

Appendix 2

TECHNICAL REPORT

Task 2: Project Purpose and Need

October 2013



New Hampshire

Capitol Corridor Rail & Transit Alternatives Analysis (Parts A & B)

State Project Numbers 16317 and 68067-A



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Table of Acronyms

AA	Alternatives Analysis
B&M	Boston & Maine Railroad
BX	Boston Express
CNHRPC	Central New Hampshire Regional Planning Commission
CSS	Context Sensitive Solutions
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GHG	Greenhouse Gas
GP	General Purpose
HOV	High Occupancy Vehicle
HSIPR	High-Speed Intercity Passenger Rail
MAP-21	Moving Ahead for Progress in the 21 st Century
MAPC	Metropolitan Area Planning Council
MassDOT	Massachusetts Department of Transportation
MBTA	Massachusetts Bay Transportation Authority
mph	miles per hour
MPO	Metropolitan Planning Organization
MVPC	Merrimack Valley Planning Commission
MVRTA	Merrimack Valley Regional Transit Authority
NEPA	National Environmental Policy Act
NH OEP	New Hampshire Office of Energy and Planning
NHDOT	New Hampshire Department of Transportation
NHML	New Hampshire Main Line
NHRTA	New Hampshire Rail Transit Authority
NMCOG	Northern Middlesex Council of Governments
NRPC	Nashua Regional Planning Commission
O&M	Operations and Maintenance
PAR	Pan Am Railways
RPC	Rockingham Planning Commission
SDP	Service Development Plan
SNHPC	Southern New Hampshire Planning Commission
TOD	Transit-Oriented Development
UNH	University of New Hampshire
VMT	Vehicle Miles Travelled
WIA	Workforce Investment Area

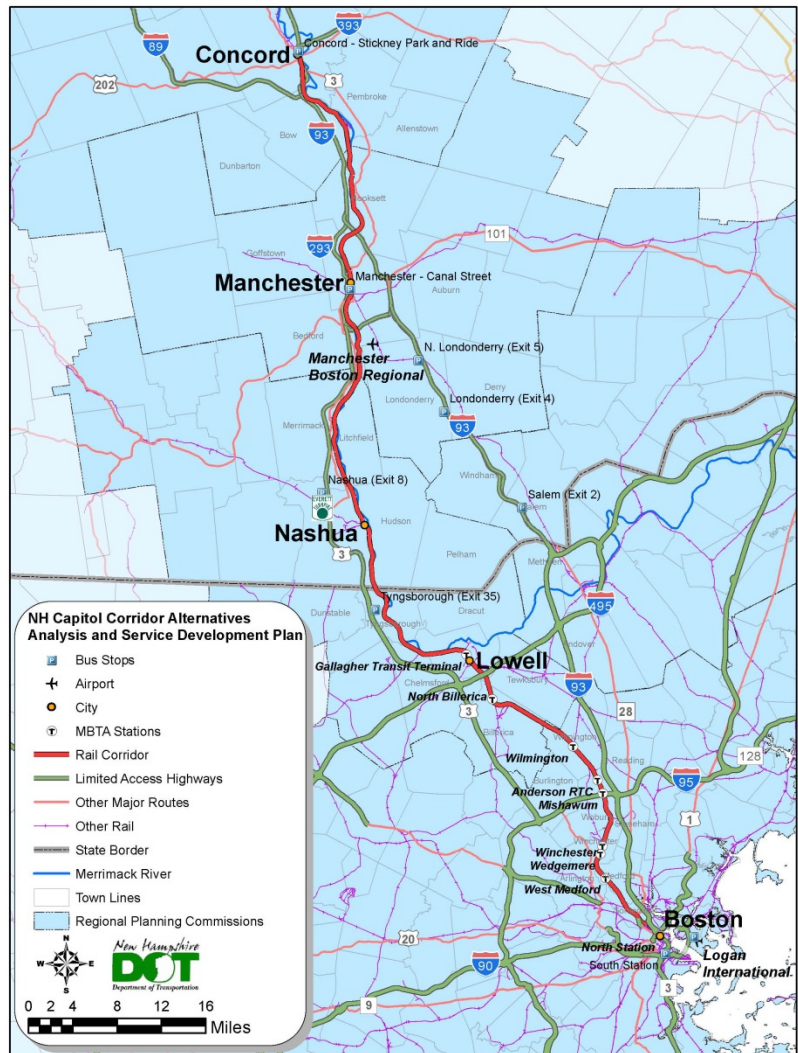
1 Introduction

1.1 Project Description

The Capitol Corridor Rail and Transit Alternatives Analysis (AA) is defining and evaluating opportunities to improve transit and/or intercity passenger rail service in the 73-mile corridor between Boston, Massachusetts and Concord, New Hampshire (Figure 1.1). While Massachusetts Bay Transportation Authority (MBTA) commuter rail service currently operates between Boston and Lowell, Massachusetts, commuter rail passenger service north of Lowell was discontinued in 1967. A public-private partnership, supported by the State of New Hampshire, operates roughly 50 daily bus round trips within the corridor between New Hampshire and Boston; this service typically carries 1,800 passengers per day.

Increasing transportation demand and growing concerns about mobility, economic development, and quality-of-life have led New Hampshire and Massachusetts citizens and officials to explore options to improve transit service along the northern end of the Study corridor. Early in 2013, the New Hampshire Department of Transportation (NHDOT), working in concert with its counterparts in Massachusetts, started the Capitol Corridor AA, a 21-month project supported by both the Federal Railroad Administration (FRA) and Federal Transit Administration (FTA). The Study, which will be completed in late 2014, will evaluate a diverse set of rail and bus options for improving connectivity in the Study corridor by leveraging existing transportation infrastructure, including Pan Am Railways (PAR), Route 3, and I-93, and result in recommendation of a transit investment strategy that is responsive to local transportation needs and the region’s economic, social, financial, and environmental context.

Figure 1.1: New Hampshire Capitol Corridor Study Area



For purposes of the AA Study, the Capitol Corridor is defined as the area included in the Central New Hampshire Regional Planning Commission (CNHRPC), the Nashua Regional Planning Commission (NRPC), Rockingham Planning Commission (RPC), the Southern New Hampshire Planning Commission (SNHPC), the Merrimack Valley Planning Commission (MVPC), the Northern Middlesex Council of Governments (NMCOG), and the Boston Region Metropolitan Planning Organization (MPO) (Figure 1.1).

1.2 Study Corridor Dynamics

The Boston metropolitan area has expanded over the past several decades, first moving beyond Route 128/I-95, then I-495 in Massachusetts, and is now beginning to extend into southern New Hampshire. The Boston-based commuter-shed is now reaching beyond Nashua and Salem, and is continuing to move northward.

Expansion of the Boston metropolitan area and Boston-based commuter-shed has contributed to congestion in the Capitol Corridor, especially near Boston and particularly on I-93. This congestion results partly from the fact that Route 3 loses its freeway functionality south of Route 128/I-95, which negatively impacts traffic flow on the corridor's Lowell-Manchester side.

The congestion resulting from strong southbound commuting and non-work trip patterns is exacerbated by sprawl-type suburban residential development patterns throughout parts of southern New Hampshire, although there are some denser development patterns, particularly in Nashua and Manchester. Sprawl-type development contributes to increased vehicle miles travelled (VMT) throughout the corridor.

Business development and job creation in the corridor's northern half have not kept pace with residential growth, especially in high-technology sectors flourishing in the corridor's southern half; this residential/employment disconnect is exacerbating the transportation issues that are driving the Capitol Corridor Study.

Existing express bus commuter service is not attractive to a broad enough market and employs a park-and-ride strategy with a focus (mainly) on park-and-ride facilities located at or very near freeway interchanges. This strategy does not promote the dense, sustainable development that leads to reduced VMT.

1.3 Project History and Planning Context

As previously discussed, regular passenger rail service between Concord, New Hampshire and Boston, Massachusetts ended in 1967, with the exception of a brief restoration of service during a 1980-81 demonstration project. Since the 1980s, numerous studies and plans have supported the return of passenger rail service and expanded transit options in portions of this corridor. Following are a few examples of state-level recognition of the need for the Capitol Corridor AA Study:

- In 2003, the New Hampshire, Vermont, and Massachusetts DOTs commissioned a feasibility study for the Boston to Montreal rail corridor: *Boston to Montreal High-Speed Rail Planning and Feasibility Study Phase I: Final Report*. The study describes existing conditions, including those

from Boston, Massachusetts to Concord, New Hampshire, as well as a ridership analysis of corridor stations. The study found that “further study of associated operational, engineering, and cost/revenue factors is warranted,” a recommendation that supports the AA Study.

- In 2004, NHDOT developed a draft Environmental Assessment, *Lowell, MA to Nashua, NH Commuter Rail Extension Project Environmental Assessment*, for the corridor segment from Lowell, Massachusetts to Nashua, New Hampshire in anticipation of extending MBTA commuter rail service to New Hampshire. Because the study focuses on a segment of the Capitol Corridor area, its environmental analysis can support the Capitol Corridor AA Study.
- In 2006, the Community Advisory Committee to the NHDOT Commissioner recommended expanded passenger rail as one of the five “initial action items” in its final report, a component of the state’s long-range transportation plan.
- In 2007, the New Hampshire legislature created the New Hampshire Rail Transit Authority (NHRTA) to establish passenger rail service in New Hampshire.
- Beginning in 2007, New Hampshire invested \$35 million in extensive new commuter bus services between greater Manchester, Nashua, and Boston. Service on I-93 was a commitment in the Environmental Impact Statement for improvements to the highway, and resulted from an extensive public scoping process that identified the need for expanded transit service. The project included the purchase of 16 coaches and construction of three bus terminals, two new park-and-ride lots, and coach service and storage facilities. The project also provided approximately \$3.8 million for three years of operating support. NHDOT has also supported private bus service from Concord to Boston by purchasing buses and constructing a new bus terminal and park-and-ride lot in Concord. The state has determined that public investment in these transit improvements is needed to expand service and leverage the involvement of private bus companies, which could not undertake major commuter bus service expansion on their own. In spite of highway and transit improvements, the need for passenger rail service has grown due to increases in population and traffic in this corridor, as well as concerns about air quality, sprawl, and a reliance on single-occupant vehicles. The access of New Hampshire commuters, students, visitors, and other travelers to the Boston area is frequently disrupted by severe traffic congestion, weather incidents, and other factors that affect the highway system.
- In 2009, the *New Hampshire Climate Action Plan*, prepared by the New Hampshire Climate Change Policy Task Force, recommended expanded passenger service as part of a balanced transportation system.
- The 2010 *New Hampshire Capitol Corridor Project Overview Based on a White Paper Prepared for Amtrak* details this corridor’s state-of-readiness to function as part of the federal High-Speed Intercity Passenger Rail (HSIPR) Program. Although the overview includes many elements of the Capitol Corridor Study, including proposed service, ridership forecast, capital costs, and economic impacts, the Study assumed Amtrak-operated service, so the completed work relates to only one potential alternative that will be studied through this project.
- Also in 2010, NHRTA commissioned the *Economic Impact of Passenger Rail Expansion along the New Hampshire Capitol Corridor*. The report assessed the economic impacts of restoring intercity passenger rail service between Boston, Massachusetts and Concord, New Hampshire.

