Service" The Beacon, October 5, 2015. http://acton.wickedlocal.com/article/20151005/news/151007892

passes). The standard single trip fare is $1.00.[7] The service allows for West Acton residents to access the South Acton commuter rail station, which often has a full parking lot. The service costs approximately $96,000 and averages over 1,000 rides per month. According to the Town of Acton, the entire cost of the rail shuttle is paid through parking fees and fares. Acton also operates the **MinuteVan Dial-A-Ride**, a service that is available to any resident. Trips are $1.00 and must be books at least 24 hours in advance. The service covers trips within Acton, as well as to Boxborough, Littleton, Maynard and to medical facilities in Concord. The service costs around $108,000 annually and averages around 275 rides per month.

Most recently in October 2016, Acton and Maynard began operating a **Maynard/Acton Shuttle** that connects Maynard and Acton the South Acton Commuter Rail station. The commuter shuttle picks up riders beginning at four stops in the towns, with service to the train station. Similar to the MinuteVan Rail Shuttle, the service operates in the morning and afternoon/evenings to connect with peak travel connections with the commuter rail.[8]

Another example of a successful local fixed route transit system is **Lexpress in Lexington**. Operating since 1979, the service now includes six routes operating on 30 minute frequencies with 23-seat buses. In 2015, Lexpress provided 81,000 rides. According to the Town, 46 percent of the riders are students. Half of the cost of the service comes from a Town tax levy, with the remainder coming from MBTA grants, bus fares, traffic mitigation funding, and donations.[9]


The REV Bus is an example of a successful municipal/Transportation Management Association partnership. (Photo source: 128 Business Council)

In 2015 the Town of Lexington partnered with the Town of Bedford and the 128 Business Council TMA to operate the **REV Bus**, a reverse commute shuttle that serves both residents (typically traveling to Boston) and TMA member businesses in the Harwell Avenue area (connecting employees from the Red Line Alewife station for reverse commutes). This unique municipal/TMA partnership has resulted in a successful shuttle with over 17,700 public and employee riders in 2016.

[7] MinuteVan website. http://www.minutevan.net/Home
[8] Town of Maynard website. http://maynardtownadmin.org/2016/09/29/maynardacton-commuter-shuttle-pilot-program-starts-monday-october-3rd/
[9] https://www.lexingtonma.gov/lexpress/pages/about-lexpress.

TMA/Employer Shuttles: Currently Massachusetts has 14 TMAs (sometimes knowns as Transportation Management organizations, or TMOs), seven of which operate primarily outside of the inner core of Boston. TMAs are membership based public-private partnerships of businesses, institutions, and municipalities joined together in a legal agreement to provide and promote commuter transportation options that reduce traffic congestion and improve air quality.[10] Services provided by all or most TMAs include:

- Transportation advocacy
- Bicycle/walking promotions and incentives
- Emergency/guaranteed ride home
- Ridesharing, carpooling, vanpooling
- Ridematching

Several of the TMAs also operate shuttle services for their members. Of these seven suburban TMAs, three (**128 Business Council, Middlesex 3, and Neponset Valley**) operate employer shuttles. Most of the shuttles operate only during the morning and late afternoon peak periods, providing bus or van service from a central point (such as a commuter rail or subway stop) to employment centers a few miles away. The TMA operates or hires a transportation company to operate the shuttle, which is paid by businesses served by the shuttles. Employees must show a valid employee ID to board.

Partnerships with TNCs: Similar to what others have done in the US, two government agencies in Metro Boston have partnered with TNCs to improve mobility. In 2016, the North Shore TMA developed a plan for **North Shore Community College** (NSCC) to partner with Uber for discounted trips to help with student mobility. Beginning in fall 2016, NSCC partnered with **Uber** to provide students partially subsidized trips between NSCCs' Danvers Campus and the North Shore Mall or Beverly Depot. NSCC provides this service as an alternative to contracting for a shuttle (until 2017, the college funded a shuttle to run among the three NSCC campuses in Lynn, Middleton, and Danvers). Students register for the service and are eligible for a $10 discount on rides between the Danvers Campus and the Mall or Depot during select hours Monday through Saturday.[11] According to the college's Vice President, the service has proven popular with students.

The **MBTA** also recently began a pilot program and entered a partnership with **Uber** and **Lyft** to provide **RIDE paratransit trips**. Ride-share pilot participants have on-demand service available with Uber or Lyft and pay the first $2.00 of the trip. The MBTA picks up the next $13.00 of the trip, with the customer picking up any remaining trip costs. In March 2017, the pilot program was expanded to the entire Ride service area.[12,13]

[10] http://www.masscommute.com/what-is-a-tmatmo/
[11] http://www.northshore.edu/uber/
[12] http://www.mass.gov/governor/press-office/press-releases/fy2017/governor-t-launch-ride-pilot-program-with-uber-lyft.html

[13] The MBTA estimates that the six-month pilot program has reduced costs for each trip, but the program's success increased the overall number of paratransit trips taken. A revised program is now underway in 2017.

# 2 Stakeholder Outreach

MAPC, in conjunction with the towns in the NSC study area, conducted focus group discussions with town staff, area employers, non-profits, and other institutions to review the study findings to-date and discuss the challenges of accessing jobs in the region with transit.

## 2.1 Discussions with NSC Member Communities

During the mobility study MAPC and North Shore TMA staff communicated with the mayors who are members of the North Shore Coalition and with the planning staff of the member towns and cities of the North Shore Task Force, to review existing conditions, emerging trends, and draft recommendations. At each meeting, mayors and staff from the municipalities provided feedback on draft findings, as well as recommendations on stakeholders who should be consulted.

## 2.2 Outreach with Stakeholders

MAPC and North Shore TMA staff held multiple focus group discussions with stakeholders– both individuals and groups – whose knowledge would be helpful in identifying needs and potential services to meet the needs. A list of these meetings is provided in **Table 2.1**.

Table 2.1: List of North Shore Stakeholder Meetings

| Stakeholder Meeting | Date (2017) |
|---|---|
| North Shore Coalition | 3/29 |
| North Shore Task Force | 4/20 |
| Staff for Rep. Moulton | 4/21 |
| Town of Beverly planning staff | 5/2 |
| Planning staff for towns of Salem and Peabody | 5/10 |
| North Shore Workforce Investment Board | 5/11 |
| North Shore Chamber of Commerce | 5/18 |
| Salem Partnership and North Shore Alliance for Economic Development | 6/29 |
| Greater Beverly and Danvers businesses | 7/12 |
| Salem Partnership | 9/8 |
| North Shore Coalition | 9/19 & 10/16 |
| Businesses in Cummings Center and Cherry Hill business parks (Beverly) | 10/20 |
| North Shore Task Force | 11/9 |

MAPC and North Shore TMA also conducted a web survey of North Shore businesses and institutions to better understand their transportation needs. The survey provided another method to collect much of the same information as the stakeholder meetings.

Below are some of the common themes and ideas received during the various stakeholder meetings and online survey.

- Most employers do not see transit access and transportation as a problem for their employees or for the recruitment and retention of their workers.

- Some employers in the retail sector noted problems with workers using the existing transit services to getting to work. Transit either does not have frequencies or does not extend as far to reach their destinations.
- A few tech firms also noted difficulty in recruiting younger workers to work in the suburbs. Younger workers seemed to not only want to use transit but also wanted to live and work in areas with a mix of retail, dining and entertainment.
- Tourism traffic, and transportation access for those working in the tourism industry was noted by stakeholders. Suggestions included improving the transit systems to be more user friendly and marketed towards tourists, and developing seasonal transit options.
- A lack of east-west transit connections was noted, as well as a lack of good connections from the commuter rail stations to employment.

On November 9, 2017 MAPC held a meeting for staff from the towns in the study area and the public to review the draft recommendations, suggest additional improvements, and vote for those recommendations which might have the greatest positive impacts and could be implemented in the short or long term. The draft recommendations were also sent to individuals on the North Shore Coalition and North Shore Task Force email distribution list for their review and comment.

# 3 Suitability Analysis and Recommendations

Using the data collected in the first three chapters, MAPC mapped areas of unmet transit needs, and develop recommendations for possible services and pilot programs.

## 3.1 Suitability Analysis Process

To identify areas where existing transit service could be improved, or where new types of service may be implemented, MAPC conducted a transit needs assessment and suitability analysis for the North Shore area. The process was based upon the procedures used in the Minuteman Advisory Group on Inter-Local Coordination *MAGIC Suburban Mobility Study (2011)*[14], the *North Suburban Mobility Study* (2017)[15] as well as methods used by MAPC in local access scoring to find the potential roadway utility for pedestrian and bicycle connections.[16]

A suitability analysis ranks places according to how well they meet a set of criteria for a specific intervention or action. In this case, MAPC used a suitability analysis to determine which Census tracts would be the best sites and most suitable candidates for additional or improved public transit and other first/last mile connections.

### 3.1.1 Calculation Methods and Criteria

MAPC's Data Services department conducted the suitability analysis. This analysis was conducted at the tract level using Community Viz, a ArcGIS add-in for planning applications. This analysis was run for different scenarios:

- Boston Centered commutes, i.e., covering commutes from the North Shore to Boston. The transit share in the North Shore is most prevalent for these work trips.
- North Shore commutes, or commutes that begin and end within the North Shore Coalition study area.
- Tourism trips within the study area, to help serve both employment supported by the tourism industry, as well as trips by tourists visiting the North Shore.

Initially, MAPC investigated reverse-commute trips (work trips originated in Boston to jobs in the North Shore). However, the number of reverse commute trips was very small and thus not significant enough for the suitability analysis. During community outreach for this study, tourism traffic and tourism employment was cited by various stakeholders as an important element for the North Shore economy. Therefore, tourism trips were added to the suitability analysis.

Each of the criteria listed for the scenarios below were assembled into a single feature class, then each measure is rescaled to a score from 0 to 100 and then combined to create an overall score for each scenario. The data used in each analysis are described below; a more detailed description of the criteria and methods is included in Appendix B.

[14] http://www.mapc.org/magic-suburban-mobility-transit-study
[15] http://www.mapc.org/nspc
[16] http://localaccess.mapc.org/

*Boston Centered Commute Suitability Criteria*

1. Population Density
2. Vehicles per Household
3. Commuters traveling to  Boston or Cambridge)
4. Proximity to MBTA Service
5. Minority population, low income households, and limited English speaking households (as defined by the American Community Survey)

*North Shore Commute Suitability Criteria*

1. Population Density
2. Employment Density
3. Vehicles per Household
4. Journey to Work Data for Intra-subregion Commuting
5. Residents with Disabilities
6. Proximity to MBTA Service
7. Minority population, low income households, and limited English speaking households (as defined by the American Community Survey)

*Tourism Trips Suitability Criteria*

1. Hospitality and restaurant employment
2. Hotel/motels
3. State owned open space
4. Retail employment

## 3.2 Suitability Assessment Results

MAPC reviewed the suitability findings for all Census tracts, and compared those findings with a review of the existing transit services and land uses in the study area. Most of the Census tracts with "highest" and "high" suitability ratings currently have commuter rail and/or MBTA or CATA bus service. For those parts of the study area with existing fixed-route transit, some improvements to these services may be warranted, in terms of route revisions or additional frequencies. New localized bus or shuttle services can also help with the first and last mile connections for work trips.

Many of the areas that lack bus or rail service do not have the residential or employment densities typically needed to support fixed route transit service, and thus often scored lowest in the suitability analysis. Therefore, investment in such transit service may not be feasible. However, these towns and cities should continue to focus other efforts at improving pedestrian and bicycle accessibility and mobility, such as through mixed land uses and the development of complete streets and greenways.

The assessment results below include geographies that were identified as most suitable for transit improvements, and general recommendations. The data used in the analysis is included in Appendix B. For those areas that scored high/highest suitability, MAPC completed additional job density and commute analyses described in section 3.3 to help determine a more specific geographies. The Recommendations (section 3.4) that combines the findings from all three trips types includes possible programs that can help meet the identified needs.

### 3.2.1 Boston-Centered Commute Suitability Assessment Results

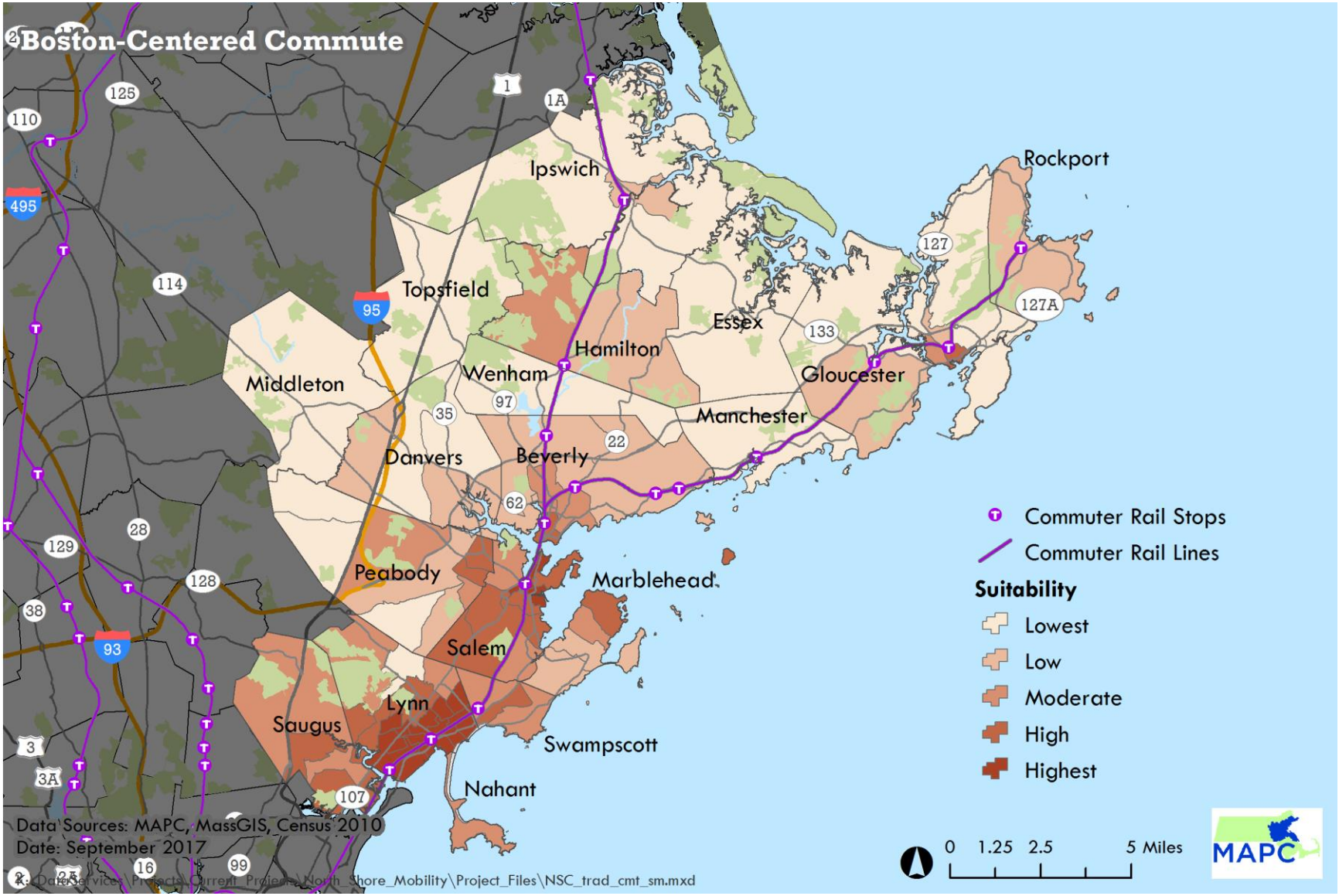
The travel patterns associated with Boston-centered commuting place an emphasis on access to major fixed route bus services and commuter rail. Given the number of jobs within Central Boston, and the availability of bus, rapid transit and commuter rail service, more transit trips in the Boston area are for work trips into Central Boston than other areas.