The study supports the case that the implementation of passenger rail along this corridor is a net economic benefit for New Hampshire.

- In 2011, the University of New Hampshire Survey Center polled New Hampshire residents to assess attitudes about extending commuter rail service through the Capital Corridor. Findings of this *Granite State Poll for New Hampshire Rail Transit Authority* suggest a majority of residents strongly favor extending commuter service in New Hampshire, and a plurality of support using federal funding to study the issue.

1.3.1 Other Related Planning

A number of other relevant planning studies reference the Capitol Corridor, and are relevant to the current AA Study.

- The *Ten Year Transportation Improvement Plan (2013-2022)* includes a provision that requires legislative approval for capital and operating budgets associated with passenger rail service prior to expenditure.
- The *Massachusetts Department of Transportation Rail Plan (2010)* and the *New Hampshire State Rail Plan (2012)* identify the corridor as a potential for passenger service, and the New Hampshire plan recommendations include “implement recommendations of studies of the New Hampshire Capitol Corridor.”
- The *I-93 Corridor Multi-Modal Transit Investment Study (2009)* does not focus on studying the New Hampshire Capitol Corridor, but recognizes it as a viable candidate for passenger rail service.

1.4 Project Purpose

The Capitol Corridor AA Study has the following purpose:

1. Identify and implement a transit and/or intercity passenger rail investment strategy that leverages the existing transportation infrastructure to improve connectivity to and from Boston, the region’s largest economic hub
2. Diversify options and reduce single-mode reliance on roadways to move people and goods
3. Support mobility options that match emerging demographic trends and preferences in the corridor
4. Maintain the region’s high quality-of-life through strategic infrastructure investments

1.5 Project Need

The Capitol Corridor dynamics described in Section 1.2 have contributed to the need for transit and/or intercity passenger rail investment within the Capitol Corridor, as described below.

Projected population growth will result in increased roadway congestion. As population density increases over the coming years, an increased number of multi-modal transportation options to Boston, the region’s largest employment center, will be critical to mitigate corresponding increases in roadway congestion, particularly along I-93 and Route 3.

New Hampshire’s existing transportation network does not effectively connect existing modes.

Increased levels of corridor transit investment will improve local and regional mobility by linking travelers to the network of existing transportation modes: roadway, buses, commuter rail, heavy rail, light rail, bicycles, ferries, and airplanes. These increased linkages will improve ridership and usage across all modes, while promoting sustainable mobility.

The regional economy suffers from singular dependency on roads for movement of goods and passengers. Investing in transportation infrastructure that provides an alternative to roadway transport will link New Hampshire’s businesses, industries, and residents to the national and New England transportation network.

Improved transportation options will attract employers to New Hampshire and improve employment options for New Hampshire residents. A mismatch between locations of residence and employment forces many in New Hampshire to spend comparatively long periods of time commuting to work. Investing in more efficient transportation modes will not only improve connectivity between existing centers of residence and employment, but increased levels of multi-modal access may also catalyze additional business investment within New Hampshire.

New Hampshire is experiencing a young professional “brain drain.” While the region’s overall population is projected to grow in the coming decades, young professionals are choosing to leave southern New Hampshire to be closer to the employment and cultural and social opportunities associated with larger urban centers. Improved transit connectivity will support the attraction and retention of young professionals within the Capitol Corridor Study area.

New Hampshire is getting older. New Hampshire’s senior population continues to grow. Additional shared transportation accommodations that support “car-light” mobility will be required to accommodate these emerging demographic and lifestyle trends, and will continue to make New Hampshire attractive to residents from childhood through retirement.

Residential development patterns resulting from population growth may negatively impact the region’s existing quality-of-life. Population growth, if not guided through strategic infrastructure investments that promote efficiency, will result in uncoordinated development patterns and sprawl, diminishing the region’s high quality-of-life and negatively impacting its unique character.

The existing transportation network cannot accommodate increased levels of demand without negative environmental consequences. Expanding existing roadways and constructing new roadways will not be sufficient to sustainably accommodate the projected growth in travel demand, causing negative environmental consequences associated with an increased number of VMT and corresponding congestion.

2 Study Funding and Organization

The Study corridor’s unique nature is reflected in its innovative combination of funding streams: the FTA and FRA are jointly funding this Study to ensure the broadest possible universe of alternatives is considered (both bus- or rail-based transit service and intercity passenger rail service) to meet the corridor’s transportation needs. While these two funding streams are supporting one AA Study, each agency has designated use of their funds for specific tasks and geographies:

- **FTA** funding was limited to AA tasks related to transit service in the Concord-Boston corridor and included developing a range of alternatives for travel from Concord, Manchester, and Nashua to Boston; soliciting and evaluating public outreach and input on those alternatives; and developing recommended strategies along with an Environmental Assessment (EA) of those alternatives.
- To fully evaluate the intercity rail alternative, **FRA** funding was used to develop and screen alternatives, identify and analyze travel markets, and review existing services for the full 73-mile corridor. Tasks were limited to examining intercity rail alternatives in the corridor between Boston and Concord and included developing a Service Development Plan (SDP) and an EA.

This type of collaboration requires close coordination between a number of agencies beyond FTA, FRA, and NHDOT, including the NHRTA, Amtrak, PAR, Massachusetts Department of Transportation (MassDOT), corridor communities, and the Manchester-Boston Regional Airport (Manchester Airport).

3 Corridor Description

3.1 Population and Employment

Table 3.1 shows historical, existing, and projected population growth within the Study corridor. While the New Hampshire and Massachusetts corridor portions are projected to grow over the next two decades, the Massachusetts portion is projected to grow at a slightly faster pace. It can be anticipated that this population growth will increase demand on the transportation network, which may result in increased levels of congestion and travel times, particularly in the southern portion of the corridor which, as discussed in Section 3.4.1, already experiences intense levels of peak-hour highway congestion.

Table 3.1: Historical, Existing, and Forecast Population in the Capitol Corridor Study Area

Geography	1990	2000	2010	2020	2030	2035	Total Change 2010-2035	Percent Change 2010-2035
MA Study Area	3,474,873	3,666,175	3,782,361	3,942,000	4,093,000	4,182,000	399,639	10.6%
NH Study Area	647,011	733,134	775,520	801,029	832,598	840,034	64,514	8.3%
TOTAL Study Area	4,121,884	4,399,309	4,557,881	4,743,029	4,925,598	5,022,034	464,153	10.2%

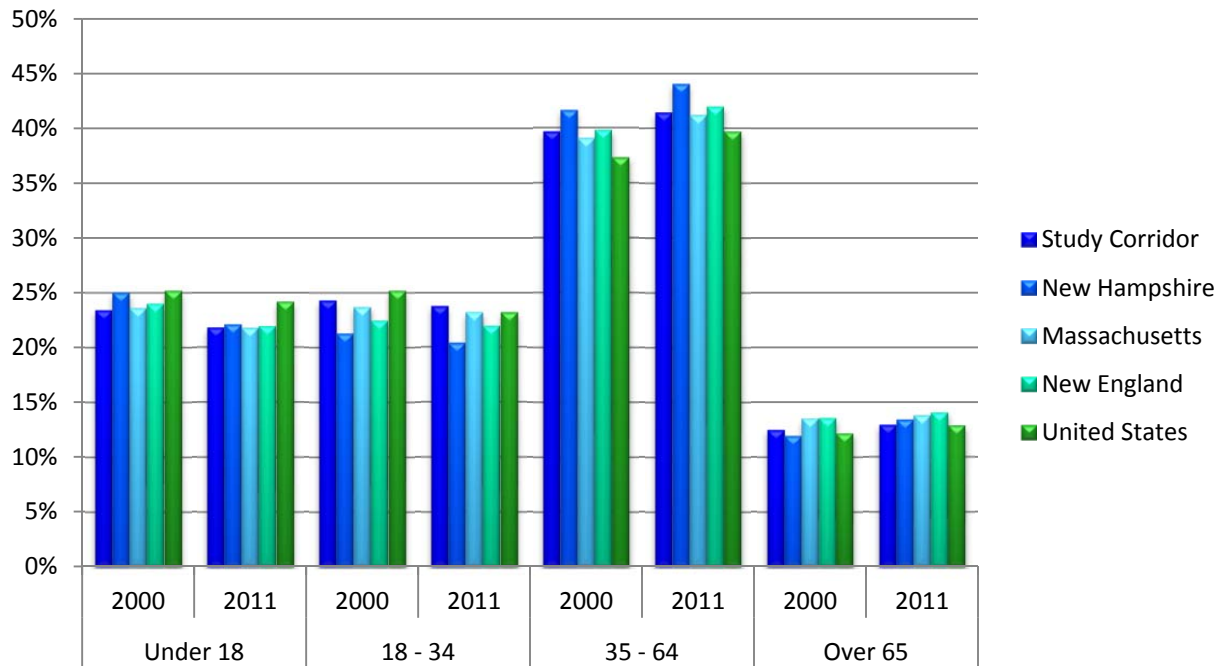
*Note: areas include Boston Region MPO, NMCOG, MVPC, CNHRPC, NRPC, Rockingham Planning Commission, SNHPC
 Source: Metropolitan Area Planning Council (MAPC), NMCOG, MVPC, NH Office of Energy and Planning (NH OEP)/CNRPC*

As shown in Figure 3.1, the U.S.’s largest population group falls between ages 35 and 64. The percent of New Hampshire’s total population that falls within that age group is higher than Massachusetts, New England, or the nation. As shown in Figure 3.2, the growth of New Hampshire’s population over age 65 increased at a significantly faster rate between 2000 and 2011 than Massachusetts, New England, or the U.S.

As shown in Figure 3.3, the median age has increased within the Study corridor, New Hampshire, Massachusetts, New England, and the U.S. Increase in median age has been greatest within the Study corridor (four years), which is more than twice the nationwide increase in median age during the same time period (1.7 years) (Figure 3.4).

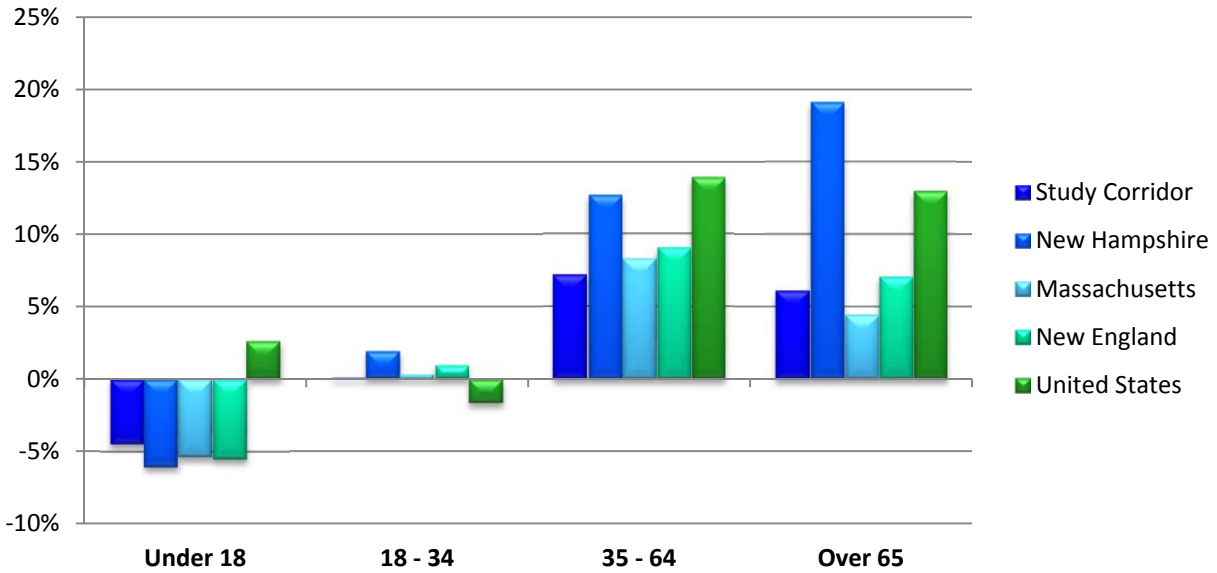
New Hampshire – and the Study corridor – are older and aging at a faster pace than the surrounding states and the nation. As New Hampshire’s residents age, a robust multi-modal transportation that reduces reliance on single-car ownership will be necessary to support these residents’ continued mobility and quality-of-life.

Figure 3.1: Population Distribution, 2000 and 2011



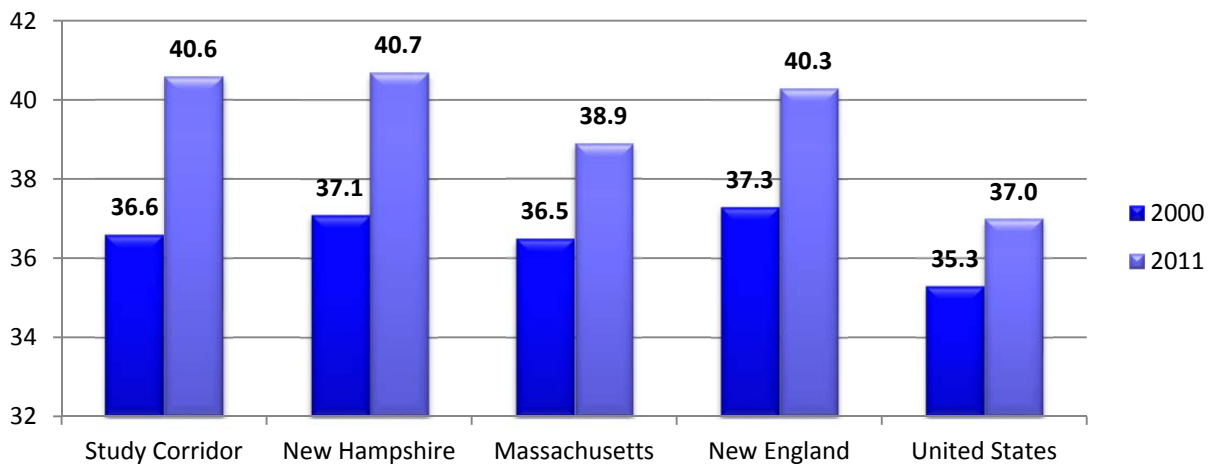
Source: 2000 U.S. Census and 2011 Five-Year American Community Survey

Figure 3.2: Change in Population by Age Group, 2000 to 2011



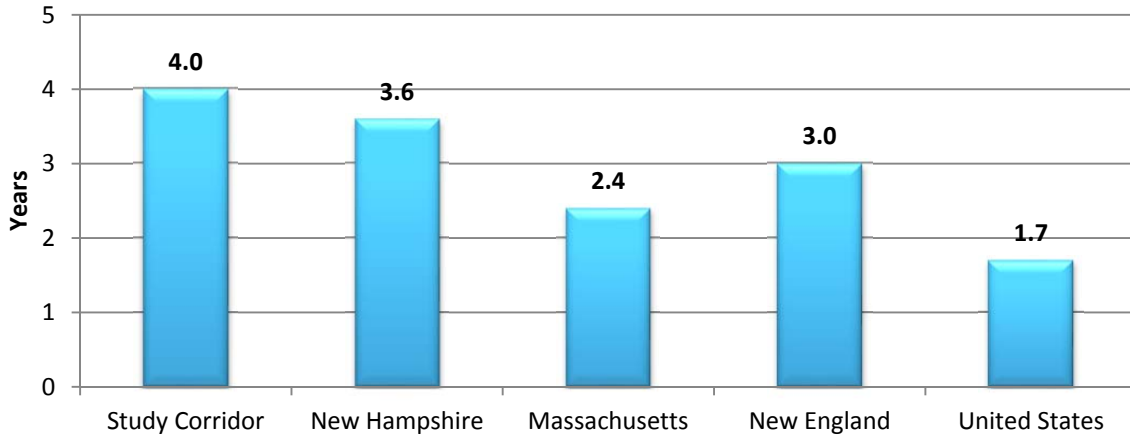
Source: 2000 U.S. Census and 2011 Five-Year American Community Survey

Figure 3.3: Median Age, 2000 and 2011



Source: 2000 U.S. Census and 2011 Five-Year American Community Survey

Figure 3.4: Change in Median Age, 2000 to 2011



Source: 2000 U.S. Census and 2011 Five-Year American Community Survey

In addition to understanding existing and projected population growth, it is important to ensure that the specific needs of transit-dependent populations are considered when developing and evaluating transit investment strategies. These households rely on transit as a means to access employment, education, medical care, goods and services, and recreational opportunities; maximizing benefits to these populations while minimizing adverse impacts is important to transit investment success.

As shown in Table 3.2, 14 percent of households in the Massachusetts Study corridor do not have a car, compared to 4.4 percent of households in the New Hampshire portion. This difference likely reflects the fact that the Massachusetts portion has a significantly more dense and robust transit network (commuter rail, heavy rail, light rail, bus, express bus, and ferry) than the New Hampshire portion.

Table 3.2: Zero Car Households in the Study Corridor

Geography	Zero Car Households	Total Households	Percent of Households with Zero Cars
Boston Region MPO	193,254	1,263,402	15.3%
MVPC	13,644	143,769	9.5%
NMCOG	9,099	129,979	7.0%
Massachusetts Total	215,997	1,537,150	14.0%
Central NH RPC	2,958	54,519	5.4%
NRPC	3,533	87,570	4.0%
RPC	2,798	80,423	3.4%
SNHPC	5,937	124,784	4.8%
New Hampshire Total	15,226	347,296	4.4%
Study Corridor Total	231,223	1,884,446	12.3%

Source: American Community Survey 2010 Five-Year Data

3.1.1 Employment

Massachusetts and New Hampshire forecast industry growth (by the North American Industry Classification System) out to 2020. Massachusetts organizes projections by Workforce Investment Areas (WIAs), while New Hampshire uses RPC jurisdictions. While the WIA boundaries do not exactly conform to the Capitol Corridor Study area, the four WIAs included in Table 3.3 below generally cover the Study area.

Table 3.3 reflects the projected three fastest-growing industries through 2020; the fastest-growing industry in each geography is in bold font.

The fastest growing industries in Massachusetts are – with the exception of construction – service-oriented industries: finance and insurance, professional, scientific and technical services, and other services. New Hampshire’s fastest-growing industry – with the exception of professional, scientific, and technical services in Nashua RPC – is health care and social assistance, which does not even place in the top three in Massachusetts. This may reflect New Hampshire’s comparatively high older population and the role of Boston as a regional finance, technology, and business service hub.