As seen in **Figure 3.1**, the suitability analysis found the following:

- The Census tracts that scored the highest or high suitability scores are within Lynn, Saugus, Swampscott, Salem, Beverly, Peabody, Marblehead and Gloucester. All of these towns currently have some sort of transit service to Boston.
- Lynn currently has the best service, with commuter rail service and 14 MBTA bus routes. Other high scoring cities have multiple bus routes providing service into Boston (as well as some providing connection with commuter rail and the Blue Line). Gloucester has commuter rail service as well as limited bus service from CATA. Beverly has only one MBTA bus route, but has five commuter rail stops within their city limits.
- Nearly all of the Census tracts northwest of highway Route 128 scored in the low or lowest range, likely due to the existence of no fixed route bus service and low population and employment densities.
- Changes to MBTA service that could help serve these areas include extending bus service hours (several bus routes do not provide service before 6:30 AM or after 7 PM).

Salem has become a community with both a substantial number of commuters to Boston, as well as an employment and tourist hub for the North Shore (Salem Station pictured; photo: Matthew Hill, Creative Commons).

Figure 3.1: Boston-Centered Commute Suitability Analysis Results



### 3.2.2 North Shore Commute Suitability Assessment Results

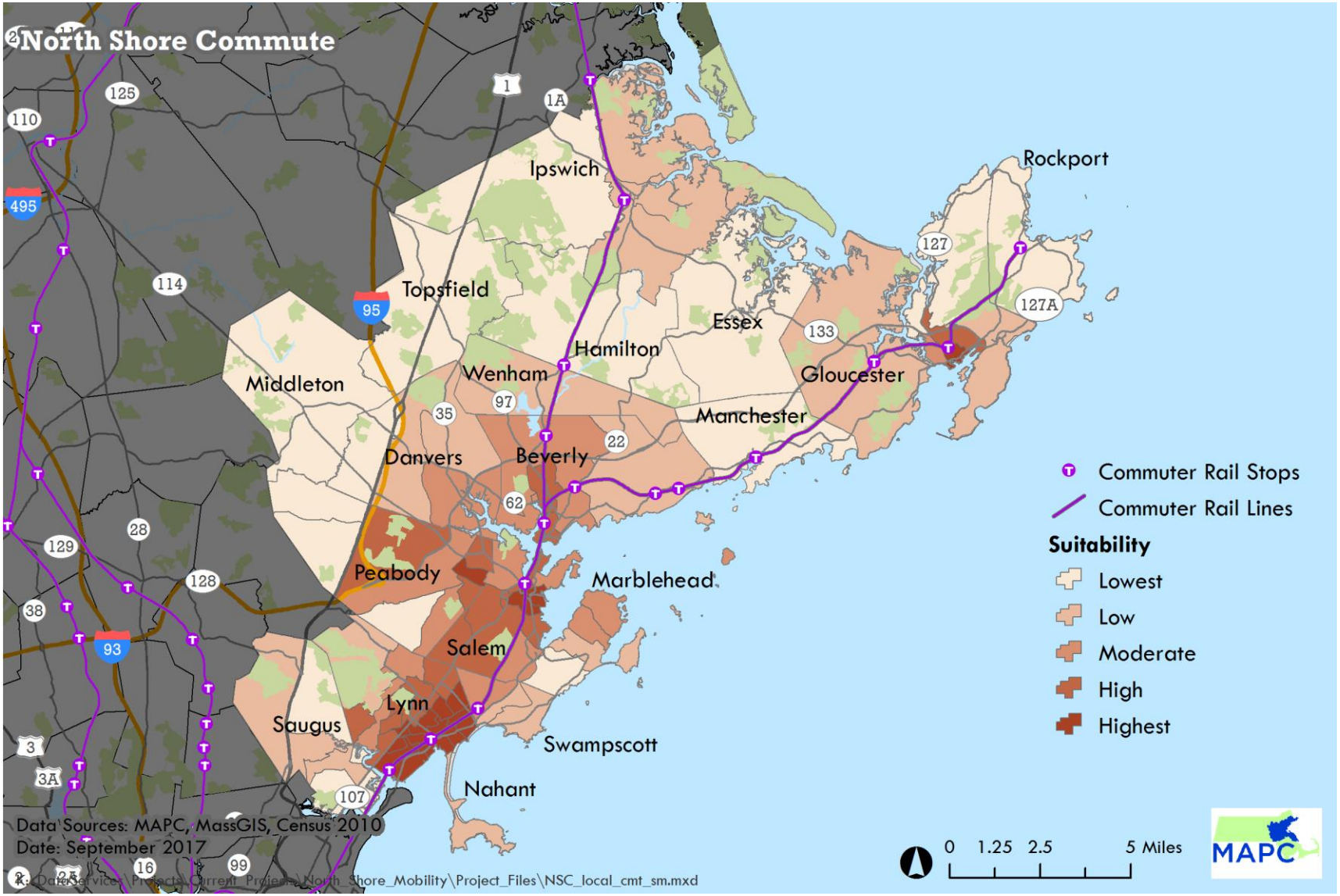
A majority of work trips within the North Shore area are within and between the various municipalities. Moreover, transit only accounts for one to three percent of the work trips outside of Boston's central core. This relatively small number of transit trips is due in part to the predominantly north-south nature and limited geography of the existing services in the area, as well as to the dispersed, low-density and auto-oriented travel patterns.

The North Shore commute suitability analysis (**Figure 3.2**) indicate the following needs.

- Areas most suitable for improved local transit service are concentrated in those municipalities with the largest concentration of employment and population, specifically the downtowns in Lynn, Salem, Peabody, Beverly and Gloucester. The tracts in these areas score higher for both Boston-centered and North Shore commute analyses, suggesting that service improvements can help with both trip types.
- Nearly all of the Census tracts that scored a high suitability for North Shore transit trips have existing bus or commuter rail service, with the exception of the western areas of Peabody between Massachusetts highway route 128 and US 1. As noted in the Boston-centered Commute suitability analysis, changes to MBTA service that could help serve these areas include extending bus service hours (several bus routes do not provide service before 6:30 AM or after 7 PM). These extended hours can help with work trips in the food service, retail and health care industries have varied work schedules.
- Locally-sponsored shuttles can serve an important link in the first/last mile connections where existing bus and rail service does not adequately serve these higher scoring tracts.

Beverly is served by multiple commuter rail stations but has limited bus service.

Figure 3.2: North Shore Commute Suitability Analysis Results



### 3.2.3 Tourism Trips Suitability Assessment Results

The North Shore area has a significant number of businesses related to tourism, both with historical sites (e.g., Salem) and more local travel (beaches, resorts, state and national parks, etc.). The results for the tourism trips suitability analysis are shown in **Figure 3.3**.

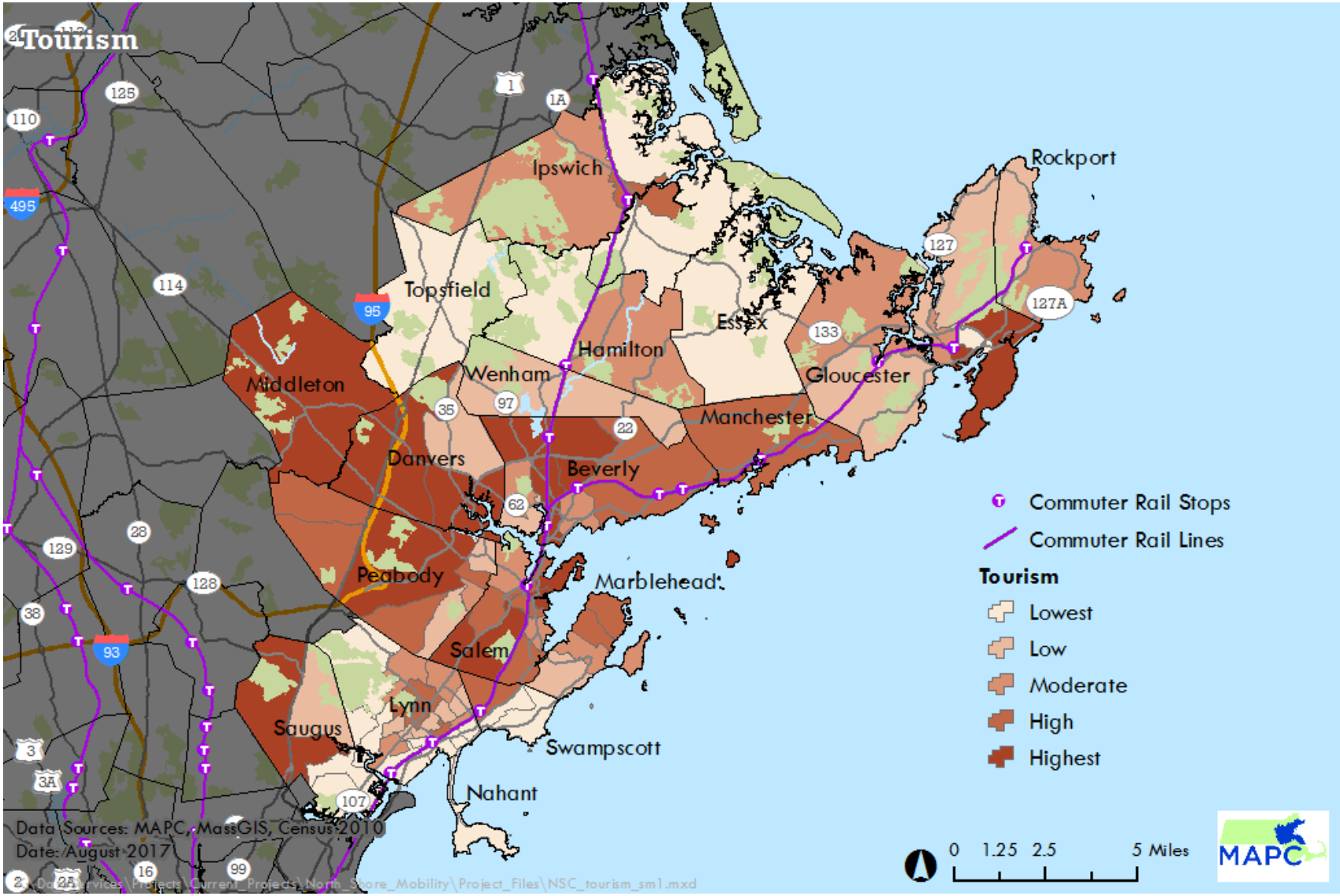
In evaluating tourism trips, MAPC searched for data sources that covered the entire study area to ensure uniformity. There are currently no statewide sources or data on tourism traffic that could be used in the suitability analysis. Therefore, the analysis was limited to hospitality employment, retail/restaurant employment, the locations of state parks, and locations of area hotels and motels.

Given these limitations of the tourism data, the suitability analysis scored higher in lower density areas of Middleton, western Danvers, and portions of Peabody and Saugus. These areas scored well due to the relatively high number of restaurants and hotels along US 1 and I-95 and the state parks in these communities. Although some tourism-related uses have clustered around US-1 and I-95, most of this corridor consists of scattered development with a severe lack of sidewalks and with barriers preventing pedestrian from crossing these highways. These development and infrastructure patterns prevent transit from adequately serving these corridors.

Other areas that had high suitability scores for tourist trips include portions of Salem, Gloucester, Peabody, Ipswich, Beverly, Marblehead and Manchester. Some of these areas are served by transit and/or have higher densities of tourism employment that might warrant improved transit services. Other areas have lower densities and consist of seasonal tourism that could be served by vanpools or other employer-sponsored services for seasonal workers.

Gloucester and other Cape Ann communities have become tourist destinations, both for their historic sites as well as their beaches (Photo: Wikimedia Commons).

Figure 3.3: Tourism Trips Suitability Analysis Results



### 3.2.4 Lower Suitability Tracts

Several tracts scored lower in the suitability analysis for all three trip types, while others scored higher in one trip type but lower in others. MAPC reviewed the data in these areas to determine the reasons for these lower scores, with the following findings.

- Census tracts in Topsfield, Hamilton, Wenham, Essex, as well as most of Ipswich and Gloucester have lower densities for population and employment than other areas of the study area, thereby contributing to a low score in all three trip analyses.
- Tracts in Middleton, Manchester, Gloucester and Rockport scored higher only in the tourism trip suitability analysis due to the concentration of retail and hospitality in some areas. These same Census tracts, however, have lower overall population and employment concentrations compared to the rest of the North Shore area.
- Swampscott and Saugus scored lower for local work trips higher for Boston-centered commutes due to the overall lower employment and population densities.