Table 3.3: Projected Changes in Industry Employment 2010-2020 (Five Highest Rates of Growth per Geography)

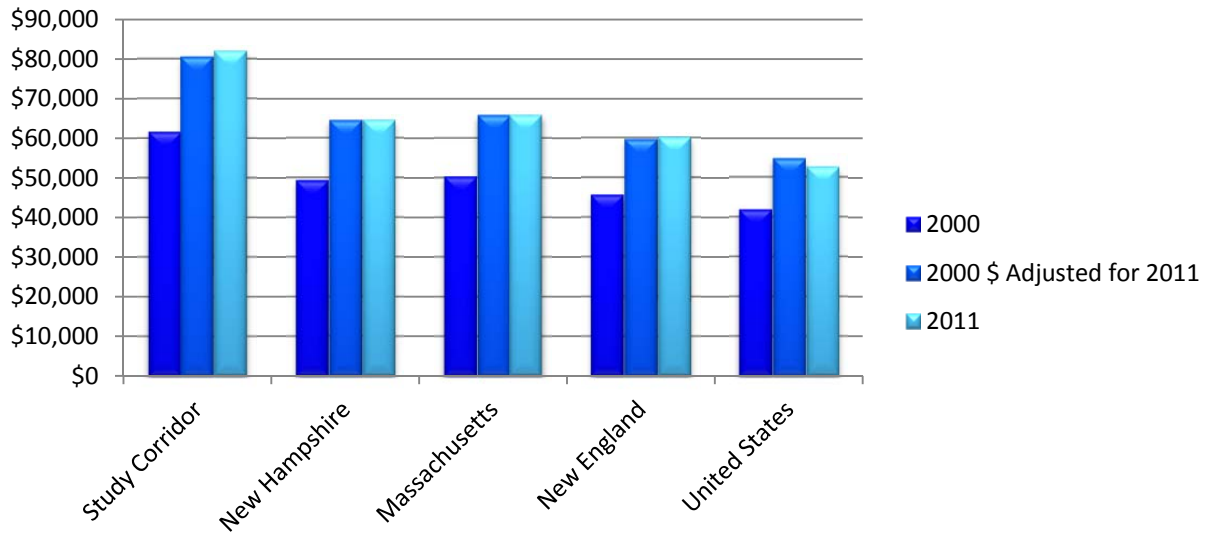
NAICS Industry	Massachusetts					New Hampshire			
	Boston WIA	Greater Lowell WIA	Lower Merrimack Valley WIA	Metro North WIA	North Shore WIA	Rockingham RPC	Central NH RPC	Southern NH RPC	Nashua RPC
Construction		50.4%			41.2%				
Wholesale Trade		49.3%			33.1%				
Retail Trade									
Transportation and Warehousing		33.7%							
Finance and Insurance				59.5%					19.7%
Professional, Scientific, and Technical Services	36.5%		43.9%	27.2%		22.4%	16.7%	22.9%	25.5%
Administrative/Support/Waste Mgmt./Remediation				24.2%	25.9%	18.6%	19.9%	18.9%	
Health Care and Social Assistance						23.9%	25.4%	25.1%	23.7%
Arts, Entertainment, and Recreation	32.9%		34.7%						
Other Services	42.8%		37.0%						

Source: Massachusetts Executive Office of Labor and Workforce Development, the Bureau of New Hampshire Employment Security

As shown in Figure 3.5, households within the Study corridor have a higher median income than New Hampshire, Massachusetts, New England, and the U.S.; this may reflect the fact that the Study corridor includes the largest cities in Massachusetts and New Hampshire (where residents tend to have higher incomes) and excludes the majority of the lower density, rural areas (where residents tend to have lower incomes).

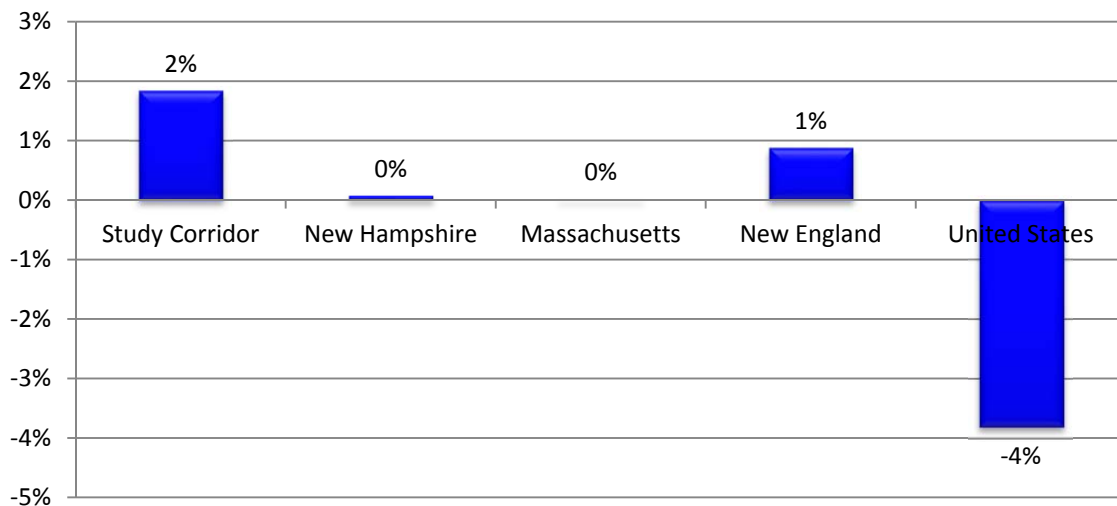
As shown in Figure 3.6, median household income within the Study corridor increased by two percent (in 2011 constant dollars) between 2000 and 2011, which outperforms New Hampshire, Massachusetts, New England, and the U.S.

Figure 3.5: Median Household Income, 2000 and 2011



Source: 2000 U.S. Census and 2011 Five-Year American Community Survey

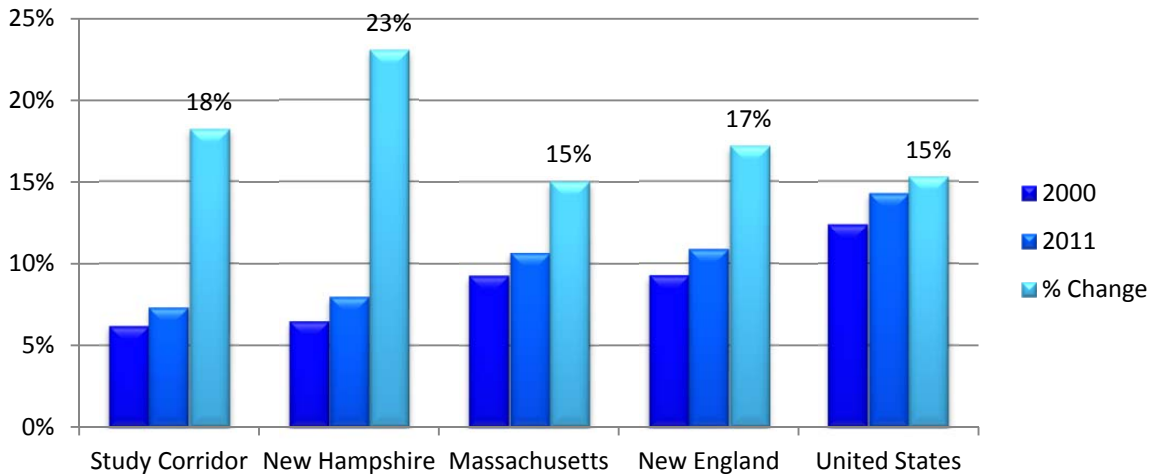
Figure 3.6: Percent Change in Median Income, 2000 to 2011 in 2011\$



Source: 2000 U.S. Census and 2011 Five-Year American Community Survey

While the Study corridor has the lowest percentage of population living below the poverty line (Figure 3.7), that population increased 18 percent between 2000 and 2011. As the percentage of population living in poverty grows, providing these residents with lower-cost mobility options that reduce the need to own a car becomes increasingly important.

Figure 3.7: Percent of Population below the Poverty Line



Source: 2000 U.S. Census and 2011 Five-Year American Community Survey

3.2 Existing and Future Land Use

A legacy of New Hampshire’s and Massachusetts’ colonial past is prevalence of traditional town-center development, designed to support pedestrian, rather than vehicular traffic. This development style has a comparatively high-density mix of uses in the “downtown” that is easily accessed on foot from surrounding residential areas. While some infrastructure elements have been retrofitted to facilitate driving, the historic downtown development patterns of Boston, Lowell, Nashua, Manchester, and Concord (and other smaller towns within the Study corridor) elevate pedestrian and non-motorized transportation modes and reduce reliance on cars.

Another traditional land use pattern, particularly within the New Hampshire corridor, is rural farmland and open spaces. As discussed in Section 4.3.1, these land uses, and the environmental assets they preserve, are critical to New Hampshire’s identity and a major factor in the continued high quality-of-life for New Hampshire residents.

As the population has grown over the decades and development has spread outside of traditional town centers and open spaces, auto-oriented, lower-density residential and commercial development patterns have emerged. These patterns, which can be found throughout the Study corridor, are typically dominated by land use segregation (as opposed to mixed use patterns found in town-centers).

Separated land uses are connected by comparatively few limited access roadways, which can result in increased levels of traffic congestion during peak travel times.

As discussed in Section 3.1, both Massachusetts' and New Hampshire's population is projected to grow over the next two decades; anecdotally, some of New Hampshire's growth can likely be attributed to the northward movement of Massachusetts residents. Regardless of the source, population growth will exert increased development pressure on New Hampshire's communities, which, in the absence of a strategic land use framework, could result in increased levels of congestion, encroachment into open spaces, and reduced quality-of-life.

Communities throughout New Hampshire and Massachusetts, including those within the Study corridor, have recognized potential costs associated with policy and regulatory inaction, and have undertaken numerous land use and development planning activities designed to encourage more sustainable land use patterns:

- **Granite State Future (ongoing).** This three-year collaborative strategic planning process among New Hampshire's nine RPCs (led by the Nashua RPC) will identify important local assets; incorporate shared values and opportunities into the planning process; plan for infrastructure investment; and conserve New Hampshire's natural, social, and financial resources while protecting its unique beauty and character.
- **New Hampshire Department of Environmental Service's *Innovative Land Use Planning Techniques (2008)*.** This document highlights strategies and outlines model ordinances for towns and regions to use when developing community plans. These ordinances strive to preserve the rural character, enhance thriving downtowns, create or maintain a sustainable working landscape, and ensure that local businesses and development continue to thrive while minimizing negative impacts and costs. Some techniques described here include urban growth boundaries, infill development, and ways to implement Transit-Oriented Development (TOD).
 - The City of Nashua adopted a TOD district as part of its Land Use Code in January 2006. This district encourages mixed land uses within a half-mile radius of a potential commuter rail station area. The ordinance helps to support development that complements transit use while limiting conflicts between vehicles and pedestrians.
 - Another example is in the City of Concord, where in 1987 the city adopted a transit development goal as part of its long-term comprehensive plan.
- **City of Manchester, *Master Plan (2009)*.** This plan promotes several goals focused on land use and transportation, including walkability, accomplished in part by having mixed land uses; alternative transportation options besides personal vehicles; sustainability, accomplished by mixed uses both within a neighborhood and within a building; a focus on the downtown, creating a transit center and updating the Central Business District zoning codes; and lastly, updating zoning codes to support mixed land uses – focusing on areas where higher residential density should occur and creating conservation zones to help maintain open spaces.

- **City of Manchester, *Toward a More Walkable and Livable Manchester (2011)*.** This technical memorandum addresses the need to balance repairing old infrastructure and developing new infrastructure to support active living and encourage economic development, while maintaining a low tax base and affordability. Short-term and less expensive options are provided, as well as some higher cost options that capitalize on existing town assets. Specific recommendations include improvements to the Crystal Lake and West Granite neighborhoods.

Crystal Lake:

- Capitalize on the exiting utility corridor to create an eco-trail that connects the neighborhood to the lake, parks, schools, and other community assets
- Modify Corning Road with narrower travel lanes, wider shoulders, better pedestrian crossings, and a mini-circle to support all users

West Granite:

- Improve the crossing at Main Street and Walker
- Create an area master plan for the greater West Granite neighborhood
- Create a vision plan for Main Street in the West Granite neighborhood

The memo also provided two recommendations for the greater Manchester area:

- Improve the trail that connects the west and east sides of central Manchester
 - Ensure sidewalks and pedestrian crossings exist on all streets where people should be expected and supported in walking and biking
- **City of Concord, *Master Plan 2030 (2008)*.** The City of Concord has a precedent of directing growth in a sustainable manner through the use of its Urban Growth Boundary, established in 1993. This plan also identifies the Opportunity Corridor – the city’s highest priority for economic development, focusing on redevelopment and an intensive mix of land uses. The Opportunity Corridor runs north-south between the downtown and the Merrimack River and covers approximately 500 acres of land. The area was once home to industrial sites and manufacturing, but today those uses have been replaced by shopping malls, warehouses, and underutilized parcels well-positioned for redevelopment.
 - **City of Nashua, *Guide to Transportation Planning (2008)*.** This guide focuses on how to address the anticipated increase in demand that will be placed on transportation infrastructure. Some land use techniques suggested are consolidating development, encouraging mixed use, and limiting access to regional roadways – all of which can be accomplished by promoting nodal development patterns, following context sensitive solutions (CSS), and understanding bicyclists’ and pedestrians’ needs.
 - **Southern New Hampshire Planning Commission, *New Hampshire Livable Walkable Communities Toolkit (2012)*.** An update to a report completed in 2004, this report demonstrates a commitment to promoting physical activity for public health benefits throughout New

Hampshire and draws a connection between creating environmentally beneficial developments that increase walkability and enhance property values. The following are some techniques recommended to accomplish these goals:

- Mixed land uses, including urban agricultural uses
- Conserving and creating green space
- Access to transit for all incomes and stages of life
- Low-impact development
- Infill development incentives
- Flexible land use types
- Using vacant lots for recreational activities
- CSS

All of the above plans demonstrate local community commitment to regulate land uses to better serve residents' transportation needs. This type of guided development facilitates efficient growth while preserving the highly valued character and quality-of-life throughout the corridor.

3.3 Travel Patterns and Market Analysis

Market analysis provides a critical first step in estimating travel demand in the Study area via developing “big-picture” flows by quantifying the travel market’s total size in the Capitol Corridor and key origin-destination travel patterns.

The Capitol Corridor’s travel market geographic area is defined by the existing track alignment extending north from Lowell through proposed Nashua and Manchester stations, and ending in Concord. This corresponds roughly with the US Route 3 corridor in New Hampshire. The entire travel corridor varies by alternative, but, at maximum, stretches from the proposed Concord station in the north to MBTA’s Boston North Station in the south. This section focuses on the New Hampshire market in the proposed extension area.¹

The Capitol Corridor could be an extension of the MBTA commuter system. Work trips are the largest market of trips MBTA serves, representing approximately 87 percent of all MBTA commuter rail system trips.² This analysis focuses on the three main work-trip markets in the Capitol Corridor:

- New Hampshire to Massachusetts
- New Hampshire to New Hampshire

¹ The New Hampshire market is considered to be communities along the corridor and consists of Concord, Manchester, Nashua, Bow, Pembroke, Hooksett, Goffstown, Bedford, Londonderry, Merrimack, Litchfield, and Hudson

² MBTA ridership numbers are from the *MBTA System-wide Passenger Survey: Commuter Rail 2008-09 Report* published by the Central Transportation Planning staff in June 2010

- Massachusetts to New Hampshire

Mobility of individuals and their ability to reach places of employment, particularly to locations outside their areas of residence, is highly dependent on automobiles. Workers without an automobile, or access to one, are transit-dependent if they live beyond walking or biking distance of their jobs. The MBTA reports that only about 10 percent of all transit riders on its commuter rail system are transit dependent, so about 90 percent of riders are choice riders. Of these, nearly 81 percent cite the reason for riding is to avoid traffic.

Corridor population³ within the proposed service catchment area is an important indicator of potential transportation infrastructure and service use. The corridor connects the three largest cities in New Hampshire: Concord, Manchester, and Nashua. These cities, as well as other communities in the corridor, represent nearly 39 percent of the population and just over 41 percent of employment in the entire State of New Hampshire. Concord, Manchester, and Nashua alone account for 24 percent of the population and just over 27 percent of employment in the state.

3.3.1 New Hampshire-to-Massachusetts Work-Trip Market

The New Hampshire communities within the corridor generate a total of approximately 200,000 work trips, of which over 28,000 (14 percent) are destined for locations in eastern Massachusetts. Of these 28,000 trips, approximately 10,000 (35 percent) are destined to locations along the existing Lowell Commuter rail line. These trips are the main component of the New Hampshire-to-Massachusetts work-trip market that would be served by the Capitol Corridor.

The main destinations of the New Hampshire work trips are Lowell and Boston/Cambridge. Lowell attracts just over 2,000 work trips from the corridor communities and Boston/Cambridge attracts just over 4,000. The Boston/Cambridge work trips face severe congestion during work commuting times and are considered a very strong market for Capitol Corridor service.

3.3.2 New Hampshire-to-New Hampshire Work-Trip Market

Of the approximately 200,000 work trips generated by New Hampshire corridor communities, just over 170,000 remain in New Hampshire and a large majority of these, nearly 148,000, stay within the corridor itself. Not all these trips are part of the market that the Capitol Corridor would serve due to project alignment, but they show the relatively large number of work trips within New Hampshire.

The intra-New Hampshire market consists primarily of work trips among Concord, Manchester, and Nashua. Excluding intracity trips, the work-trip market between these cities is over 9,000 trips.

³ Population, employment, and commuting to work numbers are from the U.S. Census Bureau, 2006-2010 American Community Survey five-year estimates

3.3.3 *Massachusetts-to-New Hampshire Work-Trip Market*

This market is the smallest of the three major work-trip markets, with a total of 1,370 work trips from existing Lowell line communities to Concord, Manchester, or Nashua. The majority of these trips are from Lowell (773) and Boston (300). Similar to the trips to Boston, the trips from Boston face the severe commuting-period congestion.

3.3.4 *Summary*

- Work-trip markets are the major market to be served by the Capitol Corridor, and ridership on the MBTA system indicates the vast majority riders are choice riders who ride to avoid traffic
- The New Hampshire-to-Boston work-trip market is the largest and experiences the most congestion, making it a strong candidate to use Capitol Corridor service
- The intra-New Hampshire work-trip market is almost as large as the Boston market, but is not considered as strong as it does not face severe congestion of the Boston area; because these trips occur in the most traveled work corridor, they may be candidates for Capitol Corridor service
- The Massachusetts-to-New Hampshire work-trip market is the smallest, with more than half of the trips originating outside of Boston, making it the weakest of potential markets for Capitol Corridor service

3.4 **Transportation Facilities and Services**

The Capitol Corridor's robust transportation network includes roadways, highways, transit services, intercity passenger rail service, freight railroads, airport, and pedestrian and bicyclist facilities. Despite this network's dense, multi-modal nature, demand is exceeding capacity, particularly within the highway network (as described in Section 3.4.1), and opportunities exist to improve connectivity between the current modes.

3.4.1 *Highway Facilities*

Limited access highways that connect New Hampshire's major population centers to metropolitan Boston are I-93, US Route 3/Everett Turnpike, Route 128/I-95, I-293, and I-495. These highways cover 134 miles of limited access freeway facilities and interchanges, shared between the States of New Hampshire and Massachusetts. The breakdown on the corridor mileage is as follows:

- I-93: 65 miles
- US Route 3: 49 miles
- Route 128/I-95: 11 miles
- I-495: 9 miles

The corridor has experienced rapid population growth, and many new residents commute to jobs in greater Boston. New Hampshire and Massachusetts have expanded the highway system to accommodate increasing traffic, and additional expansion is unlikely due to financial and environmental constraints. At a minimum, the advent of passenger rail service may delay the need for further highway widening. Traffic volume at the state line on the Everett Turnpike in Nashua grew by nearly 26 percent from 2002 to 2009 to 88,200 (average daily traffic), and continued traffic growth in the corridor in both states is projected. A recent review by the NRPC projects that average daily traffic on the Everett Turnpike will exceed capacity at several locations in 2020 (translating to a Level of Service D or below). This is consistent with earlier projections for the Massachusetts segment of the highway (US Route 3 in Massachusetts) that projected Level of Service F at peak hours by 2018, even with the additional lanes that have been constructed.