## 3.3 Job Density and Home Destination Analysis

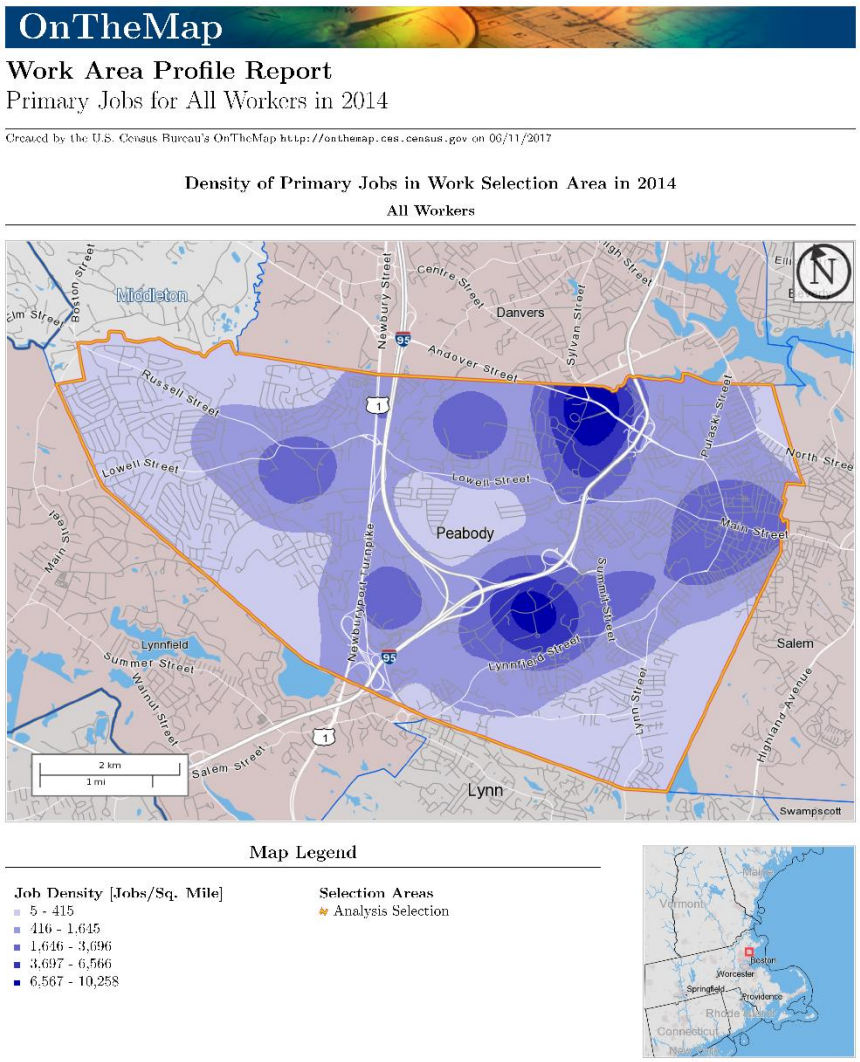
The municipalities with the highest overall suitability scores included portions of Lynn, Salem, Peabody, Beverly, Marblehead, Gloucester and Ipswich. After completing the suitability assessment at the Census tract level, MAPC then examined the commuting patterns and the location of employment in these select towns and cities to better understand the potential transit markets. MAPC staff used the US Census Bureau's OnTheMap online application[17] to map both the density of jobs and direction and location of employees who commute to jobs within each municipality in the North Shore study area. These tools helped to determine two important factors that can help find potential transit connection needs:

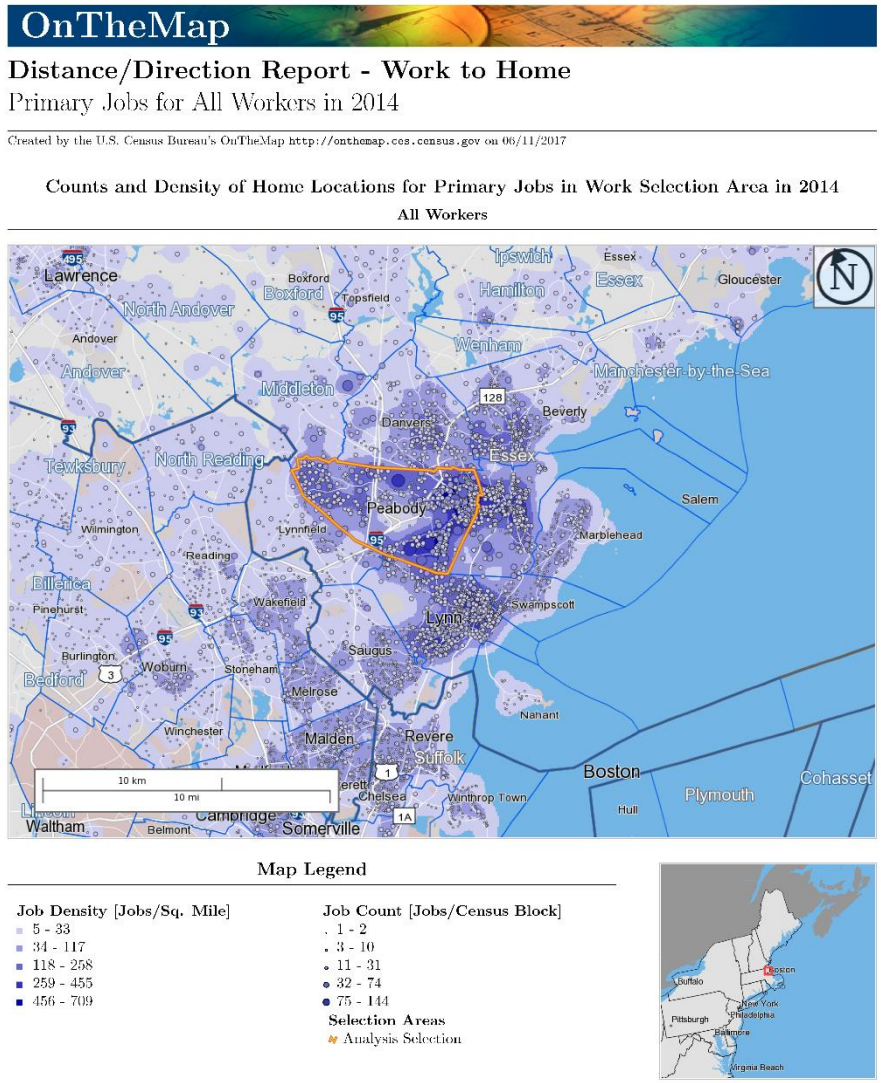
- **The density of jobs** in each municipality by Census block, both total and by industry sector. The analysis for Peabody, for example, confirms that the areas around the NorthShore Mall and Boston Children's Hospital have greater employment density, with most of those jobs being in the medical and retail trades.
- The **home location and commute distance** by Census block for employees who work in each municipality. This helps show where the largest commuting patterns are. In Peabody, for example, most workers in Peabody commute less than 10 miles (within Peabody and from Salem), while many of those who commute outside of Peabody commute from Salem and Lynn.

**Figure 3.4** shows the mapped examples of this OnTheMap analysis. This analysis helps clarify the geography of possible new transit service for those Census tracts that were identified as the most suitable for new service. (Readers can use the OnTheMap web application to review this and other data analysis for each municipality.)

[17] https://onthemap.ces.census.gov/ Users can enter each municipality in the search box to create their own analysis.

Figure 3.4: Example of OnTheMap Analysis - Density of Primary Jobs and Density of Home Locations for Primary Jobs




Source: US Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (http://onthemap.ces.census.gov)

## 3.4 Recommendations

The recommendations for this study are divided into the following:

- Improvements to existing bus services, including creation of a dial-a-ride service in select towns
- Proposed local shuttles, that can be either be operated by a municipal service, TMA, or municipal/TMA partnership
- Partnerships with Ride Hailing/Transportation Network Companies, possibly as a first step to establishing a local shuttle
- Mobility hubs at major transit connections, such as downtowns and/or commuter rail stations
- Complete street and multimodal network improvements

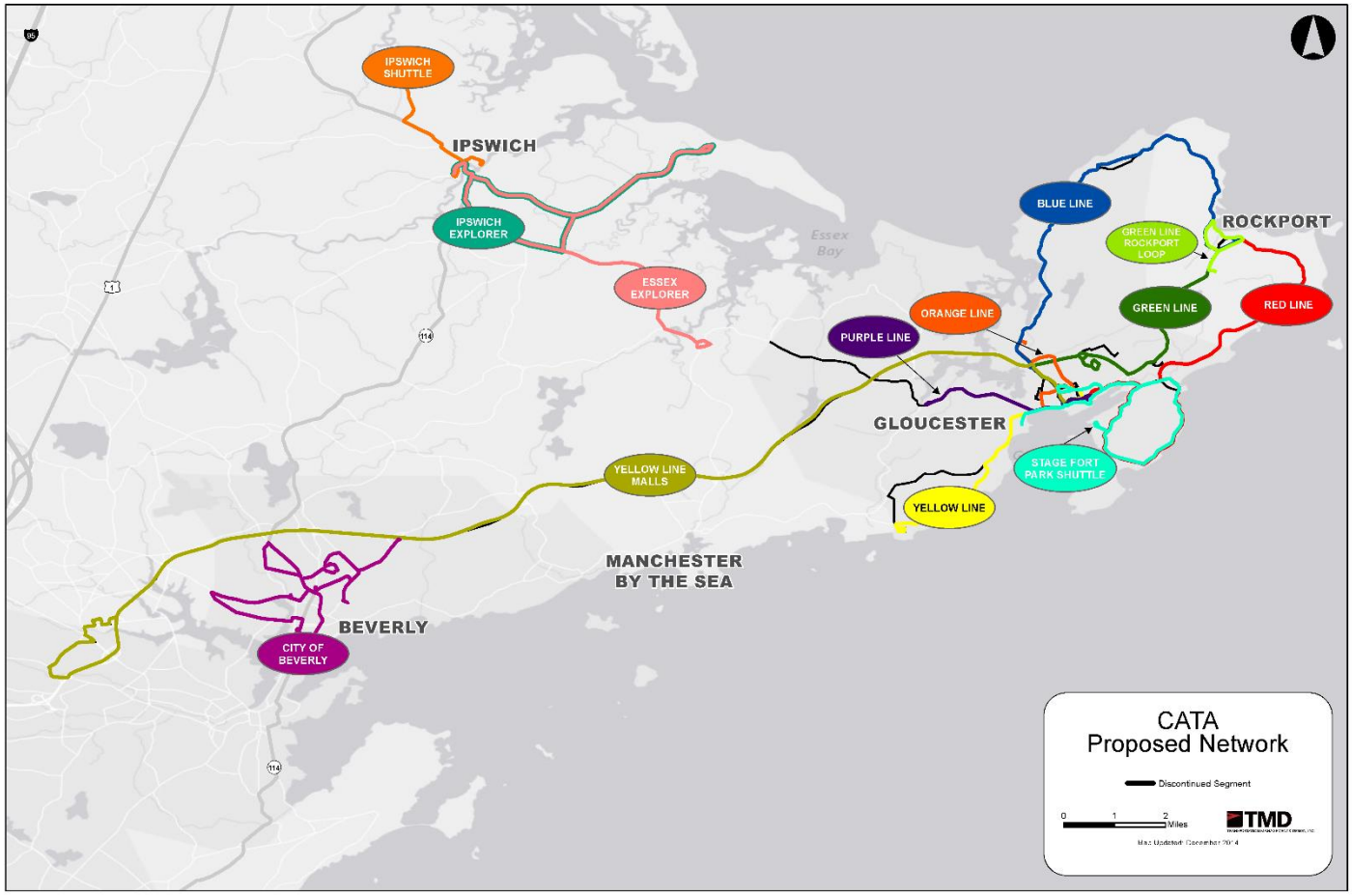
### 3.4.1 Bus Service Revisions

The areas between Lynn and Salem have the greatest concentration of population and employment and thus most of the MBTA bus service is within this portion of the study area. This study recommends that MBTA and CATA consider the following revisions to bus routes serving the North Shore.

- **Improve frequencies and span of service on MBTA Route 465**: This route is one of the few "east-west" bus routes in the study area and provides a critical connection among Danvers, Peabody and Salem. An analysis of ridership on the bus route show that most trips in downtown Danvers, Northshore Mall, Liberty Tree Mall and downtown Peabody and downtown Salem/Salem Depot. Service should be extended beyond the 7 am to 7 pm span to allow more connections between the medical and retail centers along this route and the commuter rail and other bus connections that can be made in downtown Salem. While other MBTA bus routes have later and earlier service Danvers and the malls, nearly all of the other routes connect north-south and do not provide the connections in downtown Salem that are provided with route 465.
- **Improve bus service in Beverly on MBTA Route 451**: This is the only MBTA bus route in Beverly and the route connects employment in downtown Beverly and Cummings Park with the commuter rail stations in Salem and North Beverly, as well as within walking distance of the Beverly commuter rail station. The route makes only four morning and four afternoon trips between approximately 7 am and 7 pm. Nearly all of the boardings/aligntings on this route occur in downtown Salem and the Cummings Center, suggesting that most are connecting to/from either the commuter rail or other MBTA routes in downtown Salem. Extending service to 10 pm and adding more mid-day service would help commuting for the various jobs in Beverly and provide better connections to the bus and commuter rail options in downtown Salem. These improvements combined with a more efficient Beverly Bus routing (see below), would expand mobility options for much of Beverly.

  MBTA should also investigate revising the routing of this route. Since very few trips are made to stops along the downtown portion of Cabot Street and along Tozer Road, MBTA should look to have the route instead serve the Beverly Depot (to provide additional commuter rail connections) and eliminate the alternative routing along Tozer Road.

Figure 3.5: Proposed CATA Transit Network from 2015 Regional Transit Plan




**Expand CATA transit services**: In 2015 CATA completed a **Regional Transit Plan** that included several recommendations for revisions to existing CATA routes, as well as proposed new services. The recommendations included extending the CATA Yellow Route to Beverly Farms commuter rail station and adding a flexible bus service in Ipswich to serve commuters (see **Figure 3.5**). In conversations with CATA staff, the transit agency will be working to implement some of the recommendations in the near future.

- **Revise the Beverly Local Bus**: The Beverly Local Bus is funded by the MBTA and the City of Beverly and is operated by CATA. This route currently makes a one-way "loop" around town every hour, connecting several

neighborhoods and downtown Beverly. Patronage is poor, with an average of 40 riders per day. The 2015 CATA Regional Transit Plan recommended making the route bi-directional to allow riders to get to their destinations more quickly. The plan also recommended splitting the service into two shorter routes that are easier to understand and with greater frequencies.

If MBTA revises and improves bus route 451, the City of Beverly should investigate making the Beverly Bus more of an east-west local service to complement the improved MBTA north-south service.

Between 2017 and 2019, the MBTA will undertake two critical service plans that could transform the bus and commuter rail in the North Shore.

- In 2017 the MBTA will begin a review of the entire commuter rail system to determine what the future needs will be. Known as the **2040 Commuter Rail Vision**, the study will evaluate service alternatives, analyze rail operations, and determine the capital needs to support the alternatives. The study will decide if the commuter rail to evolve into a "suburb to suburb" service with fare and schedules to serve more of the employment areas located near commuter rail. Changes that could help with mobility in the North Shore include discounts for reverse commuters and a revised interzone fare structure.
- The MBTA recently updated their **Service Delivery Policy** and will be evaluating all bus routes to see how well they meet the MBTA's service goals. North Shore towns and cities should participate in this review to provide valuable local input in any service revisions. [18]

### 3.4.2 Municipal On-Demand Transit

In addition to reforming existing transit services, municipalities can explore additional locally operated transit services.

Municipalities can **partner with RTAs for dial-a-ride service** for areas without paratransit or fixed-route bus service. Merrimack Valley RTA currently offers this service to communities without fixed route bus service. MVRTA has formed agreements with five communities and each town or city sets the eligibility requirements and price for its residents. MVRTA invoices the towns for the rides and whatever the town pays is deducted from the MBTA assessment. CATA could implement a similar service in the communities of, Hamilton and Manchester, if they join CATA. CATA would also need to plan to ensure it has the driver and vehicle capacity to offer these services.

Municipalities in the North Shore can also consider **municipally operated on-demand transit service, possibly including revised Council on Aging and Veteran's transportation services.** Towns and cities, such as Acton and Maynard with CrossTown Connect, have experienced greater operational efficiencies and expanded service by creating common dispatching and coordinated operations of Council on Aging transportation services. Furthermore, more efficient services could also allow these on-demand transit services to be extended to the general public. CrossTown Connect currently operates an on-demand transit service in Acton that is available to all residents, but which also prioritizes trips for seniors.

[18] *MBTA Service Delivery Policy*, Approved January 23, 2017.

A further step is to consider is creating municipal or regional "microtransit" on-demand transit service. **Microtransit** is demand-driven flexible transit service, bringing the flexibility of ride hailing services (Uber, Lyft) to transit. Presently transit systems testing this service include "Pickup", operating in portions of Austin, TX, as well as proposed pilots in Los Angeles. Using app-based on–demand transit may be a more efficient service in lower density areas or during shifts when fixed-route transit may be less efficient.

Discussions with stakeholders in the Cape Ann area and Salem noted the need **for additional shuttles services on weekends and other times when tourist trips are most frequent**. While some tourist shuttle services are provided by CATA, municipalities could also benefit from new municipal-sponsored transit services by having new vehicles operate as local shuttles and/or on-demand transit services during weekdays, and then as tourist shuttles from satellite parking and commuter rail stations in the evenings and weekends.

Finally, as newer transit services evolve along the North Shore, all service providers should work to find ways to better integrate their schedules, services, and payment structures. This could include a more **regional branding scheme** and customer service, similar to the "Go Triangle" service of the five transit providers in in the Raleigh/Durham/Chapel Hill area in North Carolina, and a **single payment system** similar to the ORCA card/app in the Puget Sound region in Washington (both described in above in section 1.5).



CrossTown Connect is a TMA sponsored by both municipal and business members that offers both fixed route and on-demand (dial-a-ride) transit services.

### 3.4.3 Local Shuttles

The operation of local shuttles could be done by one or more of the municipalities, perhaps through an intergovernmental agreement, or through a Transportation Management Association (TMA) with municipal membership. For all of the proposed shuttles the location of stops has not been determined, and would be developed during the next phase of planning. MBTA also should consider these proposed shuttle routes as new or revised bus routes during service evaluations of their existing bus services.

**Salem-Peabody-Centennial Drive**: This six mile shuttle would connect between the commuter rail station in downtown Salem and several employment centers in Peabody, including downtown Peabody, Boston's Children's Hospital in Peabody and the Centennial Drive area. This shuttle would provide these benefits.

- It provides an additional east-west service connecting to downtown Salem and the commuter rail, eliminating the need for nearly all transit users to connect in Lynn.
- It complements several north-south bus routes, including route 434, 435 and 436.
- The shuttle would connect with major employers along Centennial Drive, including Boston's Children's at Peabody and Analogic.

**Figure 3.6** shows a possible routing for this shuttle.

*Examples of how communities are improving first and last mile connections* - **CrossTown Connect Local Transit**

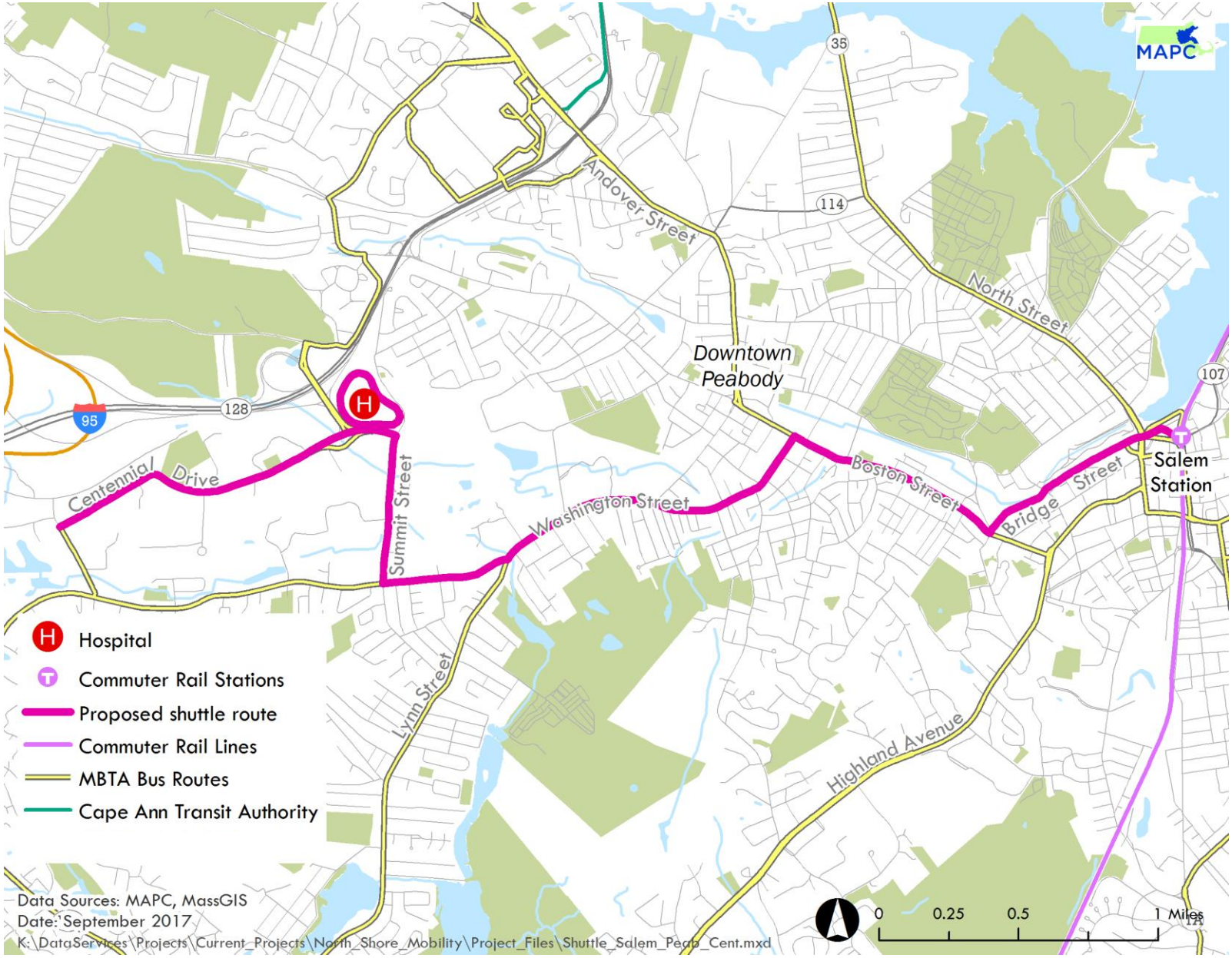

After MAPC completed two suburban mobility studies for the MAGIC subregion, several towns and area businesses formed a new TMA named CrossTown Connect. The TMA operates transit services in the service area, including a central dispatch call center to coordinate Council on Aging vehicle services; van service for seniors and those with a qualified disability; Dial-a-Ride service for any trip within four municipalities; the *MinuteVan Rail Shuttle*, which connects off-site commuter parking with peak hour trains at the South Acton MBTA Station; and the *Cross Acton Transit*, a public transportation shuttle connecting the South Acton MBTA Station with several locations in Acton. In 2017, CrossTown expanded services to Littleton.

The services have varied costs and funding arrangements. For example, the *Cross Acton Transit* (operating 10 hours per weekday), has an annual cost of approximately $140,000 and is funded through a combination of Acton's assessment to the Lowell Regional Transit Authority, local subsidy and fares. The *Rail Shuttle* (which operates 5 hours per weekday) costs approximately $106,000 and is fully funded through fares and fees charged at Acton's commuter rail parking lot.

Service began in 2015.

More information: http://www.crosstown-connect.org/

Figure 3.6: Possible Salem-Peabody-Centennial Drive Shuttle

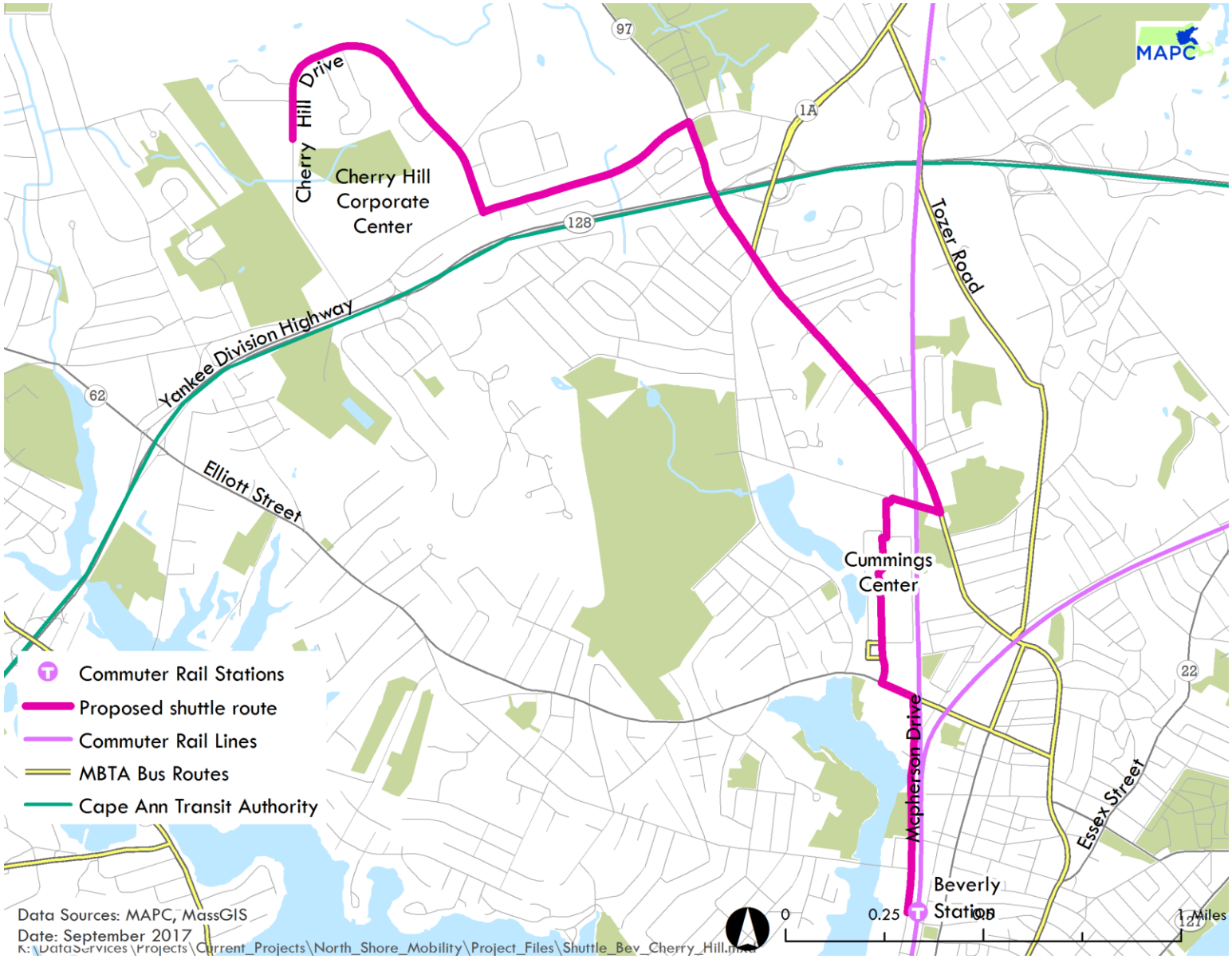


**Beverly-Cummings Center-Cherry Hill**: This four mile shuttle would operate between the commuter rail station in downtown Beverly and the Cumming Center and employment along Cherry Hill Drive.

- The shuttle would connects Beverly Depot and proposed mobility hubs with major employment centers at Cummings Center and Cherry Hill Drive.
- If possible, the shuttle should be routed through the Cummings Center to provide greater “door to door” service and to minimize routing and travel time.
- The shuttle would complement the Beverly local bus and MBTA route 451 while also extending transit service two miles.
- This service would also support the transit oriented development plan for the Beverly Depot by providing an additional connection to the mixed use development proposed around the commuter rail station.