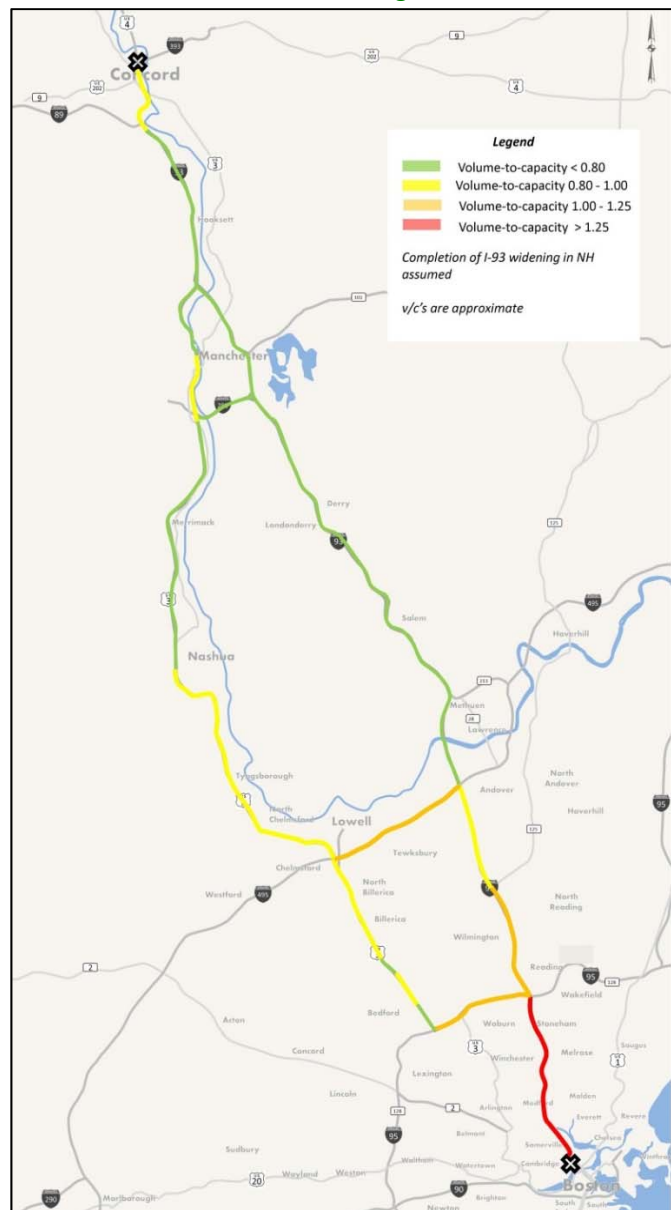
As shown in Figure 3.8, the highest levels of peak morning hour congestion are found closest to Boston. During peak hours, southbound travel speeds average less than 30 miles per hour (mph), traffic volumes exceed roadway capacity by more than 25 percent, and average speeds within eight miles of Boston dip to as low as 12 mph.

Contributing factors to the severe traffic congestion experienced entering and departing Boston are the current freeway infrastructure, limited managed freeway lanes, and insufficient commuter transit options.

On the infrastructure side, south of Exit 28 in Somerville, Massachusetts, the three general purpose (GP) lanes on I-93 southbound drop to two for more than 1,000 feet before picking back up the third lane at Exit 29. This lane drop, less than four miles from Boston, is currently a choke point causing severe congestion on I-93 on typical weekday morning conditions.

Outside of Boston and Massachusetts, I-93 North is currently being widened to four GP travel lanes in each direction in New Hampshire between Exits 1 and 5 from the Massachusetts state line (Salem, New Hampshire) to Manchester, approximately

Figure 3.8: Existing Volume-to-Capacity Ratio during the Inbound Morning Peak



19.8 miles. This widening will add peak-hour vehicular capacity and facilitate more efficient traffic operations in New Hampshire. However, the future lane imbalance with the I-93 southbound lane drop from four lanes to three lanes between the New Hampshire state line and Exit 41 in Wilmington, Massachusetts for approximately 11.5 miles is expected to be a key choke point and source of congestion in the future morning peak period.

In the northbound direction during the afternoon peak period, after Exit 41 and the Route 125 interchange, I-93 northbound has a lane drop and three GP lanes are carried up to the New Hampshire state line. In the future, this lane drop from four to three lanes at Exit 41, and back to four lanes in New Hampshire, is expected to be a choke point and source of peak-hour congestion in weekday afternoons.

The peak period breakdown travel lanes on I-93 northbound and southbound between Exits 45 and 47 will be removed as part of the Methuen interchange reconstruction at Route 110/113 and I-93.

3.4.2 Transit and Intercity Passenger Rail Service and Facilities

The Capitol Corridor has a variety of commuter and local bus operators, as well as MBTA commuter rail service and Amtrak intercity passenger rail service on the *Downeaster* line.

Regional and Local Bus Service

Seven regional and four local bus operators provide service within New Hampshire and intercity service to Boston and beyond. Boston Express (BX) provides the primary commuter service within the Study area along the heavily congested Massachusetts segments of I-93. The service was initially introduced by NHDOT as a mitigation measure during highway construction along I-93. Concord Coach also provides intercity service to Boston along the central spine of New Hampshire as far north as Berlin. In Massachusetts, MBTA and the Merrimack Valley Regional Transit Authority (MVRTA) also provide commuter service to Boston along I-93 from communities to the north. Each of these services has access to the High Occupancy Vehicle (HOV) lane on I-93 that stretches 2.5 miles between the Shore Drive overpass in Somerville and the Zakim-Bunker Hill Bridge.

Additional New Hampshire regional bus service between communities outside the Study area and to Boston operates through the Study area or along segments of the corridor, as follows:

- Dartmouth Coach provides service from Dartmouth University in Hanover, New Hampshire and White River Junction, Vermont to Boston and travels non-stop through the Study area along I-89 and I-93
- Service to and from the New Hampshire Seacoast is operated by C&J from Dover, Durham, and Portsmouth, New Hampshire and Newburyport, Massachusetts to Boston and New York City
- Greyhound provides intercity service from Boston to Manchester, Concord, and points north and west; Greyhound also provides service from Boston to Nashua via Worcester and Leominster, Massachusetts

Local bus service within the New Hampshire Study area is provided by Concord Area Transit, Manchester Transit Authority, and Nashua Transit Service. Local bus service in Massachusetts is provided within the

Study area by the Lowell Regional Transit Authority. Interconnections between these local providers are limited.

Existing traffic congestion along I-93 and Route 3 significantly impact commuter bus scheduled travel times. For instance, BX’s 6:30am southbound departure from Londonderry (Exit 4) on the I-93 service is scheduled for a one-hour trip to Boston’s South Station. Meanwhile, the 9:50am southbound departure is scheduled for a two-hour 20-minute trip, which is a built-in or induced delay of one hour and 20 minutes.

MBTA Commuter Rail Service and Amtrak *Downeaster* Service

On a typical weekday in 2013, Lowell was served by 44 MBTA revenue trains to and from Boston’s North Station (Table 3.4). The 25-mile trip serving up to seven intermediate station stops takes 44 to 49 minutes. Six weekday non-revenue “deadhead” trains run between Lowell and Boston to stage the service because there is no facility for train overnight storage or maintenance in Lowell.

Typical weekday MBTA ridership on the entire line is 17,500 passenger trips, including both northbound and southbound travel. Lowell is the busiest station on the line with 4,280 weekday boardings and alightings. Running time between Lowell and Boston ranges between 45 and 49 minutes with a maximum allowable speed of 70 mph. The daily schedule includes approximately 150 daily deadhead train miles.

Table 3.4: MBTA Service, Ridership, and Revenue Statistics

Station	Mile Post	Weekday Revenue Trains		Typical Weekday Southbound Boardings (MBTA Only)	MBTA Cash Fare	Average Revenue per Passenger Boarding (MBTA)	Typical Total Weekday Passenger Revenue (MBTA)
		MBTA	Amtrak				
Lowell	25.5	44		2,141	\$6.75	\$6.67	\$28,566
North Billerica	21.8	44		1,427	\$6.25	\$6.38	\$18,195
Wilmington	15.2	47		758	\$5.25	\$5.09	\$7,711
Woburn	12.6	57	10	1,743	\$4.75	\$4.77	\$16,640
Mishawum	11.9	6		50	\$4.75	\$4.95	\$495
Winchester	7.8	49		1,002	\$4.25	\$4.34	\$8,701
Wedgemere	7.3	48		740	\$4.25	\$4.36	\$6,459
West Medford	5.5	49		884	\$1.70	\$1.83	\$3,244
North Station	0	58	10	n/a	n/a	n/a	n/a
Totals		58	10	8,745		\$5.15	\$90,011

Source: MBTA Conductor’s Audit Reports Thursday – February 9, 2012 and Jacobs Analysis

In addition to the Lowell service, MBTA runs a limited number of trains to and from Haverhill via Woburn and Wilmington to avoid conflicts on the Haverhill line south of Lawrence. Most of these trains serve passengers at the Anderson Regional Transportation Center (Woburn) and Wilmington. Six southbound and one northbound train operate along this so-called “Wildcat Route.”

Amtrak passenger train service between Boston and Portland was restored in 2001 after an absence of more than 35 years. On November 1, 2012, service was extended to Freeport and Brunswick, Maine. The *Downeaster* service (Figure 3.9) features five daily round trips between Portland and Boston’s North Station, with eight intermediate stops – Woburn, Haverhill, Exeter, Durham-University of New Hampshire (UNH), Dover, Wells, Saco, and in season, Old Orchard Beach. Two of those five daily round trips extend north of Portland to serve the Freeport and Brunswick stations. Ridership on the *Downeaster* service in Fiscal 2013 was nearly 560,000 passengers, up 3.4 percent from the year before. Most trains make the Boston-Portland trip in two hours, 30 minutes. Track work and speed increases in 2004 and 2007 have allowed a 15- to 20-minute schedule reduction in recent years.⁴

Figure 3.9: Amtrak Downeaster Service



3.4.3 Freight Railroad Facilities

The New Hampshire Main Line (NHML) was, and remains, a principal artery of the Boston and Maine Railroad’s (B&M’s) network and a key economic link between the Granite State and the national economy. Since the 1980s the B&M has belonged to a regional amalgam of railroads initially called the Guilford Rail System, later changing its name to PAR. Today PAR, headquartered in Billerica,

⁴ Amtrak Fact Sheet, Fiscal Year 2013, State of New Hampshire

Massachusetts, owns and operates the former B&M and Maine Central Railroads as an integrated system, roughly running from Bangor to Albany with numerous branches in New Hampshire and other New England states. North of Chelmsford, PAR refers to the route as its “Northern Branch.”

Once a busy mainline railway, the NHML was double tracked to Concord and beyond, but today the railway is largely a single track north of Lowell with some passing sidings, a yard in Nashua, and numerous turnouts to customer sidings.

In New Hampshire, the NHML is property of PAR. In Massachusetts, the southernmost 34.5 miles of the line was acquired by the MBTA in the 1960s. The MBTA acquired most mainline assets of the B&M and New Haven Railroad in eastern Massachusetts at that time. Today the southernmost 25.4 miles of the route between Boston and Lowell are busy with passenger traffic operated by the MBTA and Amtrak with some local freight services operated by PAR.

In 2011, PAR conveyed trackage rights for the operation of passenger trains on the NHML northward into New Hampshire between the state line and Concord.

New Hampshire and the rest of New England are often referred to as a “cul-de-sac” in the national rail network, since the area is primarily a freight destination, and no major rail routes traverse the region. Due to the Class I network geography, rail volumes in New Hampshire and New England tend to be considerably lower than most other states.

Approximately 85 percent of national rail freight tonnage is bulk commodities, those most commonly shipped to New Hampshire being coal and petroleum products bound for local consumption. The commodity most commonly shipped from New Hampshire is sand and gravel, bound for cement and asphalt plants in Massachusetts. Almost 80 percent of the rail cars moving through the state are through movements between Maine, Eastern Canada, and the balance of the U.S.

The NHML’s only connection to the national freight network is at Lowell, Massachusetts. This corridor currently receives 75 percent of all rail freight tonnage shipped into New Hampshire. While the freight received is quite diverse, traffic flow is dominated by coal for electric generation shipped at Bow.

Unless there is a major shift New Hampshire’s economy to produce, process, or consume large volumes of bulk commodities such as paper, chemicals, or energy, it is unlikely that the total volume of rail traffic to or from the Granite State on the NHML (or any other line) will grow at a rate that varies significantly from expected population growth as now most rail traffic shipped to New Hampshire is for local consumption and the volume of outbound rail traffic other than building materials is quite minor. However, rail freight in New Hampshire could benefit from improvements in the condition of a key rail line serving major population centers, but the magnitude of that overall benefit for long journeys on the national network will likely be relatively small.

3.4.4 *Bicycle and Pedestrian Facilities*

The State of New Hampshire, its regional planning commissions, and communities within the Capitol Corridor have underscored the importance of bicyclists and pedestrians to the transportation network by creating bicycle- and pedestrian-friendly plans:

- Regional Trails Coordinating Council, CNRPC, SNHPC, *Regional Trails Plan, Salem-Manchester-Concord* (2012)
- SNHPC, *New Hampshire Livable Walkable Communities Toolkit* (2012)
- City of Concord *Bicycle Master Plan* (2010)
- NHDOT, *New Hampshire State Trails Plan* (2005)
- Rizzo Associates and Alta Planning and Design, *Salem to Concord Bikeway Feasibility Study* (2003)
- NHDOT, *New Hampshire Statewide Bicycle and Pedestrian Plan* (2000)

The City of Boston's Hubway bike sharing program, opened in 2011, has more than 1,000 bikes stationed at 104 docks throughout Boston and Cambridge. A bike station serves every line of the T, commuter rail, and ferry, as well as 64 bus routes. The five most-used bike docks are located at either T or commuter rail stations; more than 600,000 Hubway rides have been taken.

This awareness and subsequent infrastructure investments in improved bike-pedestrian mobility will support Capitol Corridor transit investment by expanding low-cost, environmentally-friendly, and health-conscious access options to transit stations and final destinations within the corridor.

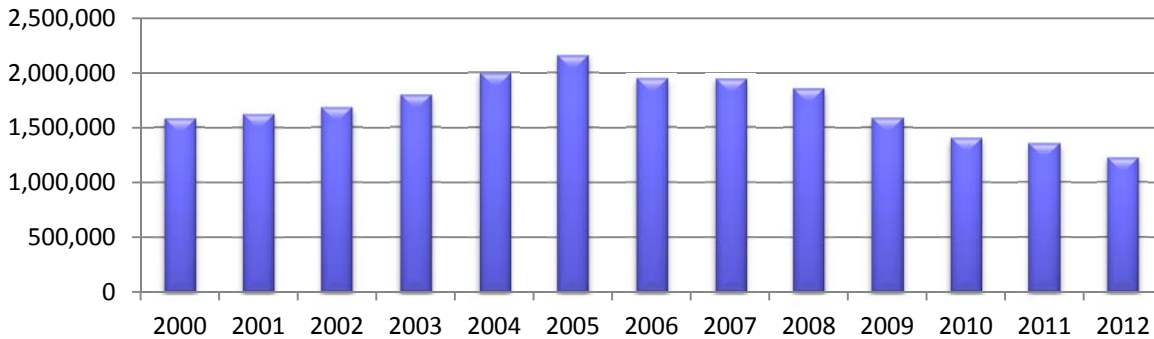
3.4.5 *Airports*

The corridor will provide an additional transit connection between the Manchester Airport and Boston, creating a system in which the three principal Boston-area airports are connected (with rail connection to Providence). Manchester Airport is an important economic engine for New Hampshire and the region – creating jobs, facilitating commerce, and providing access to the global marketplace. Manchester Airport contributes more than \$1 billion annually to the region's economy and accounts for more than 3,500 jobs in the three-county region contiguous to the airport. The airport connection, through an intermodal station adjacent to a new airport access highway, will create new rail-air connectivity.

Manchester Airport strongly supports development of passenger rail service in New Hampshire as part of a multi-modal solution to meet the region's growing and changing transportation needs. The airport incorporated a review of passenger rail service (and an anticipated airport rail station) as a focus of its 2011 *Master Plan Update* and identified important synergies between passenger rail and air passenger transportation systems. Manchester Airport will benefit from both enplaning passenger (air travelers originating from the area and using passenger rail service to travel to the airport from their home or business) and deplaning passenger (air travelers accessing New England through Manchester Airport and using passenger rail service to travel from the airport to their final destination) rail ridership. Visitors using Manchester Airport to access the region for business and leisure spent \$752.8 million in 2008, and a rail connection is considered critical to attract additional visitors, especially on international flights.

The airport’s annual enplanement statistics are shown in Figure 3.10. The 2011 *Manchester-Boston Regional Airport Master Plan Update* projects 1.9 to 2.3 million enplanements in 2020 and 2.3 million to 2.8 million enplanements in 2030.

Figure 3.10: Manchester Airport Enplanements, 2000 to 2012



Source: Manchester Airport Master Plan

Boston’s Logan International Airport is currently New England’s largest transportation center and ranks 20th in the nation in passenger volume, employs approximately 12,000 workers, and stimulates the New England regional economy by approximately \$7 billion per year.⁵ Increased multi-modal connectivity to this airport will provide Study corridor residents and visitors with expanded aviation access to their destinations while also supporting economic development activity.

4 Travel Demand and Sustainability

4.1 Increasing Travel Demand

Travel from New Hampshire to Boston is predominately made by auto trips in one of two main corridors: either I-93 or a combination of US Route 3, Route 128/I-95, and other routes.

Within Massachusetts, the Boston MPO predicts that average daily highway trips into Boston from the north and northwest corridors, which include the Massachusetts Study corridor, will increase from 176,100 to 186,500 between 2008 and 2030, approximately six percent. This growth may be somewhat

⁵ <http://www.massport.com/logan-airport>

restricted by existing corridor capacity constraints, as I-93 and the junction of Route 3 and Route 128/I-95 are considered to be one of the worst bottlenecks in the north corridor.⁶

In terms of traffic volumes on Route 3 and I-93, the Boston MPO's travel demand model forecasts large traffic volume increases just north of Route 128 by 2030. Route 3 is predicted to carry 120,400 vehicles per day by 2030, a 37 percent increase over current volumes. I-93 traffic volumes are forecasted to increase to 187,100 by 2030, an increase of 19 percent.

The Nashua MPO predicts that by 2035 the entire Route 3 corridor from Bedford to Massachusetts will experience a volume of greater than 60,000 vehicles per day. Currently the volume ranges from 53,300 at the Bedford tolls to 124,300 at Exit 5.⁷

The Manchester MPO forecasts volumes on I-93 to increase by about 15 percent between 2012 and 2040, peaking at 76,500. South of Manchester both Route 3 and I-93 are anticipated to experience major growth in volume, with I-93 having the greater increase. Volume on I-93 in Derry is currently 69,000 and is forecasted to be 121,400 by 2040, a 76 percent increase. The volume on Route 3 in Bedford is currently 42,600 and forecasted to be 66,000 in 2040, a 55 percent increase.⁸

Overall, within the corridor, traffic volumes are estimated to increase in the future. Data indicates that the most severely congested areas will grow the least in terms of volume due to current capacity constraints. Areas in the corridor with less congestion today are expected to have the greatest increase in future traffic volumes as excess capacity is utilized.

4.2 Economic Development and Land Use

4.2.1 Access to Boston-based Employment

Transit investment within the Capitol Corridor will improve multi-modal connectivity between New Hampshire's residents and Boston, the region's major employment center. As shown in Section 3.1, the New Hampshire and Massachusetts corridor portions are projected to experience population growth in the same industries. The Massachusetts portion is also projected to experience growth in a few industry segments less common in New Hampshire. Expanded access to this diversified employment base will benefit existing New Hampshire residents, and may encourage them to stay in their current communities rather than move closer to Boston.

⁶ *Paths to a Sustainable Region*, the current Long Range Transportation Plan for the Boston metropolitan region, adopted by the MPO on September 22, 2011

⁷ *Nashua Metropolitan Area Long Range Transportation Plan 2011-2035*; adopted October 20, 2010

⁸ *FY 2013-FY 2040 Regional Transportation Plan, Southern New Hampshire Planning Commission*, October 23, 2012

4.2.2 Business Attraction in New Hampshire

In addition to improved access to Boston’s employment market, transit investment in the corridor may be leveraged to lure businesses into New Hampshire. As discussed in Section 4.3.1, Millennials – the 18- to 34-year olds that will rival the Baby Boomers in size and cultural influence – have repeatedly stated a preference for built environments that support a car-light or car-free urban-style existence. These Millennials are the rising “creative class” – those workers whose career orientation is towards ideas and innovation rather than heavy manufacturing and assembly lines. As businesses, particularly technology-oriented businesses, look for lower-cost alternatives to downtown Boston and more Millennial-friendly environments than in the Route 128 corridor, Capitol Corridor communities can increase their attractiveness through transit investment. Improved connectivity will not only improve access to Boston-based employment, but can draw these “creative class” workers (and the companies that want to hire them) into the New Hampshire corridor.

4.2.3 More Strategic and Efficient Land Use Patterns

Access to the Boston-based employment market and the attraction of businesses into New Hampshire rely on the efficient flow of people between their homes and places of employment. As discussed in Section 4.1, travel demand within the Study corridor is anticipated to increase, which, in the absence of transportation network investment, could lead to increased levels of congestion and decreased levels of mobility. Simply expanding the roadway network is not a solution to this problem – it would likely induce additional demand, which would exacerbate congestion.

While mobility problems are most directly solved by transportation investment, land use plays a critical role in supporting the efficient movement of people and goods. In addition to using transit system investment to expand transportation network capacity, strategic land use planning that focuses higher-density, mixed use development near transit stations can reduce demand on the transportation network by supporting trip efficiencies. This land use pattern is a return to the traditional New England “town-center” style of development.