**Figure 3.7** shows a possible routing for this shuttle.

Figure 3.7: Possible Beverly Depot-Cummings Center-Cherry Hill Shuttle



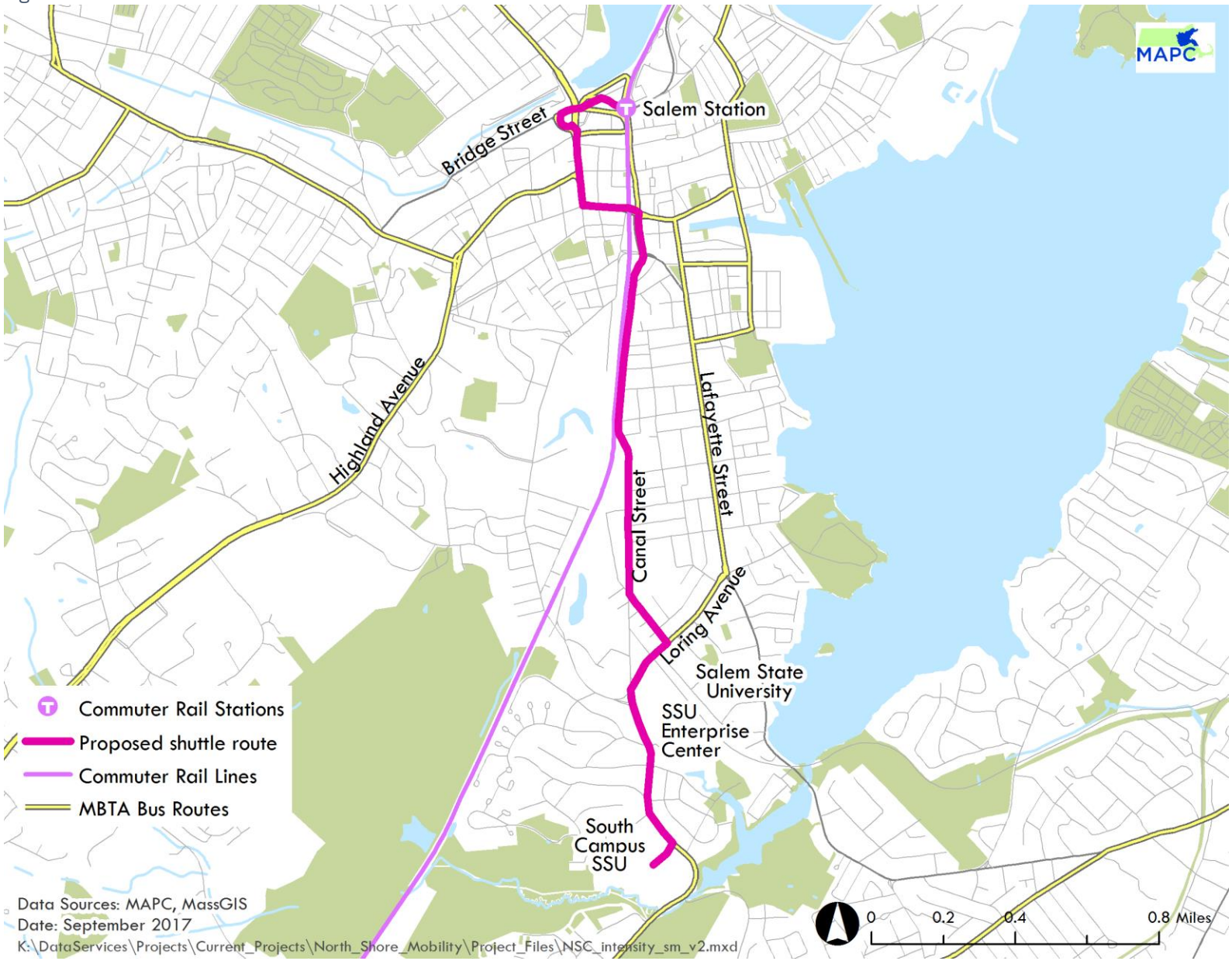
**Salem Shuttle**: This would be a two mile shuttle that would replace the current shuttle that is operated by Salem State University (SSU), operating between the Salem Depot and the SSU Campus, extending to the SSU south campus. The shuttle would be developed and operated under a partnership between the City of Salem and SSU.

- By replacing the SSU shuttle, this service would work to serve tourists, students and workers along this corridor.
- The shuttle would link portions of the SSU campus, the Salem Depot, the proposed mobility hub in downtown Salem, and the proposed Salem South commuter rail station.
- The shuttle would support the trail and transit oriented development of Canal Street, as recommended in a recent South Salem Station study.
- Long-term development of better east-west pedestrian and bicycle connections between the proposed South Salem commuter rail and the hospital would also allow connections from this shuttle to the hospital, which is a major employer in the region.
- It would complement the existing bus routes along Lafayette Street, which are primarily used for longer trips connecting Lynn, Salem and Boston.
- Depending on the operating agreement developed, the shuttle could be fare-free for SSU students, town employees and other employers who participate in the operating funding.
- An alternative would be to extend the shuttle route east of the Salem Depot for some trips to meet the Salem Ferry.
- The shuttle could be joined with other proposed shuttles, perhaps as a longer Beverly-Salem shuttle connecting Cherry Hill, Cummings Center and Beverly Depot with downtown Salem and SSU.

**Figure 3.8** shows a possible routing for this shuttle.

The growing Salem State University campus has helped to create a demand for better transit, pedestrian and bicycle connections in south Salem.

Figure 3.8: Possible Salem Shuttle

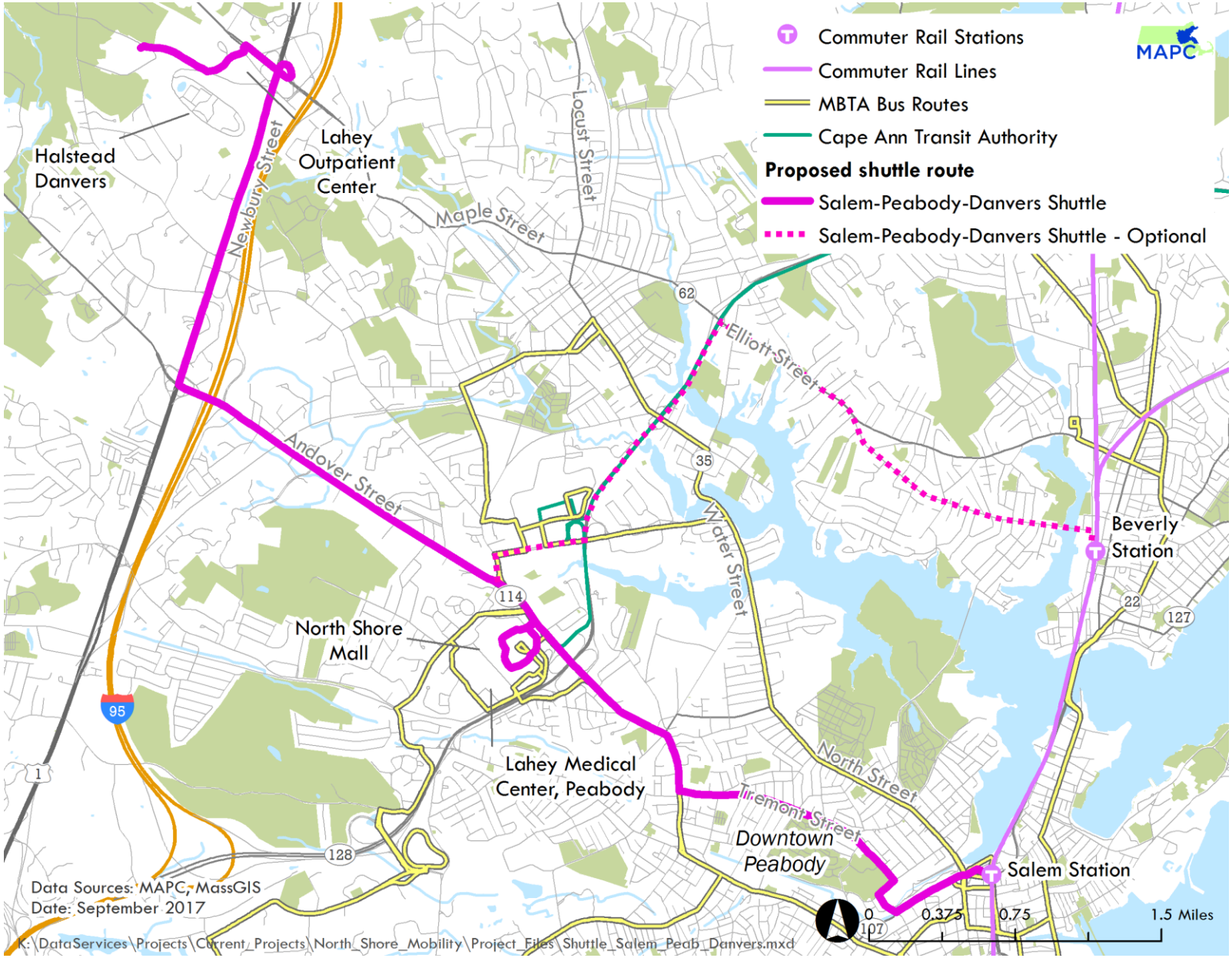


**Peabody-Danvers**: This 8.5 mile shuttle would operate between the commuter rail and locations in Danvers west of US-1.

- The shuttle would serve several retail establishments along Route 114/Andover Street west of the Northshore and Liberty Tree Malls, extending service beyond existing MBTA bus routes.
- The service would also connect the new Halstead Danvers apartments, as well as the medical buildings along Hathorne Avenue (e.g., Lahey Outpatient Center, Hathorne Hill).
- The shuttle could also serve the Danvers campus of North Shore Community College.
- This service will require complete street improvements along Route 114, including better sidewalks and signalized crosswalks.
- Due to the lack of pedestrian amenities, roadway median barrier and high speed road design, the shuttle cannot stop along US-1.
- An alternative routing would connect from the Beverly Depot, serve Bridge Street in Beverly and portions of Elliot Street in Danvers then connect to the Liberty Tree Mall before proceeding west.

**Figure 3.9** shows a possible routing options for this shuttle.

Figure 3.9: Possible Peabody-Danvers Shuttle



### 3.4.4 Ride Hailing/TNC partnerships

Another option to improve the first/last mile connections is to enter a partnership with a transportation network company such as Uber or Lyft for subsidized rides to/from select locations. The trips could be restricted to those serve employers or developers who are members of the TMA, or who enter an agreement with the transit agency. By restricting the trips by geography and/or time of day, the towns or TMA could ensure that only eligible trips are supported. ***This option could be a first step to determine the demand for a new shuttle or bus route extension.***

There are several transit agencies and communities across the US that have developed these partnerships. To ensure that only related trips are funded, rides would need to be restricted to and from certain locations (such as to/from a commuter rail station, mobility hub, or office park) and restricted to a time day and/or days of a week (e.g., 7 AM to 7 PM, Monday through Friday). The drawback to this partnership are that setting geographic limits will miss some work trips that would have been served by a bus route or other fixed-route transit.

When developing the partnership, the municipalities and/or TMA should ensure that the agreement includes data sharing of trip origins and destinations by day of the week, time of day and location. The data should be at a level of detail that can ensure rider privacy but still be relevant for evaluation and planning. For example, the data from TNCs on trip origins and destinations should be refined enough to truly understand the effects of these trips on the local transportation network. This data will then allow government officials to make informed decisions on investments in transit operations, street improvements, sidewalks, land use, zoning, etc. to better meet the needs of the users of these services, and to mitigate possible impacts.

The TNC/Ride Hailing partnerships have two limitations that must be considered. First, Lyft and Uber do not provide any regular service to areas north of the Beverly, and thus any partnership is limited by the geography of available service. Second, the Department of Transportation and the Department of Justice have issued guidelines that, under the Americans with Disabilities Act (ADA), any public transportation services must provide for the mobility impaired. Given that most Uber and Lyft drivers do not have vehicles (nor the training) to accommodate wheelchairs, municipalities and transit agencies need to have an alternative through a contracted taxi or other service for those passengers who require additional assistance.

*Examples of how communities are improving first and last mile connections* - **North Shore Community College Uber Ride**

North Shore Community College (NSCC) has campuses in Danvers, Lynn and Middleton and previously paid for a private shuttle to operate among the three campuses in a 90 minute loop. Adding a second NSCC shuttle bus to improve the service would have cost an additional $100,000 annually. Instead, NSCC partnered with Uber to provide a $10 discount on rides to and from the Danvers Campus from either the North Shore Mall (allowing for connection to MBTA buses) or the Beverly Depot (which has commuter rail and MBTA bus service). The discounts are restricted to trips when classes are in session, and are available only to students who are enrolled at NSCC and who sign up for the service.

NSCC estimates that there were 36 to 40 students who used the service per week during the first year, and projects that the program will cost the college approximately $20,000 in the first year. The college has continued and expanded the program into the 2017-2018 school year.

More information: http://www.northshore.edu/uber/

### 3.4.5 Local Mobility Hubs

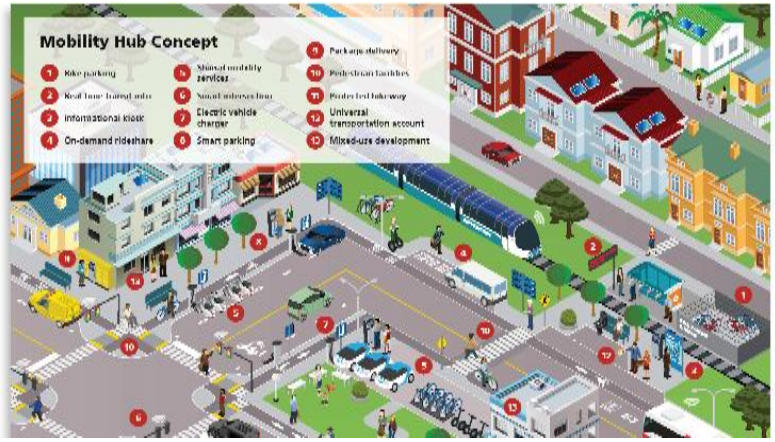
With the MBTA bus network, local shuttles, bicycle sharing and car sharing options becoming more available, many of the commuter rail stations and/or downtowns within the North Shore can become act as local mobility hubs where users can connect to a variety of transportation options (MBTA/CATA, local transit/shuttles, ride sourcing, etc.).

The Northshore Mall should also develop a mobility hub, since it currently is served by several MBTA bus routes and could be served by one or more shuttles. The mall would be a prime location for a park and ride service, ride sourcing pickup/drop off, as well as bike share station with a trail connecting to the proposed Independence Greenway.

**Figure 3.10** shows some of the components of a local mobility hub, including clearly defined areas for connections to local buses and shuttles, ride sourcing (taxis and TNCs), car-share, bicycle share, bicycle storage, as well as wayfinding and proper connections to a larger pedestrian and bicycle network. Similar mobility hubs are being constructed in San Diego, as part of its comprehensive transit network plan, and have been proposed in Boston as part of the Go Boston 2030 plan.[19]

As part of this study, MAPC reviewed the existing services and infrastructure at each potential location for a mobility hub. The proposed improvements at each location are described in **Table 3.1.** These proposed elements are for planning purposes and do not represent a final decision on design elements.

*Examples of how communities are improving first and last mile connections* - **San Diego, California Mobility Hubs**




As part of the new Mid-Coast Trolley light rail line opening in 2021, the City of San Diego is developing mobility hubs at each station to improve access and connectivity. The possible range of mobility options at each station include:

- Bus and shuttles
- Bicycle lockers and bicycle sharing
- Carsharing (e.g., zipcar)
- Ride hailing (taxis, Uber, Lyft)
- Electric vehicle charging stations
- Real-time transit information
- Pedestrian and bicycle wayfinding
- Universal transportation account (online payment and information for all available transportation services)

The City is currently implementing prototype mobility hubs at some rail and transit stations and town centers.

More information: http://www.sdforward.com/mobility-planning/mobilityHubs

[19] Boston: Neighborhood Mobility microHUBs (p. 146), at https://www.boston.gov/sites/default/files/document-file-03-2017/go_boston_2030_-_7_projects_and_policies_spreads_1.pdf

Figure 3.10: Mobility Hubs

*Examples of components that can be part of a local mobility hub include shelters and clear signage for local bus and shuttles; ride sharing (taxis, Uber, Lyft, etc.); car sharing (zipcar, etc.); wayfinding and pedestrian connections, connections to bicycle networks, bike sharing, and placemaking.*


Images: Sophia von Berg
@multi_mobility

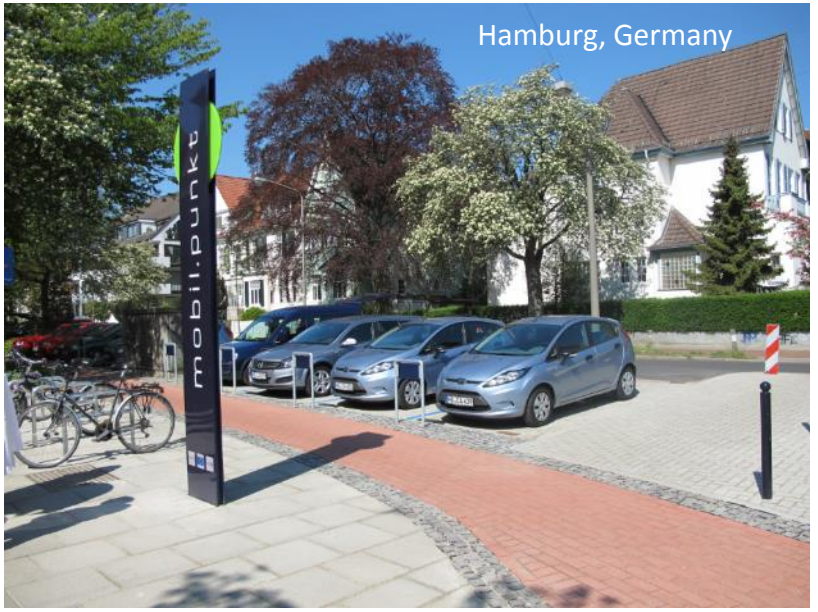



Table 3.1: Possible Improvements for Potential Mobility Hubs

| Location | Existing Conditions and Services | Proposed Mobility Hub Improvements | Notes |
|---|---|---|---|
| Downtown Salem/ Salem Depot | • Parking<br>• Bus shelters and bus loading zone<br>• Taxi zone<br>• Bicycle storage | • Improved directional signage<br>• Map showing destinations within 10 and 20 min. walk<br>• Ride Hailing pickup/drop zone<br>• Bicycle share station<br>• Improved trail signage and connections<br>• Car sharing station | Commuter rail station reconstructed in 2015. Most improvements are improved signage and implementation of bicycle components. |
| Downtown Peabody | • Parking<br>• Bus stops and shelters | • Map showing destinations within 10 and 20 min. walk<br>• Ride Hailing pickup/drop zone<br>• Bicycle share station<br>• Trail signage and connections<br>• Car sharing station | Should be adjacent to existing bus services and proposed trail connections. Possible site is municipal lot on Central Street opposite District Court building. |
| Downtown Beverly/ Beverly Depot | • Parking<br>• Bus stop | • Map showing destinations within 10 and 20 min. walk<br>• Ride Hailing pickup/drop zone<br>• Distinct bus loading zone<br>• Bicycle share station<br>• Signage and connection to future trails<br>• Car sharing station | Mobility Hub should support infrastructure improvements recommended in *Beverly Bass River District and Action Plan* (2014). |
| Northshore Mall | • Bus stop | • Map showing destinations within 10 and 20 min. walk<br>• Ride Hailing pickup/drop zone<br>• Bicycle share station<br>• Bus loading zone with shelters<br>• Signage and connection to Independence Trail<br>• Car sharing station | Should investigate agreement with mall owner to create a park and ride area |
| Downtown Danvers | • Bus stop | • Map showing destinations within 10 and 20 min. walk<br>• Ride Hailing pickup/drop zone<br>• Bicycle share station<br>• Bus shelters<br>• Signage and connection to Trail<br>• Car sharing station | An alternative location might be at Liberty Tree Mall, which a major concentration of employment in Danvers |

| Location | Existing Conditions and Services | Proposed Mobility Hub Improvements | Notes |
|---|---|---|---|
| Swampscott Commuter Rail Station | • Parking | • Map showing destinations within 10 and 20 min. walk<br>• Ride Hailing pickup/drop zone<br>• Bicycle share station<br>• Signage and connection to trail and bus connections<br>• Car sharing station | No bus service at this station, but some connections within walking distance. Complete street improvements along Route 1A could provide better connections to retail employment and multiunit housing |
| Lynn Commuter Rail Station | • Bus stop/shelters<br>• Parking | • Map showing destinations within 10 and 20 min. walk<br>• Ride Hailing pickup/drop zone<br>• Bicycle share station<br>• Car sharing station | Should the Lynn ferry continue service beyond the pilot phase, include signage and pedestrian/ bicycle connections to the ferry landing site (3/4$^{th}$ of a mile) |
| Downtown Gloucester Commuter Rail Station | • Bus stop/shelters<br>• Parking | • Map showing destinations within 10 and 20 min. walk<br>• Bicycle share station<br>• Signage and connection to future trails<br>• Car sharing station | |
| Ipswich Commuter Rail Station | • Bus stop<br>• Parking<br>• Area map/signage | • Map showing destinations within 10 and 20 min. walk<br>• Bicycle share station<br>• Signage and connection to future trails<br>• Car sharing station | |
| Manchester Commuter Rail Station | • Parking | • Map showing destinations within 10 and 20 min. walk<br>• Bicycle share station<br>• Car sharing station | |
| Wenham/ Hamilton Commuter Rail Station | • Parking | • Map showing destinations within 10 and 20 min. walk<br>• Bicycle share station<br>• Signage and connection to future trails<br>• Car sharing station | |
| Rockport Commuter Rail Station | • Bus stop<br>• Parking | • Bus shelters<br>• Map showing destinations within 10 and 20 min. walk<br>• Bicycle share station<br>• Car sharing station | |

### 3.4.7 Water Transportation

Currently Salem has seasonal ferry service from Boston (operating from May to October) and Lynn has a pilot ferry program where service operated until September 2017. In 2016 MassDOT created the Water Transportation Advisory Council, a group of state and regional agencies and communities to study the need and develop a plan for water transportation the Boston region. The Council's first major effort is working with Boston Harbor Now (a civic nonprofit) on a Comprehensive Boston Harbor Water Transportation Study and Business Plan. This study will include an evaluation of communities along the North Shore. The study will be completed in early 2018.[20]

### 3.4.8 Bicycle Sharing Services

Salem has joined several other communities in introducing a bicycle sharing service. The service, operated by Zagster, began in May 2017 as a three-year pilot. By July 2017 the service expanded from three to six stations. By August, ridership tripled from 105 rides to over 350 in four months. Ridership continued to grow once Salem State University fall semester began in September.

Because Salem borders several other communities creating complete street and bicycle networks, these adjacent towns and cities should consider implementing similar bicycle sharing services to allow riders to cross municipal lines for their bicycle trips.

*Salem's successful bicycle sharing pilot has doubled in usage and coverage in its first four months (Photo: City of Salem)*

[20] http://www.bostonharbornow.org/what-we-do/work/water-transportation/water-transportation-study/

### 3.4.9 Complete Streets, Land Uses and Bicycle/Pedestrian Networks

One of the most effective ways that municipalities can help close the first and last mile connections is through better integration of land use and transportation decision making, and through better mulitmodal street design. Some corridors which could support better transit unfortunately consist of streets that have inadequate sidewalks, no crosswalks, and buildings separated by large parking areas – all which make pedestrian access, and thus effective transit, extremely difficult. **Figure 3.11** shows two examples of suburban streets that were upgraded as complete streets to better serve transit, pedestrians, and cyclists.

As towns further evaluate their future transit needs, those streets identified for improved transit services should have priority for complete street improvements such as pedestrian scale lighting, bicycle routes, more visible and frequent crosswalks, and wider sidewalks. Land uses along these corridors should also be revised via a transit supportive zoning overlay district or other tool that encourages more mixed uses and buildings closer to the street with parking located in the rear. These tools will allow better pedestrian connections to existing and future transit, eliminating circuitous bus routing to allow transit to operate more efficiently.

Municipalities implementing mobility hubs and bike share programs should ensure that these are connected with the multiuse trails as shown in their bicycle and pedestrian plans and as shown in the regional network as shown at https://trailmap.mapc.org/.

Some of the recommended complete street, pedestrian and bicycle connections that will help with first and last mile connections include:

- Complete street and multiuse-trail improvements parallel to Canal Street, Salem (underway)
- Complete streets connecting the Beverly Depot, downtown Beverly and the Cummings Center and multiuse trail along the Bass River, as recommended Bass River District Plan, Beverly
- Multiuse trail parallel to the railroad and North River connecting Peabody and Salem (proposed)
- Improved connections from the Independence Greenway (existing and proposed) and the proposed mobility hub at Northshore Mall
- Complete street improvements along Andover Road (Peabody) and connecting to the East Coast Greenway
- Complete street improvements along Highland Avenue in Salem, as recommended in the 107 Corridor Study
- Sidewalks and pedestrian crossings along Route 114 in Peabody and Danvers
- Sidewalks along Essex Avenue (Route 133) connecting West Gloucester commuter rail station and serving CATA Purple Line bus stops

Figure 3.11: Examples of Complete Streets for Transit

*Two examples of complete street conversions that included components to support transit (left: Urbana, IL, right: Olympia, WA. Photos courtesy of Dan Burden)*


### 3.4.10 Planning for New Mobility

Transportation in the US is undergoing a transformation with new and rapidly evolving technologies that are changing and disrupting our traditional ways of traveling, working and socializing. Cities and towns should work together to determine what actions are needed to force positive change and mitigate negative impacts.

- **Telecommuting** is becoming an increasingly popular in the US, doubling since 1980. According to the American Community Survey, in 2015 around 4.5 percent of workers in Massachusetts worked from home on a regular basis, up from 3.3 percent just ten years earlier. Additionally, studies now show that workers are increasingly telecommuting at least part time. A 2015 Gallup study found that 37 percent of workers have telecommuted, a four-fold increase since 1995, while now nine percent of workers telecommute at least half of their workdays in a typical month.[21] Moreover, recent analysis of the Census data showed no correlation between working from home and density, commute time or commuting distance. Instead, education level seems to be the best predictor, indicating that improvements in technology and the increasing number of office jobs has allowed more people to choose to work from home.[22]

- **Ride Hailing/Transportation Network Companies (TNCs)** have grown exponentially since these services started in the past few years. For example, in five years of service, Uber has now completed over 2 million trips in the region. Both Uber and Lyft have now started to offer a variety of services, including UberPool and Lyft Line that allows riders to combine their trips and share costs, and both have entered into municipal partnerships to help with mobility options. However, a recent UC Davis study found that after using ride hailing, users typically use bus and light rail transit less, but actually increase their use of commuter rail, showing that ride hailing may serve as a complementary mode for commuter rail. The study, however, also concludes that ride hailing is likely to contribute to a growth in vehicle miles travelled (VMT) in urbanized areas.[23]

  As the service areas for ride hailing expand, more people will have access and the options for larger scale contract partnerships for meeting first and last mile connections may increase. However, there are equity issues since the companies cannot serve those who do not have smart phones and/or use a wheelchair. Some towns and agencies have worked with TNCs to develop a phone call based reservation system and alternative transportation for those with disabilities to help bridge this "digital divide". Finally, it should be noted that there are several press reports that both Uber and Lyft are not yet turning a profit, and the full cost model for these services is still unknown.[24]

[21] "In US, Telecommuting for Work Climbs to 37%". Gallup News, August 19, 2015. http://news.gallup.com/poll/184649/telecommuting-work-climbs.aspx

[22] "Why Telecommuting Really Matters." CityLab, February 4, 2014. http://www.citylab.com/commute/2014/02/why-telecommuting-really-matters-6-charts/8227/

[23] Clewlow, Regina R and Gouri S. Mishra. Disruptive Transportation: The Adoption, Utilization and Impacts of Ride-Hailing in the United States. Institute of Transportation Studies, University of California, Davis. October 2017.

[24] "Uber Lost Hundreds of Millions in the Most Recent Quarter." Fortune.com, December 20, 2016. http://fortune.com/2016/12/19/uber-financials-2016/ and "Lyft Eyes Profitability as it Triples its Yearly Ridership Numbers." Bizjournals.com, January 6, 2017.

- **Automated Vehicles** are vehicles that can operate partially or fully without a human, at least in some circumstances.[25] Waymo (Google/Alphabet), Tesla Autopilot, nuTonomy and others have been testing autonomous vehicles in various cities, including Boston. Several states, including Massachusetts, have legislation permitting the testing of automated vehicles and regulating when, where and how they operate. The USDOT in 2016 established the first federal policy on automated vehicles. The full impact of this technology is unknown. As these vehicles become more available, people might be more willing to "ride" to work, thereby increasing roadway congestion and travel times and decreasing transit use. There may be a reduced need for parking lots and structures, since automated vehicles could drive themselves home (or to satellite locations) and then pick up users later for the return ride. Under this scenario, however, curbside and queueing areas will need to be expanded as more vehicles line up to pickup and drop-off passengers in downtowns and office parks. TNCs will use automated vehicles more often, perhaps lowering the labor costs and costs per ride.