More efficient land use patterns can also result in employment opportunity expansion closer to home, which could reduce overall demand on the transportation network (because of shorter travel distances) and reduce overall travel times (shorter distances and reduced congestion).

4.3 Sustainability and Quality-of-Life

4.3.1 Sustainability

A sustainable transportation system is one that meets and balances a community’s existing environmental, social, and economic needs without compromising resources for future generations. The following discussion is an overview of the current state of these factors in New Hampshire, and how alternatives developed as part of this Study will address transportation system sustainability.

Environmental

Part of the New Hampshire character is rooted in the state's natural beauty, including its mountain ranges, chains of lakes, sea coast, and protected forest land. Increased levels of development and corresponding growth in transportation network demand may negatively impact these environmental assets unless proactive investments in sustainable infrastructure are pursued.

New Hampshire's Energy, Environmental, and Economic Development Benchmark Report, released by the New Hampshire Energy and Climate Collaborative in 2012, reports on the state's environmental factors. According to the latest report, transportation accounts for 35 percent of the energy use and 46 percent of the Greenhouse Gas (GHG) emissions. Total transportation-related energy consumed and GHG emission rates have remained flat in recent years, even though VMT and per capita VMT have decreased approximately five percent between the peak in 2006 and the most recent data in 2009. At the same time, public transit ridership increased 25 percent between 2000 and 2010.

Because the New Hampshire Capitol Corridor is home to the three largest cities in the state (Concord, Manchester, and Nashua) as well as two major north-south arteries (Route 3 and I-93), transportation network investments that support mode shift from cars to transit are likely to support a decrease in per capita VMT and may support reductions in GHG emissions.

Economic

The New Hampshire Center for Public Policy Studies' *From Tailwind to Headwind: New Hampshire's Shifting Economic Trends*, published in 2012, found that demographic trends in the state are related to economic trends. The report found that the state's economic advantage has traditionally been rooted in three areas: consistent population growth, increased productivity, and a more resilient economy than its competitors. However, data shows that population growth is slowing, labor force participation is declining (due to an aging population), and the rate of growth in educational attainment is slowing.

Like the Baby Boomer generation before them, the sheer size of the Millennial generation, those born between approximately 1982 and 2003, means their preferences will shape every aspect of the country's economy and culture in the coming decades. Communities investing in infrastructure and making policy decisions that are attractive to this generation will be successful in creating an economic framework for sustainable growth. This is particularly important for New Hampshire, which is aging at a higher-than-average rate. A 2013 report by U.S. Public Interest Research Group, *A New Direction: Our Changing Relationship with Driving and the Implications for America's Future*, concluded the following:

- Young people aged 16 to 34 drove 23 percent fewer miles on average in 2009 than they did in 2001— a greater decline in driving than any other age group; the severe economic recession was likely responsible for some of the decline, but not all
- Millennials are more likely to want to live in urban and walkable neighborhoods and are more open to non-driving forms of transportation than older Americans

- If the Millennial-led decline in per capita driving continues for another dozen years, even at half the annual rate of the 2001-2009 period, total vehicle travel in the U.S. could remain well below its 2007 peak through at least 2040 – despite a 21 percent increase in population

The Capitol Corridor is home to one of the largest private employers (BAE Systems) and the largest pool of labor resources. Transit investment within this corridor will provide a lower-cost commuting alternative that links New Hampshire residents with employment opportunities in Boston while increasing New Hampshire's attractiveness as a place to do business.

Social

In his 2012 report *New Hampshire Demographic Trends in the Twenty-First Century*, Kenneth Johnson of the Carsey Institute at the UNH documents four main trends that can be extracted from the most recent census data: New Hampshire's population increase is slowing, New Hampshire's population is aging, the pace of demographic change is uneven in the state, and the state is becoming more diverse. Young adults are migrating to metropolitan cores, family age residents are migrating to suburbs, major metropolitan cores are losing older residents, and rural counties are losing young adults. Many towns in the Capitol Corridor, including Manchester and Nashua, have the largest percentage of population under the age of 18 in the state.

4.3.2 Quality-of-Life

Granite State Future, a statewide project coordinating development of regional plans in each RPC jurisdiction, recognizes the interconnection between development patterns, availability of housing choices, and diversity of transportation choices as a means to preserve natural resources and community vitality and promote energy efficiency. Transit investment within the Capitol Corridor will be a powerful investment that can be leveraged to implement this regional, multi-discipline vision to maintain New Hampshire's high quality-of-life.

5 Goals and Objectives

To determine how well transit and/or intercity passenger rail investment within the Capitol Corridor will address regional and corridor needs, a set of goals, objectives, and evaluation measures have been developed. Goals and objectives, outlined in Table 5.1, build on the work that has been completed or is ongoing within the corridor and region, as described in Sections 1.3 and 3.2. Each goal reflects an understanding of the role that integrated transportation and land use planning can play in supporting an economically, environmentally, and socially sustainable community. Transit investment will be a major step in implementing an integrated planning approach within the Capitol Corridor.

Table 5.1: Capitol Corridor AA Study Goals and Objectives

Goals	Objectives
Transportation and Mobility Leverage the existing transportation network to improve access and mobility within the corridor and throughout the region	<ul style="list-style-type: none"> ▪ Provide alternatives to address congestion within the Study corridor ▪ Expand transit network capacity ▪ Increase transit ridership/mode-share by expanding existing rider base and attracting new riders ▪ Provide travel time savings ▪ Improve transit service efficiency, convenience, and reliability
System Integration Invest in transportation improvements that complement the existing multi-modal transportation network	<ul style="list-style-type: none"> ▪ Increase corridor modal connectivity ▪ Provide connections to other corridors within the region ▪ Increase access to the Manchester Airport through additional transit service ▪ Balance system capacity (MBTA, BX, Concord Coach) ▪ Ensure operating efficiency
Economic Development and Land Use Support the vision for growth laid out in local/regional development plans	<ul style="list-style-type: none"> ▪ Improve access to higher-paying jobs in greater Boston ▪ Support development patterns/lifestyle choices that attract younger, highly educated professionals to New Hampshire ▪ Leverage younger, highly educated employee base to attract new businesses/grow existing ones ▪ Promote TOD to mitigate sprawl development patterns ▪ Improve the potential for additional freight rail business through infrastructure upgrades
Sustainability Support transportation investments that contribute to an environmentally, economically, and socially sustainable community	<ul style="list-style-type: none"> ▪ Leverage existing transportation infrastructure to qualify for federal transportation investment dollars ▪ Mitigate potential adverse environmental impacts resulting from anticipated development ▪ Support growth patterns that attract and retain residents from childhood through retirement ▪ Improve access to other tourism, recreation, and cultural attractions in greater Boston and New Hampshire

5.1 Evaluation Criteria

As the project progresses, a series of evaluation criteria, based on project goals and objectives, will be developed to help determine the degree to which transit investment within the Capitol Corridor would address the project Purpose and Need. This iterative evaluation process will include two progressively more detailed levels of evaluation that use quantitative measures and qualitative assessments, and will likely include the following criteria:

- Conceptual alternatives
 - Capital and operating costs
 - Ridership
 - Land use and economic development
 - Environmental fatal flaws

- Detailed alternatives
 - Capital costs
 - Operations and maintenance (O&M) costs
 - Ridership
 - Transit-supportive land use and economic development
 - Cost effectiveness (using FTA calculations)
 - Benefit cost (using FRA calculations)
 - Environmental impacts
 - Environmental justice

5.2 FTA New/Small Starts Criteria

The project may be seeking discretionary FTA funding through either the New Starts or Small Starts funding programs. Both are highly competitive discretionary programs that require project sponsors to demonstrate, among other project components, a realistic, defensible financial plan to fund the project's capital and O&M costs.

To be eligible for a New Starts grant, total project capital costs must exceed \$250 million and project sponsors must pursue more than \$75 million in federal capital funding assistance. The Small Starts program has been designed to allow comparatively less capital-intensive transit investment projects to participate in a streamlined federal funding review and approval process. Projects with estimated total capital costs of less than \$250 million that are seeking up to \$75 million in federal funding are eligible for review under the streamlined Small Starts project development process.

In accordance with the current federal surface transportation law, called Moving Ahead for Progress in the 21st Century (MAP-21), FTA developed and uses a series of criteria to decide whether applicant projects may advance into project development, and to evaluate and rate projects in support of funding

recommendations. FTA criteria for both the New Starts and Small Starts programs are shown in Figure 5.1 and Figure 5.2.

Figure 5.1: Project Justification (50% of Overall Rating)



Figure 5.2: Local Financing Commitment (50% of Overall Rating)



5.3 FRA Criteria

To advance the Capitol Corridor initiative into the FRA’s “pipeline of future projects,” NHDOT will lead three work activities:

1. Develop a detailed SDP supported by the many stakeholders necessary to develop the service
2. Prepare the environmental analyses and documentation necessary to satisfy National Environmental Policy Act (NEPA) requirements
3. Complete preliminary engineering for all track and signal improvements needed to implement the planned service

The completed SDP will address the following topics:

- **Program Rationale:** A description of the corridor’s transportation challenges and opportunities based on current and forecasted travel demand and capacity conditions. The purpose of an SDP is to show FRA how the proposed service can cost-effectively address transportation and other needs considering system alternatives (bus, highway, etc.). Qualitative and quantitative assessments of each alternative’s costs, benefits, impacts, and risks will provide decision-makers with sufficient information. The SDP might also explore synergies between the intercity passenger rail proposal and large-scale goals and development plans within its service region and communities.
- **Operations:** The operating strategy will be based on a comprehensive and coordinated review of service development options reflecting stakeholder input and perspectives for project success. Without a viable operating strategy no other project element can be successful. Up to three alternative strategies will be developed and reviewed to build the recommended approach. Alternatives will reflect a range of collaboratively developed investments in infrastructure and service that satisfy stakeholder requirements and aspirations.
- **Capital Needs:** A description of the rail equipment and infrastructure improvements for each discrete phase of service implementation, including estimated capital costs, assumptions, and methods; estimated capital expenditures necessary to bring the service to its full operating capability; accommodation of future traffic growth; and ongoing expenditures system component replacement.
- **Operating and Financial Results:** Operating and financial projections for each phase of the planned intercity passenger rail service.
- **Public Benefits:** A description of user and non-user benefits and, to the extent readily quantifiable, the estimated economic value of those benefits.
- **Program Implementation:** An implementation plan that establishes the framework of understandings and agreements and defines the road map to lead the recommended transit strategy from conceptual plan to operating reality.