  Transit agencies will also benefit by having automated buses that can pull up directly to the curb and allow easier access, and by allowing drivers to leave the wheel and instead interact with customers onboard. The automated transit service could also be operated with smaller vehicles that could operate more as an on-demand service. Automated transit vehicles in the future will also be connected with traffic signal to allow transit to have signal priority. Finally, this technology will connect vehicles and customers and allow transit agencies to better understand the travel patterns for their customers.

- **Mobility on Demand** (MoD) is a web-based system that helps create an integrated and connected multi-modal network of transportation options that are available and accessible to all travelers. Current MoD systems allow users to determine which travel options are available for a trip – transit, ride sourcing, carpool, walking, bike rental, etc. – and some allow users to reserve and pay for options within a single application. As this technology develops, communities will be able to develop their own local transit, ride sharing, and/or bicycle sharing systems that can be integrated into other regional systems via a single application and payment system (San Diego, CA for example, is including MoD as part of their "mobility hub" program). In the future, this will any transit or for-hire transportation service to be integrated via numerous third-party applications.

This new era of transportation and mobility technology should not mean that municipalities and transit providers should develop a "wait and see" attitude and do nothing to improve first and last mile connections. Instead, towns should work together to monitor the impacts of these changes and be ready to adjust their forecasts, traffic models, traffic enforcement and adopted plans to reflect the findings from the consortium of data that will become available over the coming years, and be ready to revise policies and partnerships to address this evolving mobility landscape.

http://www.bizjournals.com/sanfrancisco/news/2017/01/05/lyft-profitability-ridership.html

[25] Also known as autonomous vehicles, highly automated vehicles (HAVs), driverless cars, self-driving cars, robotic cars.

## 3.5 Costs and Funding Options

### 3.5.1 Potential Costs

**Shuttle operations**: The costs to operate any proposed shuttles or local bus routes are dependent on hours of service, length, and type of vehicle. Based upon research of recently implemented shuttles and bus routes operated in the region, a new shuttle route would likely cost approximately $100,000 to $150,000 annually, assuming weekday operations.

The shuttles could be operated as transit routes (open to all riders with more frequent stops), similar to the municipal services operated by Lexpress (Lexington) or Cross-Acton Transit. Alternatively, the shuttles could be operated as or as employer-sponsored routes via a TMA, with a few stops at businesses funding the service and closed to employees at the sponsoring businesses.

**Ride Hailing/TNC Partnerships**: If a subsidized ride hailing service were implemented, the costs could be less, but the number of riders and service areas would also be partially dependent upon the funding established by the municipalities that wish to participate. For example, an agreement to pay up to $5 per ride, with approximately 10 rides per day, would equal $18,250 per year in required subsidies.

An example of how the service could work is something similar to the partnerships established by North Shore Community College, Pinellas Suncoast Transit Authority (PSTA) or the City of Altamonte Spring, FL. All three programs have specific requirements of where trips must begin or end (i.e., origin or destination), or with limitations also by time (e.g., for North Shore Community College, when classes are in session). For a municipality in the North Shore, the program could be limited to trips that originate or end at a commuter rail station or local bus route terminus, and could be limited to the same operating hours as the MBTA buses/trains. This would help ensure the program funds work trips.

This option could be a first step to determine the market and demand for a more comprehensive shuttle or fixed route bus service.

Any partnership with a ride hailing company must also follow the Americans with Disabilities Act of 1990 (ADA) and, if using Federal funding, must follow Title VI of the Civil Rights Act of 1964. These requirements includes providing an alternative method of payment and reservations for those without access to a smart phone, and providing accessible vehicle service to those who use wheelchairs and/or have intellectual disabilities.[26]

**MBTA Routes**: In January 2017, the MBTA adopted a new service delivery policy that staff will use to evaluate all existing bus routes. Costs and ridership benefits from proposed revisions to the existing MBTA routes would be developed as part of a larger study by the MBTA. The MBTA is currently working to close a funding deficit, which limits the capital and operating funds to add or expand bus services. The number of buses that can be operated and maintained out of the agency's various bus garages also regulates the MBTA's possible service changes in the study area.

[26] https://www.transit.dot.gov/regulations-and-guidance/policy-letters/dot-dear-colleague-letter-equity-access-shared-mobility

### 3.5.2 Potential Funding and Partnerships

Funding for new transit services can come from federal, state and local sources. Below is a list of funding opportunities to implement one or more of the recommendations in this report. It should be noted that these funding options are not mutually exclusive, i.e., more than one funding source will likely be necessary to implement a project.

- Federal/state Funds: Federal and state funding for new transit services will need to be requested through the Boston MPO Transportation Improvement Program (TIP) process. There are two MPO funding sources that can help implement first/last mile mobility projects.
  - The Regional Transit Service Planning Technical Support Program (TIP ID 14342) provides municipalities or others technical assistance to improve transit services. These funds could be used to execute a more in-depth planning study that will establish the operating parameters for a pilot project.
  - Beginning in Federal fiscal year 2021, the Boston MPO TIP includes $1.75 million annually in the Community Transportation Program (TIP ID 1729) to improve community mobility. Example projects listed in the program include locally developed transit services to improve first/last mile connections; park-and-ride improvements at transit stations, or at other viable locations; bike-share or shuttle-bus services.
- Local Funds: Operating funds should be provided locally. For example, the Town of Acton has a local meals tax that is used to partially fund local transit operated by the Crosstown Connect. While there may be opportunities for federal or state funds to operate a pilot program, there should be local funding sources established at the end of the pilot program to continue the service, if successful. If charging a fare, most public transportation services have a farebox recovery ratio of only 15 to 30 percent of operating costs.

  Additionally, municipalities in the North Shore could require mitigation funding from new development which generates additional automobile traffic in the area. Mitigation could come in multiple forms including payment in lieu of improvements, an agreement to initiate transportation demand management strategies to reduce automobile trips, or join a TMA.
- TMA Partnerships: Other options include municipalities developing partnerships with private entities, such as employers and developers, to determine how the needs for each could be aided by expanding transit service to capture ridership and share common costs. Working through North Shore TMA can be an avenue for connecting to businesses in each community that are looking for additional transportation options for their employees. The TMA can also help by providing expertise in detailed transit planning and implementation of a pilot program.

## 3.6 Next Steps and Development of Pilot Programs

The next steps are dependent upon the level of interest of the various municipalities in the study area to implement new services. Below are possible steps that can be taken to implement a pilot program and other new transit services.

### *1. Create Working Group*

The municipalities most interested in implementing new services can form a working group to oversee the additional planning process. If possible, this working group could include representatives from employers or others in the private sector who may be interested in funding and operating partnerships, such as a TMA.

### *2. Conduct More Detailed Study of New Services*

The working group formed in step 1 can then conduct a more detailed study through a contract with a consultant and/or TMA to refine the potential for new services. This will allow the municipalities to better determine the potential costs, service areas and hours of operations. As stated above, the detailed services could be conducted through a partnership with the Boston MPO staff and/or contract with a TMA.

### *3. Determine Operating Framework and Implementation Plan*

If municipalities decide to move forward with employing some first/last mile services, there are three options for implementation:

- Municipal Transit Service– One or more the towns could decide to create their own municipal transit services, similar to Lexpress (Lexington) and Beverly Bus. A town operated service would allow the municipality flexibility in routing and other operations. However, the town or towns might have fewer opportunities to leverage other funding from the state or private sector or in forming a larger service area and sharing costs with others.
- TMA – One or more of the municipalities could join with the North Shore TMA to implement employer shuttles and local public transit routes, similar to the services operated by the 128 Business Council and Middlesex 3 TMAs.
- RTA – Towns could look to join an existing RTA, such as CATA, or could look to form their own. However, any town that leaves the MBTA would likely lose some or all MBTA bus service and would no longer be eligible for paratransit service (the RIDE). The replacement paratransit service would have a smaller geography and would likely not have the same level of service as that provided by the MBTA. In January 2017 the Governor signed into law an amendment that allows municipalities to join multiple RTAs; however, it is unclear if a municipality with fixed route bus service can join an RTA and still be a member of the MBTA.[27]

Once the operating framework and implementation plan is developed, the town or towns should work with the MPO to request community transportation investment funds and other funds.

### *4. Engage MBTA and CATA on Service Improvements*

As noted earlier, the MBTA is conducting a comprehensive review of their bus routes and the commuter rail network. The recommendations from this study will be shared with the MBTA, who can further evaluate the costs and benefits of the proposed route revisions. The municipalities in the North Shore should take an active role in meeting with MBTA staff during these comprehensive reviews to ensure the changes are most beneficial to the communities, and are aligned with any locally sponsored transit improvements. The municipalities should also work with CATA on possible service reviews that could impact routes serving Rockport, Gloucester, Ipswich and Beverly.

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27 https://malegislature.gov/Laws/SessionLaws/Acts/2016/Chapter432

Because of the varied geography, resident and employment density and existing transit service availability in the North Shore area, the potential new services and tools to improve community transit and first/last mile connections will be varied. For example, municipalities north of Route 128 currently have very limited to no ride hailing and taxi services; thus partnerships with Uber or Lyft are not feasible. Nevertheless, other recommendations – such as testing municipal or regional on-demand transit services, and prioritized complete streets that connect commuter rail or bus stops to residents, are applicable to nearly every community in the study area. The list on the right shows the recommendations in this study for each municipality. Communities can look to implement some recommendations and pilots within their own jurisdiction, while other pilots might be better implemented on a subregional level.

Table 3.2 on the following page shows the implementation steps and potential funding sources for the pilot projects.

| Municipalities | Study Recommendations |
|---|---|
| Rockport, Gloucester, Essex and Ipswich | • Coordinate with CATA on proposed fixed route enhancements<br>• Evaluate expanded RTA or new municipal on-demand transit services<br>• Mobility hubs in downtowns and at commuter rail stations (Gloucester, Ipswich, Rockport)<br>• Construct complete streets and investigate bicycle sharing |
| Middleton, Topsfield, Hamilton, Wenham and Manchester | • Evaluate municipal or regional on-demand transit services (CATA dial-a-ride for Hamilton and Manchester)<br>• Mobility hubs at commuter rail stations (Hamilton/Wenham, Manchester)<br>• Construct complete streets and investigate bicycle sharing |
| Beverly, Danvers, Salem, Peabody | • Evaluate municipal or regional on-demand transit services<br>• Mobility hubs at commuter rail stations, downtowns, retail centers, and ferry landings<br>• Local shuttles<br>• Construct complete streets and implement regional bicycle sharing system<br>• Coordinate with Water Transportation Study currently underway (Salem)<br>• Provide input to MBTA on bus network service plan |
| Marblehead, Swampscott, Nahant, Lynn, Saugus | • Evaluate municipal or regional on-demand transit<br>• Mobility hubs at commuter rail stations, downtowns<br>• Construct complete streets and consider regional bicycle sharing system<br>• Coordinate with Water Transportation Study currently underway (Lynn)<br>• Provide input to MBTA on bus network service plan |

Table 3.2: Implementation Steps for Mobility Pilot Programs

| Potential Project/Pilot | Description | Implementation | Notes |
|---|---|---|---|
| Local Shuttles | Locally operated and funded shuttles running between commuter rail stations and concentrations of employment and/or housing | • Employers and municipalities join TMA and implement more detailed study of routing, operating hours and participants<br>• TMA conducts request for proposals to operate shuttles<br>• Annual costs typically $100,000-$150,000<br>• Funded through TMA dues, employer and municipalities<br>• Community Transportation Funding or Community Compact funding can help with developing operating and implementation plan | • Examples of similar employer-sponsored shuttles include the Middlesex 3 TMA, 128 Business Council<br>• Examples of joint municipal/ TMA shuttles include the Crosstown Connect in Acton and the REV in Lexington |
| TNC/Ride Hailing Partnership | Municipality and/or employers subsidize individual Uber, Lyft or taxi rides within a set geography and time of day and week | • Interested municipalities and employers join TMA, determine potential operating parameters<br>• Examples of operating parameters include setting geography, time of day, number of rides per day or week<br>• TMA conduct request for proposals, enters agreement with companies<br>• Annual costs typically $14,000-$63,000<br>• Operating agreements and subsidy limits per rider, etc. can help limit potential costs<br>• Community Transportation and/or Community Compact funds can be used for planning and pilot | • Examples of similar programs include North Shore Community College, MBTA/The Ride, City of Altamonte Springs, FL<br>• Federal law (ADA) requires offering accessible rides (such as wheelchair lift capable vehicle)<br>• Area must have drivers and ride hailing services available<br>• Can be the first step in determining market for local shuttle |
| Mobility Hubs | Designated area with multiple mobility services, including transit, ride hailing, shuttles, car and bicycle sharing, ped/bike connections, signage, placemaking | • Conduct more detailed planning and design to determine services and improvements<br>• Improvements can range from minor enhancements at commuter rail stations to new hubs in a downtown<br>• Funding sources include Community Transportation<br>• Costs depend on level of infrastructure selected and needed on site and can be up to $2 million or more | • Examples include San Diego and Micro Transit Hubs proposed in Go Boston 2030 Plan<br>• Typically within an activity center (transit station, downtown, etc.) |
| Dial-a-Ride/ Microtransit | Municipality offers dial-a-ride service through RTA or via municipal service; could include newer on-demand technology option (microtransit) | • Municipality joins RTA, or determines to operate service on its own, and establishes eligibility and geographic parameters via operating study<br>• Could be part of a larger effort on regional efficiency for other transportation services (seniors, veterans)<br>• Annual costs vary, depending on eligibility and demand (MVRTA average costs are $25 one-way) | • Example is Ring & Ride service offered by Merrimack Valley RTA<br>• Current dial-a-ride services typically require minimum 24 hour advance reservation; microtransit pilots would operate similar to ride hailing on-demand service |

# 4 Pilot Projects

In October, the North Shore Coalition decided to pursue two recommendations as pilot projects:

- Local shuttles, specifically looking at the Beverly/Danvers shuttle connecting the Cummings Center and Chery Hill Corporate Center

- A regional bicycle sharing service for the communities of Salem, Beverly, Danvers, Peabody, Swampscott and Marblehead

Both projects would help with community connections and with first and last mile work trips. The North Shore Coalition also decided to apply for an Efficiency and Regionalization Community Compact grant for funding to help implement both pilots.

The benefits of both pilots include:

- Extending transit and bicycle sharing connections to locations without these services
- More enhanced and efficient service delivery, by demonstrating the efficiency of public/private partnered shuttle services, and through regional bicycle sharing services that allow trips to cross municipal lines
- Cost savings through regional collaboration and partnerships
- Improved interagency coordination and data sharing
- Improved public health

Should the funding be awarded, both pilot projects would be implemented by mid-2018. Moreover, both pilots would include data gathering and analysis to determine how well the pilots are providing new transit and bicycle trips. The pilots also would include an equity analysis to investigate the social distribution of project benefits.

Additional pilot projects should also be considered by the various municipalities in the North Shore study area, such as the design and implementation of mobility hubs and municipal on-demand transit services. These pilots can be developed locally or regionally as part of each community's transportation and master planning process.

# Appendix A: Summary of Recent Studies

The following is a summary of five recent studies on emerging trends and innovations that agencies have undertaken to improve transit connections in suburban areas, particularly in providing for the first and last mile of transit trips. Following each summary are notes on possible applications for meeting the needs identified in the North Shore mobility study.

## 2010 Guide for Planning and Operating Flexible Public Transportation Services (TCRP Report 140)

Summary: This study looked at deviated fixed route (flexible route) service at US transit agencies. The report is a guide for public transportation providers to use in considering the merits of flexible public transportation services. The services require greater scheduling technology and are not suitable for riders who require a regular schedule and who have time-sensitive trips. The services could work when agencies need to reduce the costs of full demand-responsive services, eliminate the need to operate ADA-complementary paratransit services in select geographic areas, and can be a way to provide an introduction to public transportation to areas not previously served by fixed-route transit.

Possible Applications: Denver's Call-n-Ride service is extensive and serves multiple areas in the region where demand does not warrant fixed-route bus service. Riders can schedule the service two hours in advance and frequent users can subscribe to the service for daily or weekday trips. As of 2009 (when study was done) the service has been successful. Nearly 74 percent of the rides are work trips, and about one-third of riders are new to transit. The service costs more per ride and carries far fewer riders per hour than traditional fixed route bus service. Denver continues to offer this service today. An internet search of other transit systems covered in the study, however, seems to show that many have eliminated their flexible route services since the study was completed.

## 2015 Improving Transit Integration Among Multiple Providers, Volumes I and II (TCRP Report 173)

Summary: This manual "describes a range of possible integration activities, potential benefits of integration, and related management responsibilities for efficient delivery of integrated transit services." (Foreword of Volume I report).

The report notes that there are typically four levels of integration, which can be represented as a "continuum of integration" (p. 9).

Communication – acting independently, but communicating as opportunities arise
Coordination – acting jointly on an informal basis
Collaboration – acting jointly on a formal basis on select functions
Consolidation – merging some or all functions by legal agreement or by creating a single transit entity.

Possible Applications: Currently transit providers in the study area have some level of integration. The MBTA website and bus system maps include information on adjacent transit systems (LRTA, LexExpress, and Burlington Transit) such as bus routes and numbers, phone numbers, and websites to help riders find connections. LRTA payment structure includes the MBTA's Charlie Card, and recently LRTA extended their bus route to serve the MBTA's Wilmington commuter rail station. Other examples of transit integration that could be applied in the North Shore include better coordination of bus routes, expansion of the CharlieCard to all providers, and more frequent

communication/coordination with required reports to governing bodies.

### 2015 Transportation Demand Management Case Studies and Regulations (MAPC)

Summary: This report is a guide for municipalities to implement bylaws or zoning that advance Transportation Demand Management (TMD) measures. Case studies include policies and programs that promote transit, ridesharing, carpooling, and vanpooling.

Possible Applications: In the Town of Needham, development in specific districts that request a Special Permit to increase the floor area ratio over what is permitted by-right are subject to additional Special Permit Applications. The Town's Planning Board can require TDM measures to reduce peak hour traffic volumes. These requirements can include providing cash incentive for carpools, subsidized transit passes, and shuttles to and from public transportation terminals. The Town of Acton imposed an excise of 0.65% on the sale of restaurant meals, which is used to help fund a new fixed route transit service in the Town.

### 2016 Shared Mobility and the Transformation of Public Transit (APTA)

Summary: This study by APTA has four main findings on "shared modes." 1.) Those who use shared modes are also more likely to use transit and not have their own car, and spend less on transportation overall. 2.) Ridesharing services are most frequently used between 10pm and 4am, when transit is less frequently available. 3.) Shared modes will continue to grow, and public agencies should find opportunities to engage them to improve mobility for all. 4.) There is potential for public-private partnerships, particularly on paratransit, that can help drive down costs.

Possible Applications: This report includes almost no examples of applications. The report does note that shared modes are rarely used for daily or regular commuting trips, and that lower income groups can have the most to gain by using shared mode options, as these groups are more likely not to travel if transit is not available. Finally, the report notes that ADA paratransit rides have more than doubled between 1999 and 2012, and that contracting with shared mode services for these trips can provide a real costs savings for transit agencies.

### 2016 Private Mobility, Public Interest (Transit Center)

Summary: This study looks at transit agencies using emerging mobility services such as bikeshare, carshare, and on-demand transit and transportation network companies (Uber, Lyft, Bridj) to determine trends in the industry and best practices. Agencies can use these emerging mobility services to be more flexible and reduce their operating costs. Moreover, data sharing with third parties can help with planning and marketing efforts. Agencies can leverage items such as parking spaces and street right-of-way to negotiate with private transportation network companies. Open data and integrated fare payment systems are also a key items that agencies can use to leverage these partnerships. Finally, the report notes that agencies need to proactively start to collaborate with these emerging mobility providers. However, at this time there are only a few pilot programs, so "*there is a substantial gap between current practice and the anticipated potential for on-demand transit and transportation network companies to serve paratransit*" and other transit markets. (p. 8) The study also notes that "***emerging mobility services have not yet transformed public transportation. They will not replace high-quality, fixed-route transit as the most efficient means of moving people along dense urban corridors, and focusing on emerging mobility services is not a substitute for designing walkable, mixed-use neighborhoods or engaging in pedestrian- and transit-oriented planning.***" (p. 8)

Possible Applications: Examples of transit agencies using emerging mobility trends that might be applicable to North Shore area:

- Pinellas Suncoast Transit Authority (PTSA) in Florida will subsidize up to $3 Uber, taxi or paratransit trips for select underserved zones to a designated PTSA transit stop or transit center. The rider is responsible for any fare above $3. This service began in early 2016 (and since the report publication) and is now being expanded with unlimited, on-demand Uber and taxi rides for $1.
- PTSA is also now offering TD Late Shift, a pilot program demonstration aimed at helping low-income, unemployed residents overcome transportation barriers to employment. With this new program, riders can request up to 23 free rides per month between the hours of 9 p.m. and 6 a.m. Rides must be to a place of employment or residence. The project is funded via a $300,000 grant from Florida's Commission for the Transportation Disadvantaged. (This service began post the report publication; more information can be found at http://www.psta.net/press/07-2016/index.php.)
- Kansas City Area Transportation Authority (KCATA) has partnered with Bridj, a transportation service provider to provide an on-demand transit service between two areas of the Kansas City area during peak periods. Riders use the Bridj app to enter where they want to go, are instructed to walk to a "rallying" point and are picked up with other passengers and then dropped off at their destination. There is no transfer required. Fares are the same as one-way bus fares and are charged through the Bridj app. Vehicles providing the service are 14 passenger vans operated by KCATA. Subsequent to this 2016 report, KCATA determined that the service was not cost effective. In 2017, Bridj also went out of business.
- The City of Altamonte Springs, FL is offering discounted Uber rides within the city limits and deeper discounted rides to the SunRail commuter rail station in the city. After publication of this study, this discounted Uber ride partnerships was extended to five other cities in the region.
- GoTriangle can help riders book with Uber for a portion of their trip through the transit agency's trip-planning apps and software (developed with TransLoc).

## 2016 Fast Forward: The Technology Revolution in Transportation and What it Means for Massachusetts (Transportation for Massachusetts)

Summary: This report summarizes the innovative mobility technologies and services that are transforming transportation in Massachusetts. The three types of innovations include information technology (including real time travel information, mobile fare payment), shared mobility services (car sharing, bike sharing, microtransit, ride hailing) and autonomous vehicles. The report notes that these innovations can have positive impacts in Massachusetts, such as reducing the number of vehicles on streets and roads, accelerating the adoption of electric vehicles (and thus improving air quality), reducing the costs of transportation on households, and providing mobility to traditionally underserved areas. The study also notes the risks to society as these innovations are adopted, including the possibility of increased vehicle miles travelled, reduced ridership on existing transit services, and potential job losses for delivery and other drivers.

Possible Applications: Areas where these innovative technologies might help with community transit and first/last mile connections include providing open-source data on new transit services to be coordinated with third-party scheduling and payment apps; collaborating with ride hailing companies on first/last mile

connections; supporting pilots on new mobility services (including new municipal or TMA services); creating mobility hubs; and collaborating on regional bicycle sharing services. The report further recommends that municipalities should begin developing new polices and ordinances that revise parking requirements, limit zero-occupancy vehicles, and require standardized, open data for mobility services.

**2017 Disruptive Transportation: The Adoption, Utilization, and Impacts of Ride-Hailing in the United States (University of California, Davis)**

Summary: This study is to-date the most comprehensive survey of ride hailing users in the United States. It found that in major cities, over 20 percent of respondents have personally used ride hailing services, with nearly 30 percent of urban dwellers using them regularly. Only seven percent of those in the suburbs use ride hailing on a regular basis. The study also found that a vast majority (91 percent) of users have not made changes in vehicle ownership, and that ride hailing has likely resulted in measurable drops in light rail and bus transit ridership, while contributing to a growth in vehicle miles travelled.

Possible Applications: The report did find that users of ride hailing services were more likely to commuter rail – showing that these services are complementary for linking commuter rail with jobs and residences. This indicates that ride hailing partnerships (e.g., discounted rides) may be a tool to meet some first and last mile trips for commuter rail trips.

# Appendix B: Suitability Analysis Criteria

MAPC's Data Services department conducted an analysis to determine which areas within the North Shore would the best candidates for local public transportation improvements. This analysis was conducted at the census tract level using Community Viz, a powerful ArcGIS add-in for planning applications. The analysis was run for three scenarios—Boston-Centered Commutes, tourist trips, and commutes to workplaces within the North Shore. Each of the criteria listed for the scenarios below were assembled into a single feature class, each measure is rescaled to a score from 0 to 100 and finally they are combined to create an overall score for each scenario.

*Boston-Centered Commute Suitability Criteria*

1. Population Density - Number of residents per acre. A higher density resulted in a higher rating. (Source: Census 2010)
2. Vehicles per Household - A lower number of vehicles per household resulted in a higher rating. (Source: Mass Vehicle Census, 2014 quarter 4)
3. Commuters traveling to Boston or Cambridge – Percent of working-age residents of each Census tract who work in either Boston or Cambridge. A higher percentage of commuters resulted in a higher rating. Weighted at 10. (Source: Central Transportation Planning Package 2006-2010)
4. Proximity to MBTA Service- Census Tracts which have close proximity to commuter rail stations or MBTA bus stops received a higher rating. (Source: MAPC analysis)
    a. Distance from Census Tract centroid to nearest MBTA bus stop. Weighted at 5
    b. Distance from Census Tract centroid to nearest Commuter Rail station. Weighted at 10
5. Environmental Justice: Minority population, limited English speaking households, low income households, -- Census tracts with high proportions of residents who identify as a race other than non-Hispanic White, limited English speaking households, or low income households receive a higher score. (Source: MassGIS/MAPC)
    a. Percent population that identifies as a race or ethnicity other than non-Hispanic White (Source: Census 2010)
    b. Percent of Households considered Limited English speaking households (previously known as linguistic isolation, ACS 5 year estimates 2011-2015)
    c. Low-Income Households - A higher percentage of households with household incomes below 80% of the Boston MPO region median resulted in a higher rating. The median household income for the MPO area is $75,389 ±428, 80% of this is $60,311. (Source: ACS 5-year estimates 2011-2015)

*North Shore Commute Suitability Criteria*

1. Population Density - Number of residents per acre. A higher density resulted in a higher rating. (Source: Census 2010)
2. Employment Density - Number of employees per acre. A higher density resulted in a higher rating. (Source: LEHD 2014)
3. Vehicles per Household - A higher percentage of households having less than one vehicle resulted in a higher rating. (Source: Mass Vehicle Census 2010)
4. Journey to Work Data for Intra-subregion Commuting – Percent of workers in each North Shore Census tract who do not work at home who commuted from within the North Shore

area. A higher number of workers commuting from a North Shore town results in a higher rating. (Source: ACS 2006-2010 Journey to Work Data)

5. Residents with Disabilities - Census tracts which have a high percentage of disabled residents received a higher rating. (Source: Census 2010)
6. Proximity to MBTA Service- Census Tracts which have close proximity to commuter rail stations or MBTA bus stops received a higher rating. (Source: MAPC analysis)
    a. Distance from Census Tract centroid to nearest MBTA bus stop
    b. Distance from Census Tract centroid to nearest Commuter Rail station
7. Environmental Justice: Minority population, limited English speaking households, low income households, -- Census tracts with high proportions of residents who identify as a race other than non-Hispanic White, limited English speaking households, or low income households receive a higher score. (Source: MassGIS/MAPC)
    a. Percent population that identifies as a race or ethnicity other than non-Hispanic White (Source: Census 2010)
    b. Percent of Households considered Limited English speaking households (previously known as linguistic isolation, ACS 5 year estimates 2011-2015)
    c. Low-Income Households - A higher percentage of households with household incomes below 80% of the Boston MPO region median resulted in a higher rating. The median household income for the MPO area is $75,389 ±428, 80% of this is $60,311. (Source: ACS 5-year estimates 2011-2015)

*Tourism Trips Suitability Criteria*

1. Hospitality and Restaurant Employment – Number of employees for businesses in the “Accommodation and Food Services” industry (NAICS code 72, Source: LEHD 2014)
2. Hotel Employment—Number of employees in the category “Hotels (except Casino Hotels) and Motels,” excluding the CHM Warnick company locations (NAICS code 721110, Source: InfoGroup 2016)

    Note, these employees are also likely counted in criterion #1
3. State-owned open space—Percentage of land in each tract comprised of DCR-owned open space (Source: MassGIS)
4. Retail employment—Number of employees for businesses in the “Retail Trade” industry (NAICS codes 44-45, Source: LEHD 2014)